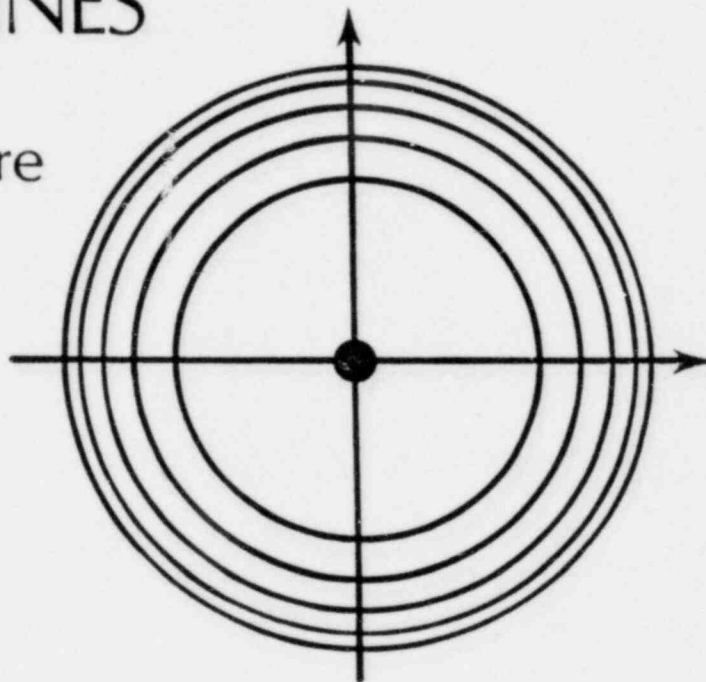


Westinghouse Owners Group

EMERGENCY RESPONSE GUIDELINES

Low Pressure
Version



VOLUME TWO - A
Optimal Recovery
Guidelines and
Emergency Contingencies

WESTINGHOUSE OWNERS GROUP
EMERGENCY RESPONSE GUIDELINE
INFORMATION PACKAGE

LOW PRESSURE VERSION

VOLUME II
OPTIMAL RECOVERY GUIDELINES
AND EMERGENCY CONTINGENCIES

Prepared by Westinghouse Electric Corporation
for
The Westinghouse Owners Group

July 1982

O. D. Kingsley, Chairman
Westinghouse Owners Group

B. L. King
Westinghouse Owners Group Project Manager

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Number: E-O	Symptom/Title: REACTOR TRIP OR SAFETY INJECTION	Revision No./Date LP - Basic 5 July, 1982
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EMERGENCY INSTRUCTION E-O REACTOR TRIP OR SAFETY INJECTION

A. PURPOSE

The purpose of this guideline is to verify proper response of the automatic protection systems following manual or automatic actuation of a REACTOR TRIP or SAFETY INJECTION, to assess plant conditions, and to identify the appropriate recovery guideline.

B. SYMPTOMS: ⁽¹⁾

- I. Following are symptoms of a reactor trip:
 - a. Any reactor trip annunciator lit
 - b. Rapid decrease in neutron level indicated by nuclear instrumentation
 - c. All shutdown and control rods are fully inserted. Rod bottom lights are lit
 - d. Rapid decrease in unit load to zero power

- II. Following are symptoms of reactor trip *and* safety injection:
 - a. Any SI annunciator lit
 - b. SI pumps in service
 - c. [Enter other plant specific symptoms]

⁽¹⁾ Plant should modify this typical list to be consistent with plant features.

Number: E-0	Symptom/Title: REACTOR TRIP OR SAFETY INJECTION (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p>NOTE ● <i>Circled numbers show IMMEDIATE ACTION steps.</i> ● <i>Foldout page should be open.</i></p>		
①	<p>Verify Reactor Trip:</p> <ul style="list-style-type: none"> • Rod bottom lights - LIT • Rod position indicators - ZERO • Neutron flux - DECREASING 	<p>Manually trip reactor. <u>IF</u> reactor will <u>NOT</u> trip, <u>THEN</u> go to ECA-1, ANTICIPATED TRANSIENT WITHOUT SCRAM.</p>
②	<p>Verify Turbine Trip:</p> <ul style="list-style-type: none"> • All turbine stop valves - CLOSED 	<p>Manually trip turbine.</p>
③	<p>Verify AC Emergency Busses Energized:</p> <ul style="list-style-type: none"> • AC emergency bus voltage - NORMAL 	<p><u>IF NOT</u> energized, <u>THEN</u> go to ECA-2, LOSS OF ALL AC POWER, STEP 3.</p>
④	<p>Check if SI Is Actuated:</p> <p>a. [Enter plant specific means]</p>	<p><u>IF NOT</u> actuated, <u>THEN</u> go to ES-0.1, REACTOR TRIP RESPONSE.</p>
⑤	<p>Verify Feedwater Isolation:</p> <ul style="list-style-type: none"> a. Flow control valves - CLOSED b. Flow control bypass valves - CLOSED c. Feedwater isolation valves - CLOSED d. Steam generator blowdown isolation valves - CLOSED 	<ul style="list-style-type: none"> a. Manually close valves. b. Manually close valves. c. Manually close valves. d. Manually close valves.
⑥	<p>Verify Containment Isolation Phase A:</p> <p>a. Containment Isolation Phase A - ACTUATED</p>	<p>a. Manually actuate Containment Isolation Phase A.</p>
⑦	<p>Verify AFW Pumps Running:</p> <ul style="list-style-type: none"> a. Motor-driven pump breaker indicator lights - LIT b. Turbine-driven pump steam supply valves - OPEN, IF NECESSARY 	<ul style="list-style-type: none"> a. Manually start pumps. b. Manually open valves, if necessary.

Number: E-0	Symptom/Title: REACTOR TRIP OR SAFETY INJECTION (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8	Verify SI Pumps Running: a. High-head SI pump breaker indicator lights - LIT b. Low-head SI pump breaker indicator lights - LIT	a. Manually start pumps. b. Manually start pumps.
9	Verify CCW Pumps Running: a. CCW pump breaker indicator lights - LIT	a. Manually start pumps.
10	Verify Service Water Pumps Running: a. Service water pump breaker indicator lights - LIT	a. Manually start pumps.
11	Verify Containment Fan Coolers Running: a. Fan cooler indicator lights - LIT	a. Manually start fan coolers.
12	Verify Containment Ventilation Isolation: a. Damper indicator lights - CLOSED	a. Manually close damper.
<i>[Appropriate steps for verification of other essential equipment as required by the specific plant design should be placed after step 12.]</i>		
13	Check If Main Steamline Isolation Is Actuated: a. [Enter plant specific means]	a. Manually actuate main steamline isolation, if required.

Number: E-0	Symptom/Title: REACTOR TRIP OR SAFETY INJECTION (Cont.)	Revision No., Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14	<p>Check Containment Pressure:</p> <p>a. Pressure has remained below <u>(1)</u> psig</p> <p>b. Pressure has remained below <u>(2)</u> psig</p>	<p>a. <u>IF</u> pressure has gone above <u>(1)</u> psig, <u>THEN</u> verify main steam isolation and bypass valves closed. <u>IF NOT</u> closed, <u>THEN</u> manually close valves.</p> <p>b. <u>IF</u> pressure has gone above <u>(2)</u> psig, <u>THEN</u>:</p> <ol style="list-style-type: none"> 1) Verify containment spray initiated. <u>IF NOT</u> initiated, <u>THEN</u> manually initiate. 2) Verify containment isolation phase B initiated. <u>IF NOT</u> initiated, <u>THEN</u> manually initiate. 3) Stop all RCPs.
15	<p>Verify SI Flow:</p> <p>a. <u>IF</u> RCS pressure is less than <u>(3)</u> psig, <u>THEN</u> check high-head SI pump flow indicators - CHECK FOR FLOW</p> <p>b. <u>IF</u> RCS pressure is less than <u>(4)</u> psig, <u>THEN</u> check low-head SI flow indicators - CHECK FOR FLOW</p>	<p>a. Manually start pumps and align valves as appropriate. <u>IF</u> SI flow <u>NOT</u> established, <u>THEN</u> monitor symptoms for FR-C.1, RESPONSE TO INADEQUATE CORE COOLING.</p> <p>b. Manually start pumps and align valves as appropriate.</p>

(1) Enter plant specific Hi-2 pressure setpoint.
(2) Enter plant specific Hi-3 pressure setpoint.
(3) Enter plant specific shutoff pressure of high-head SI pumps.
(4) Enter plant specific shutoff pressure of low-head SI pumps.

Number: E-0	Symptom/Title: REACTOR TRIP OR SAFETY INJECTION (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p><i>Caution</i> Do not throttle AFW flow until water level is above top of U-tubes.</p>		
16	<p>Verify AFW Flow: a. AFW flow indicators - CHECK FOR FLOW</p>	<p>a. Manually start pumps and align valves as appropriate. <u>IF AFW flow NOT established, THEN go to FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK.</u></p>
17	<p>Verify RCS Heat Removal: a. RCS average temperature - DECREASING TO <u>(1)</u> °F b. RCS average temperature - STABILIZES AT <u>(1)</u> °F</p>	<p>a. Dump steam: 1) Manually open condenser steam dump valves. —OR— 2) Manually open steam generator PORVs. b. Stop dumping steam and throttle AFW flow as necessary.</p>
<p>(1) Enter temperature for programmed no-load temperature.</p>		

Number: E-0	Symptom/Title: REACTOR TRIP OR SAFETY INJECTION (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	<p><i>Caution</i></p> <ul style="list-style-type: none"> • If offsite power is lost after SI reset, manual action may be required to restart safeguards equipment. • If SI is reset before automatic transfer of high-head SI pump suction to RWST occurs, manual transfer on BAT low level is required. 	
18	<p>Check RCP Seal Cooling:</p> <p>a. CCW flow to RCP thermal barriers - NORMAL</p>	<p>a. <u>IF</u> CCW to an RCP is lost, <u>THEN</u>:</p> <ol style="list-style-type: none"> 1) Trip the RCP. 2) Reset SI. 3) Ensure adequate power available to run one charging pump. 4) Start one charging pump at minimum speed for seal injection.
19	<p>Verify AFW Valve Alignment:</p> <p>a. AFW valves - PROPER EMERGENCY ALIGNMENT ⁽¹⁾</p>	<p>a. Manually open or close valves as appropriate.</p>
20	<p>Verify SI Valve Alignment:</p> <p>a. SI valves - PROPER EMERGENCY ALIGNMENT ⁽¹⁾</p>	<p>a. Manually open or close valves as appropriate.</p>
21	<p>Check RCS Pressure:</p> <p>a. Pressure - GREATER THAN ⁽²⁾ PSIG</p> <p>b. Pressure - STABLE OR INCREASING</p>	<p>a. <u>IF</u> less than ⁽²⁾ psig, <u>THEN</u> go to step 30.</p> <p>b. <u>IF</u> decreasing, <u>THEN</u> go to step 30.</p>
22	<p>Check Containment Temperature:</p> <p>a. Containment temperature - NORMAL</p>	<p>a. <u>IF</u> high, <u>THEN</u> go to step 30.</p>
23	<p>Check Containment Pressure:</p> <p>a. Containment pressure - NORMAL</p>	<p>a. <u>IF</u> high, <u>THEN</u> go to step 30.</p>

(1) Enter plant specific list.

(2) Enter plant specific shutoff head pressure of high-head SI pumps plus instrument uncertainties or low pressure reactor trip setpoint, whichever is lower.

Number: E-0	Symptom/Title: REACTOR TRIP OR SAFETY INJECTION (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
29	Go To ES-0.3, SI TERMINATION FOLLOWING SPURIOUS SI.	
30	Check If RCS Depressurization Can Be Stopped: a. Pressurizer spray valves - CLOSED b. Pressurizer PORVs - CLOSED	a. Manually close valves. <u>IF</u> valve(s) can <u>NOT</u> be closed, <u>THEN</u> stop RCP(s) in loop(s) with open valve(s). b. Manually close valves. <u>IF</u> any valve cannot be closed, <u>THEN</u> manually close its block valve.
31	Check If RCPs Should Be Stopped: a. High-head SI pumps running - CHECK FOR FLOW OR PUMP BREAKER INDICATOR LIGHTS LIT b. RCS pressure - EQUAL TO OR LESS THAN <u>(1)</u> PSIG c. Stop all RCPs	a. DO NOT STOP RCPs. Go to step 32. b. DO NOT STOP RCPs. Go to step 32.
32	Check For Secondary Integrity: a. All steam generator pressures - APPROXIMATELY EQUAL b. All steam generator pressures - GREATER THAN <u>(2)</u> PSIG	a. <u>IF</u> pressure 100 psi lower in one steam generator than the others, <u>THEN</u> go to E-2, LOSS OF SECONDARY COOLANT. b. <u>IF</u> any steam generator pressure less than <u>(2)</u> psig, <u>THEN</u> go to E-2, LOSS OF SECONDARY COOLANT.

(1) Enter plant specific value, derived from background document.

(2) Enter plant specific value corresponding to low steam pressure SI setpoint.

Number: E-0	Symptom/Title: REACTOR TRIP OR SAFETY INJECTION (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
33	<p>Check For RCS Integrity:</p> <p>a. Containment radiation - NORMAL</p> <p>b. Containment pressure - NORMAL</p> <p>c. Containment recirculation sump level - NORMAL</p>	<p>a. <u>IF</u> high, <u>THEN</u> go to E-1, LOSS OF REACTOR COOLANT.</p> <p>b. <u>IF</u> high, <u>THEN</u> check for containment radiation. <u>IF</u> containment radiation high, <u>THEN</u> go to E-1, LOSS OF REACTOR COOLANT. <u>IF</u> containment radiation normal, <u>THEN</u> return to step 32.</p> <p>c. <u>IF</u> high, <u>THEN</u> go to E-1, LOSS OF REACTOR COOLANT.</p>
34	<p>Check For RCS To Secondary Integrity:</p> <p>a. Condenser air ejector radiation - NORMAL</p> <p>b. Steam generator blowdown radiation - NORMAL</p>	<p>a. <u>IF</u> high, <u>THEN</u> go to E-3, STEAM GENERATOR TUBE RUPTURE.</p> <p>b. <u>IF</u> high, <u>THEN</u> go to E-3, STEAM GENERATOR TUBE RUPTURE.</p>
35	<p>Continue To Evaluate Plant Conditions:</p> <p>a. Monitor critical safety function status trees</p> <p style="text-align: center;">-AND-</p> <p>b. Continue with this guideline</p>	
36	<p>Check For Uncontrolled RCS Cooldown:</p> <p>a. If at least one RCP is running - HOT LEG TEMPERATURE STABILIZES AT APPROXIMATELY (1) °F</p> <p>b. If RCPs are NOT running- HOT LEG TEMPERATURE STABILIZES AT APPROXIMATELY (2) °F</p>	<p>a. <u>IF</u> temperature is decreasing in an uncontrolled manner, <u>THEN</u> close main steamline isolation valves and bypass valves.</p> <p>b. <u>IF</u> temperature is decreasing in an uncontrolled manner, <u>THEN</u> close main steamline isolation valves and bypass valves.</p>

(1) Enter temperature for programmed no-load temperature.

(2) Enter temperature corresponding to expected hot leg temperature on natural circulation.

Number: E-0	Symptom/Title: REACTOR TRIP OR SAFETY INJECTION (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
37	Check Steam Generator Levels: a. Narrow range level - GREATER THAN <u>(1)</u> % b. Throttle AFW flow to maintain narrow range level at <u>(2)</u> %	a. IF less than <u>(1)</u> %, THEN maintain full AFW flow until narrow range level is greater than <u>(1)</u> %. b. IF narrow range level in one steam generator continues to increase, THEN go to E-3, STEAM GENERATOR TUBE RUPTURE.
38	Check PRT Conditions-NORMAL.	IF PRT conditions abnormal, THEN evaluate cause of abnormal conditions.
<p><i>Caution</i></p> <ul style="list-style-type: none"> ● If offsite power is lost after SI reset, manual action may be required to restart safeguards equipment. ● If SI is reset before automatic transfer of high-head SI pump suction to RWST occurs, manual transfer on BAT low level is required. 		
39	Reset SI.	
40	Reset Containment Isolation Phase A.	
41	Check If Low-Head SI Pumps Should Be Stopped: a. RCS pressure - GREATER THAN <u>(3)</u> PSIG AND STABLE OR INCREASING b. Stop low-head SI pumps and place in standby	a. IF RCS pressure low or decreasing, THEN return to step 31.
<p><i>Caution</i> If RCS pressure drops below <u>(3)</u> psig, low-head SI pumps must be manually restarted to supply water to RCS.</p>		
<p>(1) Enter plant specific value showing level just in the narrow range including allowances for normal channel accuracy, post-accident transmitter errors and reference leg process errors. (2) Enter plant specific value corresponding to no-load steam generator level including allowances for post-accident transmitter errors and reference leg process errors. (3) Enter plant specific shutoff head of low-head SI pumps.</p>		

Number: E-0	Symptom/Title: REACTOR TRIP OR SAFETY INJECTION (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
42	Check Power Supply To Charging Pumps: a. Offsite power - AVAILABLE	a. IF offsite power <u>NOT</u> available, <u>THEN</u> verify adequate diesel capacity to run charging pumps. If necessary, shed sufficient non-essential loads.
<p><i>Caution</i> If CCW to the RCP thermal barriers is lost, RCP seal injection should be established slowly to minimize RCP thermal stresses and potential seal failures.</p>		
43	Start One Charging Pump To Establish Seal Injection Flow.	
44	Reestablish Instrument Air To Containment.	
45	Establish Charging Flow: a. [Enter plant specific means]	IF charging flow can <u>NOT</u> be established, <u>THEN</u> go to step 21.
46	Start Additional Charging Pumps, If Necessary, To Meet SI Termination Criteria.	
47	Rediagnose Plant Conditions: a. Return to step 21	

— END —

FOLDOUT FOR E-O AND ES-O GUIDELINES

1. RCP TRIP CRITERIA

- Trip any RCP if component cooling water to that pump is lost.
- Trip all RCPs if BOTH conditions listed below are met:
 - a. SI is ON.
 - b. RCS pressure - EQUAL TO OR LESS THAN (1) PSIG.

2. SI TERMINATION CRITERIA FOR SPURIOUS SI

- a. Terminate SI when ALL parameters listed below are met:
 - (1) RCS Pressure - GREATER THAN (2) PSIG AND STABLE OR INCREASING
 - (2) RCS Subcooling - GREATER THAN (3)°F
 - (3) Pressurizer Level - GREATER THAN (4) %
 - (4) Heat Sink:
 - (a) SG Level - GREATER THAN (5) % WR
 - OR—
 - (b) AFW Flow - GREATER THAN (6) GPM

3. SI REINITIATION CRITERIA FOLLOWING SPURIOUS SI

- a. Reinitiate SI if ANY ONE of the parameters listed below occurs:
 - (1) RCS Pressure - LESS THAN (7) PSIG
 - (2) RCS Subcooling - LESS THAN (3)°F
 - (3) Pressurizer Level - LESS THAN 10 %

4. SYMPTOMS FOR FR-C.1, RESPONSE TO INADEQUATE CORE COOLING

Go to FR-C.1, RESPONSE TO INADEQUATE CORE COOLING when ALL symptoms in ANY ONE of the following symptom sets occur:

PARAMETER:	SYMPTOM SET		
	I	II	III
1. TCs	>1200°F	—	>700°F
2. Containment Condition	—	ABNORMAL	ABNORMAL
3. RCP Status	—	ANY ON	ALL OFF
4. RVLIS	—	<100% NR	< <u>(8)</u> % NR

5. SYMPTOMS FOR FR-H.1 RESPONSE TO LOSS OF SECONDARY HEAT SINK

Go to FR-H.1 RESPONSE TO LOSS OF SECONDARY HEAT SINK, If AFW Flow is NOT AVAILABLE.

- (1) Enter plant specific value derived from background document.
- (2) Enter plant specific shutoff head pressure of high-head SI pumps plus instrument uncertainties or 2000 psig, whichever is lower.
- (3) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.
- (4) Enter plant specific no-load value.
- (5) Enter plant specific wide-range value which is above top of steam generator U-tubes.
- (6) Enter plant specific value derived from background document.
- (7) Enter plant specific value for shutoff head pressure of high-head SI pumps or low pressurizer pressure SI setpoint, whichever is lower.
- (8) Enter plant specific value which is 3½ feet above bottom of active fuel in core with zero void fraction, plus uncertainties.

BACKGROUND INFORMATION FOR
WESTINGHOUSE
EMERGENCY RESPONSE GUIDELINES

E-0
REACTOR TRIP OR SAFETY INJECTION
BASIC REVISION

(To be provided later)

WESTINGHOUSE OWNERS GROUP
EMERGENCY RESPONSE GUIDELINES
CONFIGURATION CONTROL SHEET

GUIDELINE DESIGNATOR: E-0

GUIDELINE TITLE: Reactor Trip or Safety Injection

REVISION: LP-Basic


DATE: July 5, 1982

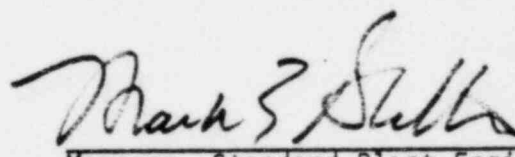
The guideline described above has been reviewed and approved for implementation by the Westinghouse Owner's Group Procedures Subcommittee and the Westinghouse Nuclear Technology Division.

NOTICE: THIS EMERGENCY RESPONSE GUIDELINE SET REVISION (LP-BASIC) IS THE ORIGINAL ISSUE OF GENERIC GUIDANCE ON ITS SUBJECT MATTER FOR PLANTS WITH LOW-PRESSURE SI SYSTEMS AND SUPERSEDES ANY GENERIC GUIDANCE ON THIS SUBJECT BEARING AN ISSUE DATE EARLIER THAN JULY 5, 1982.

THE "BASIC" REVISION OF THE EMERGENCY RESPONSE GUIDELINE SET BEARING AN ISSUE DATE OF SEPTEMBER 1, 1981, APPLIES TO PLANTS WITH HIGH-PRESSURE SI SYSTEMS.

File this sheet with the approved version of this guideline in your Emergency Response Guideline set.


Chairman, Procedures Subcommittee
Westinghouse Owner's Group


Manager, Standard Plant Engineering
Westinghouse Nuclear Technology Division

Number: ES-0.1	Symptom/Title: REACTOR TRIP RESPONSE	Revision No./Date: LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	<p><i>Caution</i> If SI actuation occurs at any time, immediately go to E-O, REACTOR TRIP OR SAFETY INJECTION, STEP 5.</p>	
	<p>NOTE Foldout page should be open.</p>	
1	<p>Verify RCS Heat Removal:</p> <p>a. RCS temperature - DECREASING TO <u>(1)</u> °F</p> <p>b. <u>WHEN</u> RCS temperature is <u>LESS THAN</u> <u>(2)</u> °F, <u>THEN</u> verify feedwater flow control valves are closed <u>(3)</u></p> <p>c. Verify AFW flow to the steam generators</p> <p>d. RCS temperature - STABILIZES AT <u>(1)</u> °F</p>	<p>a. Dump steam in following preferred order:</p> <ol style="list-style-type: none"> 1) Transfer condenser steam dump to pressure control mode. 2) Manually open condenser steam dump valves. 3) Manually open steam generator PORVs. <p>b. Manually close valves.</p> <p>c. Establish feedwater flow to the steam generators, as necessary:</p> <ol style="list-style-type: none"> 1) AFW <u>(3)</u>. <p style="text-align: center;">—OR—</p> <ol style="list-style-type: none"> 2) Main feedwater on bypass <u>(3)</u>. <p>d. Stop dumping steam and throttle feedwater flow as necessary. <u>IF</u> cooldown continues, <u>THEN</u> close main steamline isolation valves.</p>
	<p>(1) Enter programmed no-load temperature. (2) Enter temperature for low average temperature setpoint. (3) Enter plant specific list of valves.</p>	

Number: ES-0.1	Symptom/Title: REACTOR TRIP RESPONSE (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2	Verify All Control Rods Fully Inserted.	IF two or more control rods <u>NOT</u> fully inserted, <u>THEN</u> emergency borate <u>(1)</u> ppm for each control rod not fully inserted.
3	Check Pressurizer Level Control:	
	a. Level - GREATER THAN <u>(2)</u> %	a. IF level less than <u>(2)</u> %, <u>THEN</u> ;
	b. Verify charging and letdown in service.	1) Verify letdown isolation; if not, manually isolate letdown.
	c. Level - TRENDING TO <u>(3)</u> %	2) Verify heaters off; if not, manually turn off heaters.
		3) Manually control charging to restore pressurizer level.
		b. Manually place in service [enter plant specific steps].
		c. Control charging and letdown to maintain level at <u>(3)</u> %.

(1) Enter plant specific boration requirement.
(2) Enter plant specific letdown isolation level.
(3) Enter plant specific no-load level.

Number: ES-0.1	Symptom / Title: REACTOR TRIP RESPONSE (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4	<p>Check Pressurizer Pressure Control:</p> <p>a. Pressure - GREATER THAN <u>(1)</u> PSIG</p> <p>b. Pressure - STABLE AT OR TRENDING TO <u>(2)</u> PSIG</p> <p>c. Pressurizer heaters - AVAILABLE</p>	<p>a. <u>IF</u> pressure less than <u>(1)</u> psig, <u>THEN</u> verify SI actuation and go to E-O, REACTOR TRIP OR SAFETY INJECTION, STEP 5.</p> <p>b. <u>IF</u> pressure below <u>(2)</u> psig and decreasing, <u>THEN</u>:</p> <ol style="list-style-type: none"> 1) Verify pressurizer PORVs closed; if not, manually close. 2) Verify pressurizer spray valves closed; if not, manually close. <u>IF</u> valve(s) can <u>NOT</u> be closed, <u>THEN</u> STOP RCP(s) in loop(s) with open valve(s). 3) Verify pressurizer heaters on; if not, manually turn on. <p><u>IF</u> pressure above <u>(2)</u> and increasing, <u>THEN</u>:</p> <ol style="list-style-type: none"> 1) Verify pressurizer heaters off; if not, manually turn off. 2) Control pressure using pressurizer spray, auxiliary spray, or PORV in this preferred order, as necessary. <p>c. Reset pressurizer heaters.</p>

(1) Enter plant specific SI actuation setpoint.
(2) Enter plant specific normal operating pressure.

Number: ES-0.1	Symptom/Title: REACTOR TRIP RESPONSE (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
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Caution Do not terminate all feedwater flow until water level is above top of U-tubes.

- | | |
|--|---|
| <p>5</p> <p>Check Steam Generator Levels:</p> <p>a. Narrow range level - GREATER THAN <u>(1)</u> %</p> <p>b. Throttle feedwater flow to maintain narrow range level at <u>(2)</u> %</p> | <p>a. <u>IF</u> less than <u>(1)</u> %, <u>THEN</u> maintain feedwater flow until narrow range level is greater than <u>(1)</u> %.</p> <p>b. <u>IF</u> narrow range level in one or more steam generators continues to increase, <u>THEN</u> stop feedwater pumps to that steam generator. <u>IF</u> level continues to increase in an uncontrolled manner, <u>THEN</u> go to FR-H.3, RESPONSE TO STEAM GENERATOR HIGH LEVEL.</p> |
| <p>6</p> <p>Verify Offsite Power Available:</p> <ul style="list-style-type: none"> • [Enter plant specific means] | <p><u>IF</u> offsite power <u>NOT</u> available, <u>THEN</u>:</p> <p>a. Verify diesel generators have started.</p> <p>b. Verify diesel generators have assumed the following loads:
 1) [Insert plant specific list]</p> <p>c. Manually load the following equipment on the diesel generators:
 1) [Insert plant specific list]</p> |

(1) Enter plant specific value showing level just in the narrow range.
 (2) Enter plant specific value corresponding to no-load steam generator level.

Number: ES-0.1	Symptom/Title: REACTOR TRIP RESPONSE (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p><i>Caution</i> On natural circulation, RTD bypass temperatures and associated interlocks will be inaccurate.</p>		
7	Verify At Least One RCP Running.	<p>Verify natural circulation from trended values:</p> <ul style="list-style-type: none"> a. RCS subcooling - GREATER THAN <u>(1)</u> °F. b. Steam pressure - STABLE. c. RCS hot leg temperature - STABLE OR SLOWLY DECREASING. d. Core exit TCs - STABLE OR SLOWLY DECREASING. e. RCS cold leg temperature - NEAR SATURATION TEMPERATURE FOR STEAM PRESSURE.
8	<p>Transfer Condenser Steam Dump To Pressure Control Mode:</p> <ul style="list-style-type: none"> a. [Enter plant specific steps] 	<p>IF condenser <u>NOT</u> available, <u>THEN</u> use steam generator PORVs.</p>
9	<p>Check Intermediate Range Flux:</p> <ul style="list-style-type: none"> a. Flux - BELOW <u>(2)</u> b. Verify source range detectors re-energized c. Transfer nuclear recorders to source range scale 	<ul style="list-style-type: none"> a. Continue with step 10. <u>WHEN</u> flux below <u>(2)</u>, <u>THEN</u> do steps 9 b and c. b. Manually re-energize source range detectors.
<p>(1) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables. (2) Enter plant specific value for intermediate range permissive to block source range high flux trip (P-6).</p>		

Number: ES-0.1	Symptom/Title: REACTOR TRIP RESPONSE (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10	Maintain Stable Plant Conditions: a. Pressurizer pressure - AT <u>(1)</u> PSIG b. Pressurizer level - AT <u>(2)</u> % c. Steam generator narrow range levels - AT <u>(3)</u> % d. RCS average temperature - AT <u>(4)</u> °F	
11	Shutdown Unnecessary Plant Equipment: a. [Enter plant specific list]	
12	If Offsite Power Was Lost, Try To Restore Offsite Power: a. [Enter plant specific list]	IF offsite power cannot be restored, THEN maintain stable plant conditions on ac emergency power. Go to step 14.

(1) Enter plant specific normal operating pressure.
 (2) Enter plant specific no-load level.
 (3) Enter plant specific no-load narrow range level.
 (4) Enter programmed no-load temperature.

Number: ES-0.1	Symptom/Title: REACTOR TRIP RESPONSE (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p>NOTE <i>RCPs should be run in order of priority to provide pressurizer spray.</i></p>		
13	<p>Check RCP Status: a. At least one RCP - RUNNING</p>	<p>a. <u>IF</u> no RCP running, <u>THEN</u> try to start one RCP: 1) Establish conditions for running an RCP - [Enter plant specific list] 2) Start one RCP. <u>IF</u> an RCP cannot be started, <u>THEN</u> continue to monitor natural circulation per step 7.</p>
14	<p>Determine if Natural Circulation Cooldown Required: a. <u>IF</u> a natural circulation cooldown is required, <u>THEN</u> go to ES-0.2, NATURAL CIRCULATION COOLDOWN.</p>	<p>a. <u>IF</u> a natural circulation cooldown <u>NOT</u> required, <u>THEN</u> return to appropriate plant procedure.</p>
<p align="center">— END —</p>		

FOLDOUT FOR E-O AND ES-O GUIDELINES

1. RCP TRIP CRITERIA

- Trip any RCP if component cooling water to that pump is lost.
- Trip all RCPs if BOTH conditions listed below are met:
 - a. SI is ON.
 - b. RCS pressure - EQUAL TO OR LESS THAN (1) PSIG.

2. SI TERMINATION CRITERIA FOR SPURIOUS SI

- a. Terminate SI when ALL parameters listed below are met:
 - (1) RCS Pressure - GREATER THAN (2) PSIG AND STABLE OR INCREASING
 - (2) RCS Subcooling - GREATER THAN (3) °F
 - (3) Pressurizer Level - GREATER THAN (4) %
 - (4) Heat Sink:
 - (a) SG Level - GREATER THAN (5) % WR
 - OR—
 - (b) AFW Flow - GREATER THAN (6) GPM

3. SI REINITIATION CRITERIA FOLLOWING SPURIOUS SI

- a. Reinitiate SI if ANY ONE of the parameters listed below occurs:
 - (1) RCS Pressure - LESS THAN (7) PSIG
 - (2) RCS Subcooling - LESS THAN (3) °F
 - (3) Pressurizer Level - LESS THAN 10 %

4. SYMPTOMS FOR FR-C.1, RESPONSE TO INADEQUATE CORE COOLING

Go to FR-C.1, RESPONSE TO INADEQUATE CORE COOLING when ALL symptoms in ANY ONE of the following symptom sets occur:

PARAMETER:	SYMPTOM SET		
	I	II	III
1. TCs	>1200°F	—	>700°F
2. Containment Condition	—	ABNORMAL	ABNORMAL
3. RCP Status	—	ANY ON	ALL OFF
4. RVLIS	—	<100% NR	< <u>(8)</u> % NR

5. SYMPTOMS FOR FR-H.1 RESPONSE TO LOSS OF SECONDARY HEAT SINK

Go to FR-H.1 RESPONSE TO LOSS OF SECONDARY HEAT SINK, If AFW Flow is NOT AVAILABLE.

(1) Enter plant specific value derived from background document.

(2) Enter plant specific shutoff head pressure of high-head SI pumps plus instrument uncertainties or 2000 psig, whichever is lower.

(3) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.

(4) Enter plant specific no-load value.

(5) Enter plant specific wide-range value which is above top of steam generator U-tubes.

(6) Enter plant specific value derived from background document.

(7) Enter plant specific value for shutoff head pressure of high-head SI pumps or low pressurizer pressure SI setpoint, whichever is lower.

(8) Enter plant specific value which is 3 1/2 feet above bottom of active fuel in core with zero void fraction, plus uncertainties.

BACKGROUND INFORMATION FOR
WESTINGHOUSE
EMERGENCY RESPONSE GUIDELINES

ES-0.1
REACTOR TRIP RESPONSE
BASIC REVISION
(To be provided later)

WESTINGHOUSE OWNERS GROUP
EMERGENCY RESPONSE GUIDELINES
CONFIGURATION CONTROL SHEET

GUIDELINE DESIGNATOR: ES-0.1

GUIDELINE TITLE: Reactor Trip Response

REVISION: LP-Basic

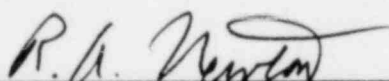
DATE: July 5, 1982

The guideline described above has been reviewed and approved for implementation by the Westinghouse Owner's Group Procedures Subcommittee and the Westinghouse Nuclear Technology Division.

