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MINECK,D.L. Iowa Electric Light & Power Co.
RECIP.NAME RECIPIENT AFFILIATION
DAVIS,A.B. Region 3, Ofc of the Director

SUBJECT: Forwards licensed operator requalification documentation of remedial & enhanced training,per 900713 CAL.

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TITLE: Operator Licensing Examination Reports

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Iowa Electric Light and Power Company
July 20, 1990

NG-90-1791

Mr. A. Bert Davis
Regional Administrator
Region III
U. S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, IL 60137

Re: Duane Arnold Energy Center
Subject: Licensed Operator Requalification
Documentation of Remedial and Enhanced Training
Reference: Confirmatory Action Letter, A.B. Davis to L. Liu, dated July 13, 1990
File: A-204h, A-204t

Dear Mr. Davis:

Please find enclosed copies of the examinations and evaluations in accordance with Item G. of the subject Confirmatory Action Letter (CAL). The enclosed documentation is for the first two crews which received the first 30 hours of the enhanced training required by Item B. of the CAL.

This training, as well as the accelerated remedial training (CAL Item A.) is being conducted in segments of 30 hours and 20 hours. The examinations consist of evaluated simulator scenarios which are attached. Also attached are copies of the Instructor Guide, and Student Guides used during the first segment of enhanced training. In addition to this formal training, operators not in training are observing the simulator training sessions as their schedules allow.

If you have any questions, please contact either myself or Steve Swails, Training Superintendent, at (319)851-7795.

Very truly yours,

Daniel L. Mineck
Manager, Nuclear Generation

DLM/SS

Attachments: listed on Page 2

IE42
1/1

Attachments:
(1) Simulator Evaluation Scenario Guides: ESG-3, ESG-8, ESG-15
(2) Simulator Remedial Scenario Guides: REM 90-1, REM 90-2, REM 90-3, REM 90-4, REM 90-5, REM 90-6, REM 90-7, REM 90-8, REM 90-9
(3) Licensed Operator Requal Exam Preparation
(4) Instructor Guide, Licensed Operator Requal 500-008, IG No. H.10
(5) LOR 500-008, Student Guide TTT.12, "EOP-2, Primary Containment Control"
(6) LOR 500-008, Student Guide TTT.19, "Alternate Level Control"
(7) LOR 500-008, Student Guide TTT.20, "Emergency Depressurization"
(8) LOR 500-008, Student Guide TTT.11, "EOP-1 RPV Control"
(9) LOR 500-008, Student Guide TTT.16, "EOP ATWS"
(10) LOR Remedial Training evaluations for 7/11/90 - 7/13/90 class
(11) LOR Remedial Training evaluations for 7/14/90 - 7/16/90 class

cc: S. Swails w/o
L. Liu w/o
L. Root w/o
R. McGaughy w/o
J.R. Hall (NRC-NRR) w/o
NRC Resident Office w/o
Document Control Desk (original ltr. w/a)
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NG-90-1791
Att. 1

DUANE ARNOLD ENERGY CENTER

NRC REQUALIFICATION EXAM

SIMULATOR EVALUATION

SCENARIO GUIDE

NUMBER 3

TITLE: Recirc Pump Seal Failure/Small Steam Line Break Inside Containment

DEVELOPED BY: _____ Name _____ 6-19-90 Date

OPERATIONS SUPERVISOR APPROVAL: _____ Name _____ 6/22/90 Date

TRAINING SUPERVISOR APPROVAL: _____ Name _____ 6-20-90 Date

OBJECTIVES

A. TERMINAL OBJECTIVE:

The operator, acting as a member of a shift operating crew, must demonstrate competence in performance of license duties required to protect the public health and safety while operating the plant in accordance with approved instructions and procedures.

B. ENABLING OBJECTIVES:

1. Following a pre-shift brief, each crew member will be able to provide a detailed plant status report to include:
   a. Status of safety-related system, running equipment, and inoperable equipment.
   b. STPs in progress and any existing LCOs.
   c. Pertinent night orders and planned evolutions.
2. Using plant installed instrumentation and plant procedures, as well as information obtained by operating personnel outside the Control Room, the operating crew will correctly diagnose plant problems.
3. The OSS will be able to use appropriate plant procedures to ensure completion of immediate actions and direct subsequent actions as required.
4. When using plant procedures, the NSOE/ANSOE will be able to:
   a. Locate the proper section of the procedure.
   b. Follow the procedure correctly.
   c. Locate and observe installed instrumentation.
   d. Analyze system response.
   e. Direct plant operators (Second ANSOE and Auxiliary Operators).
   f. Inform the OSS when complete.
5. While operating in accordance with the Emergency Operating Procedures, the OSS will:
   a. Identify all EOP entry conditions.
   b. Direct the NSOE/ANSOE to perform required actions for control of reactor power, level, pressure, or containment parameters.
   c. Specify the plant systems to be used to control plant parameters.
   d. Evaluate changes in plant conditions against current actions being taken and make corrections as necessary.
6. When directed by the OSS to perform actions in accordance with the Emergency Operating Procedures, the NSOE/ANSOE will:
   a. Utilize the systems designated by the OSS.

b. Monitor system performance; i.e., pressure flow, etc.

c. Inform the OSS immediately when a system becomes unavailable for further use.

d. Inform the OSS of plant trends in response to actions taken.

7. Given a set of plant conditions, the OSS will be able to comply with the requirements of Technical Specifications and the Administrative Procedures.

8. The OSS will be able to utilize the Emergency Plan to properly:

a. Evaluate plant conditions and determine the emergency classification.

b. Ensure requisite notifications are made.

9. The STA will assist the operating crew as required to:

a. Ascertain that plant response is as predicted in the UFSAR during transients, accidents, and plant emergencies and report abnormalities to the OSS.

b. Provide technical assistance and perform whatever activities are deemed necessary by the OSS because of specific plant conditions.

c. Review the status of inoperable equipment to determine whether the loss of the equipment is a situation addressed by Technical Specifications requiring specific action by the plant staff.

10. The crew members will demonstrate effective communications, exchanging complete and relevant information in order to make team decisions in a timely manner.

11. The NSOE/ANSOE will be able to perform the following operator actions, in response to plant events:

a. Reduce Recirc and insert control rods per the pull sheet to exit forbidden zone.

b. Isolate the "A" Recirc. Pump in response to seal failures.

c. Restore and maintain RPV level using CRD, ECCS and RWCU.

d. Initiate DW sprays to reduce DW temperature below 280°F.

NARRATIVE SUMMARY

The plant is initially operating at approximately 100% power RCIC Inop, 2404 and 2405 shut and tagged. A failure of the #1 seal for a recirculation pump has occurred, coolant leakage remains within limits. Sometime later a gradualfailure of the #2 seal for the same recirculation pump occurs. The crew responds using annunciator response procedures to secure and isolate the recirculation pump but the suction valve fails to close. Procedures for single loop operation are utilized to meet requirements for operating on one recirculation loop. The operators may vent the drywell to reduce pressure.

An unisolable, small water line break occurs inside containment. The leak will pressurize the containment to 2 psig resulting in reactor shutdown and entry into EOP-1 and EOP-2.

The Feed pumps and condensate pumps trip on overload and will not restart on the scram, level control will be with HPCI and CRD injecting.

The scenario is terminated as the crew is cooling down the reactor while maintaining level and has taken steps to control containment parameters.

SIMULATOR SETUP

A. GENERAL INSTRUCTIONS

1. Reset to IC 24, place simulator in RUN.
2. Ensure all annunciators are acknowledged and the plant is stable.

B. LIST OF MALFUNCTIONS

Verify E3 is RDPACC.LT.1460 and Type RMF ESG3

Time	Malf.	Description	ET	TD	SEV	RAMP
t = 0	RR11A	Recirc Pump A Seal #	--	--	100%	
t = 13	RR11B	Recirc Pump A Seal #2			10%	6 min
t = scram	FW09 A&B	'A' & 'B' Feed Pump trips	E3			
t = 0	RC02	RCIC Trip				
t = 30 min or 1.5 to 2 psig Drywell pressure	RR15A	Recirc loop suction break			30%	5 min
t = scram	FW02 A&B	'A' & 'B' condensate pump trip	E3			

C. OVERRIDES

1. Type ROR ESG3

   "A" Recirc Suction Valve Indicating lights Red and Green OFF.

   "A" Recirc Suction Valve HS to OPEN.

LIST OF CRITICAL TASKS

CRITICAL TASKS	RO/SRO
1. Attempt to isolate recirc pump Reduce Recirc flow Close A DISCH Valve Secure Pump Close A DISCH BYP valve Close A SUCT valve	RO/ANSOE (C.0024)
2. Direct required actions for loss of Recirc Pump due to seal failure. Order pump to be isolated Order STP 46F002 started per Tech Specs	SRO (C.0020)
3. Direct actions per EOP 1 a. Enter EOP 1 on <u>all</u> entry conditions b. Direct level restoration to 170-211 (ensure level does not rise above 250")	SRO (TTT.0011)
4. Restore RPV level 170-211 using CRD and ECCS and RWCU for draining a. RPV level does not exceed 250".	RO/NSOE (TTT.0011)
5. Direct actions per EOP 2 a. Enter EOP 2 on DW HI Press, DW HI Temp b. Direct initiation of torus spray and/or DW spray to reduce containment pressure prior to pressure reaching pressure suppression pressure limit. c. Direct DW sprays be initiated prior to reaching DW temp of 280°F if meet conditions d. If exceed 280° Emergency Depressurize	SRO (TTT.0012)
6. Initiate DW sprays prior to DW temp reaching 280°F when directed a. Satisfy containment spray logic b. Start RHR pump c. Open Inboard and Outboard DW spray valves	RO/NSOE (TTT.0012)
7. EAL declaration B-1 (LOCA > 50 gpm but within makeup)	SRO (UUU.0050)
8. Notify state and county within 15 min., notify NRC within one hour (the NRC notification may not be completed due to scenario time limit). Plant evacuation initiated.	SRO (UUU.0051) (UUU.0052) (UUU.0052)
9. Perform STP 46F002 and reduce power with rods per the pull sheet.	RO/ANSOE
Note: Critical Tasks may be assigned to specific individuals; however, any crew member may perform the task without causing a failure of the assigned individual.	

SHIFT TURNOVER

PLANT CONDITIONS: Reactor power is at 100% and the Plant is near EOL and has just completed a two week mini-outage for MSIV repairs. STP 47D005-W Main Steam Isolation Valve exercise if due. In Day 2 of 7 day for RCIC INOP.

EQUIPMENT STATUS: RCIC INOP. EGM work in progress.

TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED ACTIONS/BEHAVIOR
T_o	When the operators have familiarized themselves with the current plant conditions, direct them to perform 47D005-W Main Steam Isolation Valve Exercise.	Crew commences 47D005-W Main Steam Isolation Valve Exercise.
T = 5 min	Activate malfunction RR11B to initiate failure of #2 seal of "A" recirc pump 10% @360 sec ramp When/as Recirc pump is isolated, insert override for 'A' pump suction valve ROR ESG3. Override of Recirc Suction Valve will prevent closing. If requested respond as SANSOE and report mini purge on both pumps at 4 GPM.	Respond to annunciator (1C04A, D-4) "A" RECIRC PUMP #2 SEAL HI FLOW ▪ Monitor seal pressures - determine #2 seal pressure decreasing ▪ Notify OSS, Operations Supervisor * RO/ANSOE Remove "A" recirc pump from service prior to reaching DW pressure of 2 psig. ▪ Reduce recirc MG set to minimum ▪ Trip recirc pump ▪ Secure mini-purge ▪ Attempt to isolate recirc pump by closing suction, discharge and discharge bypass valves. * SRO/OSS Refer to Tech Spec for single loop operations with no baseline data. ▪ STP 46F002 started ▪ OI 264 used to secure or check pump secured * Respond to increasing Drywell pressure ▪ ARP 1C05B C-5 ▪ Crew may vent the containment per OI 573

TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED ACTIONS/BEHAVIOR
	Instructor verify rods are inserted as per the pull sheet RSCS Group 8; rods 18-27, 26-27, 26-19 and 18-19 should be inserted one notch at a time while maintaining "GROUP NOTCH CONTROL", no penalty if rod "double notches" as long as crew identifies and corrects.	Perform ARP (1C04A, A-4) "A" RECIRC MG DRIVE MOTOR TRIP ▪ Monitor APRM recorders for indication of reactor instability. If unstable (at least 1 APRM exhibit peak-to-peak swings greater than 10% and increasing trend in applitude of swings) manually scram. ▪ *RO/ANSOE Insert control rods per pull sheet to exit single loop forbidden region ▪ Insert rods as per pull sheet. DO NOT USE CRAM GROUP ▪ Perform forward/reverse flow determination ▪ Plot to verify outside forbidden region ▪ Perform APRM gain adjustment ▪ Evaluate thermal limits ▪ Determine APRM/LPRM noise
T = 30 mim or @ HI DW PRESS ALARM (1.5 psig) and before 2 psig Drywell pressure	Activate malfunction RR15A at 30% 5 min ramp Recirc Line Break Inside the Primary Containment if necessary to maintain Drywell pressure for spraying Drywell or depressurizing reactor.	Respond to annunciator (1C05B, C-5) PRIMARY CONTAINMENT HI/LO PRESSURE ▪ Monitor to determine high pressure exists ▪ Check well water operating ▪ Vent the containment per OI 573 if desired ▪ Verify proper operation of nitrogen makeup system OI 573 (CV-4312 and 4313 closed)

TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED ACTIONS/BEHAVIOR
DW Press 2 psig 30% line break		When it becomes evident that drywell pressure increase cannot be kept below 2 psig ▪ Reduce recirculation flow to minimum (not a requirement) ▪ Manually scram reactor Perform immediate actions reactor scram IPOI 5 ▪ Verify all control rods fully inserted ▪ Place the mode switch in SHUTDOWN ▪ Control feedwater to maintain 170"-211" ▪ Verify non-essential bus 1A1 and 1A2 transfers to Startup Transform

TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED ACTIONS/BEHAVIOR
T = 35		* SRO/OSS - When Drywell pressure reaches 2 psig, or as a result of level transient on scram enter EOP-1 * SRO/OSS- EPIP 1.1 for EAL assessment (alert B1) * SRO/OSS - State and county officials notified within 15 min. * SRO/OSS - Plant evacuation - OSS initiates the evacuation alarm. Verify isolations, ECCS initiations, SBDG initiations * RO/ANSOE - Restore and maintain RPV level 170-211 (less than 250" ▪ CRD * RO/NSOE - HPCI - use HPCI to control vessel level ▪ Verify open CV-4371A (RC/P-2) ▪ Maintain cooldown rate of less than 100°F/hr ▪ May require securing steam loads in an attempt to control rate ▪ Secure equipment not required for adequate core cooling - HPCI, CS, SBDG * OSS/SRO - When Drywell pressure reaches 2 psig (or other entry condition met) enter EOP-2 ▪ Place all available RHR pumps not required if adequate core cooling in torus cooling. ▪ Operate all available drywell cooling ▪ Initiate torus sprays as directed to control primary containment pressure * RO/NSOE - Initiate drywell sprays prior to reaching 280°F to control primary containment pressure and temperature, when directed.

TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED ACTIONS/BEHAVIOR
T = 50 min	When the reactor is shutdown with water level and pressure under control, drywell/torus parameters improving under control, and the OSS has addressed the Emergency Plan actions, terminate the scenario by placing the simulator in freeze.	When RPV pressure reaches 450# Injection Valves MO2003 and MO2004 will open and LPCI will inject. OSS should direct the "A" loop be secured and the cross tie closed to ensure vessel overfill does not occur.

REFERENCES

PROCEDURE	SECTION	PROCEDURE REVISION
Operating Instructions		
OI 149 (RHR)	5.4	14
OI 264 (RECIRC	7.1	9
Integrated Plant Operating Instructions		
IPOI 3	4.0	6
IPOI 5	3.2	4
Annunciator Response Procedures		
1C04A	A-5	6
1C04A	A-4	6
1C04A	D-5	6
1C05B	C-5	10
Emergency Operating Procedures		
EOP 1	RL/L, RCIP	0
EOP 2	DW/T, PCIP	0
Emergency Plan		
EPIP	I.1, I.2, I.3	55
Surveillance Test Procedures		
STP 46F002		0

Failure of #1 Seal for "A"("B") Recirc Pump

ENTRY CONDITION: Annunciator "A"("B") Recirc Pump Seal Staging HI/LO Flow		
K/A System/Evolution	Ability No.	RO/SRO
202001 Recirculation System	A1.09 A1.10 A2.02 A2.10 A3.04 A4.11 SG #9 SG #12	3.3/3.3 2.6/2.7 2.7/3.9 3.5/3.9 3.2/3.1 3.2/3.3 3.8/3.5 3.6/3.3

DAEC TASKS

ENTRY CONDITION: Annunciator "A"("B") Recirc Pump Seal Staging HI/LO Flow		
DAEC System	RO Task No.	SRO Task No.
Recirc (C)	C.0011 C.0020 C.0024	C.0011 C.0020 C.0024

Failure of #2 Seal for "A"("B") Recirc Pump with #1 Seal Previously Failed

ENTRY CONDITION: Annunciator "A"("B") Recirc Pump #2 Seal HI/LO Flow		
K/A System/Evolution	**Ability No.**	**RO/SRO**
202001 Recirculation System	A1.09	3.3/3.3
	A2.02	3.7/3.9
	A2.10	3.5/3.9
	A3.04	3.2/3.1
	A4.01	3.7/3.7
	A4.02	3.5/3.4
	A4.03	4.1/4.1
	A4.[illegible]1	3.7/3.7
	A4.09	3.7/3.7
	A4.11	3.2/3.3
	A4.12	3.9/3.8
	SG #9	3.8/3.5
	SG #10	3.5/3.7
	SG #11	3.4/4.2
	SG #12	3.6/3.3
	SG #13	3.6/3.4
202002 Recirculation Flow Control System	A4.01	3.3/3.1
	A4.04	3.8/3.8
	A4.05	3.4/3.4
	A4.07	3.3/3.2
	A4.08	3.3/3.3
	A4.09	3.2/3.3
	SG #12	3.5/3.3

DAEC TASKS

ENTRY CONDITION: Annunciator "A"("B") Recirc Pump Seal Staging HI/LO Flow		
DAEC System	RO Task No.	SRO Task No.
Recirc (C)	C.011 C.012 C.020 C.024	C.020 C.024

ENTRY CONDITION: ARP 1C05B, C-5 Primary Containment HI/LO Pressure Due to Small Steam Line Break Inside Containment		
K/A System/Evolution	**Ability No.**	**RO/SRO**
295010 High Drywell Pressure Abnormal (normal < DW press ≤ 2.0 psig)	AA1.01	3.4/3.5
	AA1.02	3.6/3.6
	AA1.03	2.6/2.6
	AA1.04	3.1/3.0
	AA1.05	3.1/3.4
	AA1.06	3.3/3.5
	AA1.07	3.2/3.4
	AA2.01	3.4/3.8
	AA2.02	3.8/3.9
	AA2.03	3.3/3.6
	SG #6	3.8/3.9
	SG #7	3.6/3.8
	SG #9	3.7/3.6
223001 Primary Containment System and Auxiliaries	A1.02	3.6/3.7
	A1.10	3.4/3.6
	A2.07	4.2/4.3
	A4.07	4.2/4.1
	A4.10	3.2/3.2
202002 Recirculation Flow Control System	A1.01	3.2/3.2
	A1.05	3.6/3.6
	A1.06	3.4/3.3
	A1.07	3.1/3.1
	A4.01	3.3/3.1
	A4.04	3.8/3.8
	A4.05	3.4/3.4
	A4.07	3.3/3.2
	A4.08	3.3/3.3
	A4.09	3.2/3.3
	SG #10	3.3/3.3
	SG #13	3.6/3.4
261000 Standby Gas Treatment System	A1.01	2.9/3.1
	A1.02	3.1/3.2
	A4.04	3.3/3.4
	A4.07	3.1/3.2
	SG #10	3.1/3.3

DAEC TASKS

ENTRY CONDITION: ARP 1C05B, C-5 Primary Containment HI/LO Pressure Due to Small Steam Line Break Inside Containment		
DAEC System	**RO Task No.**	**SRO Task No.**
Recirculation System (C)	C.002	C.002
Containment System (H)	H.0037	H.0037
IPOI (SSS)	SSS.0004	SSS.0004

ENTRY CONDITION: Manual Reactor Scram at Power		
K/A System/Evolution	**Ability No.**	**RO/SRO**
295006 Scram Abnormal	AA1.01	4.2/4.2
	AA1.02	3.9/3.8
	AA1.03	3.7/3.7
	AA1.04	3.1/3.2
	AA1.05	4.2/4.2
	AA1.06	3.5/3.6
	AA1.07	4.1/4.1
	AA2.01	4.5/4.6
	AA2.02	4.3/4.4
	AA2.03	4.0/4.2
	AA2.04	4.1/4.1
	AA2.05	4.6/4.6
	SG #6	4.1/4.2
	SG #10	4.1/4.2
212000 RPS	A1.06	4.2/4.2
	A1.07	3.4/3.4
	A1.08	3.4/3.4
	A1.11	3.4/3.3
	A2.20	4.1/4.2
	A4.01	4.6/4.6
	A4.05	4.3/4.3
	A4.06	4.2/4.1
	A4.07	4.0/3.9
	SG #9	4.2/4.2
	SG #13	4.1/4.1
	SG #14	4.3/4.4
201001 CRD Hydraulic System	A2.04	3.8/3.9
214000 RPIS	A2.02	3.6/3.7
	A3.01	3.4/3.3
245000 Main Turbine Generator	A2.04	3.7/3.8
	A3.01	3.6/3.6
259001 Reactor Feedwater System	A4.05	4.0/3.9
259002 Reactor Water Level Control System	A4.01	3.8/3.6
	A4.03	3.8/3.6
	A4.06	3.1/3.2
215005 APRM/LPRM	A2.04	3.8/3.9
215003 IRM	A4.01	3.3/3.3
	A4.03	3.6/3.4
	A4.06	3.0/2.9
215004 SRM	A4.01	3.9/3.8
	A4.04	3.2/3.2
262001 A.C. Electrical Distribution	A2.01	3.4/3.6
	A3.01	3.1/3.2
	A3.02	3.2/3.3
241000 Reactor/Turbine Pressure Regulating System	A2.17	3.8/3.8
	A2.19	3.8/3.8
	A3.03	2.8/2.7
	A3.08	3.8/3.8

DAEC TASKS

ENTRY CONDITION: Annunciator "A"("B") Recirc Pump Seal Staging HI/LO Flow		
DAEC System	**RO Task No.**	**SRO Task No.**
Recirc (C)	C.002 V.010 V.016	C.002 V.016
Feedwater (BB)	BB.0005 BB.006 BB.0013	KKK.0030
NI's (III)	III.0029 III.0031	KKK.0030 KKK.0008 SSS.004
KKK (RPS)	KKK.0030 KKK.0008	
SSS IPOI's)	SSS.004	

ENTRY CONDITION: Drywell Pressure Above 2 PSIG		
K/A System/Evolution	Ability No.	RO/SRO
295024 High Drywell Pressure Emergency	EA1.01	4.1/4.0
	EA1.03	4.0/3.9
	EA1.04	4.1/3.9
	EA1.05	3.9/4.0
	EA1.06	3.7/3.7
	EA1.07	3.8/3.9
	EA1.10	3.4/3.6
	EA1.14	3.4/3.6
	EA1.15	3.6/3.7
	EA1.19	3.3/3.4
	EA1.20	3.5/3.6
	EA1.21	3.4/3.8
	EA2.01	4.2/4.4
	EA2.02	3.9/4.0
	EA2.03	3.8/3.8
	EA2.04	3.9/3.9
	EA2.08	3.6/4.0
	SG #11	4.3/4.5
	SG #12	3.9/4.5

DAEC TASKS

ENTRY CONDITION: Annunciator "A"("B") Recirc Pump Seal Staging HI/LO Flow		
DAEC System	RO Task No.	SRO Task No.
HPCI	N.0001	N.0001
CS	M.0004	M.0001
RHR	L.002 L.0016 L.0009	L.002 L.0016 L.0009
SBGT	QQ.004	
EOPs (TTT)	TTT.011 TTT.012	TTT.011 TTT.012
Admin (UUU)		UUU.0050 UUU.0052 UUU.0053 UUU.0051

NG-90-1791
Att. 1

DUANE ARNOLD ENERGY CENTER

NRC REQUALIFICATION EXAM

SIMULATOR EVALUATION

SCENARIO GUIDE

NUMBER 8

TITLE: MSL Rupture Outside Primary Containment

DEVELOPED BY:	_____ Name	6-19-90 Date
OPERATIONS SUPERVISOR APPROVAL:	_____ Name	6/22/90 Date
TRAINING SUPERVISOR APPROVAL:	_____ Name	6-22-90 Date

OBJECTIVES

A. TERMINAL OBJECTIVE:

The operator, acting as a member of a shift operating crew, must demonstrate competence in performance of license duties required to protect the public health and safety while operating the plant in accordance with approved instructions and procedures.

B. ENABLING OBJECTIVES:

1. Following a pre-shift brief, each crew member will be able to provide a detailed plant status report to include:
   a. Status of safety-related systems, running equipment, and inoperable equipment.
   b. STPs in progress and any existing LCOs.
   c. Pertinent night orders and planned evolutions.
2. Using plant installed instrumentation and plant procedures, as well as information obtained by operating personnel outside the Control Room, the operating crew will correctly diagnose plant problems.
3. The OSS will be able to use appropriate plant procedures to ensure completion of immediate actions and direct subsequent actions as required.
4. When using plant procedures, the NSOE/ANSOE will be able to:
   a. Locate the proper section of the procedure.
   b. Follow the procedure correctly.
   c. Locate and observe installed instrumentation.
   d. Analyze system response.
   e. Direct plant operators (Second ANSOE and Auxiliary Operators).
   f. Inform the OSS when complete.
5. While operating in accordance with the Emergency Operating Procedures, the OSS will:
   a. Identify all EOP entry conditions.
   b. Direct the NSOE/ANSOE to perform required actions for control of reactor power, level, pressure, or containment parameters.
   c. Specify the plant systems to be used to control plant parameters.
   d. Evaluate changes in plant conditions against current actions being taken and make corrections as necessary.
6. When directed by the OSS to perform actions in accordance with the Emergency Operating Procedures, the NSOE/ANSOE will:
   a. Utilize the systems designated by the OSS.

b. Monitor system performance; i.e., pressure flow, etc.

c. Inform the OSS immediately when a system becomes unavailable for further use.

d. Inform the OSS of plant trends in response to actions taken.

7. Given a set of plant conditions, the OSS will be able to comply with the requirements of Technical Specifications and the Administrative Procedures.

8. The OSS will be able to utilize the Emergency Plan to properly:

a. Evaluate plant conditions and determine the emergency classification.

b. Ensure requisite notifications are made.

9. The STA will assist the operating crew as required to:

a. Ascertain that plant response is as predicted in the UFSAR during transients, accidents, and plant emergencies and report abnormalities to the OSS.

b. Provide technical assistance and perform whatever activities are deemed necessary by the OSS because of specific plant conditions.

c. Review the status of inoperable equipment to determine whether the loss of the equipment is a situation addressed by Technical Specifications requiring specific action by the plant staff.

10. The crew members will demonstrate effective communications, exchanging complete and relevant information in order to make team decisions in a timely manner.

11. The NSOE/ANSOE will be able to perform the following operator actions, in response to plant events:

a. Conducts all rod movement IAW pull sheet.

b. Diagnoses failed Group 1 isolation.

c. Restores and maintains RPV level 170-211.

d. Recognize the stuck rod.

NARRATIVE SUMMARY

The plant is operating at approximately 80% power both condensate and Feed pumps in service. The crew will pull rods per the pull sheet and reactor engineering to increase load line.

The crew will assume the watch and commence pulling rods per the sequance pull sheet. When rod 18-19 is selected it will become stuck. Rod 18-19 can not be moved, this will require Tech Spec evaluation of a stuc/inop control rod per Section 3.3 of Tech Specs.

A leak in the RWCU Heat Exchanger room occurs and MO2700 trips and fails to isolate. The operators will enter EOP-3 and ARP's, reducing power and inserting a scram.

A MSL Rupture Outside Primary Containment occurs producing a Group 1 Isolation with the failure of 'A' line MSIV's to close. The turbine and RFPs may trip on the high level produced by the rapid depressurization. Operator action is needed to restore Feedwater flow, use HPCI/RCIC for pressure control. ESW and RHRSW are placed in service to support RCIC/HPCI operation and torus cooling. The crew begins a controlled cooldown of the reactor, or emergency depressurizes if required.

SIMULATOR SETUP

A. GENERAL INSTRUCTIONS

1. Reset to I.C. 36 (59% power, RWM Step 34)
2. Insert overrides ZDIHPHS2238, ZDIHPHS2239 OPEN
3. Verify rod pull sheet correct and IPOI-3 signal aired in progress

B. LIST OF MALFUNCTIONS

Verify E17 is RDPACC < 1460 or RRNDEM1 < 62 and Type RMF ESG8

Time	Malf.	Description	ET	DEL	SEV.	RAMP
0	MS05A	CV 4412 Group 1 Isolation Fail			100	
0	MS05B	CV 4413 Group 1 Isolation Fail			100	
0	RD02 18-19	18-19 stuck rod				
15	CU10	Leak in Hx room			2	300 sec
30 or MS08 when scram occurs	MS08	HPCI steam line break in tunnel	E17		2%	

C. Remote Functions

HV06 85°
ROR ESG 8
ROR ESG 8a for CUM02700 fail to isolate.

