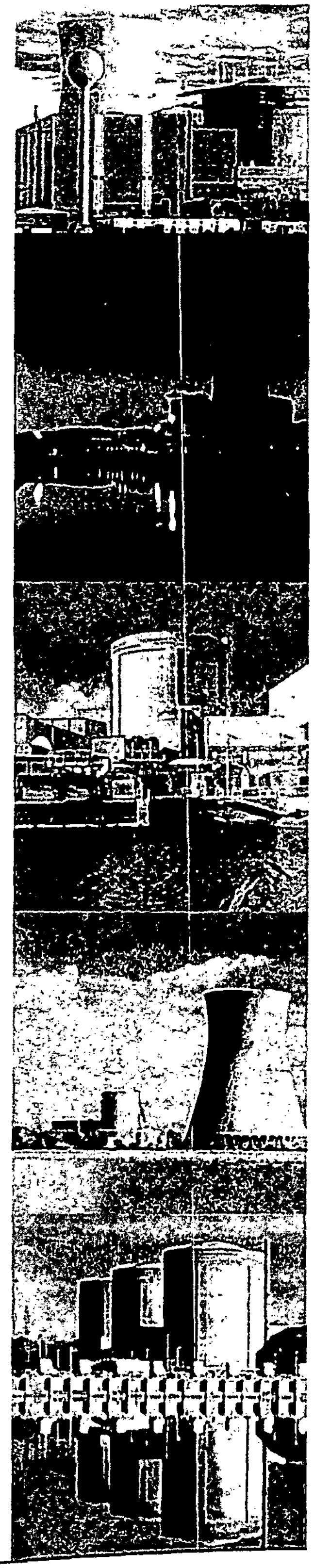
B&W Unit EOP Critical Task Description Document

47-1229003

December 2005



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AREVA

REV. NO.	CHANGE SECT/PARA.	DESCRIPTION/CHANGE AUTHORIZATION
04	All Sections	The CT Description Document was revised to bring it up to date with revision 10 of the TBD. This led to the following changes: <u>III.A, CT-1</u> Revised CT-1, Trip All RCPs (Rule 1.0), for tripping RCPs on loss of SCM to reflect Rule 1.0 changes. <u>III.A, CT-9</u> A discussion on recognition and mitigation of sump blockage was added to the bases. GEOG step V.C.6.0 was added to the GEOG step references. <u>III.E, CT-23</u> The statement, "Restart RCP only when localized boron dilution will not cause recriticality" was added to the criteria for fulfilling this CT. The bases were expanded to include recriticality concerns associated with RCP restart when localized boron dilution conditions exist. RCP Restart step 5.0 was added to the applicable GEOG sections. A new entry was made to the GEOG TAB Cross References table of Section IV.; RCP Restart was added to the GEOG TAB column with reference to CT-23, Establish and Maintain Reactor Shutdown Requirements.

Prepared by: ______________________ Date: ____________

Reviewed by: ______________________ Date: ____________

Approved by: ______________________ Date: ____________

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LIST OF ACRONYMS/ABBREVIATIONS

°F	Degree Fahrenheit
ΔP	Delta Pressure
ΔT	Delta Temperature
AC	Alternating Current
ADV	Atmospheric Dump Valve
ATWS	Anticipated Transient Without Scram
BWST	Borated Water Storage Tank
CF	Core Flood
CFT	Core Flood Tank
CRDM	Control Rod Drive Mechanism
CT	Critical Task
DBA	Design Basis Accident
DSS	Diverse Scram System
ECCS	Emergency Core Cooling System
EFW	Emergency Feedwater
EHT	Excessive Heat Transfer
EOP	Emergency Operating Procedure
ES	Engineered Safeguards
ESAS	Engineered Safeguards Actuation System
FW	Feedwater
GEOG	Generic Emergency Operating Guideline
GPM	Gallons Per Minute
H_2	Hydrogen
HPI	High Pressure Injection
HPV	High Point Vent
HR	Hour
IA	Instrument Air
ICC	Inadequate Core Cooling
ICS	Integrated Control System
LHT	Loss Of Heat Transfer
LOCA	Loss Of Coolant Accident
LPI	Low Pressure Injection
LSCM	Loss Of Subcooling Margin
MFW	Main Feedwater

LIST OF ACRONYMS/ABBREVIATIONS (cont'd)

MSIV	Main Steam Isolation Valve
MSL	Main Steam Line
MSSV	Main Steam Safety Valve
MU	Make Up
NC	Natural Circulation
NNI	Non Nuclear Instrumentation
NPSH	Net Positive Suction Head
PORV	Pilot Operated Relief Valve
PSIG	Pounds Per Square Inch Gauge
P-T	Pressure - Temperature
PTS	Pressurized Thermal Shock
PZR	Pressurizer
RB	Reactor Building
RC	Reactor Coolant
RCP	Reactor Coolant Pump
RCS	Reactor Coolant System
RPS	Reactor Protection System
RV	Reactor Vessel
SAR	Safety Analysis Report
SBLOCA	Small Break Loss Of Coolant Accident
SBO	Station Blackout
SCM	Subcooling Margin
SG	Steam Generator
SGTR	Steam Generator Tube Rupture
SPDS	Safety Parameter Display System
T. S.	Technical Specifications
T/C	Thermocouple
TBV	Turbine Bypass Valve
T_{hot}	Hot Leg Temperature
T_{sat}	Saturation Temperature
VSSV	Vital System Status Verification

I. INTRODUCTION

This document describes the Critical Tasks (CTs) delineated by the B&WOG Generic Emergency Operating Guideline (GEOG).

CRITICAL TASK DEFINITION

The term "Critical Task", is defined in NUREG-1021, OPERATOR LICENSING EXAMINER STANDARDS FOR POWER REACTORS. In accordance with that standard, a critical task must require operator intervention for successful implementation and include the following elements:

- have **safety significance** to the plant or the public
- provide at least one plant staff member with appropriate **cues**
- have measurable **performance** indicators
- give at least one plant staff member **feedback** on the plant staff 's action or inaction

Safety Significance: A task is considered to be essential to safety if it is expected that improper performance or omission of the task would result in direct adverse consequences to the plant or public safety or in significant degradation in the mitigative capability of the plant. At the highest level, the processes considered significant to safety are those that prevent the failure of fission product boundaries. This leads to the following overall "mitigation objectives" related to these safety significant processes:

- Add/maintain appropriate amount of water mass to the RCS.
- Establish and maintain appropriate decay heat flow from core to heat sinks.
- Mitigate excessive heat flow from core to available heat sinks.
- Maintain/establish fission product boundaries.
- Maintain acceptable limits of radiation release due to SGTR induced RB bypass.
- Reactivity control to provide adequate shutdown margin.
- Prevent degradation of the mitigative capability of the plant.

