Facility: Fermi 2 Nuclear Plant Scenario No.: 1 Op-Test No.: 2021-301

Examiners: _____ Operators: _____

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Initial Conditions: 100% power, MOL, steady state conditions following a rod pattern adjustment. EDG 11 Diesel is out of service for emergent troubleshooting and repair following a "Start Failure Trip" that occurred during performance of the "Start And Load Test" surveillance run on the previous shift. SR 3.8.1.1 has been completed for Operable Offsite Circuits and a Common Cause Failure investigation is in progress to determine if the cause of inoperability exists on the other EDGs (6 hours into the 24-hour Required Action Time for the determination). One hour ago, the CTG 11-1 "Off Base" cooling water skid was damaged while moving a vehicle in the area. CTG 11-1 is currently unavailable (tagged out, cooling system drained) to repair piping leaks in the "Off Base" cooling water skid. Heavy thunderstorms and lightning are forecasted for the next 12 hours. TWMS is in Bypass Mode.

Turnover: Plans for the shift are to maintain 100% power, support EDG-11 troubleshooting / repair activities and Common Cause Failure determination efforts on the operable EDGs. Transfer TWMS from Bypass Mode to Cleanup Mode.

Critical Tasks: **(CT-1)** Manually Start EDG 12 prior to Emergency Depressurization.
(CT-2) Emergency Depressurize prior to -25 inches RPV level.

Event No.	Malf. No.	Event Type*	Event Description
1		N (BOP) N (SRO)	Transfer TWMS from Bypass Mode to Cleanup Mode.
2	C7AEK6CTVSP BADEB21N080CTVSP C7DOALARM_UNIT576228REV	I (ATC) I (SRO) TS	RPV Water Level 3 Instrument Failure (B21-N080C); Results in Downscale Trip on Trip Unit B21-N680C with No RPS (A2) Half Scram Signal.
3	E4BAF1CC	C (BOP) C (SRO) TS	HPCI Logic Bus B Power Failure (Renders HPCI inoperable and unavailable).
4	C11MF1118 C1DHROD_26_51 MXACCUMRF C11RF0210	C (ATC) C (SRO) TS	CRD Pump East Breaker Fault/Trip; Start CRD Pump West.
5	NM02F607_MTVFAILSP	C (BOP) C (SRO)	SJAE Trip; Swap SJAEs.
6	NC02N22_LXPN429ATVSP	R (ATC) C (SRO)	FWH Level Instrument Failure; Requires Power Reduction Due to Loss of Feedwater Heating.
7	R11MF0159 R14MF0001	M (ALL)	Lightning Strike Causes Loss of Offsite Power.
8	RCBFR30RF0009TA_SWIT RCBOESBTVSP RCBNESATVSP RCCDAS1TVSP RCBWAS2TVSP RCCEAS2TVSP	C (ATC) C (SRO)	EDG 12 Fails to Auto Start (Recoverable). Start Failure Trips on EDG 13 and 14. **(CT-1)**;

	RCBWAS2TVSP RCCDAS1TVSP RCCEAS2TVSP RCCDAS1TVSP RCCEAS2TVSP RCBVAS1TVSP RCBWAS2TVSP		
9	B31MF0067 E502E5150F044_ ATVFAILSP	M (ALL) C (BOP)	SBLOCA (Increase Ramp Over 5 Minutes) with RCIC Trip on Overspeed; Emergency Depressurization, Maximize Injection with EDG 12 Powered Low Pressure ECCS Injection Systems. **(CT-2)**
*	(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor		

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SCENARIO SUMMARY

Event 1:

The scenario begins with the Unit at 100% power following a rod pattern adjustment and EDG-11 out of service for emergent troubleshooting and repair following a "Start Failure Trip" (Essential Trip) that occurred during performance of the "Start And Load Test" surveillance run on the previous shift. A Common Cause Failure investigation is in progress to determine if the cause of inoperability exists on the other EDGs. After turnover, the crew will transfer the TWMS from Bypass Mode to Cleanup Mode in accordance with 23.144, "Torus Water Management System."

