

**PSEG NUCLEAR L.L.C.
SALEM/OPERATIONS**

2-EOP-FRSM-1 - Rev. 24

RESPONSE TO NUCLEAR POWER GENERATION

- ◆ Biennial Review Performed: Yes No
 - ◆ Change Package(s) and Affected Document Number(s) incorporated into this revision: None
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REVISION SUMMARY

The following changes were incorporated into this revision:

- Revised Step 5 of EOP and Basis to reflect closing only "2VC5 and 2VC6" versus "2VC1 through 2VC6". This change was incorporated due to Containment Isolation Valves 2VC2 and 2VC3 being replaced with testable flanges 2VCF2 and 2VCF3 IAW DCP 80091075, Replace 2VC2 and 2VC3 Valves with Blind Flanges. [80091075-0566] [80091075-0567]

IMPLEMENTATION REQUIREMENTS

Effective Date: 04/28/2008

DCP No. 80091075 – Rev. 0, Replace 2VC2 and 2VC3 with Blind Flange:

**EMERGENCY OPERATING PROCEDURE
2-EOP-FRSM-1
RESPONSE TO NUCLEAR POWER GENERATION**

1.0 Entry Conditions

See Flowchart

2.0 Operator Actions

2.1 Immediate Actions

None

2.2 Subsequent Actions

See Flowchart

3.0 Attachment List

3.1 Tables

None

3.2 Figures

None

3.3 Graphs

None

3.4 Checkoff Sheets

None

3.5 Attachments

I - Major Action Categories

MAJOR ACTION CATEGORIES

- **VERIFY AUTOMATIC ACTIONS OR PERFORM MANUAL ACTIONS TO REDUCE CORE POWER**
- **EMERGENCY BORATE**
- **CHECK FOR POSSIBLE SOURCES OF POSITIVE REACTIVITY AND ELIMINATE THEM**
- **VERIFY SUBCRITICALITY**

SALEM GENERATING STATION

**2-EOP-FRSM-1
RESPONSE TO NUCLEAR POWER GENERATION**

BASIS DOCUMENT

EOP Step No: ENTRY CONDITIONS

ERG Step No: ENTRY CONDITIONS

EOP Step:

- EOP-TRIP-1 STEP 2.2
- EOP-CFST-1, SHUTDOWN MARGIN - RED
- EOP-CFST-1, SHUTDOWN MARGIN - PURPLE

Purpose:

To provide the plant conditions for entry into this procedure.

ERG Basis:

This procedure is entered from EOP-TRIP-1, when reactor trip is not verified and manual trip is not effective. This EOP is also entered from EOP-CFST-1 Shutdown Margin Status Tree on a PURPLE or RED condition.

EOP Basis:

Same as ERG basis.

Supplemental Information:

N/A

Setpoints and Numerical Values:

N/A

ERG Deviations:

No deviation from the ERG.

EOP Step No: N/A

ERG Step No: Note 1-1, Steps 1 and 2

EOP Step:

N/A

Purpose:

To remind the operator that the first 2 steps are immediate actions.

To ensure that the reactor has tripped.

To ensure that the turbine is tripped.

ERG Basis:

(ERG Note 1-1) Immediate actions are those actions that the operator should be able to perform from memory before opening and reading the emergency procedures. In general, immediate actions are limited to time critical actions that verify automatic protection features of the plant but are not so complex or extensive that reliance on procedures is preferred to reliance on memory.

Although the immediate actions should be memorized by the operator, they need not be memorized verbatim. The operator should know them well enough to complete the intent of each step. The order in which they should be performed should also be consistent with the Step sequence requirements.

(ERG Step 1) Reactor trip must be verified to ensure that the only heat being added to the RCS is from decay heat and reactor coolant pump heat. The safeguards systems that protect the plant during accidents are designed assuming that only decay heat and pump heat are being added to the RCS. If the reactor cannot be tripped, then the control rods should be manually inserted into the core in order to decrease reactor power.