NOTICE: THIS EMERGENCY RESPONSE GUIDELINE SET REVISION (LP-BASIC) IS THE ORIGINAL ISSUE OF GENERIC GUIDANCE ON ITS SUBJECT MATTER FOR PLANTS WITH LOW-PRESSURE SI SYSTEMS AND SUPERSEDES ANY GENERIC GUIDANCE ON THIS SUBJECT BEARING AN ISSUE DATE EARLIER THAN JULY 5, 1982.

THE "BASIC" REVISION OF THE EMERGENCY RESPONSE GUIDELINE SET BEARING AN ISSUE DATE OF SEPTEMBER 1, 1981, APPLIES TO PLANTS WITH HIGH-PRESSURE SI SYSTEMS.

File this sheet with the approved version of this guideline in your Emergency Response Guideline set.


Chairman, Procedures Subcommittee
Westinghouse Owner's Group


Manager, Standard Plant Engineering
Westinghouse Nuclear Technology Division

Number: ES-0.2	Symptom/Title: NATURAL CIRCULATION COOLDOWN	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	<p>NOTE</p> <ul style="list-style-type: none"> ● <i>Foldout page should be open.</i> ● <i>If at any time an RCP can be restarted, go to appropriate normal plant procedures.</i> 	
1	<p>Borate RCS To Cold Shutdown Boron Concentration.</p>	
2	<p>Verify Cold Shutdown Boron Concentration By Sampling:</p> <ul style="list-style-type: none"> a. RCS hot leg b. Pressurizer liquid c. Letdown line 	<p>Borate, as necessary.</p>
3	<p>Check VCT Makeup Control System:</p> <ul style="list-style-type: none"> a. Makeup set at cold shutdown boron concentration b. Makeup set for automatic control: 1) [Enter plant specific means] 	<ul style="list-style-type: none"> a. Adjust controls, as appropriate. b. Adjust controls, as appropriate.
4	<p>Verify All CRDM Fans Running.</p>	<p>Start all fans, if possible.</p>
5	<p>Initiate RCS Cooldown:</p> <ul style="list-style-type: none"> a. Maintain cooldown rate - LESS THAN <u>(1)</u> °F/HR b. Dump steam from all steam generators to condenser: 1) [Enter plant specific steps] c. Maintain steam generator narrow range level - AT <u>(2)</u> % 	<ul style="list-style-type: none"> b. Dump steam from all steam generators with steam generator PORVs. c. Throttle AFW flow, as necessary.
<p>(1) Enter plant specific maximum cooldown rate as determined in background document. (2) Enter plant specific value corresponding to no-load steam generator level including allowances for post-accident transmitter errors and reference leg process errors.</p>		

Number: ES-0.2	Symptom/TIME: NATURAL CIRCULATION COOLDOWN (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p><i>Caution</i> Alternate water sources for AFW pumps will be necessary if CST level is low.</p>		
6	<p>Check RCS Hot Leg Temperature: a. RCS hot leg temperature - LESS THAN 550°F</p>	<p>a. <u>DO NOT</u> proceed until RCS hot leg temperature is less than 550°F.</p>
7	<p>Depressurize RCS To Approximately ⁽¹⁾ PSIG: a. If letdown in service, depressurize RCS using pressurizer auxiliary spray</p>	<p>a. <u>IF</u> letdown <u>NOT</u> in service, <u>THEN</u> use pressurizer PORVs.</p>
<p><i>Caution</i> SI actuation circuits will automatically unblock if RCS pressure increases above ⁽²⁾ psig.</p>		
8	<p>Block SI Actuation Circuits: a. Low steamline pressure b. Low pressurizer pressure</p>	
9	<p>Maintain Following RCS Conditions: a. RCS pressure - APPROXIMATELY ⁽¹⁾ PSIG b. Pressurizer level - APPROXIMATELY ⁽³⁾ % c. RCS cooldown rate - LESS THAN ⁽⁴⁾ °F/HR</p>	
10	<p>Monitor RCS Cooldown: a. Core exit TCs - TRENDING DOWN b. RCS hot leg temperatures - TRENDING DOWN c. RCS subcooling - INCREASING d. RCS temperature and pressure - WITHIN LIMITS OF ⁽⁵⁾</p>	
<p>(1) Enter plant specific pressure 50 psi below permissive to block SI. (2) Enter plant specific pressure at which SI unblocks. (3) No load level. (4) Enter plant specific maximum cooldown rate as determined in background document. (5) Enter plant specific limitation as described in background document.</p>		

Number: ES-0.2	Symptom/Title: NATURAL CIRCULATION COOLDOWN (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
11	Depressurize RCS As Follows: a. If all CRDM fans running, maintain <u>(1)</u> °F subcooling b. If letdown in service, depressurize RCS using pressurizer auxiliary spray	a. <u>IF</u> all CRDM fans <u>NOT</u> running, <u>THEN</u> <u>(2)</u> . b. <u>IF</u> letdown <u>NOT</u> in service, <u>THEN</u> use pressurizer PORVs.
12	Continue RCS Cooldown And Depressurization: a. Maintain cooldown rate - LESS THAN <u>(3)</u> °F/HR b. Maintain subcooling requirements of step 11a c. Maintain RCS temperature and pressure - WITHIN LIMITS OF <u>(4)</u>	b. <u>IF</u> subcooling requirements <u>NOT</u> met, <u>THEN</u> stop depressurization and reestablish subcooling.
13	Check Pressurizer Level - RESPONSE NORMAL.	<u>IF</u> large variations occur, <u>THEN</u> repressurize RCS within limits of <u>(4)</u> to collapse potential voids in system.
14	Check If SI System Should Be Locked Out: a. RCS pressure - LESS THAN 1000 PSIG b. Average RCS temperature - LESS THAN 425°F c. Isolate SI Accumulators: 1) Close isolation valves 2) Lock out power supply to valves d. Lock out high-head SI pumps e. Realign following valves: 1) [Enter plant specific list]	a. <u>DO NOT</u> lock out SI until RCS pressure is less than 1000 psig. b. <u>DO NOT</u> lock out SI until average RCS temperature is less than 425°F. c. Manually close valves.

(1) Enter plant specific minimum subcooling requirement as determined in background document.
 (2) Enter plant specific minimum subcooling requirements or contingency action as determined in background document.
 (3) Enter plant specific maximum cooldown rate as determined in background document.
 (4) Enter plant specific limitation as described in background document.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
15	Maintain Letdown Flow: a. Open letdown orifice isolation valves, as necessary b. Reset low pressure letdown control valve, as necessary	
16	Maintain Required RCP Seal Injection Flow: a. Adjust hand control valve in charging line, as necessary	
17	Check If RHR System Should Be Placed In Service: a. RCS hot leg temperature - LESS THAN 350°F b. RCS pressure - APPROXIMATELY 400 PSIG c. Place RHR system in service per [Enter plant specific procedure]	a. <u>DO NOT</u> place RHRS in service until RCS temperature is less than 350°F. b. <u>DO NOT</u> place RHRS in service until RCS pressure is approximately 400 psig.
18	Continue RCS Cooldown To Below 200°F With RHR System:	
<p><i>Caution</i> Depressurizing the RCS before the ENTIRE RCS is below 200°F may result in void formation in the system.</p>		

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
19	<p>Continue Cooldown Of Inactive Portion Of RCS:</p> <p>a. Upper head region - ALL CRDM FANS RUNNING</p> <p>b. Steam Generator U-Tubes - CONTINUE DUMPING STEAM from all steam generators until it is VERIFIED that they have stopped steaming</p>	<p>a. IF fans <u>NOT</u> running, <u>THEN DO NOT</u> depressurize RCS until upper head cools to less than 200°F (approximately (1) days after RHR system is placed in service).</p> <p>b. <u>DO NOT</u> depressurize RCS until steam generators have stopped steaming.</p>
20	<p>Maintain Cold Shutdown Conditions:</p> <p>a. Plant staff should investigate repairs necessary for plant restart</p>	

- END -

(1) Enter plant specific waiting period as determined in background document.

FOLDOUT FOR E-O AND ES-O GUIDELINES

1. RCP TRIP CRITERIA

- Trip any RCP if component cooling water to that pump is lost.
- Trip all RCPs if BOTH conditions listed below are met:
 - a. SI is ON.
 - b. RCS pressure - EQUAL TO OR LESS THAN (1) PSIG.

2. SI TERMINATION CRITERIA FOR SPURIOUS SI

- a. Terminate SI when ALL parameters listed below are met:
 - (1) RCS Pressure - GREATER THAN (2) PSIG AND STABLE OR INCREASING
 - (2) RCS Subcooling - GREATER THAN (3) °F
 - (3) Pressurizer Level - GREATER THAN (4) %
 - (4) Heat Sink:
 - (a) SG Level - GREATER THAN (5) % WR
 - OR—
 - (b) AFW Flow - GREATER THAN (6) GPM

3. SI REINITIATION CRITERIA FOLLOWING SPURIOUS SI

- a. Reinitiate SI if ANY ONE of the parameters listed below occurs:
 - (1) RCS Pressure - LESS THAN (7) PSIG
 - (2) RCS Subcooling - LESS THAN (8) °F
 - (3) Pressurizer Level - LESS THAN 10 %

4. SYMPTOMS FOR FR-C.1, RESPONSE TO INADEQUATE CORE COOLING

Go to FR-C.1, RESPONSE TO INADEQUATE CORE COOLING when ALL symptoms in ANY ONE of the following symptom sets occur:

PARAMETER:	SYMPTOM SET		
	I	II	III
1. TCs	>1200°F	—	>700°F
2. Containment Condition	—	ABNORMAL	ABNORMAL
3. RCP Status	—	ANY ON	ALL OFF
4. RVLIS	—	<100% NR	< <u>(9)</u> % NR

5. SYMPTOMS FOR FR-H.1 RESPONSE TO LOSS OF SECONDARY HEAT SINK

Go to FR-H.1 RESPONSE TO LOSS OF SECONDARY HEAT SINK, If AFW Flow is NOT AVAILABLE.

(1) Enter plant specific value derived from background document.

(2) Enter plant specific shutoff head pressure of high-head SI pumps plus instrument uncertainties or 2000 psig, whichever is lower.

(3) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.

(4) Enter plant specific no-load value.

(5) Enter plant specific wide-range value which is above top of steam generator U-tubes.

(6) Enter plant specific value derived from background document.

(7) Enter plant specific value for shutoff head pressure of high-head SI pumps or low pressurizer pressure SI setpoint, whichever is lower.

(8) Enter plant specific value which is 3' ± feet above bottom of active fuel in core with zero void fraction, plus uncertainties.

BACKGROUND INFORMATION
FOR
WESTINGHOUSE
EMERGENCY RESPONSE GUIDELINES

ES-0.2
NATURAL CIRCULATION COOLDOWN
BASIC REVISION
(To be provided later)

WESTINGHOUSE OWNERS GROUP
EMERGENCY RESPONSE GUIDELINES
CONFIGURATION CONTROL SHEET

GUIDELINE DESIGNATOR: ES-0.2

GUIDELINE TITLE: Natural Circulation Cooldown

REVISION: LP-Basic

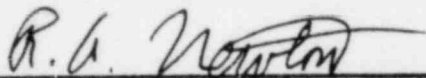
DATE: July 5, 1982

The guideline described above has been reviewed and approved for implementation by the Westinghouse Owner's Group Procedures Subcommittee and the Westinghouse Nuclear Technology Division.

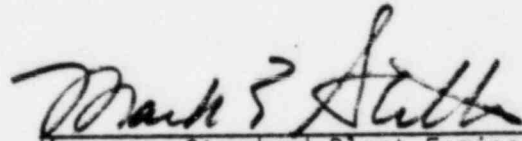
NOTICE: THIS EMERGENCY RESPONSE GUIDELINE SET REVISION (LP-BASIC) IS THE ORIGINAL ISSUE OF GENERIC GUIDANCE ON ITS SUBJECT MATTER FOR PLANTS WITH LOW-PRESSURE SI SYSTEMS AND SUPERSEDES ANY GENERIC GUIDANCE ON THIS SUBJECT BEARING AN ISSUE DATE EARLIER THAN JULY 5, 1982.

THE "BASIC" REVISION OF THE EMERGENCY RESPONSE GUIDELINE SET BEARING AN ISSUE DATE OF SEPTEMBER 1, 1981, APPLIES TO PLANTS WITH HIGH-PRESSURE SI SYSTEMS.

File this sheet with the approved version of this guideline in your Emergency Response Guideline set.



Chairman, Procedures Subcommittee
Westinghouse Owner's Group



Manager, Standard Plant Engineering
Westinghouse Nuclear Technology Division

Number:

ES-0.3

Symptom/Title:

SI TERMINATION FOLLOWING SPURIOUS SI

Revision No./Date

LP - Basic
5 July, 1982

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

Caution

- If offsite power is lost after SI reset, manual action may be required to restart safeguards equipment.
- If SI is reset before automatic transfer of high-head SI pump suction to RWST occurs, manual transfer on BAT low level is required.

NOTE Foldout page should be open.

- 1 Reset SI.
- 2 Reset Containment Isolation Phase A.
- 3 Reestablish Instrument Air To Containment.
- 4 Align High-Head SI Pump Suction From BAT To RWST.
 - a. [Enter plant specific steps]

Caution

Automatic reinitiation of SI will not occur until reactor trip breakers are reset.

- 5 Stop SI Pumps And Place In Standby:
 - a. Stop low-head SI pumps.
 - b. WHEN recirculation lines have been flushed, THEN:
 - 1) Stop high-head SI pumps
 - 2) Establish normal valve alignment for SI pump suction

Number: ES-0.3	Symptom/Title: SI TERMINATION FOLLOWING SPURIOUS SI (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6	<p>Verify SI Reinitiation NOT Required:</p> <p>a. RCS pressure – GREATER THAN <u>(1)</u> PSIG</p> <p>b. RCS subcooling – GREATER THAN <u>(2)</u> °F</p> <p>c. Pressurizer level – GREATER THAN 10%</p>	<p>a. Manually reinitiate SI. Go to E-O, REACTOR TRIP OR SAFETY INJECTION, STEP 5.</p> <p>b. Manually reinitiate SI. Go to E-O, REACTOR TRIP OR SAFETY INJECTION, STEP 5.</p> <p>c. Manually reinitiate SI. Go to E-O, REACTOR TRIP OR SAFETY INJECTION, STEP 5.</p>
7	<p>Verify Offsite Power Available.</p> <ul style="list-style-type: none"> • [Enter plant specific means] 	<p>Try to restore offsite power:</p> <ul style="list-style-type: none"> • [Enter plant specific list] <p><u>IF</u> offsite power cannot be restored, <u>THEN</u> manually load the following equipment on the diesel generators:</p> <ul style="list-style-type: none"> • [Enter plant specific list]
<p><i>Caution</i> If CCW to the RCP thermal barriers is lost, RCP seal injection should be established slowly to minimize RCP thermal stresses and potential seal failures.</p>		
8	<p>Check Charging Pump Status:</p> <p>a. At least one charging pump – RUNNING</p>	<p>a. <u>IF NOT</u> running, <u>THEN</u> start one charging pump to establish seal injection flow.</p>
9	<p>Establish Desired Charging Flow:</p> <p>a. [Enter plant specific means]</p>	
10	<p>Check VCT Makeup Control System:</p> <p>a. VCT level – NORMAL</p> <p>b. Makeup set for automatic control</p> <p>c. Makeup set for GREATER THAN RCS boron concentration</p>	<p>a. Reestablish VCT level.</p> <p>b. Adjust controls, as appropriate.</p> <p>c. Adjust controls, as appropriate.</p>
<p>(1) Enter plant specific shutoff head pressure of high-head SI pumps or low pressurizer pressure SI setpoint, whichever is lower. (2) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.</p>		

Number: ES-0.3	Symptom/Title: SI TERMINATION FOLLOWING SPURIOUS SI (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
11	Establish Letdown: a. Verify CCW flow to letdown heat exchanger b. Open letdown line containment isolation valves c. Open letdown line isolation valves d. Open letdown orifice isolation valves, as appropriate	<u>IF</u> normal letdown can <u>NOT</u> be established, <u>THEN</u> establish excess letdown: a. [Enter plant specific means.]
12	Verify Charging Pump Suction Aligned To VCT.	<u>IF NOT</u> aligned to VCT, <u>THEN</u> realign pump suction from RWST to VCT.
13	Check RCP Cooling: a. RCP CCW system flow - NORMAL b. RCP seal injection flow - NORMAL c. Do not proceed to step 14 until either conditions in step 13a or b are met.	a. Establish CCW flow to RCPs per [Enter plant specific procedure]. b. Adjust charging hand control valve, as necessary. c. <u>IF</u> neither conditions in step 13a or b can be met, <u>THEN</u> go to step 15.
14	Establish RCP Seal Return Flow: a. Verify CCW flow to seal water heat exchanger b. Open RCP seal return line isolation valves	

Number: ES-0.3	Symptom/Title: SI TERMINATION FOLLOWING SPURIOUS SI (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
15	<p>Check Steam Generator Levels:</p> <p>a. Narrow range level - GREATER THAN <u>(1)</u> %</p> <p>b. Throttle AFW flow to maintain narrow range level at <u>(2)</u> %</p>	<p>a. <u>IF</u> less than <u>(1)</u> % , <u>THEN</u> maintain full AFW flow until narrow range level is greater than <u>(1)</u> %</p> <p>b. <u>IF</u> narrow range level in one or more steam generators continues to increase, <u>THEN</u> stop AFW pumps to that steam generator. <u>IF</u> level continues to increase in an uncontrolled manner, <u>THEN</u> go to FR-H.3, RESPONSE TO STEAM GENERATOR HIGH LEVEL.</p>
16	<p>Check CST Level:</p> <p>a. CST level - GREATER THAN <u>(3)</u> %</p>	<p>a. <u>IF</u> CST level low, <u>THEN</u> switch to alternate AFW water supply.</p>
17	<p>Establish Pressurizer Level In Normal Operating Range:</p> <p>a. Adjust letdown flow as necessary</p> <p>b. Adjust charging flow as necessary</p> <p>c. <u>WHEN</u> pressurizer level is normal, <u>THEN</u> place pressurizer level controls in automatic</p>	

*(1) Enter plant specific value showing level just in the narrow range including allowances for normal channel accuracy, post-accident transmitter errors, and reference leg process errors.
(2) Enter plant specific value corresponding to no-load steam generator level including allowances for post-accident transmitter errors and reference leg errors.
(3) Enter plant specific low level setpoint.*

Number: ES-0.3	Symptom/Title: SI TERMINATION FOLLOWING SPURIOUS SI (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
18	<p>Check Pressurizer Pressure Control:</p> <p>a. Pressure - GREATER THAN <u>(1)</u> PSIG</p> <p>b. Pressure - STABLE AT OR TRENDING TO <u>(2)</u> PSIG</p> <p>c. Pressurizer heaters - AVAILABLE</p>	<p>a. <u>IF</u> pressure less than <u>(1)</u> psig, <u>THEN</u> verify SI actuation and go to E-O, REACTOR TRIP OR SAFETY INJECTION, STEP 5.</p> <p>b. <u>IF</u> pressure below <u>(2)</u> psig and decreasing, <u>THEN</u>:</p> <ol style="list-style-type: none"> 1) Verify pressurizer PORVs closed; if not, manually close. 2) Verify pressurizer spray valves closed; if not, manually close. <u>IF</u> valve(s) can <u>NOT</u> be closed, <u>THEN</u> STOP RCP(s) in loop(s) with open valve(s). 3) Verify pressurizer heaters on; if not, manually turn on. <p><u>IF</u> pressure above <u>(2)</u> and increasing, <u>THEN</u>:</p> <ol style="list-style-type: none"> 1) Verify pressurizer heaters off; if not, manually turn off. 2) Control pressure using pressurizer spray, auxiliary spray, or PORV in this preferred order, as necessary. <p>c. Reset pressurizer heaters.</p>

(1) Enter plant specific SI actuation setpoint.
 (2) Enter plant specific normal operating pressure.

Number: ES-0.3	Symptom/Title: SI TERMINATION FOLLOWING SPURIOUS SI (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
19	Check RCS Subcooling - GREATER THAN 50°F.	Dump steam to establish 50°F subcooling: a. Limit RCS cooldown rate - LESS THAN 50°F/HR. b. Dump steam to condenser -OR- Dump steam with steam generator PORVs. c. Maintain RCS temperature and pressure - WITHIN LIMITS OF (1).

(1) Enter plant specific limitation as described in background document.

Number: ES-0.3	Symptom/Title: SI TERMINATION FOLLOWING SPURIOUS SI (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	<p>NOTE RCPs should be run in order of priority to provide pressurizer spray.</p>	
20	<p>Check RCP Status: a. At least one RCP - RUNNING</p>	<p>a. <u>IF</u> no RCP running, <u>THEN</u> try to start one RCP:</p> <ol style="list-style-type: none"> 1) Establish conditions for running an RCP: [Enter plant specific list] 2) Start one RCP. <u>IF</u> an RCP cannot be started, <u>THEN</u> monitor natural circulation from trended values: <ol style="list-style-type: none"> (a) RCS subcooling - GREATER THAN <u>(1)</u> °F. (b) Steam pressure - STABLE. (c) RCS hot leg temperature - STABLE OR SLOWLY DECREASING. (d) Core exit TCs - STABLE OR SLOWLY DECREASING. (e) RCS cold leg temperature - NEAR SATURATION TEMPERATURE FOR STEAM PRESSURE. <p><u>IF</u> natural circulation <u>NOT</u> verified, <u>THEN</u> increase dumping steam.</p>
21	<p>Transfer Condenser Steam Dump To Pressure Control Mode: a. [Enter plant specific steps]</p>	<p><u>IF</u> condenser <u>NOT</u> available, <u>THEN</u> use steam generator PORVs.</p>
<p>(1) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.</p>		

Number: ES-0.3	Symptom/Title: SI TERMINATION FOLLOWING SPURIOUS SI (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
22	Check Intermediate Range Flux: a. Flux - BELOW <u>(1)</u> b. Verify source range detectors re-energized c. Transfer nuclear recorders to source range scale	a. Continue with step 23. <u>WHEN</u> flux below <u>(1)</u> , <u>THEN</u> do steps 22 b and c. b. Manually re-energize source range detectors.
23	Maintain Stable Plant Conditions: a. Pressurizer pressure - AT <u>(2)</u> PSIG b. Pressurizer level - AT <u>(3)</u> % c. Steam generator narrow range levels - AT <u>(4)</u> % d. RCS average temperature - AT <u>(5)</u> °F	
24	Shutdown Unnecessary Plant Equipment: a. [Enter plant specific list]	

(1) Enter plant specific value for intermediate range permissible to block source range high flux trip (P-6).
 (2) Enter plant specific normal operating pressure.
 (3) Enter plant specific no-load level.
 (4) Enter plant specific no-load narrow range level.
 (5) Enter programmed no-load temperature.

Number: ES-0.3	Symptom/Title: SI TERMINATION FOLLOWING SPURIOUS SI (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
25	Verify SI Reinitiation NOT Required: a. RCS pressure - GREATER THAN (1) PSIG b. RCS subcooling - GREATER THAN 50°F c. Pressurizer level - GREATER THAN 10%	a. Manually reinitiate SI. Go to E-O, REACTOR TRIP OR SAFETY INJECTION, STEP 5. b. Manually reinitiate SI. Go to E-O, REACTOR TRIP OR SAFETY INJECTION, STEP 5. c. Manually reinitiate SI. Go to E-O, REACTOR TRIP OR SAFETY INJECTION, STEP 5.
26	Investigate Cause Of SI: a. Go to appropriate plant procedure	

-END-

(1) Enter plant specific shutoff head pressure of high-head SI pumps or low pressurizer pressure SI setpoint, whichever is lower.

FOLDOUT FOR E-O AND ES-O GUIDELINES

1. RCP TRIP CRITERIA

- Trip any RCP if component cooling water to that pump is lost.
- Trip all RCPs if BOTH conditions listed below are met:
 - a. SI is ON.
 - b. RCS pressure - EQUAL TO OR LESS THAN (1) PSIG.

2. SI TERMINATION CRITERIA FOR SPURIOUS SI

- a. Terminate SI when ALL parameters listed below are met:
 - (1) RCS Pressure - GREATER THAN (2) PSIG AND STABLE OR INCREASING
 - (2) RCS Subcooling - GREATER THAN (3)°F
 - (3) Pressurizer Level - GREATER THAN (4) %
 - (4) Heat Sink:
 - (a) SG Level - GREATER THAN (5) % WR

—OR—

 - (b) AFW Flow - GREATER THAN (6) GPM

3. SI REINITIATION CRITERIA FOLLOWING SPURIOUS SI

- a. Reinitiate SI if ANY ONE of the parameters listed below occurs:
 - (1) RCS Pressure - LESS THAN (7) PSIG
 - (2) RCS Subcooling - LESS THAN (3)°F
 - (3) Pressurizer Level - LESS THAN 10%

4. SYMPTOMS FOR FR-C.1, RESPONSE TO INADEQUATE CORE COOLING

Go to FR-C.1, RESPONSE TO INADEQUATE CORE COOLING when ALL symptoms in ANY ONE of the following symptom sets occur:

PARAMETER:	SYMPTOM SET		
	I	II	III
1. TCs	>1200°F	—	>700°F
2. Containment Condition	—	ABNORMAL	ABNORMAL
3. RCP Status	—	ANY ON	ALL OFF
4. RVLIS	—	<100% NR	< <u>(8)</u> % NR

5. SYMPTOMS FOR FR-H.1 RESPONSE TO LOSS OF SECONDARY HEAT SINK

Go to FR-H.1 RESPONSE TO LOSS OF SECONDARY HEAT SINK, If AFW Flow is NOT AVAILABLE.

- (1) Enter plant specific value derived from background document.
- (2) Enter plant specific shutoff head pressure of high-head SI pumps plus instrument uncertainties or 2000 psig, whichever is lower.
- (3) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.
- (4) Enter plant specific no-load value.
- (5) Enter plant specific wide-range value which is above top of steam generator U-tubes.
- (6) Enter plant specific value derived from background document.
- (7) Enter plant specific value for shutoff head pressure of high-head SI pumps or low pressurizer pressure SI setpoint, whichever is lower.
- (8) Enter plant specific value which is 3 1/2 feet above bottom of active fuel in core with zero void fraction, plus uncertainties.

BACKGROUND INFORMATION
FOR
WESTINGHOUSE
EMERGENCY RESPONSE GUIDELINES

ES-0.3
SI TERMINATION FOLLOWING SPURIOUS
SAFETY INJECTION

BASIC REVISION
(To be provided later)

WESTINGHOUSE OWNERS GROUP
EMERGENCY RESPONSE GUIDELINES
CONFIGURATION CONTROL SHEET

GUIDELINE DESIGNATOR: ES-0.3

GUIDELINE TITLE: SI Termination Following Spurious Safety Injection

REVISION: LP-Basic

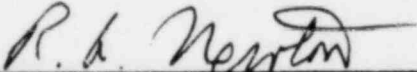
DATE: July 5, 1982

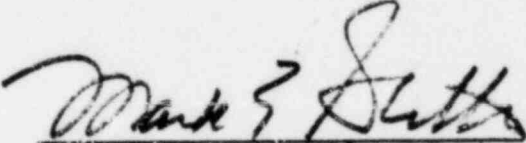
The guideline described above has been reviewed and approved for implementation by the Westinghouse Owner's Group Procedures Subcommittee and the Westinghouse Nuclear Technology Division.

NOTICE: THIS EMERGENCY RESPONSE GUIDELINE SET REVISION (LP-BASIC) IS THE ORIGINAL ISSUE OF GENERIC GUIDANCE ON ITS SUBJECT MATTER FOR PLANTS WITH LOW-PRESSURE SI SYSTEMS AND SUPERSEDES ANY GENERIC GUIDANCE ON THIS SUBJECT BEARING AN ISSUE DATE EARLIER THAN JULY 5, 1982.

THE "BASIC" REVISION OF THE EMERGENCY RESPONSE GUIDELINE SET BEARING AN ISSUE DATE OF SEPTEMBER 1, 1981, APPLIES TO PLANTS WITH HIGH-PRESSURE SI SYSTEMS.

File this sheet with the approved version of this guideline in your Emergency Response Guideline set.


Chairman, Procedures Subcommittee
Westinghouse Owner's Group


Manager, Standard Plant Engineering
Westinghouse Nuclear Technology Division

Number: E-1	Symptom/Title: LOSS OF REACTOR COOLANT	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE <i>Foldout page should be open.</i>		
1	Check if RCPs Should Be Stopped: a. High-head SI pumps running - CHECK FOR FLOW OR PUMP BREAKER INDICATOR LIGHTS LIT b. RCS pressure - EQUAL TO OR LESS THAN <u>(1)</u> PSIG c. Stop all RCPs	a. DO NOT STOP RCPs. Go to step 2. b. DO NOT STOP RCPs. Go to step 2.
2	Check RWST Level: a. RWST level - GREATER THAN <u>(2)</u>	a. <u>IF</u> level less than <u>(2)</u> , <u>THEN</u> go to step 20.
3	Check Containment Sump Level: a. Containment sump level - INCREASING	a. <u>IF NOT</u> increasing, <u>THEN</u> rediagnose event, go to E-0, REACTOR TRIP OR SAFETY INJECTION, STEP 32.
<i>Caution</i> Alternate water sources for AFW pumps will be necessary if CST level is low.		
4	Check Steam Generator Levels: a. Narrow range level - GREATER THAN <u>(3)</u> % b. Throttle AFW flow to maintain narrow range level at <u>(4)</u> %	a. <u>IF</u> less than <u>(3)</u> % , <u>THEN</u> maintain full AFW flow until narrow range level is greater than <u>(3)</u> % b. <u>IF</u> narrow range level in one steam generator continues to increase, <u>THEN</u> go to E-3, STEAM GENERATOR TUBE RUPTURE.
<p>(1) Enter plant specific value derived from background document to E-0.</p> <p>(2) Enter plant specific level corresponding to low level (switchover) plus 10 minutes of draw-down at maximum ECCS rate.</p> <p>(3) Enter plant specific value showing level just in the narrow range including allowances for normal channel accuracy, post-accident transmitter errors and reference leg process errors.</p> <p>(4) Enter plant specific value corresponding to no-load steam generator level including allowances for post-accident transmitter errors and reference leg process errors.</p>		

Number: E-1	Symptom/Title: LOSS OF REACTOR COOLANT (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5	Check Pressurizer PORVs and Block Valves: a. Power available to block valves b. PORVs - CLOSED c. Block valves - OPEN	a. Restore power to block valves. b. Manually close PORVs. <u>IF</u> any valve cannot be closed, <u>THEN</u> manually close its block valve. c. Open block valve unless it was closed to isolate a faulty PORV.
<p><i>Caution</i></p> <ul style="list-style-type: none"> ● <i>If any pressurizer PORV opens because of high RCS pressure, repeat step 5 after pressure drops below PORV setpoint.</i> ● <i>If offsite power is lost after SI reset, manual action may be required to restart safeguards equipment.</i> ● <i>If SI is reset before automatic transfer of high-head SI pump suction to RWST occurs, manual transfer on BAT low level is required.</i> 		
6	Check If Charging Pumps Should Be Started: a. RCS pressure - GREATER THAN <u>(1)</u> PSIG AND STABLE OR INCREASING b. High-head SI flow - APPROXIMATELY ZERO	a. <u>IF</u> RCS pressure low or decreasing, <u>THEN</u> go to step 16. b. <u>IF</u> SI flow greater than zero, <u>THEN</u> go to step 16.
7	Reset SI.	
8	Reset Containment Isolation Phase A.	
9	Reestablish Instrument Air To Containment.	
<p><i>(1) Enter plant specific shutdown head pressure of high-head SI pumps.</i></p>		

Number: E-1	Symptom/Title: LOSS OF REACTOR COOLANT (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10	Check Power Supply To Charging Pumps: a. Offsite power - AVAILABLE	a. IF offsite power <u>NOT</u> available, <u>THEN</u> verify adequate diesel capacity to run charging pumps. If necessary, shed sufficient non-essential loads.
<p><i>Caution</i> If CCW to the RCP thermal barriers is lost, RCP seal injection should be established slowly to minimize RCP thermal stresses and potential seal failures.</p>		
11	Start One Charging Pump To Establish Seal Injection Flow.	
12	Establish Charging Flow: a. [Enter plant specific means]	
13	Start Additional Charging Pumps, If Necessary, To Meet SI Termination Criteria.	

Number: E-1	Symptom/Title: LOSS OF REACTOR COOLANT (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14	<p>Check If SI Can Be Terminated:</p> <p>a. RCS pressure - GREATER THAN <u>(1)</u> PSIG AND STABLE OR INCREASING</p> <p>b. Pressurizer level - GREATER THAN 50%</p> <p>c. RCS subcooling - GREATER THAN <u>(2)</u> °F</p> <p>d. Secondary heat sink:</p> <p>1) Total AFW flow to non-faulted steam generators - GREATER THAN <u>(3)</u> GPM</p> <p style="text-align: center;">-OR-</p> <p>2) Narrow range level in at least one non-faulted steam generator - GREATER THAN <u>(4)</u> %</p>	<p>a. DO NOT TERMINATE SI. Go to step 16.</p> <p>b. DO NOT TERMINATE SI. Go to step 16.</p> <p>c. DO NOT TERMINATE SI. Go to step 16.</p> <p>d. <u>IF</u> neither condition is satisfied, <u>THEN DO NOT TERMINATE SI.</u> Go to step 16.</p>
15	<p>Go To ES-1.1, SI TERMINATION FOLLOWING LOSS OF REACTOR COOLANT.</p>	

(1) Enter plant specific shutoff head pressure of high-head SI pumps plus instrument uncertainties or 2000 psig, whichever is lower.

(2) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.

(3) Enter plant specific value derived from background document.

(4) Enter plant specific value showing level just in the narrow range including allowances for normal accuracy, post-accident transmitter errors and reference leg process errors.