Event 2:

Once the TWMS has been placed in Cleanup Mode, the crew will respond to annunciator 3D79,"Reac Vessel Water Level L3 Channel Trip," and determine that an RPV Water Level 3 instrument failure (B21-N080C) resulted in a downscale trip condition on Trip Unit B21-N680C, with the failure of RPS instrumentation to initiate an A2 trip logic half scram. The SRO will reference SOP 23.601, "Instrument Trip Sheets," and enter Tech Specs 3.3.1.1 (Table 3.3.1.1-1, Function 4) and 3.3.6.1 (Table 3.3.6.1-1, Functions 2.a & 7.a). The RPS failure will require the crew to insert a manual half scram on the "A" Trip System to comply with the Tech Spec Required Action to place the inoperable channel in "Trip."

Event 3:

Following insertion of the manual half scram, the crew will respond to annunciator 2D50,"HPCI Logic Bus Power Failure," determine that power is lost to Logic Bus 'B,' and take action to manually isolate HPCI, rendering the system both inoperable and unavailable. The SRO will enter Tech Specs 3.3.5.1 (Table 3.3.5.1-1, Function 3), 3.3.6.1 (Table 3.3.6.1-1, Function 3), 3.5.1, and 3.6.1.3.

Event 4:

Once HPCI has been isolated, CRD Pump East will trip on breaker fault. The crew will respond to annunciators 3D5, "CRD Charging H2O Pressure Low," and 3D96, "Motor Tripped," enter AOP 20.106.01, "CRD Hydraulic System Failure," and start standby CRD Pump (West.) The crew will also address annunciator 3D10, "CRD Accumulator Trouble," by dispatching a Field Operator to investigate. The Field Operator will report that accumulator pressure is low (900 psig) on one HCU only. The crew will direct the Field Operator to add nitrogen to the accumulator in accordance with 23.106, "Control Rod Drive Hydraulic System." The SRO will enter Tech Spec 3.1.5.

Event 5:

Once standby CRD Pump (West) has been started and the HCU accumulator low pressure condition addressed, the in-service Steam Jet Air Ejector (SJAE) will trip. The crew will enter AOP 20.125.01, "Loss of Condenser Vacuum," and take prompt action to place the standby SJAE in service in accordance with SOP 23.125, "Condenser Vacuum System."

Event 6:

Once the standby SJAE has been placed in service and condenser vacuum has

stabilized, a Feed Water Heater (FWH) level transmitter fails high, resulting in a loss of one 3, 4, 5 FWH String and reduction in feedwater heating. The crew will enter AOP 20.107.02, “Loss of Feedwater Heating,” and reduce power to ≤ 85% using reactor recirc flow, while ensuring operation within the Power/Flow Map. The crew, using Enclosure A, “Feedwater Inlet Temperature vs. Reactor Power,” will evaluate the feedwater temperature decrease, excluding the temperature decrease due to the power reduction, and determine that they are operating in the Acceptable Area of the “Reduced FW Temperature Region.”

Events 7 to 9:

Once the power reduction has been completed, a loss of offsite power occurs due to lightning strike. This immediately results in a Reactor Scram and MSIV closure. EDGs 13 and 14 experience Start Failure Trips (the result of a Common Cause Failure). EDG12 fails to auto start but can be manually started to restore power to 4.16 KV ESS Bus 64C. A Station Blackout Condition will exist until EDG 12 is recovered **(CT-1)**. The crew will enter EOP 29.100.01 SH 1, “RPV Control,” on RPV Low Level and RPV High Pressure, prioritize Level Control with RCIC (HPCI is unavailable due to the Logic Bus ‘B’ Power Failure (Event 3)) and Pressure Control with SRVs. RCIC is the only available high pressure injection source. The crew may also enter AOPs 20.300.Offsite, “Loss of Offsite Power,” and 20.300.SBO, “Loss of Offsite and Onsite Power.” The crew will enter EOP 29.100.01 SH 2, “Primary Containment Control,” when Suppression Pool Temperature reaches 95°F due to inability to cool the Torus (EDG 12 is the only available power source).