(ERG Step 2) The turbine is tripped to prevent an uncontrolled cooldown of the RCS due to steam flow that the turbine would require. For an ATWS event where a loss of normal feedwater has occurred, analyses have shown that a turbine trip is necessary (within 30 seconds) to maintain SG inventory.

If the turbine will not trip, a turbine runback (manual decrease in load) at maximum rate will also reduce steam flow in a delayed manner. If the turbine stop valves cannot be closed by either trip or runback, the MSIVs should be closed.

EOP Step No: Step N/A (CONTINUED)

EOP Basis:

N/A

Supplemental Information:

ERG Knowledge Item: The intent of the immediate action steps should be committed to memory.

ERG Knowledge Item: If RCS temperature has increased above the current reference temperature, then the rods should automatically be driven in by the Rod Control System. This action satisfies the intent of the contingency requirement.

ERG Knowledge Item: A turbine trip is required for an ATWS event where a loss of main feedwater has occurred. For other ATWS events, with the exception of when a turbine trip is the initiating event, manual tripping of the turbine may yield a somewhat higher system pressure, depending on the initiating event and time in core life, than what would otherwise be expected. However, this action has been determined to be necessary due to the analytical results presented and discussed in ERG Subsections 2.4, ATWS Analysis and Results, and 2.5, Discussion of Analytical Results. Since there are many initiating ATWS events and some that require immediate mitigating actions, diagnosis of the initiating event would not be feasible and separate guidance for different ATWS events would complicate training and could delay timely performance of necessary operator actions.

DW-91-017: Reduced the number of immediate actions in ERGs E-0, ECA-0.0, and FR-S.1, and revised references to these immediate actions accordingly.

Setpoints and Numerical Values:

N/A

ERG Deviations:

DEV.1 Deleted ERG Note 1-1, Step 1, and Step 2.

JUST. There are two entry conditions into the EOP set-- EOP-TRIP-1 and EOP-LOPA-1. Both of these EOPs have immediate actions to trip the reactor and the turbine. Since these steps will have been performed prior to entry into this FRP, ERG Steps 1 and 2 and the associated note were redundant and have been deleted. This plant has chosen not to implement the turbine runback contingency due to this action being too time consuming. Refer to the 30-second assumption in ERG Step 2 basis.

EOP Step No: Step 1

ERG Step No: Step 3

EOP Step:

START 21 AND 22 AFW PUMPS
[AFW FLOW VERIFICATION]

Purpose:

To ensure that 21 and 22 AFW Pumps are running.

ERG Basis:

The 21 and 22 AFW Pumps start automatically on an SI signal and SG low level to provide feed to the SGs for decay heat removal. If SG levels drop below the appropriate setpoint, the 23 AFW Pump will also automatically start to supplement the 21 and 22 AFW Pumps. The ATWS analyses have shown that actuation of AFW within 60 seconds after the failure to scram provides acceptable results.

EOP Basis:

Same as ERG basis.

Supplemental Information:

None

Setpoints and Numerical Values:

<u>Value</u>	<u>Setpoint</u>	<u>Description</u>
44x10 ⁴ lb/hr	S.06	Value corresponding to discharge flow of two AFW pumps at S/G design pressure.
95%	X.09	Valve demand for the AF21 control valve that will prevent runout of the AFW pump.

EOP Step No: Step 1 (CONTINUED)

ERG Deviations:

- DEV.1 Added an action step which checks if total AFW flow is greater than 44E04 lb/hr.
- JUST. Duplicated guidance of ERG Step 7.a.RNO in this step to check all AFW-related actions at the same time.
- DEV.2 Added plant-specific details regarding the AF-21 valves.
- JUST. This guidance aids operators in performing these actions in a consistent manner. The AF21 valves have a pressure override feature that throttles them down to prevent pump runout. If total AFW flow is inadequate, this signal is defeated in case instrument malfunction is limiting these valves from opening properly. [SD-12]
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EOP Step No: Steps 2, 3, 4, and 5