Number: E-1	Symptom/Title: LOSS OF REACTOR COOLANT (Cont.)	Revision No., Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16	<p>Check If Low-Head SI Pumps Should Be Stopped:</p> <p>a. RCS pressure - GREATER THAN ⁽¹⁾ PSIG AND STABLE OR INCREASING</p> <p>b. Reset SI</p> <p>c. Stop low-head SI pumps and place in standby</p>	<p>a. <u>IF</u> RCS pressure low or decreasing, <u>THEN</u> go to step 17.</p>
<p><i>Caution</i> If RCS pressure drops below ⁽¹⁾ psig, the low-head SI pumps must be manually restarted to supply water to the RCS.</p>		
17	<p>Compare RCS And Steam Generator Pressures:</p> <p>a. RCS pressure - GREATER THAN OR EQUAL TO STEAM GENERATOR PRESSURES</p>	<p>a. <u>IF</u> RCS pressure less than steam generator pressures, <u>THEN</u> go to step 19.</p>
18	<p>Decrease Steam Generator Pressure To ⁽²⁾ PSIG:</p> <p>a. Dump steam to condenser: 1) [Enter plant specific steps]</p>	<p>a. Dump steam with steam generator PORVs.</p>
19	<p>If Desired, Implement ES-1.2, POST LOCA COOLDOWN AND DEPRESSURIZATION, While Continuing In This Guideline.</p>	
<p>⁽¹⁾ Enter plant specific shutoff head pressure of low-head SI pumps. ⁽²⁾ Enter plant specific value corresponding to 200 psi below the lowest steam generator safety valve setpoint.</p>		

Number: E-1	Symptom/Title: LOSS OF REACTOR COOLANT (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
20	Check For Switchover To Cold Leg Recirculation: a. RWST level - AT <u>(1)</u> b. Align SI system for cold leg recirculation per ES-1.3, TRANSFER TO COLD LEG RECIRCULATION FOLLOWING LOSS OF REACTOR COOLANT	a. Until RWST reaches <u>(1)</u> , perform a preliminary evaluation of plant status in steps 21 to 24.
21	Check Containment Spray System: a. Spray pumps - RUNNING b. Containment pressure - LESS THAN <u>(2)</u> PSIA c. Reset containment spray signal d. Stop containment spray pumps and place in standby 1) [Enter plant specific steps]	a. <u>IF</u> pumps not running, <u>THEN</u> go to step 22. b. <u>IF</u> pressure high, <u>THEN</u> maintain containment spray until containment pressure is reduced to normal range.
<p><i>Caution SI recirculation flow to RCS must be maintained at all times.</i></p>		
22	Check Auxiliary Building Radiation: a. [Enter plant specific list] - NORMAL	a. Try to identify and isolate leakage.
23	Evaluate Plant Equipment: a. [Enter plant specific list]	
24	Obtain Samples: a. [Enter plant specific list]	
<p>(1) Enter plant specific value corresponding to RWST switchover alarm in plant specific units. (2) Enter plant specific value.</p>		

Number: E-1	Symptom/Title: LOSS OF REACTOR COOLANT (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
25	<p>Prepare For Switchover To Hot Leg Recirculation:</p> <p>a. Verify control room valve switches in the following position:</p> <p>1) [Enter plant specific list of normally deenergized valves used for transfer to hot leg recirculation with their correct position during cold leg recirculation]</p> <p>b. Verify circuit breakers for the following valves are energized.</p> <p>1) [Enter plant specific list of valves used for transfer to hot leg recirculation]</p>	<p>a. Set valve switches to proper position.</p> <p>b. Energize circuit breakers, as required.</p>
26	<p>At ⁽¹⁾ Hours After Event Initiation, Align SI System For Hot Leg Recirculation Per ES-1.4, TRANSFER TO HOT LEG RECIRCULATION.</p>	
27	<p>Plant Staff Should Determine If Reactor Vessel Head Should Be Vented:</p> <p>a. Refer to FR-1.3, RESPONSE TO VOID IN REACTOR VESSEL</p>	
28	<p>Evaluate Long Term Plant Status.</p>	

— END —

⁽¹⁾ Enter plant specific time.

FOLDOUT FOR E-1 AND ES-1 GUIDELINES

1. RCP TRIP CRITERIA

- Trip any RCP if component cooling water to that pump is lost.
- Trip all RCPs if BOTH conditions listed below are met:
 - a. SI is ON.
 - b. RCS pressure - EQUAL TO OR LESS THAN (1) PSIG.

2. SI TERMINATION CRITERIA FOLLOWING LOSS OF REACTOR COOLANT

- a. Terminate SI when ALL parameters listed below are met:
 - (1) RCS Pressure - GREATER THAN (2) PSIG AND STABLE OR INCREASING
 - (2) RCS Subcooling - GREATER THAN (3)°F
 - (3) Pressurizer Level - GREATER THAN 50%
 - (4) Heat Sink:
 - (a) SG Level - GREATER THAN (4) % NR
 - OR—
 - (b) AFW Flow - GREATER THAN (1) GPM

3. SI REINITIATION CRITERIA FOLLOWING LOSS OF REACTOR COOLANT

- a. Reinitiate SI if ANY ONE of the parameters listed below occurs:
 - (1) RCS Pressure - LESS THAN (5) PSIG
 - (2) RCS Subcooling - LESS THAN (3)°F
 - (3) Pressurizer Level - LESS THAN 20%

4. COLD LEG RECIRCULATION SWITCHOVER CRITERION

IF RWST level less than (6), THEN align SI system for cold leg recirculation per ES-1.3, TRANSFER TO COLD LEG RECIRCULATION FOLLOWING LOSS OF REACTOR COOLANT.

5. SYMPTOMS FOR FR-C.1, RESPONSE TO INADEQUATE CORE COOLING

Go to FR-C.1, RESPONSE TO INADEQUATE CORE COOLING when ALL symptoms in ANY ONE of the following symptom sets occur:

PARAMETER:	SYMPTOM SET		
	I	II	III
1. TCs	>1200°F	—	700°F
2. Containment Condition	—	ABNORMAL	ABNORMAL
3. RCP Status	—	ANY ON	ALL OFF
4. RVLIS	—	<100% NR	< <u>(7)</u> % NR

6. SYMPTOMS FOR FR-H.1 RESPONSE TO LOSS OF SECONDARY HEAT SINK

Go to FR-H.1 RESPONSE TO LOSS OF SECONDARY HEAT SINK, If AFW Flow is NOT AVAILABLE.

(1) Enter plant specific value derived from background document to E-O.

(2) Enter plant specific shutoff head pressure of high-head SI pumps plus instrument uncertainties or 2000 psig, whichever is lower.

(3) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.

(4) Enter plant specific narrow range value which includes allowance for normal channel accuracy, post-accident transmitter errors, and reference leg process errors.

(5) Enter plant specific value for shutoff head pressure of high-head SI pumps or low pressurizer pressure SI setpoint, whichever is lower.

(6) Enter plant specific value corresponding to RWST switchover alarm in plant specific units.

(7) Enter plant specific value which is 3½ feet above bottom of active fuel in core with zero void fraction, plus uncertainties.

BACKGROUND INFORMATION FOR
WESTINGHOUSE
EMERGENCY RESPONSE GUIDELINES

E-1
LOSS OF COOLANT ACCIDENT

BASIC REVISION
(To be provided later)

WESTINGHOUSE OWNERS GROUP
EMERGENCY RESPONSE GUIDELINES
CONFIGURATION CONTROL SHEET

GUIDELINE DESIGNATOR: E-1

GUIDELINE TITLE: Loss of Reactor Coolant

REVISION: LP-Basic

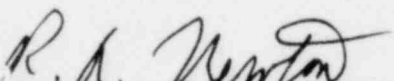
DATE: July 5, 1982

The guideline described above has been reviewed and approved for implementation by the Westinghouse Owner's Group Procedures Subcommittee and the Westinghouse Nuclear Technology Division.

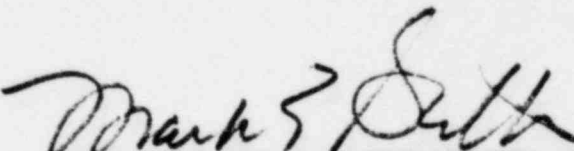
NOTICE: THIS EMERGENCY RESPONSE GUIDELINE SET REVISION (LP-BASIC) IS THE ORIGINAL ISSUE OF GENERIC GUIDANCE ON ITS SUBJECT MATTER FOR PLANTS WITH LOW-PRESSURE SI SYSTEMS AND SUPERSEDES ANY GENERIC GUIDANCE ON THIS SUBJECT BEARING AN ISSUE DATE EARLIER THAN JULY 5, 1982.

THE "BASIC" REVISION OF THE EMERGENCY RESPONSE GUIDELINE SET BEARING AN ISSUE DATE OF SEPTEMBER 1, 1981, APPLIES TO PLANTS WITH HIGH-PRESSURE SI SYSTEMS.

File this sheet with the approved version of this guideline in your Emergency Response Guideline set.



Chairman, Procedures Subcommittee
Westinghouse Owner's Group



Manager, Standard Plant Engineering
Westinghouse Nuclear Technology Division

Number:

ES-1.1

Symptom/Title:

**SI TERMINATION FOLLOWING
LOSS OF REACTOR COOLANT**

Revision No./Date

LP - Basic
5 July, 1982

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

NOTE *Foldout page should be open.*

- 1 **Reestablish Instrument Air To Containment.**
- 2 **Align High-Head SI Pump Suction From BAT To RWST:**
 - a. [Enter plant specific steps]

Caution *Automatic reinitiation of SI will not occur until reactor trip breakers are reset.*

- 3 **Stop SI Pumps And Place In Standby:**
 - a. Stop low-head SI pumps
 - b. WHEN recirculation lines have been flushed, THEN:
 - 1) Stop high-head SI pumps
 - 2) Establish normal valve alignment for SI pump suction.

- 4 **Verify SI Reinitiation NOT Required:**
 - a. RCS pressure – GREATER THAN (1) PSIG
 - b. RCS subcooling – GREATER THAN (2) °F
 - c. Pressurizer level – GREATER THAN 20%

- a. Manually reinitiate SI. Go to E-O, REACTOR TRIP OR SAFETY INJECTION, STEP 5.
- b. Manually reinitiate SI. Go to E-O, REACTOR TRIP OR SAFETY INJECTION, STEP 5.
- c. Manually reinitiate SI. Go to E-O, REACTOR TRIP OR SAFETY INJECTION, STEP 5.

(1) Enter plant specific shutoff head pressure of high-head SI pumps or low pressurizer pressure SI setpoint, whichever is lower.
 (2) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.

Number: ES-1.1	Symptom/Title: SI TERMINATION FOLLOWING LOSS OF REACTOR COOLANT (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5	Verify Offsite Power Available.	Attempt to restore offsite power: <ul style="list-style-type: none"> • [Enter plant specific list] IF offsite power cannot be restored, THEN manually load the following equipment on the diesel generators: <ul style="list-style-type: none"> • [Enter plant specific list]
6	Establish Desired Charging Flow:	
	a. [Enter plant specific means]	
7	Check VCT Makeup Control System:	
	a. VCT level - NORMAL	a. Reestablish VCT level.
	b. Makeup set for automatic control	b. Adjust controls, as appropriate.
	c. Makeup set for GREATER THAN RCS boron concentration	c. Adjust controls, as appropriate.
8	Establish Letdown:	IF normal letdown can NOT be established, THEN establish excess letdown:
	a. Verify CCW flow to letdown heat exchanger	
	b. Open letdown line containment isolation valves	a. [Enter plant specific means]
	c. Open letdown line isolation valves	
	d. Open letdown orifice isolation valve, as appropriate	
9	Verify Charging Pump Suction ALIGNED to VCT.	IF NOT aligned to VCT, THEN realign pump suction from RWST to VCT.
10	Check RCP Cooling:	
	a. RCP CCW system flow - NORMAL	a. Establish CCW flow to RCPs per [Enter plant specific procedure].
	b. RCP seal injection flow - NORMAL	b. Adjust charging hand control valve, as necessary.
	c. Do not proceed to step 11 until either conditions in step 10 a or b are met.	c. IF neither conditions in step 10a or b can be met, THEN go to step 12.

Number: ES-1.1	Symptom/Title: SI TERMINATION FOLLOWING LOSS OF REACTOR COOLANT (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
11	Establish RCP Seal Return Flow: a. Verify CCW flow to seal water heat exchanger b. Open RCP seal return line isolation valves	
12	Check Non-Faulted Steam Generator Levels: a. Narrow range level - GREATER THAN <u>(1)</u> % b. Throttle AFW flow to maintain narrow range level at <u>(2)</u> %	a. <u>IF</u> less than <u>(1)</u> %, <u>THEN</u> maintain full AFW flow until narrow range level is greater than <u>(1)</u> %. b. <u>IF</u> narrow range level in one or more steam generators continues to increase, <u>THEN</u> stop AFW pumps to that steam generator. <u>IF</u> level continues to increase in an uncontrolled manner, <u>THEN</u> go to FR-H.3, RESPONSE TO STEAM GENERATOR HIGH LEVEL.
13	Check CST Level: a. CST level - GREATER THAN <u>(3)</u> %	a. <u>IF</u> CST level low, <u>THEN</u> switch to alternate AFW water supply.
14	Establish Pressurizer Level In Normal Operating Range: a. Adjust letdown flow as necessary b. Adjust charging flow as necessary c. <u>WHEN</u> pressurizer level is normal, <u>THEN</u> place pressurizer level controls in automatic	

(1) Enter plant specific value showing level just in the narrow range including allowances for normal channel accuracy, post-accident transmitter errors, and reference leg process errors.

(2) Enter plant specific value corresponding to no-load steam generator level including allowances for post-accident transmitter errors and reference leg errors.

(3) Enter plant specific low level setpoint.

Number:

ES-1.1

Symptom/Title:

**SI TERMINATION FOLLOWING
LOSS OF REACTOR COOLANT (Cont.)**

Revision No./Date

LP - Basic
5 July, 1982

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
15	Control Pressurizer Pressure; a. Energize pressurizer heaters and operate normal spray, as necessary, to maintain pressure within TECH SPEC limits.	a. Use auxiliary spray or PORV, if necessary.
16	Check RCS Subcooling - GREATER THAN 50°F.	Dump steam to establish 50°F subcooling: a. Limit RCS cooldown rate - LESS THAN 50°F/HR. b. Dump steam to condenser. -OR- Dump steam with steam generator PORVs.

Number:

ES-1.1

Symptom/Title:

**SI TERMINATION FOLLOWING
LOSS OF REACTOR COOLANT (Cont.)**

Revision No./Date

LP - Basic
5 July, 1982

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

NOTE RCPs should be run in order of priority to provide pressurizer spray.

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Check RCP Status:

a. At least one RCP - RUNNING

a. IF no RCP running, THEN try to start one RCP:

1) Establish conditions for running an RCP:
[Enter plant specific list]

2) Start one RCP.

IF an RCP cannot be started, THEN monitor natural circulation from trended values:

(a) RCS subcooling - GREATER THAN (1) °F.

(b) Steam pressure - STABLE.

(c) RCS hot leg temperature - STABLE OR SLOWLY DECREASING.

(d) Core exit TCs - STABLE OR SLOWLY DECREASING.

(e) RCS cold leg temperature - NEAR SATURATION TEMPERATURE FOR STEAM PRESSURE.

IF natural circulation NOT verified, THEN increase dumping steam.

18

Transfer Condenser Steam Dump To Pressure Control Mode:

a. [Enter plant specific steps]

IF condenser NOT available, THEN use steam generator PORVs.

(1) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.

Number:

ES-1.1

Symptom/Title:

**SI TERMINATION FOLLOWING
LOSS OF REACTOR COOLANT (Cont.)**

Revision No./Date

LP - Basic
5 July, 1982

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

19

Check Intermediate Range Flux:

- a. Flux - BELOW (1)
- b. Verify source range detectors re-energized
- c. Transfer nuclear recorders to source range scale

- a. Continue with step 20. WHEN flux below (1), THEN do steps 19b and c.
- b. Manually re-energize source range detectors.

20

Maintain Stable Plant Conditions:

- a. Pressurizer pressure - STABLE
- b. Pressurizer level - AT (2) %
- c. Steam generator narrow range level - AT (3) %
- d. RCS average temperature - STABLE

21

Shutdown Unnecessary Plant Equipment:

- a. [Enter plant specific list]

22

Verify SI Reinitiation NOT Required:

- a. RCS pressure - GREATER THAN (4) PSIG
- b. RCS subcooling - GREATER THAN 50°F
- c. Pressurizer level - GREATER THAN 20%

- a. Manually reinitiate SI. Go to E-O, REACTOR TRIP OR SAFETY INJECTION, STEP 5.
- b. Manually reinitiate SI. Go to E-O, REACTOR TRIP OR SAFETY INJECTION, STEP 5.
- c. Manually reinitiate SI. Go to E-O, REACTOR TRIP OR SAFETY INJECTION, STEP 5.

23

Investigate Cause of SI:

- a. Go to appropriate plant procedure

-END-

(1) Enter plant specific value for intermediate range permissible to block source range high flux trip (P-6).

(2) Enter plant specific no-load level.

(3) Enter plant specific no-load narrow range level.

(4) Enter plant specific shutoff head pressure of high-head SI pumps or low pressurizer pressure SI setpoint, whichever is lower.

FOLDOUT FOR E-1 AND ES-1 GUIDELINES

1. RCP TRIP CRITERIA

- Trip any RCP if component cooling water to that pump is lost.
- Trip all RCPs if BOTH conditions listed below are met:
 - a. SI is ON.
 - b. RCS pressure - EQUAL TO OR LESS THAN (1) PSIG.

2. SI TERMINATION CRITERIA FOLLOWING LOSS OF REACTOR COOLANT

- a. Terminate SI when ALL parameters listed below are met:
 - (1) RCS Pressure - GREATER THAN (2) PSIG AND STABLE OR INCREASING
 - (2) RCS Subcooling - GREATER THAN (3)°F
 - (3) Pressurizer Level - GREATER THAN 50%
 - (4) Heat Sink:
 - (a) SG Level - GREATER THAN (4) % NR
 - OR—
 - (b) AFW Flow - GREATER THAN (1) GPM

3. SI REINITIATION CRITERIA FOLLOWING LOSS OF REACTOR COOLANT

- a. Reinitiate SI if ANY ONE of the parameters listed below occurs:
 - (1) RCS Pressure - LESS THAN (5) PSIG
 - (2) RCS Subcooling - LESS THAN (3)°F
 - (3) Pressurizer Level - LESS THAN 20%

4. COLD LEG RECIRCULATION SWITCHOVER CRITERION

IF RWST level less than (6), THEN align SI system for cold leg recirculation per ES-1.3, TRANSFER TO COLD LEG RECIRCULATION FOLLOWING LOSS OF REACTOR COOLANT.

5. SYMPTOMS FOR FR-C.1, RESPONSE TO INADEQUATE CORE COOLING

Go to FR-C.1, RESPONSE TO INADEQUATE CORE COOLING when ALL symptoms in ANY ONE of the following symptom sets occur:

PARAMETER:	SYMPTOM SET		
	I	II	III
1. TCs	>1200°F	—	700°F
2. Containment Condition	—	ABNORMAL	ABNORMAL
3. RCP Status	—	ANY ON	ALL OFF
4. RVLIS	—	< 100% NR	< <u>(7)</u> % NR

6. SYMPTOMS FOR FR-H.1 RESPONSE TO LOSS OF SECONDARY HEAT SINK

Go to FR-H.1 RESPONSE TO LOSS OF SECONDARY HEAT SINK, If AFW Flow is NOT AVAILABLE.

(1) Enter plant specific value derived from background document to E-O.

(2) Enter plant specific shutoff head pressure of high-head SI pumps plus instrument uncertainties or 2000 psig, whichever is lower.

(3) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.

(4) Enter plant specific narrow range value which includes allowance for normal channel accuracy, post-accident transmitter errors, and reference leg process errors.

(5) Enter plant specific value for shutoff head pressure of high-head SI pumps or low pressurizer pressure SI setpoint, whichever is lower.

(6) Enter plant specific value corresponding to RWST switchover alarm in plant specific units.

(7) Enter plant specific value which is 3½ feet above bottom of active fuel in core with zero void fraction, plus uncertainties.

BACKGROUND INFORMATION
FOR
WESTINGHOUSE
EMERGENCY RESPONSE GUIDELINES

ES-1.1
SI TERMINATION FOLLOWING
LOSS OF REACTOR COOLANT

BASIC REVISION
(To be provided later)

WESTINGHOUSE OWNERS GROUP
EMERGENCY RESPONSE GUIDELINES
CONFIGURATION CONTROL SHEET

GUIDELINE DESIGNATOR: ES-1.1

GUIDELINE TITLE: SI Termination Following Loss of Reactor Coolant

REVISION: LP-Basic

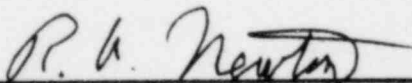
DATE: July 5, 1982

The guideline described above has been reviewed and approved for implementation by the Westinghouse Owner's Group Procedures Subcommittee and the Westinghouse Nuclear Technology Division.

NOTICE: THIS EMERGENCY RESPONSE GUIDELINE SET REVISION (LP-BASIC) IS THE ORIGINAL ISSUE OF GENERIC GUIDANCE ON ITS SUBJECT MATTER FOR PLANTS WITH LOW-PRESSURE SI SYSTEMS AND SUPERSEDES ANY GENERIC GUIDANCE ON THIS SUBJECT BEARING AN ISSUE DATE EARLIER THAN JULY 5, 1982.

THE "BASIC" REVISION OF THE EMERGENCY RESPONSE GUIDELINE SET BEARING AN ISSUE DATE OF SEPTEMBER 1, 1981, APPLIES TO PLANTS WITH HIGH-PRESSURE SI SYSTEMS.

File this sheet with the approved version of this guideline in your Emergency Response Guideline set.


Chairman, Procedures Subcommittee
Westinghouse Owner's Group


Manager, Standard Plant Engineering
Westinghouse Nuclear Technology Division

Number: ES-1.2	Symptom/Title: POST LOCA COOLDOWN AND DEPRESSURIZATION	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	<p><i>Caution</i> ● If RWST level reaches ⁽¹⁾, align SI system for cold leg recirculation per ES-1.3, TRANSFER TO COLD LEG RECIRCULATION FOLLOWING LOSS OF REACTOR COOLANT.</p> <ul style="list-style-type: none"> ● If offsite power is lost after SI reset, manual action may be required to restart safeguards equipment. ● If SI is reset before automatic transfer of high-head SI pump suction to RWST occurs, manual transfer on BAT low level is required. <p>NOTE ● RCP pressure trip criteria does not apply during controlled RCS depressurization. RCP must be tripped if RCS subcooling is less than ⁽²⁾ °F.</p> <ul style="list-style-type: none"> ● RCPs should be run in order of priority to provide pressurizer spray. ● Foldout page should be open. 	
1	Reset SI.	
2	Reset Containment Isolation Phase A.	
3	Reestablish Instrument Air To Containment.	
4	Check Power Supply To Charging Pumps:	
	a. Offsite power - AVAILABLE	<p>a. IF offsite power <u>NOT</u> available, <u>THEN</u> verify adequate diesel capacity to run charging pumps. If necessary, shed sufficient non-essential loads.</p> <p>IF diesel generators can <u>NOT</u> accept charging pump loads, <u>THEN</u> go to step 7.</p>
<p>(1) Enter plant specific value corresponding to RWST switchover alarm in plant specific units.</p> <p>(2) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.</p>		

Number: ES-1.2	Symptom/Title: POST LOCA COOLDOWN AND DEPRESSURIZATION (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p><i>Caution</i> If CCW to the RCP thermal barriers is lost, RCP seal injection should be established slowly to minimize RCP thermal stresses and potential seal failures.</p>		
5	Start One Charging Pump To Establish Seal Injection Flow.	
6	Check RCP Status: a. At least one RCP - RUNNING b. If more than one RCP running, stop all but one RCP	a. <u>IF</u> no RCP running, <u>THEN</u> try to start one RCP: 1) Establish conditions for running one RCP - [Enter plant specific list.] 2) Start one RCP.
7	Verify Adequate Shutdown Margin.	Borate as necessary.

Number: ES-1.2	Symptom/Title: POST LOCA COOLDOWN AND DEPRESSURIZATION (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p><i>Caution</i> Maintain RCS pressure and temperature within normal cooldown limits.</p>		
8	<p>Initiate RCS Cooldown:</p> <ul style="list-style-type: none"> a. Refer to FR-P.2 to determine if a cooldown can be established. b. Maintain cooldown rate - LESS THAN 100°F/HR c. Dump steam to condenser: [Enter plant specific list] d. Maintain steam generator narrow range level - AT <u>(1)</u> % 	<ul style="list-style-type: none"> c. Dump steam with steam generator PORVs. d. Throttle AFW flow as necessary.
<p><i>Caution</i> RCS subcooling must be maintained greater than <u>(2)</u> °F during any RCS depressurization.</p>		
9	<p>Try To Restore Pressurizer Level Above 20%:</p> <ul style="list-style-type: none"> a. Maintain RCS subcooling - GREATER THAN <u>(2)</u> °F b. Reduce pressurizer pressure with normal spray c. Pressurizer level - GREATER THAN 20% 	<ul style="list-style-type: none"> a. Continue dumping steam. b. Use one pressurizer PORV. IF pressurizer PORVs <u>NOT</u> available, <u>THEN</u> use auxiliary spray. c. Perform steps 11 and 12. <u>WHEN</u> level reaches 20%, <u>THEN</u> do step 10.
10	<p>Increase Pressurizer Temperature:</p> <ul style="list-style-type: none"> a. Energize heaters b. Restore temperature to 50°F above core exit TCs c. Maintain temperature - GREATER THAN 50°F ABOVE CORE EXIT TCs 	
<p>(1) Enter plant specific value corresponding to no-load steam generator level including allowances for post accident transmitter errors and reference leg process errors. (2) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables</p>		

Number: ES-1.2	Symptom/Title: POST LOCA COOLDOWN AND DEPRESSURIZATION (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
11	Prevent Accumulators From Injecting: a. Check power available to isolation valves b. Close isolation valves	a. Restore power to isolation valves. b. Vent any un-isolated accumulator to <u>(1)</u> psig.
12	Check RCS Pressure: a. RCS pressure - GREATER THAN 400 PSIG	a. <u>IF</u> pressure less than 400 psig, <u>THEN</u> go to step 14.
<p><i>Caution</i> Do not open high-head SI pump miniflow valves if the SI system is in cold or hot leg recirculation.</p>		
13	Depressurize RCS By Reducing High-Head SI Flow: a. Throttle flow from one high-head SI pump b. Maintain pressurizer level by controlling RCS pressure using normal spray c. Check high-head SI pump discharge pressure - LESS THAN <u>(2)</u> PSIG d. Check RCS pressure - LESS THAN 400 PSIG	b. Use one pressurizer PORV. <u>IF</u> pressurizer PORVs <u>NOT</u> available, <u>THEN</u> use auxiliary spray. c. <u>IF</u> discharge pressure greater than <u>(2)</u> psig, <u>THEN</u> : 1) Stop pump. 2) <u>IF</u> another high-head SI pump is running, <u>THEN</u> repeat step 13. <u>IF NOT</u> , <u>THEN</u> go to step 14. d. <u>IF</u> RCS pressure greater than 400 psig, <u>THEN</u> repeat step 13.
<p>(1) Enter value such that injection of accumulator water from this pressure will not result in nitrogen injection at low RCS pressure. (2) Enter high-head SI pump discharge pressure at miniflow.</p>		

Number: ES-1.2	Symptom/Title: POST LOCA COOLDOWN AND DEPRESSURIZATION (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14	Check RCS Conditions: a. RCS pressure - LESS THAN 400 PSIG b. RCS hot leg temperature - LESS THAN 350°F	b. Continue dumping steam.
15	Evaluate Plant Status: a. Determine if RHR can be placed in service for cooldown	a. <u>IF NOT, THEN</u> return to E-1, LOSS OF REACTOR COOLANT, step 20.

— END —

FOLDOUT FOR E-1 AND ES-1 GUIDELINES

1. RCP TRIP CRITERIA

- Trip any RCP if component cooling water to that pump is lost.
- Trip all RCPs if BOTH conditions listed below are met:
 - a. SI is ON.
 - b. RCS pressure - EQUAL TO OR LESS THAN (1) PSIG.

2. SI TERMINATION CRITERIA FOLLOWING LOSS OF REACTOR COOLANT

- a. Terminate SI when ALL parameters listed below are met:
 - (1) RCS Pressure - GREATER THAN (2) PSIG AND STABLE OR INCREASING
 - (2) RCS Subcooling - GREATER THAN (3)°F
 - (3) Pressurizer Level - GREATER THAN 50%
 - (4) Heat Sink:
 - (a) SG Level - GREATER THAN (4) % NR
 - OR—
 - (b) AFW Flow - GREATER THAN (1) GPM

3. SI REINITIATION CRITERIA FOLLOWING LOSS OF REACTOR COOLANT

- a. Reinitiate SI if ANY ONE of the parameters listed below occurs:
 - (1) RCS Pressure - LESS THAN (5) PSIG
 - (2) RCS Subcooling - LESS THAN (3)°F
 - (3) Pressurizer Level - LESS THAN 20%

4. COLD LEG RECIRCULATION SWITCHOVER CRITERION

IF RWST level less than (6), THEN align SI system for cold leg recirculation per ES-1.3, TRANSFER TO COLD LEG RECIRCULATION FOLLOWING LOSS OF REACTOR COOLANT.

5. SYMPTOMS FOR FR-C.1, RESPONSE TO INADEQUATE CORE COOLING

Go to FR-C.1, RESPONSE TO INADEQUATE CORE COOLING when ALL symptoms in ANY ONE of the following symptom sets occur:

PARAMETER:	SYMPTOM SET		
	I	II	III
1. TCs	>1200°F	—	700°F
2. Containment Condition	—	ABNORMAL	ABNORMAL
3. RCP Status	—	ANY ON	ALL OFF
4. RVLIS	—	< 100% NR	< <u>(7)</u> % NR

6. SYMPTOMS FOR FR-H.1 RESPONSE TO LOSS OF SECONDARY HEAT SINK

Go to FR-H.1 RESPONSE TO LOSS OF SECONDARY HEAT SINK, if AFW Flow is NOT AVAILABLE.

(1) Enter plant specific value derived from background document to E-O.

(2) Enter plant specific shutoff head pressure of high-head SI pumps plus instrument uncertainties or 2000 psig, whichever is lower.

(3) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.

(4) Enter plant specific narrow range value which includes allowance for normal channel accuracy, post-accident transmitter errors, and reference leg process errors.

(5) Enter plant specific value for shutoff head pressure of high-head SI pumps or low pressurizer pressure SI setpoint, whichever is lower.

(6) Enter plant specific value corresponding to RWST switchover alarm in plant specific units.

(7) Enter plant specific value which is 3½ feet above bottom of active fuel in core with zero void fraction, plus uncertainties.

BACKGROUND INFORMATION
FOR
WESTINGHOUSE
EMERGENCY RESPONSE GUIDELINES

ES-1.2
POST-LOCA COOLDOWN AND DEPRESSURIZATION
BASIC REVISION
(To be provided later)

WESTINGHOUSE OWNERS GROUP
EMERGENCY RESPONSE GUIDELINES
CONFIGURATION CONTROL SHEET

GUIDELINE DESIGNATOR: ES-1.2

GUIDELINE TITLE: Post-LOCA Cooldown and Depressurization

REVISION: LP-Basic

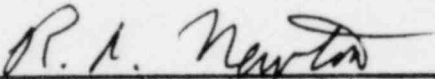
DATE: July 5, 1982

The guideline described above has been reviewed and approved for implementation by the Westinghouse Owner's Group Procedures Subcommittee and the Westinghouse Nuclear Technology Division.

NOTICE: THIS EMERGENCY RESPONSE GUIDELINE SET REVISION (LP-BASIC) IS THE ORIGINAL ISSUE OF GENERIC GUIDANCE ON ITS SUBJECT MATTER FOR PLANTS WITH LOW-PRESSURE SI SYSTEMS AND SUPERSEDES ANY GENERIC GUIDANCE ON THIS SUBJECT BEARING AN ISSUE DATE EARLIER THAN JULY 5, 1982.

THE "BASIC" REVISION OF THE EMERGENCY RESPONSE GUIDELINE SET BEARING AN ISSUE DATE OF SEPTEMBER 1, 1981, APPLIES TO PLANTS WITH HIGH-PRESSURE SI SYSTEMS.

File this sheet with the approved version of this guideline in your Emergency Response Guideline set.


Chairman, Procedures Subcommittee
Westinghouse Owner's Group


Manager, Standard Plant Engineering
Westinghouse Nuclear Technology Division

Number: ES-1.3	Symptom/Title: TRANSFER TO COLD LEG RECIRCULATION FOLLOWING LOSS OF REACTOR COOLANT	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p>NOTE <i>Transfer to cold leg recirculation may differ for each plant design. This guideline is for a typical low-pressure plant.</i></p>		
<p><i>Caution</i> <i>Do steps 1 through 4 without delay.</i></p>		
1	Reset SI.	
2	Verify CCW Flow To The RHR Heat Exchangers:	
	a. [Enter plant specific method]	a. Establish CCW flow: 1) [Enter plant specific method]
<p><i>Caution</i></p> <ul style="list-style-type: none"> ● <i>Any pumps taking suction from RWST should be stopped upon receipt of RWST empty alarm.</i> ● <i>High-head SI pumps should be stopped if RCS pressure is greater than their shutoff head pressure.</i> 		
3	Determine If Charging Pumps Should Be Stopped:	
	a. [Enter plant specific list]	
4	Align SI System for Recirculation:	
	a. [Enter plant specific list]	a. Try to open or close valves, as appropriate.
5	Start Safeguards Pumps, As Necessary	
6	Align Containment Spray System For Recirculation, If Necessary:	
	a. [Enter plant specific method]	
7	Continue With Procedure In Effect.	
<p>— END —</p>		

BACKGROUND INFORMATION
FOR
WESTINGHOUSE
EMERGENCY RESPONSE GUIDELINES

ES-1.3
TRANSFER TO COLD LEG
RECIRCULATION
FOLLOWING LOSS OF REACTOR COOLANT
BASIC REVISION

AND

ES-2.2
TRANSFER TO COLD LEG RECIRCULATION
FOLLOWING LOSS OF SECONDARY COOLANT
BASIC REVISION

(To be provided later)

WESTINGHOUSE OWNERS GROUP
EMERGENCY RESPONSE GUIDELINES
CONFIGURATION CONTROL SHEET

GUIDELINE DESIGNATOR: ES-1.3

GUIDELINE TITLE: Transfer to Cold Leg Recirculation Following Loss of
Reactor Coolant

REVISION: LP-Basic

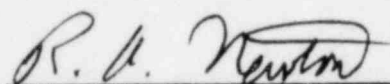
DATE: July 5, 1982

The guideline described above has been reviewed and approved for implementation by the Westinghouse Owner's Group Procedures Subcommittee and the Westinghouse Nuclear Technology Division.