Shortly after the initial actions to stabilize reactor level and pressure have been completed, a Small Break LOCA occurs. Crew re-enters the RPV Control and Primary Containment Control EOPs on High Drywell Pressure. RCIC subsequently trips on overspeed, leaving no source of high-pressure injection available to maintain level. RHR Pump ‘C’ and Core Spray Pump ‘C’ are the only Low Pressure ECCS Systems available for RPV injection. The crew will inhibit ADS at 32 IN and after determining that RPV Level cannot be maintained ≥ 0 IN, will exit the RPV Control Pressure Leg, Emergency Depressurize the RPV, and maximize injection using EDG 12 powered Low Pressure ECCS Systems **(CT-2)**. The scenario may be terminated when RPV blowdown is in progress and RPV water level can be restored and maintained between 173 IN and 214 IN.

Critical Task 1(CT-1): Manually Start EDG 12 prior to Emergency Depressurization.

Initial Conditions:

A Station Blackout has occurred.
A Loss of Coolant Accident has occurred.
Available injection sources CANNOT maintain RPV level.
EDG 12 is NOT running and can be started manually.

Critical Task Statement:

> **CT1:** A Station Blackout and a Loss of Coolant Accident has occurred. EDG 12 can be started manually. **TAKE ACTION** to manually start EDG 12 **BEFORE** RPV Emergency Depressurization so that lower pressure ECCS is powered for level recovery after emergency depressurization.

NUREG 1021 App D BASIS:

Safety Significance – Adequate core cooling (ACC) because of submergence exists so long as RPV water level remains above TAF. RPV depressurization is performed to maximize the injection flowrate from operating sources of injection at TAF. Given the initial conditions, EDG 12 can be started to restore power to 1 CS pump and 1 RHR pump for injection.

> NUREG 1021 App D – D.1.c Failure Criteria reasoning*: Candidate will fail if EDG 12 is not started manually prior to RPV* Emergency Depressurization.

Initiating Cue - A Station Blackout has occurred and EDG 12 is NOT running and can be started manually.

Measurable Performance Standard – Manually start EDG 12 and then control RPV level after Emergency Depressurization per 29.100.01 SH 1.

Performance Feedback -.RPV level is recovered after Emergency Depressurization to above TAF

Expected action: - Manually start EDG 12.

Critical Task 2(CT-2): Emergency Depressurize prior to -25 inches RPV level.

Initial Conditions:
RPV Level cannot be maintained greater than TAF

Critical Task Statement:

> **CT2: WHEN** RPV Level cannot be maintained greater than TAF, **INITIATE** Emergency Depressurization, **BEFORE** level reaches Minimum Steam Cooling RPV Water Level (-25 inches).

NUREG 1021 App D BASIS:

Safety Significance – If the decreasing RPV water trend has not been reversed before RPV water level drops to TAF and if at least one source of injection into the RPV is available, emergency depressurization is performed to maximize the injection flowrate from operating sources of injection. The consequences of not depressurizing the RPV under conditions that require emergency RPV depressurization could include a loss of adequate core cooling or failure of the primary containment.

> NUREG 1021 App D – D.1.c Failure Criteria reasoning*: Open 5 SRVs prior to -25" RPV level.*

Initiating Cue RPV water level at TAF.

Measurable Performance Standard – Initiate emergency depressurization before level reaches -25".

Performance Feedback -.RPV pressure is decreasing.

Expected action: - Open 5 SRV.

Appendix D	Scenario Outline	Form ES-D-1

Facility: Fermi 2 Nuclear Plant Scenario No.: 3 Op-Test No.: 2021-301

Examiners: _____ Operators: _____

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Initial Conditions: 100% power, MOL, steady state conditions. The Transmission System Operator (TSO) has issued a Maximum Emergency Generation Alert due to grid instabilities.

Turnover: Perform 24.106.04, "Scram Discharge Volume Vent and Drain Valve Operability Test," Section 5.3 only. Maintain reactor power at 100% and comply with TSO requests for grid support as necessary.

Critical Tasks: **(CT-1)** Inhibit ADS.
(CT-2) Control RPV injection per FSL-OR1 of 29.100.01 SH 1A
(CT-3) Insert ALL Control Rods ≤ 02.