ERG Step No: Steps 4 and 5

EOP Step:

(Step 2) START 21 AND 22 CHARGING PUMPS
[BIT FLOW VERIFICATION]

(Step 3) IS CHARGING FLOW AT LEAST 100 GPM ON SI SYSTEMS CHG FLOW METER
[RAPID BORATION INITIATION]

(Step 4) IS PZR PRESSURE LESS THAN 2335 PSIG
[PZR PORV STATUS]

(Step 5) CLOSE THE FOLLOWING CONTAINMENT VENTILATION ISOLATION VALVES:
• 2VC5
• 2VC6
[CONTAINMENT VENTILATION ISOLATION CHECK]

Purpose:

To add negative reactivity to bring the reactor core subcritical.

To ensure non-essential containment ventilation penetrations are isolated.

ERG Basis:

After control rod trip and rod insertion functions, boration is the next most direct manner of adding negative reactivity to the core. The intended boration path here is the most direct one available, not requiring SI initiation, but using the normal charging pump(s). Pump miniflow lines are assumed to be open to protect the pumps in the event of high RCS pressure.

Several plant specific means are usually available for rapid boration and should be specified here in order of preference. Methods of rapid boration include emergency boration, injecting the BIT, and safety injection actuation. It should be noted that SI actuation will trip the main feedwater pumps. If this is undesirable, the operator can manually align the system for safety injection. However, the RWST valves to the suction of the ECCS pumps should be opened first before opening up the BIT valves. If a safety injection is already in progress but is having no effect on nuclear flux, then the BIT and RWST are not performing their intended function, perhaps due to blockage or leakage. In this case some other alignment using the BATs and/or non-safeguards charging pump(s) is required.

EOP Step No: Steps 2, 3, 4, and 5 (CONTINUED)

ERG Basis: (CONTINUED)

The check on RCS pressure is intended to alert the operator to a condition which would reduce centrifugal charging or SI pump injection into the RCS and, therefore, boration. The PZR PORV pressure setpoint is chosen as that pressure at which flow into the RCS is insufficient. The contingent action is a rapid depressurization to a pressure which would allow increased injection flow. When primary pressure drops 200 psi below the PORV pressure setpoint, the PORVs should be closed. The operator must verify successful closure of the PORVs, closing the isolation valves, if necessary.

Non-essential ventilation penetrations are isolated to prevent potential release of radioactive materials from containment.

This step is addressed in FR-S.1 in accordance with the ATWS analytical case of the "Accidental Depressurization of the RCS Without Reactor Trip" (See Section 2.0, page 48) which results in the most releases of mass and energy into the containment. As a result, verification of containment ventilation should conservatively always be performed independent of the RCS pressure.

EOP Basis:

Same as ERG basis.

Supplemental Information:

None

Setpoints and Numerical Values:

<u>Value</u>	<u>Setpoint</u>	<u>Description</u>
2335 psig	A.02	Pressurizer PORV pressure setpoint.
2135 psig	A.08	200 psi less than pressurizer PORV pressure setpoint.
100 gpm	S.07	Minimum charging flow (per the SI systems charging flow meter) which indicates injection into the RCS.
87 gpm	S.09	Minimum charging flow rate when borating the RCS via the RWST.

ERG Deviations:

No deviation from the ERG

EOP Step No: Step 6

ERG Step No: Caution 6-1

EOP Step:

IF AN SI SIGNAL HAS OCCURRED, THEN VERIFY SI EQUIPMENT ALIGNMENT IAW EOP-APPX-3 "SI VERIFICATION" WHILE CONTINUING WITH THIS PROCEDURE

Purpose:

To alert the operator that he should verify proper actuation of all SI actuated equipment.