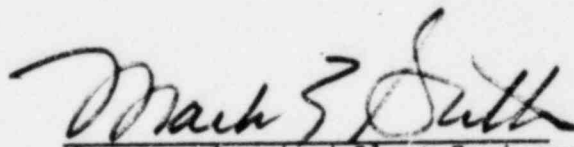
NOTICE: THIS EMERGENCY RESPONSE GUIDELINE SET REVISION (LP-BASIC) IS THE ORIGINAL ISSUE OF GENERIC GUIDANCE ON ITS SUBJECT MATTER FOR PLANTS WITH LOW-PRESSURE SI SYSTEMS AND SUPERSEDES ANY GENERIC GUIDANCE ON THIS SUBJECT BEARING AN ISSUE DATE EARLIER THAN JULY 5, 1982.

THE "BASIC" REVISION OF THE EMERGENCY RESPONSE GUIDELINE SET BEARING AN ISSUE DATE OF SEPTEMBER 1, 1981, APPLIES TO PLANTS WITH HIGH-PRESSURE SI SYSTEMS.

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Chairman, Procedures Subcommittee
Westinghouse Owner's Group



Manager, Standard Plant Engineering
Westinghouse Nuclear Technology Division

Number: ES-1.4	Symptom/Title: TRANSFER TO HOT LEG RECIRCULATION	Revision No./Date LP - Basic 5 July, 1982
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STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

NOTE *Transfer to hot leg recirculation may differ for each plant design. This guideline is for a typical low-pressure plant.*

Caution *The following actions should be performed approximately (1) hours after a Loss of Reactor Coolant Accident.*

- 1 **Align Low-Head SI Flow Path For Hot Leg Recirculation:**
 a. [Enter plant specific list]

- 2 **Align High-Head SI Flow Path For Hot Leg Recirculation:**
 a. [Enter plant specific list]

- 3 **Return to E-1, step 27.**

— END —

(1) Enter plant specific time.

BACKGROUND INFORMATION
FOR
WESTINGHOUSE
EMERGENCY RESPONSE GUIDELINES

ES-1.4
TRANSFER TO HOT LEG
RECIRCULATION
BASIC REVISION

(To be provided later)

WESTINGHOUSE OWNERS GROUP
EMERGENCY RESPONSE GUIDELINES
CONFIGURATION CONTROL SHEET

GUIDELINE DESIGNATOR: ES-1.4

GUIDELINE TITLE: Transfer to Hot Leg Recirculation

REVISION: LP-Basic

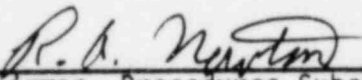
DATE: July 5, 1982

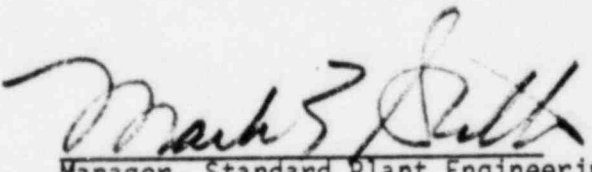
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NOTICE: THIS EMERGENCY RESPONSE GUIDELINE SET REVISION (LP-BASIC) IS THE ORIGINAL ISSUE OF GENERIC GUIDANCE ON ITS SUBJECT MATTER FOR PLANTS WITH LOW-PRESSURE SI SYSTEMS AND SUPERSEDES ANY GENERIC GUIDANCE ON THIS SUBJECT BEARING AN ISSUE DATE EARLIER THAN JULY 5, 1982.

THE "BASIC" REVISION OF THE EMERGENCY RESPONSE GUIDELINE SET BEARING AN ISSUE DATE OF SEPTEMBER 1, 1981, APPLIES TO PLANTS WITH HIGH-PRESSURE SI SYSTEMS.

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Chairman, Procedures Subcommittee
Westinghouse Owner's Group


Manager, Standard Plant Engineering
Westinghouse Nuclear Technology Division

Number: E-2	Symptom/Title: LOSS OF SECONDARY COOLANT	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE <i>Foldout page should be open.</i>		
1	Verify Main Steamline Isolation: a. Main steamline isolation valve(s) of affected steam generator(s) - CLOSED b. Main steamline isolation bypass valve(s) of affected steam generator(s) - CLOSED	a. Manually close valves. b. Manually close valves.
2	Check Pressurizer PORVs And Block Valves: a. Power available to block valves b. PORVs - CLOSED c. Block valves - OPEN	a. Restore power to block valves. a. IF RCS pressure less than (1) psig, <u>THEN</u> manually close PORVs. IF any valve cannot be closed, <u>THEN</u> manually close its block valve. IF block valve cannot be closed, <u>THEN</u> go to E-1, LOSS OF REACTOR COOLANT. c. Open block valve unless it was closed to isolate a faulty PORV.
<p><i>Caution</i></p> <ul style="list-style-type: none"> ● If any pressurizer PORV opens because of high RCS pressure, repeat step 2 after pressure drops below PORV setpoint. ● If offsite power is lost after SI reset, manual action may be required to restart safeguards equipment. ● If SI is reset before automatic transfer of high-head SI pump suction to RWST occurs, manual transfer on BAT low level is required. 		
<p>(1) Enter plant specific normal operating pressure.</p>		

Number: E-2	Symptom/Title: LOSS OF SECONDARY COOLANT (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3	<p>Check If Low-Head SI Pumps Should Be Stopped:</p> <p>a. Check RCS pressure:</p> <p> 1) Pressure - GREATER THAN <u>(1)</u> PSIG</p> <p> 2) Pressure - STABLE OR INCREASING</p> <p>b. Reset SI</p> <p>c. Stop low-head SI pumps and place in standby</p>	<p>1) <u>IF</u> less than <u>(1)</u> psig, <u>THEN</u> go to E-1, LOSS OF REACTOR COOLANT, STEP 1.</p> <p>2) <u>IF</u> decreasing, <u>THEN</u> go to step 4.</p>
<p><i>Caution</i> If RCS pressure drops below <u>(1)</u> psig, the low-head SI pumps must be manually restarted to supply water to the RCS.</p>		
4	<p>Check If RCPs Should Be Stopped:</p> <p>a. High-head SI pumps running - CHECK FOR FLOW OR PUMP BREAKER INDICATOR LIGHTS LIT</p> <p>b. RCS pressure - EQUAL TO OR LESS THAN <u>(2)</u> PSIG</p> <p>c. Stop all RCPs</p>	<p>a. DO NOT STOP RCPs, go to step 5.</p> <p>b. DO NOT STOP RCPs, go to step 5.</p>
<p>(1) Enter plant specific shutoff head pressure of low-head SI pumps. (2) Enter plant specific value derived from background document to E-O.</p>		

Number: E-2	Symptom/Title: LOSS OF SECONDARY COOLANT (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5	Identify Faulted Steam Generator: a. Pressure lower in one steam generator than the others	a. <u>IF</u> all steam generator pressures approximately equal, <u>THEN</u> search for initiating break: <ul style="list-style-type: none"> • Main steamlines • Main feedlines • Other secondary piping <u>IF</u> break found, <u>THEN</u> go to step 7. <u>IF</u> break <u>NOT</u> found, <u>THEN</u> rediagnose event, go to E-0, REACTOR TRIP OR SAFETY INJECTION, STEP 32.
<p><i>Caution</i> DO NOT terminate AFW flow to any steam generator until faulted steam generator is identified.</p>		
6	Isolate Faulted Steam Generator: a. Main steamline isolation [Enter plant specific steps] b. AFW isolation [Enter plant specific steps]	
<p><i>Caution:</i> The faulted steam generator or initiating break should remain isolated throughout further recovery actions.</p>		
7	Check Non-faulted Steam Generator Levels: a. Narrow range level - GREATER THAN <u>(1)</u> % b. Throttle AFW flow to maintain narrow range level at <u>(2)</u> %	a. <u>IF</u> less than <u>(1)</u> %, <u>THEN</u> maintain full AFW flow until narrow range level is greater than <u>(1)</u> %. b. <u>IF</u> narrow range level in one steam generator continues to increase, <u>THEN</u> go to E-3, STEAM GENERATOR TUBE RUPTURE.
<p>(1) Enter plant specific value showing level just in the narrow range including allowance for normal channel accuracy, post-accident transmitter errors and reference leg process errors. (2) Enter plant specific value corresponding to no-load steam generator level including allowances for post-accident transmitter errors and reference leg process errors.</p>		

Number: E-2	Symptom/Title: LOSS OF SECONDARY COOLANT (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8	Check CST Level: a. CST level - GREATER THAN <u>(1)</u> %	a. <u>IF</u> CST level low, <u>THEN</u> switch to alternate AFW water supply.
9	Check Containment Spray System: a. Spray pumps - RUNNING b. Containment pressure - LESS THAN <u>(2)</u> PSIA c. Reset containment spray signal d. Stop containment spray pumps and place in standby 1) [Enter plant specific steps]	a. <u>IF</u> pumps <u>NOT</u> running, <u>THEN</u> go to step 10. b. <u>IF</u> pressure high, <u>THEN</u> maintain containment spray until containment pressure is reduced to normal range.
10	Check RWST Level: a. RWST level - GREATER THAN <u>(3)</u>	a. <u>IF</u> less than <u>(3)</u> , <u>THEN</u> align SI system for cold leg recirculation per ES-2.2, TRANSFER TO COLD LEG RECIRCULATION FOLLOWING LOSS OF SECONDARY COOLANT.
11	Check RCS Cold Leg Temperatures: a. ALL RCS cold leg temperatures - GREATER THAN 350°F	a. <u>IF</u> any RCS cold leg temperature less than 350°F, <u>THEN</u> go to step 25.
12	Check RCS Pressure: a. RCS pressure - GREATER THAN <u>(4)</u> PSIG	a. <u>IF</u> RCS pressure remains below <u>(4)</u> psig after faulted steam generator dryout, <u>THEN</u> go to E-0, REACTOR TRIP OR SAFETY INJECTION, step 33 to evaluate cause of low pressure.

(1) Enter plant specific low level setpoint.
 (2) Enter plant specific value.
 (3) Enter plant specific value corresponding to RWST switchover alarm in plant specific units.
 (4) Enter plant specific shutoff head pressure of high-head SI pumps.

Number: E-2	Symptom/ Title: LOSS OF SECONDARY COOLANT (Cont.)	Revision No./ Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	<p><i>Caution</i></p> <ul style="list-style-type: none"> ● If offsite power is lost after SI reset, manual action may be required to restart safeguards equipment. ● If SI is reset before automatic transfer of high-head SI pump suction to RWST occurs, manual transfer on BAT low level is required. 	
13	Reset SI.	
14	Reset Containment Isolation Phase A.	
15	Reestablish Instrument Air To Containment.	
16	Check Power Supply To Charging Pumps:	
	a. Offsite power - AVAILABLE	a. IF offsite power <u>NOT</u> available, <u>THEN</u> verify adequate diesel capacity to run charging pumps. If necessary, shed sufficient non-essential loads.
	<p><i>Caution</i> If CCW to the RCP thermal barriers is lost, RCP seal injection should be established slowly to minimize RCP thermal stresses and potential seal failures.</p>	
17	Start One Charging Pump To Establish Seal Injection Flow.	
18	Establish Charging Flow:	
	a. [Enter plant specific means]	
19	Start Additional Charging Pumps, If Necessary, To Meet SI Termination Criteria.	
20	Check Containment Conditions:	
	a. Containment pressure - NORMAL	a. IF high, <u>THEN</u> go to step 23.
	b. Containment temperature -NORMAL	b. IF high, <u>THEN</u> go to step 23.

Number: E-2	Symptom/Title: LOSS OF SECONDARY COOLANT (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p><i>Caution</i> If containment conditions exhibit abnormally high or increasing readings while doing step 21, go to step 23.</p>		
21	<p>Check if SI Can Be Terminated (Under Normal Containment Conditions):</p> <p>a. RCS pressure - GREATER THAN ⁽¹⁾ PSIG AND STABLE OR INCREASING</p> <p>b. Pressurizer level - GREATER THAN 20%</p> <p>c. RCS subcooling - GREATER THAN ⁽²⁾ °F</p> <p>d. Secondary heat sink:</p> <p>1) Total AFW flow to non-faulted steam generators - GREATER THAN ⁽³⁾ GPM</p> <p style="text-align: center;">-OR-</p> <p>2) Wide range level in at least one non-faulted steam generator - GREATER THAN ⁽⁴⁾ %</p>	<p>a. DO NOT TERMINATE SI. Return to step 10.</p> <p>b. DO NOT TERMINATE SI. Return to step 10.</p> <p>c. DO NOT TERMINATE SI. Return to step 10.</p> <p>d. IF neither condition is satisfied, <u>THEN DO NOT TERMINATE</u> SI. Return to step 10.</p>
22	<p>Go To ES-2.1, SI TERMINATION FOLLOWING LOSS OF SECONDARY COOLANT.</p>	
<p>(1) Enter plant specific shutoff head pressure of high-head SI pumps plus instrument uncertainties or 2000 psig, whichever is lower. (2) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables. (3) Enter plant specific value derived from background document to E-O. (4) Enter plant specific value which is above top of steam generator U-tubes.</p>		

Number: E-2	Symptom/Title: LOSS OF SECONDARY COOLANT (Cont.)	Revision No./ Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
23	<p>Check If SI Can Be Terminated (Under Abnormal Containment Conditions):</p> <ul style="list-style-type: none"> a. RCS pressure - GREATER THAN <u>(1)</u> PSIG AND STABLE OR INCREASING b. Pressurizer level - GREATER THAN 50% c. RCS subcooling - GREATER THAN <u>(2)</u> °F d. Secondary heat sink: <ul style="list-style-type: none"> 1) Total AFW flow to non-faulted steam generators - GREATER THAN <u>(3)</u> GPM <li style="text-align: center;">-OR- 2) Narrow range level in at least one non-faulted steam generator - GREATER THAN <u>(4)</u> % 	<ul style="list-style-type: none"> a. DO NOT TERMINATE SI. Return to step 10. b. DO NOT TERMINATE SI. Return to step 10. c. DO NOT TERMINATE SI. Return to step 10. d. <u>IF</u> neither condition is satisfied, <u>THEN</u> DO NOT TERMINATE SI. Return to step 10.
24	<p>Go To ES-2.1, SI TERMINATION FOLLOWING LOSS OF SECONDARY COOLANT.</p>	

(1) Enter plant specific shutoff head pressure of high-head SI pumps plus instrument uncertainties or 2000 psig, whichever is lower.
(2) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.
(3) Enter plant specific value derived from background document to E-O.
(4) Enter plant specific value showing level just in the narrow range including allowances for normal accuracy, post-accident transmitter errors and reference leg process errors.

Number: E-2	Symptom/Title: LOSS OF SECONDARY COOLANT (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
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Caution If RCS cold leg temperature is less than 350°F, SI **MUST BE TERMINATED** when termination criteria are met to protect reactor vessel integrity.

- | | | |
|----|--|--|
| 25 | <p>Check If SI Can Be Terminated (RCS Cold Leg Temperature Below 350°F):</p> <ul style="list-style-type: none"> a. RCS pressure - GREATER THAN 700 PSIG AND STABLE OR INCREASING b. Pressurizer level - GREATER THAN 20% c. RCS subcooling - GREATER THAN <u>(1)</u> °F d. Secondary heat sink: <ul style="list-style-type: none"> 1) Total AFW flow to non-faulted steam generators - GREATER THAN <u>(2)</u> GPM <li style="text-align: center;">-OR- 2) Narrow range level in at least one non-faulted steam generator - GREATER THAN <u>(3)</u> % | <ul style="list-style-type: none"> a. DO NOT TERMINATE SI. Return to step 10. b. DO NOT TERMINATE SI. Return to step 10. c. DO NOT TERMINATE SI. Return to step 10. d. <u>IF</u> neither condition is satisfied, <u>THEN</u> DO NOT TERMINATE SI. Return to step 10. |
| 26 | <p>Go To ES-2.1, SI TERMINATION FOLLOWING LOSS OF SECONDARY COOLANT.</p> | |

-- END --

(1) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.

(2) Enter plant specific value derived from background document to E-O.

(3) Enter plant specific value showing level just in the narrow range including allowances for normal accuracy, post-accident transmitter errors and reference leg process errors.

FOLDOUT FOR E-2 AND ES-2 GUIDELINES

1. RCP TRIP CRITERIA

- Trip any RCP if component cooling water to that pump is lost.
- Trip all RCPs if BOTH conditions listed below are met:
 - a. SI is ON.
 - b. RCS pressure - EQUAL TO OR LESS THAN (1) PSIG.

2. SI REINITIATION CRITERIA FOLLOWING LOSS OF SECONDARY COOLANT

- a. Reinitiate SI if ANY ONE of the parameters listed below occurs:
 - (1) RCS Subcooling - LESS THAN (2)°F
 - (2) Pressurizer level — greater than 20%

3. AFW SUPPLY SWITCHOVER CRITERION

IF CST level less than (3) %, THEN switch to alternate AFW water supply.

4. COLD LEG RECIRCULATION SWITCHOVER CRITERION

IF RWST level less than (4) %, THEN align SI system for cold leg recirculation per ES-2.2, COLD LEG RECIRCULATION FOLLOWING LOSS OF SECONDARY COOLANT.

5. SYMPTOMS FOR FR-C.1, RESPONSE TO INADEQUATE CORE COOLING

Go to FR-C.1, RESPONSE TO INADEQUATE CORE COOLING when ALL symptoms in ANY ONE symptom set occur:

PARAMETER:	SYMPTOM SET		
	I	II	III
1. TCs	>1200°F	—	> 700°F
2. Containment Condition	—	ABNORMAL	ABNORMAL
3. RCP Status	—	ANY ON	ALL OFF
4. RVLIS	—	< 100% NR	< <u>(5)</u> % NR

6. SYMPTOMS FOR FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK

Go to FR-H.1 RESPONSE TO LOSS OF SECONDARY HEAT SINK, If AFW Flow is NOT AVAILABLE.

(1) Enter plant specific value derived from background document to E-O.

(2) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.

(3) Enter plant specific low level setpoint.

(4) Enter plant specific value corresponding to RWST switchover alarm in plant specific units.

(5) Enter plant specific value which is 3½ feet above bottom of active fuel in core with zero void fraction, plus uncertainties.

BACKGROUND INFORMATION FOR
WESTINGHOUSE
EMERGENCY RESPONSE GUIDELINES

E-2
LOSS OF SECONDARY COOLANT

BASIC REVISION
(To be provided later)

WESTINGHOUSE OWNERS GROUP
EMERGENCY RESPONSE GUIDELINES
CONFIGURATION CONTROL SHEET

GUIDELINE DESIGNATOR: E-2

GUIDELINE TITLE: Loss of Secondary Coolant

REVISION: LP-Basic

DATE: July 5, 1982

The guideline described above has been reviewed and approved for implementation by the Westinghouse Owner's Group Procedures Subcommittee and the Westinghouse Nuclear Technology Division.

NOTICE: THIS EMERGENCY RESPONSE GUIDELINE SET REVISION (LP-BASIC) IS THE ORIGINAL ISSUE OF GENERIC GUIDANCE ON ITS SUBJECT MATTER FOR PLANTS WITH LOW-PRESSURE SI SYSTEMS AND SUPERSEDES ANY GENERIC GUIDANCE ON THIS SUBJECT BEARING AN ISSUE DATE EARLIER THAN JULY 5, 1982.

THE "BASIC" REVISION OF THE EMERGENCY RESPONSE GUIDELINE SET BEARING AN ISSUE DATE OF SEPTEMBER 1, 1981, APPLIES TO PLANTS WITH HIGH-PRESSURE SI SYSTEMS.

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Chairman, Procedures Subcommittee
Westinghouse Owner's Group


Manager, Standard Plant Engineering
Westinghouse Nuclear Technology Division

Number: ES-2.1	Symptom/Title: SI TERMINATION FOLLOWING LOSS OF SECONDARY COOLANT	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	<p><i>Caution</i></p> <ul style="list-style-type: none"> ● If offsite power is lost after SI reset, manual action may be required to restart safeguards equipment. ● If SI is reset before automatic transfer of high-head SI pump suction to RWST occurs, manual transfer on BAT low level is required. ● Automatic reinitiation of SI will not occur until reactor trip breakers are reset. <p><i>NOTE</i> Foldout page should be open.</p>	
1	Reset SI.	
2	Stop SI Pumps And Place In Standby: a. Stop high-head SI pumps b. Stop low-head SI pumps	
3	Reset Containment Isolation Phase A.	
4	Reestablish Instrument Air To Containment.	
5	Align High-Head SI Pump Suction From BAT To RWST: a. [Enter plant specific steps]	
6	Verify SI Reinitiation NOT Required: a. RCS subcooling - GREATER THAN (1) °F b. Pressurizer level - GREATER THAN 20%	a. Manually operate SI pumps, as required. <u>IF</u> subcooling can <u>NOT</u> be maintained, <u>THEN</u> manually reinitiate SI and go to E-0, REACTOR TRIP OR SAFETY INJECTION, step 5. b. Manually operate SI pumps, as required. <u>IF</u> pressurizer level can <u>NOT</u> be maintained, <u>THEN</u> manually reinitiate SI and go to E-0, REACTOR TRIP OR SAFETY INJECTION, step 5.

(1) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.

Number: ES-2.1	Symptom/Title: SI TERMINATION FOLLOWING LOSS OF SECONDARY COOLANT (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7	Control RCS Heat Removal: a. Dump steam from non-faulted steam generator(s), as necessary, to stabilize RCS pressure	a. <u>IF</u> steam dump <u>NOT</u> available, <u>THEN</u> reestablish conditions necessary to dump steam to the atmosphere.
8	Verify Offsite Power Available.	Try to restore offsite power: • [Enter plant specific list] <u>IF</u> offsite power cannot be restored, <u>THEN</u> manually load the following equipment on the diesel generators: • [Enter plant specific list]
<p><i>Caution</i> If CCW to the RCP thermal barriers is lost, RCP seal injection should be established slowly to minimize RCP thermal stresses and potential seal failures.</p>		
9	Check Charging Pump Status: a. At least one charging pump - RUNNING	a. <u>IF NOT</u> running, <u>THEN</u> start one charging pump to establish seal injection flow.
10	Establish Desired Charging Flow: a. [Enter plant specific means]	
11	Check VCT Makeup Control System: a. VCT level - NORMAL b. Makeup set for automatic control c. Makeup set for GREATER THAN RCS boron concentration	a. Reestablish VCT level. b. Adjust controls, as appropriate. c. Adjust controls, as appropriate.

Number:

ES-2.1

Symptom/Title:

SI TERMINATION FOLLOWING LOSS OF
SECONDARY COOLANT (Cont.)

Revision No./Date

LP - Basic
5 July, 1982

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
12	Establish Letdown: a. Verify CCW flow to letdown heat exchanger b. Open letdown line containment isolation valves c. Open letdown line isolation valves d. Open letdown orifice isolation valves, as appropriate	<u>IF</u> normal letdown can <u>NOT</u> be established, <u>THEN</u> establish excess letdown: a. [Enter plant specific means.]
13	Verify Charging Pump Suction Aligned To VCT.	<u>IF NOT</u> aligned to VCT, <u>THEN</u> realign pump suction from RWST to VCT.
14	Check RCP Cooling: a. RCP CCW system flow - NORMAL b. RCP seal injection flow - NORMAL c. Do not proceed to step 15 until either conditions in step 14a or b are met.	a. Establish CCW flow to RCPs per [Enter plant specific procedure]. b. Adjust charging hand control valve, as necessary. c. <u>IF</u> neither conditions in step 14a or b can be met, <u>THEN</u> go to step 16.
15	Establish RCP Seal Return Flow: a. Verify CCW flow to seal water heat exchanger b. Open RCP seal return line isolation valves	

Number: ES-2.1	Symptom/Title: SI TERMINATION FOLLOWING LOSS OF SECONDARY COOLANT (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16	Check Non-Faulted Steam Generator Levels: a. Narrow range level - GREATER THAN <u>(1)</u> % b. Throttle AFW flow to maintain narrow range level at <u>(2)</u> %	a. <u>IF</u> less than <u>(1)</u> %, <u>THEN</u> maintain full AFW flow until narrow range level is greater than <u>(1)</u> %. b. <u>IF</u> narrow range level in one or more steam generators continues to increase, <u>THEN</u> stop AFW pumps to that steam generator. <u>IF</u> level continues to increase in an uncontrolled manner, <u>THEN</u> go to FR-H.3, RESPONSE TO STEAM GENERATOR HIGH LEVEL.
17	Check CST Level: a. CST level - GREATER THAN <u>(3)</u> %	a. <u>IF</u> CST level low, <u>THEN</u> switch to alternate AFW water supply.
18	Establish Pressurizer Level In Normal Operating Range: a. Adjust letdown flow as necessary b. Adjust charging flow as necessary c. <u>WHEN</u> pressurizer level is normal, <u>THEN</u> level controls may be placed in automatic	
19	Control Pressurizer Pressure: a. Energize pressurizer heaters and operate normal spray, as necessary, to maintain pressure within TECH SPEC limits	a. Use auxiliary spray or PORV, if necessary

(1) Enter plant specific value showing level just in the narrow range including allowances for normal channel accuracy, post-accident transmitter errors, and reference leg process errors.

(2) Enter plant specific value corresponding to no-load steam generator level including allowances for post-accident transmitter errors and reference leg errors.

(3) Enter plant specific low level setpoint.

Number:

ES-2.1

Symptom/Title:

**SI TERMINATION FOLLOWING LOSS OF
SECONDARY COOLANT (Cont.)**

Revision No./Date

LP - Basic
5 July, 1982

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

20

Check RCS Subcooling - **GREATER THAN 50°F.**

Dump steam to establish 50°F subcooling:

- a. Limit RCS cooldown rate - **LESS THAN 50°F/HR.**
- b. Dump steam to condenser.

-OR-

Dump steam with steam generator PORVs.

NOTE *RCPs should be run in order of priority to provide pressurizer spray.*

21

Check RCP Status:

- a. At least one RCP - **RUNNING**

- a. IF no RCP running, THEN try to start one RCP:

- 1) Establish conditions for running an RCP:

[Enter plant specific list]

- 2) Start one RCP.

IF an RCP cannot be started, THEN monitor natural circulation from trended values:

- (a) RCS subcooling - **GREATER THAN (1) °F.**
- (b) Steam pressure - **STABLE.**
- (c) RCS hot leg temperature - **STABLE OR SLOWLY DECREASING.**
- (d) Core exit TCs - **STABLE OR SLOWLY DECREASING.**
- (e) RCS cold leg temperature - **NEAR SATURATION TEMPERATURE FOR STEAM PRESSURE.**

IF natural circulation NOT verified, THEN increase dumping steam.

(1) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.

Number: ES-2.1	Symptom/Title: SI TERMINATION FOLLOWING LOSS OF SECONDARY COOLANT (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
22	Check Intermediate Range Flux: a. Flux - BELOW <u>(1)</u> b. Verify source range detectors re-energized c. Transfer nuclear recorders to source range scale	a. Continue with step 23. <u>WHEN</u> flux below <u>(1)</u> , <u>THEN</u> do steps 22 b and c. b. Manually re-energize source range detectors.
23	Maintain Stable Plant Conditions: a. Pressurizer pressure - STABLE b. Pressurizer level - AT <u>(2)</u> % c. Steam generator narrow range levels - AT <u>(3)</u> % d. RCS average temperature - STABLE	
24	Shutdown Unnecessary Plant Equipment: a. [Enter plant specific list]	

(1) Enter plant specific value for intermediate range permissible to block source range high flux trip (P-6).

(2) Enter plant specific no-load level.

(3) Enter plant specific no-load narrow range level.

Number: ES-2.1	Symptom/Title: SI TERMINATION FOLLOWING LOSS OF SECONDARY COOLANT (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
25	Verify SI Reinitiation NOT Required: a. RCS subcooling - GREATER THAN 50 °F b. Pressurizer level - GREATER THAN 20%	a. Manually operate SI pumps, as required. <u>IF</u> subcooling can <u>NOT</u> be maintained, <u>THEN</u> manually reinitiate SI and go to E-0, REACTOR TRIP OR SAFETY INJECTION, step 5. b. Manually operate SI pumps, as required. <u>IF</u> pressurizer level can <u>NOT</u> be maintained, <u>THEN</u> manually reinitiate SI and go to E-0, REACTOR TRIP OR SAFETY INJECTION, step 5.
26	Investigate Cause of SI: a. Refer to FR-P.2 to determine cooldown limitations b. Go to appropriate plant procedure	

— END —

FOLDOUT FOR E-2 AND ES-2 GUIDELINES

1. RCP TRIP CRITERIA

- Trip any RCP if component cooling water to that pump is lost.
- Trip all RCPs if BOTH conditions listed below are met:
 - a. SI is ON.
 - b. RCS pressure - EQUAL TO OR LESS THAN (1) PSIG.

2. SI REINITIATION CRITERIA FOLLOWING LOSS OF SECONDARY COOLANT

- a. Reinitiate SI if ANY ONE of the parameters listed below occurs:
 - (1) RCS Subcooling - LESS THAN (2)°F
 - (2) Pressurizer level — greater than 20%

3. AFW SUPPLY SWITCHOVER CRITERION

IF CST level less than (3) %, THEN switch to alternate AFW water supply.

4. COLD LEG RECIRCULATION SWITCHOVER CRITERION

IF RWST level less than (4) %, THEN align Si system for cold leg recirculation per ES-2.2, COLD LEG RECIRCULATION FOLLOWING LOSS OF SECONDARY COOLANT.

5. SYMPTOMS FOR FR-C.1, RESPONSE TO INADEQUATE CORE COOLING

Go to FR-C.1, RESPONSE TO INADEQUATE CORE COOLING when ALL symptoms in ANY ONE symptom set occur:

PARAMETER:	SYMPTOM SET		
	I	II	III
1. TCs	> 1200°F	—	> 700°F
2. Containment Condition	—	ABNORMAL	ABNORMAL
3. RCP Status	—	ANY ON	ALL OFF
4. RVLIS	—	< 100% NR	< <u>(5)</u> % NR

6. SYMPTOMS FOR FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK

Go to FR-H.1 RESPONSE TO LOSS OF SECONDARY HEAT SINK, If AFW Flow is NOT AVAILABLE.

(1) Enter plant specific value derived from background document to E-O.

(2) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.

(3) Enter plant specific low level setpoint.

(4) Enter plant specific value corresponding to RWST switchover alarm in plant specific units.

(5) Enter plant specific value which is 3 1/2 feet above bottom of active fuel in core with zero void fraction, plus uncertainties.

BACKGROUND INFORMATION
FOR
WESTINGHOUSE
EMERGENCY RESPONSE GUIDELINES

ES-2.1
SI TERMINATION FOLLOWING
LOSS OF SECONDARY COOLANT

BASIC REVISION
(To be provided later)

WESTINGHOUSE OWNERS GROUP
EMERGENCY RESPONSE GUIDELINES
CONFIGURATION CONTROL SHEET

GUIDELINE DESIGNATOR: ES-2.1

GUIDELINE TITLE: SI Termination Following Loss of Secondary Coolant

REVISION: LP-Basic

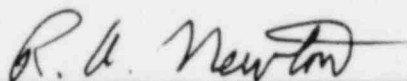
DATE: July 5, 1982

The guideline described above has been reviewed and approved for implementation by the Westinghouse Owner's Group Procedures Subcommittee and the Westinghouse Nuclear Technology Division.

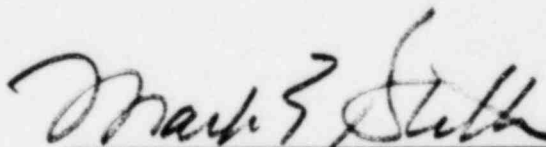
NOTICE: THIS EMERGENCY RESPONSE GUIDELINE SET REVISION (LP-BASIC) IS THE ORIGINAL ISSUE OF GENERIC GUIDANCE ON ITS SUBJECT MATTER FOR PLANTS WITH LOW-PRESSURE SI SYSTEMS AND SUPERSEDES ANY GENERIC GUIDANCE ON THIS SUBJECT BEARING AN ISSUE DATE EARLIER THAN JULY 5, 1982.

THE "BASIC" REVISION OF THE EMERGENCY RESPONSE GUIDELINE SET BEARING AN ISSUE DATE OF SEPTEMBER 1, 1981, APPLIES TO PLANTS WITH HIGH-PRESSURE SI SYSTEMS.

File this sheet with the approved version of this guideline in your Emergency Response Guideline set.