Event No.	Malf. No.	Event Type*	Event Description
1		N (ATC) N SRO)	Perform SDV Vent and Drain Valve Operability Test, Section 5.3 Only.
2	H_P603_A074_4 H_P603_A074_5 P603_A074_2 P603_A074_1 BBAZP603_A150NOISE BCBYALARM_UNIT151623REV BCBYALARM_UNIT149801REV BBBCLGACMOTOR932567TFSEIZUR	C (ATC) C (SRO)	Degrading Condition on the In Service North RRMG Set Lube Oil Pump (Fluctuating Amps & Intermittent Alarms), with Failure of the Standby Lube Oil Pump to Auto Start.
3	NG13N3021PSEN246CTFCLOSE	R (ATC) C (SRO) C (BOP)	#3 TCV Unitized Actuator Fault (Oil Pump Degrading Results in Low System Pressure (< 1200 psig)). Reduce Power < 91.5% / Lock Close #3 TCV / Reset Half Scram.
4	G302G33MF0009TVLEAK G3BBG33R616ATVSP G3BBRELAY_D902529TVSP G3BBG33R616BTVSP G3BBRELAY_D221958TVSP	C (BOP) C (SRO) TS	RWCU Leak with Auto Isolation Failure (Manual Isolation Successful).
5	N102PXEC71N052ATVSP	TS (SRO)	Turbine First Stage Pressure Instrument Failure (C71-N052A); Trip Unit C71-N652A Output Signal Downscale and Auto Bypass of Channel A1.
6	N22MF0018 P603_A317_1	C (ATC) C (SRO)	South Heater Drain Pump Trip with Failure of Manual Runback Pushbutton to Lower Power.
7	S3RPRESSPERT	M (ALL)	Neutron Flux Instabilities / Hydraulic ATWS / SLC Common Discharge Header Rupture. **(CT-1) (CT-3)**

	C1DKMF3671TVV		
8	NDAFTTR1TVSP N30MF0069 N30MF0071	C (BOP) C (SRO)	Main Turbine Trip / Bypass Valves Trip after the first Lowering of RPV Level. Restore and Maintain RPV injection per 29.100.01 SH 1A. **(CT-2)**
9	E11MF0046	C (BOP) C (SRO)	RHRSW Pump Trip (C or D). Throttle F068A/B for Single Pump Flow and RHRHX Vibration Limits.
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

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SCENARIO SUMMARY

Event 1:

The scenario begins with the Unit at 100% power. The Transmission System Operator (TSO) has issued a Maximum Emergency Generation Alert due to grid instabilities. After turnover, the crew will perform 24.106.04, "Scram Discharge Volume Vent and Drain Valve Operability Test," Section 5.3 only.

Event 2:

Once Section 5.3 of surveillance procedure 24.106.04 has been completed, annunciators 3D108, "Recirc Sys A Fluid Drive Lube Oil Press Low," and 3D130, "Recirc Sys A Circ Lube Oil Pump Auto Start," will alarm, alerting the crew to a degrading condition on the in-service North RRMG Set Lube Oil Pump. The Standby Lube Oil Pump fails to auto start. The crew will observe indications of fluctuating amps on the in-service Lube Oil Pump Motor and take timely action to manually start the Standby Lube Oil Pump to restore Recirc System A lube oil pressure prior to trip of the North RRMG Set (30 psig decreasing for 6 seconds). The crew may reference SOP 23.138.01, "Reactor Recirculation System," when performing the pump shift.

Event 3:

Once the Standby Lube Oil Pump has been started and Recirc System A lube oil pressure has stabilized, the crew will respond to annunciator 4D2, "Unitized Actuator Throttle Vlv Fault," evaluate indications on the Unitized Actuator (UA) mimic, and determine that the alarm was due to a low pressure condition (< 1200 psig) on the #3 Turbine Control Valve (TCV) UA that was caused by the associated oil pump degrading. The crew, in accordance with SOP 23.109, "Turbine Operating Procedure," will (a) lower power to ≤ 91.5%, (b) Lock Close #3 TCV, (c) reset the RPS the Half Scram, and (d) continue operations with three steam lines supplying the turbine.

Event 4:

Once the RPS Half Scram has been reset, a leak in excess of 55 gpm will occur in the RWCU System. The crew will respond to annunciator 2D115, "RWCU Diff Flow High," and verify that RWCU System Differential Flow Indication is greater than 55 gpm. RWCU will fail to isolate after the 44-second time delay elapses. The crew will diagnose the failure to isolate and take prompt action to manually perform the isolation. The SRO will enter Tech Spec 3.3.6.1 (Table 3.3.6.1-1, Function 5.a). The crew may perform the isolation from memory or using the guidance contained in ARP 2D115, AOP 20.707.01, "Loss of RWCU," or SOP 23.601, "Instrument Trip Sheets."