ERG Basis:

It is possible to make a transition to this procedure without having performed the verification of automatic SI actions in E-0. This step specifically instructs the operator to perform the verification. This verification is started after Steps 1 through 5 of FR-S.1 since the first five steps deal directly with ATWS mitigation while the E-0 actions deal with system alignment for design basis events.

EOP Basis:

Same as ERG basis.

Supplemental Information:

ERG Knowledge Item: This step should be initiated and performed in parallel with the subsequent steps of this procedure as manpower and time permit.

DW-92-065: If an SI signal occurs, then SI equipment should be verified.

Setpoints and Numerical Values:

None

ERG Deviations:

DEV.1 Deleted ERG caution regarding performing actions (Steps 1 thru 14) of E-0.

JUST. Since the EOP Writer's Guide does not allow hidden actions in cautions and notes, the ERG Caution was replaced with a conditional continuous action step to perform APPX-3, which contains the equivalent actions of ERG E-0 Steps 1 thru 14 plus some additional plant-specific checks related to SI verification. [SD-20]

EOP Step No: Steps 7 and 8

ERG Step No: Step 6

EOP Step:

(Step 7) ARE BOTH REACTOR TRIP BKR_s OPEN
[REACTOR TRIP CONFIRMATION]

(Step 8) ARE ALL TURBINE STOP VALVES CLOSED
[TURBINE TRIP CONFIRMATION]

Purpose:

To determine if earlier control room actions were successful in producing reactor and turbine trips and, if not, to initiate local actions.

ERG Basis:

Reactor trip is the fastest mechanism for adding negative reactivity to the reactor core. Turbine trip removes a large source of positive reactivity addition (heat removal by steaming), and will conserve SG inventory for the limiting ATWS event. If any of these actions have not been successfully achieved when attempted from the control room, an operator should be dispatched to perform the actions locally. Local actions were delayed until now because they will be more time consuming to initiate and complete, but may still be effective. Local reactor trip actions are performed first since the sooner a trip is obtained the less severe the ATWS transient will be.

EOP Basis:

Same as ERG basis.

Supplemental Information:

None

Setpoints and Numerical Values:

None

ERG Deviations:

No deviation from the ERG. The wording has been slightly modified, however the intent is the same.

EOP Step No: Step 9

ERG Step No: Caution 7-1

EOP Step:

IF "AFWST LEVEL LO-LO" ALARM ACTUATES (10.3%),
THEN SHIFT AFW PUMP SUCTION TO AN ALTERNATE SOURCE

Purpose:

To alert the operator that AFST level should be monitored and that an alternate water supply may be necessary.

ERG Basis:

If AFST level decreases below 10.3%, inadequate suction pressure may result in AFW pump trip. An alternate suction source should be provided.

EOP Basis:

Same as ERG basis.

Supplemental Information:

None

Setpoints and Numerical Values:

<u>Value</u>	<u>Setpoint</u>	<u>Description</u>
10.3%	U.01	AFST low-low level switchover setpoint.

ERG Deviations:

DEV.1 Deleted ERG caution regarding shifting AFW to alternate water source.

JUST. Since the EOP Writer's Guide does not allow hidden actions in cautions and notes, the ERG caution was converted into a continuous action step. [SD-20]

EOP Step No: Step 10

ERG Step No: Step 7

EOP Step:

IS ANY SG NR LEVEL GREATER THAN 9% (15% ADVERSE)
[FEED FLOW VERIFICATION]

Purpose:

To ensure that sufficient AFW flow is present to remove heat generated from power operation during an ATWS event or a return to criticality.

ERG Basis:

ATWS analyses have shown that AFW flow of 44×10^4 lb/hr is acceptable to adequately remove the heat generated from power operation prior to reactor shutdown. If AFW flow is not greater than 44×10^4 lb/hr, it is important to increase AFW flow in order to maintain a secondary heat sink. For the loss of normal feedwater ATWS, the SG tubes are uncovered in about two minutes.