Chairman, Procedures Subcommittee
Westinghouse Owner's Group



Manager, Standard Plant Engineering
Westinghouse Nuclear Technology Division

Number: ES-2.2	Symptom/Title: TRANSFER TO COLD LEG RECIRCULATION FOLLOWING LOSS OF SECONDARY COOLANT	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	<p>NOTE <i>Transfer to cold leg recirculation may differ for each plant design. This guideline is for a typical low-pressure plant.</i></p>	
	<p><i>Caution</i> <i>Do steps 1 through 4 without delay.</i></p>	
1	Reset SI.	
2	Verify CCW Flow To The RHR Heat Exchangers:	
	a. [Enter plant specific method]	a. Establish CCW flow: 1) [Enter plant specific method]
	<p><i>Caution</i></p> <ul style="list-style-type: none"> ● <i>Any pumps taking suction from RWST should be stopped upon receipt of RWST empty alarm.</i> ● <i>High-head SI pumps should be stopped if RCS pressure is greater than their shutoff head pressure.</i> 	
3	Determine If Charging Pumps Should Be Stopped:	
	a. [Enter plant specific list]	
4	Align SI System for Recirculation:	
	a. [Enter plant specific list]	a. Try to open or close valves, as appropriate
5	Start Safeguard Pumps, As Necessary	
6	Align Containment Spray System For Recirculation, If Necessary:	
	a. [Enter plant specific method]	
7	Continue With Procedure In Effect.	
<p>— END —</p>		

BACKGROUND INFORMATION
FOR
WESTINGHOUSE
EMERGENCY RESPONSE GUIDELINES

ES-1.3
TRANSFER TO COLD LEG
RECIRCULATION
FOLLOWING LOSS OF REACTOR COOLANT
BASIC REVISION

AND

ES-2.2
TRANSFER TO COLD LEG RECIRCULATION
FOLLOWING LOSS OF SECONDARY COOLANT
BASIC REVISION

(To be provided later)

WESTINGHOUSE OWNERS GROUP
EMERGENCY RESPONSE GUIDELINES
CONFIGURATION CONTROL SHEET

GUIDELINE DESIGNATOR: ES-2.2

GUIDELINE TITLE: Transfer to Cold Leg Recirculation Following Loss of
Secondary Coolant

REVISION: LP-Basic

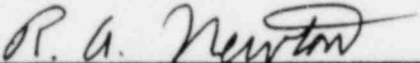
DATE: July 5, 1982

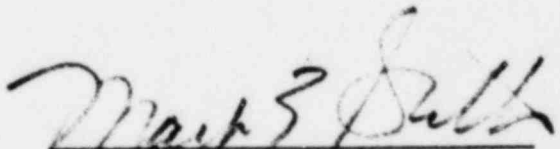
The guideline described above has been reviewed and approved for implementation by the Westinghouse Owner's Group Procedures Subcommittee and the Westinghouse Nuclear Technology Division.

NOTICE: THIS EMERGENCY RESPONSE GUIDELINE SET REVISION (LP-BASIC) IS THE ORIGINAL ISSUE OF GENERIC GUIDANCE ON ITS SUBJECT MATTER FOR PLANTS WITH LOW-PRESSURE SI SYSTEMS AND SUPERSEDES ANY GENERIC GUIDANCE ON THIS SUBJECT BEARING AN ISSUE DATE EARLIER THAN JULY 5, 1982.

THE "BASIC" REVISION OF THE EMERGENCY RESPONSE GUIDELINE SET BEARING AN ISSUE DATE OF SEPTEMBER 1, 1981, APPLIES TO PLANTS WITH HIGH-PRESSURE SI SYSTEMS.

File this sheet with the approved version of this guideline in your Emergency Response Guideline set.


Chairman, Procedures Subcommittee
Westinghouse Owner's Group


Manager, Standard Plant Engineering
Westinghouse Nuclear Technology Division

Number: E-3	Symptom/Title: STEAM GENERATOR TUBE RUPTURE	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p><i>Caution</i> If all steam generators are ruptured, the steam generator with the lowest level should be used for subsequent RCS cooldown. DO NOT isolate this steam generator. Consider it non-ruptured.</p>		
<p>NOTE</p> <ul style="list-style-type: none"> ● Foldout page should be open. ● Personnel should be available for sampling during this procedure. 		
1	<p>Identify Ruptured Steam Generator(s):</p> <ul style="list-style-type: none"> • Unexpected rise in any steam generator narrow range level • High radiation from any steam generator blowdown line 1) [Enter plant specific steps for opening blowdown lines sequentially to check radiation] • High radiation from any steam generator sample • High radiation from any steam generator steamline 	<p><u>IF NOT</u> immediately identified, <u>THEN</u> continue with steps 3 through 8. <u>WHEN</u> ruptured steam generator(s) identified, <u>THEN</u> do step 2.</p>

Number: E-3	Symptom/Title: STEAM GENERATOR TUBE RUPTURE (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
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Caution Ruptured steam generator(s) level should be maintained above the top of the U-tubes.

- | | | |
|---|--|--|
| 2 | <p>Isolate Ruptured Steam Generator(s):</p> <ul style="list-style-type: none"> a. <u>WHEN</u> level in narrow range, <u>THEN</u> stop all AFW flow to ruptured steam generator(s) <ul style="list-style-type: none"> 1) [Enter plant specific steps] b. Close ruptured steam generator(s) main steamline isolation valve and bypass valve c. Verify ruptured steam generator(s) PORV controller set AT <u>(1)</u> PSIG d. <u>WHEN</u> ruptured steam generator(s) pressure LESS THAN <u>(1)</u> PSIG, <u>THEN</u> verify ruptured steam generator(s) PORVs closed e. Close ruptured steam generator(s) steam supply valve to turbine-driven AFW pump f. Verify blowdown from ruptured steam generator(s) isolated | <ul style="list-style-type: none"> b. Close non-ruptured steam generator main steamline isolation valves and bypass valves. Use non-ruptured steam generator PORVs for steam dump. c. <u>IF NOT</u>, <u>THEN</u> adjust PORV controller setpoint to <u>(1)</u> psig. d. Place PORV controller in MANUAL and close PORV. <u>IF</u> PORV can <u>NOT</u> be closed, <u>THEN</u> manually isolate PORV. f. Manually isolate blowdown from ruptured steam generator(s). |
|---|--|--|

(1) Enter plant specific setpoint for PORV controller, typically 25 psig below lowest safety valve set pressure.

Number: E-3	Symptom/Title: STEAM GENERATOR TUBE RUPTURE (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3	<p>Check Pressurizer PORVs and Block Valves:</p> <p>a. Power available to block valves</p> <p>b. PORVs - CLOSED</p> <p>c. Block valves - OPEN</p>	<p>a. Restore power to block valves.</p> <p>b. Manually close PORVs. <u>IF</u> any valve cannot be closed, <u>THEN</u> manually close its block valve.</p> <p>c. Open block valve unless it was closed to isolate a faulty PORV.</p>
<p><i>Caution</i> IF any pressurizer PORV opens because of high RCS pressure, repeat step 3 after pressure drops below PORV setpoint.</p>		
4	<p>Check if RCPs Should Be Stopped:</p> <p>a. High-head SI pump running - CHECK FOR FLOW OR PUMP BREAKER INDICATOR LIGHTS LIT</p> <p>b. RCS pressure - EQUAL TO OR LESS THAN <u>(1)</u> PSIG</p> <p>c. Stop all RCPs</p>	<p>a. DO NOT STOP RCPs. Go to step 5.</p> <p>b. DO NOT STOP RCPs. Go to step 5</p>
<p><i>Caution</i></p> <ul style="list-style-type: none"> ● If offsite power is lost after SI reset, manual action may be required to restart safeguards equipment. ● If SI is reset before automatic transfer of high-head SI pump suction to RWST occurs, manual transfer on BAT low level is required. 		
5	Reset SI.	
6	Reset Containment Isolation Phase A.	

(1) Enter plant specific value derived from background document to E-O.

Number: E-3	Symptom/Title: STEAM GENERATOR TUBE RUPTURE (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7	<p>Check Electrical Power And Air Supply Available To Equipment Needed For Cooldown And Depressurization:</p> <p>a. Offsite power - AVAILABLE</p> <p>b. [Enter plant specific list]</p>	<p>a. IF offsite power <u>NOT</u> available, <u>THEN</u> verify adequate diesel capacity. If necessary, shed sufficient non-essential loads.</p>
8	<p>Check Secondary System Integrity:</p> <p>a. RCS hot leg temperature - GREATER THAN <u>(1)</u> °F</p> <p>b. ALL steam generator pressures - GREATER THAN <u>(2)</u> PSIG</p>	<p>a. IF any hot leg temperature less than <u>(1)</u> °F and decreasing, <u>THEN</u> close all main steamline isolation valves and bypass valves. IF any steam generator pressure continues to decrease, <u>THEN</u> go to ES-3.3, SGTR WITH SECONDARY DEPRESSURIZATION.</p> <p>b. IF any steam generator pressure less than <u>(2)</u> psig, <u>THEN</u> close all main steamline isolation valves and bypass valves. IF any steam generator pressure continues to decrease, <u>THEN</u> GO TO ES-3.3, SGTR WITH SECONDARY DEPRESSURIZATION.</p>
<p>Caution</p> <ul style="list-style-type: none"> ● DO NOT PROCEED to step 9 until ruptured steam generator has been identified and isolated. ● Disregard RCP trip criteria for all subsequent steps in this guideline. 		
<p>(1) Enter plant specific temperature corresponding to lowest expected hot leg temperature following a normal reactor trip. (2) Enter plant specific value corresponding to low steamline pressure SI setpoint.</p>		

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
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NOTE Steps 10 through 13 should be performed while cooling down in step 9 to expedite recovery.

- 9 **Establish 50°F Subcooling In Non-Ruptured RCS Hot Leg(s) By Depressurizing Non-Ruptured Steam Generator(s):**
- a. Determine required non-ruptured steam generator pressure in table below:

Ruptured Steam Generator Pressure (PSIG)	Required Non-ruptured Steam Generator Pressure (PSIG)	
	Any RCP Running	All RCPs Stopped
1200	780	610
1100	710	550
1000	640	490
900	570	430
800	500	370
700	430	320
600	350	260
500	310	210
400	230	160

- | | |
|--|---|
| <p>b. Rapidly dump steam to condenser from non-ruptured steam generators:
1) [Enter plant specific steps]</p> <p>c. Check ruptured steam generator(s) pressure - STABLE OR INCREASING</p> <p>d. <u>WHEN</u> non-ruptured hot leg(s) are subcooled by 50°F, <u>THEN</u> maintain required steam generator pressure to stabilize temperature</p> | <p>b. Rapidly dump steam with non-ruptured steam generator PORVs.</p> <p>c. <u>IF</u> decreasing, <u>THEN</u> go to ES-3.3, SGTR WITH SECONDARY DEPRESSURIZATION, STEP 4.</p> |
|--|---|

Number: E-3	Symptom/Title: STEAM GENERATOR TUBE RUPTURE (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p><i>Caution</i> Alternate water sources for AFW pumps will be necessary if CST level is low.</p>		
10	<p>Check Steam Generator Levels:</p> <p>a. Narrow range level - GREATER THAN <u>(1)</u> %</p> <p>b. Throttle AFW flow to maintain narrow range level at <u>(2)</u> %</p>	<p>a. IF less than <u>(1)</u> %, THEN maintain full AFW flow until narrow range level is greater than <u>(1)</u> %.</p>
11	<p>Check If Low-head SI Pumps Should Be Stopped:</p> <p>a. RCS pressure - GREATER THAN <u>(3)</u> PSIG</p> <p>b. Stop low-head SI pumps and place in standby</p>	<p>a. IF less than <u>(3)</u> psig, THEN go to E-1, LOSS OF REACTOR COOLANT, STEP 20.</p>
<p><i>Caution</i> IF RCS pressure drops below <u>(3)</u> psig, the low-head SI pumps must be manually restarted to supply water to the RCS.</p>		
12	<p>Check RCP Seal Cooling:</p> <p>a. CCW flow to RCP thermal barriers - NORMAL</p> <p>-OR-</p> <p>RCP seal injection flow - NORMAL</p>	<p>a. Try to establish CCW flow to RCP thermal barriers and go to step 14.</p>
<p>(1) Enter plant specific value showing level just in the narrow range including allowances for normal channel accuracy, post-accident transmitter errors and reference leg process errors.</p> <p>(2) Enter plant specific value corresponding to no-load steam generator level including allowances for post-accident transmitter errors and reference leg process errors.</p> <p>(3) Enter plant specific shutoff head of low-head SI pumps.</p>		

Number: E-3	Symptom/Title: STEAM GENERATOR TUBE RUPTURE (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13	Establish Maximum Charging Flow: a. Offsite power - AVAILABLE b. Establish maximum charging flow [Enter plant specific means]	a. <u>IF</u> offsite power <u>NOT</u> available, <u>THEN</u> verify adequate diesel capacity to run charging pumps. If necessary, shed sufficient non-essential loads.
<p><i>Caution</i> <i>If containment conditions are abnormal, go to E-1, LOSS OF REACTOR COOLANT, STEP 1.</i></p>		
14	Check RCS Pressure: a. RCS pressure - AT LEAST 200 PSI GREATER THAN RUPTURED STEAM GENERATOR PRESSURE	a. <u>IF NOT</u> , <u>THEN</u> : 1) Go to ES-3.2, MULTIPLE SGTR CONTINGENCY. 2) <u>WHEN</u> ES-3.2 is completed, <u>THEN</u> return to step 20 of this guideline.
15	Depressurize RCS Using Normal Spray: a. Verify normal spray - AVAILABLE b. Open normal spray valves c. Verify RCS pressure - DECREASING	a. Go to step 17. b. Go to step 17. c. Close spray valves and go to step 17.

Number: E-3	Symptom/Title: STEAM GENERATOR TUBE RUPTURE (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16	<p>Check If RCS Depressurization Should Be Stopped:</p> <p>a. RCS pressure - LESS THAN OR EQUAL TO RUPTURED STEAM GENERATOR PRESSURE</p> <p style="text-align: center;">-OR-</p> <p>Pressurizer level - GREATER THAN <u>(1)</u> %</p> <p>b. Stop RCS depressurization by closing spray valves</p> <p>c. Check pressurizer level - GREATER THAN <u>(2)</u> %</p> <p>d. Verify RCS pressure - INCREASING</p> <p>e. Go to step 19</p>	<p>a. Continue depressurization until either condition met.</p> <p>c. <u>IF</u> level less than <u>(2)</u> %, <u>THEN</u>:</p> <p>1) Go to ES-3.2, MULTIPLE SGTR CONTINGENCY.</p> <p>2) <u>WHEN</u> ES-3.2 is completed, <u>THEN</u> return to step 20 of this guideline.</p> <p>d. <u>IF</u> RCS pressure decreasing or stable, <u>THEN</u> stop RCPs in loops with spray line connections.</p>
<p><i>Caution The upper head may void during depressurization of the RCS if RCPs are not running. This will result in a rapidly increasing pressurizer level.</i></p>		
17	<p>Depressurize RCS Using One Pressurizer PORV:</p> <p>a. Open one pressurizer PORV</p>	<p>a. <u>IF</u> RCS cannot be depressurized using any PORV, <u>THEN</u> use auxiliary spray.</p>
<p>(1) Enter plant specific value corresponding to high pressurizer level reactor trip setpoint. (2) Enter plant specific value showing level just in span including allowances for normal channel accuracy.</p>		

Number:

E-3

Symptom/Title:

STEAM GENERATOR TUBE RUPTURE (Cont.)

Revision No./Date

LP - Basic
5 July, 1982

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

18

Check If RCS Depressurization Should Be Stopped:

a. RCS pressure - LESS THAN OR EQUAL TO RUPTURED STEAM GENERATOR PRESSURE

-OR-

Pressurizer level - GREATER THAN (1) %

b. Stop RCS depressurization:

1) Close PORV

2) Close auxiliary spray valve

c. Check pressurizer level - GREATER THAN (2) %

d. Verify RCS pressure - INCREASING

a. Continue depressurization until either condition met.

b. 1) Close PORV block valve.

2) Isolate auxiliary spray line.

c. IF level less than (2) %, THEN:

1) Go to ES-3.2, MULTIPLE SGTR CONTINGENCY.

2) WHEN ES-3.2 is completed, THEN return to step 20 of this guideline.

d. IF RCS pressure NOT increasing, THEN check PRT conditions. IF PRT conditions indicate an RCS leak, THEN go to E-1, LOSS OF REACTOR COOLANT.

(1) Enter plant specific value corresponding to high pressurizer level reactor trip setpoint.

(2) Enter plant specific value showing level just on span including allowances for normal channel accuracy.

Number: E-3	Symptom/Title: STEAM GENERATOR TUBE RUPTURE (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	<p><i>Caution</i></p> <ul style="list-style-type: none"> ● If PRT integrity is lost, abnormal containment conditions may not be reliable indications of a loss of reactor coolant. ● SI MUST BE TERMINATED when termination criteria are met to prevent overfilling of the ruptured steam generator(s). <p>NOTE A void in the upper head may result in a water solid pressurizer. This condition should not preclude the termination of SI when all criteria are met.</p>	
19	<p>Check If SI Can Be Terminated:</p> <p>a. RCS pressure - INCREASES BY 200 PSI</p> <p>b. Pressurizer level - GREATER THAN <u>(1)</u> %</p> <p>c. RCS subcooling - GREATER THAN <u>(2)</u> °F</p> <p>d. Do not proceed to step 20 until all the above conditions are met</p>	<p>a. DO NOT TERMINATE SI. <u>IF</u> pressure has <u>NOT</u> increased by 200 psi <u>AND</u> pressurizer level is stable or decreasing, <u>THEN</u>:</p> <ol style="list-style-type: none"> 1) Go to ES-3.2, MULTIPLE SGTR CONTINGENCY. 2) <u>WHEN</u> ES-3.2 is completed, <u>THEN</u> return to step 20 of this guideline. <p>b. DO NOT TERMINATE SI:</p> <ol style="list-style-type: none"> 1) Go to ES-3.2, MULTIPLE SGTR CONTINGENCY. 2) <u>WHEN</u> ES-3.2 is completed, <u>THEN</u> return to step 20 of this guideline. <p>c. DO NOT TERMINATE SI. Return to step 9.</p>
	<p>(1) Enter plant specific value showing level just on span including allowances for normal channel accuracy.</p> <p>(2) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.</p>	

Number: E-3	Symptom/Title: STEAM GENERATOR TUBE RUPTURE (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p><i>Caution</i> Automatic reinitiation of SI will not occur until reactor trip breakers are reset.</p>		
20	<p>Stop SI Pumps And Place In Standby:</p> <p>a. Stop high-head SI pumps b. Stop low-head SI pumps</p>	
21	<p>Verify Instrument Air To Containment.</p>	<p>Establish instrument air to containment.</p>
22	<p>Align High-Head SI Pump Suction From BAT To RWST:</p> <p>a. [Enter plant specific steps]</p>	
23	<p>Verify SI Reinitiation NOT Required:</p> <p>a. RCS subcooling – GREATER THAN <u>(1)</u> °F</p> <p>b. Pressurizer level – GREATER THAN 20%</p>	<p>a. Manually operate SI pumps, as required. <u>IF</u> subcooling can <u>NOT</u> be maintained, <u>THEN</u> manually reinitiate SI and return to step 9.</p> <p>b. Manually operate SI pumps, as required. <u>IF</u> pressurizer level can <u>NOT</u> be maintained, <u>THEN</u> manually reinitiate SI and return to step 9.</p>
24	<p>Verify Offsite Power Available.</p>	<p>Try to restore offsite power. <u>IF</u> offsite power cannot be restored, <u>THEN</u> manually load following equipment on the diesel generators:</p> <ul style="list-style-type: none"> • [Enter plant specific list].

(1) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.

Number: E-3	Symptom/Title: ST ^{AM} GENERATOR TUBE RUPTURE (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p><i>Caution</i> If CCW to the RCP thermal barriers is lost, RCP seal injection should be established slowly to minimize RCP thermal stresses and potential seal failures.</p>		
25	<p>Check Charging Pump Status: a. At least one charging pump - RUNNING</p>	<p>a. <u>IF NOT</u> running, <u>THEN</u> start one charging pump to establish seal injection flow.</p>
26	<p>Establish Desired Charging Flow: a. [Enter plant specific means]</p>	
27	<p>Check VCT Makeup Control System: a. VCT level - NORMAL b. Makeup set for automatic control c. Makeup set for GREATER THAN RCS BORON CONCENTRATION</p>	<p>a. Reestablish VCT level. b. Adjust controls, as appropriate. c. Adjust controls, as appropriate.</p>
28	<p>Establish Letdown: a. Verify CCW flow to letdown heat exchanger b. Open letdown line containment isolation valves c. Open letdown line isolation valves d. Open letdown orifice isolation valve, as appropriate</p>	<p><u>IF</u> normal letdown can <u>NOT</u> be established, <u>THEN</u> establish excess letdown: a. [Enter plant specific means]</p>
29	<p>Verify Charging Pump Suction Aligned To VCT.</p>	<p><u>IF NOT</u> aligned to VCT, <u>THEN</u> realign pump suction from RWST to VCT.</p>
30	<p>Check RCP Cooling: a. RCP CCW system flow - NORMAL b. RCP seal injection flow - NORMAL c. Do not proceed to step 31 until either conditions in step 30a or b are met.</p>	<p>a. Establish CCW flow to RCPs per [Enter plant specific procedure]. b. Adjust charging hand control valve, as necessary. c. <u>IF</u> neither conditions in step 30a or b can be met, <u>THEN</u> go to step 32.</p>

Number: E-3	Symptoms/Titles: STEAM GENERATOR TUBE RUPTURE (Cont.)	Revision No./Date: LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
31	Establish RCP Seal Return Flow: a. Verify CCW flow to seal water heat exchanger b. Open RCP seal return line isolation valves	
32	Equalize Charging And Letdown Flows: a. Take manual control of charging and letdown b. Adjust charging and seal injection flows EQUAL to letdown and seal leakoff flows	
33	Minimize Secondary System Contamination: a. [Enter plant specific list]	
34	Check CST Level: a. CST level - GREATER THAN <u>(1)</u> % b. CST level - LESS THAN <u>(2)</u> %	a. <u>IF</u> CST level low, <u>THEN</u> switch to alternate AFW water supply. b. Stop reject and makeup flow to CST.
35	Energize Pressurizer Heaters.	
36	Check Pressurizer Water Temperature: a. Water temperature - EQUAL TO SATURATION TEMPERATURE OF RUPTURED STEAM GENERATOR	a. Establish required pressurizer water temperature before continuing to step 37.
37	Check Pressurizer Level: a. Level - LESS THAN 90% b. Level - GREATER THAN 30%	a. Draw a bubble in pressurizer. b. Increase charging flow and spray pressurizer to maintain RCS pressure constant.

(1) Enter plant specific low level setpoint.

(2) Enter plant specific overflow level point.

Number: E-3	Symptom/Title: STEAM GENERATOR TUBE RUPTURE (Cont.)	Revision No./Date: LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
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NOTE RCPs should be run in order of priority to provide pressurizer spray.

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Check RCP Status:

a. At least one RCP - RUNNING

- a. IF no RCP running, THEN try to start one RCP:
- 1) Check reactor vessel level full. IF reactor vessel level NOT full, THEN increase pressurizer level to (1) %.
 - 2) Establish conditions for running one RCP:
[Enter plant specific list].
 - 3) Start one RCP:
IF one RCP cannot be started, THEN monitor natural circulation from trended values:
 - (a) RCS subcooling - GREATER THAN (2) °F.
 - (b) Steam pressure - STABLE.
 - (c) RCS hot leg temperature - STABLE OR SLOWLY DECREASING.
 - (d) Core exit TCs - STABLE OR SLOWLY DECREASING.
 - (e) RCS cold leg temperature - NEAR SATURATION TEMPERATURE FOR STEAM PRESSURE.

IF natural circulation NOT verified, THEN increase steam dump from non-ruptured steam generator(s).

b. Stop all but one RCP

(1) Enter plant specific pressurizer level to accommodate void collapse as determined in background document.

(2) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.

Number: E-3	Symptom/Title: STEAM GENERATOR TUBE RUPTURE (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
39	<p>Check Intermediate Range Flux:</p> <p>a. Flux - BELOW (1)</p> <p>b. Verify source range detectors re-energized</p> <p>c. Transfer nuclear recorders to source range scale</p>	<p>a. Continue with step 40. <u>WHEN</u> below (1), <u>THEN</u> do steps 39 b and c.</p> <p>b. Manually re-energize source range detectors.</p>
40	<p>Shutdown Unnecessary Plant Equipment:</p> <p>a. [Enter plant specific list]</p>	
41	<p>Select Post-SGTR Cooldown Method:</p> <p>a. Go to ES-3.1A, SGTR ALTERNATE COOLDOWN BY BACKFILLING RCS</p> <p style="text-align: center;">-OR-</p> <p>Go to ES-3.1B, SGTR ALTERNATE COOLDOWN USING STEAM GENERATOR BLOWDOWN</p> <p style="text-align: center;">-OR-</p> <p>Go to ES-3.1C, SGTR ALTERNATE COOLDOWN BY STEAMING RUPTURED STEAM GENERATOR(S)</p>	
-END-		

(1) Enter plant specific value for intermediate range permissive to block source range high flux trip (P-6).

FOLDOUT FOR E-3 AND ES-3 GUIDELINES

1. RCP TRIP CRITERIA

- Trip any RCP if component cooling water to that pump is lost.
- If a controlled cooldown is not in progress, then trip all RCPs when BOTH conditions listed below are met:
 - a. SI is ON
 - b. RCS pressure - EQUAL TO OR LESS THAN (1) PSIG

2. SI REINITIATION CRITERIA FOLLOWING STEAM GENERATOR TUBE RUPTURE

Reinitiate SI if ANY ONE of the parameters listed below occurs:

- (1) RCS subcooling - LESS THAN (2) PSIG
- (2) Pressurizer level - LESS THAN 20%

3. SYMPTOMS OF LOSS OF REACTOR COOLANT DURING STEAM GENERATOR TUBE RUPTURE

Go to E-1, LOSS OF REACTOR COOLANT, if abnormal containment conditions persist AND are not due only to failure of PRT rupture disc.

4. SYMPTOMS OF PRIMARY TO SECONDARY LEAKAGE DURING RECOVERY ACTIONS

Charging and letdown flows should be compared to determine if leakage between the RCS and the ruptured steam generator exists.

5. SYMPTOMS FOR FR-C.1, RESPONSE TO INADEQUATE CORE COOLING

Go to FR-C.1, RESPONSE TO INADEQUATE CORE COOLING, when ALL symptoms in ANY ONE of the following symptom sets occurs:

PARAMETER:	SYMPTOM SET		
	I	II	III
1. TCs	>1200°F	—	>700°F
2. Containment Condition	—	ABNORMAL	ABNORMAL
3. RCP Status	—	ANY ON	ALL OFF
4. RVLIS	—	<100% NR	< <u>(3)</u> % NR

6. SYMPTOMS FOR FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK

Go to FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK, if AFW NOT AVAILABLE.

(1) Enter plant specific value derived from background document.

(2) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.

(3) Enter plant specific value which is 3½ feet above bottom of active fuel in core with zero void fraction, plus uncertainties.

BACKGROUND INFORMATION
FOR
WESTINGHOUSE
EMERGENCY RESPONSE GUIDELINES

E-3

STEAM GENERATOR TUBE RUPTURE

Basic Revision
(To be provided later)

WESTINGHOUSE OWNERS GROUP
EMERGENCY RESPONSE GUIDELINES
CONFIGURATION CONTROL SHEET

GUIDELINE DESIGNATOR: E-3

GUIDELINE TITLE: Steam Generator Tube Rupture

REVISION: LP-Basic

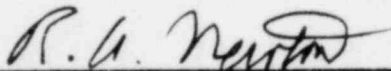
DATE: July 5, 1982

The guideline described above has been reviewed and approved for implementation by the Westinghouse Owner's Group Procedures Subcommittee and the Westinghouse Nuclear Technology Division.

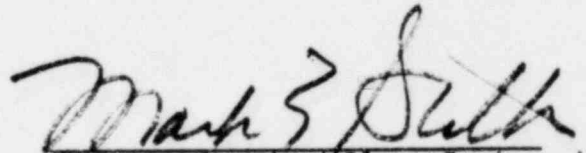
NOTICE: THIS EMERGENCY RESPONSE GUIDELINE SET REVISION (LP-BASIC) IS THE ORIGINAL ISSUE OF GENERIC GUIDANCE ON ITS SUBJECT MATTER FOR PLANTS WITH LOW-PRESSURE SI SYSTEMS AND SUPERSEDES ANY GENERIC GUIDANCE ON THIS SUBJECT BEARING AN ISSUE DATE EARLIER THAN JULY 5, 1982.

THE "BASIC" REVISION OF THE EMERGENCY RESPONSE GUIDELINE SET BEARING AN ISSUE DATE OF SEPTEMBER 1, 1981, APPLIES TO PLANTS WITH HIGH-PRESSURE SI SYSTEMS.

File this sheet with the approved version of this guideline in your Emergency Response Guideline set.



Chairman, Procedures Subcommittee
Westinghouse Owner's Group



Manager, Standard Plant Engineering
Westinghouse Nuclear Technology Division

Number: ES-3.1A	Symptom/Title: SGTR ALTERNATE COOLDOWN BY BACKFILLING RCS	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE <i>Foldout page should be open.</i>		
1	Check Pressurizer Water Temperature: a. Water temperature - EQUAL TO SATURATION TEMPERATURE OF RUPTURED STEAM GENERATOR	a. Energize heaters to establish required temperature before continuing to step 2.
2	Check Pressurizer Level: a. Level - LESS THAN 90% b. Level - GREATER THAN 30%	a. Draw a bubble in pressurizer. b. Increase charging flow <u>AND</u> spray pressurizer to maintain RCS pressure constant.
3	Equalize Charging And Letdown Flows: a. Take manual control of charging and letdown b. Adjust total charging and seal injection flows EQUAL to letdown and seal leakoff flows	
NOTE <i>Flow balance between charging and letdown should be maintained throughout this guideline.</i>		
4	Verify Adequate Shutdown Margin: a. Sample ruptured steam generator(s) b. Sample RCS c. Shutdown Margin - ADEQUATE	c. Borate, as necessary.

Number: ES-3.1A	Symptom/Title: SGTR ALTERNATE COOLDOWN BY BACKFILLING RCS (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	<p><i>Caution</i></p> <ul style="list-style-type: none"> ● Since ruptured steam generator(s) may continue to depressurize toward normal RCP trip pressure, cooldown to cold shutdown should be completed as quickly as possible, but not to exceed 50°F/hr. ● Maintain RCS pressure and temperature within normal cooldown limits. 	
5	<p>Initiate RCS Cooldown:</p> <p>a. Maintain cooldown rate - LESS THAN 50°F/HR</p> <p>b. Dump steam to condenser from non-ruptured steam generators: 1) [Enter plant specific steps]</p>	<p>b. Dump steam with non-ruptured steam generator PORVs.</p>
	<p><i>Caution</i> 50°F subcooling must be maintained at all times.</p>	
6	<p>Depressurize RCS To Backfill From Ruptured Steam Generator(s):</p> <p>a. Use normal pressurizer spray</p> <p>b. Control pressurizer heaters, as necessary</p> <p>c. Pressurizer level - GREATER THAN 25%</p> <p>d. Pressurizer level - LESS THAN 70%</p>	<p>a. <u>IF</u> letdown is in service, <u>THEN</u> use auxiliary spray. <u>IF NOT</u> in service, <u>THEN</u> use one pressurizer PORV.</p> <p>c. <u>IF</u> level less than 25%, <u>THEN</u> continue to decrease RCS pressure. <u>IF</u> level continues to decrease, <u>THEN</u> stop RCS cooldown until level is greater than 35%.</p> <p>d. <u>IF</u> level greater than 70%, <u>THEN</u> stop RCS depressurization.</p>

Number: ES-3.1A	Symptom/Title: SGTR ALTERNATE COOLDOWN BY BACKFILLING RCS (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7	Check Ruptured Steam Generator Levels: a. Narrow range level - GREATER THAN 25% NOTE <i>Ruptured steam generator pressure and RCS pressure may increase during refill of the ruptured steam generator(s).</i>	a. <u>IF</u> level less than 25%, <u>THEN</u> refill ruptured steam generator to 70% level using AFW.
8	Determine If SI Accumulators Should Be Isolated: a. RCS pressure - LESS THAN OR EQUAL TO (1) PSIG b. Close all SI accumulator isolation valves	a. <u>IF</u> RCS pressure greater than (1) psig, <u>THEN</u> go to step 9. b. Vent any unisolated accumulator.
9	Check Charging And Letdown Flows: a. Charging and seal injection flows - EQUAL TO LETDOWN AND SEAL LEAKOFF FLOWS	a. <u>IF NOT</u> , adjust flows, as appropriate.
<i>[Appropriate steps for plant specific items related to cooldown should be placed after step 9.]</i>		
10	Check If RHR System Can Be Placed In Service: a. RCS temperature - LESS THAN 350°F b. RCS pressure - LESS THAN 400 PSIG	a. <u>IF</u> temperature greater than 350°F, <u>THEN</u> return to step 4. b. <u>IF</u> pressure greater than 400 psig, <u>THEN</u> continue cooldown per steps 3 through 10 until ruptured steam generator pressure decays to 400 psig.
11	Place RHR System In Service: a. Realign RHR system from SI mode to RHR mode b. Refer to plant specific procedure	

(1) Enter plant specific value slightly above normal accumulator pressure.

Number: ES-3.1A	Symptom/Title: SGTR ALTERNATE COOLDOWN BY BACKFILLING RCS (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
12	Verify Adequate Shutdown Margin: a. Sample ruptured steam generator(s) b. Sample RCS c. Shutdown margin - ADEQUATE	c. Borate, as necessary.
13	Continue RCS Cooldown To Cold Shutdown: a. Maintain cooldown rate - LESS THAN 50°F/hr b. Use RHR system c. At least one RCP - RUNNING	c. <u>IF</u> all RCPs are stopped, <u>THEN</u> continue dumping steam from non-ruptured steam generator(s) until they stop steaming. Start CRDM fans to cool upper head.
<p><i>Caution</i> 50°F subcooling must be maintained at all times.</p>		
14	Depressurize RCS To Backfill From Ruptured Steam Generator(s): a. Use normal pressurizer spray b. Control pressurizer heaters, as necessary c. Pressurizer level - GREATER THAN 25% d. Pressurizer level - LESS THAN 70%	a. <u>IF</u> letdown is in service, <u>THEN</u> use auxiliary spray. <u>IF NOT</u> in service, <u>THEN</u> use one pressurizer PORV. c. <u>IF</u> level less than 25%, <u>THEN</u> continue to decrease RCS pressure. <u>IF</u> level continues to decrease, <u>THEN</u> stop RCS cooldown until level is greater than 35%. d. <u>IF</u> level greater than 70%, <u>THEN</u> stop RCS depressurization.