Event 5:

Once RWCU has been isolated, the crew will respond to annunciator 3D91, "Turbine Stop/Cont Val Channel Trip By-Passed," and verify that HP Turbine First Stage Pressure is greater than 161.9 psig. The crew will determine that Turbine First Stage Pressure Instrument C71-N052A has failed such that the output from associated Trip Unit C71-N652A is downscale, resulting in a bypass condition on Channel A1. The SRO will reference SOP 23.601, "Instrument Trip Sheets," and enter Tech Spec 3.3.1.1 (Table 3.3.1.1-1, Functions 9 and 10). The instrument failure will require a fuse to be pulled to

place the A1 Channel in a non-bypass condition to comply with the Tech Spec Required Action to place the inoperable channel in "Trip."

Event 6:

Once the CRS has addressed TS, the South Heater Drain Pump (HDP) will trip, requiring the crew to perform a Rapid Power Reduction to ≤ 85%. The crew will enter AOP 20.107.01, "Loss of Feedwater or Feedwater Control," and take Immediate Action to lower power using the Recirc Manual Runback Pushbutton. The Recirc Manual Runback Pushbutton will fail, requiring the crew to manually lower recirc flow using the speed controllers. The crew will evaluate the P/F Map and insert the CRAM Array as necessary.

Events 7-9:

Once the crew has inserted the CRAM Array, Neutron Flux Instabilities (i.e., power-to-flow oscillations) will be observed, prompting the crew to take Immediate Action to manually scram the reactor. Following the manual scram action, a High Power Hydraulic ATWS will occur. The crew will enter EOP 29.100.01 SH 1, "RPV Control," and perform "initial" ATWS actions to (a) Inhibit ADS **(CT-1)**, (b) Terminate and Prevent injection (except for SLC, CRD, and RCIC) until RPV water level is lowered less than or equal to 114 inches, and (c) Initiate SLC. Shortly after SLC is initiated, a rupture occurs in the discharge piping common to both pumps, rending SLC unavailable as a boron injection source. The crew will transition to EOP 29.100.01 SH 1A, "ATWS." The initial RPV level band will be 50 to 100 inches. When RPV level is stable and in band the Main Turbine and Bypass Valves will trip, leaving SRVs as the only means of pressure control, forcing additional steam flow through the SRVs and placing a greater heat load on the Torus. When Torus temperature exceeds 110°F, the crew will execute ATWS EOP override FSL-OR1 to deliberately lower RPV level by controlling injection rate until level reaches 0 inches (one or more SRVs remain open with Rx Power > 3 %) **(CT-2)**. When RPV level drops below 0 inches the crew will execute ATWS EOP override FSL-OR1 to inject to the RPV above the Minimum Core Steam Flow Injection Rate of 3120 gpm, but as low as practical to maintain 11.3% Rx power **(CT2).** As power lowers due to the combined effects of the RPV level reduction and control rod insertion, RPV injection will be increased to maintain 11.3 % Rx power, causing RPV level to slowly rise. When 11.3 % Rx power can no longer be maintained, the crew will execute FSL-3 and maintain RPV level between -25 inches and the RPV level where power remains below 11.3 % Rx power.

The crew will determine that the ATWS is due to hydraulic lock conditions within the Scram Discharge Volume (SDV) and that control rods need to be inserted using the "Scram-Reset-Scram" strategy contained in Emergency Support Procedure 29.ESP.03, "Alternate Control Rod Insertion Methods." The crew will achieve success inserting all control rods following the initial attempt **(CT-3).** Due to significant heat addition to the Torus and potential challenges to containment, the crew will enter EOP 29.100.01 SH 2, "Primary Containment Control," and place two loops of Torus Cooling in service. For the first division of Torus Cooling placed in service, one of the RHRSW Pumps (C or D) will trip. The crew will diagnose the failure and throttle E1150-F068A/B, Div 1/2 RHR Hx Serv Wtr Outlet FCV," in the close direction to maintain 5400-6300 gpm to prevent excessive vibration of E1150-F068A/B and runout of the other RHRSW Pump. Throttling E1150-F068A/B in the close direction will test applicant knowledge of RHR HX Service Water Outlet FCV operation, as this valve is only designed to throttle in the open direction. Throttling the valve closed is accomplished by momentarily depressing the