Cue: A cue is an external stimulus that prompts execution of the action by plant staff. Examples of appropriate cues include:

- Verbal direction by or reports from plant staff.
- Procedure steps, e.g., satisfying entry conditions, flow chart decision points and "response not obtained" columns.
- Indication of a system/component malfunction (including passive failures) by meters or alarming devices.

Performance Indicators: A performance indicator consists of positive actions that an observer can objectively identify taken by at least one member of the crew. Examples of performance indicators are:

- Control manipulations, e.g., manual reactor trip, trip RCPs, start HPI pump and open PORV.
- Verbal notifications to plant staff of successful CT execution, e.g., "all control rods inserted" following manual reactor trip action.
- Actions taken as a result of transition to a symptom mitigation section of the GEOG, e.g., EFW initiated in Loss of SCM section.

Feedback: Feedback is the effect(s) of execution of the CT. Examples of performance feedback include:

- Parameter trends, such as RCS pressure, RB pressure and temperature and RCS subcooling margin.
- Change in status measuring systems, e.g., limit switch illumination of lamps, indication of electrical breaker closure, electrical meter changes and on-off sonic flow indicators.
- Verbal notifications of equipment/systems status change in response to execution of a CT.

Minimum actions described here are intended only to satisfy training objectives. While they do represent actions considered necessary to accomplish "critical tasks", they are not intended to represent the entire set of bases necessary to support the Emergency Operating Procedures (EOPs.) This document is in no way intended to supersede the Technical Bases Document.

SCOPE

The scope of CT identification is based on GEOG guidance that is used initially when a transient occurs to provide safe-controlled plant conditions. This guidance is associated with GEOG Tabs III.A, III.B, III.C, III.D and III.E. Along with this, consideration was given to transient length. As discussed in Reference 2, guidance evaluated for CT consideration was limited to that which would reasonably be expected to be executed within a 45 to 60 minute time period following transient initiation.

One exception to these criteria is CT-15, Terminate HPI Cooling. This guidance is found in a GEOG cooldown section, but may be needed within the 45 to 60 minute time frame. Another potential exception is the transition from the BWST to the sump in IV.A. But this activity is adequately covered by CT-9, Switch ECCS Suction to Sump, in III.B, III.D and V.C.

II. SAFETY SIGNIFICANT PROCESS CRITICAL TASKS

A. CTs BASED ON: ADD/MAINTAIN APPROPRIATE RCS WATER MASS

CT-1 Trip all RCPs (Rule 1.0)
CT-2 Initiate HPI (Rules 1.0, 2.0 and 3.0)
CT-3 Isolate Possible RCS Leak Paths
CT-4 Initiate LPI
CT-5 Control HPI (Rule 2.0)
CT-6 CFT Valves
CT-7 Minimize SCM
CT-9 Switch ECCS Suction to Sump
CT-10 Establish FW Flow and Feed SG(s) (Rules 1.0 and 4.0)

B. ESTABLISH AND MAINTAIN APPROPRIATE DECAY HEAT FLOW FROM CORE TO HEAT SINKS

B.1 CTs BASED ON: MITIGATE INADEQUATE AND MAINTAIN ADEQUATE HEAT FLOW FROM CORE TO HEAT SINKS

CT-10 Establish FW Flow and Feed SG(s) (Rules 1.0 and 4.0)
CT-11 Control SG Pressure (adjust TBVs/ADVs) to: Maintain RC Temperature Constant or Maintain Appropriate Pri-Sec ΔT/Cooldown Rate
CT-12 Establish Natural Circulation RC Flow
CT-13 PORV Control For Heat Transfer
CT-14 Initiate HPI Cooling
CT-15 Terminate HPI Cooling
CT-26 Restore Feed To A Dry SG (intact or trickle feed)

B.2 CTs BASED ON: MITIGATE EXCESSIVE HEAT FLOW FROM CORE TO HEAT SINKS

CT-11 Control SG Pressure (adjust TBVs/ADVs) to: Maintain RC Temperature Constant or Maintain Appropriate Cooldown Rate
CT-16 FW Flow Control
CT-17 Isolate Overcooling SG(s)
CT-18 Turbine Trip

C. CTs BASED ON: MAINTAIN/ESTABLISH FISSION PRODUCT BOUNDARIES

CT-3 Isolate Possible RCS Leak Paths
CT-19 Maintain RB Radiation Boundary (includes SG tubes)
CT-20 RCS Pressure Control to Prevent Exceeding RV P-T Limits and Comply with PTS Guidance
CT-25 Temperature Control to Limit RV Head Stress

D. CTs BASED ON: MAINTAINING ACCEPTABLE LIMITS OF RADIATION RELEASES DUE TO SGTR INDUCED RB BYPASS

CT-21 Limit Uncontrolled Radiation Release
CT-7 Minimize SCM
CT-22 Reduce Steaming/Isolate Affected SGs (includes use of SG drains)

E. CTs BASED ON: REACTIVITY CONTROL TO PROVIDE ADEQUATE SHUTDOWN MARGIN

CT-23 Establish and Maintain Reactor Shutdown Requirements
CT-24 Shutdown Reactor - ATWS

F. CTs BASED ON: PREVENTING DEGRADATION OF THE MITIGATIVE CAPABILITY OF THE PLANT

CT-8 Electrical Power Alignment
CT-27 Implementation of Control Room Habitability Guidance
CT-28 Maintain RCS Make Up Inventory
CT-29 Maintain SG availability
CT-30 Control RCS Inventory
CT-31 Instrument Systems Power Alignment
CT-32 Bypass/Realign ECCS Actuation/Components

III.A DESCRIPTION OF CTs BASED ON: ADDING/MAINTAINING APPROPRIATE RCS WATER MASS

CT-1: TRIP ALL RCPs (Rule 1.0)[1]

Fulfillment of this CT requires the following:

Trip all RCPs

1.0 PLANT CONDITIONS

The GEOG prescribes performance of this CT anytime adequate subcooling margin (SCM) is lost. It is intended that tripping of all RCPs be accomplished immediately following a loss of SCM (and verification that the reactor is shutdown), and no later than [1or 2] minutes of loss of SCM, depending on plant-specific ECCS capability. If this is not accomplished then it is intended that the RCPs not be tripped, i.e., the RCPs should remain running if they cannot be tripped within [1 or 2] minutes of the loss of SCM.