Number: ES-3.1A	Symptom/Title: SGTR ALTERNATE COOLDOWN BY BACKFILLING RCS (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
15	Check Ruptured Steam Generator Levels: a. Narrow range level - GREATER THAN 25%	a. <u>IF</u> level less than 25%, <u>THEN</u> refill ruptured steam generator to 70% level using AFW.
<p style="text-align: center;">NOTE Ruptured steam generator pressure and RCS pressure may increase during refill of ruptured steam generator(s).</p>		
16	Check Charging And Letdown Flows: a. Charging and seal injection flows - EQUAL TO LETDOWN AND SEAL LEAKOFF FLOWS	a. <u>IF NOT</u> , adjust flows, as appropriate.
17	Check If RCPs Must Be Stopped: a. No. 1 seal differential pressure - LESS THAN <u>(1)</u> PSIG. -OR- No. 1 seal leakoff flow - LESS THAN <u>(2)</u> GPM b. Stop all RCPs	a. Do not stop RCPs. Go to step 18.
18	Check RCS Temperature: a. Temperature - LESS THAN 200°F	a. <u>IF</u> greater than 200°F, <u>THEN</u> return to step 12.
<p style="text-align: center;">NOTE Normal solid plant pressure control will not be effective at this time.</p>		
<p>(1) Enter plant specific minimum value for continued RCP operation. (2) Enter plant specific value for continued RCP operation.</p>		

Number: ES-3.1A	Symptom/Title: SGTR ALTERNATE COOLDOWN BY BACKFILLING RCS (Cont.)	Revision No. Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
19	Cool Down Pressurizer: a. Spray pressurizer with normal spray b. <u>WHEN</u> pressurizer cooled, <u>THEN</u> balance charging and seal injection flows equal to letdown and seal leakoff flows	a. <u>IF</u> normal spray <u>NOT</u> available, <u>THEN</u> use auxiliary spray.
20	Maintain Cold Shutdown Conditions: a. Plant staff should determine actions necessary for repair	

— END —

FOLDOUT FOR E-3 AND ES-3 GUIDELINES

1. RCP TRIP CRITERIA

- Trip any RCP if component cooling water to that pump is lost.
- If a controlled cooldown is not in progress, then trip all RCPs when BOTH conditions listed below are met:
 - a. SI is ON
 - b. RCS pressure - EQUAL TO OR LESS THAN ⁽¹⁾ PSIG

2. SI REINITIATION CRITERIA FOLLOWING STEAM GENERATOR TUBE RUPTURE

Reinitiate SI if ANY ONE of the parameters listed below occurs:

- (1) RCS subcooling - LESS THAN ⁽²⁾ PSIG
- (2) Pressurizer level - LESS THAN 20%

3. SYMPTOMS OF LOSS OF REACTOR COOLANT DURING STEAM GENERATOR TUBE RUPTURE

Go to E-1, LOSS OF REACTOR COOLANT, if abnormal containment conditions persist AND are not due only to failure of PRT rupture disc.

4. SYMPTOMS OF PRIMARY TO SECONDARY LEAKAGE DURING RECOVERY ACTIONS

Charging and letdown flows should be compared to determine if leakage between the RCS and the ruptured steam generator exists.

5. SYMPTOMS FOR FR-C.1, RESPONSE TO INADEQUATE CORE COOLING

Go to FR-C.1, RESPONSE TO INADEQUATE CORE COOLING, when ALL symptoms in ANY ONE of the following symptom sets occurs:

PARAMETER:	SYMPTOM SET		
	I	II	III
1. TCs	>1200°F	—	>700°F
2. Containment Condition	—	ABNORMAL	ABNORMAL
3. RCP Status	—	ANY ON	ALL OFF
4. RVLIS	—	<100% NR	< ⁽³⁾ % NR

6. SYMPTOMS FOR FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK

Go to FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK, if AFW NOT AVAILABLE.

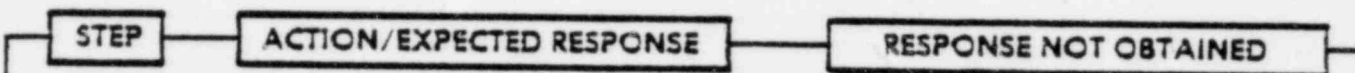
(1) Enter plant specific value derived from background document.

(2) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.

(3) Enter plant specific value which is 3½ feet above bottom of active fuel in core with zero void fraction, plus uncertainties.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE <i>Foldout page should be open.</i>		
1	Check Pressurizer Water Temperature: a. Water temperature - EQUAL TO SATURATION TEMPERATURE OF RUPTURED STEAM GENERATOR	a. Energize heaters to establish required temperature before continuing to step 2.
2	Check Pressurizer Level: a. Level - LESS THAN 90% b. Level - GREATER THAN 30%	a. Draw a bubble in pressurizer. b. Increase charging flow <u>AND</u> spray pressurizer to maintain RCS pressure constant.
3	Equalize Charging And Letdown Flows: a. Take manual control of charging and letdown b. Adjust total charging and seal injection flows EQUAL to letdown and seal leakoff flows	
4	Verify Adequate Shutdown Margin: a. Sample ruptured steam generator(s) b. Sample RCS c. Shutdown margin - ADEQUATE	c. Borate, as necessary.
Caution <i>Maintain RCS pressure and temperature within normal cooldown limits.</i>		
5	Initiate RCS Cooldown: a. Maintain cooldown rate - LESS THAN 50°F/HR b. Dump steam to condenser from non-ruptured steam generators: 1) [Enter plant specific steps] c. Adjust charging flow GREATER THAN letdown to match RCS shrinkage	b. Dump steam with non-ruptured steam generator PORVs.

Number: ES-3.1B	Symptom/Title: SGTR ALTERNATE COOLDOWN USING STEAM GENERATOR BLOWDOWN (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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Caution RCS subcooling must be maintained at all times.

- 6 Control RCS Pressure To Minimize Break Flow:
- a. Use normal pressurizer spray
 - a. IF letdown is in service, THEN use auxiliary spray. IF NOT in service, THEN use one PORV.
 - b. Determine appropriate action from table below:

RUPTURED STEAM GENERATOR LEVEL	STABLE -OR- DECREASING	INCREASING	OFFSCALE
STABLE	Go to step 7.	Depressurize RCS per step 6a.	Go to step 7.
INCREASING	Stop RCS depressurization.	Decrease charging flow.	Stop RCS depressurization.
DECREASING	Depressurize RCS per step 6a.	Depressurize RCS per step 6a.	Depressurize RCS per step 6a.

- 7 Check Pressurizer Level:
- a. Level - GREATER THAN 25%
 - a. IF level less than 25%, THEN depressurize RCS AND increase charging flow until level greater than 25%.
 - b. Level - LESS THAN 70%
 - b. IF level greater than 70%, THEN stop RCS depressurization AND decrease charging flow until level less than 70%.

Number:

ES-3.1B

Symptom/Title:

**SGTR ALTERNATE COOLDOWN USING STEAM
GENERATOR BLOWDOWN (Cont.)**

Revision No./Date

LP - Basic
5 July, 1982

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

- | STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|------|---|---|
| 8 | Check RCS Temperature:
a. Temperature - LESS THAN
350°F | a. <u>IF</u> greater than 350°F, <u>THEN</u>
return to step 4. |
| 9 | Stop RCS Cooldown. | |
| 10 | Depressurize Ruptured Steam
Generator Using Blowdown:
a. Initiate blowdown from ruptured
steam generator to waste holdup
tank | a. <u>IF</u> blowdown can <u>NOT</u> be initiated,
<u>THEN</u> return to E-3, STEAM
GENERATOR TUBE RUPTURE,
STEP 41 to select another post-SGTR
cooldown guideline. |
| 11 | Adjust Charging - seal Injection
Flows EQUAL To Letdown And Seal
Leakoff Flows. | |

Number:
ES-3.1B

Symptoms/Title:
**SGTR ALTERNATE COOLDOWN USING STEAM
GENERATOR BLOWDOWN (Cont.)**

Revision No./Date
LP - Basic
5 July, 1982

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

Caution RCS subcooling must be maintained at all times.

12 Control RCS Pressure To Minimize Break Flow:

- a. Use normal pressurizer spray
- a. IF letdown is in service, THEN use auxiliary spray. IF NOT in service, THEN use one PORV.
- b. Determine appropriate action from table below:

RUPTURED STEAM GENERATOR LEVEL / PRESSURIZER LEVEL	STABLE -OR- DECREASING	INCREASING	OFFSCALE
STABLE	Go to step 13.	Depressurize RCS per step 12a.	Go to step 13.
INCREASING	Stop RCS depressurization.	Decrease charging flow.	Stop RCS depressurization.
DECREASING	Depressurize RCS per step 12a.	Depressurize RCS per step 12a.	Depressurize RCS per step 12a.

13 Check Pressurizer Level:

- a. Level - GREATER THAN 25%
- a. IF level less than 25%, THEN depressurize RCS AND increase charging flow until level greater than 25%.
- b. Level - LESS THAN 70%
- b. IF level greater than 70%, THEN stop RCS depressurization AND decrease charging flow until level less than 70%.

Number ES-3.1B	Symptom/Titles SGTR ALTERNATE COOLDOWN USING STEAM GENERATOR BLOWDOWN (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14	Determine If SI Accumulators Should Be Isolated: a. RCS pressure - LESS THAN OR EQUAL TO (1) PSIG b. Close all SI accumulator isolation valves.	a. IF RCS pressure greater than (1) psig, <u>THEN</u> return to step 10. b. Vent any unisolated accumulator.
15	Check Ruptured Steam Generator Level: a. Narrow range level - GREATER THAN 25%	a. IF narrow range level less than 25%, <u>THEN</u> 1) Stop blowdown. 2) Refill steam generator to 70%.
<p>NOTE RCS pressure and ruptured steam generator pressure may increase during refilling of the ruptured steam generator.</p>		
<p><i>[Appropriate steps for plant specific items related to cooldown should be placed after step 15.]</i></p>		
16	Check If RHR System Can Be Placed In Service: a. Pressure - APPROXIMATELY 400 PSIG	a. IF pressure greater than 400 psig, <u>THEN</u> either: 1) Return to step 10. -OR- 2) Maintain stable plant conditions until ruptured steam generator pressure decays to 400 psig from ambient heat losses.
17	Stop Blowdown.	

(1) Enter plant specific value slightly above normal accumulator pressure.

Number:

ES-3.1B

Symptom/Title:

**SGTR ALTERNATE COOLDOWN USING STEAM
GENERATOR BLOWDOWN (Cont.)**

Revision No./Date

LP - Basic
5 July, 1982

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
18	<p>Place RHR System In Service:</p> <p>a. Realign RHR system from SI mode to RHR mode</p> <p>b. Refer to plant specific procedure</p>	
19	<p>Verify Adequate Shutdown Margin:</p> <p>a. Sample ruptured steam generator(s)</p> <p>b. Sample RCS</p> <p>c. Shutdown margin - ADEQUATE</p>	c. Borate, as necessary.
<p><i>Caution Since ruptured steam generator(s) may continue to depressurize toward normal RCP trip pressure, cooldown to cold shutdown should be completed as quickly as possible, but not to exceed 50°F/hr.</i></p>		
20	<p>Continue RCS Cooldown To Cold Shutdown:</p> <p>a. Maintain cooldown rate - LESS THAN 50°F/HR</p> <p>b. Use RHR system</p> <p>c. At least one RCP - RUNNING</p>	<p>c. <u>IF</u> all RCPs are stopped, <u>THEN</u> continue dumping steam from non-ruptured steam generators until they stop steaming. Start CRDM fans to cool upper head.</p>

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
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Caution RCS subcooling must be maintained at all times.

- 21 **Control RCS Pressure To Minimize Break Flow:**
- a. Use normal pressurizer spray
 - a. IF letdown is in service, THEN use auxiliary spray. IF NOT in service, THEN use one PORV.
 - b. Determine appropriate action from table below:

RUPTURED STEAM GENERATOR LEVEL PRESSURIZER LEVEL	STABLE -OR- DECREASING	INCREASING	OFFSCALE
STABLE	Go to step 22.	Depressurize RCS per step 21a.	Go to step 22.
INCREASING	Stop RCS depressurization.	Decrease charging flow.	Stop RCS depressurization.
DECREASING	Depressurize RCS per step 21a.	Depressurize RCS per step 21a.	Depressurize RCS per step 21a.

- 22 **Check Pressurizer Level:**
- a. Level - GREATER THAN 25%
 - a. IF level less than 25%, THEN depressurize RCS AND increase charging flow until level greater than 25%.
 - b. Level - LESS THAN 70%
 - b. IF level greater than 70%, THEN stop RCS depressurization AND decrease charging flow until level less than 70%.

Number:

ES-3.1B

Symptom/Title:

**SGTR ALTERNATE COOLDOWN USING STEAM
GENERATOR BLOWDOWN (Cont.)**

Revision No./Date

LP - Basic
5 July, 1982

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

- | | | |
|----|---|--|
| 23 | <p>Check If RCPs Must Be Stopped:</p> <p>a. No. 1 seal differential pressure - LESS THAN <u>(1)</u> PSIG</p> <p style="text-align: center;">-OR-</p> <p>No. 1 seal leakoff flow - LESS THAN <u>(2)</u> GPM</p> <p>b. Stop all RCPs</p> | a. Do not stop RCPs. Go to step 24. |
| 24 | <p>Check RCS Temperature:</p> <p>a. Temperature - LESS THAN 200°F</p> | a. <u>IF</u> greater than 200°F, <u>THEN</u> return to step 19. |
| 25 | <p>Cool Down Pressurizer:</p> <p>a. Spray pressurizer with normal spray</p> <p>b. <u>WHEN</u> pressurizer cooled, <u>THEN</u> balance charging and seal injection flows EQUAL TO letdown and seal leakoff flows</p> | a. <u>IF</u> normal spray <u>NOT</u> available, <u>THEN</u> use auxiliary spray. |
| 26 | <p>Maintain Cold Shutdown Conditions:</p> <p>a. Plant staff should determine actions necessary for repair</p> | |

— END —

(1) Enter plant specific minimum value for continued RCP operation.

(2) Enter plant specific value for continued RCP operation.

FOLDOUT FOR E-3 AND ES-3 GUIDELINES

1. RCP TRIP CRITERIA

- Trip any RCP if component cooling water to that pump is lost.
- If a controlled cooldown is not in progress, then trip all RCPs when BOTH conditions listed below are met:
 - a. SI is ON
 - b. RCS pressure - EQUAL TO OR LESS THAN (1) PSIG

2. SI REINITIATION CRITERIA FOLLOWING STEAM GENERATOR TUBE RUPTURE

Reinitiate SI if ANY ONE of the parameters listed below occurs:

- (1) RCS subcooling - LESS THAN (2) PSIG
- (2) Pressurizer level - LESS THAN 20%

3. SYMPTOMS OF LOSS OF REACTOR COOLANT DURING STEAM GENERATOR TUBE RUPTURE

Go to E-1, LOSS OF REACTOR COOLANT, if abnormal containment conditions persist AND are not due only to failure of PRT rupture disc.

4. SYMPTOMS OF PRIMARY TO SECONDARY LEAKAGE DURING RECOVERY ACTIONS

Charging and letdown flows should be compared to determine if leakage between the RCS and the ruptured steam generator exists.

5. SYMPTOMS FOR FR-C.1, RESPONSE TO INADEQUATE CORE COOLING

Go to FR-C.1, RESPONSE TO INADEQUATE CORE COOLING, when ALL symptoms in ANY ONE of the following symptom sets occurs:

PARAMETER:	SYMPTOM SET		
	I	II	III
1. TCs	> 1200°F	—	> 700°F
2. Containment Condition	—	ABNORMAL	ABNORMAL
3. RCP Status	—	ANY ON	ALL OFF
4. RVLIS	—	< 100% NR	< <u>(3)</u> % NR

6. SYMPTOMS FOR FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK

Go to FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK, if AFW NOT AVAILABLE.

(1) Enter plant specific value derived from background document.

(2) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.

(3) Enter plant specific value which is 3½ feet above bottom of active fuel in core with zero void fraction, plus uncertainties.

Number:

ES-3.1C

Symptom/Title:

**SGTR ALTERNATE COOLDOWN BY STEAMING
RUPTURED STEAM GENERATOR**

Revision No./Date

LP - Basic

5 July, 1982

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

***Caution** If ruptured steam generator(s) narrow range level is offscale high or water may exist in the main steamlines, guidelines ES-3.1A, SGTR ALTERNATE COOLDOWN BY BACKFILLING RCS, or ES-3.1B, SGTR ALTERNATE COOLDOWN USING STEAM GENERATOR BLOWDOWN, should be used for post-SGTR cooldown.*

NOTE Foldout page should be open.

- | | | |
|---|--|---|
| 1 | Check Pressurizer Water Temperature:
a. Water temperature - EQUAL TO SATURATION TEMPERATURE OF RUPTURED STEAM GENERATOR | a. Energize heaters to establish required temperature before continuing to step 2. |
| 2 | Check Pressurizer Level:
a. Level - LESS THAN 90%
b. Level - GREATER THAN 30% | a. Draw a bubble in pressurizer.
b. Increase charging flow <u>AND</u> spray pressurizer to maintain RCS pressure constant. |
| 3 | Verify Adequate Shutdown Margin:
a. Sample ruptured steam generator(s)
b. Sample RCS
c. Shutdown margin - ADEQUATE | c. Borate, as necessary. |

Number: ES-3.1C	Symptom/Title: SGTR ALTERNATE COOLDOWN BY STEAMING RUPTURED STEAM GENERATOR (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p><i>Caution</i></p> <ul style="list-style-type: none"> ● Steps 4 through 8 must be performed concurrently to minimize break flow. ● Maintain RCS pressure and temperature within normal cooldown limits. 		
4	<p>Initiate RCS Cooldown To 350°F:</p> <ul style="list-style-type: none"> a. Maintain cooldown rate - LESS THAN 50°F/HR b. Dump steam from non-ruptured steam generators to condenser: <ul style="list-style-type: none"> 1) [Enter plant specific steps] c. Adjust charging flow GREATER THAN letdown to match RCS shrinkage 	<ul style="list-style-type: none"> b. Dump steam with non-ruptured steam generator PORVs.
5	<p>Check Ruptured Steam Generator Levels:</p> <ul style="list-style-type: none"> a. Narrow range level - GREATER THAN <u>(1)</u> % b. Narrow range level - LESS THAN 100% c. Verify AFW flow is stopped to ruptured steam generator(s) 	<ul style="list-style-type: none"> a. IF less than <u>(1)</u> %, THEN increase level to <u>(2)</u> % as follows: <ul style="list-style-type: none"> 1) Add AFW to ruptured steam generator. 2) Bleed steam from ruptured steam generator, as necessary, to maintain pressure constant. b. IF NOT, THEN return to E-3, STEAM GENERATOR TUBE RUPTURE, STEP 41 to select another post-SGTR cooldown guideline. c. Stop AFW flow to ruptured steam generator(s).
<p>(1) Enter plant specific value showing level just in the narrow range including allowances for normal channel accuracy, post-accident transmitter errors and reference leg process errors.</p> <p>(2) Enter plant specific value corresponding to no-load steam generator level including allowances for post-accident transmitter errors and reference leg process errors.</p>		

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
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- 6**
- Depressurize RCS and Ruptured Steam Generator(s):**
- a. Slowly release steam to condenser from ruptured steam generator(s)
 - 1) [Enter plant specific steps]
 - b. Reduce RCS pressure - EQUAL TO RUPTURED STEAM GENERATOR PRESSURE:
 - 1) Use normal pressurizer spray
 - 2) Control pressurizer heaters, as necessary

- a. Slowly release steam to atmosphere with ruptured steam generator(s) PORV.
- b. IF letdown is in service, THEN use auxiliary spray. IF NOT in service, THEN use one pressurizer PORV.

Caution IF RCS pressure or pressurizer level drop in an uncontrolled manner, THEN reinitiate SI and return to E-3, STEAM GENERATOR TUBE RUPTURE, STEP 9.

- 7**
- Control Pressurizer Level And Ruptured Steam Generator Levels To Minimize Break Flow:**
- a. Determine appropriate action from table below:

RUPTURED STEAM GENERATOR LEVEL PRESSURIZER LEVEL	STABLE	INCREASING	DECREASING
STABLE	Go to step 8.	Reduce RCS pressure per step 6b.	Go to step 8.
INCREASING	Reduce charging flow.	Reduce charging flow.	Reduce ruptured steam generator pressure per step 6a.
DECREASING	Increase charging flow.	Reduce RCS pressure per step 6b.	Increase charging flow.

Number: ES-3.1C	Symptom/Title: SGTR ALTERNATE COOLDOWN BY STEAMING RUPTURED STEAM GENERATOR (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8	Determine if SI Accumulators Should Be Isolated: a. RCS pressure – LESS THAN OR EQUAL TO <u>(1)</u> PSIG b. Close all SI accumulator isolation valves	a. <u>IF</u> RCS pressure greater than <u>(1)</u> psig, <u>THEN</u> return to step 4. b. Vent any unisolated accumulator.
<i>[Appropriate steps for plant specific items related to cooldown should be placed after step 8.]</i>		
9	Check If RHR System Can Be Placed In Service: a. RCS hot leg temperatures – LESS THAN 350°F IN NON-RUPTURED LOOPS b. RCS pressure – APPROXIMATELY 400 PSIG	a. <u>IF</u> greater than 350°F, <u>THEN</u> return to step 4. b. <u>IF</u> greater than 400 psig, <u>THEN</u> return to step 5.
<i>Caution Do not collapse the pressurizer bubble.</i>		
10	Place RHR System In Service: a. Realign RHR system from SI mode to RHR mode b. Refer to plant specific procedure	
11	Verify Adequate Shutdown Margin: a. Sample ruptured steam generator(s) b. Sample RCS c. Shutdown margin – ADEQUATE	c. Borate, as necessary.
<i>Caution Since ruptured steam generator(s) may continue to depressurize toward normal RCP trip pressure, cooldown to cold shutdown should be completed as quickly as possible, but not to exceed 50°F/hr.</i>		
<i>(1) Enter plant specific value slightly above normal accumulator pressure.</i>		

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED																	
12	<p>Continue RCS Cooldown To Cold Shutdown:</p> <p>a. Maintain cooldown rate - LESS THAN 50°F/HR</p> <p>b. Use RHR system</p> <p>c. At least one RCP - RUNNING</p> <p>d. Adjust charging flow GREATER THAN letdown to match RCS shrinkage.</p>	<p>c. <u>IF</u> all RCPs stopped, <u>THEN</u> continue dumping steam from non-ruptured steam generators until they have stopped steaming. Start CRDM fans to cool upper head.</p>																	
13	<p>Control RCS Pressure To Minimize Break Flow:</p> <p>a. Use normal spray</p> <p>b. Control pressurizer heaters, as necessary</p> <p>c. Determine appropriate action from table below:</p>	<p>a. <u>IF</u> letdown is in service, <u>THEN</u> use auxiliary spray. <u>IF NOT</u> in service, <u>THEN</u> use one PORV.</p>																	
<table border="1"> <thead> <tr> <th data-bbox="395 1480 760 1637"> RUPTURED STEAM GENERATOR LEVEL PRESSURIZER LEVEL </th> <th data-bbox="760 1480 1016 1637">STABLE</th> <th data-bbox="1016 1480 1298 1637">INCREASING</th> <th data-bbox="1298 1480 1541 1637">DECREASING</th> </tr> </thead> <tbody> <tr> <td data-bbox="395 1637 760 1715">STABLE</td> <td data-bbox="760 1637 1016 1715">Go to step 14.</td> <td data-bbox="1016 1637 1298 1715">Depressurize RCS per step 13a.</td> <td data-bbox="1298 1637 1541 1715">Go to step 14.</td> </tr> <tr> <td data-bbox="395 1715 760 1805">INCREASING</td> <td data-bbox="760 1715 1016 1805">Stop RCS depressurization.</td> <td data-bbox="1016 1715 1298 1805">Decrease charging flow.</td> <td data-bbox="1298 1715 1541 1805">Stop RCS depressurization</td> </tr> <tr> <td data-bbox="395 1805 760 1888">DECREASING</td> <td data-bbox="760 1805 1016 1888">Increase charging flow.</td> <td data-bbox="1016 1805 1298 1888">Depressurize RCS per step 13a.</td> <td data-bbox="1298 1805 1541 1888">Increase charging flow.</td> </tr> </tbody> </table>				RUPTURED STEAM GENERATOR LEVEL PRESSURIZER LEVEL	STABLE	INCREASING	DECREASING	STABLE	Go to step 14.	Depressurize RCS per step 13a.	Go to step 14.	INCREASING	Stop RCS depressurization.	Decrease charging flow.	Stop RCS depressurization	DECREASING	Increase charging flow.	Depressurize RCS per step 13a.	Increase charging flow.
RUPTURED STEAM GENERATOR LEVEL PRESSURIZER LEVEL	STABLE	INCREASING	DECREASING																
STABLE	Go to step 14.	Depressurize RCS per step 13a.	Go to step 14.																
INCREASING	Stop RCS depressurization.	Decrease charging flow.	Stop RCS depressurization																
DECREASING	Increase charging flow.	Depressurize RCS per step 13a.	Increase charging flow.																

Number: ES-3.1C	Symptom/Title: SGTR ALTERNATE COOLDOWN BY STEAMING RUPTURED STEAM GENERATOR (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14	Check If RCP Must Be Stopped: a. No. 1 seal differential pressure - LESS THAN <u>(1)</u> PSIG -OR- No. 1 seal leakoff flow - LESS THAN <u>(2)</u> GPM b. Stop all RCPs	a. Do not stop RCP. Go to step 15.
15	Check RCS Temperature: a. RCS temperature - LESS THAN 200°F NOTE <i>Normal solid plant pressure control will not be effective at this time.</i>	a. <u>IF</u> greater than 200°F, <u>THEN</u> return to step 11.
16	Cool Down Pressurizer: a. Spray pressurizer with normal spray b. <u>WHEN</u> pressurizer cooled, <u>THEN</u> balance charging and seal injection flows EQUAL TO letdown and seal leakoff flows	a. <u>IF</u> normal spray <u>NOT</u> available, <u>THEN</u> use auxiliary spray.
17	Maintain Cold Shutdown Conditions: a. Plant staff should determine actions necessary for repair	
— END —		
<i>(1) Enter plant specific minimum value for continued RCP operation. (2) Enter plant specific value for continued RCP operation.</i>		

FOLDOUT FOR E-3 AND ES-3 GUIDELINES

1. RCP TRIP CRITERIA

- Trip any RCP if component cooling water to that pump is lost.
- If a controlled cooldown is not in progress, then trip all RCPs when BOTH conditions listed below are met:
 - a. SI is ON
 - b. RCS pressure - EQUAL TO OR LESS THAN (1) PSIG

2. SI REINITIATION CRITERIA FOLLOWING STEAM GENERATOR TUBE RUPTURE

Reinitiate SI if ANY ONE of the parameters listed below occurs:

- (1) RCS subcooling - LESS THAN (2) PSIG
- (2) Pressurizer level - LESS THAN 20%

3. SYMPTOMS OF LOSS OF REACTOR COOLANT DURING STEAM GENERATOR TUBE RUPTURE

Go to E-1, LOSS OF REACTOR COOLANT, if abnormal containment conditions persist AND are not due only to failure of PRT rupture disc.

4. SYMPTOMS OF PRIMARY TO SECONDARY LEAKAGE DURING RECOVERY ACTIONS

Charging and letdown flows should be compared to determine if leakage between the RCS and the ruptured steam generator exists.

5. SYMPTOMS FOR FR-C.1, RESPONSE TO INADEQUATE CORE COOLING

Go to FR-C.1, RESPONSE TO INADEQUATE CORE COOLING, when ALL symptoms in ANY ONE of the following symptom sets occurs:

PARAMETER:	SYMPTOM SET		
	I	II	III
1. TCs	>1200°F	—	>700°F
2. Containment Condition	—	ABNORMAL	ABNORMAL
3. RCP Status	—	ANY ON	ALL OFF
4. RVLIS	—	<100% NR	< <u>(3)</u> % NR

6. SYMPTOMS FOR FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK

Go to FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK, if AFW NOT AVAILABLE.

(1) Enter plant specific value derived from background document.

(2) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.

(3) Enter plant specific value which is 3½ feet above bottom of active fuel in core with zero void fraction, plus uncertainties.

BACKGROUND INFORMATION FOR
WESTINGHOUSE
EMERGENCY RESPONSE GUIDELINES

ES-3.1
STEAM GENERATOR TUBE RUPTURE
ALTERNATE COOLDOWN

BASIC REVISION
(To be provided later)

WESTINGHOUSE OWNERS GROUP
EMERGENCY RESPONSE GUIDELINES
CONFIGURATION CONTROL SHEET

GUIDELINE DESIGNATOR: ES-3.1

GUIDELINE TITLE: SGTR Alternate Cooldown

REVISION: LP-Basic

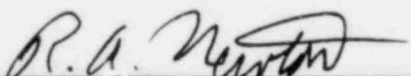
DATE: July 5, 1982

The guideline described above has been reviewed and approved for implementation by the Westinghouse Owner's Group Procedures Subcommittee and the Westinghouse Nuclear Technology Division.

NOTICE: THIS EMERGENCY RESPONSE GUIDELINE SET REVISION (LP-BASIC) IS THE ORIGINAL ISSUE OF GENERIC GUIDANCE ON ITS SUBJECT MATTER FOR PLANTS WITH LOW-PRESSURE SI SYSTEMS AND SUPERSEDES ANY GENERIC GUIDANCE ON THIS SUBJECT BEARING AN ISSUE DATE EARLIER THAN JULY 5, 1982.

THE "BASIC" REVISION OF THE EMERGENCY RESPONSE GUIDELINE SET BEARING AN ISSUE DATE OF SEPTEMBER 1, 1981, APPLIES TO PLANTS WITH HIGH-PRESSURE SI SYSTEMS.

File this sheet with the approved version of this guideline in your Emergency Response Guideline set.


Chairman, Procedures Subcommittee
Westinghouse Owner's Group


Manager, Standard Plant Engineering
Westinghouse Nuclear Technology Division

Number: ES-3.2	Symptom/Title: MULTIPLE SGTR CONTINGENCY	Revision No./Date: LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE <i>Foldout page should be open.</i>		
1	Establish Pressurizer Level By Controlling RCS Pressure Using Normal Spray: a. Verify normal spray - AVAILABLE b. Open normal spray valves c. Verify pressurizer level - INCREASING	a. Go to step 3. b. Go to step 3. c. Close spray valves and go to step 3.
2	Check If RCS Depressurization Should Be Stopped: a. Pressurizer level - GREATER THAN 40% b. Stop RCS depressurization by closing spray valves c. Pressurizer level - STABLE OR DECREASING d. Go to step 5	a. Continue depressurization until pressurizer level GREATER THAN 40%. c. <u>IF</u> level continues to increase, <u>THEN</u> stop RCPs in loops with spray line connections.
3	Establish Pressurizer Level By Controlling RCS Pressure Using One Pressurizer PORV: a. Open one pressurizer PORV	a. <u>IF</u> no PORV available, <u>THEN</u> use auxiliary spray.

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

4

**Check If RCS Depressurization
Should Be Stopped:**

- a. Pressurizer level - GREATER THAN 40%
- b. Stop RCS depressurization
 - 1) Close PORV
 - 2) Close auxiliary spray valve
- c. Pressurizer level - STABLE OR DECREASING

- a. Continue depressurization until pressurizer level GREATER THAN 40%.
- b. 1) Close PORV block valve.
2) Isolate auxiliary spray line.
- c. IF level continues to increase, THEN check PRT conditions. IF PRT conditions indicate an RCS leak, THEN go to E-1, LOSS OF REACTOR COOLANT.

Caution If PRT integrity is lost, abnormal containment conditions may not be reliable indications of a loss of reactor coolant.

5

Check If SI Can Be Terminated:

- a. RCS subcooling - GREATER THAN (1) °F
- b. Pressurizer level - GREATER THAN 20% and stable
- c. Do not proceed to step 6 until all the above conditions are met

- a. DO NOT TERMINATE SI. Go to E-3, STEAM GENERATOR TUBE RUPTURE, STEP 9 to reestablish subcooling.
- b. DO NOT TERMINATE SI. Return to step 1.

6

**Return To Guideline In Effect To
Terminate SI And Complete Cooldown:**

- a. Return to E-3, STEAM GENERATOR TUBE RUPTURE, step 20.
— OR —
Return to E-3.3, SGTR WITH SECONDARY DEPRESSURIZATION, step 16.

— END —

(1) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.

FOLDOUT FOR E-3 AND ES-3 GUIDELINES

1. RCP TRIP CRITERIA

- Trip any RCP if component cooling water to that pump is lost.
- If a controlled cooldown is not in progress, then trip all RCPs when BOTH conditions listed below are met:
 - a. SI is ON
 - b. RCS pressure - EQUAL TO OR LESS THAN (1) PSIG

2. SI REINITIATION CRITERIA FOLLOWING STEAM GENERATOR TUBE RUPTURE

Reinitiate SI if ANY ONE of the parameters listed below occurs:

- (1) RCS subcooling - LESS THAN (2) PSIG
- (2) Pressurizer level - LESS THAN 20%

3. SYMPTOMS OF LOSS OF REACTOR COOLANT DURING STEAM GENERATOR TUBE RUPTURE

Go to E-1, LOSS OF REACTOR COOLANT, if abnormal containment conditions persist AND are not due only to failure of PRT rupture disc.

4. SYMPTOMS OF PRIMARY TO SECONDARY LEAKAGE DURING RECOVERY ACTIONS

Charging and letdown flows should be compared to determine if leakage between the RCS and the ruptured steam generator exists.

5. SYMPTOMS FOR FR-C.1, RESPONSE TO INADEQUATE CORE COOLING

Go to FR-C.1, RESPONSE TO INADEQUATE CORE COOLING, when ALL symptoms in ANY ONE of the following symptom sets occurs:

PARAMETER:	SYMPTOM SET		
	I	II	III
1. TCs	>1200°F	—	>700°F
2. Containment Condition	—	ABNORMAL	ABNORMAL
3. RCP Status	—	ANY ON	ALL OFF
4. RVLIS	—	<100% NR	< <u>(3)</u> % NR

6. SYMPTOMS FOR FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK

Go to FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK, if AFW NOT AVAILABLE.

(1) Enter plant specific value derived from background document.

(2) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.

(3) Enter plant specific value which is 3½ feet above bottom of active fuel in core with zero void fraction, plus uncertainties.