OPEN pushbutton to interrupt valve travel in the closed direction. Guidance for throttling E1150-F068A/B closed and establishing an operational band of 5400-6300 gpm is contained in SOP 23.208, “RHR Complex Service Water Systems.” The scenario may be terminated once all rods have been fully inserted, EOP 29.100.01 SH 1A is exited, EOP 29.100.01 SH 1 entered, and RPV water level is in the process of being restored 173 IN and 214 IN.

Critical Task 1(CT-1): Inhibit ADS

Initial Conditions:

Reactor SCRAM required, reactor not shutdown.

Critical Task Statement:

> **CT1: WITH** a reactor scram required, reactor not shutdown, **INHIBIT** ADS to prevent an uncontrolled RPV depressurization.

NUREG 1021 App D BASIS:

Safety Significance - In order to affect a reduction in reactor power, actions may be taken to lower RPV water level to a level below the automatic initiation setpoint of ADS. Actuation of ADS under ATWS conditions could result in core damage, therefore automatic ADS actuation should be prevented.

> NUREG 1021 App D – D.1.c Failure Criteria reasoning: Candidate will fail if there is a valid SCRAM signal (automatic or manual) AND the reactor will NOT remain shut down under all conditions without boron AND ADS automatically actuates and causes an RPV depressurization.

Safety significant boundary conditions Actuation of ADS imposes a severe thermal transient on the RPV and complicates the efforts to maintain RPV water level within the ranges specified in the ATWS RPV Control EOP. Further, rapid and uncontrolled injection of large amounts of relatively cold, unborated water from low pressure injection systems may occur as RPV pressure decreases to and below the shutoff heads of these pumps. Such an occurrence would quickly dilute in-core boron concentration and reduce reactor coolant temperature. When the reactor is not shutdown, or when the shutdown margin is small, sufficient positive reactivity might be added in this way to cause a reactor power excursion large enough to severely damage the core.

Initiating Cue – ATWS conditions.
Measurable Performance - Inhibit ADS.
Performance Feedback - ADS inhibited white lights and alarm window.
Expected action - Place both ADS inhibit switches to inhibit.

Critical Task 2 (CT-2): Control RPV injection per FSL-OR1 of 29.100.01 SH 1A.

Initial Conditions (a):
Rx Power > 3% AND RPV Level > 0 inches AND Torus temp > 110°F AND DW press > 1.68 psig or SRV open
Required Action (a):
Lower injection to establish RPV water level at TAF or Rx Power < 3% or all SRV closed.

Critical Task Statement (a):

CT2a: During an ATWS with conditions met to deliberately inject to lower RPV water level to TAF, DELIBERATELY LOWER INJECTION to the RPV to lower RPV water level to TAF or Rx Power < 3% or all SRV closed.

Initial Conditions (b):
Rx Power > 11.3% AND RPV Level < 0 inches AND DW press > 1.68 psig or SRV open.
Required Action (b):
Inject to the RPV above Minimum Core Steam Flow Injection Rate (MCSFIR) of 3120 gpm but as low as practical to maintain Minimum Steam Cooling as indicated by 11.3% Rx power.

Critical Task Statement(b):

CT2b: During an ATWS with conditions met to inject to the RPV above Minimum Core Steam Flow Injection Rate, inject to the RPV at > 3120 gpm but as low as practical to maintain 11.3% Rx power.

Bounding Criteria Basis:

Given an ATWS condition, exceeding the HCL requires Emergency Depressurization per 29.100.01 SH 2 TWT-5. While the condition present in this scenario can result in exceeding the HCL, operator action in compliance with the EOPs will mitigate this and prevent the need for emergency depressurization. This Bounding Criterion uses the requirements of NUREG 1021 Appendix D Section D. Critical Task Methodology. Operation Management and Nuclear Training has reviewed the conditions in the ATWS scenario and found that a competent crew would not Emergency Depressurize and would mitigate the event by controlling RPV injection and inserting control rod.