2.0 ASSOCIATED GEOG BASES

SBLOCA analyses were performed using conservative Appendix K assumptions with the objective of meeting 10CFR50.46 criteria. These analyses predicted that continued RCP operation, during certain SBLOCAs, could lead to RCS void fractions of 70% if RCPs continued to operate longer than [1 or 2] minutes following initiation of the SBLOCA. The analyses predicted that if RCPs were tripped after these high void fractions occurred, the core would not be adequately covered and fuel clad failure would occur.

For more realistic assumptions (e.g., full flow from 2 HPI pumps, 1.0 times decay heat, etc.) the time period to reach these high RCS void fractions was > 10 minutes. However, the GEOG maintained the [1 or 2] minute time period for the following reasons:

[1] Rule 1.0 provides the following guidance relative to this CT:
- If RCPs not tripped within [1 or 2] minutes after a loss of SCM, then RCP operation (existing RCP combination) must be maintained until SCM is restored or until minimum LPI flow is established.
- If SCM is lost, immediately following RCP restart, then the RCPs do not need to be tripped immediately but must be tripped if SCM is not restored within 2 minutes.

- The process of achieving and verifying full HPI flow may take more than [1 or 2] minutes. Also, such a verification requirement represents additional "time constrained diagnosis" operator burden (Reference 3.0).
- The use of a 1 or 2 minute and a 10 minute contingency, in the guidance, was considered to increase complexity and the likelihood of confusion.
- The RCP trip on loss of SCM is intended to be an immediate action and to eliminate/reduce time-based decisions (Reference 3.0). Divergence from the concept of immediate to that of measuring time and then acting is expected to detract from this intent.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
LSCM	1.0
LHT	4.0 and 6.3
EHT	18.3
SGTR	17.6

4.0 CUES

- SCM monitor and associated alarms
- SPDS displays and associated alarms
- P-T display and associated alarms
- Lo and Lo-Lo RCS pressure alarms
- ESAS HPI actuation and associated alarms
- Verbal alert by plant staff that combinations of RCS pressure and temperature indicate a loss of SCM
- [plant specific cues]

5.0 PERFORMANCE INDICATORS

- Operation of all console RCP trip devices
- [plant specific performance indicators]

6.0 FEEDBACK

- Change of status of lamps on all console RCP trip devices
- Console and computer indicated RCS flow
- RCP breaker ammeters
- RCP breaker status computer alarms
- Verbal announcement by control room personnel of RCP status
- [plant specific feedback]

CT-2: INITIATE HPI (Rules 1.0, 2.0 and 3.0)[2]

Fulfillment of this CT requires the following:
Full flow established from 2 HPI pumps (MU pumps at Davis Besse if RC pressure > [ ] PSIG) and flows balanced

1.0 PLANT CONDITIONS

The GEOG prescribes performance of this CT anytime SCM is lost.

2.0 ASSOCIATED GEOG BASES

Whenever SCM is lost, full HPI flow must be provided to the RCS. Full HPI flow is established to provide maximum core heat removal. HPI will provide heat removal from the core by continual addition of low enthalpy water to the RCS. Full HPI flow is required to restore SCM as quickly as possible. As long as SCM exists the core is assured of being covered and, therefore, adequately cooled. For this reason, it is important to reestablish SCM as quickly as possible. Also, full HPI flow is required to provide subcooled RC for primary to secondary heat transfer. If the SGs are available for heat removal, then adding water to the RCS will replenish the heat transfer medium for primary to secondary heat transfer.

Full HPI is achieved by operating two HPI pumps and balancing the HPI flow. HPI flow should be verified as full flow for current RCS pressure conditions. The intent of balancing the HPI flow is to address such failures as a break in the HPI injection line. These failures will cause imbalances in the HPI flow with the result that that HPI to the RV may not be as large as possible. For example, if an HPI line break exists, the broken line may have a much higher flow rate than in each of the unbroken lines. If flow is throttled only in the broken line, then more flow will go through each of the other lines to the RCS and less HPI water will be lost out the broken line, thus, the flowrate in each line will trend toward a balanced condition. The intent of balancing the flow is to increase the total flow reaching the RCS and not to try to make the flow through each flow path exactly equal. Balancing may or may not be

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2 This CT should be performed in accordance with Rule 1.0, Loss of SCM Rule, Rule 2.0, HPI Throttling/Termination Rule and Rule 3.0, Pressurized Thermal Shock (PTS) Rule.

Relative to Rule 1.0 and CT-2, the following guidance is provided:
- Full flow may require flow balancing or isolation of a broken HPI line accomplished by plant specific methods. The intent is to ensure minimum flows required for LOCA are met.

inherent in the HPI system design by use of such devices as cross-connected injection lines, venturi flow nozzles, orifices and preset valve positions.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
VSSV	11.0
LSCM	2.0 and 6.0
EHT	5.0
SGTR	1.0

4.0 CUES

- SCM monitor and associated alarms
- SPDS displays and associated alarms
- P-T display and associated alarms
- Lo and Lo-Lo RCS pressure alarms
- ESAS HPI actuation and associated ESAS alarms
- Verbal alert by plant staff that combinations of RCS pressure and temperature indicate a loss of SCM
- [plant specific cues]

5.0 PERFORMANCE INDICATORS

- Operation of HPI/MU pump start switches
- Operation of HPI/MU valve switches
- [plant specific performance indicators]

6.0 FEEDBACK

- HPI/MU pump status indication
- HPI/MU valves status indication
- HPI/MU flow
- Verbal indication by plant staff of HPI/MU flow status
- [plant specific feedback]

CT-3: ISOLATE POSSIBLE RCS LEAK PATHS

Fulfillment of this CT requires the following:

Close the following valves if they are available and open and it is possible to close them:
- PORV and PORV block valve
- Pressurizer spray valve and spray block valve
- RC letdown valves
- Pressurizer vent and sample valves
- Hot leg and RV head vents
- [any other plant specific leak isolation]

NOTE: Initiation of HPI cooling can result in a loss of SCM. In this case, the PORV and PORV block valve must not be closed.

1.0 PLANT CONDITIONS

The GEOG prescribes performance of this CT when SCM is lost.

2.0 ASSOCIATED GEOG BASES

All isolable leaks should be isolated, if possible. There are several possible leaks in the RCS which may be isolated by closing certain valves. These may include:

1. The PORV
2. PORV block valve
3. Pressurizer spray block and spray valve
4. Pressurizer vent valves
5. Pressurizer sample valves
6. Hot leg high point vent valves
7. Reactor vessel head vent valves

Station Blackout procedures include provisions for minimizing primary inventory losses including isolating all letdown flows and other known leak paths and closing seal return valves. Establishing seal injection when power is restored reduces primary leakage through seals.

Isolation of the letdown line is accomplished during HPI cooling.