LIST OF CRITICAL TASKS

CRITICAL TASKS	RO/SRO
1. Recognizes stuck control rod a. Tech Spec inop rod determined per 3.3	RO/NSOE SRO
2. Directs required actions IAW EOP 1 a. Enters EOP 1 on low level or hi pressure b. Directs level restoration to 170-211.	SRO
3. Crew verifies isolations and maintains level a. Crew restores and maints RPV level 170-211 1) Level does not exceed 250"	RO/ANSOE RO/ANSOE
4. Crew recognizes EOP 3 entry and direct actions IAW EOP-3 a. Cleanup leak detection EOP-3 entry b. Steam tunnel Hi temperature or Hi radiation EOP-3 entered	SRO
5. Crew recognizes 1 main steam line die not isolate a. Directs action to reduce pressure/cooldown in a normal manner, BPV or SRVs	SRO/RO/ NSOE SRO
6. If Emergency Depressurization is required, Emergency Depressurization directed. a. Reduces pressure/cools down in a normal manner BPVs or SRVs or EPs when directed.	RO/NSOE
7. Crew recognizes all rods did not insert	RO/ANSOE
Note: Specific Critical Tasks may be assigned to specific individuals; however, any crew member may perform the task without causing a failure of the assigned individual.	

SHIFT TURNOVER

PLANT CONDITIONS: Reactor up power in progress pulling rods to increase load line per Reactor Engineering, power ≈80%. Pulling rods to the target rod pattern per IPOI 3.

EQUIPMENT STATUS: No inop equipment.

TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED ACTIONS/BEHAVIOR
T_o	When the operators have familiarized themselves with the current plant conditions, direct power increase by pulling rods. - Respond as SANSOE, when directed to adjust F/D effluent flows.	
		Crew increases power utilizing rods in accordance with IPOI 3 and pull sheet. ▪ Limit step change in power to 5% and overall rate of power change to less than 1% 1 minute.
t≈10	Act as Reactor Engineer and have them place group rods at same position and tell them will investigate. Act as Tech Support and confirm 48 hr. LCO.	*RO/NSOE - Crew recognizes stuck rod. 1. Perform AOP 255.1 for stuck rod. * increase drive pressure * double clutch *SRO/OSS 2. Declare rod inop per TS 3.3 3. STP for inop rod.
t = 15 min	IMF CU10 at 2% 300 sec ramp, ROR ESG 8A Act as SANSOE/ANSOE and inform control breaker will not reset on MO2700 and inform control water coming out under door. Camera cannot see anything. Report steam tunnel temperatures 320° if Steam Tunnel Hi Temp alarms in. INST. NOTE: If reactor scram occurs insert malfunction MS08 2% and continue at t = 35 min.	Crew responds to Hi steam leak and/or hi DT alarm. ARP 1C04B B4 and/or D4 * 1C21 checked *SRO/OSS enters EOP 3 on HI Temp or ΔT * Temp exceeds maximum safe temperature, OSS orders reactor scram. * Manual scram initiated. *RO/ANSOE - If plant scrams note one rod did not go full in. - EOP ATWS not required since TS 3.3 for shutdown margin allows determining plant shutdown.

TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED ACTIONS/BEHAVIOR
T = 30 min	Activate MALF MS08 2% MSL Rupture inside Primary containment.	OSS/SRO - Crew enters EOP-1 on reactor vessel low water level/high pressure following scram and Group 1 Isolation. *OSS/SRO - RC-1 EAL-EPIP 1.1 Alert (B-2) Plant Evacuated - RC-2 Carryout IPOI 5, Reactor Scram, Immediate Actions *RO/ANSOE - RC-4 Verify isolations, manually close CV 4412 and CV 4413 *RO/ANSOE - RC/L-1 Restore and maintain RPV water level 170-211" - RC/P-2 Verify CV 4371A open - RC/P-5 Depressurize/cooldown at less than 100°F/hr - RC/Q-1 Verify all rods inserted - RC/Q-4 Exit RC/Q to IPOI 5 *SRO/OSS - Crew enters EOP-3 on hi temperature or hi rad in steam tunnel. *SRO/OSS - Crew recognizes 1 steam line did not isolate. * Cew begins normal cooldown/depressurization to reduce leak per IPOI-4 or IPOI-5 or * use BPVs or SRVs to control pressure and cooldown. *SRO/OSS - If Emergency Depressurization is required * Verify torus level >4.5 feet * Verify reactor shutdown * Prevent initiation from low pressure systems not required for level control if level goes below 46.5 or drywell pressure is greater than 2 psig. *RO/NSOE - opens 4ADS SRVs when directed. Crew operates plant systems to support EOP activities - ESW - RHR in Torus Cooling - HPCI/RCIC Room Cooling Units - SBGT
t = 50 min	When the reactor is shutdown with water level under control, pressure being intentionally lowered, containment parameters under control, and the OSS has addressed the Emergency Plan Actions, terminate the scenario by placing the simulator in Freeze.	

REFERENCES

PROCEDURE	SECTION	PROCEDURE REVISION
Operating Instructions * OI 255 (CRD) * OI 644 (Feedwater)	3.6	11
Integrated Plant Operating Inst IPOI 3 IPOI 5 IPOI 4	 4.0 3.2	 6 4
Annunciator Response Procedures ARP 1C07B ARP 1C05A 1C04A	 B-2 C-1 D-2 (D-8)	 12 11 6
Emergency Operating Procedures EOP 1 EOP 3	 RC, RC/L, RC/P S/T	 0 0
Emergency Plant Implementing Procedures	1.1, 1.2, 1.3	55
Abnormal Operating Procedures AOP 255.1		

ENTRY CONDITION: Placing Second Reactor Feed Pump in Operation		
K/A System/Evolution	Ability No.	RO/SRO
259001 Reactor Feedwater	A1.01	3.3/3.3
	A1.03	2.8/2.8
	A4.01	3.6/3.5
	A4.02	3.9/3.7
	A4.04	3.1/2.9
	A4.05	4.0/3.9
	A4.07	3.3/3.2
	A4.08	3.3/3.3
	SG #9	3.7/3.5
	SG #10	3.2/3.3
	SG #13	3.6/3.4
259002 Reactor Water Level Control	A1.01	3.8/3.8
	A1.02	3.6/3.5
	A1.04	3.6/3.6
	A1.05	2.9/2.9
	A3.02	3.4/3.4
	A3.04	3.2/3.2
	A4.01	3.8/3.6
	A4.02	3.7/3.6
	A4.03	3.8/3.6
	SG #9	3.8/3.6
	SG #13	3.8/3.5

DAEC TASKS

ENTRY CONDITION: Placing Second Reactor Feed Pump in Operation		
DAEC System	RO Task No.	SRO Task No.
Feedwater (BB)	BB.0018	BB0018

ENTRY CONDITION: Any Auto Reactor Scram Signal - Full Scram		
K/A System/Evolution	**Ability No.**	**RO/SRO**
212000 RPS	A1.06	4.2/4.2
	A1.07	3.4/3.4
	A1.08	3.4/3.4
	A1.11	3.4/3.3
	A2.20	4.1/4.2
	A3.01	4.4/4.4
	A3.03	4.2/4.2
	A3.04	3.9/3.8
	A3.05	3.9/3.9
	A3.07	3.6/3.6
	SG #13	4.1/4.1
	SG #14	4.3/4.4
295006 Scram Abnormal Plant Evolution	AA1.01	4.2/4.2
	AA1.02	3.9/3.8
	AA1.03	3.7/3.7
	AA1.04	3.1/3.2
	AA1.05	4.2/4.2
	AA1.06	3.5/3.6
	AA1.07	4.1/4.1
	AA2.01	4.5/4.6
	AA2.02	4.3/4.4
	AA2.03	4.0/4.2
	AA2.04	4.1/4.1
	AA2.05	4.6/4.6
	AA2.06	3.5/3.8
	SG #6	4.1/4.2
	SG #10	4.1/4.2
	SG #11	4.3/4.5
	SG #12	3.8/4.4

DAEC TASKS

ENTRY CONDITION: Any Auto Reactor Scram Signal		
DAEC System	**RO Task No.**	**SRO Task No.**
IPO1 (SSS)	**SSS.004	**SSS.004
		UUU.018
Admin (UUU)		UUU.027

ENTRY CONDITION: MALF MS04A - MSL "A" Rupture Inside Primary Containment/W MSIV Failure		
K/A System/Evolution	**Ability No.**	**RO/SRO**
239001 Main and Reheat Steam System	A2.04	3.5/3.6
	A2.07	3.8/3.9
	A2.11	4.1/4.3
	A2.12	4.2/4.3
	A3.01	4.2/4.1
	A4.03	3.5/3.5
	A4.04	3.8/3.7
	A4.05	2.7/2.7
	A4.06	3.6/3.8
	A4.07	3.3/3.3
	A4.08	3.7/3.7
	A4.09	3.9/3.9
	A4.10	3.8/3.8
	SG #15	4.2/4.3
223002 PCIS/NSSS	A2.09	3.6/3.7
	A3.01	3.4/3.4
	A3.02	3.5/3.5
	SG #15	4.1/4.3

ENTRY CONDITION:		
K/A System/Evolution	**Ability No.**	**RO/SRO**
295033 HIGH Secondary Containment Temp.	EK1.01 EK1.02 EK3.01 EA1.05 SG #1 SG #2 SG #6 SG #10 SG #11 SG #12	3.6/3.8 3.6/4.0 3.5/3.8 3.7/3.9 3.1/4.0 2.9/4.4 3.8/3.7 3.8/3.6 4.1/4.2 3.6/4.4

DAEC TASKS

ENTRY CONDITION: MALF MS04A - MSL "A" Rupture Inside Primary Containment/W MSIV Failure		
DAEC System	**RO Task No.**	**SRO Task No.**
EOP's (TTT)	TTT.0011 TTT.0020	TTT.0011 TTT.0020
Administrative (UUU)		UUU.0050 UUU.0051 UUU.0052 UUU.0053

NG-90-1791
ATT. 1

Rev. 2, 06/13/90

DUANE ARNOLD ENERGY CENTER

NRC REQUALIFICATION EXAM

SIMULATOR EVALUATION

SCENARIO GUIDE

NUMBER 15

TITLE: ATWS W/SORV

DEVELOPED BY:	Name	Date 6-19-90
OPERATIONS SUPERVISOR APPROVAL:	Name	Date 6/22/90
TRAINING SUPERVISOR APPROVAL:	Name	Date 6-19-90

OBJECTIVES

A. TERMINAL OBJECTIVE:

The operator, acting as a member of a shift operating crew, must demonstrate competence in performance of license duties required to protect the public health and safety while operating the plant in accordance with approved instructions and procedures.

B. ENABLING OBJECTIVES:

1. Following a pre-shift brief, each crew member will be able to provide a detailed plant status report to include:
   a. Status of safety-related systems, running equipment, and inoperable equipment.
   b. STPs in progress and any existing LCOs.
   c. Pertinent night orders and planned evolutions.
2. Using plant installed instrumentation and plant procedures, as well as information obtained by operating personnel outside the Control Room, the operating crew will correctly diagnose plant problems.
3. The OSS will be able to use appropriate plant procedures to ensure completion of immediate actions and direct subsequent actions as required.
4. When using plant procedures, the NSOE/ANSOE will be able to:
   a. Locate the proper section of the procedure.
   b. Follow the procedure correctly.
   c. Locate and observe installed instrumentation.
   d. Analyze system response.
   e. Direct plant operators (Second ANSOE and Auxiliary Operators).
   f. Inform the OSS when complete.
5. While operating in accordance with the Emergency Operating Procedures, the OSS will:
   a. Identify all EOP entry conditions.
   b. Direct the NSOE/ANSOE to perform required actions for control of reactor power, level, pressure, or containment parameters.
   c. Specify the plant systems to be used to control plant parameters.
   d. Evaluate changes in plant conditions against current actions being taken and make corrections as necessary.
6. When directed by the OSS to perform actions in accordance with the Emergency Operating Procedures, the NSOE/ANSOE will:
   a. Utilize the systems designated by the OSS.

b. Monitor system performance; i.e., pressure flow, etc.

c. Inform the OSS immediately when a system becomes unavailable for further use.

d. Inform the OSS of plant trends in response to actions taken.

7. Given a set of plant conditions, the OSS will be able to comply with the requirements of Technical Specifications and the Administrative Procedures.

8. The OSS will be able to utilize the Emergency Plan to properly:

a. Evaluate plant conditions and determine the emergency classification.

b. Ensure requisite notifications are made.

9. The STA will assist the operating crew as required to:

a. Ascertain that plant response is as predicted in the UFSAR during transients, accidents and plant emergencies and report abnormalities to the OSS

b. Provide technical assistance and perform whatever activities are deemed necessary by the OSS because of specific plant conditions.

c. Review the status of inoperable equipment to determine whether the loss of the equipment is a situation addressed by Technical Specifications requiring specific action by the plant staff.

10. The crew members will demonstrate effective communications, exchanging complete and relevant information in order to make team decisions in a timely manner.

11. The NSOE/ANSOE will be able to perform the following operator actions, in response to plant events:

a. Predict the impact of ADS/LLS valve operation on torus temperature and tailpipe temperature and determine appropriate mitigating actions. (D.02.01)

b. Evaluate plant status and take appropriate action to control RPV water level. (TTT.11.02)

c. Evaluate SBLC condition and determine if system has responded properly to initiation. (O.05.02)

d. Evaluate plant status and take appropriate actions to achieve a shutdown condition. (TTT.16.22)

NARRATIVE SUMMARY

When shift is assumed, Core Spray pump trips during STP 45A001-LCO. The operators check Tech Specs to verify operability. Then PSV 4407 fails open. The crew attempts to close PSV 4407 but is unable to. When a reactor scram is attempted, the crew will not be able to scram and enters ATWS-EOP. The resulting torus heatup will force the crew to inject with SBLC and perform power level control. The loss of both CRD pumps will not allow the rods to be manually inserted. The reactor can only be scrammed by depressurizing RPS scram air headers. ATWS EOP and EOP-2 procedures are entered and the scenario will be secured after the reactor is shutdown, RPV level is stabilized, and torus cooling is established.

SIMULATOR SETUP

A. GENERAL INSTRUCTIONS

1. Reset to IC 25.
2. Tagout 'B' RHR, 'C' Well Water, and 'A' CRD pump.
3. Place 'A' RHR in torus cooling; ensure 'A' ESW pump running.
4. Override recirc hi temp alarm and Aux xfmr alarms off, IC04A D-6 and IC08B C-5.

B. SCENARIO SPECIFIC INSTRUCTIONS

1. Use bad lite bulbs for lites on all tagg. . pumps.
2. RHR pump inop package done except for core spray.

C. LIST OF MALFUNCTIONS

Verify E 5 is RPDI Shutdown .EQ. true

Type RMF ESG 15

Time	Malfunction No.	Malfunction Title	ET	Delay	F. Sev.	Ramp	I. Sev
t = 0	SW21C	'C' Well Water Pump Trip					
t = 0	RH01B	RHR Pump Trip					
t = 0	RP05A	RPS Auto Scram Fail					
t = 0	RP05B	RPS Manual Scram Fail					
t = 0	RP05C	ATWS ARI Fail					
t = 0	AD01H	PSV 4407 Fails Open			100%	3:00	
t = 0	RP05D	RPS Fuse					
Note: Insert after directed to and power < 5%							
t = 20	RD13	Loss of RPS Air			100%	5:00	
t = 0	RD11A	'A' CRD Pump Trip					
t = scram	RD11B	B CRD Pump Trip	E5				
t = 5	CS01A or B	A or B CS pump trip					

Note: When directed to bypass MSIV Lo-Lo-Lo, type in ror defeat 5. rmf defeat 5a and rmf defeat 5b can be used if all MSIV isolations are to be bypassed.

D. LIST OF OVERRIDES

* When PSV 4407 fuses simulated pulled, TYPE ROR PSV7
* TYPE in ROR ESG 15
* ROR Defeat 5 for MSIV Lo-Lo-Lo level isolation override

LIST OF CRITICAL TASKS

CRITICAL TASKS	RO/SRO
1. Perform required actions for SRV Tailpipe Hi Press. alarm a. Reduce Recirc to minimum and manually scram reactor	RO/NSOE D.0002
2. Direct required actions for EOP 1 a. Enter EOP 1 initially on RPS failure b. Exit EOP 1 and enter ATWS EOP after IPOI 5 performed c. Upon re-entering EOP 1, direct level restoration to 170-211"	SRO TTT.0011
3. Restore RPV level as directed by OSS while in EOP 1 a. Level does not exceed 250"	RO/ANSOE TTT.0011
4. Direct required actions for ATWS-EOP a. Inject with SBLC prior to torus water temp. reaching 110°F b. Secure injection except CRD and Boron when Continuous Recheck met, monitor level > 15" c. Override MSIV Lo-Lo-Lo isolation	SRO TTT.0016
5. Manually inject with SBLC when directed	RO/ANSOE O.0005
6. Maintain RPV level during ATWS as directed. a. Level does not fall below -30 inches	RO/ANSOE TTT.0016
7. Shutdown reactor as directed by OSS. a. Perform EOP-C's as directed	RO/NSOE TTT.0017
8. Direct required actions per EOP-2 a. Enter on torus water temp. > 95°F b. Direct torus cooling (maximize)	SRO TTT.0012
9. Maximize torus cooling as directed. a. Place additional RHR and RHR-SW pumps in operation as directed.	RO/NSOE L.0009
10. Declare EPIP EAL C-9.	SRO UUU.0050
11. Notify State/County within 15 min. Notify NRC within one hour Evacuate Plant (Sound Evac. Alarm)	SRO UUU.0051 UUU.0052
12. Determine Tech Spec operability requirements for one core spray and one RHR pump inop	SRO
Note: Critical tasks may be assigned to specific individuals; however, any crew member may perform the task without causing a failure of the assigned individual.	

SHIFT TURNOVER

PLANT CONDTIONS: EOL Steady State at 100%
Torus Hot at 90°F due to HPCI operability testing.
Plant is immediate 30 day LCO due to bearing replacement on 'B' RHR. Inop package done except for core spray.

EQUIPMENT STATUS: 'B' RHR Inop (bearing replacement)
'C' Well Water Pump Inop (breaker replacement)
'A' CRD pump motor bearing replacement

TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED ACTIONS/BEHAVIOR
t = 0	Crew assumes shift and starts core spray STP 45A001-LCO, SANSOE respond with normal lubricant levels on pumps and pumps check out fine, room coolers are on and air flow is fine, both RHR pumps running.	Oss directs completion of STP 45A001-LCO. Crew starts STP.
t = 5	Insert malfunction CS01A or CS0B depending on first core spray pump started. SANSOE responds with core spray pump and room looks fine. Aux respond with CS overloads tripped.	RO notes core spray pump tripped and informs OSS. * SRO/OSS determines LCO requirements with 1 RHR and 1 CS pump inop.
t = 15	Insert malfunction AD01H at 100% over a 3 minute ramp. When RO has simulated pulling fuses type in * "ROR PSV7" this will: ▪ Override off all SRV tailpipe Hi Press. lights on 1C21 ▪ Override off red and green lights for PSV4407 ▪ Override off amber lights for PSV 4404, 4405, 4406, 4407 ▪ Override off amber lights for 'B' ADS override HS on 1C03	* RO/NSOE Perform required actions for SRV/tailpipe Hi Press. Alarm per ARP 1C31A B-5 and as directed. ▪ Diagnose PSV 4407 open ▪ Cycle affected handswitch ▪ Deenergize PSV 4407 by pulling fuses on 1C45 ▪ Reduce Recirc to minimum ▪ Attempt to manually scram reactor * SRO/OSS Perform required actions for EOP-2 Place torus cooling on service Drain torus level

TIME/NOTES	INSTRUCTOR ACTIVITY	EXPECTED ACTIONS/BEHAVIOR
t = 20	When mode switch taken to shutdown, verify RD11B is active. On 'B' CRD pump Aux report lockout trip on overload. When directed to bypass MS1V Lo-Lo-Lo isolation type in ror defeat5 As any operator/SANSOE respond to depressurize RPS scram air header when directed and when Rx power < 5%. IMF RD13 100 300 sec. ramp When crew attempts to scram using scram test switches, inform them that they are to assume all switches are in TEST. Respond as Radwaste that can take all water sent.	Operators note pump tripped, send SANSOE and Aux to check. * SRO/OSS Perform required actions for EOP 1 Enter EOP 1 due to "Scram required with power above 5% Exit EOP 1 and enter ATWS-EOP * RO/ANSOE restore level as directed by OSS in EOP 1 * RO/ANSOE Perform required actions for ATWS-EOP as directed. Initiate ARI Inject with Boron prior to Boron Injection Initiation Temp (110°F) Lockout ADS Lower RPV level by securing all injection into RPV except SBLC and CRD Stablize RPV pressure < 1055 psig Perform EOP C's as directed. * SRO/OSS Direct actions per EOP-2 if entered * RO/NSOE Maximize torus cooling as directed
t = 30		* SRO/OSS Exit ATWS-EOP and enter EOP 1 after all rods are inserted, restore RPV level to 170-211"
t = 45	When reactor pressure < 700# remove AD01H. Respond as Aux to start hogger. That hogger is ready to start.	* SRO/OSS Declare EPIP EAL B-11 * SRO/OSS Notify State/County within 15 min. Notify NRC within 1 hour * SRO/OSS Initiate Plant evacuation
t = 50	Terminate Scenario, when reactor shutdown, torus water temp is decreasing and EPIP actions have been carried out.	

REFERENCES

PROCEDURE	SECTION	PROCEDURE REVISION
Annunciator Response Procedures	B-5	16
ARP 1C03A	C-1	
Integrated Plant Operating Instructions	3.1, 3.2	4
1POI 5		
Emergency Operating P ocedures	All	0
EOP 1	T/T, T/L	0
EOP 2	All	0
ATWS-EOP	5.0	10
EOP C's		
Emergency Plant Implementing Procedures	1.1, 1.2, 1.3	57
EPIP's		

Stuck Open Relief Valve/DAEC TASKS

ENTRY CONDITION: Stuck Open Relief Valve		
K/A System/Evolution	**Ability No.**	**RO/SRO**
Automatic Depressurization System 218000	A1.01	3.4/3.6
	A1.04	4.1/4.2
	A1.05	4.1/4.1
	A1.06	4.1/4.3
	A3.01	4.2/4.3
	A3.04	3.7/3.8
	A3.05	3.6/3.7
	A3.06	3.9/3.9
	A4.01	4.4/4.4
	A4.08	3.7/3.8
	A4.09	3.9/3.9
	SG 9	4.4/4.1
	SG 12	4.0/3.8
	SG 13	3.9/3.8
	SG 15	4.2/4.4
High Suppression Pool Temp. 295013	AA1.01	3.9/3.9
	AA1.02	3.9/3.9
	AA2.01	3.8/4.0
	SG 6	3.6/3.7
	SG 11	4.1/4.4
	SG 12	3.6/4.2

DAEC TASKS

ENTRY CONDITION: Stuck Open Relief Valve		
DAEC System	**RO Task No.**	**SRO Task No.**
ADS/LLS	D.0006	D.0006
RHR (L)	L.0009	L.0009
EOP's (TTT)	TTT.0012	TTT.0012

ATWS/DAEC TASKS

ENTRY CONDITION: ATWS		
K/A System/Evolution	**Ability No.**	**RO/SRO**
Scram Condition Present and Reactor Power above APRM Downscale or Unknown	EA 1.01 EA 1.03 EA 1.04 EA 1.05 EA 1.06 EA 1.07 EA 1.08 EA 2.01 EA 2.02 EA 2.03 EA 2.04 EA 2.05 EA 2.06 SG 11 SG 12	4.6/4.6 4.1/4.1 4.5/4.5 3.9/4.0 3.6/3.6 4.2/4.3 4.1/4.2 4.3/4.4 4.0/4.1 4.2/4.3 4.0/4.1 4.4/4.7 3.9/4.6

DAEC TASKS

ENTRY CONDITION: ATWS		
DAEC System	**RO Task No.**	**SRO Task No.**
CRD (A)	A.0070 A.0055 A.0059	A.0070 A.0055 A.0059
RPS (KKK)	KKK.0032 KKK.0034	KKK.0032 KKK.0034
EOP's (TTT)	TTT.0016	TTT.0016
ADMIN (UUU)		UUU.0050 UUU.0051 UUU.0052

NG-90-1791
Att. 2

REM 90-1

LEAK OUTSIDE PRIMARY CONTAINMENT

INITIAL CONDITIONS:

IC-20, 100% maximum decay heat

MALFUNCTIONS/OVR:

SW34C RHRSW Pump Trip
MS28A MO-2700 fails to close
CU10 Leakage outside containment
C RHRSW pump lights
MO-2700 indicating lights and handswitches
MS05A MSIV disc failure
MS08 Steam leakage in tunnel

PROCEDURES:

EOP 3, Rev. 0, 06/16/89
STP 47D003, Rev. 0, 08/21/89
OI 734, Rev. 6, 12/15/89
ARP 1C35A C-3, Rev. 7, 10/20/89

ATTACHMENTS:

(1) Shift Turnover Forms
(2) Partially complete STP 47D003
(3) Tag for C RHRSW pump

SUMMARY:

During the performance of STP 47D003, a leak outside primary containment will develop. The operators will be required to execute EOP-3.

COURSE: 500-008 Licensed Operator Requal (1990 Remedial Training)
DURATION: 2 Hrs.
QUALIFICATIONS: 6c, (17c), 33

TERMINAL OBJECTIVE

The student, acting as a member of a shift operating crew, must demonstrate competence in performance of license duties required to protect the public health and safety while operating the plant in accordance with approved instructions and procedures.

ENABLING OBJECTIVES

The students will complete the following objectives listed in the classroom training material:

1. Following a pre-shift brief, each crew member will be able to provide a detailed plant status report to include:
   a. Status of safety-related systems, running equipment, and inoperable equipment.
   b. STPs in progress and any existing LCOs.
   c. Pertinent night orders and planned evolutions.
2. Using plant installed instrumentation and plant procedures, as well as information obtained by operating personnel outside the Control Room, the operating crew will correctly diagnose plant problems.
3. The OSS will be able to use appropriate plant procedures to ensure completion of immediate actions and direct subsequent actions as required.
4. When using plant procedures, the NSOE/ANSOE will be able to:
   a. Locate the proper section of the procedure.
   b. Follow the procedure correctly.
   c. Locate and observe installed instrumentation.
   d. Analyze system response.
   e. Direct plant operators (Second ANSOE and Auxiliary Operators).
   f. Inform the OSS when complete.
5. While operating in accordance with the Emergency Operating Procedures, the OSS will:
   a. Direct the NSOE/ANSOE to perform required actions for control of reactor power, level, pressure or containment parameters.
   b. Specify the plant systems to be used to control plant parameters.
   c. Evaluate changes in plant conditions against current actions being taken and make corrections as necessary.
6. When directed by the OSS to perform actions in accordance with the Emergency Operating Procedures, the NSOE/ANSOE will:
   a. Utilize the systems designated by the OSS.
   b. Monitor system performance; i.e., pressure, flow, etc.
   c. Inform the OSS immediately when a system becomes unavailable for further use.

d. Inform the OSS of plant trends in response to actions taken.

7. Given a set of plant conditions, the OSS will be able to comply with the requirements of Technical Specifications and the Administrative Procedures.

8. The OSS will be able to utilize the Emergency Plan to properly:

   a. Evaluate plant conditions and determine the emergency classification.

   b. Ensure requisite notifications are made.

   c. Complete required log entries (paperwork).

9. The STA will assist the operating crew as required to:

   a. Ascertain the plant response is as predicted in the UFSAR during transients, accidents, and plant emergencies and report abnormalities to the OSS.

   b. Provide technical assistance and perform whatever activities are deemed necessary by the OSS because of specific plant conditions.

   c. Review the status of inoperable equipment to determine whether the loss of the equipment is a situation addressed by Technical Specifications requiring specific action by the plant staff.

10. The crew members will demonstrate effective communications, exchanging complete and relevant information in order to make team decisions in a timely manner.

11. The students will complete the following objectives listed in the Classroom Training Material:

    a. EOP-3 and 4

       TTT 07 Evaluate overall plant status and direct appropriate actions per the EOPs.

       TTT 18 Explain the goal of EOP 3 and relate this goal to the overall strategy of the EOPs.

       TTT 19 Evaluate plant status and take appropriate action for a Primary System Leak into secondary containment.

LIST OF CRITICAL TASKS

CRITICAL TASKS	RO/SRO
Ensure compliance with Tech Spec. 3.7.D	SRO (A OSS)
Directs Rx Scram prior to any max safe operating limit being reached.	SRO (A OSS)
Manually Scram Rx when directed	RO (NSOE)
Direct Emerg. Depress. if two like parameters exceed max safe operating limit.	SRO (A OSS)
Initiate Emerg. Depress. when directed	RO (ANSOE)
Declare EPIP EAL B-2	SRO (A OSS)
Notify State/County within 15 minutes. Notify NRC within one hour.	SRO (B OSS)
Evacuate the plant.	SRO (B OSS)

COMMON TRAINEE ERRORS

1. Does not enter EOP-1 in time.
2. Fails to use bypass valves to depressurize.

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY
I. SIMULATOR INITIAL CONDITION: Reset to IC-20 Insert malfunction SW34C (RHRSW pump trip) and override the pump breaker lights off on IC03. Insert malfunction MS05A at 100% severity. Place simulator in Run.	NOTE: Critical Tasks are indicated by a C next to the Trainee Action.
II. PRE-EXERCISE BRIEFING A. Assign Shift Positions. B. Shift Turnover Information. 1. Give Turnover Forms to students. 2. Initial Conditions. o 100% power o STP 47D003 in progress, all sections requiring jumpers are complete. o C RHRSW is tagged for motor inspection. Day number 3 of LCO.	Conduct shift turnover, board walkdown, and assume shift positions.
III. EXERCISE When requested provide the following information: o Chemistry has shifted conductivity monitoring point. o 2nd Assistant is ready to remove RWCU demins from service. When asked, remove the demins from service using remote functions CU01 and CU02. When RWCU is being restored to service perform the following: o When MO-2700 is open > 75%, override the valve indicating lights off on 1C04 and PC mimic. o Override MO-2700 handswitch to	(RO) Continue with STP 47D003. Remove RWCU from service.