For other transients, such as a return to criticality, this feed flow requirement would be excessive. NR SG level can be maintained with lower AFW flow rates. As long as level can be maintained with the lower flow rate, the higher rate is not necessary.

EOP Basis:

Same as ERG basis.

Supplemental Information:

DW-89-056: Reference leg heatup errors should be included in the determination of the level setpoint for normal containment conditions.

EOP Step No: Step 10 (CONTINUED)

Setpoints and Numerical Values:

<u>Value</u>	<u>Number</u>	<u>Description</u>
44x10 ⁴ lb/hr	S.06	Value corresponding to discharge flow of two AFW pumps at S/G design pressure.
9%	M.02	Value showing S/G level just in the narrow range including allowances for normal channel accuracy and reference leg process errors.
15%	M.03	Value showing S/G level just in the narrow range including allowance for normal channel accuracy, post-accident transmitter errors, and reference leg process errors, not to exceed 50%.
33%	M.09	Normal SG narrow range level representing the upper control band limit.

ERG Deviations:

No deviation from the ERG.

EOP Step No: Step 11

ERG Step No: Step 8

EOP Step:

SEND AN OPERATOR TO CLOSE THE FOLLOWING VALVES:

- 2WR70 (PRIMARY WATER TO MAKEUP SYSTEM)
- 21CV151 (BORIC ACID PUMP FLUSH)
- 22CV151 (BORIC ACID PUMP FLUSH)

[DILUTION PATH ISOLATION]

Purpose:

To insure that any possible dilution path is isolated.

ERG Basis:

A possible cause of power generation would be an inadvertent dilution of the RCS. Removal of this source of positive reactivity will make the boration performed earlier more effective.

Since the control room operator is not able to completely verify the isolation of some potential dilution paths, it may be necessary to dispatch an operator locally to verify the proper alignment of the manual valves in these dilution paths.

EOP Basis:

Same as ERG basis.

Supplemental Information:

None

Setpoints and Numerical Values:

None

ERG Deviations:

No deviation from the ERG.

EOP Step No: Step 12

ERG Step No: Steps 9 and 10

EOP Step:

IS RCS TEMPERATURE DROPPING IN AN UNCONTROLLED MANNER
[SOURCES OF REACTIVITY INSERTION]

Purpose:

To see if an uncontrolled or controlled cooldown is in progress.

To determine if main steamline isolation and bypass valves are closed.

ERG Basis:

(ERG Step 9) An uncontrolled cooldown of the RCS is indicated by either an uncontrolled RCS temperature decrease or an uncontrolled SG pressure decrease. Such an RCS cooldown could add a significant amount of positive reactivity to the core, depending on the current value of the moderator temperature coefficient.

If an uncontrolled cooldown is not in progress, the operator is instructed to stop any controlled cooldown and proceed to EOP Step 16. The actions required for stopping the controlled cooldown could include closing the atmospheric or condenser steam dump valves if steaming was in progress, or reducing AFW flow to that of the 21 or 22 AFW pump if the maximum flow was established in EOP Step 10 in response to low SG level. These actions, within the control of the operator, could reduce the RCS cooldown to minimize the amount of positive reactivity that is being added to the core. Once the controlled RCS cooldown has been addressed, the identification and isolation of the faulted SG(s) is bypassed and the next action (EOP Step 15) is to determine if CETs are less than 1200° F.

(ERG Step 10) This step is only performed if an uncontrolled RCS cooldown is observed, and is the initial step in isolating any faulted SG(s).

EOP Basis:

Same as ERG basis.

EOP Step No: Step 12 (CONTINUED)

Supplemental Information:

ERG Knowledge Item: "Uncontrolled" means not under the control of the operator, and incapable of being controlled by the operator using available equipment.

ERG Knowledge Item: Since the severity of a reactivity addition due to uncontrolled cooldown is directly a function of the current moderator temperature reactivity coefficient, training should emphasize the increased magnitude of this parameter at high-burnup, low-ppm core condition.