If HPI is not available during attempts to establish HPI cooling, then the PORV is ensured closed to reduce primary inventory losses.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
VSSV	10.b and 10.c
LSCM	8.0
LHT	6.2 and 6.4.1
EHT	18.2 and 18.4.1

4.0 CUES

- SCM monitor and associated alarms
- SPDS displays and associated alarms
- P-T display and associated alarms
- Lo and Lo-Lo RCS pressure alarms
- ESAS HPI actuation and associated ESAS alarms
- Verbal alert by plant staff that combinations of RCS pressure and temperature indicate a loss of SCM
- [plant specific cues]

5.0 PERFORMANCE INDICATORS

- Operation of associated valve controls
- [plant specific performance indicators)

6.0 FEEDBACK

- Valve status indication
- Verbal indication by plant staff of valve status
- Associated process flows
- [plant specific feedback]

CT-4: INITIATE LPI

Fulfillment of this CT requires the following:
Operation of two LPI pumps with suction from the BWST and LPI valves open
or
Operation of one LPI pump with suction from the BWST, cross-tie open (if applicable) and LPI valves open (or throttled if applicable)

1.0 PLANT CONDITIONS

The GEOG prescribes performance of this CT anytime LPI initiation setpoints are reached.

2.0 ASSOCIATED GEOG BASES

If a larger LOCA occurs (e.g., LOCAs that reduce and maintain RCS pressure < LPI pump discharge pressure) the RCS will rapidly cool and depressurize. In this situation LPI along with HPI and CF will provide inventory for core recovery as well as long term core cooling.

Proper operation of the LPI system is provided as soon as LPI is actuated whether manually or automatically. This includes proper valve alignment. If LPI is actuated when RCS pressure is > shutoff head of the LPI pumps, then there will be no LPI flow to the RCS until RCS pressure decreases below the operational pressure of the LPI pumps.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
VSSV	11.0
LSCM	2.0 and 6.0

4.0 CUES

- SPDS displays and associated alarms
- Lo-Lo RCS pressure alarms
- ESAS LPI actuation and associated ESAS alarms
- Verbal alert by plant staff that combinations of RCS pressure has decreased to the LPI actuation setpoint
- [plant specific cues]

5.0 PERFORMANCE INDICATORS

- Operation of LPI pump controls
- Operation of LPI valve controls
- [plant specific performance indicators]

6.0 FEEDBACK

- LPI pump status indication
- LPI valves status indication
- LPI flow
- Verbal indication by plant staff of LPI flow status
- [plant specific feedback]

CT-5 CONTROL HPI (Rule 2.0)[3]

This CT will be fulfilled if the following are adhered to during HPI operations:
a) HPI flow may not be throttled unless SCM exists.
b) HPI flow must be throttled to prevent violating the RV P-T limit.
c) HPI flow must be throttled to prevent exceeding [pump runout]
d) HPI flow must be maintained greater than [minimum allowable pump flow]

1.0 PLANT CONDITIONS

The GEOG prescribes performance of this CT whenever HPI has been initiated.

2.0 ASSOCIATED GEOG BASES

The only requirement to allow throttling of HPI is the existence of SCM. Throttling means to reduce the HPI flow rate below full flow rate. In general, HPI flow may be throttled anytime SCM exists as indicated by the incore T/Cs. HPI flow must not be throttled when SCM is lost.

If the PORV is not maintained open (i.e., allowed to cycle) during HPI cooling, the RC will continue to heat up as the PORV is opened and closed either automatically or manually to control pressure. This heatup will continue until SCM is lost or HPI mass flow starts removing more energy than is being added to the RC. Full HPI flow must always be maintained when SCM does not exist. In addition, while the PORV is being cycled, full HPI flow must be maintained until the core outlet temperature is decreasing. This criteria ensures that full HPI flow will be maintained if the PORV is permitted to cycle; therefore, throttling the HPI flow cannot be permitted until the HPI flow is sufficient to remove decay heat.

MU/HPI flow MUST be THROTTLED to prevent overpressurizing the RCS when SCM exists by keeping the RC pressure below the RV P-T limit. HPI flow must be maintained within acceptable operational bounds. This requires maintaining HPI

[3] Rule 2.0 provides the following guidance relative to this CT:
- HPI may not be throttled, even with SCM, if HPI cooling is in progress until core exit thermocouple temperatures are decreasing, except to prevent violating the RV P-T limit.
- When reducing flow to prevent pump runout, care should be taken to not reduce flow more than necessary to prevent exceeding the limit.

flow greater than the minimum allowable pump flow rate and less than the pump runout flow rate

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
LSCM	2.0
LHT	6.1
EHT	18.1
SGTR	17.4 and 17.5

4.0 CUES

- SCM monitor and associated alarms
- SPDS displays and associated alarms
- P-T display and associated alarms
- RCS pressure and temperature (incore T/Cs)
- SG level
- SG pressure
- MFW flow
- EFW flow
- Verbal alert by plant staff that combinations of RCS pressure and temperature indicate a need for HPI control
- [plant specific cues]

5.0 PERFORMANCE INDICATORS

- Operation of HPI pump controls
- Operation of HPI valve controls
- [plant specific performance indicators]

6.0 FEEDBACK

- HPI pump status indications
- HPI valve status indications
- HPI Flow
- RCS pressure and temperature (incore T/Cs)
- Verbal indication by plant staff that HPI flow is being controlled
- [plant specific feedback]

CT-6: CFT VALVES

Fulfillment of this CT requires the following:
If CFT valves are not open, then open them

1.0 PLANT CONDITIONS

The GEOG prescribes performance of this CT when SCM has been lost and RCS pressure could decrease below the CFT operational pressure.

2.0 ASSOCIATED GEOG BASES

Core flood tanks provide a source of inventory for make up to the core. Generally, such make up is associated with a large break DBA LOCA. This is because analysis indicates that these LOCAs can be successfully mitigated, without exceeding the criteria of 10CFR50.46, if 1 HPI pump, 2 CFTs and 1 LPI pump are operable. For this reason the CFT isolation valves are maintained open at all times following plant heatup and pressurization above their operational pressure. The operator actions associated with these kinds of LOCAs are to initiate full HPI flow, full LPI flow and open CFT valves, if they are closed.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
LSCM	5.4 and 6.0

4.0 CUES

- SCM monitor and associated alarms
- SPDS displays and associated alarms
- P-T display and associated alarms
- Lo and Lo-Lo RCS pressure alarms
- ESAS actuation and associated ESAS alarms
- Verbal alert by plant staff that indications of a LOCA exist
- [plant specific cues]

5.0 PERFORMANCE INDICATORS

- Operation of CFT isolation valve controls
- [plant specific performance indicators]

6.0 FEEDBACK

- Valve status indication
- Verbal indication by plant staff that valves are open
- Decreasing CFT level and pressure once RCS pressure decreases < CFT pressure
- [plant specific feedback]

CT-7: MINIMIZE SCM

Fulfillment of this CT requires the following:
Maintain RCS pressure close to but above minimum allowable SCM and, if applicable, the RCP NPSH limit.