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY
open.	
o Insert malfunction MS 28A (MO-2700 fails to close). o Insert malfunction CU10 (leakage outside primary containment). Ramp from as is to 100% severity over a 30 minute time delay.	(RO) Diagnose loss of power to MO-2700. C(SRO) Ensures compliance with Technical Specification 3.7.D. (RO) Recognize failure of RWCU to isolate as leakage increases.
When requested, provide the following information: o Steam is leaking from RWCU pump room. After Reactor Scram, insert malfunction MS08, Ramp from 0 to 3% over 2 minutes.	(SRO) Recognizes EOP-3 entry condition. C(SRO) prior to reaching any max safe operating limit directs Reactor Scram. C(RO) When directed manually scrams and carries out IPOI-5 actions: o verify rods in o control level o place mode switch in shutdown o complete turbine shutdown o insert IRMs/SRMs (SRO) Direct operators to depressurize through the bypass valves. (RO) Recognizes failure to complete GP 1 isolation. C(SRO) Directs emergency depressurization if two like parameters exceed max safe operating limit. C(RO) Opens 4 ADS SRVs if directed. C(SRO) Declares B2 EAL. C(SRO) Makes appropriate notifications. C(SRO) Initiates plant evacuation.
Terminate Scenario when plant conditions are stable or operators are making preparations for shutdown cooling.	
IV. POST-EXERCISE CRITIQUE **OBTAIN** trainee's self-evaluation, comments, and questions. **REVIEW** learning objectives.	Discuss major problems and questions about the exercise.

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY
REVIEW the exercise using trends of the evolutions; compare trainee responses to malfunctions with correct responses.	
CRITIQUE student and team performance observed during each exercise.	
Reinforce proper individual and team performance.	
Reinforce applicable theory.	
Identify areas for improvement.	
SOLICIT additional questions from students and promote discussion of correct answers.	Participate in discussions.

DEVELOPED BY: _____

Joseph Bennett — Date
SRO Instructor

VALIDATED BY: _____

SRO Instructor — Date

REVIEWED BY: _____

Frank S. Van Etten — Date
Training Supervisor-Operations

REVIEWED BY: _____

Charles R. (Bob) Mick — Date
Operations Supervisor

REVIEWED BY: _____

Robert K. Tucker — Date
Training Supervisor Instructional Standards

APPROVED BY: _____

Stephen L. Swails — Date
Training Superintendent

The difference in signature date vs. revision date is attributed to development/approval process.

NG-90-1791
Att. 2

REM 90-2

LOCA WITH PARTIAL LOSS OF ESSENTIAL POWER AND INSTRUMENT AC

INITIAL CONDITIONS:

IC-20, 100% power max

decay heat

MALFUNCTIONS/OVR:

ED13F Inverter ID15 trouble

RR15A LOCA

ED08C Bus 1A3 fault

MO-1902 HS to close

PROCEDURES:

EOP 1, Rev. 0, 06/16/89

EOP 2, Rev. 0, 06/16/89

RPV/F, Rev. 0, 06/16/89

AOP 301, Rev. 3, 11/20/89

AOP 317, Rev. 10, 06/08/89

ED, Rev. 0, 06/16/89

ATTACHMENTS:

1. Shift turnover forms
2. Drywell leakage calculations

SUMMARY:

A small steam leak will result in a reactor scram. When ECCS are actuated due to high drywell pressure, a loss of one essential bus will occur. Due to the electrical lineup, this will cause a loss of one side of instrument AC. The leak will increase sufficiently to require entry into RPV/F, due to DW temperature and RPV pressure and conditions.

COURSE: 500-008 Licensed Operator Requal (1990 Remedial Training)
DURATION: 2 Hr
QUALIFICATIONS: 6A (17a), 8B (19b), 8d (19d), 24c, 33

TERMINAL OBJECTIVE

The student, acting as a member of a shift operating crew, must demonstrate competence in performance of license duties required to protect the public health and safety while operating the plant in accordance with approved instructions and procedures.

ENABLING OBJECTIVES

1. Following a pre-shift brief, each crew member will be able to provide a detailed plant status report to include:
   a. Status of safety-related systems, running equipment, and inoperable equipment.
   b. STPs in progress and any existing LCOs.
   c. Pertinent night orders and planned evolutions.
2. Using plant installed instrumentation and plant procedures, as well as information obtained by operating personnel outside the Control Room, the operating crew will correctly diagnose plant problems.
3. The OSS will be able to use appropriate plant procedures to ensure completion of immediate actions and direct subsequent actions as required.
4. When using plant procedures, the NSOE/ANSOE will be able to:
   a. Locate the proper section of the procedure.
   b. Follow the procedure correctly.
   c. Locate and observe installed instrumentation.
   d. Analyze system response.
   e. Direct plant operators (Second ANSOE and Auxiliary Operators).
   f. Inform the OSS when complete.
5. While operating in accordance with the Emergency Operating Procedures, the OSS will:
   a. Direct the NSOE/ANSOE to perform required actions for control of reactor power, level, pressure or containment parameters.
   b. Specify the plant systems to be used to control plant parameters.
   c. Evaluate changes in plant conditions against current actions being taken and make corrections as necessary.
6. When directed by the OSS to perform actions in accordance with the Emergency Operating Procedures, the NSOE/ANSOE will:
   a. Utilize the systems designated by the OSS.
   b. Monitor system performance; i.e., pressure, flow, etc.
   c. Inform the OSS immediately when a system becomes unavailable for further use.
   d. Inform the OSS of plant trends in response to actions taken.

7. Given a set of plant conditions, the OSS will be able to comply with the requirements of Technical Specifications and the Administrative Procedures.

8. The OSS will be able to utilize the Emergency Plan to properly:

   a. Evaluate plant conditions and determine the emergency classification.

   b. Ensure requisite notifications are made.

   c. Complete required log entries (paperwork).

9. The STA will assist the operating crew as required to:

   a. Ascertain the plant response is as predicted in the UFSAR during transients, accidents, and plant emergencies and report abnormalities to the OSS.

   b. Provide technical assistance and perform whatever activities are deemed necessary by the OSS because of specific plant conditions.

   c. Review the status of inoperable equipment to determine whether the loss of the equipment is a situation addressed by Technical Specifications requiring specific action by the plant staff.

10. The crew members will demonstrate effective communications, exchanging complete and relevant information in order to make team decisions in a timely manner.

11. The students will complete the following objectives listed in the classroom training material:

    a. Main Electrical

       CCC.12 Evaluate loss of any bus(ses) and determine the impact of loss on plant equipment.

       CCC.15 Recognize the difference between loss of equipment due to LOAD SHED and the loss of equipment due to loss of power

       CCC.16 Determine appropriate procedural support for evaluation and operation of electrical busses in normal or abnormal conditions.

       CCC.18 Recognize and respond to any EOP Entry conditions reached as a result of loss of portions of the electrical distribution system.

    b. Instrument AC

       EEE.01 Evaluate plant conditions and recognize a loss of Instrument A.C.

       EEE.02 Determine the effects on plant equipment when Instrument A.C. is lost to either 1Y11 or 1Y21.

       EEE.03 Determine the appropriate actions to take to restore the plant to a safe condition following a loss of Instrument A.C.

    c. RPV/F

       TTT.23 Explain the goal of RPV Flooding and relate the use of RPV F to the overall goals of the EOPs.

       TTT.24 Determine the actions to be taken if adequate core cooling cannot be assured after having attempted injection with all available systems.

LIST OF CRITICAL TASKS:

CRITICAL TASKS	RO/SRO
Direct DW spray prior to reaching 280°F or after torus press exceeds 9 psig if allowed by drywell spray initiation graph.	SRO (A OSS)
Attempt to initiate DW sprays prior to 280°F when directed.	RO (ANSOE)
Direct Emergency Depressurization if DW temp cannot be maintained < 280°F.	SRO (A OSS)
Initiate Emerg. Depress. when directed.	RO (NSOE)
Direct level restoration by establishing minimum flooding pressure and isolating MSIV's, Main Steamline Drains, and RCIC.	SRO (A OSS)
Restore level by injecting with systems as necessary to establish minimum flooding pressure when directed.	RO (ANSOE)
Declare EPIP EAL A1.	SRO (A OSS)
Notify State/County within 15 minutes. Notify NRC within one hour.	SRO (B OSS)
Calculates leakage > 5 gpm and informs OSS.	RO (NSOE)

COMMON TRAINEE ERRORS

1. Does not enter RPV/F
2. Overrides 2/3 core covered interlock

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY

I. SIMULATOR INITIAL CONDITION:

Reset to IC-20

Place simulator in run

Insert malfunction ED13F

Reduce power to 95%

Pump DW sumps and take a set of integrator readings

Override MO-1902 HS closed via override (ori rhhs)

II. PRE-EXERCISE BRIEFING

A. Assign Shift Positions.

B. Shift Turnover Information.

- o 1Y11 is being powered from regulating Transformer (1Y1A) because of work on inverter 1D15.
- o Drywell unidentified leakage has shown a steady increase over last 24 hours. Decision to start shutdown was made about an hour ago. Just got started in 1POI-3 a few minutes ago. Load dispatcher agrees with 3 MWE per minute decrease rate.
- o Need to pump sumps every hour to check leakage.

Conduct shift turnover, and assume shift positions.

III. EXERCISE

(SRO) Directs ROs to continue power reduction per 1POI-3.

Insert malfunction RR15A.

Ramp from 0 to 2% severity over 20 minutes.

(RO) Reduces RECIRC flow

(RO) Notes drywell pressure and

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY
	temperature increase or responds to alarm 1C04 D-2 (Floor drain sump hi leakage).
	C(RO) Calculates leakage at > 5 gpm
	(SRO) Directs ROs to increase rate of shutdown. Recognize Tech Spec. required S/D.
	C(SRO) Declares EAL A-1.
	C(SRO) Notify State, County, NRC.
	(RO) Monitors drywell pressure and temperature increases.
	(SRO) May direct venting per OI 573 Section 6.1 or ARP 1C05B C-5.
	(RO) Vents per OI 573.
When this is directed, set ramp time on RR15A to zero.	(SRO) Directs manual scram.
When core spray pump A automatically starts at 2 psig DW pressure, insert malfunction ED08C (Bus 1A3 fault)	(SRO) Enters EOP-1 and EOP-2 due to high drywell pressure.
When requested, provide the following information:	(SRO) Recognizes loss of 1A3 and 1Y11. Directs actions per AOP 301 Tab 1, and AOP 317 Tab 1.
o At 1A3, the lockout relays for the core spray pump and the bus are both tripped.	(RO) Performs IPOI-5 actions Recognizes failure of a RECIRC pump to runback and trips pump
	(RO) Recognizes loss of instrument air due to loss of power.
	(SRO) Directs use of Torus spray per EOP-2.
	(RO) Initiates Torus spray using B RHR, does not override 2/3 core coverage interlock
	(SRO) Recognize SBDG "A" running with no ESW.
	(RO) Secures "A" SBDG.
NOTE: Operators need to Read T/T and DW/T at Backpanel 1C-29.	C(SRO) Directs use of drywell sprays to maintain drywell temperature < 280°.
After Torus sprays are initiated, increase severity of RR15A to 10% over a 2 minute ramp rate.	(SRO) Does not use bypass valves to depressurize since CIRC water is shutdown.
	C(RO) Attempts to initiate drywell sprays,

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY
	(does not override 2/3 core coverage interlock). C(SRO) Directs opening 4 ADS valves when DW/T cannot be maintained ≤ 280°F or Level < 15". C(RO) Opens 4 ADS valves.
Increase severity of RR15A slowly, as necessary to require RPV/F entry. Do not exceed 20%	(SRO) Enters RPV/F when drywell temp and reactor pressure require. C(SRO) Directs Level restoration by establishing minimum flooding pressure. C(RO) Restores level and establishes min. flooding press.

TERMINATION:

Terminate scenario when plant conditions are stable and RPV/F has been executed.

FREEZE simulator.

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY
IV. POST-EXERCISE CRITIQUE	
OBTAIN trainee's self-evaluation, comments, and questions.	Discuss major problems and questions about the exercise.
REVIEW learning objectives.	
REVIEW the exercise using trends of the evolutions; compare trainee responses to malfunctions with correct responses.	
CRITIQUE student and team performance observed during each exercise.	
Reinforce proper individual and team performance.	
Reinforce applicable theory.	
Identify areas for improvement.	
SOLICIT additional questions from students and promote discussion of correct answers.	Participate in discussions.
VERIFY exercise critique forms complete.	

DEVELOPED BY: _____

Joseph Bennett — Date
SRO Instructor

VALIDATED BY: _____

SRO Instructor — Date

REVIEWED BY: _____

Frank S. Van Etten — Date
Training Supervisor-Operations

REVIEWED BY: _____

Charles R. (Bob) Mick — Date
Operations Supervisor

REVIEWED BY: _____

Robert K. Tucker — Date
Training Supervisor Instructional Standards

APPROVED BY: _____

Stephen L. Swails — Date
Training Superintendent

The difference in signature date vs. revision date is attributed to development/approval process.

NG-90-1791
Att. 2

REM 90-3

ATWS With Stuck Open SRV

INITIAL CONDITIONS:

IC-20 Max Decay Heat

PROCEDURES:

ATWS EOP, Rev. 0, 06/16/89

ARP 1C03A, B-5, Rev. 6, 01/05/90

OP 1, Rev. 2, 07/23/88

OP 5, Rev. 5, 10/03/89

OP 6, Rev. 3, 10/03/89

ATTACHMENTS:

Shift Turnover Forms

OP 1, 5, 6

Tag for A RHRSW heat exchanger outlet valve (MO-2046)

MALFUNCTIONS/OVR:

RP05 A, B, C, D, E RPS failure to scram

AD01 11 PSV 4407 stuck open

RX03 core wide Lasalle event

RD 13 scram air header leak

A RHRSW controller meters

A RHRSW loop flow meter

1C21 SRV tailpipe pressure lights

Amber lights for 4404, 4405, 4406 and 4407

B ADS override amber light

Red and green lights PSV-4407

SUMMARY: During plant operation, an SRV will lift and stick open. Torus temperature will increase and require a reactor scram. The reactor will not scram and boron injection will be required.

COURSE: 500-008 Licensed Operator Requal (1990 Remedial Training)
DURATION: 2 hours
QUALIFICATIONS: 23d, 27b

TERMINAL OBJECTIVE

The student, acting as a member of a shift operating crew, must demonstrate competence in performance of license duties required to protect the public health and safety while operating the plant in accordance with approved instructions and procedures.

ENABLING OBJECTIVES

The students will complete the following objectives listed in the classroom training material:

1. Following a pre-shift brief, each crew member will be able to provide a detailed plant status report to include:
   a. Status of safety-related systems, running equipment, and inoperable equipment.
   b. STPs in progress and any existing LCOs.
   c. Pertinent night orders and planned evolutions.
2. Using plant installed instrumentation and plant procedures, as well as information obtained by operating personnel outside the Control Room, the operating crew will correctly diagnose plant problems.
3. The OSS will be able to use appropriate plant procedures to ensure completion of immediate actions and direct subsequent actions as required.
4. When using plant procedures, the NSOE/ANSOE will be able to:
   a. Locate the proper section of the procedure.
   b. Follow the procedure correctly.
   c. Locate and observe installed instrumentation.
   d. Analyze system response.
   e. Direct plant operators (Second ANSOE and Auxiliary Operators).
   f. Inform the OSS when complete.
5. While operating in accordance with the Emergency Operating Procedures, the OSS will:
   a. Direct the NSOE/ANSOE to perform required actions for control of reactor power, level, pressure or containment parameters.
   b. Specify the plant systems to be used to control plant parameters.
   c. Evaluate changes in plant conditions against current actions being taken and make corrections as necessary.
6. When directed by the OSS to perform actions in accordance with the Emergency Operating Procedures, the NSOE/ANSOE will:
   a. Utilize the systems designated by the OSS.
   b. Monitor system performance; i.e., pressure, flow, etc.
   c. Inform the OSS immediately when a system becomes unavailable for further use.
   d. Inform the OSS of plant trends in response to actions taken.

7. Given a set of plant conditions, the OSS will be able to comply with the requirements of Technical Specifications and the Administrative Procedures.

8. The OSS will be able to utilize the Emergency Plan to properly:

   a. Evaluate plant conditions and determine the emergency classification.

   b. Ensure requisite notifications are made.

   c. Complete required log entries (paperwork).

9. The STA will assist the operating crew as required to:

   a. Ascertain the plant response is as predicted in the UFSAR during transients, accidents, and plant emergencies and report abnormalities to the OSS.

   b. Provide technical assistance and perform whatever activities are deemed necessary by the OSS because of specific plant conditions.

   c. Review the status of inoperable equipment to determine whether the loss of the equipment is a situation addressed by Technical Specifications requiring specific action by the plant staff.

10. The crew members will demonstrate effective communications, exchanging complete and relevant information in order to make team decisions in a timely manner.

11. The students will complete the objectives listed in the classroom training material.

    a. CRD and Hydraulics

       A.05 Determine what conditions exist which warrant Emergency Rod Insertion and the method for emergency rod insertion.

       A.28 Evaluate non-performance of steps in EOP-C and determine the impact on ability to insert control rods.

    b. Recirculation

       C.14 Determine if reactor instability exists and take appropriate corrective action.

       C.16 Explain the reason for initiating a reactor scram following a loss of both recirc pumps.

       C.20 Explain the purpose of the ATWS Channel Trip relative to the reactor recirc pumps.

    c. ATWS EOP

       TTT.21 Explain the goal of each section of the ATWS EOP and relate these goals to the overall EOP strategy.

       TTT.22 Evaluate plant status and take appropriate action to achieve a shutdown condition.

       TTT.42 Evaluate plant conditions and determine appropriate use of EOP-C.

       TTT.41 Determine the impact of use of the sections of EOP-C on the affected equipment.

       TTT.05 Evaluate plant status and take appropriate action for reactor power when all rods are inserted or when all rods are not inserted.

LIST OF CRITICAL TASKS

CRITICAL TASKS	RO/SRO
Direct injection into the vessel be secured except CRD and SBLC. Direct level be maintained in accordance with ATWS level/power criteria.	SRO (A OSS)
Direct Boron injection prior to reaching the Boron Injection Initiation Temperature curve.	SRO (A OSS)
Direct Torus Cooling be maximized.	SRO (A OSS)
Secure injection into the vessel and maintain RPV level as directed.	RO (NSOE)
Inject Boron prior to reaching the Boron Injection Initiation Temperature curve.	RO (NSOE)
Maximize torus cooling when directed.	RO (ANSOE)
Perform Alternate Rod Insertion procedures per EOP C Section 5.0 as directed.	SRO (B OSS)
Declare EPIP EAL C-9.	SRO (A OSS)
Notify State/County within 15 minutes. Notify NRC within one hour.	SRO (B OSS)
Evacuate the plant.	SRO (B OSS)
Recognize that all rods did not fully insert.	RO (NSOE)
Manually drive rods, if directed.	RO (NSOE)

COMMON TRAINEE ERRORS

1. Trips recirc pumps prior to running back
2. Does not recognize SRV going shut
3. Does not inject SBLC in time

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY

I. SIMULATOR INITIAL CONDITION:

Reset to IC-25

Override A RHRSW controller meters to zero (close)

Override A RHRSW loop flow meter to zero

Place RHRSW ΔP controller in manual and fully shut, hang tag on controller

Insert malfunctions RP05A, B, C, D, E (RPS failure to scram).

Insert RFSW08 at close.

Override off alarms for A/B recirc Hi temp and Aux transformer trouble. (1C04A D6, 1C08B C5)

NOTE: Critical tasks are indicated by a C next to the trainee action.

II. PRE-EXERCISE BRIEFING

A. Assign Shift Positions.

B. Shift Turnover Information.

1. Give turnover forms and copies of OP 1, 5, 6 to students

2. Initial Conditions.

   100% power

   OP 1, 5, 6 due

   A RHRSW heat exchanger outlet (MO-2046) operator is being rebuilt. Day 3 of LCO.

Walkdown panels, assume roles, conduct shift briefing.

III. EXERCISE

During OP-1, while one of the turbine stop valves is going shut, insert AD01 H (PSV 4407 stuck open) with an initial severity of 50% ramp to 100% over 5 minutes.

(RO) Commence OP 1, 5, 6

(SRO) Directs response to open SRV in accordance with ARP 1C03A, B-5

- o Cycles control switch

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY
	o Pulls fuses
When RO has simulated pulling fuses for PSV-4407 o Override of all SRV tailpipe high pressure lights on 1C21 o Override off red and green lights for PSV-4407 on 1C04 o Override off amber lights for 4407, 4404, 4405 and 4406 o Override off amber light for B ADS override handswitch on 1C03 (if SRV fuses are reinstalled, delete these overrides) (Type "ROR PSV7")	
	(RO) Recognizes that SRV is still open using tailpipe temperature recorder. (SRO) Directs reactor scram per ATP. C (RO) Recognizes that reactor does not manually scram. (SRO) Enters EOP-1, ATWS EOP and EOP-2 (when torus temperature reaches 95°F) C (RO) Manually drives control rods.
After pumps are tripped, insert malfunction RX03 at 10%	(RO) Ensures recirculation pumps are runback to minimum prior to ARI initiation. (RO) Recognizes instability C (SRO) Orders SBLC injection when directed by EOP Graph 6. C (RO) Injects SBLC when directed. (SRO) Should direct following actions: o Lockout of ADS o Bypass MSIV Lo-Lo-Lo isolation

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY
	o Reduce pressure set to 880 psig o C - Vent scram air header o C - Deenergize scram solenoids
	C (SRO) Directs maximum torus cooling. C (RO) Maximizes torus cooling. C (SRO) Directs lowering of level to reduce power.
If SRO directs venting of air header, wait about 5 minutes and insert malfunction RD 13. Ramp from 0-100% over a 10 minute ramp rate.	C (RO) Maintains level as directed.
When reactor pressure is about 600 psig, remove malfunction AD01 11.	(SRO) When all rods are in, stops SBLC injection.
If directed to repressurize the scram air header, ramp malfunction RD 13 from 100% to 0% over a 5 minute time delay.	(SRO) Exits ATWS EOP (RO) Diagnoses that SRV has gone shut C (SRO) Declares C-9 EAL C (SRO) Makes appropriate EPIP notifications. C (SRO) Initiates plant evacuation.
Terminate scenario when plant conditions are stable with scram reset.	

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY
IV. POST-EXERCISE CRITIQUE	Discuss major problems and questions about the exercise.
OBTAIN trainee's self-evaluation, comments, and questions.	
REVIEW learning objectives.	
REVIEW the exercise using trends of the evolutions; compare trainee responses to malfunctions with correct responses.	
CRITIQUE student and team performance observed during each exercise.	
Reinforce proper individual and team performance.	
Reinforce applicable theory.	
Identify areas for improvement.	
SOLICIT additional questions from students and promote discussion of correct answers.	Participate in discussions.

DEVELOPED BY: _____

Joseph G. Bennett — Date
SRO Instructor

VALIDATED BY: _____

SRO Instructor — Date

REVIEWED BY: _____

Frank S. Van Etten — Date
Training Supervisor-Operations

REVIEWED BY: _____

Charles R. (Bob) Mick — Date
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Robert K. Tucker — Date
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Stephen L. Swails — Date
Training Superintendent

The difference in signature date vs. revision date is attributed to development/approval process.

NG-90-1791
Att. 2

LOCA - Large Line Break Inside Primary Containment

INITIAL CONDITIONS:

IC-14 Full Power Operations

- Power Level 100%
- Xenon 100% equilibrium
- Middle of Core Life
- All systems operable
- Normal working hours

MALFUNCTIONS/OVR:

RR15 Recirc Loop Rupture

MPS; Restore LOCA

PROCEDURES:

- EOP-1, Rev. 0, 06/16/89
- EOP-2, Rev. 0, 06/16/89
- EPIP 1.1, Rev. 9, 09/23/88
- IPOI 5, Rev. 4, 07/27/89
- EPIP 1.1, Rev. 9, 09/23/88

ATTACHMENTS:

1. Shift Turnover forms
2. UFSAR Curves for LOCA

SUMMARY:

During normal plant operations, a large break in the recirc piping occurs. Operators diagnose LOCA and carry out EOPs. This is a design basis LOCA.

COURSE: 500-008 Licensed Operator Requal (1990 Remedial Training)
DURATION: 2 Hours
QUALIFICATIONS: 6b, (17b)

TERMINAL OBJECTIVE

The student, acting as a member of a shift operating crew, must demonstrate competence in performance of license duties required to protect the public health and safety while operating the plant in accordance with approved instructions and procedures.

ENABLING OBJECTIVES

The students will complete the following objectives listed in the classroom training material:

1. Following a pre-shift brief, each crew member will be able to provide a detailed plant status report to include:
   a. Status of safety-related systems, running equipment, and inoperable equipment.
   b. STPs in progress and any existing LCOs.
   c. Pertinent night orders and planned evolutions.
2. Using plant installed instrumentation and plant procedures, as well as information obtained by operating personnel outside the Control Room, the operating crew will correctly diagnose plant problems.
3. The OSS will be able to use appropriate plant procedures to ensure completion of immediate actions and direct subsequent actions as required.
4. When using plant procedures, the NSOE/ANSOE will be able to:
   a. Locate the proper section of the procedure.
   b. Follow the procedure correctly.
   c. Locate and observe installed instrumentation.
   d. Analyze system response.
   e. Direct plant operators (Second ANSOE and Auxiliary Operators).
   f. Inform the OSS when complete.
5. While operating in accordance with the Emergency Operating Procedures, the OSS will:
   a. Direct the NSOE/ANSOE to perform required actions for control of reactor power, level, pressure or containment parameters.
   b. Specify the plant systems to be used to control plant parameters.
   c. Evaluate changes in plant conditions against current actions being taken and make corrections as necessary.
6. When directed by the OSS to perform actions in accordance with the Emergency Operating Procedures, the NSOE/ANSOE will:
   a. Utilize the systems designated by the OSS.
   b. Monitor system performance; i.e., pressure flow, etc.
   c. Inform the OSS immediately when a system becomes unavailable for further use.

d. Inform the OSS of plant trends in response to actions taken.

7. Given a set of plant conditions, the OSS will be able to comply with the requirements of Technical Specifications and the Administrative Procedures.

8. The OSS will be able to utilize the Emergency Plan to properly:

   a. Evaluate plant conditions and determine the emergency classification.

   b. Ensure requisite notifications are made.

   c. Complete required log entries (paperwork).

9. The STA will assist the operating crew as required to:

   a. Ascertain the plant response is as predicted in the UFSAR during transients, accidents, and plant emergencies and report abnormalities to the OSS.

   b. Provide technical assistance and perform whatever activities are deemed necessary by the OSS because of specific plant conditions.

   c. Review the status of inoperable equipment to determine whether the loss of the equipment is a situation addressed by Technical Specifications requiring specific action by the plant staff.

10. The crew members will demonstrate effective communications, exchanging complete and relevant information in order

11. The students will complete the following objectives listed in the classroom training material:

    L.01 Determine which loop has been selected following initiation of LPCI Loop Selection Logic.

    L.03 Explain why wide range level instruments are not reliable during rapid RPV depressurization.

    L.08 Determine any limitations on RHR system realignment following LPCI initiation.

    L.13 Determine Status of plant conditions required to support diversion of water from injection to torus cooling.

    H.09 Evaluate RCIC system indications and determine if system is properly aligned for automatic initiation.

    H.10 Evaluate RCIC system indications and determine if proper automatic initiation has occurred.

    M.01 Evaluate core spray system response to automatic initiation signals and determine actions necessary to properly align system.

    M.02 Evaluate core spray pump parameters (flow, discharge pressure, amps) and take necessary corrective actions to establish proper values based on plant conditions.

    N.01 Evaluate HPCI system indications and determine if proper automatic initiation has occurred.

    TTT.02 Evaluate the status of RPV level instrumentation and take appropriate action to maintain adequate core cooling.

    TTT.03 Evaluate plant status and take appropriate action to control RPV water level.

TTT.06 Verify system isolations, initiations, and actuations.

TTT.07 Evaluate overall plant status and direct appropriate actions per the EOPs.

TTT.08 Identify and explain the transitions to contingency procedures.

TTT.10 Evaluate plant status and take appropriate actions to control primary containment parameters.

TTT.11 Evaluate plant status and determine if use of containment sprays is appropriate.

TTT.16 Evaluate plant status and utilize EOP curves and limits to assist in determining appropriate corrective actions.

TTT.17 Evaluate plant status and determine corrective action if the curves/limits are exceeded.

LIST OF CRITICAL TASKS

CRITICAL TASKS	RO/SRO
Direct DW spray prior to 280°F or after Torus pressure exceeds 9 psig if allowed by DW Spray Initiation graph.	SRO (A OSS)
Initiate DW sprays prior to 280°F when directed.	RO (ANSOE)
Direct Emergency Depressurization if DW temp cannot be maintained < 280°F.	SRO (A OSS)
Initiate Emerg. Depress. when directed.	RO (NSOE)
Direct level restoration by establishing minimum flooding pressure and isolating MSIV's, Main Steamline Drains, and RCIC.	SRO (A OSS)
Restore level by injecting with systems as necessary to establish minimum flooding pressure when directed.	RO (ANSOE)
Declare EPIP EAL B-1.	SRO (A OSS)
Notify State/County within 15 minutes. Notify NRC within one hour.	SRO (B OSS)
Evacuate the plant.	SRO (B OSS)
Direct level restoration to restore RPV level above + 15".	SRO (A OSS)
Restore and maintain RPV level above + 15" but do not allow RPV level to rise above + 250" if MSIV's are open.	RO (ANSOE)

COMMON TRAINEE ERRORS

1. Trainees neglect EOP-2.
2. Trainees do not verify auto initiations. (See Objective #TTT 06)

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY
I. SIMULATOR INITIAL CONDITION: Reset IC-14 MPS; Restore LOCA Place simulator in RUN	NOTE: Critical tasks are indicated by a C next to the Trainee Action.
II. PRE-EXERCISE BRIEFING A. Assign Shift Positions B. Shift Turnover Information: 1. Initial Conditions: 100% Power Xenon 100% equilibrium Middle of Core Life 2. All systems operable. 3. Give shift turnover forms 4. OSS conducts shift briefing with crew.	Conduct shift turnover, board walkdown, and assume shift positions.
III. EXERCISE Allow operators to familiarize themselves with panels. Insert malfunction RR15A (Recirc Loop Rupture) at 70%.	RESPOND to alarms and indications C(SRO) Direct level restoration > 15" per ALC. C(RO) restore level greater than 15" according to ALC. C(SRO) OSS makes EAL assessment B-1, IAW EPIP 1.1. (RO) initiate/verify auto initiation of: Isolations ECCS SBGT SBDGs C(SRO) Directs drywell sprays to control drywell pressure.

