

**Appendix D**

**Scenario Outline**

**Form ES-D-1**

Facility: Duane Arnold Energy Center Scenario No.: 1 Op-Test No.: 19-1 NRC

Examiners: \_\_\_\_\_

Operators: SRO-U (2), SRO-I (4), RO (5)

Initial Conditions/Turnover:

Reactor Power is 75%

Guarded Equipment: Spent Fuel Cooling Pumps, Skimmer Surge Tank Room, Fuel Pool Heat Exchanger Room 1B35, 1B43, Fuel Pool Pump Breakers, 1C136, Fuel Pool Panel

Evolutions in progress or planned for upcoming shift

- Alternate EHC Pumps for maintenance later in the shift
- Raise Power with rods IAW the pull sheet to achieve 80% Reactor Power
- Later this shift, Security will be running a force on force drill

Plant PRA/PSA Status including CDF/LERF & color

- Green-CDF 1.34 E-6/ ICDP to Yellow equal 1 year
- Green-LERF 3.27 E-7 ILERP to Yellow equal to 1 year

2 Extra Non Licensed Personnel Available in Work Control

Event No.	Malf. No.	Event Type*	Event Description
1		N-BOP N-SRO	Shift EHC Pumps
2		R-ATC R-SRO	Raise Power With Rods to 80% RTP
3		TS-SRO	Control Rod 22-07 N2 Leak Tech Spec 3.1.5 Condition A
4	zz03		Design Basis Earthquake, Entry into AOP 901
5	eg08a eg08c do-eg-026 do-eg-027	C-BOP C-SRO	H2 Main Seal Oil Pump fails and the crew will have to start the Emergency H2 Seal Pump ARP 1C08C D-6
6	rr06b	C-ATC C-SRO TS-SRO	Trip of B Recirc MG Set The Crew will enter AOP 255.2 and 264. Tech Spec 3.4.1, Condition D
7	mc07	M-All	Condenser Tube Leak will require the entry into AOP 639, resulting in inserting a manual reactor scram
8	rp05g	C-ATC C-SRO	Entry into EOP 1, Transition to EOP ATWS  Hydraulic ATWS <ul style="list-style-type: none"> <li>• Potential to enter Power Level Control</li> </ul> Rods will insert via: <ul style="list-style-type: none"> <li>• RIP 103.2, Increase CRD Cooling Flow and Pressure</li> <li>• RIP 102.1, Repeated Manual Scram</li> </ul>
9	pc14 di-ms-076 di-ms-077 di-ms-072 di-ms-074 ms19a ms19b	C-BOP C-SRO	Leak in the torus results in the performance of ED, anticipation will not be available due to a spurious group 1 isolation

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Facility: Duane Arnold Energy Center Scenario No.: 2 Op-Test No.: 19-1 NRC  
 Examiners: \_\_\_\_\_ Operators: SRO-U (2), SRO-I (4), RO (5)

Initial Conditions/Turnover:

Reactor Power is 100%

Guarded Equipment: Skimmer Surge Tank Room, Fuel Pool Heat Exchanger Room, 1C136 Fuel Pool Cooling Panel, 1B3507 'A' Fuel Pool Cooling Pump Breaker, 1B4327 'B' Fuel Pool Cooling Pump Breaker.

Evolutions in progress or planned for upcoming shift

- Perform Auto Voltage Regulator Wipe per Task Card 154
- Reduce Reactor Power to 95% with Control Rod Insertion for Load Line Adjustment

Plant PRA/PSA Status including CDF/LERF & color

- CDF GREEN – 1.47E-6/ Cumulative Core Damage Probability (CCDP) No Limit
- LERF GREEN – 3.92 E-7/ Cumulative Large/Early Release Probability (CLERP) No Limit

Rain will be moving into the area later in the shift.

2 Extra Non Licensed Personnel Available in Work Control

Event No.	Malf. No.	Event Type*	Event Description
1		N-BOP N-SRO	Perform Auto Voltage Regulator Wipe In Accordance With Task Card 154.
2		R-ATC R-SRO	Reduce Rx Power with Rods In Accordance With Load Line Adjustment to 95% RTP
3	DI-CS-008	I-BOP I-SRO TS-SRO	"A" Core Spray pump will receive an inadvertent start signal.  Tech Spec 3.5.1 Condition B (3.3.5.1 Also Possible)
4	sl07	TS-SRO	Leak on 1T-218 develops and causes 1C05A E-3, SBLC Tank HI/LO Level alarm to come in Tech Spec 3.1.7, Condition B
5	sw37a an1c06 a(17) sw32 stsw01a sw10c	C-BOP C-ATC C-SRO	Lightning Strike causes: <ul style="list-style-type: none"> <li>• Trip of B GSW Pump                             <ul style="list-style-type: none"> <li>○ Standby Pump Fails to Start → AOP 411 (Possible)</li> <li>○ High ΔP across Auto Filter → ARP Actions</li> </ul> </li> <li>• C RBCCW Pump                             <ul style="list-style-type: none"> <li>○ Standby Pump Fails to Start → ARP Actions</li> </ul> </li> </ul>
6	cu05 cu11a cu12a ms28b cu07	M-All	A leak will develop in the RWCU HX room requiring EOP 3 Entry <ul style="list-style-type: none"> <li>• Scram prior to Temperatures Reaching Max Safe</li> <li>• Leak will not be Isolated</li> <li>• Defeat 9 will not work to restore ventilation</li> </ul>
7	rp05	C-ATC C-SRO	On the reactor scram, there will be an electrical ATWS <ul style="list-style-type: none"> <li>• ARI will be effective at inserting all but 1 control rod</li> </ul>
8	ed08d	C-All	After all but one of the control rods have inserted, 1A4 will lockout. The crew will take actions In Accordance With AOP 301
9	DI-AD-015 DI-AD-017	C-BOP C-SRO	TIP room exceeds a Max Safe Temperature Limit, the crew will enter ED. <ul style="list-style-type: none"> <li>• If the crew attempts to use the EHC Control System, it will fail to control the B/P Valves</li> <li>• Only two ADS SRV's will open, requiring the crew to open the LLS SRV's to complete the ED</li> </ul>