ERG Knowledge Item: "Controlled" means capable of being controlled through operator action using available equipment. With the identification of a controlled cooldown, the operator can proceed to minimize the effect (stop steaming, reduce AFW flow) of the cooldown on adding positive reactivity to the core.

ERG Knowledge Item: The instructions in EOP Steps 12, 13, and 15 are intended to limit any uncontrolled cooldown caused by a faulted SG (secondary side break). Allowance is made for multiple (but less than all) SGs to be faulted.

Setpoints and Numerical Values:

None

ERG Deviations:

No deviation from the ERG.

EOP Step No: Step 13

ERG Step No: Step 11

EOP Step:

IS ANY SG PRESSURE DROPPING IN AN UNCONTROLLED MANNER
[FAULTED SG EVALUATION]

Purpose:

To identify any faulted (failure in secondary pressure boundary) SG(s).

ERG Basis:

An uncontrolled SG pressure decrease (following MSIV closure) or a completely depressurized (near containment or atmospheric pressure) SG indicates an unisolable failure of the secondary pressure boundary. These symptoms are sufficient to identify the affected SG(s).

EOP Basis:

Same as ERG basis.

Supplemental Information:

ERG Knowledge Item: "Uncontrolled" means not under the control of the operator and incapable of being controlled by the operator using available equipment.

Setpoints and Numerical Values:

None

ERG Deviations:

No deviation from the ERG.

EOP Step No: Step 14

ERG Step No: Caution 12-1

EOP Step:

**CAUTION AT LEAST ONE SG MUST BE MAINTAINED AVAILIABLE FOR RCS COOLDOWN
[FAULTED SG ISOLATION]**

Purpose:

To alert the operator that at least one SG must be available as a heat sink for decay heat removal and RCS cooldown.

ERG Basis:

During the attempt to determine the faulted loop(s), the operator must maintain at least one loop available for cooldown capability. Otherwise, RCS pressure and temperature will increase if all SGs are isolated.

EOP Basis:

Same as ERG basis.

Supplemental Information:

ERG Knowledge Item: System transient characteristics and symptoms for different size breaks.

Setpoints and Numerical Values:

None

ERG Deviations:

No deviation from the ERG.

EOP Step No: Step 15

ERG Step No: Cautions 12-2, 12-3 and Step 12

EOP Step:

IF ALL SGs ARE FAULTED,
THEN MINIMIZE AND MAINTAIN AT LEAST 1.0E04 LB/HR AFW FLOW TO EACH SG
[FAULTED SG ISOLATION]

Purpose:

To alert the operator to maintain a minimum feed flow to minimize any subsequent thermal shock to SG components.

To alert the operator that the steamline to the turbine-driven AFW pump must not be isolated if it is the only source of feed flow to the steam generators

To isolate all feedwater to and steam flow from the faulted SG(s).

ERG Basis:

(ERG Caution 12-2) If feed flow to a SG is isolated and the SG is allowed to dry out, subsequent reinitiation of feed flow to the SG could create significant thermal stress conditions on SG components. Maintaining a minimum verifiable feed flow to the SG allows the components to remain in a "wet" condition, thereby minimizing any thermal shock effects if feed flow is increased.

(ERG Caution 12-3) If the turbine-driven AFW pump is the only operable source of feed flow to the steam generators (i.e., no other motor driven AFW pumps or other operable pumps are capable of providing feed flow to the SGs), then isolation of its steam supply line may degrade system conditions and result in a transition to EOP-FRHS-1. Therefore, this isolation must not be performed.

(ERG Step 12) Isolation of the feedwater to the faulted SG maximizes the cooldown capability of the non faulted loops following a feedline break and minimizes the cooldown and mass and energy release following a steamline break. Isolation of steam paths from the faulted SG also minimizes the RCS cooldown and mass and energy release to the containment. In addition, isolation of these steam paths could isolate the break.