1.0 PLANT CONDITIONS

The GEOG prescribes performance of this CT during SGTR mitigation when SCM is greater than the minimum allowable.

2.0 ASSOCIATED GEOG BASES

Except when RCP NPSH limits are applicable and are more restrictive, RCS pressure should be maintained close to, but above, the minimum SCM to minimize RCS-SG ΔP. The reason for minimizing RCS-SG ΔP is to reduce the leak flowrate from primary to secondary to as low as possible. Therefore, this procedure (minimizing SCM) is desirable whenever possible during SGTR mitigation.

Reducing the leak flowrate from the RCS to the secondary side of a SG reduces RCS losses and when accomplished with an impaired steam system (e.g., weeping MSSV and MSL leak) should reduce integrated radiation releases from the impaired system. If the level of the leaking SG can be maintained within normal operating limits, then the SG will remain available for continued use during the cooldown, thus enhancing the transient mitigation capability of the plant.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
SGTR	7.0

4.0 CUES

- SCM monitor and associated alarms
- SPDS displays and associated alarms
- P-T display and associated alarms
- Verbal alert by plant staff that SCM may be reduced
- [plant specific cues]

5.0 PERFORMANCE INDICATORS

- Operation of MU/HPI pump and valve controls
- Operation of normal or auxiliary spray valve controls
- Operation of PORV and/or pressurizer vent valve controls
- [plant specific performance indicators]

6.0 FEEDBACK

- RCS pressure and temperature
- MU/HPI pump and valve status indications
- Normal and auxiliary spray valve status indications
- PORV and pressurizer vent valve status indications
- Verbal indication by plant staff that SCM is being controlled
- [plant specific feedback]

CT-9: SWITCH ECCS SUCTION TO SUMP

Fulfillment of this CT requires the following:
Switch LPI pump suction to the RB sump in accordance with [plant specific guidance] and if HPI is still required, establish HPI pump piggyback operation in accordance with [plant specific guidance]

1.0 PLANT CONDITIONS

The GEOG prescribes performance of this CT whenever the BWST level has decreased to the [RB sump switchover level].

2.0 ASSOCIATED GEOG BASES

The LPI suction must be changed from the BWST to the RB emergency sump when switchover conditions are met. The BWST water inventory remaining should provide sufficient time to make a transition to the emergency sump to prevent losing LPI suction water, provide adequate LPI pump NPSH and prevent air entrapment in the LPI flow. The switchover from the BWST to the RB sump must not be made before switchover conditions are met. The reason is that both LPI pumps may cavitate due to inadequate RB sump level. If HPI pumps will continue to operate, then they will have to have their suction switched to the LPI discharge establishing "piggyback" operation.

If indications of sump degradation occur, then actions to minimize the effects and preserve ECCS operation must be performed promptly. Throttling LPI to [minimum flow rate] and terminating RBS if possible will both increase available NPSH by reducing pressure losses across the sump screens and decrease the required NPSH by the running pumps.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
LSCM	10.0
EHT	3.0
V.C	1.0, 2.0, 3.0, 4.0, 5.0 and 6.0

4.0 CUES

- BWST level alarms

- Verbal indication by plant staff that the BWST level is approaching the switchover level
- [plant specific cues]

5.0 PERFORMANCE INDICATORS

- Operation of associated valve controls
- Operation of associated pump controls
- [plant specific performance indicators]

6.0 FEEDBACK

- Associated valve status indication
- Associated pump status indication
- HPI/LPI flow
- Verbal indication by plant staff that BWST to sump switchover has been successful
- BWST level
- [plant specific feedback]

CT-10: ESTABLISH FW FLOW AND FEED SG(s) (Rules 1.0 and 4.0)[4]

Fulfillment of this CT requires the following:

In accordance with minimum flow rates and SG levels of Rule 4.0, feed available SG(s) to appropriate level using [plant specific FW pump(s)]. If [plant specific FW pump(s)] not available, then use [plant specific alternate pumps]. Establish and control SG level at [loss of SCM setpoint]).

1.0 PLANT CONDITIONS

The GEOG prescribes performance of this CT anytime SCM is lost.

2.0 ASSOCIATED GEOG BASES

Heat removal from the reactor coolant by the SGs is required for a range of LOCAs to satisfy the acceptance criteria of 10 CFR 50.46. For this range of LOCAs, the RCS inventory will decrease causing a loss of natural circulation (i.e. during the transition from saturated natural circulation to boiler condenser cooling), resulting in a period of little primary to secondary heat transfer. This can cause the RCS to heat up and repressurize causing a decrease in MU/HPI flow rate such that MU/HPI flow by itself may not be sufficient for keeping the core covered and adequately cooled. However, for this range of LOCAs enough reactor coolant will be lost out the break, prior to any core uncovering, to provide a sufficient steam volume in the primary side of the SG tubes for boiler condenser cooling to occur. Boiler condenser cooling will reduce RCS pressure so that MU/HPI flow rate can be increased to a value where its heat removal rate matches the decay heat generation rate such that peak clad temperatures remain within acceptable limits.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
LSCM	3.0

[4] This CT should be accomplished in accordance with Rule 1.0, Loss of SCM Rule and Rule 4.0, Feedwater/SG Control Rule.

4.0 CUES

- SCM monitor and associated alarms
- SPDS displays and associated alarms
- P-T display and associated alarms
- Lo and Lo-Lo RCS pressure alarms
- ESAS HPI actuation and associated alarms
- Verbal alert by plant staff that combinations of RCS pressure and temperature indicate loss of SCM
- [plant specific cues]

5.0 PERFORMANCE INDICATORS

- Operation of associated EFW/MFW valve controls
- Operation of EFW/MFW pump controls
- [plant specific performance indicators]

6.0 FEEDBACK

- EFW/MFW flow
- SG level
- RCS pressure and temperature
- Verbal alert by plant staff of SG(s) level increase
- [plant specific feedback]

III.B ESTABLISH AND MAINTAIN APPROPRIATE DECAY HEAT FLOW FROM CORE TO HEAT SINKS

B.1 DESCRIPTION OF CTs BASED ON: MITIGATE INADEQUATE AND MAINTAIN ADEQUATE HEAT FLOW FROM CORE TO HEAT SINKS

CT-10: ESTABLISH FW FLOW AND FEED SG(s) (Rules 1.0 and 4.0)[5]

Fulfillment of this CT requires the following:
Feed available SG(s) using [plant specific FW pump(s)]. If [plant specific FW pump(s)] not available, then use [plant specific alternate pumps]. Establish and control at the appropriate SG level setpoint ([low level limit setpoint], [NC level setpoint] or [loss of SCM setpoint) or during trickle feeding adjust feed flow rate to control primary to secondary heat transfer.