BACKGROUND FOR INFORMATION
FOR
WESTINGHOUSE
EMERGENCY RESPONSE GUIDELINES

ES-3.2

MULTIPLE SGTR
CONTINGENCY

BASIC REVISION
(To be provided later)

WESTINGHOUSE OWNERS GROUP
EMERGENCY RESPONSE GUIDELINES
CONFIGURATION CONTROL SHEET

GUIDELINE DESIGNATOR: ES-3.2

GUIDELINE TITLE: Multiple SGTR Contingency

REVISION: LP-Basic

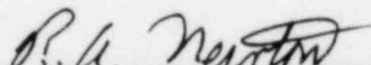
DATE: July 5, 1982

The guideline described above has been reviewed and approved for implementation by the Westinghouse Owner's Group Procedures Subcommittee and the Westinghouse Nuclear Technology Division.

NOTICE: THIS EMERGENCY RESPONSE GUIDELINE SET REVISION (LP-BASIC) IS THE ORIGINAL ISSUE OF GENERIC GUIDANCE ON ITS SUBJECT MATTER FOR PLANTS WITH LOW-PRESSURE SI SYSTEMS AND SUPERSEDES ANY GENERIC GUIDANCE ON THIS SUBJECT BEARING AN ISSUE DATE EARLIER THAN JULY 5, 1982.

THE "BASIC" REVISION OF THE EMERGENCY RESPONSE GUIDELINE SET BEARING AN ISSUE DATE OF SEPTEMBER 1, 1981, APPLIES TO PLANTS WITH HIGH-PRESSURE SI SYSTEMS.

File this sheet with the approved version of this guideline in your Emergency Response Guideline set.



Chairman, Procedures Subcommittee
Westinghouse Owner's Group



Manager, Standard Plant Engineering
Westinghouse Nuclear Technology Division

Number: ES-3.3	Symptom/Title: SGTR WITH SECONDARY DEPRESSURIZATION	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	<p>NOTE</p> <ul style="list-style-type: none"> ● Throughout this guideline "ruptured" refers to a steam generator with a ruptured tube and "faulted" refers to a steam generator with an uncontrolled secondary steam release. "Intact" refers to a steam generator which is neither "ruptured" nor "faulted". ● Foldout page should be open. 	
1	<p>Verify Main Steamline Isolation:</p> <ul style="list-style-type: none"> a. Main steamline isolation valves - CLOSED b. Main steamline bypass valves - CLOSED 	<ul style="list-style-type: none"> a. Manually close valves. b. Manually close valves.
2	<p>Identify Faulted Steam Generator(s):</p> <ul style="list-style-type: none"> ● Pressure lower in one steam generator than the others ● Inspect steam generators and main steamlines 	<p><u>IF</u> no faulted steam generator is identified <u>THEN</u> go to E-3, STEAM GENERATOR TUBE RUPTURE, STEP 9.</p>
3	<p>Isolate AFW Flow To Faulted Steam Generator(s):</p> <ul style="list-style-type: none"> a. [Enter plant specific steps] 	
	<p><i>Caution</i></p> <ul style="list-style-type: none"> ● Maintain ruptured steam generator(s) level above top of U-tubes. ● Steam supply to turbine driven AFW pump must be maintained if water driven AFW pump is not available. 	

Number: ES-3.3	Symptom/Title: SGTR WITH SECONDARY DEPRESSURIZATION (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4	<p>Verify Ruptured Steam Generator(s) Isolated:</p> <ul style="list-style-type: none"> a. Ruptured steam generator(s) - IDENTIFIED b. <u>WHEN</u> in narrow range, <u>THEN</u> stop all AFW flow to ruptured generator(s) 1) [Enter plant specific steps] c. Verify ruptured steam generator(s) PORV - CLOSED d. Close ruptured steam generator(s) steam supply valve to turbine-driven AFW pump e. Ruptured steam generator pressure - GREATER THAN (1) PSIG 	<ul style="list-style-type: none"> a. <u>IF NOT</u>, <u>THEN</u> identify ruptured steam generator(s) as per step 1 in E-3, STEAM GENERATOR TUBE RUPTURE. c. Place PORV controller in manual and close PORV. <u>IF</u> PORV can <u>NOT</u> be closed, <u>THEN</u> manually isolate PORV. e. <u>IF</u> pressure less than (1) psig, <u>THEN</u> go to step 6.
5	<p>Verify At Least One Intact Steam Generator Available For RCS Cooldown:</p> <ul style="list-style-type: none"> a. At least one steam generator - INTACT b. Return to E-3, STEAM GENERATOR TUBE RUPTURE, STEP 9 	<ul style="list-style-type: none"> a. <u>IF</u> all steam generators are either faulted or ruptured or both, <u>THEN</u> go to step 6.

***Caution** If no intact steam generator is available for cooldown, the non-faulted steam generator with the smallest primary-to-secondary leakage should be considered as intact until RHR system cooling is established. This steam generator is identified as the one with the lowest indicated narrow range level.*

(1) Enter plant specific value corresponding to low steamline pressure SI setpoint.

Number: ES-3.3	Symptom/Title: SGTR WITH SECONDARY DEPRESSURIZATION (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p>NOTE Steps 7 through 10 should be performed while completing step 6 to expedite recovery.</p>		
6	<p>Depressurize Intact Steam Generators To 250 psig:</p> <p>a. Rapidly dump steam to condenser from intact steam generators 1) [Enter plant specific steps]</p>	<p>a. Rapidly dump steam with intact steam generator PORVs.</p>
7	<p>Check Intact Steam Generator Levels:</p> <p>a. Narrow range levels – GREATER THAN <u>(1)</u> %</p> <p>b. Throttle AFW flow to maintain narrow range level at <u>(2)</u> %</p>	<p>a. <u>IF</u> less than <u>(1)</u> %, <u>THEN</u> maintain full AFW flow until narrow range level is greater than <u>(1)</u> %.</p>
8	<p>Check If Low-Head SI Pumps Should Be Stopped:</p> <p>a. RCS pressure – GREATER THAN <u>(3)</u> PSIG</p> <p>b. Stop low-head SI pumps and place in standby</p>	<p>a. <u>IF</u> less than <u>(3)</u> psig, <u>THEN</u> go to E-1, LOSS OF REACTOR COOLANT, STEP 20.</p>
<p><i>Caution</i> If RCS pressure drops below <u>(3)</u> psig, the low-head SI pumps must be manually restarted to supply water to the RCS.</p>		
<p>(1) Enter plant specific value showing level just in narrow range including allowance for normal channel accuracy, post-accident transmitter errors and reference leg process errors.</p> <p>(2) Enter plant specific value corresponding to no-load steam generator level including allowances for normal channel accuracy, post-accident transmitter errors and reference e.g., process errors.</p> <p>(3) Enter plant specific shutoff head of low-head SI pumps.</p>		

Number: ES-3.3	Symptom/Title: SGTR WITH SECONDARY DEPRESSURIZATION (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9	<p>Check RCP Seal Cooling:</p> <p>a. CCW flow to RCP thermal barriers - NORMAL</p> <p style="text-align: center;">-OR-</p> <p>RCP seal injection flow - NORMAL</p>	<p>a. Try to establish CCW flow to RCP thermal barriers and go to step 11.</p>
10	<p>Establish Maximum Charging Flow:</p> <p>a. Offsite power - AVAILABLE</p> <p>b. Establish maximum charging flow [Enter plant specific means]</p>	<p>a. <u>IF</u> offsite power <u>NOT</u> available, <u>THEN</u> verify adequate diesel capacity to run charging pumps. If necessary, shed sufficient non-essential loads.</p>
<p><i>Caution</i> ● <i>If containment conditions are abnormal, go to E-1, LOSS OF REACTOR COOLANT, STEP 16.</i></p> <p>● <i>Disregard RCP trip criteria for all subsequent steps in this procedure.</i></p>		
11	<p>Depressurize RCS Using Normal Spray:</p> <p>a. Verify normal spray - AVAILABLE</p> <p>b. Open normal spray valves</p> <p>c. Verify RCS pressure - DECREASING</p>	<p>a. Go to step 13.</p> <p>b. Go to step 13.</p> <p>c. Close spray valves and go to step 13.</p>

Number: ES-3.3	Symptom/Title: SGTR WITH SECONDARY DEPRESSURIZATION (Cont.)	Revision No./Date: LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
12	<p>Check If RCS Depressurization Should Be Stopped:</p> <p>a. RCS subcooling - LESS THAN OR EQUAL TO 50°F</p> <p style="text-align: center;">-OR-</p> <p>Pressurizer level - GREATER THAN <u>(1)</u> %</p> <p>b. Stop RCS depressurization by closing spray valves</p> <p>c. Check pressurizer level - GREATER THAN <u>(2)</u> %</p> <p>d. Go to step 15</p>	<p>a. Continue depressurization until either condition met.</p> <p>b. <u>IF</u> RCS pressure decreasing or stable, <u>THEN</u> stop RCPs in loops with spray line connection.</p> <p>c. <u>IF</u> level less than <u>(2)</u> %, <u>THEN</u>:</p> <p>1) Go to ES-3.2, MULTIPLE SGTR CONTINGENCY.</p> <p>2) <u>WHEN</u> ES-3.2 is completed, <u>THEN</u> return to step 16 of this guideline.</p>
<p><i>Caution The upper head may void during depressurization of the RCS if RCPs are not running. This will result in a rapidly increasing pressurizer level.</i></p>		
13	<p>Depressurize RCS Using One Pressurizer PORV:</p> <p>a. Open one pressurizer PORV</p>	<p>a. <u>IF</u> RCS cannot be depressurized using any PORV, <u>THEN</u> use auxiliary spray.</p>

(1) Enter plant specific value corresponding to high pressurizer level reactor trip setpoint.
 (2) Enter plant specific value showing level just on span including allowance for normal channel accuracy.

Number: ES-3.3	Symptom/Title: SGTR WITH SECONDARY DEPRESSURIZATION (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14	<p> Check If RCS Depressurization Should Be Stopped: </p> <p> a. RCS subcooling – LESS THAN OR EQUAL TO 50°F –OR– Pressurizer level – GREATER THAN <u>(1)</u> % </p> <p> b. Stop RCS depressurization <ol style="list-style-type: none"> 1) Close PORV 2) Close auxiliary spray valve </p> <p> c. Check pressurizer level – GREATER THAN <u>(2)</u> % </p> <p> d. Verify RCS pressure – INCREASING </p>	<p> a. Continue depressurization until either condition met. </p> <p> b. <ol style="list-style-type: none"> 1) Close PORV block valve. 2) Isolate auxiliary spray line. </p> <p> c. <u>IF</u> level less than <u>(2)</u> %, <u>THEN</u>: <ol style="list-style-type: none"> 1) Go to ES-3.2, MULTIPLE SGTR CONTINGENCY. 2) <u>WHEN</u> ES-3.2 is completed, <u>THEN</u> return to step 16 of this guideline. </p> <p> d. <u>IF</u> RCS pressure <u>NOT</u> increasing, <u>THEN</u> check PRT conditions. <u>IF</u> PRT conditions indicate an RCS leak, <u>THEN</u> close PORV block valve. </p>

(1) Enter plant specific value corresponding to high pressurizer level reactor trip.

(2) Enter plant specific value showing level just on span including allowance for normal channel accuracy.

Number: ES-3.3	Symptom/Title: SGTR WITH SECONDARY DEPRESSURIZATION (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	<p><i>Caution</i> ● If PRT integrity is lost, abnormal containment conditions may not be reliable indications of a loss of reactor coolant.</p> <p>● SI MUST BE TERMINATED when termination criteria are met to prevent overflow of the ruptured steam generator(s).</p> <p>NOTE A void in the upper head or continued leakage to the PRT may result in a water solid pressurizer. This condition should not preclude the termination of SI when all criteria are met.</p>	
15	<p>Check If SI Can Be Terminated:</p> <p>a. RCS pressure – INCREASES BY 200 PSI</p> <p>b. Pressurizer level – GREATER THAN <u>(1)</u> % AND STABLE OR INCREASING</p> <p>c. RCS subcooling – GREATER THAN <u>(2)</u> °F</p> <p>d. Do not proceed to step 16 until all the above conditions are met</p>	<p>a. DO NOT TERMINATE SI. IF pressure has not increased by 200 psi <u>AND</u> pressurizer level stable or decreasing, <u>THEN</u>:</p> <p>1) Go to ES-3.2, MULTIPLE SGTR CONTINGENCY.</p> <p>2) <u>WHEN</u> ES-3.2 is completed, <u>THEN</u> return to step 16 of this guideline.</p> <p>b. DO NOT TERMINATE SI:</p> <p>1) Go to ES-3.2, MULTIPLE SGTR CONTINGENCY.</p> <p>2) <u>WHEN</u> ES-3.2 is completed, <u>THEN</u> return to step 16 of this guideline.</p> <p>c. DO NOT TERMINATE SI. Dump steam from intact steam generator(s) to establish RCS subcooling and return to step 11.</p>
<p>(1) Enter plant specific value showing level just on span including allowances for normal channel accuracy.</p> <p>(2) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.</p>		

Number: ES-3.3	Symptom/Title: SGTR WITH SECONDARY DEPRESSURIZATION (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p><i>Caution</i> Automatic reinitiation of SI will not occur until reactor trip breakers are reset.</p>		
16	<p>Stop SI Pumps And Place In Standby:</p> <ul style="list-style-type: none"> a. Stop high-head SI pumps b. Stop low-head SI pumps 	
17	<p>Verify Instrument Air To Containment.</p>	<p>Establish instrument air to containment.</p>
18	<p>Align High-Head SI Pump Suction From BAT To RWST:</p> <ul style="list-style-type: none"> a. [Enter plant specific steps] 	
19	<p>Verify Charging Pump Suction Aligned To RWST.</p>	<p>Align valves, as necessary.</p>
20	<p>Verify SI Reinitiation Not Required:</p> <ul style="list-style-type: none"> a. RCS subcooling - GREATER THAN <u>(1)</u> °F b. Pressurizer level - GREATER THAN 20% 	<ul style="list-style-type: none"> a. Manually operate SI pumps, as required. <u>IF</u> subcooling can <u>NOT</u> be maintained, <u>THEN</u>: <ul style="list-style-type: none"> 1) Manually reinitiate SI. 2) Dump steam from intact steam generator(s) to reestablish subcooling. 3) Return to step 11. b. Manually operate SI pumps as required. <u>IF</u> pressurizer level can <u>NOT</u> be maintained, <u>THEN</u> manually reinitiate SI and return to step 11.

(1) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.

Number: ES-3.3	Symptom/Title: SGTR WITH SECONDARY DEPRESSURIZATION (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
21	Verify Offsite Power Available.	Try to restore offsite power. <u>IF</u> offsite power cannot be restored, <u>THEN</u> manually load following equipment on the diesel generators: • [Enter plant specific list].
<p><i>Caution</i> If leakage from pressurizer is occurring, the pressurizer may remain water solid throughout the recovery. RCS subcooling must be maintained to ensure adequate RCS inventory.</p>		
22	Check Pressurizer Level: a. Pressurizer level - LESS THAN 90 % b. Pressurizer level - GREATER THAN 30 % c. Energize heaters, as necessary to maintain pressure	a. Reduce charging flow, as necessary. b. Increase charging flow, as necessary.
23	Check RCP Cooling: a. RCP CCW system flow - NORMAL b. RCP seal injection flow - NORMAL	a. Establish CCW flow to RCPs per [Enter plant specific procedure]. b. Adjust charging hand control valve, as necessary.
24	Check CST Level: a. CST level - GREATER THAN <u>(1)</u> % b. CST level - LESS THAN <u>(2)</u> %	a. <u>IF</u> CST level low, <u>THEN</u> switch to alternate AFW water supply. b. Stop reject and makeup flow to CST.

(1) Enter plant specific low-level setpoint.
 (2) Enter plant specific overflow level point.

Number: ES-3.3	Symptom/Title: SGTR WITH SECONDARY DEPRESSURIZATION (Cont.)	Revision No., Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p>NOTE RCPs should be operated in order of priority to provide pressurizer spray.</p>		
25	<p>Check RCP Status:</p> <p>a. At least one RCP - RUNNING</p> <p>b. If more than one RCP running, stop all but one RCP</p>	<p>a. <u>IF</u> no RCP running, <u>THEN</u> try to start one RCP:</p> <p>1) Establish conditions for running one RCP. [Enter plant specific list].</p> <p>2) Start one RCP.</p>
26	<p>Verify Adequate Shutdown Margin:</p> <p>a. Sample ruptured steam generator(s)</p> <p>b. Sample RCS</p> <p>c. Shutdown margin - ADEQUATE</p>	<p>c. Borate, as necessary.</p>
<p><i>Caution</i> ● Steps 27 through 30 must be performed concurrently to minimize break flow.</p> <p>● Maintain RCS pressure and temperature within normal cooldown limits.</p>		
27	<p>Initiate Rapid RCS Cooldown To 350°F:</p> <p>a. Maintain cooldown rate - LESS THAN 100°F/HR</p> <p>b. DUMP steam from intact steam generators to condenser:</p> <p>1) [Enter plant specific steps]</p>	<p>b. Dump steam with intact steam generator PORVs.</p>
28	<p>Control Charging Flow To Maintain Pressurizer Level Approximately Constant.</p>	<p>Manually operate SI pumps, as necessary. <u>IF</u> pressurizer level decreases uncontrollably, <u>THEN</u> manually reinitiate SI and return to step 11.</p>

Number ES-3.3	Symptom/Titles SGTR WITH SECONDARY DEPRESSURIZATION (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
29	<p>Depressurize RCS To Maintain Minimum RCS Subcooling:</p> <p>a. Use normal pressurizer spray</p> <p>b. Control pressurizer heaters, as necessary</p> <p>c. Depressurize ruptured steam generator(s) - EQUAL TO RCS PRESSURE:</p> <p>1) Slowly release steam to condenser</p> <p>d. <u>WHEN</u> RCS subcooling <u>LESS THAN OR EQUAL TO</u> <u>(1)</u> °F, <u>THEN</u> stop RCS depressurization</p>	<p>a. Use one pressurizer PORV. <u>IF</u> RCS can <u>NOT</u> be depressurized using any PORV, <u>THEN</u> use auxiliary spray.</p> <p>c. 1) Slowly release steam to atmosphere using PORV.</p>
30	<p>Determine If SI Accumulators Should Be Isolated:</p> <p>a. RCS pressure - LESS THAN OR EQUAL TO <u>(2)</u> PSIG</p> <p>b. Close all SI accumulator isolation valves.</p>	<p>a. <u>IF</u> RCP pressure greater than <u>(2)</u> psig, <u>THEN</u> go to step 31.</p> <p>b. Vent any unisolated accumulator.</p>
31	<p>Check If RHR System Can Be Placed In Service:</p> <p>a. RCS hot leg temperatures - LESS THAN 350°F IN NON-RUPTURED LOOPS</p> <p>b. RCS pressure - APPROXIMATELY 400 PSIG</p>	<p>a. <u>IF</u> greater than 350°F, <u>THEN</u> return to step 27.</p> <p>b. <u>IF</u> greater than 400 psig, <u>THEN</u>, return to step 28.</p>

(1) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.
 (2) Enter plant specific value slightly above normal accumulator pressure.

Number ES-3.3	Symptom/TIME: SGTR WITH SECONDARY DEPRESSURIZATION (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p><i>Caution</i></p> <ul style="list-style-type: none"> ● Do not collapse the pressurizer bubble. ● Cooldown using only non-ruptured steam generators should continue while placing RHR system in service. 		
32	<p>Place RHR System In Service:</p> <ul style="list-style-type: none"> a. Realign RHR system from SI mode to RHR mode b. Refer to plant specific procedure 	
33	<p>Continue Rapid Cooldown To Cold Shutdown:</p> <ul style="list-style-type: none"> a. Maintain cooldown rate - LESS THAN 100°F/HR b. Cooldown using RHR system c. Continue dumping steam from only non-ruptured steam generators 	
34	<p>Check RCP Status:</p> <ul style="list-style-type: none"> a. At least one RCP - RUNNING b. No. 1 seal differential pressure - GREATER THAN <u>(1)</u> PSIG c. No. 1 seal leakoff flow - GREATER THAN <u>(2)</u> GPM d. RCS pressure - GREATER THAN <u>(3)</u> PSIG 	<ul style="list-style-type: none"> a. <u>IF</u> all RCPs stopped, <u>THEN</u> go to step 35. b. Stop all RCPs and go to step 35. c. Stop all RCPs and go to step 35. d. Maintain RCS pressure greater than <u>(3)</u> psig and go to step 36.
<p>(1) Enter plant specific minimum value for continued RCP operation. (2) Enter plant specific value for continued RCP operation. (3) Enter plant specific value corresponding to minimum RCS pressure required for RCP operation including allowances for instrument uncertainty.</p>		

Number:

ES-3.3

Symptom/Title:

SGTR WITH SECONDARY DEPRESSURIZATION (Cont.)

Revision No./Date

LP - Basic
5 July, 1982

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

35

**Depressurize RCS To Maintain
Minimum RCS Subcooling:**

- a. Use normal pressurizer spray
- b. Control pressurizer heaters, as necessary
- c. Depressurize ruptured steam generator(s) - EQUAL TO RCS PRESSURE:
 - 1) Slowly release steam to condenser
- d. WHEN RCS subcooling LESS THAN OR EQUAL TO (1) °F, THEN stop RCS depressurization

- a. Use one pressurizer PORV. IF RCS can NOT be depressurized using any PORV, THEN use auxiliary spray.

- c. 1) Slowly release steam to atmosphere using PORV.

36

Check RCS Temperatures:

- a. Temperature - LESS THAN 200°F
- b. Stop all RCPs

- a. Return to step 33.

37

Check VCT Makeup Control System:

- a. VCT level - NORMAL
- b. Makeup set for automatic control
- c. Makeup set for GREATER THAN RCS boron concentration

- a. Reestablish VCT level.
- b. Adjust controls, as appropriate
- c. Adjust controls, as appropriate.

(1) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.

Number: ES-3.3	Symptom/Titles SGTR WITH SECONDARY DEPRESSURIZATION (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
38	Establish Letdown: a. Verify CCW flow to letdown heat exchanger b. Open letdown line containment isolation valves c. Open letdown line isolation valves d. Open letdown orifice isolation valves, as appropriate	
39	Align Charging Pump Suction To VCT.	
40	Establish RCP Seal Return Flow: a. Verify CCW flow to seal water heat exchanger b. Open RCP seal return line isolation valves	
41	Depressurize RCS To Stop Break Flow: a. Depressurize ruptured steam generator(s), as necessary: 1) Dump steam to condenser from ruptured steam generator(s) b. Cooldown pressurizer with auxiliary spray c. <u>WHEN</u> pressurizer temperature reaches 200°F, <u>THEN</u> adjust charging and seal injection flows EQUAL TO letdown and seal leakoff flows	a. 1) Dump steam with ruptured steam generator(s) PORV.
42	Maintain Cold Shutdown Conditions.	

— END —

FOLDOUT FOR E-3 AND ES-3 GUIDELINES

1. RCP TRIP CRITERIA

- Trip any RCP if component cooling water to that pump is lost.
- If a controlled cooldown is not in progress, then trip all RCPs when BOTH conditions listed below are met:
 - a. SI is ON
 - b. RCS pressure - EQUAL TO OR LESS THAN (1) PSIG

2. SI REINITIATION CRITERIA FOLLOWING STEAM GENERATOR TUBE RUPTURE

Reinitiate SI if ANY ONE of the parameters listed below occurs:

- (1) RCS subcooling - LESS THAN (2) PSIG
- (2) Pressurizer level - LESS THAN 20%

3. SYMPTOMS OF LOSS OF REACTOR COOLANT DURING STEAM GENERATOR TUBE RUPTURE

Go to E-1, LOSS OF REACTOR COOLANT, if abnormal containment conditions persist AND are not due only to failure of PRT rupture disc.

4. SYMPTOMS OF PRIMARY TO SECONDARY LEAKAGE DURING RECOVERY ACTIONS

Charging and letdown flows should be compared to determine if leakage between the RCS and the ruptured steam generator exists.

5. SYMPTOMS FOR FR-C.1, RESPONSE TO INADEQUATE CORE COOLING

Go to FR-C.1, RESPONSE TO INADEQUATE CORE COOLING, when ALL symptoms in ANY ONE of the following symptom sets occurs:

PARAMETER:	SYMPTOM SET		
	I	II	III
1. TCs	> 1200°F	—	> 700°F
2. Containment Condition	—	ABNORMAL	ABNORMAL
3. RCP Status	—	ANY ON	ALL OFF
4. RVLIS	—	< 100% NR	< <u>(3)</u> % NR

6. SYMPTOMS FOR FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK

Go to FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK, if AFW NOT AVAILABLE.

(1) Enter plant specific value derived from background document.

(2) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.

(3) Enter plant specific value which is 3½ feet above bottom of active fuel in core with zero void fraction, plus uncertainties.

BACKGROUND INFORMATION
FOR
WESTINGHOUSE
EMERGENCY RESPONSE GUIDELINES

ES-3.3
SGTR WITH SECONDARY DEPRESSURIZATION

BASIC REVISION

(To be provided later)

WESTINGHOUSE OWNERS GROUP
EMERGENCY RESPONSE GUIDELINES
CONFIGURATION CONTROL SHEET

GUIDELINE DESIGNATOR: ES-3.3

GUIDELINE TITLE: SGTR with Secondary Depressurization

REVISION: LP-Basic

DATE: July 5, 1982

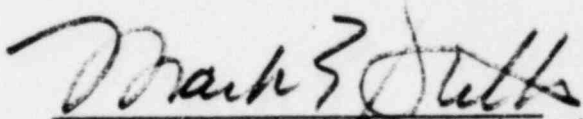
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NOTICE: THIS EMERGENCY RESPONSE GUIDELINE SET REVISION (LP-BASIC) IS THE ORIGINAL ISSUE OF GENERIC GUIDANCE ON ITS SUBJECT MATTER FOR PLANTS WITH LOW-PRESSURE SI SYSTEMS AND SUPERSEDES ANY GENERIC GUIDANCE ON THIS SUBJECT BEARING AN ISSUE DATE EARLIER THAN JULY 5, 1982.

THE "BASIC" REVISION OF THE EMERGENCY RESPONSE GUIDELINE SET BEARING AN ISSUE DATE OF SEPTEMBER 1, 1981, APPLIES TO PLANTS WITH HIGH-PRESSURE SI SYSTEMS.

File this sheet with the approved version of this guideline in your Emergency Response Guideline set.

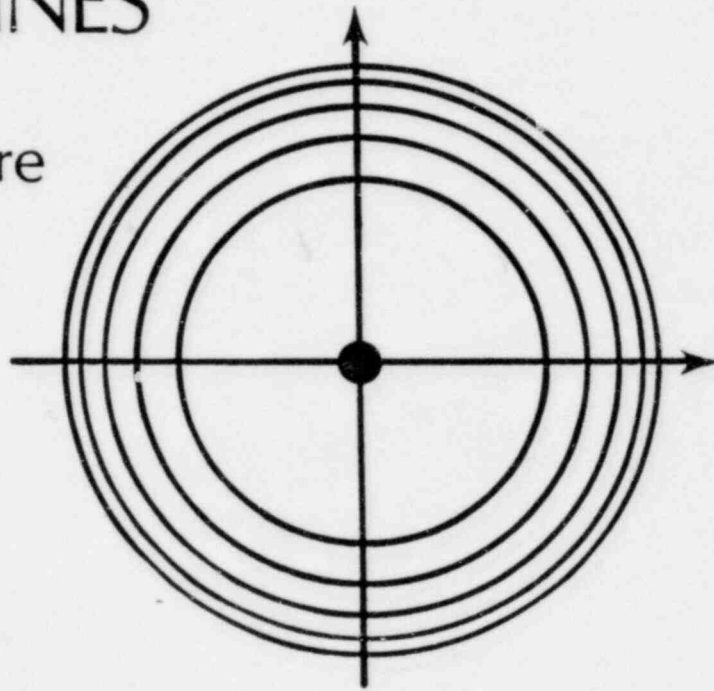

Chairman, Procedures Subcommittee
Westinghouse Owner's Group


Manager, Standard Plant Engineering
Westinghouse Nuclear Technology Division

Westinghouse Owners Group

EMERGENCY RESPONSE GUIDELINES

Low Pressure
Version



VOLUME TWO - B

Optimal Recovery
Guidelines and
Emergency Contingencies

WESTINGHOUSE OWNERS GROUP
EMERGENCY RESPONSE GUIDELINE
INFORMATION PACKAGE

LOW PRESSURE VERSION

VOLUME II
OPTIMAL RECOVERY GUIDELINES
AND EMERGENCY CONTINGENCIES

Prepared by Westinghouse Electric Corporation
for
The Westinghouse Owners Group

July 1982

O. D. Kingsley, Chairman
Westinghouse Owners Group

B. L. King
Westinghouse Owners Group Project Manager

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3	Summary of Westinghouse Owners Group Emergency Response Guideline Program
4	Event Tree Evaluation - Summary Review
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- FR-I.3: Response to Voids in Reactor Vessel

Number: ECA-1	Symptom/ Title: ANTICIPATED TRANSIENT WITHOUT SCRAM	Revision No./ Date LP - Basic 5 July, 1982
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A. PURPOSE

The purpose of this guideline is to add negative reactivity to the core when the control/shutdown banks are not inserted upon demand, to establish and maintain a heat sink for conditions amenable to long term cooling, and to prevent or minimize damage to the fuel and release of excessive radioactivity.

B. SYMPTOMS

Following are symptoms of an anticipated transient without scram condition:

1. Reactor trip breakers fail to open.
2. Rod position indicators show failure of CRDMs to insert.
3. Rod bottom lights not lit.
4. Neutron level not decreasing rapidly corresponding to large negative reactivity insertion.

Number: ECA-1	Symptom/Title: ANTICIPATED TRANSIENT WITHOUT SCRAM (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	<p>NOTE</p> <ul style="list-style-type: none"> ● <i>Circled numbers show immediate actions steps.</i> ● <i>If at any time a reactor trip occurs, immediately go to E-O, REACTOR TRIP OR SAFETY INJECTION, STEP 2.</i> 	
1	<p>Perform Following Actions From Control Room:</p> <ul style="list-style-type: none"> a. Try to trip reactor manually b. Try to trip turbine manually 	<ul style="list-style-type: none"> a. Try to manually insert control rods. b. Try to runback turbine.
2	<p>Check AFW Pumps Running:</p> <ul style="list-style-type: none"> a. Motor-driven pump breaker indicator lights - LIT b. Turbine-driven pump steam supply valves - OPEN 	<ul style="list-style-type: none"> a. Manually start pumps. b. Manually open valves.
3	<p>Check AFW Valve Alignment:</p> <ul style="list-style-type: none"> a. AFW valves - PROPER EMERGENCY ALIGNMENT ⁽¹⁾ 	<ul style="list-style-type: none"> a. Manually open or close valves as appropriate.
4	<p>Initiate Rapid Boration Of RCS To Obtain Adequate Shutdown Margin:</p> <ul style="list-style-type: none"> a. Start charging pumps b. Align boration flow path ⁽²⁾ c. Verify all dilution paths are isolated d. Check RCS pressure - LESS THAN ⁽³⁾ PSIG 	<ul style="list-style-type: none"> d. Open pressurizer PORVs, as necessary, until RCS pressure is ⁽⁴⁾ psig.
	<p>⁽¹⁾ Enter plant specific list. ⁽²⁾ Enter plant specific means. ⁽³⁾ Enter plant specific pump shutoff head. ⁽⁴⁾ Enter 200 psig below plant specific pump shutoff head.</p>	

Number:

ECA-1

Symptom/Title:

ANTICIPATED TRANSIENT WITHOUT SCRAM (Cont.)

Revision No./Date

LP - Basic
5 July, 1982

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

- | STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|------|--|--|
| 5 | Check if The Following Trips Have Occurred:
a. Reactor trip

b. Turbine trip | a. If not, try to trip reactor locally.
1) [Enter plant specific means.]

b. If not, try to trip turbine locally.
1) [Enter plant specific means.] |
| 6 | Verify AFW Flow:
a. AFW flow indicators - CHECK FOR FLOW | a. Perform actions of steps 2 and 3 locally. |
| 7 | Verify Containment Ventilation Isolation:
a. Damper indicator lights - CLOSED | a. Manually close damper. |
| 8 | Maintain Adequate Shutdown Margin. | |
| 9 | Go to E-O, REACTOR TRIP OR SAFETY INJECTION, STEP 2. | |

— END —

BACKGROUND INFORMATION
FOR
WESTINGHOUSE
EMERGENCY RESPONSE GUIDELINES

ECA-1
ANTICIPATED TRANSIENT WITHOUT SCRAM
BASIC REVISION
(To be provided later)

WESTINGHOUSE OWNERS GROUP
EMERGENCY RESPONSE GUIDELINES
CONFIGURATION CONTROL SHEET

GUIDELINE DESIGNATOR: ECA-1

GUIDELINE TITLE: Anticipated Transient Without SCRAM

REVISION: LP-Basic

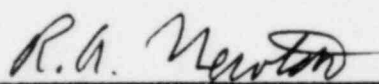
DATE: July 5, 1982

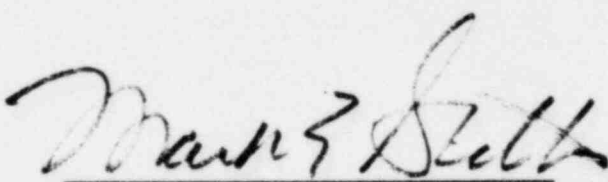
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THE "BASIC" REVISION OF THE EMERGENCY RESPONSE GUIDELINE SET BEARING AN ISSUE DATE OF SEPTEMBER 1, 1981, APPLIES TO PLANTS WITH HIGH-PRESSURE SI SYSTEMS.

File this sheet with the approved version of this guideline in your Emergency Response Guideline set.


Chairman, Procedures Subcommittee
Westinghouse Owner's Group


Manager, Standard Plant Engineering
Westinghouse Nuclear Technology Division

Number: ECA-2	Symptom/Title: LOSS OF ALL AC POWER	Revision No./Date LP - Basic 5 July, 1982
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A. PURPOSE

The purpose of this guideline is to verify proper response of available automatic protection systems following the loss of all ac power; and to specify appropriate operator actions to:

- (1) Minimize RCS inventory loss.
- (2) Maintain an ultimate heat sink.
- (3) Restore ac power.
- (4) Recover the plant following restoration of ac power.