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY
NOTE: Expect SRV and SV amber lights on 1C04 when Drywell pressure reaches 25 psig. These are associated with the white lights for high discharge pressure from an S/RV on Panel 1C21.	(RO) control torus water level between 42.5% and 60%. C(RO) maintain drywell temperature/pressure with drywell sprays. (RO) monitor H_2 and O_2 concentrations in the torus and drywell. C(SRO) if drywell temperature exceeds 280° direct ED. C(RO) open 4 ADS valves when directed. C(SRO) if RPV saturation curve exceeded, directs level restoration by establishing minimum flooding pressure. C(RO) injects as necessary to obtain minimum flooding pressure. C(SRO) makes appropriate notifications. C(SRO) initiates plant evacuation.
Terminate exercise once plant is in a stable condition and operators have completed actions for IPOI-5, EOP-1 and EOP-2 and EPIP notifications. FREEZE Simulator.	
IV. POST-EXERCISE CRITIQUE **OBTAIN** trainee's self-evaluation, comments, and questions. **REVIEW** learning objectives. **REVIEW** the exercise using recorder traces of the evolutions; compare trainee responses to malfunctions with correct responses. **CRITIQUE** student and team performance observed during each exercise. Reinforce proper individual and team performance. Reinforce applicable theory Identify areas for improvement **SOLICIT** additional questions from	Discuss major problems and questions about the exercise.

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY
students and promote discussion of correct answers.	
DISCUSS DB LOCA: Double ended shear of recirc suction pipe, this is the largest break for a single failure.	Participate in discussions.
QUESTIONS:	Answer questions.
1. Was the core uncovered? Answer: Yes	
2. Do you expect serious fuel failure to occur? Answer: No. (The ECCS are designed to reflood before fuel failure occurs.)	

DEVELOPED BY: _____

Kye L. Dawald — Date
SRO Instructor

VALIDATED BY: _____

SRO Instructor — Date

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Frank S. Van Etten — Date
Training Supervisor-Operations

REVIEWED BY: _____

Charles R. (Bob) Mick — Date
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REVIEWED BY: _____

Robert K. Tucker — Date
Training Supervisor Instructional Standards

APPROVED BY: _____

Stephen L. Swails — Date
Training Superintendent

The difference in signature date vs. revision date is attributed to development/approval process.

NG-90-1791
Att. 2

REM 90-5

LOSS OF DRYWELL COOLING REQUIRING USE OF DRYWELL SPRAYS

INITIAL CONDITIONS:

IC-25

100% Xenon EOL

98% Core Flow

Summertime Hot Operations (102°F outside)

100% Power

Dayshift

MALFUNCTIONS/OVR:

(RBCCW) MS 33A Group 7 Isolation Valve Fail to Close (MO 4841A)

(RBCCW) MS 33B Group 7 Isolation Valve Fail to Close (MO 4841B)

MS 32 Spurious Group 7 Isolation.

MS 02 Small Steam line break inside containment (5%).

PROCEDURES:

BS-5, Rev. 39, 03/31/89

STP-42A001, Rev. 87, 10/30/89

EOP 1, Rev. 0, 06/16/89

EOP 2, Rev. 0, 06/16/89

EPIP 1.1, Rev. 9, 09/23/88

STP-47D003, Rev. 0, 08/21/89

OI 261 RWCU, Rev. 11, 07/27/89

OI 760 Drywell Cooling, Rev. 04, 10/29/87

EOP-C Defeat 4, Rev. 0, 06/16/89

IPOI-4, Rev. 11, 05/02/89

ARP 1C05B C-5, 11/06/89

ARP 1C25A/B A-4, 03/03/88

P & ID Bech-M143

P & ID Bech-M144

P & ID Bech-M156

P & ID Bech-M157

P & ID Bech-M174

ATTACHMENTS: (1) Shift Turnover forms
(2) Partially completed STP 47D003

SUMMARY:
Operators will complete STP 47D003. A failure during the STP will result in a loss of Drywell cooling, which in conjunction with a small steam leak will force the use of Drywell sprays.

COURSE: 500-008 Licensed Operator Requal (1990 Remedial Training)
DURATION: 2 hours
QUALIFICATIONS: 5(16), 33

TERMINAL OBJECTIVE

The student, acting as a member of a shift operating crew, must demonstrate competence in performance of license duties required to protect the public health and safety while operating the plant in accordance with approved instructions and procedures.

ENABLING OBJECTIVES

The students will complete the following objectives listed in the classroom training material:

1. Following a pre-shift brief, each crew member will be able to provide a detailed plant status report to include:
   a. Status of safety-related systems, running equipment, and inoperable equipment.
   b. STPs in progress and any existing LCOs.
   c. Pertinent night orders and planned evolutions.
2. Using plant installed instrumentation and plant procedures, as well as information obtained by operating personnel outside the Control Room, the operating crew will correctly diagnose plant problems.
3. The OSS will be able to use appropriate plant procedures to ensure completion of immediate actions and direct subsequent actions as required.
4. When using plant procedures, the NSOE/ANSOE will be able to:
   a. Locate the proper section of the procedure.
   b. Follow the procedure correctly.
   c. Locate and observe installed instrumentation.
   d. Analyze system response.
   e. Direct plant operators (Second ANSOE and Auxiliary Operators).
   f. Inform the OSS when complete.
5. While operating in accordance with the Emergency Operating Procedures, the OSS will:
   a. Direct the NSOE/ANSOE to perform required actions for control of reactor power, level, pressure or containment parameters.
   b. Specify the plant systems to be used to control plant parameters.
   c. Evaluate changes in plant conditions against current actions being taken and make corrections as necessary.
6. When directed by the OSS to perform actions in accordance with the Emergency Operating Procedures, the NSOE/ANSOE will:
   a. Utilize the systems designated by the OSS.
   b. Monitor system performance; i.e., pressure flow, etc.
   c. Inform the OSS immediately when a system becomes unavailable for further use.

d. Inform the OSS of plant trends in response to actions taken.

7. Given a set of plant conditions, the OSS will be able to comply with the requirements of Technical Specifications and the Administrative Procedures.

8. The OSS will be able to utilize the Emergency Plan to properly:

   a. Evaluate plant conditions and determine the emergency classification.

   b. Ensure requisite notifications are made.

   c. Complete required log entries (paperwork).

9. The STA will assist the operating crew as required to:

   a. Ascertain the plant response is as predicted in the UFSAR during transients, accidents, and plant emergencies and report abnormalities to the OSS.

   b. Provide technical assistance and perform whatever activities are deemed necessary by the OSS because of specific plant conditions.

   c. Review the status of inoperable equipment to determine whether the loss of the equipment is a situation addressed by Technical Specifications requiring specific action by the plant staff.

10. The crew members will demonstrate effective communications, exchanging complete and relevant information in order to make team decisions in a timely manner.

L 04 Determine if components in RHR system are in correct position/condition based on plant conditions.

L 18 Determine actions necessary to control drywell/torus pressure within specified band.

L 19 Evaluate RHR system/component response to system realignment while preparing to initiate torus/drywell spray.

TTT 02 Evaluate the status of RPV level instrumentation and take appropriate action to maintain adequate core cooling.

TTT 06 Verify system isolations, initiations and actuations.

TTT 07 Evaluate overall plant status and direct appropriate actions per the EOP's.

TTT 08 Identify and explain the transitions to Contingency procedures.

TTT 10 Evaluate plant status and take appropriate actions to control primary containment parameters.

TTT 11 Evaluate plant status and determine if use of containment sprays is appropriate.

TTT 15 Evaluate plant conditions and determine when entry into ED will be required.

TTT 16 Evaluate plant status and utilize EOP curves and limits to assist determining appropriate corrective actions.

TTT 17 Evaluate plant status and determine correction action if the curves/limits are exceeded.

LIST OF CRITICAL TASKS

CRITICAL TASKS	RO/SRO
Direct DW spray prior to reaching 280°F or after torus press exceeds 9 psig if allowed by DW spray initiation graph.	SRO (A OSS)
Initiate DW Sprays prior to 280°F when directed.	RO (ANSOE)
Direct Emergency Depressurization if DW temp cannot be maintained < 280°F.	SRO (A OSS)
Initiate Emerg. Depress. when directed.	RO (NSOE)
Direct level restoration by establishing minimum flooding pressure and isolating MSIV's, Main Steam Line Drains, and RCIC.	SRO (A OSS)
Restore level by injecting with systems as necessary to establish minimum flooding pressure when directed.	RO (ANSOE)
Declare EPIP EAL A1, A7, or B1.	SRO (A OSS)
Notify State/County within 15 minutes. Notify NRC within one hour.	SRO (B OSS)
Evacuate the plant if an alert is declared.	SRO (B OSS)

COMMON TRAINEE ERRORS

1. Failure to enter EOP-1 on High Drywell Pressure of 2.0 psig.
2. Failure to diagnose only a partial Group 7 isolation. Only Well Water Supply and Return close and NOT RBCCW.
3. Trainees forget to shutdown Recirc pumps and drywell fans before initiating drywell sprays.
4. Trainees forget to look at Torus Level (< 13.5 ft) prior to initiating drywell sprays.
5. Trainees forget all isolations, initiations, and auto starts for 2.0 psig. They are per ARP 1C05B C-5:

   RHR pumps auto start

   RHRSW pumps trip if running

   Drywell fans shift to slow speed

   Standby DG's start

   SBGT starts

   River Water Supply valves CV-4914 and CV-4915 open and Radwaste Dilution valves CV-4910A and CV-4910B close.

   Core Spray pumps start

   HPCI initiates

   Groups 2, 3, 4, and 8 isolate for PCIS.

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY
I. SIMULATOR INITIAL CONDITION: Reset 1C-25 MPS; Restore DW.01 Place simulator in RUN Override off A/B recirc Hi temp alarm and Aux transformer trouble alarm. (1C04A D6, 1C08B C5)	NOTE: Critical tasks are indicated by a C next to the trainees action.
II. PRE-EXERCISE BRIEFING A. Assign Shift Positions. B. Shift Turnover Information. 1. Give Turnover Forms to Students 2. Initial Conditions. 3. All systems operable 4. a. Complete STP 47D003 PCIS VALVE Functional TEST(7.12) other sections already signed off.	Conduct shift turnover, board walkdown, and assume shift positions.
III. EXERCISE Insert the following malfunctions prior to RO performing Section 7.12. MS 33A Group 7 Isolation Valve Fails to close (MO 4841A) RBCCW. MS 33B Group 7 isolation valve fails to close (MO 4841B) RBCCW.	Test the PCIS valves per the STP 47D003. 1. Section 7.12 Well Water Supply and Return to Drywell Cooling.
When Step 7.12.1 of STP 47D003 is performed insert: MS 32 Spurious Group 7 Isolation. (Last page of malfunction index) MS 02 (1%) Small Steam Line Break inside Containment. (Insert at DW temp of about 210°, later if entry into ED/RPV F is desired).	(RO) Acknowledge alarms: ARP 1C05B, C-5 "Primary Containment Hi/Lo Press" ARP 1C25A/B A-4 Drywell Cooling Loop A/Loop B overtemp.
Ensure trainees also monitor other	(SRO) Enter EOP-2 on: Primary

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY
EOP-2 parameter especially PC/P during this evolution.	containment High Pressure 2 psig. Also enter EOP-1
Role Play: If students go to back panels to remove fuses FU-10A and FU-10B and lift leads 167 & 168 the isolation still remains in. This would be EOP-C defeat #4. Type "ROR Defeat 4".	(SRO) Begin to monitor and control drywell temp below 150°F using available drywell cooling systems per OI 760. May vent and air purge the drywell.
NOTE: Trainees should have entered EOP-1 on High Drywell Pressure of 2.0 psig.	(SRO) Wait until Drywell temp cannot be maintained below 150°F and then operate all available drywell cooling. Defeat isolation interlocks (EOP-C defeat 4) if necessary.
If SRO directs drywell venting, after vent path is established, insert malfunction ED09H (Fault on 1B32).	(SRO) Begin Reactor shutdown per shutdown IPOI-4 and perform concurrently.
	(SRO) Before drywell temp reaches 280°F direct a reactor scram.
	(RO) Manually scrams if directed.
	(SRO) Check Torus water level below 13.5 ft. and drywell temp. and press. the drywell spray Initiation Limit (Graph 7).
	(RO) Shutdown recirc pumps and drywell fans
	C (RO) Initiate drywell sprays using only RHR pumps not required continuously for adequate core cooling.
	C (SRO) Maintain drywell temp. below 280°F with drywell sprays if in spray curve.
	C (SRO) If drywell temp cannot be maintained below 280°F then enter Emergency Depressurization.
	C (RO) Open 4 ADS SRVs if directed.
* SRO may declare A-1, B-1 or A-7. Discuss reasons for declared EVENT during critique.	C (SRO) Declare EAL
	C (SRO) Make appropriate notifications.
	C (SRO) Evacuate the plant if an alert is declared.

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY
	C (SRO) If RPV saturation curve violated, enters RPV/F and directs injection to minimum flooding pressure.
	C (RO) Injects to establish minimum flooding pressure when directed.
Terminate exercise when reactor conditions, are stable with level restores, and drywell pressure and temperature stable or decreasing with drywell sprays controlling.	
FREEZE: simulator.	
IV. POST-EXERCISE CRITIQUE	Discuss major problems and questions about the exercise.
OBTAIN trainee's self-evaluation, comments, and questions.	
REVIEW learning objectives.	
REVIEW the exercise using trends of the evolutions; compare trainee responses to malfunctions with correct responses.	
CRITIQUE student and team performance observed during each exercise.	
Reinforce proper individual and team performance.	
Reinforce applicable theory.	
Identify areas for improvement.	
SOLICIT additional questions from students and promote discussion of correct answers.	Participate in discussions.
QUESTIONS:	Answer questions.
1. What does defeat-4 of	

EOP-C accomplish?

Answer: Restores drywell cooling and shifts drywell fans to fast speed following a Group 7 isolation signal.

2. What valves are closed on a Group 7 isolation signal?

Answer: RBCCW supply and Return (2 valves) Well Water to drywell cooling supply and return (4 valves).

DEVELOPED BY: _____

Joseph Bennett — Date
SRO Instructor

VALIDATED BY: _____

SRO Instructor — Date

REVIEWED BY: _____

Frank S. Van Etten — Date
Training Supervisor-Operations

REVIEWED BY: _____

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Training Supervisor Instructional Standards

APPROVED BY: _____

Stephen L. Swails — Date
Training Superintendent

The difference in signature date vs. revision date is attributed to development/approval process.

NG-90-1791
Att. 2

REM 90-6

ATWS - Hydraulic Lock

INITIAL CONDITIONS:

IC-20 Max decay heat

MALFUNCTIONS/OVR:

RP05F Hydraulic lock

SW12B B ESW pump trip

RD07 Accumulator Trouble (06-15)

RD08 Rod Scram (02-19)

RP05A RPS fail to scram

TC 12 EHC Fluid Leak

TC06 A/B, Bypass valve failures

Alarm overrides 1C05B, A-2, 1C05B, A-5

B ESW pump lights

PROCEDURES:

OI 358, Rev. 8, 10/11/89

OI 255, Rev. 14, 12/05/89

ATWS EOP, Rev. 0, 06/16/89

ARP 1C07A D-3, Rev. 4, 10/10/89

EOP C, Rev. 8, 11/17/89

ATTACHMENTS:

1. Shift Turnover Forms
2. Tags for B ESW pump, B&D RHR, B Core Spray, B SBDG

SUMMARY:

During a transfer of RPS, a rod will scram due to a failed solenoid valve. The rod's scram outlet valve will continue to leak even after the scram is reset, requiring isolation of the HCV. A loss of EHC will result in a reactor scram, but all rods will not insert due to the scram discharge volumes filling up.

COURSE: 500-008 Licensed Operator Requal (1990 Remedial Training)
DURATION: 2 hours
QUALIFICATIONS: 11B(22 B), 28A, 32A

TERMINAL OBJECTIVE

The student, acting as a member of a shift operating crew, must demonstrate competence in performance of license duties required to protect the public health and safety while operating the plant in accordance with approved instructions and procedures.

ENABLING OBJECTIVES

The students will complete the following objectives listed in the classroom training material:

1. Following a pre-shift brief, each crew member will be able to provide a detailed plant status report to include:
   a. Status of safety-related systems, running equipment, and inoperable equipment.
   b. STPs in progress and any existing LCOs.
   c. Pertinent night orders and planned evolutions.
2. Using plant installed instrumentation and plant procedures, as well as information obtained by operating personnel outside the Control Room, the operating crew will correctly diagnose plant problems.
3. The OSS will be able to use appropriate plant procedures to ensure completion of immediate actions and direct subsequent actions as required.
4. When using plant procedures, the NSOE/ANSOE will be able to:
   a. Locate the proper section of the procedure.
   b. Follow the procedure correctly.
   c. Locate and observe installed instrumentation.
   d. Analyze system response.
   e. Direct plant operators (Second ANSOE and Auxiliary Operators).
   f. Inform the OSS when complete.
5. While operating in accordance with the Emergency Operating Procedures, the OSS will:
   a. Direct the NSOE/ANSOE to perform required actions for control of reactor power, level, pressure or containment parameters.
   b. Specify the plant systems to be used to control plant parameters.
   c. Evaluate changes in plant conditions against current actions being taken and make corrections as necessary.
6. When directed by the OSS to perform actions in accordance with the Emergency Operating Procedures, the NSOE/ANSOE will:
   a. Utilize the systems designated by the OSS.
   b. Monitor system performance; i.e., pressure, flow, etc.
   c. Inform the OSS immediately when a system becomes unavailable for further use.
   d. Inform the OSS of plant trends in response to actions taken.

7. Given a set of plant conditions, the OSS will be able to comply with the requirements of Technical Specifications and the Administrative Procedures.

8. The OSS will be able to utilize the Emergency Plan to properly:

   a. Evaluate plant conditions and determine the emergency classification.

   b. Ensure requisite notifications are made.

   c. Complete required log entries (paperwork).

9. The STA will assist the operating crew as required to:

   a. Ascertain the plant response is as predicted in the UFSAR during transients, accidents, and plant emergencies and report abnormalities to the OSS.

   b. Provide technical assistance and perform whatever activities are deemed necessary by the OSS because of specific plant conditions.

   c. Review the status of inoperable equipment to determine whether the loss of the equipment is a situation addressed by Technical Specifications requiring specific action by the plant staff.

10. The crew members will demonstrate effective communications, exchanging complete and relevant information in order to make team decisions in a timely manner.

11. The students will complete the following objectives listed in the classroom training material:

    a. ATWS EOP

       TTT.03 Evaluate plant status and take appropriate action to control RPV water level.

       TTT.04 Evaluate plant status and take appropriate action to control RPV pressure.

       TTT.07 Evaluate overall plant status and direct appropriate actions per the EOPs.

       TTT.08 Identify and explain the transitions to Contingency procedures.

       TTT.10 Evaluate plant statue and take appropriate actions to control primary containment parameters.

       TTT.17 Evaluate plant status and determine corrective action if the curves/limits are exceeded.

       TTT.21 Explain the goal of each section of the ATWS EOP and relate these goals to the overall EOP strategy.

       TTT.22 Evaluate plant statue and take appropriate action to achieve a shutdown condition.

       TTT.42. Evaluate plant conditions and determine appropriate use of EOP-C.

    b. CRD

       A.05 Determine when conditions exist which warrant emergency rod insertion and the method for emergency rod insertion.

       A.09 Determine how an HCU should be isolated during reactor operation.

A.28 Evaluate non-performance of steps in EOP-C and determine the impact on ability to insert control rods.

A.29 Evaluate CRD system/component status and determine impact on control rod operability.

LIST OF CRITICAL TASKS

CRITICAL TASKS	RO/SRO
Determines control rod inoperability per T.S.3.3.B.	SRO (A OSS)
Direct injection into the vessel be secured except CRD and SBLC. Direct level be maintained in accordance with ATWS level/power criteria.	SRO (A OSS)
Direct Boron injection prior to reaching the Boron Injection Initiation Temperature curve.	SRO (A OSS)
Direct Torus Cooling be maximized.	SRO (A OSS)
Secure injection into the vessel and maintain RPV level as directed.	RO (NSOE)
Inject Boron prior to reaching the Boron Injection Initiation Temperature curve.	RO (NSOE)
Maximize torus cooling when directed.	RO (ANSOE)
Perform Alternate Rod Insertion procedures per EOP-C section 5.0 as directed.	SRO (B OSS)
Declare EPIP EAL B-11.	SRO (A OSS)
Notify State/County within 15 minutes. Notify NRC within one hour.	SRO (B OSS)
Evacuate the plant.	SRO (B OSS)
Recognize that all rods did not fully insert.	RO (NSOE)

COMMON TRAINEE ERRORS

1. Inserts scram prior to SDV alarm clearing
2. Attempt to insert rods by deenergizing RPS
3. Starts B loop RHR pumps with no ESW
4. Forget to prevent HPCI/RCIC injection when lowering level

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY
I. SIMULATOR INITIAL CONDITION: RESET IC-20 Insert malfunction SWI2B (B ESW pump trip) override the pump breaker lights on 1C06 off. Hang warning tags Place simulator in RUN	**NOTE:** Critical tasks are indicated by a C next to the trainee action.
II. PRE-EXERCISE BRIEFING A. Assign Shift Positions. B. Shift Turnover Information. 1. Give turnover forms to students 2. Initial Conditions. o B ESW pump out of service for impeller replacement, Day 2 of LCO o B RPS MG to be inspected for PMAR. Transfer RPS B to alternate source. Inform maintenance when transfer complete.	Conduct shift turnover, board walkdown, and assume shift positions.
III. EXERCISE	
While SRO is conducting the shift brief, insert malfunction RD07 for Rod 06-15 (accumulator trouble)	(SRO) Directs RO to transfer B RPS to alternate source per OI 358. (RO) Responds to alarm
When RPS BUS is transferred, insert malfunction RD08 for Rod 02-19 (rod scrams in)	(RO) Transfers RPS Bus B to alternate

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY
After 1/2 scram is reset, provide the following information when requested: o One scram solenoid valve is cold (A side) and the other scram solenoid is warm (B side) o The scram outlet valve is stuck partially open. o Rod 06-15 trouble alarm is not due to water.	
Insert Malfunction RP05F	(SRO) Diagnoses leakage from scram outlet valve into SDV, orders rod 02-19 isolated.
When directed to isolate the HCU of 02-19, insert malfunction TC 12 (EHC fluid leak) ramp to 100% over 10 minutes.	C(SRO) ensures compliance with Tech Spec 3.3.B. If accumulator on 06-15 cannot be made operable, it must be inserted and reactor shutdown. (RO) Respond to Loss of EHC Fluid per ARP 1C07A, D-3
After scram, call operators, ask if rod 02-19 HCU should still be isolated. If answer is yes, remove malfunction RD 08 for 02-19 and insert malfunction RD 07 (Accumulator Trouble) for Rod 02-19. After TC 12 reaches 100% severity, insert TC06A and B at 0%.	(RO) When reactor scram occurs, performs IPOI 5 actions C - Recognizes all rods not in - Places mode switch in shutdown - Inserts IRM/SRMs and verifies power - Checks main turbine and generator - Controls reactor water level (SRO) Again directs HCU isolation to allow SDV drainage (SRO) Enters ATWS EOP and directs the following: o Lockout of ADS o Bypass of CV-4371A o Initiation of ARI (RO) Carries out SRO orders
If SRO directs defeat 3, type "RMF	(SRO) Directs use of following EOP-C

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY
defeat 3".	methods to insert rods
If SRO attempts to manually drive rods, when asked to shut V-17-24, shut V-17-24 using remote function RD05.	o Reset scram and rescram or o Manually driving control rods (Does not attempt both procedures simultaneously)
	(RO) Waits for alarm 1C05B, A-2 (SDV Hi Level Trip) clear prior to attempting another scram.
	C(SRO) Prior to torus temperature of 110°, directs SBLC initiation.
	C(RO) Initiates SBLC if directed.
	(SRO) When all rods are inserted, exit ATWS EOP.
	C(SRO) Directs maximum torus cooling if torus temp > 95°.
	C(RO) Maximizes torus cooling if directed.
	C(SRO) Directs securing injection to reduce reactor power.
	C(RO) Controls level as directed by ATWS EOP.
	C(SRO) Implements appropriate EOP C to insert rods.
	C(SRO) Declares EAL B-11.
	C(SRO) Makes appropriate notifications.
	C(SRO) Initiates plant evacuation.
Terminate scenario when plant conditions are stable with all rods in.	

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY
IV. POST-EXERCISE CRITIQUE	Discuss major problems and questions about the exercise.
OBTAIN trainee's self-evaluation, comments, and questions.	
REVIEW learning objectives.	
REVIEW the exercise using trends of the evolutions; compare trainee responses to malfunctions with correct responses.	
CRITIQUE student and team performance observed during each exercise.	
Reinforce proper individual and team performance.	
Reinforce applicable theory.	
Identify areas for improvement.	
SOLICIT additional questions from students and promote discussion of correct answers.	Participate in discussions.

DEVELOPED BY: _____

Joseph G. Bennett — Date
SRO Instructor

VALIDATED BY: _____

SRO Instructor — Date

REVIEWED BY: _____

Frank S. Van Etten — Date
Training Supervisor-Operations

REVIEWED BY: _____

Charles R. (Bob) Mick — Date
Operations Supervisor

REVIEWED BY: _____

Robert K. Tucker — Date
Training Supervisor Instructional Standards

APPROVED BY: _____

Stephen L. Swails — Date
Training Superintendent

The difference in signature date vs. revision date is attributed to development/approval process.

NG-90-1791
Att. 2

REM 90-8

Station Blackout (Loss of All AC Power)

INITIAL CONDITIONS:

IC-15 Full Power Operations

Power Level 100%

Xenon 100% Equilibrium

End of Core Life

MALFUNCTIONS/OVR:

ED01 A and B Loss of Offsite Power Sources

DG01B Diesel Generator Fails to Start (1G21)

DG06A Diesel Generator Overspeed Relay Trip (1G31)

ROR TORNADO

MPS; Restore LOOP

PROCEDURES:

IPOI-5, Rev. 4, 07/27/89
AOP 301 Rev. 3, 12/06/89
EPIP 1.1 Rev. 9, 09/23/88
EOP-1 Rev. 0, 06/16/89
EOP-2 Rev. 0, 06/16/89
STP 45G002, Rev. 4, 07/28/89
STP 45G001, Rev. 1, 06/30/89
AOP 903, Rev. 0, 07/20/88

ATTACHMENTS:

1. Shift Turnover Forms
2. STP 45G001
3. STP 45G002
4. Tag for B DG

SUMMARY:

One DG is inop and the other is being tested per the STP. A severe thunderstorm/tornado warning is in effect. A tornado will cause a loss of all offsite power and the running DG will trip. The loss of all AC power will result in an auto scram, turbine trip, and loss of all AC support systems. Primary containment will isolate and relief valves will lift to control pressure. The DC power sources will be available. Loss of D/W cooling will result in elevated D/W temperature which will cause increased pressure and can cause indicated RPV level to read higher than actual level due to reference leg flashing. DW Pressure/Temperature increase may lead to ED or RPV/F. Loss of AC cooling in the HPCI/RCIC rooms may result in system isolation.

COURSE: 500-008 Licensed Operator Requal (1990 Remedial Training)
DURATION: 2 Hrs.
QUALIFICATIONS: 8a, 8f, 19a, 19f

TERMINAL OBJECTIVE

The student, acting as a member of a shift operating crew, must demonstrate competence in performance of license duties required to protect the public health and safety while operating the plant in accordance with approved instructions and procedures.

ENABLING OBJECTIVES

1. Following a pre-shift brief, each crew member will be able to provide a detailed plant status report to include:
   a. Status of safety-related systems, running equipment, and inoperable equipment.
   b. STPs in progress and any existing LCOs.
   c. Pertinent night orders and planned evolutions.
2. Using plant installed instrumentation and plant procedures, as well as information obtained by operating personnel outside the Control Room, the operating crew will correctly diagnose plant problems.
3. The OSS will be able to use appropriate plant procedures to ensure completion of immediate actions and direct subsequent actions as required.
4. When using plant procedures, the NSOE/ANSOE will be able to:
   a. Locate the proper section of the procedure.
   b. Follow the procedure correctly.
   c. Locate and observe installed instrumentation.
   d. Analyze system response.
   e. Direct plant operators (Second ANSOE and Auxiliary Operators).
   f. Inform the OSS when complete.
5. While operating in accordance with the Emergency Operating Procedures, the OSS will:
   a. Direct the NSOE/ANSOE to perform required actions for control of reactor power, level, pressure or containment parameters.
   b. Specify the plant systems to be used to control plant parameters.
   c. Evaluate changes in plant conditions against current actions being taken and make corrections as necessary.
6. When directed by the OSS to perform actions in accordance with the Emergency Operating Procedures, the NSOE/ANSOE will:
   a. Utilize the systems designated by the OSS.
   b. Monitor system performance; i.e., pressure, flow, etc.
   c. Inform the OSS immediately when a system becomes unavailable for further use.
   d. Inform the OSS of plant trends in response to actions taken.

7. Given a set of plant conditions, the OSS will be able to comply with the requirements of Technical Specifications and the Administrative Procedures.