1.0 PLANT CONDITIONS

The GEOG prescribes performance of this CT when primary to secondary heat transfer has been lost; SCM may or may not exist. FW flow and/or SG level must be controlled to maintain/initiate primary to secondary heat transfer.

2.0 ASSOCIATED GEOG BASES

The normal method of core cooling is by transferring core heat to the RC, then transferring the heat from the RC to the secondary side steam system via the SGs. This mode of heat transfer requires that adequate inventory of feedwater be supplied to the SGs, either as a liquid level, liquid flowrate or both. In the event all feedwater is lost HPI cooling can provide backup cooling of the core; however, this mode causes degradation of the RB. It is the intention of the GEOG bases to maintain appropriate FW flow, including trickle feed, to the SGs if at all possible. This includes use of approved plant specific alternate FW sources (e.g., service water, fire water systems, etc.).

5 This CT should be accomplished in accordance with Rule 1.0, Loss of SCM Rule and Rule 4.0, Feedwater/SG Control Rule.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
VSSV	4.b
LSCM	3.0
LHT	1.0, 6.4.5 and 9.0
EHT	7.1.1, 7.1.2, 7.3, 7.3.1 and 18.4.2
SGTR	9.2

4.0 CUES

- Low FW flow alarms
- SG low level alarms
- Low SG pressure alarms
- EFW/MFW pump trip alarms
- High RCS pressure and pressurizer level alarms
- SCM monitor and associated alarms
- SPDS displays and associated alarms
- P-T display and associated
- Verbal alert by plant staff that all FW flow has been lost and/or SG(s) level is inappropriate for current plant conditions
- [plant specific cues]

5.0 PERFORMANCE INDICATORS

- Operation of associated EFW/MFW valve controls.
- Operation of EFW/MFW pump controls
- [plant specific performance indicators]

6.0 FEEDBACK

- EFW/MFW flow
- SG level and pressure
- RCS pressure and temperature
- Verbal alert by plant staff of FW flow and/or SG(s) level status
- [plant specific feedback]

CT-11: CONTROL SG PRESSURE (adjust TBVs/ADVs) TO: MAINTAIN RC TEMPERATURE CONSTANT OR MAINTAIN APPROPRIATE PRI-SEC ΔT/COOLDOWN RATE

Fulfillment of this CT requires the following:

a) If there has been a loss of SCM and no HPI flow is available, then use TBVs/ADVs to initiate and maintain cooldown rate at the maximum rate possible with both SGs.

b) If there is no primary to secondary heat transfer and SG(s) are available as heat sinks, then use TBVs/ADVs to establish appropriate primary to secondary side ΔT as long as excessive RCS cooling is not occurring due to a LOCA.

c) When a or b above are not occurring and SG(s) are operable, use TBVs/ADVs to maintain RC temperature constant or at the appropriate cooldown rate:

When SCM exists the cooldown rate is ≤ T.S. limit unless a head bubble forms during natural circulation cooldown. In such a situation the limit is ≤ 50°F/HR. When the RCS is saturated, T.S. and special case RV head cooldown rates do not apply.

If a SGTR is occurring, then an emergency cooldown rate of 240°F/HR is allowed while RC temperature is > 500°F T_{hot}.

1.0 PLANT CONDITIONS

The GEOG prescribes performance of this CT for several plant conditions. Generally, control of SG pressure is accomplished to either maintain the RC temperature constant or an appropriate cooldown rate. However, the GEOG also addresses SG pressure control when there is a loss of SCM or there is inadequate primary to secondary heat transfer. If there has been a loss of SCM and no HPI is available, then both SGs are used to establish the maximum cooldown rate possible in an attempt to depressurize the RCS as quickly as possible in order to establish CF/LPI. If there has been a loss of adequate primary to secondary heat transfer, and SG(s) are available, then they are depressurized to establish an appropriate primary to secondary side ΔT in an effort to initiate natural circulation.

2.0 ASSOCIATED GEOG BASES

Whenever the RCS subcooling margin is lost and the HPI (MU/HPI at DB) flow can not be started, then a plant cooldown, at the maximum rate possible, must be started immediately and continued as long as HPI (MU/HPI at DB) flow is unavailable. If primary to secondary heat transfer has been lost and SG(s) are available as heat sinks, then it will be necessary to decrease SG pressure to establish a positive primary to secondary side ΔT in order to initiate natural circulation.

RC temperature is normally controlled by adjusting TBVs/ADVs. These valves are controlled to provide either a constant RC temperature or an appropriate cooldown rate. Appropriate cooldown rates are generally ≤ T.S. limits or in the event of a NC cooldown with a head void, ≤ 50°F/HR. Also, an emergency cooldown rate of 240°F/HR is allowed when RC temperature is > 500°F T_{hot} during mitigation of a SGTR.

When the RCS is saturated normal Technical Specification cooldown rates and the special case RCS cooldown rate for RV head void concerns do not apply. The reasons that the cooldown rate limits do not apply are that pressure stresses are minimal (the RC pressure is much less than assumed in establishing the cooldown limits) and other considerations become more important.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
VSSV	5.0
LSCM	5.1, 5.2, 12.1, 12.2 and 12.3
LHT	10.0 and 14.0
EHT	6.1.2, 7.1.1 and 7.1.2
SGTR	8.0, 9.0 and 9.1

4.0 CUES

- SPDS displays and associated alarms
- SCM monitor and associated alarms
- P-T display and associated alarms
- Verbal alert by plant staff that cooldown rate is inappropriate
- Verbal alert by plant staff that SCM has been lost and there is no HPI flow
- Verbal alert by plant staff that SG(s) are operable but there in no primary to secondary heat transfer
- Verbal alert by plant staff the a head bubble has formed
- [plant specific cues]

5.0 PERFORMANCE INDICATORS

- Operation of TBV/ADV controls
- [plant specific performance indicators]

6.0 FEEDBACK

- RC temperature and pressure
- SG pressure
- Verbal notification by plant staff of cooldown rate status conditions
- [plant specific feedback]

CT-12: ESTABLISH NATURAL CIRCULATION RC FLOW

Fulfillment of this CT requires the following:

a. If SCM exists and primary to secondary heat transfer has not been lost:

Establish and control at [NC setpoint].