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**Scenario Outline**

**Form ES-D-1**

Facility: Duane Arnold Energy Center Scenario No.: 3 Op-Test No.: 19-1 NRC  
 Examiners: \_\_\_\_\_ Operators: SRO-U (2), SRO-I (4), RO (5)

Initial Conditions/Turnover:

Reactor Power is 50%.

1C06B, RFP Aux Lube Oil Pump 1P-2A or 1P-2B Running, will be locked in until the "B" Feedwater pump is started.

Guarded Equipment: Skimmer Surge Tank Room, Fuel Pool Heat Exchanger Room, 1C136 Fuel Pool Cooling Panel, 1B3507 'A' Fuel Pool Cooling Pump Breaker, 1B4327 'B' Fuel Pool Cooling Pump Breaker.

Rain will be moving into the area later in the shift.

Evolutions in progress or planned for upcoming shift

- Perform Daily RWS Flow Verifications
- Raise Power with Recirc to 55%-60% in preparation of putting the 'B' RFP in service

Plant PRA/PSA Status including CDF/LERF & color

- CDF GREEN – 1.47E-6/ Cumulative Core Damage Probability (CCDP) No Limit
- LERF GREEN – 3.92 E-7/ Cumulative Large/Early Release Probability (CLERP) No Limit

2 Extra Non Licensed Personnel Available in Work Control

Event No.	Malf. No.	Event Type*	Event Description
1	None	N-BOP N-SRO	Perform Daily RWS Flow Verifications
2	None	R-ATC R-SRO	Raise Power with Recirc to 55%-60% from an initial power of 50%
3	ed08m	C-BOP C-SRO TS-SRO	Breaker 1A312, feeder breaker to 1B09 opens on ground fault. Subsequently, a loss of "A" side RWS occurs. The crew will start 1P-117B(D) IAW ARP 1C08A, B-6 and AOP 410 Loss of River Water Supply; Tech Spec 3.8.7, Condition D → 3.7.2 Condition A
3	sw21d rr37a rr37b cu01a/b	C-ATC C-BOP C-SRO TS-SRO	Shortly after the crew enters AOP 903, a lightning strike will result in; <ul style="list-style-type: none"> <li>• The Tripping of the "D" well → AOP 408</li> <li>• A run back to 45% of both Recirc MG sets → AOP 255.2</li> <li>• Cleanup Pump Trip → TRM 3.3.4</li> </ul>
4	rr15b	M-All	A LOCA will develop. The crew will insert a manual scram prior to the DW reaching 2 psig. The crew will enter EOP 1 on the scram, and when the DW reaches 2 psig, the crew will re-enter EOP 1 and enter EOP 2.
5	cs01b cs05a	C-BOP C-SRO	On the 2 psig signal; The "B" CS pump will start and trip . The "A" CS pump will fail to automatically start. The "A" CS pump can be started manually by taking the CS pump HS to the start position. (Critical)
6	hp12	C-BOP C-SRO	The HPCI Aux Oil Pump Feeder Breaker will trip on start and prevent HPCI from injecting.
7	fw02b	C-All	On the Turbine Trip, 1A1 will not transfer automatically or manually, to the startup transformer and 1A1 will be lost. The crew will perform the applicable actions of AOP 304.1, Loss of 4160V Non-Essential Electrical Power. This will result in a loss of 'A' Condensate and Feed When attempts are made to start B Condensate Pump, the beaker trips on Ground Fault

8		C-BOP	<p>The crew will enter ALC and prepare for an Emergency Depressurization. When RPV level reaches +15", the crew will;</p> <ul style="list-style-type: none"><li>• Open 4 ADS SRVs. <b>(Critical)</b></li><li>• When RPV pressure lowers to 450 psig, the crew will determine that the selected RHR inject valve did not automatically open, and manually open the valve. <b>(Critical)</b></li></ul> <p>Maximize injection until the wide range level instruments reach ~90", then throttle injection.</p>