B. SYMPTOMS

The following are symptoms of a loss of all ac power:

- Control room standard lighting off and emergency lighting on.
- Plant safeguards equipment not energized.
- Zero voltage indication from the plant auxiliary transformer and startup auxiliary transformer.
- Zero voltage indication from the main and emergency ac busses.

Number: ECA-2	Symptom/Title: LOSS OF ALL AC POWER (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE <i>Circled numbers show IMMEDIATE ACTION steps.</i>		
1	Verify Reactor Trip: <ul style="list-style-type: none"> • All rod bottom lights - LIT • All rod position indicators - ZERO • Neutron flux - DECREASING 	<ul style="list-style-type: none"> a. Manually trip reactor, <u>IF</u> reactor will <u>NOT</u> trip, <u>THEN</u> go to ECA-1, ANTICIPATED TRANSIENT WITHOUT SCRAM. b. <u>IF</u> instrumentation <u>NOT</u> functional, <u>THEN</u> dispatch personnel to restore power to ac vital instrument busses.
2	Verify Turbine Trip: <ul style="list-style-type: none"> • All turbine stop valves - CLOSED 	<ul style="list-style-type: none"> • Manually trip turbine.

Number: ECA-2	Symptom/Title: LOSS OF ALL AC POWER (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	<p><i>Caution</i></p> <ul style="list-style-type: none"> • When power is restored to one ac emergency bus, immediately go to step 19 and evaluate plant recovery options. • If an SI signal exists or if SI is actuated during this guideline, it should be reset. 	
3	<p>Try to Restore Power To Any AC Emergency Bus:</p> <p>a. Load ac emergency bus on diesel</p> <ol style="list-style-type: none"> 1) Start diesel 2) Verify automatic loading on diesel [Enter plant specific means] <p>b. <u>IF</u> ac emergency bus <u>NOT</u> loaded, <u>THEN</u> load bus on any other power supply</p> <ol style="list-style-type: none"> 1) [Enter plant specific steps] <p>c. <u>IF</u> ac emergency power restored, <u>THEN</u> go to step 19. <u>IF NOT</u> restored, <u>THEN</u>:</p> <ol style="list-style-type: none"> 1) Dispatch personnel to locally restore ac power per [enter plant specific ac power restoration procedure] 2) Place following component switches in PULL-TO-LOCK position: <ul style="list-style-type: none"> • Charging pumps • High-head SI pumps • Low-head SI pumps • Containment spray pumps • CCW pumps • Motor-driven AFW pumps • Containment fan coolers • [Enter plant specific list] 	<ol style="list-style-type: none"> 1) Emergency start diesel [Enter plant specific steps]. 2) Manually load diesel. <u>IF</u> diesel cannot be loaded, <u>THEN</u> manually trip diesel.

Number: ECA-2	Symptom/Title: LOSS OF ALL AC POWER (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p><i>Caution</i> Essential service water pump will automatically load on energized ac emergency bus to provide diesel generator cooling.</p>		
4	<p>Verify RCS Isolation:</p> <p>a. Pressurizer PORVs - CLOSED</p> <p>b. Letdown isolation valves - CLOSED</p> <p>c. Excess letdown isolation valves - CLOSED</p>	<p>a. <u>IF</u> RCS pressure less than 2335 psig, <u>THEN</u> manually close PORVs.</p> <p>b. Manually close valves.</p> <p>c. Manually close valves.</p>
5	<p>Dispatch Personnel To Locally Close Valves To Isolate RCP Seals And Place Remote Operated Valve Switches in CLOSED Position:</p> <p>a. Close RCP seal return outside containment isolation valve</p> <p>b. Close RCP seal injection outside containment isolation valves</p> <p>c. Close RCP thermal barrier CCW return outside containment isolation valve</p>	
6	<p>Verify AFW Flow:</p> <p>a. AFW flow indicators - CHECK FOR FLOW</p>	<p>a. <u>IF</u> AFW flow <u>NOT</u> verified, <u>THEN</u>:</p> <p>1) Verify turbine-driven AFW pump steam supply valves open. <u>IF</u> <u>NOT</u> open, <u>THEN</u> manually open valves.</p> <p>2) Verify proper emergency alignment of AFW valves. <u>IF</u> <u>NOT</u> properly aligned, <u>THEN</u> manually open or close valves, as appropriate.</p>

Number: ECA-2	Symptom/Title: LOSS OF ALL AC POWER (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7	Check CST To Hotwell Isolation: a. Condenser hotwell isolation valves - CLOSED b. [Enter plant specific list]	a. Manually close valves.
8	Check Steam Generator Isolation: a. Main steamline isolation valves - CLOSED b. Main steamline isolation bypass valves - CLOSED c. Blowdown isolation valves - CLOSED	a. Manually close valves. 1) [Enter plant specific means.] b. Manually close valves. c. Manually close valves.
9	Check For Secondary Integrity: a. All steam generator pressures - APPROXIMATELY EQUAL	a. <u>IF</u> pressure 100 psig lower in one steam generator than the others, <u>THEN</u> : 1) Isolate AFW flow to faulted steam generator. 2) Isolate faulted steam generator steam supply to turbine-driven AFW pump.
10	Check For Primary To Secondary Integrity: a. Condenser air ejector radiation - NORMAL b. Steam generator blowdown radiation - NORMAL	a. <u>IF</u> high, <u>THEN</u> continue with this guideline while trying to identify and isolate faulted steam generator. b. <u>IF</u> high, <u>THEN</u> continue with this guideline while trying to identify and isolate faulted steam generator.

Number: ECA-2	Symptom/Title: LOSS OF ALL AC POWER (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
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Caution A faulted steam generator that is isolated should remain isolated throughout further recovery actions.

- 11 **Check Non-Faulted Steam Generator Levels:**
- a. Narrow range level -- GREATER THAN (1) %
 - b. Manually control AFW flow to maintain narrow range level at (2) %
- a. IF less than (1) %, THEN maintain full AFW flow until narrow range level is greater than (1) %.
 - b. IF narrow range level in one steam generator continues to increase with AFW flow stopped, THEN:
 - 1) Isolate AFW flow to faulted steam generator.
 - 2) Isolate faulted steam generator steam supply to turbine-driven AFW pump.
- 12 **Check CST Level:**
- a. CST level -- GREATER THAN (3) %
- a. IF CST level low, THEN switch to alternate AFW water supply.
- 13 **Check DC Bus Loads:**
- a. Shed all large non-vital dc loads as soon as practical
 - 1) [Enter plant specific list]
 - b. Dispatch personnel to monitor dc power supply per [enter plant specific dc power monitoring procedure]

(1) Enter plant specific value showing level just in the narrow range including allowances for normal channel accuracy, post-accident transmitter errors and reference leg process errors.

(2) Enter plant specific value corresponding to no-load steam generator level including allowances for post-accident transmitter errors and reference leg process errors.

(3) Enter plant specific low level setpoint.

Number: ECA-2	Symptom/Title: LOSS OF ALL AC POWER (Cont.)	Revision No./Date: LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
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Caution *The non-faulted steam generators should be depressurized as quickly as possible BUT in a controlled manner. DO NOT reduce RCS pressure below (1) psig OR core exit TC temperature below (2) °F.*

- NOTE**
- *The above RCS pressure and temperature limits prevent injection of accumulator nitrogen into the RCS and prevent the reactor core returning to criticality due to moderator temperature effects.*
 - *Reactor vessel upper head voiding may occur due to rapid depressurization of the non-faulted steam generator(s). Depressurization should not be stopped if upper head voiding occurs.*
 - *Continue with step 15 of this guideline after depressurization of non-faulted steam generators in step 14 has been started.*

14

Depressurize Non-Faulted Steam Generators To Minimize RCS Inventory Loss:

- | | |
|--|--|
| <p>a. Manually open and throttle steam generator PORVs to reduce RCS pressure to <u>(1)</u> psig</p> <p>b. Manually control AFW flow to maintain steam generator narrow range levels at <u>(4)</u> %</p> | <p>a. Locally open and throttle PORVs.
1) [Enter plant specific means.]</p> <p>b. <u>IF</u> less than <u>(3)</u> %, <u>THEN</u>:
1) Maintain full AFW flow until narrow range level is greater than <u>(3)</u> %.
2) Maintain steam generator levels above top of U-tubes. <u>IF NOT</u> above U-tubes, <u>THEN</u> stop steam generator depressurization.</p> |
| <p>c. Manually throttle steam generator PORVs to maintain RCS pressure at <u>(1)</u> psig</p> | <p>c. Locally throttle PORVs.</p> |

(1) Enter plant specific value which is 300 psig plus instrument uncertainties.
(2) Enter plant specific end of life criticality temperature plus instrument uncertainties.
(3) Enter plant specific value showing level just in the narrow range including allowances for normal channel accuracy, post-accident transmitter errors and reference leg process errors.
(4) Enter plant specific value corresponding to no-load steam generator level including allowances for post-accident transmitter errors and reference leg process errors.

Number: ECA-2	Symptom/Title: LOSS OF ALL AC POWER (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
15	Check RCS Conditions During Secondary Depressurization: a. RCS pressure - GREATER THAN <u>(1)</u> PSIG b. Core exit TCs - GREATER THAN <u>(2)</u> °F	a. <u>IF</u> less than <u>(1)</u> psig, <u>THEN</u> stop steam generator depressurization AND restore RCS pressure to <u>(1)</u> psig. b. <u>IF</u> less than <u>(2)</u> °F, <u>THEN</u> stop steam generator depressurization AND restore RCS temperature to <u>(2)</u> °F.
16	Verify And Reset SI Signal: a. Verify SI signal actuated b. Reset SI signal	a. Manually initiate SI.
17	Verify Containment Isolation Phase A: a. Isolation phase A valves - CLOSED	a. Manually close valves.

(1) Enter plant specific value which is 300 psig plus instrument uncertainties.

(2) Enter plant specific end of life criticality temperature plus instrument uncertainties.

Number: ECA-2	Symptom/Title: LOSS OF ALL AC POWER (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
18	Check If Recovery Can Be Initiated: a. One ac emergency bus - POWER RESTORED	a. <u>IF NOT</u> restored, <u>THEN</u> continue to control RCS conditions and monitor plant status: 1) Check status of auxiliary boration systems: <ul style="list-style-type: none"> • Boric acid tank temperature greater than <u>(1)</u> °F. <u>IF</u> temperatures less than <u>(1)</u> °F, <u>THEN</u> dispatch personnel to reduce boron concentration. [Enter plant specific means.] 2) Check status of spent fuel cooling: <ul style="list-style-type: none"> • Spent fuel pit level greater than <u>(2)</u>. <u>IF</u> level less than <u>(2)</u> , <u>THEN</u> dispatch personnel to initiate makeup to the spent fuel pit. [Enter plant specific means.] 3) Return to step 14 and control RCS pressure and temperature.

(1) Enter plant specific low alarm setpoint.

(2) Enter plant specific value in plant specific units derived from background document.

Number: ECA-2	Symptom/Title: LOSS OF ALL AC POWER (Cont.)	Revision No., Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
19	Maintain Stable RCS Pressure And Temperature While Evaluating Recovery Options.	
20	<p>Select Recovery Option:</p> <p>a. Check RCS subcooling - GREATER THAN <u>(1)</u>° F</p> <p>b. Check pressurizer level - GREATER THAN 10%</p> <p>c. Verify that SI components have not automatically actuated upon ac power restoration</p> <p>d. <u>IF</u> conditions a, b, and c are satisfied, <u>THEN</u> go to ECA-2.1, LOSS OF ALL AC POWER RECOVERY WITHOUT SI REQUIRED, STEP 1</p>	<p>a. <u>IF</u> less than <u>(1)</u> °F, <u>THEN</u> go to ECA-2.2, LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED, STEP 1.</p> <p>b. <u>IF</u> less than 10%, <u>THEN</u> go to ECA-2.2, LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED, STEP 1.</p> <p>c. <u>IF</u> SI components have automatically actuated, <u>THEN</u> go to ECA-2.2, LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED, STEP 1.</p>

— END —

(1) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.

BACKGROUND INFORMATION FOR
WESTINGHOUSE
EMERGENCY RESPONSE GUIDELINES

ECA-2
LOSS OF ALL AC POWER

BASIC REVISION
(To be provided later)

WESTINGHOUSE OWNERS GROUP
EMERGENCY RESPONSE GUIDELINES
CONFIGURATION CONTROL SHEET

GUIDELINE DESIGNATOR: ECA-2

GUIDELINE TITLE: Loss of All ac Power

REVISION: LP-Basic

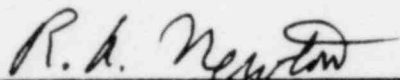
DATE: July 5, 1982

The guideline described above has been reviewed and approved for implementation by the Westinghouse Owner's Group Procedures Subcommittee and the Westinghouse Nuclear Technology Division.

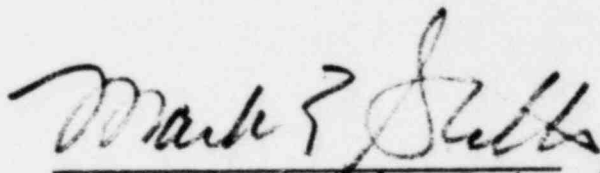
NOTICE: THIS EMERGENCY RESPONSE GUIDELINE SET REVISION (LP-BASIC) IS THE ORIGINAL ISSUE OF GENERIC GUIDANCE ON ITS SUBJECT MATTER FOR PLANTS WITH LOW-PRESSURE SI SYSTEMS AND SUPERSEDES ANY GENERIC GUIDANCE ON THIS SUBJECT BEARING AN ISSUE DATE EARLIER THAN JULY 5, 1982.

THE "BASIC" REVISION OF THE EMERGENCY RESPONSE GUIDELINE SET BEARING AN ISSUE DATE OF SEPTEMBER 1, 1981, APPLIES TO PLANTS WITH HIGH-PRESSURE SI SYSTEMS.

File this sheet with the approved version of this guideline in your Emergency Response Guideline set.



Chairman, Procedures Subcommittee
Westinghouse Owner's Group



Manager, Standard Plant Engineering
Westinghouse Nuclear Technology Division

Number: ECA-2.1	Symptom/Title: LOSS OF ALL AC POWER RECOVERY WITHOUT SI REQUIRED	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p><i>Caution</i> If either RCS subcooling or pressurizer level is lost at any time, immediately go to ECA-2.2, LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED.</p>		
1	<p>Check Status Of Energized AC Emergency Bus:</p> <ul style="list-style-type: none"> • AC emergency bus voltage - NORMAL • AC emergency bus frequency - STABLE 	<p>IF voltage low or frequency unstable, THEN exercise caution in loading equipment on bus.</p>
2	<p>Verify Following Equipment Loaded On AC Emergency Bus:</p> <ul style="list-style-type: none"> a. 480 volt busses b. Battery chargers c. Instrumentation and control d. Emergency lighting e. Communications f. [Enter plant specific list] 	<p>Manually load equipment, as necessary.</p>
3	<p>Verify Essential Service Water System Operation:</p> <ul style="list-style-type: none"> a. Verify valve alignment <ul style="list-style-type: none"> 1) [Enter plant specific list] b. Verify pump running 	<ul style="list-style-type: none"> a. Manually align valves, as necessary. b. Manually start pump.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4	<p>Check RCP Seal Isolation Status:</p> <p>a. RCP seal injection outside containment isolation valves - CLOSED</p> <p>b. RCP thermal barrier CCW return outside containment isolation valve - CLOSED</p>	<p>a. <u>IF</u> valves open, <u>THEN</u> check charging pump status:</p> <p>1) <u>IF</u> pump running, <u>THEN</u> go to step 5.</p> <p>2) <u>IF</u> pump <u>NOT</u> running, <u>THEN</u> locally close valves. <i>DO NOT start charging pump during subsequent recovery until valves are closed, UNLESS pump is essential for recovery.</i></p> <p>b. <u>IF</u> valve open, <u>THEN</u> check CCW pump status:</p> <p>1) <u>IF</u> pump running, <u>THEN</u> go to step 5.</p> <p>2) <u>IF</u> pump <u>NOT</u> running, <u>THEN</u> manually close valve. <u>IF</u> valve cannot be closed, <u>THEN</u> manually close CCW return inside containment isolation valve.</p>
5	<p>Verify That Containment Isolation Phase A Signal Has Not Been Actuated.</p>	<p><u>IF</u> actuated, <u>THEN</u>:</p> <p>a. Reset containment isolation phase A signal.</p> <p>b. Establish instrument air to containment.</p>

Number:

ECA-2.1

Symptom/Title:

**LOSS OF ALL AC POWER RECOVERY
WITHOUT SI REQUIRED (Cont.)**

Revision No./Date

LP - Basic
5 July, 1982

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

6

**Manually Load Following Blackout
Components On AC Emergency Bus:**

a. Verify valve alignment and load
charging/SI pump

1) Check valve alignment:

- VCT suction valves - OPEN
- VCT makeup control system -
SET FOR AUTOMATIC
CONTROL AND GREATER
THAN RCS BORON
CONCENTRATION
- Charging line isolation valve -
OPEN

2) Manually load pump at minimum
speed

b. Verify valve alignment and load CCW
pump

1) Check valve alignment:
[Enter plant specific list]

2) Manually load pump

c. Load containment fan cooler

d. [Enter plant specific list]

a. 1) Manually align valves, as
necessary. IF VCT suction NOT
available, THEN establish RWST
suction:

- Open RWST suction valves.
- Close VCT suction valves.

b. 1) Manually align valves, as
necessary.

Number:

ECA-2.1

Symptom/Title:

**LOSS OF ALL AC POWER RECOVERY
WITHOUT SI REQUIRED (Cont.)**

Revision No./Date

LP - Basic
5 July, 1982

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

7

**Check If Motor-Driven AFW Pump
Should Be Loaded On AC Emergency
Bus:**

- a. Check suction valve alignment to AFW water supply
- b. Steam generator levels - CHECK WITHIN NARROW RANGE
- c. Keep motor-driven AFW pump switches in PULL-TO-LOCK

- a. Open or close valves, as appropriate.
- b. IF below narrow range, THEN:
 - 1) Manually load motor-driven AFW pump on ac emergency bus.
 - 2) Control AFW flow to maintain narrow range level at (1) %.
 - 3) Go to step 8.

***Caution** If steam generator level drops out of the narrow range, the motor-driven AFW pumps must be manually loaded on ac emergency bus to supply water to steam generators.*

8

**Return Following SI Pump Switches To
STANDBY:**

- a. High-head SI pump
 - 1) Check BAT temperature - GREATER THAN (2) °F
- b. Low-head SI pump
- c. Containment spray pump

- a. 1) Align high-head SI pump suction to RWST:
 - Open RWST valves.
 - Place BAT valves in closed position.

(1) Enter plant specific no-load narrow range level.

(2) Enter plant specific temperature.

Number:

ECA-2.1

Symptom/Title:

**LOSS OF ALL AC POWER RECOVERY
WITHOUT SI REQUIRED (Cont.)**

Revision No./Date

LP - Basic
5 July, 1982

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

Caution RCP seal cooling should be established slowly to prevent potential introduction of steam into the CCW system and to minimize RCP thermal stresses and potential seal failures.

- 9 **Try To Establish RCP Seal Cooling:**
- a. Establish CCW flow to RCP thermal barriers
 - 1) [Enter plant specific steps]
 - b. Establish seal injection flow to RCPs
 - 1) [Enter plant specific steps]

Caution As part of subsequent recovery actions, DO NOT start any RCP prior to a complete status evaluation UNLESS RCP start is required in an inadequate core cooling guideline.

- 10 **Establish Desired Charging Flow:**
- a. [Enter plant specific means]

- 11 **Establish Stable Steam Generator Pressures:**
- a. Set each steam generator PORV controller to maintain existing steam generator pressure
 - b. Return steam generator PORVs to remote control

- b. Locally return PORVs to remote control.
[Enter plant specific means]

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
12	<p>Check RCS Conditions:</p> <p>a. RCS pressure - STABLE OR INCREASING</p> <p>b. RCS hot leg temperature - STABLE OR DECREASING</p>	<p>a. <u>IF</u> decreasing, <u>THEN</u> check RCS subcooling. <u>IF</u> subcooling is less than <u>(1)</u> °F, <u>THEN</u> go to ECA-2.2, LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED, STEP 6.</p> <p>b. <u>IF</u> increasing, <u>THEN</u> check RCS subcooling. <u>IF</u> subcooling is less than <u>(1)</u> °F, <u>THEN</u> go to ECA-2.2, LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED, STEP 6.</p>
13	<p>Check Pressurizer Level:</p> <p>a. Level - GREATER THAN 10 %</p> <p>b. Level - GREATER THAN <u>(2)</u> %</p> <p>c. Level - TRENDING TO <u>(3)</u> %</p>	<p>a. <u>IF</u> less than 10%, <u>THEN</u> go to ECA-2.2, LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED, STEP 6.</p> <p>b. Verify letdown isolation, <u>IF NOT</u> manually isolate letdown.</p> <p>c. Manually control charging to restore pressurizer level.</p>
14	<p>Check Steam Generator Levels:</p> <p>a. Level - IN NARROW RANGE</p> <p>b. Throttle AFW flow to maintain narrow range level at <u>(4)</u> %</p>	<p>a. Continue filling steam generators until level is in narrow range.</p>
15	<p>Check CST Level:</p> <p>a. CST level - GREATER THAN <u>(5)</u> %</p>	<p>a. <u>IF</u> CST level low, <u>THEN</u> switch to alternate AFW water supply.</p>

(1) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.

(2) Enter plant specific letdown isolation level.

(3) Enter plant specific no-load level.

(4) Enter plant specific no-load narrow range level.

(5) Enter plant specific low level setpoint.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16	Establish Pressurizer Level in Normal Operating Range: a. Establish letdown b. Open letdown orifice isolation valves, as necessary c. Start additional charging pumps, if necessary d. <u>WHEN</u> pressurizer level is in normal range, <u>THEN</u> place charging pump speed controller in automatic	
17	Establish Stable RCS Pressure: a. Manually load pressurizer heaters on ac emergency bus, as necessary	
<i>Caution</i> On natural circulation, RTD bypass temperatures and associated interlocks will be inaccurate.		
18	Verify Natural Circulation From Trended Valves: a. RCS subcooling - GREATER THAN <u>(1)</u> °F b. Steam pressure - STABLE c. RCS hot leg temperature - STABLE or SLOWLY DECREASING d. Core exit TCs - STABLE or SLOWLY DECREASING e. RCS cold leg temperature - NEAR SATURATION TEMPERATURE FOR STEAM PRESSURE	<u>IF</u> natural circulation <u>NOT</u> verified, <u>THEN</u> increase dumping steam.
19	Check RCS Pressure And Temperature Relationship - WITHIN ACCEPTABLE LIMITS.	Establish RCS pressure and temperature relationship within acceptable limits.

(1) Enter sum of temperature and pressure measurement system errors translated into temperature using saturation tables.

Number:

ECA-2.1

Symptom/Title:

**LOSS OF ALL AC POWER RECOVERY
WITHOUT SI REQUIRED (Cont.)**

Revision No./Date

LP - Basic
5 July, 1982

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
20	Check RCS Subcooling - GREATER THAN 50°F.	Establish 50°F subcooling: a. Increase RCS pressure. -OR- b. Dump steam: 1) Limit RCS cooldown rate - LESS THAN 25°F/HR. 2) Dump steam with steam generator PORVs.
21	Check Intermediate Range Flux: a. Flux - BELOW <u>(1)</u> b. Verify source range detectors re-energized c. Transfer nuclear recorders to source range scale	a. Proceed to step 22. <u>WHEN</u> flux decreases below <u>(1)</u> , <u>THEN</u> do steps 21 b and c. b. Manually re-energize source range detectors.
22	Verify SI NOT Required: a. RCS subcooling - GREATER THAN 50°F b. Pressurizer level - GREATER THAN 10%	a. <u>IF</u> subcooling less than 50°F, <u>THEN</u> go to ECA-2.2, LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED, STEP 6. b. <u>IF</u> level less than 10%. <u>THEN</u> go to ECA-2.2, LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED, STEP 6.
23	Try to Restore Normal AC Power: a. [Enter plant specific list]	<u>IF</u> normal ac power cannot be restored, <u>THEN</u> maintain stable plant conditions on ac emergency power.

(1) Enter plant specific value for intermediate range permissive to block source range high flux trip (P-6).

Number:

ECA-2.1

Symptom/Title:

**LOSS OF ALL AC POWER RECOVERY
WITHOUT SI REQUIRED (Cont.)**

Revision No./ Date

LP - Basic
5 July, 1982

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

24

**Determine If Natural Circulation
Cooldown Required:**

a. IF a natural circulation cooldown
is required, THEN go to ES-0.2,
NATURAL CIRCULATION
COOLDOWN.

a. IF a natural circulation cooldown
NOT required, THEN return to
appropriate plant procedure.

— END —

BACKGROUND INFORMATION FOR
WESTINGHOUSE
EMERGENCY RESPONSE GUIDELINES

ECA-2.1
LOSS OF ALL AC POWER RECOVERY
WITHOUT SI REQUIRED

BASIC REVISION
(To be provided later)

WESTINGHOUSE OWNERS GROUP
EMERGENCY RESPONSE GUIDELINES
CONFIGURATION CONTROL SHEET

GUIDELINE DESIGNATOR: ECA-2.1

GUIDELINE TITLE: Loss of All ac Power Recovery Without SI Required

REVISION: LP-Basic

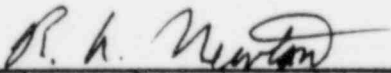
DATE: July 5, 1982

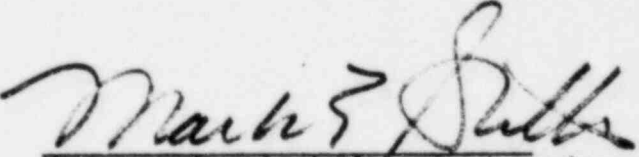
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THE "BASIC" REVISION OF THE EMERGENCY RESPONSE GUIDELINE SET BEARING AN ISSUE DATE OF SEPTEMBER 1, 1981, APPLIES TO PLANTS WITH HIGH-PRESSURE SI SYSTEMS.

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Chairman, Procedures Subcommittee
Westinghouse Owner's Group


Manager, Standard Plant Engineering
Westinghouse Nuclear Technology Division

Number: ECA-2.2	Symptom/Title: LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1	Check Status Of Energized AC Emergency Bus: <ul style="list-style-type: none"> • AC emergency bus voltage - NORMAL • AC emergency bus frequency - STABLE 	IF voltage low or frequency unstable, THEN exercise caution in loading equipment on bus.
2	Verify Following Equipment Loaded On AC Emergency Bus: <ul style="list-style-type: none"> a. 480 volt busses b. Battery chargers c. Instrumentation and control d. Emergency lighting e. Communications f. [Enter plant specific list] 	Manually load equipment, as necessary.
3	Verify Essential Service Water System Operation: <ul style="list-style-type: none"> a. Verify valve alignment: 1) [Enter plant specific list] b. Verify pump running 	<ul style="list-style-type: none"> a. Manually align valves, as necessary. b. Manually start pump.

Number: ECA-2.2	Symptom/Title LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4	<p>Check RCP Seal Isolation Status:</p> <p>a. RCP seal injection outside containment isolation valves - CLOSED</p> <p>b. RCP thermal barrier CCW return outside containment isolation valve - CLOSED</p>	<p>a. Locally close valves. <i>DO NOT start charging pump during subsequent recovery until valves are closed UNLESS pump is essential for recovery.</i></p> <p>b. <u>IF</u> valve open, <u>THEN</u> check CCW pump status:</p> <p>1) <u>IF</u> pump running, <u>THEN</u> go to step 5.</p> <p>2) <u>IF</u> pump <u>NOT</u> running, <u>THEN</u> manually close valve. <u>IF</u> valve cannot be closed, <u>THEN</u> manually close CCW return inside containment isolation valve.</p>
5	<p>Verify SI Injection Mode Is Required:</p> <p>a. RWST level - GREATER THAN <u>(1)</u></p>	<p>a. <u>IF</u> RWST level less than <u>(1)</u> <u>THEN</u>:</p> <p>1) Verify containment sump level.</p> <p>2) Manually align valves to establish recirculation mode. [Enter plant specific list].</p> <p>3) Manually load following safeguards components on ac emergency bus:</p> <p>(a) CCW pump</p> <p>(b) Low-head SI pump</p> <p>(c) High-head SI pump</p> <p>(d) Containment fan cooler</p> <p>(e) [Enter plant specific list]</p> <p>4) Go to step 8.</p>

(1) Enter plant specific value corresponding to RWST switchover alarm in plant specific units.

Number: ECA-2.2	Symptom/Title: LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p><i>Caution</i> If SI is reset before automatic transfer of high-head SI pump suction to RWST occurs, manual transfer on BAT low-level is required.</p>		
6	<p>Manually Align Valves To Establish Injection Mode:</p> <p>a. Check BAT temperature – GREATER THAN <u>(1)</u> °F</p> <p>b. [Enter plant specific list]</p>	<p>a. Align high-head SI pump suction to RWST:</p> <ul style="list-style-type: none"> • Open RWST valves. • Place BAT valves in closed position.
7	<p>Manually Load Following Safeguards Components On AC Emergency Bus To Establish Injection Mode:</p> <p>a. High-head SI pump</p> <p>b. <u>IF</u> RCS pressure less than <u>(2)</u> psig, <u>THEN</u> load low-head SI pump</p> <p>c. CCW pump</p> <p>d. Containment fan cooler</p> <p>e. [Enter plant specific list]</p>	

(1) Enter plant specific temperature.

(2) Enter plant specific shutoff head pressure of low-head SI pumps.

Number: ECA-2.2	Symptom/Title: LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED (Cont.)	Revision No., Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p><i>Caution</i> If RCS pressure drops below ⁽¹⁾ psig, the low-head SI pump must be manually loaded on ac emergency bus to supply water to RCS.</p>		
8	<p>Check If Motor-Driven AFW Pump Should Be Loaded On AC Emergency Bus:</p> <p>a. Check suction valve alignment to AFW water supply</p> <p>b. Check non-faulted steam generator narrow range levels - GREATER THAN ⁽²⁾ %</p> <p>c. Keep motor-driven AFW pump switches in PULL-TO-LOCK</p>	<p>a. Open or close valves, as appropriate.</p> <p>b. IF less than ⁽²⁾ %, THEN:</p> <ol style="list-style-type: none"> 1) Manually load motor-driven AFW pump on ac emergency bus. 2) Control AFW flow to maintain narrow range level at ⁽³⁾ %. 3) Go to step 9.
<p><i>Caution</i> If steam generator level drops out of the narrow range, the motor-driven AFW pumps must be manually loaded on ac emergency bus to supply water to steam generators.</p>		
<p>(1) Enter plant specific shutoff head pressure of low-head SI pumps.</p> <p>(2) Enter plant specific value showing level just in narrow range including allowances for normal channel accuracy, post-accident transmitter errors and reference leg process errors.</p> <p>(3) Enter plant specific value corresponding to no-load steam generator level including allowances for post-accident transmitter errors and reference leg process errors.</p>		

Number: ECA-2.2	Symptom/Title: LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED (Cont.)	Revision No., Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9	Check If Containment Spray Pump Should Be Loaded On AC Emergency Bus:	
	a. Check containment pressure - HAS STAYED BELOW <u>(1)</u> PSIG	a. <u>IF</u> pressure has gone above <u>(1)</u> <u>psig, THEN:</u> 1) Verify containment fan cooler running. 2) Verify containment isolation phase B actuated. 3) Verify containment spray signal actuated. 4) Reset containment spray signal. 5) Check containment pressure: • <u>IF</u> less than <u>(1)</u> psig, OR decreasing, <u>THEN</u> return containment spray pump switch to STANDBY. • <u>IF</u> greater than <u>(1)</u> psig and increasing, <u>THEN</u> establish required valve alignment and manually load containment spray pump on ac emergency bus. 6) Go to step 11.
	b. Return containment spray pump switch to STANDBY	

(1) Enter plant specific Hi-3 pressure setpoint.

Number: ECA-2.2	Symptom/Title: LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED (Cont.)	Revision No./Date LP - Basic 5 July, 1982
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	<p><i>Caution</i> RCP thermal barrier cooling should be established slowly to prevent potential introduction of steam into the CCW system. RCP thermal barrier cooling should not be established to an RCP with excessive seal leakage.</p>	
10	<p>Try To Establish RCP Thermal Barrier Cooling:</p> <p>a. Establish CCW flow to RCP thermal barriers:</p> <p>1) [Enter plant specific steps]</p> <p><i>Caution</i></p> <ul style="list-style-type: none"> ● As part of subsequent recovery actions, RCP seal injection should be established slowly to minimize RCP thermal stresses and potential seal failures. ● As part of subsequent recovery actions, DO NOT start any RCP prior to a complete status evaluation UNLESS RCP start is required in an inadequate core cooling guideline. 	
11	<p>Go To E-O, REACTOR TRIP OR SAFETY INJECTION, STEP 5.</p>	

— END —

BACKGROUND INFORMATION FOR
WESTINGHOUSE
EMERGENCY RESPONSE GUIDELINES

ECA-2.2
LOSS OF ALL AC POWER RECOVERY
WITH SI REQUIRED

BASIC REVISION
(To be provided later)

WESTINGHOUSE OWNERS GROUP
EMERGENCY RESPONSE GUIDELINES
CONFIGURATION CONTROL SHEET

GUIDELINE DESIGNATOR: ECA-2.2

GUIDELINE TITLE: Loss of All ac Power Recovery With SI Required

REVISION: LP-Basic

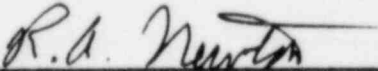
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THE "BASIC" REVISION OF THE EMERGENCY RESPONSE GUIDELINE SET BEARING AN ISSUE DATE OF SEPTEMBER 1, 1981, APPLIES TO PLANTS WITH HIGH-PRESSURE SI SYSTEMS.

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Chairman, Procedures Subcommittee
Westinghouse Owner's Group


Manager, Standard Plant Engineering
Westinghouse Nuclear Technology Division