Reduce SG pressure using the TBVs/ADVs to establish a positive primary to secondary side ΔT.

b. If primary to secondary heat transfer has been lost:

Establish and maintain appropriate SG levels in accordance with Rule 4.0.

Reduce SG pressure using the TBVs/ADVs to establish a positive primary to secondary side ΔT of ~ 50°F. If primary to secondary heat transfer is not established, then open the HPVs in loop(s) without RCPs running. RCS pressure should be maintained constant or slightly increasing using MU or HPI. RCS pressure should not be increased if PTS guidance is invoked.

1.0 PLANT CONDITIONS

The GEOG prescribes performance of this CT whenever forced RC flow cannot be established and SGs are available as heat sinks.

2.0 ASSOCIATED GEOG BASES

Whenever forced RC flow is not available, NC flow should be established. If NC flow cannot be established, then the back up mode of core cooling is HPI cooling. While this method is adequate to cool the core, NC flow enhances the transient mitigation capability of the plant by maintaining SGs operable. Also, maintaining primary to secondary heat transfer via NC eliminates the need to add RC to the RB as would occur with the back up feed and bleed HPI core cooling mode.

When there is no primary to secondary heat transfer the hot leg should be vented by opening the hot leg HPVs to remove any steam or gas which may be blocking natural circulation flow of the RC. While the HPVs are open, RCS pressure should be maintained constant or slightly increasing to prevent additional steam formation in the loop. However, if PTS guidance has been invoked, then RCS pressure should not be increased.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
LHT	1.0, 9.0, 10.0, 12.0 and 15.0

4.0 CUES

- RCP trip alarms
- Low RC flow alarm
- Low SG pressure alarms
- Verbal alert by plant staff that all RCPs have tripped
- Verbal alert by plant staff that there is no primary to secondary heat transfer
- SPDS displays and associated alarms
- SCM monitor and associated alarms
- P-T display and associated alarms
- [plant specific cues]

5.0 PLANT PERFORMANCE INDICATORS

- Operation of EFW/FW pump and valve controls
- Operation of TBV/ADV controls
- Operation of hot leg HPV controls
- Operation of MU/HPI pump and valve controls
- [plant specific performance indicators]

6.0 FEEDBACK

- Verbal verification that natural circulation has been established
- SG pressure
- RC temperature
- [plant specific feedback]

CT-13: PORV CONTROL FOR HEAT TRANSFER

Fulfillment of this CT requires the Following:

During mitigation of loss of SCM with < full flow from 1 HPI pump, manually cycle the PORV as necessary to maintain RCS pressure between the PORV setpoint and 1600 PSIG.

During mitigation of LHT, manually cycle the PORV as necessary to maintain RCS pressure between the PORV setpoint or RV P-T limit and minimum SCM (if subcooled) or 1600 PSIG (if saturated)

1.0 PLANT CONDITIONS

The GEOG prescribes performance of this CT when primary to secondary heat transfer is inadequate.

2.0 ASSOCIATED GEOG BASES

During action to restore primary to secondary heat transfer, RCS pressure must be continually controlled. RCS pressure is controlled by manually opening and closing the PORV. This prevents excessive PORV cycling which could occur if the PORV were allowed to operate automatically.

During mitigation of loss of SCM, if the PORV setpoint is reached, then the PORV is manually cycled to reduce RCS pressure while minimizing automatic PORV cycling. The PORV is closed when RCS pressure decreases to about 1600 PSIG. The use of 1600 PSIG is a compromise between minimizing the necessary manual cycles and requiring long periods of the PORV being open which would add to the RC inventory loss. There is no specific bases for 1600 PSIG.

During mitigation of LHT the PORV should be manually cycled to control RCS pressure between the PORV setpoint or RV P-T limit and 1600 PSIG if the RC is saturated or minimum allowable SCM if the RC is subcooled. The PORV opening values prevent challenges to the pressurizer safety valves and the RV P-T limit while the PORV closing values maintain a positive primary to secondary side ΔT (SGs remain heat sinks).

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
LSCM	5.3
LHT	6.4.3 and 8.0

4.0 CUES

- High RCS pressure alarm
- SCM monitor and associated alarms
- SPDS displays and associated alarms
- P-T display and associated alarms
- Verbal alert by plant staff that RCS pressure has reached the PORV setpoint
- [plant specific cues]

5.0 PLANT PERFORMANCE INDICATORS

- Operation of PORV controls
- [plant specific performance indicators]

6.0 FEEDBACK

- PORV status indications
- RCS pressure and temperature
- Verbal indication by plant staff that PORV flow has been initiated
- [plant specific feedback]

CT-14 INITIATE HPI COOLING (all except Davis-Besse)

Fulfillment of this CT requires the following:

One HPI pump operating at full flow and the PORV maintained open with appropriate RCS pressure control.

1.0 PLANT CONDITIONS

The GEOG prescribes performance of this CT in order to maintain adequate core cooling when primary to secondary heat transfer is not adequate or will be intentionally terminated. HPI cooling must be initiated:

A. During mitigation of LHT

When there is no feedwater available and any of the following limits is reached:
- RCS pressure approaches the PORV setpoint
- RCS P-T limit
- PORV automatically lifts

or

The RCS heats to the point where SCM is lost

B. During mitigation of EHT and SGTR and primary to secondary heat transfer is intentionally terminated.

C. During loss of SCM when primary to secondary heat transfer is not adequate and SCM has not been restored.

2.0 ASSOCIATED GEOG BASES

HPI flow supplied to the core and subsequently released from the pressurizer (i.e., through the PORV and/or pressurizer safety valves) can provide adequate core cooling if all feedwater is lost. This has been determined by an analysis that used 10CFR50 Appendix K assumptions for all inputs except decay heat; the input assumption for decay heat was: 1.0 x (ANS 1971 decay heat value). This analysis showed that one HPI pump started at full flow within 20 minutes of the loss of feedwater, in conjunction with mass and energy removal through only the pressurizer safety valves (i.e., no PORV flow), was sufficient to cool the core (criteria of 10CFR50.46 were not violated). This situation describes RC pressure near the pressurizer safety valve setpoint.

If all feedwater is lost, the action to establish HPI cooling must be made expeditiously in order to establish core cooling before too much RC is lost. For this reason, if all feedwater is lost, HPI cooling should be established when or before the RCS pressure reaches the PORV open setpoint (i.e., the first automatic PORV lift following loss of all feedwater). This initiation criteria is appropriate, since it represents the point when RC inventory will commence being lost. Further, keying initiation of HPI cooling to RC pressure avoids the use of time as an operational criteria.