8. The OSS will be able to utilize the Emergency Plan to properly:

   a. Evaluate plant conditions and determine the emergency classification.

   b. Ensure requisite notifications are made.

   c. Complete required log entries (paperwork).

9. The STA will assist the operating crew as required to:

   a. Ascertain the plant response is as predicted in the UFSAR during transients, accidents, and plant emergencies and report abnormalities to the OSS.

   b. Provide technical assistance and perform whatever activities are deemed necessary by the OSS because of specific plant conditions.

   c. Review the status of inoperable equipment to determine whether the loss of the equipment is a situation addressed by Technical Specifications requiring specific action by the plant staff.

10. The crew members will demonstrate effective communications, exchanging complete and relevant information in order to make team decisions in a timely manner.

11. The students will complete the following objectives listed in the classroom training material:

   a. AC Electrical Distribution

      CCC.06 Evaluate the consequences of Droop Switch position on desired SBDG output breaker operation.

      CCC.12 Evaluate loss of any busses and determine the impact of loss on plant equipment.

      CCC.15 Recognize the difference between loss of equipment due to LOAD SHED and the loss of equipment due to loss of power.

      CCC.16 Determine appropriate procedural support for evaluation and operation of electrical busses in normal or abnormal conditions.

      CCC.18 Recognize and respond to any EOP entry conditions reached as a result of loss of portions of the electrical distribution system.

   b. Standby Diesel Generator

      DDD.03 Determine proper rotation of the synchroscope for various paralleling operations.

      DDD.08 Evaluate plant conditions and determine whether SBDG output breaker auto close requirements are satisfied, or which requirements are yet to be satisfied.

      DDD.09 Evaluate plant conditions and determine whether an automatic trip of the SBDG output breaker is required or has occurred.

      DDD.10 Evaluate plant conditions and determine whether requirements to reset SBDG lockout relay have been satisfied, or which requirements are yet to be satisfied.

DDD.11 Explain why the governor is run to its minimum position prior to a slow start.

DDD.12 Evaluate and change generator power factor without exceeding generator ratings while operating the SBDG in parallel with another power supply.

DDD.15 Evaluate plant conditions and determine whether or not the SBDG is operable, and any administrative requirements that must be met

c. Emergency Operating Procedures

TTT.02 Evaluate the status of RPV level instrumentation and take appropriate actions to maintain adequate core cooling.

TTT.03 Evaluate plant status and take appropriate action to control RPV water level.

TTT.04 Evaluate plant status and take appropriate action to control RPV pressure.

TTT.07 Evaluate overall plant status and direct appropriate actions per the EOP's.

TTT.10 Evaluate plant status and take appropriate actions to control primary containment parameters.

TTT.15 Evaluate plant conditions and determine when entry into ED will be required.

TTT.16 Evaluate plant status and utilize EOP curves and limits to assist in determining appropriate corrective actions.

TTT.17 Evaluate plant status and determine corrective action if the curves/limits are exceeded.

LIST OF CRITICAL TASKS

CRITICAL TASKS	RO/SRO
Direct DW spray prior to reaching 280°F or after torus press exceeds 9 psig or when AC power restored, if allowed by DW Spray Initiation Graph.	SRO (A OSS)
Initiate DW sprays prior to 280°F when directed.	RO (ANSOE)
Direct Emergency Depressurization if DW temp cannot be maintained < 280°F.	SRO (A OSS)
Initiates Emerg. Depress. when directed.	RO (NSOE)
Direct level restoration by establishing minimum flooding pressure and isolating MSIV's, Main Steamline Drains, and RCIC.	SRO (A OSS)
Restore level by injecting with systems as necessary to establish minimum flooding pressure when directed.	RO (ANSOE)
Declare EPIP EAL B-9 or B-15.	SRO (A OSS)
Notify State/County within 15 minutes. Notify NRC within one hour.	SRO (B OSS)
Evacuate the plant.	SRO (B OSS)

COMMON TRAINEE ERRORS

1. OSS forgets to upgrade EAL when power is not restored.
2. EOP-2 is not entered due to entry conditions not being recognized due to loss of front panel indications.

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY
I. SIMULATOR INITIAL CONDITION: Reset IC-15 MPS; Restore Loop Place Simulator in RUN Select SPMET1 screen on SPDS and adjust wind speeds from 20 to 40 mph and wind direction slightly using rf 11V1, HV2. Place "B" DG in pull-to-lock and hang warning tag. o Place Droop Switch to Parallel (rf DG10) o Verify Man/Auto Sel. Switch in Auto (rf DG05) o Place "A" DG on 1A3 Bus and fully load it (2850 kw, 490 amps).	NOTE: Critical tasks are indicated by a "C" next to the trainee action.
II. PRE-EXERCISE BRIEFING A. Assign Shift Positions. B. Shift Turnover Information. 1. Give turnover forms to students 2. Initial Conditions. 100% Power Xenon 100% equilibrium end of Core Life 3. "B" DG inop due to work on lube oil system. Inop package done except for "A" DG which is in its 1 hour full load run. (10 minutes at full load.)	Conduct shift turnover, board walkdown, and assume shift positions.
III. EXERCISE **MALFUNCTION:** Loss of offsite Power Sources, and "B" Diesel Generator Fails to Start. - insert after "A" DG fully loaded onto Bus. RMF Loop Black1 (This has a 1 1/2 minute time delay)	Operators perform STP 45G002

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY
(DG01B (none 100))	
(ED01A (none 100))	
(ED01B (none 100))	
ROLE PLAY: Security Report a tornado has been sited and is moving toward DAEC.	Perform AOP 903 Announce tornado Recirc. to minimum Manual scram IPOI 5, IPOI 4
OVERRIDE: Insert 5 seconds before Loop Black1 occurs ROR TORNADO (Will cause loss of indication of offsite sources). IMF DG06A to trip the "A" DG.	Respond to alarms and indications. Recognize station blackout condition and perform actions IAW AOP 301 Tab 4. Perform AOP 301 Tab 3 concurrently. Perform all immediate and follow-up actions IAW IPOI 5.
NOTE: "A" DG Bkr will trip after loss of offsite power. ROLE PLAY: Operator in SBDG room. Cause for "A" DG trip due to overspeed. ROLE PLAY: Unable to reset fuel racks if attempted	Perform appropriate actions from EOP-1. RC/L Maintain water level between 170" and 211" with HPCI and RCIC. RC/P Stabilize pressure below 1055 psig with SRVs, HPCI, or RCIC. RC/Q verify all rods inserted, to at least 02.
ROLE PLAY: Load Dispatcher. Offsite power cannot be regained due to electrical faults in the switchyard that resulted from a severe thunderstorm/tornado.	RC/P Depressurize at less than 100°F/hr.
After DW temp reaches ≈240°F, perform the following: IMF DG06A Reset SDR via rf DG03	Perform appropriate actions from EOP-2. Monitor containment pressure/ temperature. C(SRO) Directs DW spray before 280° if in spray curve and AC power restored. C(RO) Initiate DW spray when directed. C(SRO) Directs ED at 280° (if applicable). C(RO) Open 4 ADS SRV's if directed.

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY
ROLE PLAY: Aux operator reports SDR and fuel racks reset.	C(SRO) Directs level restoration to achieve min. flooding press. per RPV/F (if applicable). C(RO) Restore level as directed. C(SRO) Declare EAL B9 or B15. C(SRO) Notify State/County within 15 minutes. Notify NRC within one hour. C(SRO) Evacuate the plant. Perform Actions from AOP 301: Send an operator locally to the 1A3 Switchgear room and/or DG room to investigate reason for diesel breaker trip. Continue attempts to restore normal AC power Upgrade EAL to C-7, Loss of all AC Power, Restoration not possible within 15 minutes, or C-14 (if exceed 15 minutes).
TERMINATION: Terminate exercise when plant is in a stable, shutdown condition. AC power will be restored to one essential bus. **FREEZE** simulator.	
IV. POST-EXERCISE CRITIQUE **OBTAIN** trainee's self-evaluation, comments, and questions. **REVIEW** learning objectives. **REVIEW** the exercise using trends of the evolutions; compare trainee responses to malfunctions with correct responses. **CRITIQUE** student and team performance observed during each exercise. Reinforce proper individual and team performance. Reinforce applicable theory. Identify areas for improvement.	Discuss major problems and questions about the exercise.
SOLICIT additional questions from	Participate in discussions.

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY

students and promote discussion of correct answers.

QUESTIONS:

Answer questions.

1. How long will the batteries last? Can you extend this?

   Answer: By design 4 hours, can be extended by reducing loads.

VERIFY exercise critique forms complete.

DEVELOPED BY: _____

Tim Page — Date
SRO Instructor

VALIDATED BY: _____

SRO Instructor — Date

REVIEWED BY: _____

Frank S. Van Etten — Date
Training Supervisor-Operations

REVIEWED BY: _____

Charles R. (Bob) Mick — Date
Operations Supervisor

REVIEWED BY: _____

Robert K. Tucker — Date
Training Supervisor Instructional Standards

APPROVED BY: _____

Stephen L. Swails — Date
Training Superintendent

The difference in signature date vs. revision date is attributed to development/approval process.

NG-90-1791
ATT. 2

REM 90-7

RECIRC PUMP TRIP WITH ATWS

INITIAL CONDITIONS:

IC-23

Power Level 75%

MALFUNCTIONS/OVR:

RD13 Scram air header leak

RR06A (B) - Recirc MG Drive Motor Bkr Trip

RR01(2) - A(B) Recirc MG Lockout Relay - reset

ROP5 A, B, C, D, E - Failure to scram

MC04A main condenser air leak

RX03 Core wide LaSalle Event

PROCEDURES:

ARP 1C04A, Rev. 6, 09/26/89

ARP 1C04B, Rev. 10, 01/24/90

IPOI-3, Rev. 6, 05/03/89

OI 264, Rev. 8, 12/07/89

OI 878.4, Rev. 4, 05/04/88

SER 14-88 Scram Caused by Neutron Flux Oscillations

Notice of Violation DAEC 07/06/88

NRC B 88-07 Supl. 1 Power Oscillations

STP 46F001, Rev. 0, 09/05/89

PROCEDURES (CONT.)

STP 46F002, Rev. 0, 09/05/89

STP 42F007, Rev. 0, 10/28/88

Tech. Specs., Rev. 163, 10/89

SOER 84-2 Control Rod Mispositioning.

EOP ATWS Rev. 0, 06/16/89

EOP 2 Rev. 0, 06/16/89

ATTACHMENTS:

(1) Shift Turnover forms

SUMMARY:

During normal plant operation, a Reactor Recirculation Pump trips due to inadvertent isolation of the lube oil pressure switches, causing the Drive Motor Bkr. to trip. Single loop operation is entered and Rx instabilities will occur requiring a Rx Scram. The Reactor will not scram and Boron injection will be required.

COURSE: 500-008 Licensed Operator Requal (1990 Remedial Training)
DURATION: 2 hours
QUALIFICATIONS: 9a

TERMINAL OBJECTIVE

The student, acting as a member of a shift operating crew, must demonstrate competence in performance of license duties required to protect the public health and safety while operating the plant in accordance with approved instructions and procedures.

ENABLING OBJECTIVES

1. Following a pre-shift brief, each crew member will be able to provide a detailed plant status report to include:
   a. Status of safety-related systems, running equipment, and inoperable equipment.
   b. STPs in progress and any existing LCOs.
   c. Pertinent night orders and planned evolutions.
2. Using plant installed instrumentation and plant procedures, as well as information obtained by operating personnel outside the Control Room, the operating crew will correctly diagnose plant problems.
3. The OSS will be able to use appropriate plant procedures to ensure completion of immediate actions and direct subsequent actions as required.
4. When using plant procedures, the NSOE/ANSOE will be able to:
   a. Locate the proper section of the procedure.
   b. Follow the procedure correctly.
   c. Locate and observe installed instrumentation.
   d. Analyze system response.
   e. Direct plant operators (Second ANSOE and Auxiliary Operators).
   f. Inform the OSS when complete.
5. While operating in accordance with the Emergency Operating Procedures, the OSS will:
   a. Direct the NSOE/ANSOE to perform required actions for control of reactor power, level, pressure or containment parameters.
   b. Specify the plant systems to be used to control plant parameters.
   c. Evaluate changes in plant conditions against current actions being taken and make corrections as necessary.
6. When directed by the OSS to perform actions in accordance with the Emergency Operating Procedures, the NSOE/ANSOE will:
   a. Utilize the systems designated by the OSS.
   b. Monitor system performance; i.e., pressure, flow, etc.
   c. Inform the OSS immediately when a system becomes unavailable for further use.
   d. Inform the OSS of plant trends in response to actions taken.

7. Given a set of plant conditions, the OSS will be able to comply with the requirements of Technical Specifications and the Administrative Procedures.

8. The OSS will be able to utilize the Emergency Plan to properly:

   a. Evaluate plant conditions and determine the emergency classification.

   b. Ensure requisite notifications are made.

   c. Complete required log entries (paperwork).

9. The STA will assist the operating crew as required to:

   a. Ascertain the plant response is as predicted in the UFSAR during transients, accidents, and plant emergencies and report abnormalities to the OSS.

   b. Provide technical assistance and perform whatever activities are deemed necessary by the OSS because of specific plant conditions.

   c. Review the status of inoperable equipment to determine whether the loss of the equipment is a situation addressed by Technical Specifications requiring specific action by the plant staff.

10. The crew members will demonstrate effective communications, exchanging complete and relevant information in order to make team decisions in a timely manner.

11. The students will complete the following objectives listed in the classroom training material:

    a. Recirc

       C.03 Evaluate plant conditions and determine if proper response to recirc pump speed changes has occurred.

       C.05 Evaluate recirculation pump performance during initial startup and determine if starting sequence has been correctly completed.

       C.07 Determine reactor loadline using the power to flow map.

       C.09 Determine if temperature requirements for start of an idle recirc pump are met. (One or both pumps)

       C.13 Determine jet pump operability based on relevant plant data.

       C.14 Determine if reactor instability exists and take appropriate corrective action.

       C.15 Evaluate plant conditions and take actions necessary to ensure operations within single loop constraints.

       C.25 Evaluate recirc system parameters and determine if system is in compliance with Tech Specs.

       C.26 Determine if pump speed requirements for restart of an idle loop are met.

LIST OF CRITICAL TASKS

CRITICAL TASKS	RO/SRO
Directs performance of STP 46F002	SRO (A OSS)
Perform STP 46F002 and reduce power with rods using pull sheet.	RO (NSOE)
Direct Reactor Scram due to power oscillation.	SRO (A OSS)
Recognize that all rods did not fully insert.	RO (NSOE)
Direct torus cooling be maximized.	SRO (A OSS)
Maximize torus cooling when directed.	RO (ANSOE)
Direct Boron injection prior to reaching the Boron Injection Initiation Temperature curve.	SRO (A OSS)
Inject Boron prior to reaching the Boron Injection Initiation Temperature curve.	RO (NSOE)
Perform Alternate Rod Insertion procedures per EOP-C section 5.0 as directed.	SRO (B OSS)
Manually insert rods as directed.	RO (NSOE)
Direct injection into the vessel be secured except CRD and SBLC. Direct level be maintained in accordance with ATWS level/power criteria.	SRO (A OSS)
Secure injection into the vessel and maintain RPV level as directed.	RO (NSOE)
Declare EAL C-9	SRO (A OSS)
Notify State/County officials within 15 minutes. NRC within 1 hour.	SRO (B OSS)
Evacuate the plant.	SRO (B OSS)

COMMON TRAINEE ERRORS

1. Trainees do not control level swell.
2. Trainees forget to check direction of idle loop flow for P1 data, which will require substitute valve for core flow. (NRC Report)

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY
I. SIMULATOR INITIAL CONDITION: Reset IC-23 Place simulator in RUN Override OFF Annunciators 1C04A A1 and C1 (A Recirc MG) or 1C04A A7 or C7 (B Recirc MG). Insert malfunctions RP05 A, B, C, D, E (failure to scram)	NOTE: Critical tasks are indicated by a "C" next to the trainee action.
II. PRE-EXERCISE BRIEFING A. Assign Shift Positions. B. Shift Turnover Information. 1. Give Turnover Forms to students. 2. Initial Conditions. 75% Power 3. All systems operable 4. Increasing power to 100%	Conduct shift turnover, board walkdown, and assume shift positions.
III. EXERCISE **MALFUNCTION:** Trip A (or B) Recirc MG Drive Motor Bkr. IMF RR06A (or B) At same time, start Emerg. DC L.O. pump A (or B) via remote function RR03 (RR04), and override ON Annunciator 1C04A D3 (A MG) or 1C04A D9 (B MG). **CLEAR MALFUNCTION** CMF Reset A(B) Recirc MG Lockout Relay via RR01 (RR02) Clear "OFF" overrides on annunciators.	(RO)(SRO) Respond to alarms and indications. 1C04A A-4 (or 1C04B A-1) "Recirc MG Drive Motor Trip" 1C04A D-3 (or D-9) "Recirc MG Fluid Drive Oil Lo Press" (RO) Verify automatic actions have occurred: MG Drive Motor Bkr. and Field Bkr. Trip. (RO) Send operator to Panel 1C113A (B) to monitor relays and investigate cause of trip.

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY
ROLE PLAY:	(RO)(SRO) Evaluate plant conditions and determine operating point on Power/Flow Map and Reactor stability. (Find operating in Forbidden region).
When asked, investigate cause for Drive Motor Bkr. Trip. After approximately five minutes - report a laborer cleaning in the MG Room found a valve leaking oil (minor) and closed the valve to wipe up the oil. (V-16-121 for A MG or V-16-122 for B MG).	C(SRO) Directs performance of STP 46F002 per Tech Specs.
NOTE: This valve isolates the lube oil pressure switches and causes an apparent loss of lube oil to the control systems.	C(RO) Perform STP 46F002 and reduce power with rods per pull sheet.
Reopen valve when directed.	NOTE: Operators should not insert rods using the CRAM method. Rods should be inserted using the pull sheet, in reverse order (SOER 84-2).
Stop Emerg. DC L.O. pump A (or B) via RR03 (RR04) and clear override on 1C04A D3 (D9), and then report valve reopened.	(RO)(SRO) Verify operation in SLO IAW OI 264 and begin STP 46F002 and then STP 46F001 if baseline data is not available.
NOTE: Instability would be indicated by at least one APRM exhibiting peak to peak swings greater than 10% and increasing.	LIMIT operating Recirc Pump speed to 100%, and core flow between 39E6 and 45E6 lbm/hr.
	(RO) Perform STP 42F007 APRM Gain Adjust Calibration, and operate APRM's IAW OI 878.4 for SLO.
	(RO or SRO) Notify Reactor Engineer.
	(SRO) May order restoration to two-loop operation before STP complete once cause of trip is known and evaluated.
After 46F002 identified, and rod insertion started, insert malfunction RX03. Ramp from 0-30% severity over 5 minutes.	(RO) Notice instability > 10% peak to peak.
	C(SRO) Direct reactor scram due to power oscillation.
	C(RO) Recognizes rods did not insert.
After reactor scram is attempted insert malfunction MC04A. Ramp from 0-100% over 10 minutes.	(RO) Recognizes lowering condenser vacuum.
If asked, report that HP condenser boot has ruptured.	C(SRO) Directs torus cooling maximized (when torus temp exceeds 95°).
	C(RO) Maximizes torus cooling when directed.
	C(SRO) Directs Boron injection prior to reaching EOP Graph 6 limits.
	C(RO) Initiates Boron injection when directed. (SRO) Directs EOP C's performed to shutdown the reactor.

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY
ROLE PLAY: When directed/requested: o Venting scram air header in progress. o Shut V-17-24 using remote function RD05. After power/level control has been implemented, vent the scram air header using malfunction RD13. Ramp from 0-100% over 5 minutes. **TERMINATION:** Terminate scenario when all rods are in and level has been restored. **FREEZE** simulator.	C(SRO) Implements EOP C's as directed. C(RO) Manually drives rods if directed. C(SRO) Direct injection secured (except Boron and CRD). Directs level maintained per level/power criteria. C(RO) Maintains level as directed. C(SRO) Declare EAL C-9. C(SRO) Notify State/County officials within 15 minutes, NRC within 1 hour. C(SRO) Initiate plant evacuation.

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY
IV. POST-EXERCISE CRITIQUE	Discuss major problems and questions about the exercise.
OBTAIN trainee's self-evaluation, comments, and questions.	
REVIEW learning objectives.	
REVIEW the exercise using trends of the evolutions; compare trainee responses to malfunctions with correct responses.	
CRITIQUE student and team performance observed during each exercise.	
Reinforce proper individual and team performance.	
Reinforce applicable theory.	
Identify areas for improvement.	
SOLICIT additional questions from students and promote discussion of correct answers.	Participate in discussions.
DISCUSS Flow direction in idle loop Jet Pumps.	
1. For operating pump above 50% speed, idle loop reverse flow.	
2. For operating pump below 50% speed, idle loop forward flow.	
3. For operating pump near 50% speed, idle loop stagnant.	

QUESTIONS:

Answer questions.

1. Why should operation in the forbidden region (above 80% load line and below 45% core flow) be avoided?

   Answer: Due to the possibility of core instabilities at high loadline/low flow conditions. (SER 14-88, NRCB 88-07 supl.1).

2. What may occur in the PI if the operating loop is below 50%speed? How do you fix this?

   Answer: Core flow is derived from subtracting the idle loop valve assuming it is reverse flow, when in fact it is forward flow and should be added.

   A substitute valve must be calculated and inserted into the Process Computer for this case.

3. What are core instabilities and what action must be taken if they occur?

   Answer: Power oscillations greater than 10% of rated power and increasing.

   Scram the reactor. (SER 14-88, NRCB 88-07, Supl 1)

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY
4. When may core instabilities occur? When most likely? Answer: Anywhere on operating Map. Most likely in forbidden region.	

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The difference in signature date vs. revision date is attributed to development/approval process.

NG-90-1791
Att. 2

REM 90-9

TURBINE TRIP WITH ATWS

INITIAL CONDITIONS:

IC-13 50% power

MALFUNCTIONS/OVR:

RP05A, B, C, D, E RPS failure to scram
MC04A Main condenser leak
RD11A/B CRD pump trips

PROCEDURES:

IPOI-4, Rev. 11, 05/02/89
ARP 1C07A D-6, Rev. 4, 10/10/89
EOP 1, Rev. 0, 06/16/89
ATWS EOP, Rev. 0, 06/16/89
STP 43B005, Rev. 0, 04/14/89
IPOI-3, Rev. 7, 04/30/90

ATTACHMENTS:

Shift turnover forms
Tags for RCIC

SUMMARY:

During a plant shutdown a loss of main turbine lube oil will result in a turbine trip. The reactor will fail to scram and the operators will respond using the ATWS EOP.

COURSE: 500-008 Licensed Operator Requal (1990 Remedial Training)
DURATION: 2 Hours
QUALIFICATIONS: 30

TERMINAL OBJECTIVE

The student, acting as a member of a shift operating crew, must demonstrate competence in performance of license duties required to protect the public health and safety while operating the plant in accordance with approved instructions and procedures.

ENABLING OBJECTIVES

The students will complete the following objectives listed in the classroom training material:

1. Following a pre-shift brief, each crew member will be able to provide a detailed plant status report to include:
   a. Status of safety-related systems, running equipment, and inoperable equipment.
   b. STPs in progress and any existing LCOs.
   c. Pertinent night orders and planned evolutions.
2. Using plant installed instrumentation and plant procedures, as well as information obtained by operating personnel outside the Control Room, the operating crew will correctly diagnose plant problems.
3. The OSS will be able to use appropriate plant procedures to ensure completion of immediate actions and direct subsequent actions as required.
4. When using plant procedures, the NSOE/ANSOE will be able to:
   a. Locate the proper section of the procedure.
   b. Follow the procedure correctly.
   c. Locate and observe installed instrumentation.
   d. Analyze system response.
   e. Direct plant operators (Second ANSOE and Auxiliary Operators).
   f. Inform the OSS when complete.
5. While operating in accordance with the Emergency Operating Procedures, the OSS will:
   a. Direct the NSOE/ANSOE to perform required actions for control of reactor power, level, pressure or containment parameters.
   b. Specify the plant systems to be used to control plant parameters.
   c. Evaluate changes in plant conditions against current actions being taken and make corrections as necessary.
6. When directed by the OSS to perform actions in accordance with the Emergency Operating Procedures, the NSOE/ANSOE will:
   a. Utilize the systems designated by the OSS.
   b. Monitor system performance; i.e., pressure, flow, etc.
   c. Inform the OSS immediately when a system becomes unavailable for further use.
   d. Inform the OSS of plant trends in response to actions taken.

7. Given a set of plant conditions, the OSS will be able to comply with the requirements of Technical Specifications and the Administrative Procedures.

8. The OSS will be able to utilize the Emergency Plan to properly:

   a. Evaluate plant conditions and determine the emergency classification.

   b. Ensure requisite notifications are made.

   c. Complete required log entries (paperwork).

9. The STA will assist the operating crew as required to:

   a. Ascertain the plant response is as predicted in the UFSAR during transients, accidents, and plant emergencies and report abnormalities to the OSS.

   b. Provide technical assistance and perform whatever activities are deemed necessary by the OSS because of specific plant conditions.

   c. Review the status of inoperable equipment to determine whether the loss of the equipment is a situation addressed by Technical Specifications requiring specific action by the plant staff.

10. The crew members will demonstrate effective communications, exchanging complete and relevant information in order to make team decisions in a timely manner.

11. The students will complete the following objectives listed in the classroom training material:

   a. ATWS EOP

      TTT.21 Explain the goal of each section of the ATWS EOP and relate these goals to the general EIO strategy.

      TTT.22 Evaluate plant status and take appropriate action to achieve a shutdown condition.

      TTT.42 Evaluate plant conditions and determine appropriate use of EOP C.

   b. CRD

      A.05 Given plant conditions, determine when conditions exist, which warrant Emergency Rod insertion, and the method for Emergency Rod insertion.

      A.28 Evaluate non-performance of steps in EOP C and determine the impact on ability to insert control rods.

LIST OF CRITICAL TASKS

CRITICAL TASKS	RO/SRO
Direct injection into the vessel be secured except CRD and SBLC. Direct level be maintained in accordance with ATWS level/power criteria.	SRO (A OSS)
Direct Boron injection prior to reaching the Boron Injection Initiation Temperature curve.	SRO (A OSS)
Direct Torus Cooling be maximized.	SRO (A OSS)
Secure injection into the vessel and maintain RPV level as directed.	RO (NSOE)
Inject Boron prior to reaching the Boron Injection Initiation Temperature curve.	RO (NSOE)
Maximize torus cooling when directed.	RO (ANSOE)
Perform alternate Rod Insertion procedures per EOP-C section 5.0 as directed.	SRO (B OSS)
Declare EPIP EAL C-9.	SRO (A OSS)
Notify State/County within 15 minutes. Notify NRC within one hour.	SRO (B OSS)
Evacuate the plant.	SRO (B OSS)
Recognize that all rods did not fully insert.	RO (NSOE)
Manually insert rods as directed.	RO (NSOE)

COMMON TRAINEE ERRORS

1. Trips turbine before scram.
2. Does not use emergency in to drive rods.
3. Attempts to reset scram with RPS fuses removed.

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY
I. SIMULATOR INITIAL CONDITION:	**NOTE:** Critical tasks are indicated by a "C" next to the trainee action.
Reset to IC-13	
Insert malfunctions RP05A, B, C, D, E	
Place simulator in Run	
Trip RCIC valve and tag MO-2405 switch	
Override alarm 1C07A, B-6 off (TLO tank Hi level)	
II. PRE-EXERCISE BRIEFING	
A. Assign Shift Positions.	
B. Shift Turnover Information.	Conduct shift turnover, board walkdown, and assume shift positions.
1. Give attachments to students	
2. Initial conditions	
o Shutdown in progress per IPOI-3, 4.	
o Proceed to cold shutdown due to RCIC inoperability. Day 7 of LCO	
III. EXERCISE	
	(SRO) Directs operators to continue with shutdown.
After shift turnover, insert malfunction TU04 (Turbine Bearing low oil pressure) at 1%, Ramp to 100% over 20 minutes.	
Override alarm 1C07A, D-6 on (low turbine lube oil tank level)	(RO) Request aux operator to check out lube oil system.

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY
When requested, provide following information: o Tank level is -5 inches o Last reading was + 1 (from logs) o Level seems to be dropping about 1 inch every 3 or 4 minutes. o MSOP discharge pressure is about 200 psig (at tank and at front standard) o Bearing header pressure is about 25 psig at tank and 18 psig at front standard. o If told to enter heater bay, evidence of oil in heater bay. Can hear abnormal noises coming from turbine.	
Turbine may trip automatically, if so, the feedwater temperature decrease will cause reactor power to increase. After turbine trip, insert MC04A. Ramp 0-100% over 3 minutes.	(SRO) Direct ROs to Manually scram C (RO) Recognizes all rods did not fully insert. (SRO) Enters EOP-1 and ATWS EOP. - initiates ARI - reduces pressure setpoint to 880 psig (if he decides not to break vacuum) - directs use of HPCI for pressure control.
Perform the following as appropriate o Ensure operator pulls correct fuses. o If told to vent air header, wait until power/level control done and insert RD13. Ramp to 100% over 5 minutes.	- directs ROs to deenergize RPS or vent scram air header. - directs ROs to manually drive rods.
	C (SRO) Direct SBLC injection prior to torus water temperature exceeding EOP graph 6 limits.

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY
After approximately six rods are driven, trip both CRD pumps by inserting malfunctions RD11A/B.	C(SRO) Implements EOP C's as directed. C(RO) Manually drive rods if directed: - uses emergency in (SRO) When all rods are in, direct RO to break vacuum to slow main turbine. C(RO) Injects SBLC when directed.
If RO attempts to reset scram: o When directed, repressurize scram air header by removing malfunction RD13.	(RO) Before attempting to reset scram - repressurizes scram air header C(SRO) Directs torus cooling maximized. C(RO) Maximizes torus cooling when directed. C(SRO) Direct injection to the vessel be secured (except CRD and Boron) Direct level be maintained per level/power criteria. C(RO) Maintain RPV level as directed. C(SRO) Declare EAL C-9 C(SRO) Notify State/County within 15 minutes. Notify NRC within one hour. C(SRO) Initiate plant evacuation.
Terminate scenario when plant conditions are stable and all rods are in.	