EOP Step No: Step 15 (CONTINUED)

EOP Basis:

Same as ERG basis, with the following additional information:

Care must be exercised when isolating the steam supply to the 23 AFW Pump when performing faulted SG isolation. Isolation could potentially cause an SI actuation (Steam Line delta P) or a loss of feed flow. The second flowchart decision step provides a check to determine if 23 AFW Pump is needed to maintain SG level. If this pump is needed, then the EOP performs the action to isolate the steam flow path from the faulted SG by locally closing the affected MS45 steam isolation. If the 23 AFW Pump is not needed and the faulted SG is one of the two sources of steam supply, then the 23 AFW Pump is secured and the affected MS45 is closed which isolates the 23 AFW Pump from the faulted SG.

After the 23 AFW pump is tripped, the pump should be stopped (by depressing the "23 STOP" bezel) to close 2MS132. This prevents the turbine from restarting when 2MS52 is reset locally.

Supplemental Information:

ERG Knowledge Item: Recovery actions affected by isolation of the faulted SG or secondary break.

Setpoints and Numerical Values:

<u>Value</u>	<u>Number</u>	<u>Description</u>
1×10^4 lb/hr	S.05	Value of feed flow in plant specific units corresponding to 25 gpm.

ERG Deviations:

- DEV.1 Deleted ERG Caution regarding maintaining 1.0E04 LB/HR feed flow to all faulted SGs.
- JUST. Since the EOP Writer's Guide does not allow hidden actions in cautions and notes, the ERG caution was converted into a continuous action step. [SD-20]
- DEV.2 Deleted ERG caution regarding isolating steam supply from faulted SG to 23 AFW Pump.
- JUST. Added plant specific steps that ensure isolation of steam from faulted SG(s) will not isolate both steam supply sources to 23 AFW Pump if it is needed to maintain SG level. This guidance aids operators in performing these actions in a consistent manner.

EOP Step No: Step 16

EOP Step:

ARE 5 OR MORE CETs GREATER THAN 1200°F
[SAMG TRANSITION]

Purpose:

To ensure severe conditions do not exist that require a transition to the SAMGs

ERG Basis:

The Severe Accident Management Guidelines (SAMGs) are entered from the ERGs by the control room operators when core damage occurs. The ERG to SAMG transition uses, as part of the transition criteria, a core exit thermocouple temperature indication of greater than 1200°F to indicate the need to transition from the ERGs to the SAMGs. The 1200°F criteria for transition from the ERGs to the SAMGs is identical to the 1200°F criteria on the Core Cooling Critical Safety Function Status Tree.

If the operator enters this step and core exit TC temperatures are greater than 1200°F and increasing, the operator should transition to the SAMGs. This condition indicates that all attempts to restore core cooling have failed and core damage can not be prevented and the operator should go to the SAMGs.

If the operator enters this step and core exit TC temperatures are less than 1200°F or core exit TC temperatures are greater than 1200°F and decreasing, the operator will stay in the loop between steps 4 and 14 in guideline FR-S.1 to continue efforts to emergency borate the RCS and check for sources of positive reactivity.

EOP Basis:

Same as ERG basis.

Supplemental Information:

None

Setpoints and Numerical Values:

<u>Value</u>	<u>Setpoint</u>	<u>Description</u>
1200°F	G.04	Core exit temperatures indicative of superheat conditions

ERG Deviations:

No deviation from the ERG.

EOP Step No: Steps 17 and 18

ERG Step No: Step 14, Caution 15-1, and Step 15

EOP Step:

(Step 16) ARE AT LEAST THREE POWER RANGE CHANNELS LESS THAN 5%
[VERIFYING REACTOR SUBCRITICAL.]

(Step 17) DIRECT CHEMISTRY TO SAMPLE THE RCS FOR BORON
[SHUTDOWN MARGIN VERIFICATION]

Purpose:

To see if previous actions were successful in returning the reactor to a subcritical condition.

To inform the operator of the required extent of boration after the reactor is subcritical.