<u>Safety Significance and boundary conditions:</u> Per BWROG EPGs/SAGs App B Vol II:

"All RPV injection except from boron injection systems, CRD, RCIC, and HPAC (HPAC is N/A for Fermi) is terminated and prevented to effect an immediate reduction in core inlet subcooling and achieve the target control band in the shortest possible time. Here, RPV water level is lowered to limit suppression pool heat up by reducing reactor power. A more controlled level reduction may be performed to facilitate stabilizing level within the applicable control band and avoid dropping below the MSCRWL."
"A combination of high reactor power (above the APRM downscale trip setpoint), high suppression pool temperature (above the suppression pool temperature at which reactor scram is required), and an open SRV or high drywell pressure (above the scram setpoint), indicates that heat is being added to the suppression pool faster than it is being removed by suppression pool cooling. The resulting suppression pool heat up could result in loss of NPSH for pumps taking suction from the suppression pool, primary containment over pressurization, and ultimately loss of primary containment integrity. Loss of primary containment integrity, in turn, could lead to a loss of adequate core cooling and uncontrolled release of radioactivity to the environment. Prompt mitigation is required since, as long as the identified conditions exist, suppression pool heat up will continue and emergency RPV depressurization will be required when suppression pool temperature can no longer be maintained below the Heat Capacity Temperature Limit (HCTL)."
"The subsequent RPV water level control band is defined in EPG Step C5/L-3. The high end of the control band is dependent on the circumstances of the level reduction but the low end in all

cases is the Minimum Steam Cooling RPV Water Level (MSCRWL). Lowering RPV water level no farther than TAF provides sufficient margin to readjust injection to maintain level above the MSCRWL."

NUREG 1021 App D – D.1.c Failure Criteria reasoning: Initial Conditions are met, and the crew exceeds Heat Capacity Temperature Limit as plotted on 29.100.01 SH6 HCL Curve.

Initiating Cue: As listed in INTIAL CONDITIONS.

Measurable Performance: Actions result in lowering RPV water level until level reaches required level and then maintain using available injection sources.

Feedback: RPV water level lowers to required level.

Expected action: Lower RPV level to required band.

Critical Task 3(CT-3) Insert ALL Control Rods ≤ 02

Initial Conditions:
Reactor SCRAM required, reactor not shutdown.

Critical Task Statement:

CT-3: When directed by the EOPs, TAKE ACTION to insert ALL Control Rods ≤ 02.

Bounding Criteria Basis:

Given an ATWS condition, exceeding the HCL requires Emergency Depressurization per 29.100.01 HS 1A FLS-4. While the condition present in this scenario can result in exceeding the HCL, operator action in compliance with the EOPs will mitigate this and prevent emergency depressurization. This Bounding Criterion uses the requirements of NUREG 1021 Appendix D Section D. Critical Task Methodology. Operation Management and Nuclear Training has reviewed the conditions in the ATWS scenario and found that a competent crew would not Emergency Depressurize and would mitigate the event by controlling RPV injection and inserting control rod.

Safety Significance – The challenge to containment becomes the limiting factor that defines the requirement for reactor power reduction in an ATWS condition. Thus, reducing reactor power below 3% can preclude failure of containment or equipment necessary for the safe shutdown of the plant.

NUREG 1021 App D – D.1.c Failure Criteria reasoning: Candidate will fail if reactor power is NOT reduced sufficiently to prevent operation in the "DO NOT OPERATE IN THIS AREA" region of the HCL curve of 29.100.01 sheet 6.

Safety significant boundary conditions are defined by the BWROG EPGs/SAGs, appendix B, rev 3. This document identifies limiting primary containment heatup as the basis for reducing reactor power using boron, control rods, or lowering RPV water level. The scenario validation process provided assurance that the HCL curve will be violated if power is not sufficiently reduced.

Initiating Cue -- Reactor scram required and reactor not shutdown.
Measurable Performance -- Reduce reactor power using control rods.
Performance Feedback – Reactor Power is decreasing until below 3%.
Expected action - Insert control rods; while monitoring reactor power to ensure power is reduced <3%.