INSTRUCTOR ACTIVITY	TRAINEE ACTIVITY
IV. POST-EXERCISE CRITIQUE	Discuss major problems and questions about the exercise.
OBTAIN trainee's self-evaluation, comments, and questions.	
REVIEW learning objectives.	
REVIEW the exercise using trends of the evolutions; compare trainee responses to malfunctions with correct responses.	
CRITIQUE student and team performance observed during each exercise.	
Reinforce proper individual and team performance.	
Reinforce applicable theory.	
Identify areas for improvement.	
SOLICIT additional questions from students and promote discussion of correct answers.	Participate in discussions.

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Att. 3

LICENSED OPERATOR REQUAL EXAM PREPARATION

1. EOP-1

   * Verify all rods in
   * Level control - Overfilling Rx vessel with Main Steam Lines open

2. EOP-2

   *Spray the drywell before 280 degrees Allow time for system initiation
   *Emergency Depressurize if cannot maintain below 280
   *Spray torus before 9# in the torus (If not go directly to Drywell sprays)
   *Scram Rx before torus water temperature reaches 110
   -Allow enough time to evaluate ATWS/SBLC prior to 110
   *During ATWS do not drain torus below 10 ft. - adverse impact on Heat Capacity Limit
   *Consider the value of Defeat 4 if drywell temperature is increasing rapidly

3. EOP-3

   *Brief review of procedure and monitored parameters

4. EOP ATWS

   *Inject SBLC before 110
   *Power/Level Control
   -When to enter (relate to need for SBLC)
   -Stop injection rather than throttling injection shut FRV,
   -Prevent injection from HPCI and RCIC, Bypass Msiv lo-lo-lo
   *Reduce pressure set to 880# when able
   *Verify ARI trips recirc pumps

5. ALTERNATE LEVEL CONTROL

   *Review - E/D at -15"

6. EMERGENCY DEPRESSURIZATION

   *ONLY secure injection if in an ATWS
   *Should check Saturation Graph for level instrument accuracy

7. RPV FLOODING

   *Review establishing 50# dP

8 OTHER PROCEDURES

a Venting Containment

- When to use the big valve vs the small valve
- When to use an air purge vs. nitrogen
- Requirements for a lifted SBGT Relief

b SORV ARP

- Urgency of pursuing the problem-Cycling the switch & fuses
- Be sure to pull all fuses-procedure confusing

c. Others

9. Miscellaneous Problems

- RHR injection lined up to inject - Operators unaware
- Confusion when using SPDS indications along with 1CO3
- Extraneous communications during major accidents (small items)
- Confusion on sump indications when determining leak-rates
- Using wrong Power Flow map during single-loop

Rev. 0
11/29/88

INSTRUCTOR GUIDE

IOWA ELECTRIC LIGHT AND POWER COMPANY

COURSE TITLE: Reactor Operator 500-007
Licensed Operator Requal 500-008

INSTRUCTOR GUIDE NUMBER: H.10

LESSON TOPIC: EOP 3, Secondary Containment Control

ALLOTTED LESSON TIME: Classroom: Laboratory:

I/2 hour 0 hour

INSTRUCTIONAL MATERIALS:

A. Whiteboard and Markers
B. EOP Flowcharts

INSTRUCTIONAL REFERENCES:

A. BWROG EPG REV 4
B. BWROG EPG REV 4 Appendix B
C. Plant Specific Technical Guideline for EPG REV 4
D. PSTG-EOP Differences Documentation for EPG REV 4
E. EOP Training Material Section K

TERMINAL OBJECTIVE:

ENABLING OBJECTIVES:

See Section 1.C. of Instructor Guide

CRITERION TEST:

A. Exam

HOMEWORK:

A. Self study during class time.

NG-90-1791
Att. 4

INSTRUCTOR GUIDE # H.10

Rev. 0
11/29/88

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OUTLINE OF INSTRUCTION	ACTIVITY/OBJECTIVE #
I. INTRODUCTION	
A. Establish Contact	(1) Introduce Self/Topic
B. Learning Objective Upon completion of this lesson, the student will be able to use EOP 3, Secondary Containment Control to maintain Secondary Containment parameters within allowable limits.	(I) Read learning objectives aloud. (S) Read objectives printed in Student Guide while instructor reads objectives aloud.
C. Enabling Objectives Upon completion of this lesson, the student will perform the following objectives at a minimum proficiency level of 80% unless otherwise stated.	(I) Read enabling objective aloud. (S) Read objectives printed in student guide while instructor reads objective aloud.
1. From memory explain the goal of EOP 3 and relate this goal to the overall strategy of the EOPs.	
2. Given EOP flowcharts and a scenario, assess plant status and take appropriate action for a Primary System Leak into Secondary Containment.	

SRO ONLY

3. When given EOP flowcharts and a scenario, assess overall plant status and direct appropriate actions per the EOPs.

D. Establish Readiness: this lesson will familiarize you with the use of Secondary Containment Control EOP.

(I) Bring out the need for this lesson.

(S) Students bring out their needs for this lesson.

II. PRESENTATION

A. Goal and Structure of EOP 3

OBJECTIVE 1

1. The goal of EOP 3 is to provide protection to plant equipment and/or provide for personnel access to equipment in those areas that is required to shutdown the reactor or maintain adequate core cooling. ~~If more than one area~~

(I) Maintain class participation through effective oral questioning.

(S) Participate in class discussion.

2. If more than one area experiences high temperature, high water levels or high radiation levels, then RPV depressurization is directed if the leak is known to have been caused by a primary system.

3. Plant shutdown is directed if high temperatures, high water levels or high radiation occurs which is not related to the RPV.

(I) Review EOP-3

(S) Participate in review by following along in the flowcharts.

OBJECTIVE 2

OBJECTIVE 3

B. Entry into EOP 3

1. There are 4 major reasons for entering EOP 3. These are:

a. Area ~~Temp~~ Water Level above max normal
b. Area Radiation above max normal
c. Area Temperatures above max normal
d. Group III Radiation based Isolation/SBGT Initiation signal

2. Each of the above is consistent with observations of a reactor coolant leak that could result in a release outside of the containment. Other non-RPV related events however may be responsible for one or more of the parameters above max normal (e.g. fire involving contaminated anti-C's, TIP malfunction or flooding due to broken GSW or Well water piping). In any event, EOP 3 must be entered. The direction given in EOP 3 will distinguish between the cause.

3. Table 6 provides a specific listing of the areas monitored. Note that not all areas within Secondary Containment are listed due to instrumentation limitations.

C. Applicable Continuous Recheck Statements

IF REACTOR BUILDING VENT SHAFT EXHAUST RADIATION LEVEL IS ABOVE 11 MR/HR

OR

REFUEL FLOOR EXHAUST RADIATION LEVEL IS ABOVE 9 NR/HR

OR

OFFGAS VENT PIPE EXHAUST RADIATION LEVEL IS ABOVE (HI-HI TRIP SETPOINT RN-4116A[B])

THEN VERIFY ISOLATION OF REACTOR BUILDING HVAC

AND

VERIFY INITIATION OF SBGT.

1. If SBGT should have started due to radiation levels, then the operator is directed to start SBGT and verify isolation of Secondary Containment HVAC.

(I) Review EOP-3

(S) Participate in review by following along in the flowcharts.

IF ALL THE FOLLOWING CONDITIONS APPLY:

- o REACTOR BUILDING HVAC IS ISOLATED
- o REACTOR BUILDING VENT SHAFT EXHAUST RADIATION LEVEL IS BELOW 11 NR/HR
- o REFUEL FLOOR EXHAUST RADIATION LEVEL IS BELOW 9 NR/HR
- o OFFGAS VENT PIPE RADIATION LEVEL IS BELOW (HI-HI TRIP SETPOINT RN-4116A[B])

THEN RESTART REACTOR BUILDING NVAC. DEFEAT HIGH DRYWELL PRESSURE AND LOW RPV WATER LEVEL ISOLATION INTERLOCKS AS NECESSARY PER EOP C, DEFEAT 9.

2. If the Reactor Building HVAC is isolated for a reason other than radiation levels (e.g. high Drywell pressure or low RPV water level) then restoration of RB HVAC is directed as RB HVAC should aid in restoring normal Secondary Containment temperatures.

ACTIVITY/OBJECTIVE #

(I) Review EOP-3

(S) Participate in review by following along in the flowcharts.

D. Action Steps

1. Section SC/T steps SC/T-1 through SC/T-3 direct operation of available coolers and RB HVAC if permitted.

(I) Review EOP-3

(S) Participate in review by following along in the flowcharts.

2. Section SC/L directs operation of sump pumps.

3. Section SC/R combines actions from SC/T SC/L and SC/R due to the identical nature of these sections once the initial mitigation actions have been taken.

4. If after performing the mitigation actions of SC/T and SC/L, the entry condition has not been cleared, then SC/R-1 provides direction to proceed into the significant control steps.

5. SC/R-2 provides direction to isolate the source of the discharge by isolating systems that are discharging into Secondary Containment areas unless the system is required to complete reactor shutdown (e.g. SDV leak), assure adequate core cooling (e.g. RCIC steam leak) or suppress a fire (e.g. fire in corner room).

6. SC/R-3 through SC/R-5 provide for the need to take action per EOP 1 if the source of the high area temperature, radiation level or water level can be determined to be from a primary system leak.

(I) Review EOP-3

(S) Participate in review by following along in the flowcharts.

7. SC/R-7 and SC/R-8 provides for subsequent execution of emergency RPV despressurization IF max safe operating levels are exceeded for the same parameter in more than one area.

8. SC/R-10 through SC/R-12 (which parallel execution of the previously mentioned steps) provides for direction to conduct a plant shutdown. If maximum safe operating levels are exceeded for reasons unrelated to the RPV, then plant shutdown is appropriate, while a Reactor Scram and emergency RPV depressurization as directed previously are not required since there is no link between an area and the RPV. If subsequent reports or observations lead to the conclusion that the RPV is indeed the source of the problems, then execution of SC/R-3 through SC/R-9 is valid and should be performed.

E. EOP Exit

EOP 3 may be exited once the entry conditions have been cleared.

(1) Review EOP-3

(S) Participate in review by following along in flowcharts.

III. Summary

A. Questions

Q. How do the entry conditions relate to the goal of EOP-3?
A. The entry conditions are indicative of a potential release of RPV contents that may eventually be released to the environment.

Q. How does a knowledge that high HPCI room temperatures are caused by a fire relate to EOP-3.
A. The steps following SC/R-3 need not be executed if the sole reason for the high temperature can be traced to something other than a primary system discharging into the area.

Q. What are the implications of exceeding max normal operating levels for temperature in both the RCIC room and HPCI room during the same time frame.
A. EOP-3 would have been entered, but more substantial actions required in SC/R-7 and subsequent steps would not be performed.

(I) Briefly discuss each topic and ask factual questions about presentation materials.

(S) Answer questions.

B. Scenario:

The plant is at full power when a spurious MSIV closure results in a turbine trip and reactor scram. The rods insert to notch position 22. RPV water level is normal on the startup level controller. Following the scram the second assistant reports a steam leak from the North CRD scram discharge volume. RI-9168 reads 95 mr/hr. Reactor Building Exhaust Ventilation Rad monitors are trending up.

(1) Discuss scenario with students. Work through EOP 3. Discuss Entry into EOP 1 and EOP 1 ATWS but do not pursue.

(S) Follow scenario and respond to instructor questions.

Reactor and Containment Parameters are:

RPV Water Level	190 inches and steady
RPV pressure	900 to 1025 psig
Rx Power	APRMs are downscale
Drywell temp	137 F and steady
Drywell press	1.3 psig steady
Torus level	10.3 ft and steady
Torus temp	98 F and rising

Optional (1) Have the OSS assign crew positions and have OSS walkthrough the scenario with the crew. Guide discussions.

Systems running

No change from initial conditions.

The time is T+3 minutes into the scenario. Data provided above may be placed on the board at once or given out as requested.

C. Scenario Discussion Items

1. Discuss the implications of isolating the scram discharge volume. Who, and How?

2. What actions are required if the CRD Rebuild Room ARM alarms?

3. Discuss EPIP evaluation.

4. What other secondary containment parameters are likely to be affected by this event (even though there is little instrumentation to indicate the parameters)?

5. The SRO decides that the leak is unisolable and decides to depressurize the RPV. Is this an appropriate action? Explain.

(I) Discuss the following items with the students during the scenario or use as questions.

(S) Discuss the items and answer questions.

IV. APPLICATION

A. EOP 3, Secondary Containment Control

B. The operator will utilize this procedure during simulator training.

V. ASSIGNMENT

A. Self study during class time.

NG-90-1791
Att. 5

LICENSED OPERATOR REQUAL 500-008

TTT.0012

EOP-2, PRIMARY CONTAINMENT CONTROL

Document Number Rev. 0

December 28, 1989

DUANE ARNOLD ENERGY CENTER

Primary Containment Control

I. INTRODUCTION

A. Learning Objective:

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

1. Use EOP-2, Primary Containment Control to monitor, maintain, and control Primary Containment parameters below design limits.

B. Enabling Objectives

Upon completion of this lesson, the student will perform the following objectives at a minimum proficiency level of 80% unless otherwise stated.

TTT.09 Explain the goal of each section of EOP-2 and relate these goals to the overall EOP strategy.

TTT.10 Evaluate plant status and take appropriate actions to control primary containment parameters.

TTT.11 Evaluate plant status and determine if use of containment sprays is appropriate.

SRO ONLY

TTT.07 Evaluate overall plant status and direct appropriate action per the EOPs.

TTT.08 Identify and explain the transitions to contingency procedures.

C. References

1. EOP Training Material Section F.

II. PRESENTATION

A. Goal and Structure of EOP-2

1. EOP-2 monitors and controls parameters that represent containment limits or can result in the loss of containment integrity. Containment integrity is to be maintained, even at the expense of adequate core cooling. The second most significant aspect of Primary Containment is its pressure suppression function. However, it has no relief or overpressure protection. If pressure suppression is lost, the RPV is placed in its lowest energy state.

2. Section T/T provides direction to maintain Torus temperature and its ability to condense steam from the RPV or the Drywell.

3. Section T/L provides direction to maintain Torus level between high and low limits.

   a. Low Torus levels reduce the amount of energy that the Torus may hold. Very low Torus level may uncover pressure suppression components such as the downcomers and SRV tail pipes as well as the HPCI discharge.

   b. High Torus levels improve the ability to store energy. However, Drywell/Torus vacuum breakers may become covered resulting in the inability to use Drywell Sprays, or high loads in the SRV tail pipes may result in the loss of SRV use.

4. Section DW/T maintains Drywell temperature less than the design temperature. Steel loses strength as its temperature rises. The Drywell will, therefore, lose strength and its ability to withstand pressure as Drywell temperature increases.

5. Section PC/H controls Primary Containment hydrogen and oxygen to preclude reaching a mixture of the two gases that might result in a deflagration. The peak containment pressures resulting from a hydrogen

burn via deflagration are sufficiently high and rapidly occurring to overpressurize the containment.

6. Section PC/P provides direction to maintain Primary Containment pressure (Torus and Drywell) below the point of failure.

7. At various points throughout EOP-2, Emergency RPV Depressurization will be directed to prevent the RPV from being a source of possible containment failure. The CRS for Emergency RPV Depressurization is now activated and the transition from RC/P to ED can be made if the operator has entered EOP-1. It is imperative that the operator enter EOP-1 as directed, execute steps RC-1 through RC-4, and reach the RPV control sections prior to making the transition to Emergency Depressurization.

B. Entry into EOP-2

1. EOP-2 is entered when Torus level and temperature LCO values are exceeded, Drywell pressure exceeds the scram setpoint, normal Drywell temperature is at the alarm setpoint, or hydrogen concentration is at the alarm setpoint.

2. High Drywell pressure also results in entry into EOP-1. This is the only entry condition common to more than one EOP.

C. Applicable Continuous Recheck Statements while performing the following:

IF PRIMARY CONTAINMENT FLOODING IS REQUIRED, THEN ENTER PRIMARY CONTAINMENT FLOODING

1. The goal of Torus level control is to maintain Torus level within the LCO limits. However, when Primary Containment Flooding is required, control is transfered to PCF (Contingency #6) to control water level outside the LCO limits.

While performing the following:

IF TORUS AND/OR DRYWELL SPRAYS HAVE BEEN INITIATED AND TORUS AND/OR DRYWELL PRESSURE DROPS BELOW 2.0

PSIG, THEN TERMINATE TORUS SPRAYS AND/OR DRYWELL SPRAYS.

2. Operation of Torus and/or Drywell sprays may reduce containment pressure below atmospheric which may result in de-inerting the containment as well as threatening the Drywell/Torus with negative differential pressure.

While performing the following:

IF H_2 or O_2 MONITORING SYSTEMS ARE UNAVAILABLE, THEN NOTIFY CHEMISTRY TO MANUALLY SAMPLE THE DRYWELL AND TORUS FOR H_2 AND O_2 PER PASAP 2.6.

3. Loss of hydrogen and oxygen monitoring requires manual sampling.

IF DRYWELL OR TORUS H_2 CANNOT BE DETERMINED TO BE BELOW 6%

AND

DRYWELL OR TORUS O_2 CANNOT BE DETERMINED TO BE BELOW 5%, THEN PROCEED TO STEP PC/H-14.

4. If primary containment hydrogen and oxygen cannot be determined to be below the deflagration point, then actions to mitigate the dangerous containment environment and place the RPV in its lowest energy state are required.

While performing the following:

IF THE OFFSITE RADIOACTIVITY RELEASE RATE REACHES OFFGAS VENT PIPE HI-HI TRIP (RM-4116A[B]) SETPOINT, THEN VERIFY ISOLATION OF TORUS AND DRYWELL VENT AND PURGE

AND

CONTINUE AT STEP PC/H-13.

5. Venting the Drywell or Torus when hydrogen is less than 6%, is contingent upon not exceeding plant release limits for normal operation. If the Offgas

Vent Pipe Rad Monitor exceeds the Hi-Hi trip setpoint, the venting lineup is isolated.

D. Action Steps

1. Section T/T

a. **Steps T/T-1 through T/T-3** are designed to provide for Torus cooling using RHR.

b. **Steps T/T-4 through T/T-6** direct EOP-1 entry resulting in a reactor scram prior to exceeding the temperature at which boron injection is required.

c. **Step T/T-7** provides direction to maintain Torus temperature below the Heat Capacity Limit.

d. **Steps T/T-8 through T/T-10** provide direction on actions to take when the Torus temperature cannot be maintained below the Heat Capacity Limit curve. The RPV depressurization directed at this point ensures that the RPV can be depressurized before exceeding the ability of the Torus to handle the heat energy.

e. **Step T/T-11** is only performed if adequate core cooling is not affected. Note that NPSH considerations for CS and RHR are now significant.

2. Section T/L

a. **Steps T/L-1 through T/L-3** provide guidance for monitoring and restoration of Torus water level within the LCO limits.

b. **Step T/L-4** holds action until Torus level is outside or expected to go outside the LCO limits while **Step T/L-5** directs left or right hand side path execution depending upon level high or low.

c. **Steps T/L-6 through T/L-9** provide the most significant actions for a lowering Torus level. The level is maintained above the 7 ft. minimum required for the downcomers and as much margin as possible between the Heat Capacity Limit, actual Torus water temperature, and RPV

pressure. If these limits cannot be maintained, then Emergency RPV Depressurization is required as well as entering EOP-1 at Step RC-1.

d. **Steps T/L-10 through T/L-12** provide for maintenance and actions related to keeping the HPCI exhaust covered with water.

e. **Steps T/L-13 through T/L-17** provide for actions designed to maintain the Drywell/Torus vacuum breakers uncovered in order to retain the ability to conduct Drywell Sprays. Note that adequate core cooling is not sacrificed to maintain Torus level below 13.5 ft.

f. **Steps T/L-18 through T/L-25** provide for actions designed to protect the SRV tail pipes from failure. The SRV tail pipe limit is a function of RPV pressure for a very limited region. Therefore, once RPV pressure has been lowered or is being maintained below 1000 psig, the effective Torus level limit is 16 ft. due to instrumentation limitations.

g. **Steps T/L-29 through T/L-31** provide the final steps of Torus level control with the object of not exceeding the elevation of the Drywell vent line. Sources external to the Primary Containment are sacrificed irrespective of adequate core cooling.

3. Section DW/T

a. **Steps DW/T-1 through DW/T-5** provides for successive actions to restore Drywell Cooling as well as direction for conducting a reactor shutdown if temperatures cannot be restored.

b. **Steps DW/T-6 through DW/T-8** take action to avoid exceeding the Drywell design limit of 281°F, rounded off to 280°F. Directions are given to enter EOP-1, which results in a reactor scram, and provides for the execution of the following steps.

c. **Steps DW/T-9 through DW/T-16** provide for the use of Drywell Sprays (if allowed) to reduce Drywell temperature. Also, Emergency

Depressurization is required if DW/T cannot be maintained below 280°F.

4. Section PC/H

a. **Step PC/H-1** provides instructions to monitor and control hydrogen and oxygen concentration. Entry into EOP-2 is unlikely to have been based on 4% hydrogen without having exceeded the other parameters for a long period of time.

b. Action is held at **Step PC/H-2** until hydrogen concentration exceeds the minimum detectable value of 0.4%.

c. **Step PC/H-3** provides for a rough determination of whether or not a vent and purge of the Primary Containment is likely to result in a containment isolation on high radiation. Vent and purge of hydrogen with the concentration below the deflagration point (assumes oxygen is also present at 5% or more) is only conducted under conditions of normally allowable releases. The LCO note corresponds to a value less than a site emergency value (C-25).

d. **Steps PC/H-4 through PC/H-8** provide for preferentially venting via the Torus to make use of the Torus's ability to scrub fission products. Note that venting does not reduce concentration of a gas and that the vent path will only be used if activity levels remain below the Offgas Vent Pipe Hi-Hi Trip Setpoint.

e. **Steps PC/H-9 through PC/H-12.** Once a vent path has been established, Drywell purge, preferably nitrogen, must follow to achieve a reduction in hydrogen concentration. However, if the atmosphere is already de-inerted, as measured by oxygen concentration greater than 5%, an air purge is directed due to its high volume flowrate.

f. **Step PC/H-13** is the holding point for a variety of situations. Direction to proceed past this point is only granted when concentrations of hydrogen and oxygen reach the point of deflagration.

g. **Steps PC/H-14 through PC/H-16** provide for placing the RPV in its lowest energy state, and conducting Torus Sprays if sprays are not required continuously for adequate core cooling.

h. **Steps PC/H-17 through PC/H-21** parallel previous actions to vent the Primary Containment except when ANY venting interlocks are defeated.

i. **Step PC/H-22** parallel previous actions to establish a purge of the Drywell with air.

j. **Steps PC/H-23 through PC/H-25** will initiate Drywell Sprays if permitted by the Drywell Spray Initiation graph and Torus level. At this point, sprays are initiated only if not required continuously for adequate core cooling.

k. **Step PC/H-26** provides a holding point. **Steps PC/H-19 through PC/H-25** should have mitigated the explosive atmosphere. If not, the remaining actions preserve the containment at the expense of maintaining adequate core cooling.

l. **Steps PC/H-27 through PC/H-30** provide for initiation of Torus Sprays and Drywell Sprays (if allowed) irrespective of continued adequate core cooling.

m. **Steps PC/H-31 through PC/H-34** direct a return to sheet 1 of EOP-2 to continue hydrogen control actions once the concentration has been reduced below 0.4%. Venting and purging is secured. Further releases are not warranted until an explosive mixture is again detected.

5. Section PC/P

   a. **Steps PC/P-1 through PC/P-2** provide for initial control actions if Drywell pressure has not yet reached 2.0 psig.

   b. **Steps PC/P-3 through PC/P-4** provide for initiation of Torus Sprays anytime after reaching 2.0 psig and before 9.0 psig. If 9.0 psig has been exceeded, Torus sprays should be used anyways.

   c. **Steps PC/P-5 through PC/P-8** provide for use of Drywell Sprays if allowed by torus water level and Drywell Spray Initiation Graph.

   d. **Steps PC/P-9 and PC/P-10** are concerned about the ability of the Pressure Suppression System to operate properly. The region outside the limits of the Pressure Suppression Graph represents energy that is bypassing the pressure suppression system. Continued pressurized operation of the RPV is not permitted because the pressure suppression system may not be functioning.

   e. Venting of the containment is directed in **Steps PC/P-12 through PC/P-17** to maintain Torus pressure below the maximum allowed. Interlock defeats are addressed in EOP-C Defeat 10.

   f. If the previous actions to vent the containment were not successful, **Step PC/P-18** provides direction to attempt pressure reduction irrespective of adequate core cooling.

   g. **Steps PC/P-19 through PC/P-23** provide direction for Torus Sprays (initiation) and Drywell Sprays (if allowed).

E. EOP Exit

Once all the entry conditions have been cleared, exiting the EOP is appropriate.

III. SUMMARY

A. Questions

Q. What are the containment design parameters that are controlled by EOP-2?

A.

Q. What functional aspects of the Pressure Suppression System are controlled by EOP-2?

A.

Q. Given a stuck open SRV and dual failures of Torus cooling valves, what limit will be reached as a result of the transient (assumes reactor will be shutdown)?

A.

Q. Given a Torus level of 12.5 ft, what are the implications of a further Torus level rise?

A.

Q. Given Drywell temperatures of 195°F following a loss of Drywell cooling and Drywell pressure of 1.85 psig, what actions may be taken to mitigate the event.

A.

Q. Distinguish between the actions required for a high hydrogen concentration in the primary containment versus high hydrogen and oxygen concentrations simultaneously.

A.

Q. Given a Drywell pressure of 38 psig with an average Drywell temperature of 260°F, determine if Drywell sprays may be used.

A.

Q. Given a Torus level of 7.5 ft. and dropping at a rate of 1 inch per minute, describe the required actions.

A.

B. Scenario

A small steam line break has resulted in Drywell temperature increase to 255 degrees while also causing a reactor scram due to Drywell pressure. MSIVs are isolated due to a loss of condenser vacuum. HPCI, RCIC and RFPs tripped on high RPV water level.

Reactor and Containment Parameters are:

RPV Water Level	+ 232 inches and dropping slowly
RPV Pressure	921 psig
RX is shutdown on all rods inserted to 00	
Drywell Temp.	255°F
Drywell Pressure	9.0 psig
Torus Level	10.3 ft.
Torus Temp.	123°F and rising slowly

Systems Running

DIV I and 2 components per normal initiation signals.

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STUDENT GUIDE LIT.19

ALTERNATE LEVEL CONTROL

Document Number Rev. 0

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DUANE ARNOLD ENERGY CENTER

Alternate Level Control

LEARNING OBJECTIVE:

Upon completion of this lesson, the student will be able to use the Alternate Level Control Flowchart in conjunction with the EOP-1 to control RPV Water Level during any situation.

Enabling Objectives

Upon completion of this lesson, the student will perform the following objectives at a minimum proficiency level of 80% unless otherwise stated.

TTT.12 Evaluate plant status and determine when entry into ALC is required.

TTT.13 From memory explain the criteria that lead to steam cooling.

SRO ONLY

TTT.07 Evaluate overall plant status and direct appropriate action per the EOPs.

TTT.08 Identify and explain the transitions to contingency procedures.

Establish Readiness

This lesson will familiarize you with the use of the Alternate Level Control Contingency.

PRESENTATION

A. Goal and Structure of ALC

1. The goal of ALC is to restore adequate core cooling through core submergence with low pressure injection systems. ALC is a contingency procedure that is used temporarily in lieu of the Level Control portion of EOP-1.
2. ALC directs the start up of normal injection systems followed by the start up up of alternate injection systems, if necessary.
3. Once RPV Water Level drops to +15 inches then if injection systems are available, the RPV may be depressurized and level restored. If no injection systems are available then steam cooling will be pursued.

B. Entry into ALC

1. ALC is entered from EOP 1 when RPV water level cannot be maintained above +15 inches. This may be either a trend of lowering level or actual level at or below +15 inches.
2. ALC is <u>not</u> entered under ATWS conditions.

C. Applicable Continuous Recheck Statements

IF RPV WATER LEVEL CANNOT BE DETERMINED THEN ENTER RPV FLOODING.

1. As in any of the EOP sections dealing with RPV water level control, if RPV water level cannot be determined, then RPV Flooding Contingency must be pursued to ensure adequate core cooling is re-established.

IF RPV WATER LEVEL IS RISING THEN ENTER RPV CONTROL.

2. If water level is being restored, then the operator is directed to the initial steps of RC/L for level control. This provides an exit from ALC when a previously inoperable system has been restored.

IF PRIMARY CONTAINMENT WATER LEVEL AND TORUS PRESSURE CANNOT BE MAINTAINED BELOW THE FOLLOWING LIMITS:

PRIMARY CONTAINMENT WATER LEVEL 95 FT.

TORUS PRESSURE 53 PSIG

THEN IRRESPECTIVE OF ADEQUATE CORE COOLING, TERMINATE INJECTION INTO THE RPV FROM SOURCES EXTERNAL TO THE PRIMARY CONTAINMENT

UNTIL

PRIMARY CONTAINMENT WATER LEVEL AND TORUS PRESSURE CAN BE MAINTAINED BELOW THE LIMITS.

3. Sources of injection external to the containment are secured to preclude overpressurizing the Torus or filling the containment above the Drywell vent line penetration (located at 95 ft.). The consequence of not doing so, may be a complete and uncontrolled loss of Primary Containment.

   IF THE ADS TIMER HAS INITIATED THEN, PLACE BOTH ADS TIMER HANDSWITCHES IN OVERRIDE.