To direct the operator to the proper procedure following successful completion of the steps in this procedure.

ERG Basis:

(ERG Step 14) By this time all attempts to identify and isolate the most obvious sources of positive reactivity addition to the RCS have been performed. Furthermore, the boration initiated in ERG Step 4 may already have had some effect in returning the core to a subcritical condition. Hence, a check on subcriticality is in order. This step specifies two conditions which must both be satisfied to verify that the reactor is indeed subcritical. Power range channels below 5% ensure that the heat load to available heat sinks is just the decay heat level normally accommodated with AFW flow. The negative IR startup rate ensures that the reactor is subcritical. Notice that no degree of subcriticality is specified and, therefore, any negative startup rate is acceptable.

If neither of the above conditions for subcriticality is satisfied, the operator is directed to continue the boration. If boration is not available, then the RCS should be allowed to heat up in order for the negative reactivity feedback mechanisms (moderator temperature coefficient and Doppler effect) to take effect in reducing nuclear power.

In addition, actions of other Function Restoration Guidelines in effect can be performed at this time (even though the Shutdown Margin Status Tree may still indicate a RED or PURPLE priority) as long as they do not cool down or otherwise add positive reactivity to the core. The operator is then returned to EOP Step 2 of EOP-FRSM-1 to continue efforts to emergency borate the RCS and check for sources of positive reactivity.

(ERG Caution 15-1) Subcriticality (negative startup rate) is a sufficient condition to satisfy the Shutdown Margin Critical Safety Function RED or PURPLE priority. However, establishing adequate shutdown margin reflects a conservative operational approach.

EOP Step No: Steps 17 and 18 (CONTINUED)

ERG Basis: (CONTINUED)

(ERG Step 15) Since the reactor has been verified to be subcritical (the RED or PURPLE priority no longer exists on the Shutdown Margin Status Tree), the operator should continue plant recovery operations by returning to the procedure and step that was in effect at the time EOP-FRSM-1 was entered.

EOP Basis:

Same as ERG basis.

Supplemental Information:

ERG Knowledge Item: Other FRPs in effect can mean previous FRPs in effect or lower priority FRPs that may be identified e.g., high containment pressure.

ERG Knowledge Item: Confirmation of subcriticality is sufficient to terminate the boration currently in progress. However, prior to termination, the operator should consider future actions in the recovery process and their effect on core reactivity. The "should continue" wording of the caution suggests that the current level of subcriticality may not be adequate throughout these future actions. Boration may be terminated at this time, based on the judgment that near-term actions will not add positive reactivity to the core. However, the operator should be aware that additional boration may be necessary in the future, for example, during cooldown operations. (DW-91-013)

Setpoints and Numerical Values:

<u>Value</u>	<u>Setpoint</u>	<u>Description</u>
5%	P.02	Maximum nuclear power level for performance of the EOP network.

ERG Deviations:

DEV.1 Deleted ERG caution regarding boration to obtain adequate shutdown margin.

JUST. Since the EOP Writer's Guide does not allow hidden actions in cautions and notes, the ERG caution was converted into equivalent action steps. [SD-20]

APPENDIX A
EOP/ERG CORRELATION

2-EOP-FRSM-1: RESPONSE TO NUCLEAR POWER GENERATION

EOP/ERG CORRELATION

EOP Step	ERG Step
ENTRY CONDITIONS	ENTRY CONDITIONS
N/A	Note 1-1 (1)
N/A	1 (1)
N/A	2 (2)
1	3 (3)
2, 3, 4, 5	4 (4) 5 (5)
6	Caution 6-1 (6)
7, 8	6 (6)
9	Caution 7-1 (7)
10	7 (7)
11	8 (8)
12	9 (9) 10 (10)
13	11 (11)
14	Caution 12-1 (12)
15	Caution 12-2 (12) Caution 12-3 (12) 12 (12)
16	13
17, 18	14 (14) Caution 15-1 (15) 15 (15)