4. In EOPs the operator will be taking action and has the ability to assess when depressurization is appropriate. An operator can draw on more information than ADS logic and thus is better able to judge via EOP criteria, when to depressurize the RPV.

D. Action Steps

1. ALC-1 through ALC-6 are concerned with providing one or more MOTOR DRIVEN injection systems. Steam driven equipment is not included because these systems are not likely to be available following RPV depressurization.

   a. Note that Table 1B refers CS/RHR loop rather than pumps. This additional conservatism ensures that multiple 'loops' are available, since a single failure in an injection path could prevent injection from any pump or pumps supplying that loop.

b. Low pressure injection systems may be "lined up and running" without actually injecting. This is acceptable since the following steps will allow RPV depressurization.

2. ALC-7 and ALC-8 provide the logic for determining when to proceed as well as which pathway to use. Additional time is gained to allow high pressure systems such as RCIC or CRD (both pumps) to reverse the level trend.

   a. If no motor driven pumps are running, then the only course of action is to conserve RPV inventory by entering steam cooling.

   b. If any motor driven pumps are available then the RPV is depressurized to allow pressure systems to inject.

   c. Prior to level reaching +15 inches, the severe transient from an emergency depressurization is not warranted.

3. ALC-9 is a Continuous Recheck Statement "flag" which provides the "Emergency Depressurization is required" statement. Note that the requirement to use ED results in a transition from the only active section of EOP 1, RC/P. Thus the operator can discard EOP 1 and now has ALC and ED side by side on the same flowchart for control of RPV Water Level and RPV pressure.

4. ALC-11 directs level restoration without the restrictions of NPSH or Vortex limits. Injection to restore adequate core cooling takes precedence over equipment concerns at this point.

5. ALC-12 provides the determination of whether or not Primary Containment Flooding needs to be pursued.

   a. PCF is specified because, despite injection of all available systems, RPV Water Level cannot be raised above +15 inches. This circumstance must be due to a break beyond the makeup capacity and Primary Containment Flooding is required.

b. Note that Spray Cooling, achieved by one or more CS pumps injecting at rated flow, does provide adequate core cooling, but in the long run core submergence is required and this goal will only be met by PCF flood.

6. ALC-16 through ALC-20 provide instructions for maintaining adequate core cooling when NO injection systems are available.

   a. In this case, then the only action is to conserve RPV Water inventory while attempting to make an RPV injection system available such as during a Station Blackout scenario.

   b. Note that ALC-13 directed an exit from RC/P of EOP 1. Low-Low Set is allowed to control RPV pressure in order to conserve inventory and transfer the maximum amount of decay heat per lbm of RPV water inventory.

   c. The operator is directed to blowdown at -40 inches since below this level, adequate core cooling cannot be assured due to boil off.

   d. It must be remembered that steam cooling is only a means of buying time, in order to restore injection system. It should not be seen as a final means of restoring adequate core cooling.

E. ALC Exit

ALC-9 through ALC-15 provide direction on restoring RPV Water Level and returning to RC/L for water level control.

SUMMARY

A. Goal and Structure of ALC

Q. Lists the mechanisms used in ALC to assure adequate core cooling.

A.

B. Entry Into ALC

C. Applicable Continuous Recheck Statements

D. Action Steps

Q. When is it appropriate to enter Steam Cooling?

A.

E. ALC Exit

Q. Describe the exit paths from ALC.

A.

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ALTERNATE LEVEL CONTROL

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LICENSED OPERATOR REQUAL 500-008

EMERGENCY DEPRESSURIZATION

STUDENT GUIDE TTT.20

Document Number Rev. 1

December 21, 1989

DUANE ARNOLD ENERGY CENTER

Emergency Depressurization

LEARNING OBJECTIVE:

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

1. Use the Emergency Depressurization Contingency flowchart when directed by the EOPs under the appropriate plant conditions.

ENABLING OBJECTIVES

1. Explain the goals of Emergency Depressurization.
2. Evaluate plant conditions and determine when entry into ED will be required.

SRO

3. Evaluate overall plant status and direct appropriate actions per the EOP.
4. Identify and explain the transitions to contingency procedures.

PRESENTATION

A. Goal and Structure of ED

1. The goal of ED is to depressurize the plant irrespective of normal plant cooldown limitations.
2. ED directs the use of the ADS SRVs if available and when torus water level is sufficient, or various alternate means of depressurization.

B. ED Entry

1. ED is only entered by direction from section RC/P of EOP 1, EOP ATWS, or ALC.
2. ED may be entered under ATWS conditions. Special actions are then provided to prevent injecting as the RPV depressurizes in order to preclude a positive reactivity excursion.
3. Reasons for ED entry include the need:
   - To depressurize the RPV in order to allow low pressure systems to inject.
   - To place the RPV in its lowest energy state to preclude further threat to Primary Containment Limits.
   - To place the RPV in its lowest energy state prior to losing the capability to depressurize.
   - To eliminate the driving head behind a leak into Secondary Containment.
   - To eliminate the driving head behind a leak outside Secondary Containment.

C. Action Steps

1. ED-1 and ED-2 provide determination and action for ATWS conditions. It is essential to prevent all but CRD, RCIC and boron injection systems from injecting cold, unborated water into a potentially critical reactor.
2. ED-3 and ED-4 prevent RHR and CS from overfilling the RPV during the depressurization. Since high drywell pressure starts low pressure ECCS, these systems will inject once RPV pressure is reduced below their shutoff head.

3. ED-5 through ED-7 depressurize the RPV with SRVs as long as the T-quenchers are submerged.
4. ED-8 and ED-9 determine if the RPV is depressurized. The minimum SRV re-opening pressure of 50 psig is used since actions for continued depressurization are not required below this value.
5. The list of paths given in ED-10 is prioritized according to capacity, availability, and whether or not the system adds heat to the primary containment.
6. ED-11 determines the impact of the depressurization upon the RPV water level instrumentation due to boil off in the reference or variable legs. RPV flooding may be required.

D. Exit from ED

ED-13 provides a return to the shutdown cooling section of RC/P if the reactor is shutdown with rods or boron.

Note: SRV handswitches should remain in the open position.

SUMMARY

A. Questions

Q. Explain the purpose of Emergency Depressurization

A.

Q. Emergency Depressurization may be required due to exceeding the Heat Capacity Limit. Explain the transition from EOP 2 to EOP 1 and then into ED.

A.

Q. What are the implications of less 3 SRVs open while depressurizing?

A.

Q. What is the significance of 50 psig above torus pressure?

A.

Q. Describe alternate methods to depressurize the RPV and discuss the consequences of each pathway.

A.

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LICENSED OPERATOR REQUAL (500-008) STUDENT GUIDE TTT.11 EMERGENCY OPERATING PROCEDURE 1 RPV CONTROL

Document Number Rev. 1

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DUANE ARNOLD ENERGY CENTER

EOP 1, RPV Control

I. INTRODUCTION

A. Enabling Objectives

Upon completion of this lesson, the student will perform the following objectives at a minimum proficiency level of 80% unless otherwise stated.

1. Explain the overall strategy of EOP 1.
2. Explain the goal of each section of RPV Control and relate these goals to the overall EOP strategy.
3. Evaluate the status of RPV level instrumentation and take appropriate action to maintain adequate core cooling.
4. Determine plant status and take appropriate action to control RPV water level.
5. Determine plant status and take appropriate action to control RPV pressure.
6. Determine plant status and take appropriate action for reactor power.
7. Determine when plant conditions require entry into EOP 1.
8. SRO
   a. Assess overall plant status and direct appropriate actions per the EOPs.
   b. Explain the transitions to Contingency procedures.

References:

1. DAEC Emergency Operating Procedure Flowcharts, Rev. 0, 06/16/89
2. BWROG EPG, Rev. 4

II. PRESENTATION

A. Purpose

1. RC/L - Maintain adequate core cooling through core submergence,
2. RC/P - Control RPV pressure and cool down the RPV to cold shutdown conditions if warranted, and
3. RC/Q - Shut down the reactor.

B. Description

1. Section RC/L and RC/P ultimately directs the operator to proceed to cold shutdown conditions in accordance with normal operating procedures.
2. Section RC/Q directs the operator to the Scram procedure or to EOP ATWS if the reactor is not shut down.
3. If plant conditions cannot be stabilized, the operator will be directed to various contingencies.
   a. Alternate Level Control will be entered if RPV water level cannot be maintained above the top of the active fuel.
   b. Emergency Depressurization will be entered if rapid RPV depressurization is required.
   c. RPV Flooding will be entered whenever RPV water level is unknown.

C. Entry Conditions

1. ANY of the following:
   - RPV water level below +170 in.
   - RPV pressure above 1055 psig
   - Drywell pressure above 2.0 psig
   - Scram required with power above 5% or unknown
   a. These conditions are symptomatic of an emergency, or conditions which if not corrected, could degrade into an emergency.

b. RPV water level, RPV pressure, and reactor power are all controlled concurrently. Actions taken to control one will affect the control of all three parameters.

c. High Drywell pressure is indicative of a line break occurring in the Drywell and thus relates to RPV water level control.

d. All four entry conditions require a reactor scram. If the reactor is not shut down the procedure exits to EOP ATWS.

D. Operator Actions

1. Steps RC-1 through RC-4

a. Due to the seriousness of these entry conditions an EAL assessment is required.

b. The potential for multiple sensor relay failures in the automatic RPS logic is addressed when an automatic reactor scram should have initiated, but did not.

c. It is not appropriate to shut down systems that have valid initiation signals until the plant is in a stable condition.

E. RPV Water Level Control (RC/L)

The RPV Water Level Control section establishes and maintains adequate core cooling through core submergence.

1. Continuous Recheck Statements

If any of the conditions in the following override statements occur, RPV water level needs to be controlled in a manner other than that specified in this section.

a. While performing the following:

IF RPV WATER LEVEL CANNOT BE DETERMINED, THEN ENTER RPV FLOODING

Under conditions where level cannot be determined, level control must be transferred to RPV Flooding to assure adequate core cooling.

b. While performing the following:

IF THE ADS TIMER HAS INITIATED, THEN PLACE BOTH ADS TIMER RESET HANDSWITCHES IN OVERRIDE

ADS actuation imposes a severe thermal transient on the RPV and may complicate efforts to restore and maintain RPV water level.

c. While performing the following:

IF PRIMARY CONTAINMENT WATER LEVEL AND TORUS PRESSURE CANNOT BE MAINTAINED BELOW THE FOLLOWING LIMITS:

PRIMARY CONT. WATER LEVEL	**95 ft.**
TORUS PRESSURE	**53 psig**

THEN IRRESPECTIVE OF ADEQUATE CORE COOLING, STOP INJECTING INTO THE RPV FROM SOURCES EXTERNAL TO THE PRIMARY CONTAINMENT

UNTIL

PRIMARY CONTAINMENT WATER LEVEL AND TORUS PRESSURE CAN BE MAINTAINED BELOW THE LIMITS.

Injection into the RPV from sources outside the primary containment is terminated, irrespective of adequate core cooling concerns, as necessary to maintain containment integrity.

2. Steps RC/L-1 through RC/L-5

   a. These steps define the preferred ranges in which RPV water level should be established and maintained, and specify the preferred systems to use. Maintaining level above the low end of the identified control band permits the scram to be reset, and allows the use of the normal shutdown cooling system.

   b. The widened RPV water level control band provides added operational flexibility while still assuring adequate core cooling through submergence.

      NOTE: Full use of this widened control band may result in Group 1 isolations as well as ECCS initiation signals.

3. Step RC/L-6

   This step in conjunction with Step RC/P, coordinate the exit from EOP 1.

F. RPV Pressure Control (RC/P)

The RPV Pressure Control section first stabilizes RPV pressure below the high RPV pressure scram setpoint and then depressurizes and cools down the RPV to cold shutdown conditions.

1. Continuous Recheck Statements

   If any of the conditions in the following override statements occur, RPV pressure needs to be controlled in a manner other than that specified in this section.

   a. While performing the following:

      IF EMERGENCY DEPRESSURIZATION IS REQUIRED, THEN ENTER EMERGENCY DEPRESSURIZATION.

b. While performing the following:

IF RPV WATER LEVEL CANNOT BE DETERMINED,
THEN ENTER RPV FLOODING.

RPV Flooding directs a different mode of pressure control to achieve the desired effects.

c. While performing the following:

IF DRYWELL PRESSURE IS ABOVE 2.0 PSIG

THEN PREVENT INJECTION FROM CS AND LPCI PUMPS NOT REQUIRED FOR ADEQUATE CORE COOLING BEFORE DEPRESSURIZING BELOW THEIR MAXIMUM INJECTION PRESSURES

AND

PREVENT INJECTION FROM HPCI IF NOT REQUIRED FOR ADEQUATE CORE COOLING.

Uncontrolled injection only complicates actions to maintain control of RPV water level.

d. While performing the following:

IF EMERGENCY DEPRESSURIZATION IS ANTICIPATED,
THEN RAPIDLY DEPRESSURIZE THE RPV WITH THE MAIN TURBINE BYPASS VALVES.

In this condition, it is appropriate to rapidly reject as much heat energy as possible to a heat sink other than the Torus.

2. Step RC/P-1

   a. SRV cycling is manually terminated by reducing pressure substantially below the lowest SRV lifting setpoint.

   b. RPV pressure reduction is continued until the HHC pressure setpoint for 100% of the bypass valve capacity is reached.

3. Continuous Recheck Statements

   While performing the following:

   IF TORUS TEMPERATURE CANNOT BE MAINTAINED BELOW THE HEAT CAPACITY LIMIT (GRAPH 4)

   OR

   TORUS LEVEL CANNOT BE MAINTAINED BELOW THE SRV TAIL PIPE LEVEL LIMIT (GRAPH 2) THEN MAINTAIN RPV PRESSURE BELOW THE CURVE FOR THE GIVEN TORUS LEVEL AND TORUS TEMPERATURE.

   RPV pressure must be reduced in order to remain below both of these curves. Failure to do so may lead to SRV system damage, containment failure, or loss of equipment necessary for the safe shut down of the plant.

4. Steps RC/P-3 through RC/P-6

   a. The desired RPV pressure control band is specified and the preferred system to use.

   b. Torus Water level must be above the top of the SRV discharge device, otherwise discharged steam would pass directly into the Torus air space. The resultant pressure increase could potentially exceed primary containment pressure limits.

5. Steps RC/P-5 through RC/P-9

   a. Shutdown cooling is placed in service when the low RPV water level and high RPV pressure interlocks are clear.

   b. Maintaining the RPV water level in the preferred band takes priority over the forced cooldown of the RPV.

   c. Continued RPV depressurization and cooldown may be accomplished using any combination of the systems listed in Step RC/P-4.

6. Steps RC/P-10 through RC/P-12

These statements determine the exit to the appropriate section of IPOI 4. After shutdown cooling has been established, normal operating procedures provide instructions for control of RPV water level.

G. RPV Power Control (RC/Q)

RC/Q is provided to direct operator actions to the EOP ATWS when the reactor may not remain shut down under all conditions.

1. Steps RC/Q-1 through RC/Q-5

   a. If an ATWS condition exists action is directed either to the EOP ATWS procedure or to exit this section via normal shutdown procedures.

   b. If entry is made into EOP ATWS, the entire EOP-1 procedure is exited.

III. SUMMARY

Q. Given a single rod stuck at notch position 48, would EOP 1 ATWS be executed in lieu of EOP 1?

A.

Q. What two unrelated phenomenon may influence RPV pressure control per the Heat Capacity Limit?

A.

Q. Why can't the Bypass Valves be used for Emergency RPV depressurization in lieu of SRVs?

A.

b. Note that Spray Cooling, achieved by one or more CS pumps injecting at rated flow, does provide adequate core cooling, but in the long run core submergence is required and this goal will only be met by PCF flood.

6. ALC-16 through ALC-20 provide instructions for maintaining adequate core cooling when NO injection systems are available.

a. In this case, then the only action is to conserve RPV Water inventory while attempting to make an RPV injection system available such as during a Station Blackout scenario.

b. Note that ALC-13 directed an exit from RC/P of EOP 1. Low-Low Set is allowed to control RPV pressure in order to conserve inventory and transfer the maximum amount of decay heat per lbm of RPV water inventory.

c. The operator is directed to blowdown at -40 inches since below this level, adequate core cooling cannot be assured due to boil off.

d. It must be remembered that steam cooling is only a means of buying time, in order to restore injection system. It should not be seen as a final means of restoring adequate core cooling.

E. ALC Exit

ALC-9 through ALC-15 provide direction on restoring RPV Water Level and returning to RC/L for water level control.

SUMMARY

A. Goal and Structure of ALC

Q. Lists the mechanisms used in ALC to assure adequate core cooling.

A.

B. Entry Into ALC

C. Applicable Continuous Recheck Statements

D. Action Steps

Q. When is it appropriate to enter Steam Cooling?

A.

E. ALC Exit

Q. Describe the exit paths from ALC.

A.

LICENSED OPERATOR REQUAL (500-008)

STUDENT GUIDE TTT.19

ALTERNATE LEVEL CONTROL

Document Number Rev. 0

January 10, 1990

DUANE ARNOLD ENERGY CENTER

NG-90-1791
Att. 9

LICENSED OPERATOR REQUAL 500-008

STUDENT GUIDE TTT-16

EOP ATWS

Document Number Rev. 1

February 22, 1990

DUANE ARNOLD ENERGY CENTER

EOP ATWS

I. INTRODUCTION

A. Learning Objective

Upon completion of this lesson, the student will be able to use the ATWS EOP flowchart to control RPV water level, pressure, and power under ATWS conditions.

B. Enabling Objectives

Upon completion of this lesson, the student will perform the following objectives at a minimum proficiency level of 80%, unless otherwise stated.

1. Evaluate plant status and take appropriate action to control RPV water level under ATWS conditions.
2. Evaluate plant status and take appropriate action to control RPV pressure under ATWS conditions.
3. Evaluate plant status and take appropriate action to achieve a shutdown condition.
4. Explain the goal of each section of the ATWS EOP and relate these goals to the overall EOP strategy.

SRO ONLY

5. Identify and explain the transitions to Contingency procedures.
6. Evaluate overall plant status and direct appropriate actions per the EOPs.
7. Evaluate plant status and determine corrective action if applicable curves/limits are exceeded.

C. References

1. DAEC Emergency Operating Procedure Flowcharts, Rev. 0, 06/16/89
2. BWROG EPG, Rev. 4

II. PRESENTATION

A. Purpose

1. /L - Maintain adequate core cooling and use level control to reduce reactor power when containment is threatened.
2. /P - Stabilize RPV pressure to facilitate level and power control.
3. /Q - Shut down the reactor using control rods or Standby Liquid Control System.

B. Operator Actions

Continuous Recheck Statements

If the following condition occurs, RPV Control needs to be controlled in a manner other than that specified in this section.

While performing the following:

IF ALL CONTROL RODS ARE INSERTED AT LEAST TO POSITION 02

OR

IT HAS BEEN DETERMINED THAT THE REACTOR WILL REMAIN SHUTDOWN UNDER ALL CONDITIONS WITHOUT BORON

THEN TERMINATE BORON INJECTION. EXIT ALL SECTIONS OF THIS EOP AND ENTER EOP 1.

C. RPV Water Level Control (/L)

This section control RPV water level under conditions when it cannot be determined that control rod insertion will assure that the reactor remains shut down under all conditions.

- When boron is injected into the RPV, the systems used for control of RPV water level must be operated so as to minimize boron dilution and cold water injection, and to promote boron mixing.
- If the reactor cannot be shut down and Torus temperature continues to rise, RPV water level must be controlled to reduce reactor power and minimize torus heat up.

1. Step /L-1

   a. Actions in this section may deliberately lower RPV water level below the automatic initiation setpoint of ADS. Actuating ADS imposes a severe thermal transient on the RPV and complicates the efforts to maintain RPV water level and control power.

2. Continuous Recheck Statements

   If any of the following conditions occur, RPV water level needs to be controlled in a manner other than that specified in this section.

a. While performing the following:

IF ALL OF THE FOLLOWING CONDITIONS APPLY:

- **REACTOR POWER ABOVE 5% OR CANNOT BE DETERMINED**
- **RPV WATER LEVEL IS ABOVE + 15 INCHES**
- **TORUS WATER TEMPERATURE IS ABOVE 110°F**
- **ANY SRV IS OPEN OR OPENS OR DRYWELL PRESSURE IS ABOVE 2.0 PSIG**

THEN CONTINUE AT STEP /L-2.

The combination of the above conditions are symptomatic of more heat being rejected to the Torus than can be removed by Torus cooling. These conditions could ultimately result in loss of NPSH for ECCS pumps taking suction on the Torus, containment overpressurization, and loss of primary containment integrity.

b. While performing the following:

IF RPV WATER LEVEL CANNOT BE DETERMINED THEN ENTER RPV FLOODING

When RPV water level cannot be determined this section cannot be executed, and RPV Flooding is required to assure adequate core cooling.

c. While performing the following:

IF EMERGENCY DEPRESSURIZATION IS REQUIRED THEN CONTINUE AT STEP RC/L-18

These steps operate systems necessary to minimize the potential for rapid injection of large amounts of cold, unborated water into the core region as RPV pressure decreases below pump shutoff head.

d. While performing the following:

IF PRIMARY CONTAINMENT WATER LEVEL AND TORUS PRESSURE CANNOT BE MAINTAINED BELOW THE FOLLOWING LIMITS:

PRIMARY CONT. WATER LEVEL	**95 ft.**
TORUS PRESSURE	**53 psig**

THEN IRRESPECTIVE OF ADEQUATE CORE COOLING, STOP INJECTING INTO THE RPV FROM SOURCES EXTERNAL TO THE PRIMARY CONTAINMENT

UNTIL

PRIMARY CONTAINMENT WATER LEVEL AND TORUS PRESSURE CAN BE MAINTAINED BELOW THE LIMITS.

Injection into the RPV from sources outside the primary containment is terminated, irrespective of adequate core cooling concerns, in order to maintain containment integrity.

3. Steps /L-2 through /L-4

   a. Since lowering of RPV water level is performed without regard to system isolation setpoints, the Drywell Nitrogen supply and MSIVs are maintained in the open position by overriding the applicable RPV water level interlocks.

4. Steps /L-5 and /L-6

   a. These Steps deliberately lower RPV water level to reduce reactor power.

   b. No action to re-establish injection to the RPV is to be taken until either:

      - Torus heatup is terminated or reduced to near that of decay heat.
      - RPV water level decreases to the top of the active fuel.

5. Steps /L-7 and /L-8

   a. These steps define the preferred ranges RPV water level should be maintained, and specify the preferred systems to use. The operator must remain aware of system initiations and isolations that may occur if RPV level is allowed to fall below +119.5 inches or +46.5 inches.

   b. The widened RPV water level control band provides added operational flexibility while still assuring adequate core cooling through submergence.

6. Steps /L-9 and /L-18-19

   a. If RPV water level cannot be maintained above the Minimum Steam Cooling RPV Water Level, Emergency RPV Depressurization is required for the purposes of maximizing injection flow from high pressure pumps and to permit injection from low pressure pumps.

7. Step /L-18

   Injection into the RPV (except CRD, RCIC, and Boron injection) is terminated and prevented, while Emergency RPV Depressurization proceeds, in order to prevent uncontrolled injection of cold water as RPV pressure decreases below the shutoff head of various pumps.

8. Steps /L-21 and RC/L-22

   When RPV pressure drops below the Minimum Alternate RPV Flooding Pressure, injection into the RPV must be reestablished to maintain adequate core cooling.

9. Steps /L-23 through /L-25

   a. Injection is controlled to keep the core submerged and to make up for losses through the open SRVs.

b. The LPCI System is operated even if NPSH or Vortex Limits are exceeded. The undesirable consequences of uncovering the core and loosing adequate core cooling outweighs the risk of any equipment damage.

c. If RPV water level cannot be restored and maintained above the Minimum Steam Cooling RPV Water Level using the preferred systems, additional systems are required.

10. Steps /L-26 through /L-31

a. If all available systems and alternate systems are unable to restore and maintain adequate core cooling, an attempt to submerge the core is made by flooding the primary containment (Contingency #6).

b. If RPV water level can be restored and maintained, the operator is looped back to Step /L-6 or /L-7.

c. Section RC/L can be exited by maintaining RPV water level above -30 inches and following Steps /L-10 through /L-16.

11. Continuous Recheck Statement

While performing the following:

IF REACTOR POWER BEGINS AND CONTINUES TO INCREASE THEN RETURN TO STEP /L-2

a. If reactor power increases and continues to increase as RPV water level is restored to the normal range, the boron required to shut down the reactor has not reached the core.

b. As injection into the RPV is initially increased to raise RPV water level, a small transient increase in reactor power is expected as natural circulation core flow is reestablished.

12. Steps /L-10 through /L-12

a. In-core mixing of the injected boron is achieved by raising RPV water level and increasing natural circulation flow through the vessel.

13. Steps /L-13 and /L-17

a. When adequate core cooling through core submergence cannot be achieved, emergency RPV depressurization is required in order to maximize injection flow from high-head pumps and permit injection from low-head pumps.

b. Depressurizing the RPV is preferred over restoring RPV water level through the use of systems which inject inside the shroud because of the large reactor power excursions which may result from large volume of unborated, relatively cold water.

14. Steps /L-14 through /L-16

Once RPV water level control is stabilized and the reactor is shut down, the exit is through EOP I. EOP I is intended to be the normal exit for all EOPs.

D. Pressure Control (/P)

The RPV Pressure Control section first stabilizes RPV pressure below the high RPV pressure scram setpoint.

The main turbine bypass valves and the main condenser is the preferred method for discharging steam from the RPV, but alternate methods are identified.

1. Continuous Recheck Statements

If any of the following conditions occur, RPV pressure needs to be controlled in a manner other than that specified in this section.

a. While performing the following:

EMERGENCY DEPRESSURIZATION IS THEN ENTER EMERGENCY DEPRESSURIZATION.

b. While performing the following:

IF RPV WATER LEVEL CANNOT BE THEN ENTER RPV FLOODING.

Continued control of RPV pressure can proceed directly with Contingency #4 (RPV/F).

c. While performing the following:

IF DRYWELL PRESSURE IS ABOVE 2.0 PSIG

THEN PREVENT INJECTION FROM CS AND LPCI PUMPS NOT REQUIRED FOR ADEQUATE CORE COOLING BEFORE DEPRESSURIZING BELOW THEIR MAXIMUM INJECTION PRESSURES

AND

PREVENT INJECTION FROM HPCI IF NOT REQUIRED FOR ADEQUATE CORE COOLING.

If injection from ECCS pumps is not required to assure adequate core cooling, uncontrolled injection only complicates actions to maintain control of RPV water level.

2. Steps /P-1 and /P-2

a. SRV cycling that is not per LLS design is manually terminated by reducing RPV pressure substantially below the lowest SRV lifting setpoint.

b. EHC Press Set is reduced to 880 psig to ensure steam flow through the main turbine bypass valves is 100% of the bypass valve capacity with SRVs closed at 900 psig.

3. Continuous Recheck Statements

a. While performing the following:

IF BORON INJECTION IS REQUIRED

AND

THE MAIN CONDENSER IS AVAILABLE

AND

THERE IS NO INDICATION OF GROSS FUEL FAILURE OR STEAM LINE BREAK THEN OVERRIDE MSIV LO-LO-LO LEVEL TRIP. OPEN MSIVs TO ESTABLISH THE MAIN CONDENSER AS A HEAT SINK. RETURN TO STABILIZE RPV PRESSURE.

1) With the reactor not shut down, and the steam discharged to the suppression pool, the Heat Capacity Limit could be reached in a very short period of time.

2) This override permits bypassing the low RPV water level portion of the MSIV isolation logic, and any interlocks which inhibit restoration of the pneumatic supply to the MSIV actuators.

3) The MSIVs may be reopened if all of the following conditions exist:

- Boron Injection is required.
- The Main Condenser is available.
- No indication of "gross" fuel failure.
- No indication of a steam line break.

b. While performing the following:

IF TORUS TEMPERATURE CANNOT BE MAINTAINED BELOW THE HEAT CAPACITY LIMIT (GRAPH 4)

OR

TORUS LEVEL CANNOT BE MAINTAINED BELOW THE SRV TAIL PIPE LEVEL LIMIT (GRAPH 2)

THEN MAINTAIN RPV PRESSURE BELOW THE CURVE FOR THE GIVEN TORUS LEVEL AND TORUS TEMPERATURE.

RPV pressure must be reduced in order to remain below the SRV Tail Pipe Level Limit and the Heat Capacity Limit. Failure to do so may lead to SRV system damage, containment failure, or loss of equipment necessary for the safe shut down of the plant.

4. Steps /P-4 and /P-5

   a. The desired RPV pressure control band is specified and the preferred system to use. Controlling RPV pressure below this value avoids SRVs lifting due to high pressure, and allows the scram logic to be reset.

   b. If the main turbine bypass valves are not available or not of sufficient capacity, additional systems must be used to augment RPV pressure control.

5. Steps /P-6 through /P-8

   When the reactor is shut down, an exit from the RPV pressure control section of ATWS EOP I is permitted.

E. RPV Power Control (/Q)

/Q reduces reactor power and shuts down the reactor by manual control rod insertion and boron injection. the reactor is shut down is this section

1. Steps /Q-1 through /Q-3

   a. An immediate and rapid reactor power reduction is achieved by reducing reactor recirculation flow rate. The recirculation pumps are tripped after the runback to achieve a more controlled reduction in reactor power and avoid tripping the main turbine if it is on line.

   b. Initiating ARI provides an independent and redundant means of depressurizing the reactor scram air header and operating the scram discharge volume vent drain valves.

2. Step /Q-5

   ARI is reset as necessary per EOP C in order to allow rod insertion during Step /Q-6.

3. Step /Q-6

   The OSS is provided with the "menu" of rod-insertion techniques. He is to determine which techniques will be most likely to insert rods and proceed with that method per the EOP C's.

   a. Deenergizing Scram Solenoids

      These actions are designed to vent the scram air header by de-energizing the scram solenoids using the RPS test switches or pulling the scram solenoid fuses. Deenergizing all RPS power could cause unwanted isolations.

   b. Individual Scram Test Switches

      Opening individual scram test switches acts on only a single control rod at a time, and may be more effective than a full core scram because the total available differential pressure of the CRD hydraulic system is applied to the single selected rod.

c. Vent Scram Air Header

If the scram air header remains pressurized following de-energization, then the air header is vented. This action is last because other actions can be done from the Control Room, access to the Reactor Building may be impaired, the HCU area may not be accessible, or operators may be occupied.

d. Manually Driving Rods

Independent of efforts to scram the reactor, inward rod motion is attempted. Inward rod motion may be achieved by driving rods with EMERGENCY IN and an increased CRD cooling water differential pressure.

In order to drive rods they must be selectable, and the CRD charging header isolated so that drive header pressure can be established.

e. Vent Individual CRD Exhaust Headers

Venting the CRD over-piston area is a last resort step due to the hazards involved with venting reactor coolant into open areas.

f. Reset Scram

Resetting the scram will require ARI to be reset and may require RPS trips to be bypassed.

4. Steps 7 and 8

a. If Torus temperature and RPV pressure cannot be maintained below the Heat Capacity Temperature Limit, rapid depressurization of the RPV will be required. To avoid depressurizing the RPV with the reactor at power, it is desirable to shut down the reactor prior to reaching the Heat Capacity Temperature Limit, and minimizing the quantity of heat rejected to the Torus.

b. Defeating ADS is appropriate whenever boron injection is required in order to prevent the injection of large amounts of relatively cold, unborated water from low pressure injection systems.

5. Steps 9 and 11

Although the SBLC System is highly reliable, a number of shared components make the SBLC System susceptible to a single failure. Boron injection is therefore handled alternately with the Reactor Water Cleanup System.

6. Continuous Recheck Statement

While performing the following:

IF SBLC TANK LEVEL DROPS TO 0% THEN MANUALLY TRIP THE SBLC PUMPS.

Failure to secure the SBLC pumps before the SBLC pump suction inlet becomes uncovered may result in mechanical damage to the pumps.

7. Step 10

   It is desirable to have RWCU isolated when boron is being injected because:

   - The filter and demineralizer volume is not included in the shutdown weight calculation.
   - The demineralizers remove boron from the reactor coolant.
   - Boron may plate out on the cooler sections of the RWCU System piping.

8. Steps 12 through 14

   Boron injection is continued until sufficient boron has been injected into the RPV to maintain the reactor shut down under cold conditions irrespective of control rod position.

III. SUMMARY

Q. Given two rods stuck at notch position 02. What is the response to step RC/Q-1 in EOP 1?

A.

Q. The RO notes that the reactor is in the source range with SBLC tank level at 49%. Attempts to move control rods have met with limited success. The RO requests to secure SBLC injection. Is the proposed action appropriate?

A.

Q. While waiting at step /L-22, RPV pressure drops below 260 psig with 4 SRVs open. Is adequate core cooling being maintained?

A.

Q. Why is Core Spray not used for injection initially in ATWS EOP 1?

A.

Q. Why is pressure set lowered in section RC/P of EOP 1 ATWS?

A.

NG-90-1791
Att. 10

LICENSED OPERATOR REQUAL REMEDIAL TRAINING

7/11/90 - 7/13/90, Wednesday, Thursday, Friday

INSTRUCTORS: Kye Dawald
Charlie Tirella
Ellis Vann

CREW: Kevin Huber
Wayne Render
Ed Harrison
John Krueger

DAY 1

ESG-15	ATWS w/SORV
REM 90-6	Hydraulic Lock ATWS
REM 90-5	Loss of DW Cooling/Steam Leak Requiring Use of DW Sprays
LUNCH	(no classroom)
ESG-15	ATWS w/SORV

DAY 2

ESG-8	RWCU Leak/MSL Leak in Steam Tunnel
REM 90-2	Partial Loss of ESS Bus 1A3/Instrument AC W/LOCA
REM 90-10	Loss of 125V DC Div I W/Leak Inside Containment

LUNCH

CLASSROOM

EOP-1, EOP-2, ATWS-EOP and Exam preparation concerns.

ARPs 1C35B C-1, SBGT Relief Open

ARP 1C03A B-5, SORV Temp/Bellows Failure

ARP 1C05B C-5, Primary Containment Hi/Lo Pressure

ESG-8, RWCU Leak/MSL Leak in Tunnel

HPCI Inop / Loss 1A4

DAY 3

ESG-3	Recirc Seal Failure/Small LOCA Inside Containment
REM 90-8	Station Blackout
REM 90-7	Recirc Pump Trip w/ATWS (ran twice)

LUNCH

CLASSROOM

Reviewed OI-573, Primary Containment Control, especially venting control changes

ESG-13, Recirc Pump Trip/w LOCA Failure of Inject Valve

PLEASE USE BLACK INK

[redacted]URSE QUOTA CONTROL LOG
[redacted]A ELECTRIC TRAINING CENTER
COURSE: 500-008 Licensed Operator Requal
Cycle 4 [redacted]
INSTRUCTOR: KD1 DAWALD/TIRELLA/VANN SPONSOR: 0001
COURSE LENGTH: ~~240~~ 30 hrs.

7-11-90 TO 7-13-90
CLASS HOURS: ~~8~~ 10
LOCATION: SIMULATOR WEEK 1 OF 1 WEEKS
TIME: 0700-1700 CLCVN DATE: 7-11-90

NAME	EXT.	TLD #	SSN	CO.	SIGNATURE
1. EDWARD E HARRISON	7262	869	484 72803	IE	Edward E Harrison
2. JOHN M KRUEGER	7262	457	478 82 5212	IE	John M Krueger
3. Kevin J. Huber	723-	653	481-76-6808	IE	Kevin J. Huber
4. Wayne Reneker	7266	278	356-36-0269	IE	Wayne Reneker
5. Tim Enger	7735	44	484-78-4100	IE	Timothy J. Enger
6.					
7.					
8.					
[redacted]					
10. All the above attended 3 ten-hour days					
11.					
12.					
13.					
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21.					
22.					
23.					
[redacted]					
25.					

ENTERED [illegible]

STUDENT SIMULATOR PROGRESS EVALUATION

Student Name K. Huber

Dates Covered _____

Position RO/(SRO)/STA 'A' OSS

Week/Cycle # 7-11-90 / 7-13-90

Class IILC/UPGRADE/STA/(REQUAL)

SCENARIO NO.	PROBLEMS NOTES	CORRECTIVE ACTION
Day 1	DID NOT MEET CONTINUOUS RECHECK STATEMENT REQUIREMENTS FOR LOWERING RPV LEVEL DURING AN ATWS (ESG-15)	CRITICAL TASK #46 reviewed + critiqued RE-RAN LATER IN DAY
Day ~~2~~ 1	DID NOT ~~MEET~~ DIRECT MAXIZATION OF Torus Cooling until well into Scenario (ESG-15)	critical task #86 reviewed + critiqued RE-RAN LATER IN DAY
Evaluated all critical TASKS SAT FOR REM 90-6, REM 90-5, Rem 90-2		
Day ~~3~~ 2	EVALUATED ESG #8, Rem 90-2, Rem 90-10, ESG-#8, All critical tasks SAT	
Day ~~4~~ 3	EVALUATED ESG #3, Rem-90-2, Rem 90-10, ESG-#8, Rem 90-7 All critical tasks, SAT	
Day ~~5~~		

Attached pages [X] Yes [ ] No

Frank Van Sutter for K. DAWALD 7-18-90

Student Review Signature Date

Instructor(s) Signature(s) Date(s)

TDF 1802.60(6)
01/08/90

CRITICAL TASK FAILURES/WEAKNESSES

I ESG-15 "DAY-1" 7/11/90

KEVIN HUBER - "A" OSS

a) DID NOT MEET CONTINUOUS RECHECK STATEMENT REQ'TS FOR LOWERING RPV LEVEL DURING AN ATWS. (CRITICAL TASK #4b)

b) DID NOT DIRECT MAXIMIZATION OF TORUS COOLING UNTIL WELL INTO SCENARIO (AFTER 2 #). (CRITICAL TASK #8b)

JOHN KRUEGER - "ANSOE"

a) DID NOT MAXIMIZE TORUS COOLING AS DIRECTED. TOOK A LONG TIME (7 MINUTES) TO ACCOMPLISH THIS TASK. (CRITICAL TASK #9)

II REM 90-6

JOHN KRUEGER "NSOE"

a) DID NOT MAXIMIZE TORUS COOLING AS DIRECTED. (DID NOT HAVE REQUIRED FLOW RATE OR ESW pumps (BOTH) ON.) (CRITICAL TASK #5)

III ESG-15

WAYNE RENDER - "A" OSS

a) DID NOT DIRECT OVERRIDE OF MSIV LO-LO-LO ISOLATION DEFEAT 5. (CRITICAL TASK #4c)

STUDENT SIMULATOR PROGRESS EVALUATION

Student Name WAYNE RENDER

Dates Covered 7-11-90 to 7-13-90

Position RO (SRO) STA

Week/Cycle # _____

Class ILC/UPGRADE/STA (REQUAL)

SCENARIO NO.	PROBLEMS NOTES	CORRECTIVE ACTION
Day 1	EVALUATED ES6 #15, Rem 90-6, Rem 90-5, Rem 90-2 All TASKS EVALUATED SAT.	
Day 2	DID NOT DIRECT override of MSIV LO-LO-LO ISOLATION (DEFEAT 5) DURING ES6-15	critiqued went over basis for Defeat 5.
Day 3	Evaluated ES6 #8, REM 90-2, Rem 90-10, ES6 #8, Rem 90-7 All critical tasks SAT.	
Day 4	ES6 #3, Rem 90-8, Rem 90-7, Rem 90-7, ES6-13 Evaluated all critical tasks SAT.	
~~Day 5~~		

Attached pages ☒ Yes ☐ No

Student Review Signature Date

Instructor(s) Signature(s) Date(s) 7-18-90

TDF 1802.60(6)
01/08/90

CRITICAL TASK FAILURES/WEAKNESSES

I ESG-15 "DAY-1" 7/11/90

KEVIN HUBER - "A" OSS

a) DID NOT MEET CONTINUOUS RECHECK STATEMENT REQ'TS FOR LOWERING RPV LEVEL DURING AN ATWS. (CRITICAL TASK #4b)

b) DID NOT DIRECT MAXIMIZATION OF TORUS COOLING UNTIL WELL INTO SCENARIO (AFTER 2 #). (CRITICAL TASK #8b)

JOHN KRUEGER - "ANSOE"

a) DID NOT MAXIMIZE TORUS COOLING AS DIRECTED. TOOK A LONG TIME (7 MINUTES) TO ACCOMPLISH THIS TASK. (CRITICAL TASK #9)

II REM 90-6

JOHN KRUEGER "NSOE"

a) DID NOT MAXIMIZE TORUS COOLING AS DIRECTED. (DID NOT HAVE REQUIRED FLOW RATE OR ESW PUMPS (BOTH) ON.) (CRITICAL TASK #5)

III ESG-15

WAYNE RENDER - "A" OSS

a) DID NOT DIRECT OVERRIDE OF MSIV LO-LO-LO ISOLATION DEFEAT 5. (CRITICAL TASK #4c)

STUDENT SIMULATOR PROGRESS EVALUATION

Student Name Ed Harrison

Dates Covered 7-11-90 7-13-90

Position (RO)/SRO/STA

Week/Cycle # _____

Class ILC/UPGRADE/STA/(REQUAL)

SCENARIO NO.	PROBLEMS NOTES	CORRECTIVE ACTION
Day 1	ESG #15, Rem 90-6, Rem 90-5, ESG #15, Rem 90-2 All critical tasks evaluated as SAT.	
Day 2	ESG #8, Rem 90-2, Rem 90-10, ESG #8, Rem 90-7 All critical tasks evaluated as SAT.	
Day 3	ESG #3, Rem 90-8, Rem 90-7, Rem 90-7, ESG #13 All critical tasks evaluated as SAT.	
~~Day 4~~		
~~Day 5~~		

Attached pages [X] Yes [ ] No

Student Review Signature Date

Frank W. Ritter for K. DAWALD

Instructor(s) Signature(s) Date(s)

7-19-90

TDF 1802.60(6)
01/08/90

CRITICAL TASK FAILURES/WEAKNESSES

I ESG-15 "DAY-1" 7/11/90

KEVIN HUBER - "A" OSS

a) DID NOT MEET CONTINUOUS RECHECK STATEMENT REQ'TS FOR LOWERING RPV LEVEL DURING AN ATWS. (CRITICAL TASK #4b)

b) DID NOT DIRECT MAXIMIZATION OF TORUS COOLING UNTIL WELL INTO SCENARIO (AFTER 2 #). (CRITICAL TASK #8b)

JOHN KRUEGER - "ANSOE"

a) DID NOT MAXIMIZE TORUS COOLING AS DIRECTED. TOOK A LONG TIME (7 MINUTES) TO ACCOMPLISH THIS TASK. (CRITICAL TASK #9)

II REM 90-6

JOHN KRUEGER "NSOE"

a) DID NOT MAXIMIZE TORUS COOLING AS DIRECTED. (DID NOT HAVE REQUIRED FLOW RATE OR ESW PUMPS (BOTH) ON.) (CRITICAL TASK #5)

III ESG-15

WAYNE RENDER - "A" OSS

a) DID NOT DIRECT OVERRIDE OF MSIV LO-LO-LO ISOLATION DEFEAT 5. (CRITICAL TASK # 4c)

STUDENT SIMULATOR PROGRESS EVALUATION

Student Name John Krueger

Dates Covered 7-11-90 7-13-90

Position (RO)/SRO/STA

Week/Cycle # _____

Class HLC/UPGRADE/STA/(REQUAL)

SCENARIO NO.	PROBLEMS NOTES	CORRECTIVE ACTION
Day 1 Rem 90-6 ESG # 8, 15 critical TASK #9	DID NOT MAXIMIZE TORUS cooling AS Directed. Did not have req'd Flow critical TASK #5.	Req'd John to Practice Torus cooling AFTER Scenario's
Day 2	REM 90-5, ESG #15, Rem 90-2 All critical tasks were SAT.	
Day 2	Absent from Scenario ESG #8, Rem 90-2, Rem 90-10, ESG #8, Rem 90-7 All critical tasks were SAT	RE-RAN ESG #8
Day 3	RAN ESG #3, Rem 90-8, Rem 90-7, Rem 90-7, ESG-13 All critical tasks were COMPLETED SAT	
Day 3		

Attached pages [X] Yes [ ] No

Student Review Signature Date

Frank Watts for K. DAWALD 7-19-90

Instructor(s) Signature(s) Date(s)

CRITICAL TASK FAILURES/WEAKNESSES

I ESG-15 "DAY-1" 7/11/90

KEVIN HUBER - "A" OSS

a) DID NOT MEET CONTINUOUS RECHECK STATEMENT REQ'TS FOR LOWERING RPV LEVEL DURING AN ATWS. (CRITICAL TASK #4b)

b) DID NOT DIRECT MAXIMIZATION OF TORUS COOLING UNTIL WELL INTO SCENARIO (AFTER 2 #). (CRITICAL TASK #8b)

JOHN KRUEGER - "ANSOE"

a) DID NOT MAXIMIZE TORUS COOLING AS DIRECTED. TOOK A LONG TIME (7 MINUTES) TO ACCOMPLISH THIS TASK. (CRITICAL TASK #9)

II REM 90-6

JOHN KRUEGER "NSOE"

a) DID NOT MAXIMIZE TORUS COOLING AS DIRECTED. (DID NOT HAVE REQUIRED FLOW RATE OR ESW PUMPS (BOTH) ON.) (CRITICAL TASK #5)

III ESG-15

WAYNE RENDER - "A" OSS

a) DID NOT DIRECT OVERRIDE OF MSIV LO-LO-LO ISOLATION DEFEAT 5. (CRITICAL TASK #4c)

NG-90-1791
Att. 11

LICENSED OPERATOR REQUAL REMEDIAL TRAINING

7/14/90 - 7/16/90, Saturday, Sunday, Monday

INSTRUCTORS: J. Bennett
M. Meyer
C. Hunt

CREW: K. Morgan
G. Kaegi
P. Sullivan
S. Arebough - day 1 and day 2
J. Mellem - day 3 only

DAY 1

ESG-15	ATWS w/SORV
REM 90-6	Hydraulic Lock ATWS
REM 90-7	Recirc Pump Trip w/ATWS (ran twice)
REM 90-9	Turbine Trip With ATWS
REM 90-6	Hydraulic Lock ATWS

Class ATWS EOP

DAY 2

ESG-3	Recirc Seal Failure/Small LOCA Inside Containment
REM 90-10	Loss of 125v DC Div I W/Leak Inside Containment
REM 90-8	Station Blackout
REM 90-5	Loss of DW Cooling/Steam Leak Requiring Use of DW Sprays

Class EOP 1, EOP 2, LPCI Loop Select, RPV/F, ALC, ED

DAY 3

ESG-8	RWCU Leak/MSL Leak in Steam Tunnel
REM 90-1	Leak Outside Primary Containment
REM 90-12	Loss of All Power to Nonessential Busses 1A1 and 1A2

Class EOP 3

PLEASE USE BLACK INK

COURSE QUOTA CONTROL LOG
IOWA ELECTRIC TRAINING CENTER
COURSE: Regular 500-008

7/14/90 TO 7/16/90

CLASS HOURS:

INSTRUCTOR: JBI SPONSOR: 0001 LOCATION: SIM WEEK OF WEEKS

COURSE LENGTH: 30 hrs. TIME: n/a - CLCVN DATE: 7/14/90

NAME	EXT.	TLD #	SSN	CO.	SIGNATURE
1. J. Mollen	7262	534	384-00-1646	IE	Jerome J Mollen
2. R. Sullivan	7263	473	479-50-4185	IE	Robert Sullivan
3. Glen Kaegi	7230	444	401-78-3949	IE	
4. [illegible]	[illegible]	[illegible]	[illegible]	IE	
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12. NOTE * SCOTT AREBAUGH ATTENDED 2 DAYS WITH					
13. TITUS CREW, TERRY MELLEN WILL SUBSTITUTE					
14. 2 DAYS ON AREBAUGHS CREW, ALL WILL					
15. HAVE RECEIVED 30 HOURS TOTAL FOR SESSION #1					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					

STUDENT SIMULATOR PROGRESS EVALUATION

Student Name Kevin Morgan

Dates Covered 7/14 - 7/16/90

Position RO/SRO/STA

Week/Cycle # Remedial Training Session #1 1990

Class IILC/UPGRADE/STA/REQUAL

SCENARIO NO.	PROBLEMS NOTES	CORRECTIVE ACTION
Day 1 ESG 15 ATWS w/ SCSRV (A OSS)	(CT) (1) didn't order HPCI/RCIC stopped to lower level (2) initially said to take level to 15" on power/level control, corrected	critiqued
REM 90-6 Hydraulic lock ATWS (B OSS)	(1) didn't realize ARI keeping MSR header vented	
~~Day 2~~ 90-7 'A' OSS	1) left SRV manually open 2) HPCI & RCIC injected	
90-9 'B' OSS	None	
90-6 'A' OSS	~~None~~ 1) SXS control Rod array	
~~Day 2~~ ~~Day 3~~ ESG 3 (Boss)	(1) didn't realize HDS initiation had occurred	
REM 10 (A OSS)	(1) didn't ED @ 115" until prompted (2) monitor level, locked in on ECP-2 (3) didn't give clear orders on IDIC loss	
DAY 2 ~~Day 4~~ 90-5 (B OSS)	(1) need to do EPIPs when operators can handle panels (2) asked for level several times even though told we had entered RPV floodmap	
90-5 (A OSS)	(1) entering (due to miscommunication) RPV flooding before necessary (2) use BYPASS valves to ↓ press if anticipating ED	
DAY 3 ~~Day 5~~ ESG 5 (A OSS)	(1) Good on ECP-3 (2) Be direct with communications	
REM 90-1 (B OSS)	(1) Reported MSIV Torus closure all pumps not running (2) good assistance on ECP-3 numbers	

Attached pages ☒ Yes ☐ No (on back)

Student Review Signature Date

Instructor(s) Signature(s) 7/16/90 Date(s)

REM 90-12 (A OSS)

(1) didn't know ADS TIMERS ~~SHOULD HAVE~~ HAD INITIATED
(2) NEED TO ANTICIPATE ALTERNATE LEVEL CONTROL & BE READY TO EJ
(3) NEED TO MAXIMIZE INJECTION WHEN IN NLC UNTIL LEVEL IS > 15"

REM 90-7 (B OSS)

(1) BREAK AWAY TO do EALS AS SOON AS FEASIBLE

REM 90-2 (A OSS)

(1) ENTER RPV SATURATION CURVE & didn't RECOGNIZE
(2) BE SPECIFIC ON ORDERS TO RO
(3) Good on UPDATING CREW

STUDENT SIMULATOR PROGRESS EVALUATION

Student Name Glen Kaegi

Dates Covered 7/14 - 7/16/90

Position RO/SRO/STA

Week/Cycle # Remedial 1990 Session #1

Class IILC/UPGRADE/STA/REQUAL

SCENARIO NO.	PROBLEMS NOTES	CORRECTIVE ACTION
Day 1 ESG 15 'B' OSS	1.) upgraded EAL quickly 2.) prompted SLC + power level/control/EAL	
REM 90-6 'A' OSS	1.) ARI venting air header (didn't realize)	
~~DAY 1~~		
~~Day 2~~ 90-7 'B' OSS	NONE	
90-9 'A' OSS	1.) entered power level early 2.) ordered defeat 3, SA) 12 when not required	
~~DAY 2~~ 90-6 'B' OSS	1.) 5X5 control rod array 2.) RHRSW on no ESW 3.) said on Range IRM + IRMs were not inserted	
~~Day 3~~		
ESG 3 (A OSS)	(1) didn't REALIZE ADS INITIATION (2) NEED TO GIVE CLEAR DIRECTION TO OPERATORS (3) MONITOR LEVEL, IT DROPPED WITHOUT CREW APPEARING TO KNOW	
REM 90-10 (B OSS)	(1) STEP 1A2 PRIOR TO REEMERGENCY (2) didn't REALIZE LEVEL GOT TO 2#S" WITH MSIVs OPEN	
~~Day 4~~ DAY 2		
90-8 (A OSS)	(1) ~~SAY FROM~~ STA CORRECTED SPRAY FROM DRYWELL WHEN OUTSIDE GRAPH (2) Pull B OSS of PANELS WHEN ROs CAN HANDLE OPERATIONS (3) GIVE SPECIFIC ORDERS	
90-5 (B OSS)	(1) SEEMED TO LOCK IN ON LOSS OF VENT PATH	
~~Day 5~~ ESG 8 (B OSS)	(1) NONE	
REM 90-1 (A OSS)	(1) PROVIDE UPDATES TO CREW (2) GIVE SPECIFIC ORDERS TO ROs (3) USE ROs ON PANELS INSTEAD OF OSS IF POSSIBLE	

Attached pages [X] Yes (on BACK) [ ] No

Student Review Signature Date

Instructor(s) Signature(s) 7/16/90 Date(s)

TDF 1802.60(6)
01/08/90

REM 90-12 (Boss)
(1) declared WRONG level EAL
(2) didn't KNOW ADS TIMERS INITIATED
(3) good on EOP-3

REM 90-7 (A oss)
(1) NEED TO GIVE A level BANDS TO RO
(2) NEED TO TELL ROs HOW low TO TAKE level
(3) give UPDATES TO operators on Big picture

REM 90-2 (Boss)
(1) communications on IAS problems
(2) TRIED to use DG onto locked out BJS
(3) communications on RHR interf to RO
(4) BREAK away TO MAKE EAL AS soon AS possible, LET operators Handle panels

STUDENT SIMULATOR PROGRESS EVALUATION

Student Name Paul Sullivan

Dates Covered 7/14 - 7/16/90

Position RO/SRO/STA

Week/Cycle # Remedial 1990
SESSION #1

Class ILC/UPGRADE/STA/REQUAL

SCENARIO NO.	PROBLEMS NOTES	CORRECTIVE ACTION
Day 1 ESG 1	1.) HPCI & RCIC start on level (power/level control) 2.) Tried to drive rods with no CRD pump	
90-6	1.) HPCI & RCIC injected 2.) ARI vent header vented (did not realize)	
90-7	1.) HPCI & RCIC injected 2.) closed SRV in manual (good)	
~~DAY 1~~		
~~Day 2~~ 90-9	1.) HPCI & RCIC did not inject (good) 2.) good manual pressure control	
90-6	1.) Start Feed HI level trip in	
DAY 2		
~~Day 3~~ ESG 3 (NSCE)	(1) ADS INITIATION- didn't REALIZE (2) Told OSS level 6, But didn't THINK ABOUT HPCI THROTTLED (3) DEFEAT 4, THEN SHUT OFF PUMPS	
REM 90 (ANSCE)	(1) didn't OPEN drywell spray valve until PROMPTED (2) LEVEL AT 245" WITH ADSVs OPEN, REMEMBER TO CHECK FLOODUP TIMES	
~~Day 4~~ REM 90-4 (ANSCE)	(1) CHECK LEADS ON DG WHEN STARTING PUMPS	
REM 90-5 (ANSCE)	(1) STARTED RFP W/NO MCF- CORRECTED SELF (2) NO ACKNOWLEDGEMENT FROM OSS ON LOSS of 1852	
~~DAY 3~~		
~~Day 5~~ ESG 4 (NSCE)	(1) ✓ OTHER LEVELS BESIDES FUEL ZONE, FLOODUP @ 245"	
REM 90-1 (ANSCE)	(1) good on diagnostics, valve open	

Attached pages ☒ Yes ☐ No
ON BACK

Student Review Signature Date

Instructor(s) Signature(s) Date(s) 7/16/90

REM 90-12 (NSEE)

(1) DON'T KNOW ADS TIMERS ON
(2) MAXIMIZE INJECTION WITH RHR WHEN IN ALC, SHUT OFF DRYWELL SPRAYS, TORUS COOLING IF NECESSARY

REM 90-7 (ANSEE)

(1) BYPASS RWM WHEN INSERTING RODS

REM 90-2 (NSEE)

(1) good on questioning order to secure injection
(2) good on DG, BUT let OSS know

STUDENT SIMULATOR PROGRESS EVALUATION

Student Name JERRY MELLEM

Dates Covered 7/14- 7/16/90

Position (RO)/SRO/STA

Week/Cycle # REMEDIAL 1990 SESSION #1

Class HLC/UPGRADE/STA/(REQUAL)

SCENARIO NO.	PROBLEMS NOTES	CORRECTIVE ACTION
~~Day 1~~ ~~DAY 3~~ ESG 8 (ANSOE)	(1) CHECK OTHER LEVEL INDICATORS BESIDES FUEL ZONE WHEN DEPRESSURIZED	
REM 90-1 (ANSOE) ~~DAY 3~~	(1) WHEN CHECKING STEAM LEAK DETECTION PANEL, REPORT #'S TO OSS	
~~Day 2~~ REM 90-12 (ANSOE)	(1) DIDN'T KNOW ADS TIMER INITIATED (2) ATTACH A NAME TO COMMUNICATIONS TO HELP ENSURE THE MESSAGE IS HEARD	
REM 90-7 (ANSOE)	(1) good 3 panel ops	
~~Day 3~~ ~~DAY 3~~ REM 90-2 (ANSOE)	(1) WATCH PUMP AMPS TO PREVENT OVERLOAD TRIPS DUE TO EXCESSIVE FLOW (2) good on TRYING TO STRAIGHTEN OUT COMMUNICATION ~~MESS~~ MISUNDERSTANDINGS	
Day 4		
Day 5		

Attached pages ☐ Yes ☐ No

Student Review Signature Date

Instructor(s) Signature(s) 7/16/90 Date(s)

TDF 1802.60(6)
01/08/90

STUDENT SIMULATOR PROGRESS EVALUATION

Student Name Scott AREBAUGH

Dates Covered 7/14 - 7/16/90

Position (RO)/SRO/STA

Week/Cycle # REMEDIAL 1990 SESSION #1

Class ILC/UPGRADE/STA/REQUAL

SCENARIO NO.	PROBLEMS NOTES	CORRECTIVE ACTION
Day 1 ESG 1)	1) HPCI-B RCIC injection	
90-6	2) HPCI-A RCIC injection 2) ~~Reactor~~ ARI kept header vented (did not realize)	
90-7	1) HPCI & RCIC injected 2) Manual rod insertion per EOP-C no RWM bypass	
~~Day 2~~ DAY 1		
~~Day 2~~ 90-9	1) Manual rod insertion per EOP-C (good) 2) HPCI & RCIC didn't inject (good)	
90-6	1) tried to start HPCI - hi level trip in 2) TC on no ESW running	
DAY 2		
~~Day 3~~ ESG 3 (ANSCE)	(1) ADS INITIATION - didn't REALIZE (2) level ↓ ; OOS didn't REALIZE, REMEMBER TO ✓ FUEL ZONES & REPEAT (3) RHRSW LOCK OVERRIDES - CORRECTED SELF	
REM 90 10 (NSCE)	(1) didn't see level @ 245" WITH MSIV's OPEN, REMEMBER TO USE FLOODUP INST (2) STEP IAZ PRIOR TO REENERGIZING	
DAY 2		
~~Day 4~~ 90-8 (NSCE)	(1) Good on RECOGNIZING level INSTRUMENTS NO good (2) REMEMBER NARROW RANGE PRESS ON LOOP	
90-5 (NSCE)	(1) CHECK TORUS PRESS > 2# PRIOR TO SPRAYS (2) REMEMBER TO USE RHR CROSSTIE TO SPLIT SPRAYS/INJECTION	
~~Day 5~~		

Attached pages ☐ Yes ☒ No

Student Review Signature Date

Instructor(s) Signature(s) Date(s) 7/16/90

TDF 1802.60(6)
01/08/90