Whenever HPI cooling is initiated and only one HPI pump is operable then the PORV must be maintained open. While analysis indicated that one HPI pump operating in conjunction with pressurizer safety valves can adequately cool the core, it also indicated a small margin of collapsed liquid level to core uncovery (this margin was greater for two HPI pump operation). Promptly opening the PORV reduces the rate at which the net RCS inventory decreases, hence, the margin to core uncovery for this limited makeup condition is increased. This means that RCS inventory loss throughout the transient will not be as great as it would be if the PORV were not opened or if PORV opening was delayed. Due to the minimum margins resulting from HPI cooling with only one HPI pump operating, it has been determined that the PORV must be opened for this situation.

The RC pressure must not exceed the RV P-T limit. Therefore, if the RC pressure increases to the RV P-T limit following a loss of primary to secondary heat transfer, the PORV should be opened (i.e., to limit RC pressure increase) and HPI pumps started. The HPI flow should be throttled as necessary to try and keep the RC pressure below the RV P-T limit.

If PTS guidance is invoked, or will be invoked due to HPI initiation, then RC pressure must be controlled in accordance with PTS guidance per Rule 3.0. After initiating HPI and opening the PORV, throttling HPI may be necessary to maintain RC pressure in accordance with PTS guidance.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
LSCM	13.2
LHT	6.1, 6.4.5, 6.4.6 and 6.4.7
EHT	18.1, 18.4.5 and 18.4.7
SGTR	17.4

4.0 CUES

- Incore Thermocouple Temperature
- SCM monitor and associated alarms
- SPDS displays and associated alarms
- P-T display and associated alarms
- SG level
- SG pressure
- RC temperature
- MFW flow
- EFW flow
- Verbal alert by plant staff that indications of inadequate primary to secondary heat transfer are occurring.
- [plant specific cues]

5.0 PERFORMANCE INDICATORS

- Operation of HPI pump controls
- Operation of HPI valve controls
- Operation of PORV and PORV block valve controls
- [plant specific performance indicators]

6.0 FEEDBACK

- HPI pump status indication
- HPI valves status indication
- PORV and PORV block valve status indication
- HPI flow
- Verbal notification by plant staff of HPI flow status
- Incore thermocouple temperatures
- [plant specific feedback indicators]

CT-14 INITIATE HPI COOLING (Davis-Besse only)

Fulfillment of this CT requires the Following:

Operation of 1 MU pump at full flow through one MU flow path piggybacked on LPI with the PORV and PORV block valve maintained open in conjunction with operation of all available HPI pumps piggybacked with LPI and associated HPI valves open.

Maintain appropriate RCS pressure control.

1.0 PLANT CONDITIONS

The GEOG prescribes performance of this CT in order to maintain adequate core cooling when primary to secondary heat transfer is not adequate or will be intentionally terminated. HPI cooling must be initiated:

A. During mitigation of LHT

When feedwater is not available and any of the following occurs:

- flow cannot be achieved from two MU pumps
- The PORV fails open prior to core exit temperature reaching 600°F
- When any of the following limits is reached:
  - Core exit temperature reaches 600°F
  - RC pressure increases to the RV P-T limit

or

The RCS heats to the point where SCM is lost

B. During mitigation of EHT and SGTR and primary to secondary heat transfer is intentionally terminated.

C. During loss of SCM when primary to secondary heat transfer is not adequate and SCM has not been restored.

2.0 ASSOCIATED GEOG BASES

Calculations were performed which determine that the core will not uncover if the following conditions exist:

a. full MU flow to the RCS via the two operating MU flow paths,
b. two MU pumps are operating,
c. MU flow to RCS is started within ten minutes after T_{hot} = 600°F,
d. the MU pumps are taking suction from the BWST and
e. the flow out of the RCS is via the pressurizer safety valves.

Another calculation was performed which assumed:

a. flow to the RCS is via only one MU flow path,
b. one MU pump operating,
c. MU/LPI piggyback,
d. MU/HPI cooling operation started within ten minutes after T_{hot} = 600°F and
e. flow from the RCS is via an open PORV.

This calculation determined that the collapsed core liquid level decreases to about 6 inches below the top of the core. However, the core should still be adequately cooled because a liquid froth would exist at the top of the core rather than a collapsed liquid level. Although the core is determined to be adequately cooled, the margin to onset of ICC conditions is significantly reduced. Because of this, the bases do not allow waiting until T_{hot} reaches 600°F before starting MU/HPI cooling when only one MU pump starts. Instead the PORV and PORV block valve should be immediately opened to initiate MU/HPI cooling. This will minimize the decrease in RCS water level and reduce RCS pressure thus maximizing flow to the core.

The bases state to operate the MU pumps in the MU/LPI piggyback mode with two operating MU pumps even though the analysis determined that the core could be adequately cooled without doing so (i.e., piggyback operation of the MU pump is only necessary for adequate core cooling when only one MU pump is operational). The piggyback mode is stipulated for conservatism since the additional flow to the RCS will increase the MU/HPI cooling capability and the 600°F trigger is based on piggyback capability existing, and margin.

The EOP bases permit waiting until the core outlet temperature reaches 600°F before initiating MU/HPI cooling if there are two operating MU pumps. MU/HPI cooling means that there is MU and/or HPI flow established to the RCS and the PORV and PORV block valve are maintained open.

The MU/HPI cooling analyses assumed that actions were taken to initiate MU/HPI cooling ten minutes after T_{hot} reached 600°F. The EOP bases require the actions to be taken no later than 600°F. This requirement (based on engineering judgement) attempts to provide HPI flow and not rely only on MU flow.

MU/HPI cooling cools the core by adding relatively cold water to the RCS using the Makeup, HPI and LPI systems while removing relatively hot water through the Pressurizer PORV.

If only one MU pump is operational, then MU/HPI cooling must be initiated immediately (i.e., open the PORV and PORV block valve immediately to accommodate the flow established with the MU pump). However, if both MU pumps are operational, then, with the exception of opening the PORV to prevent violating the RV P-T limit, PORV opening to establish MU/HPI cooling can wait until the core outlet temperature reaches 600°F (as discussed above). This delay allows time to try and restore feedwater flow and primary to secondary heat transfer before initiating MU/HPI cooling.

It is intended by the bases that all available HPI pumps be started in piggyback mode on LPI pumps, in conjunction with operation of MU pumps, and their associated HPI valves be opened. This will provide additional flow to cool the core at RC pressures $\leq \sim$ 1830 psig. Further, if no MU pumps start then immediately running all available HPI pumps in piggyback on LPI pumps and opening the PORV and PORV block valve is expected to establish HPI flow to the core.

The RC pressure must not exceed the RV P-T limit. Therefore, if the RC pressure increases to the RV P-T limit following a loss of primary to secondary heat transfer, the PORV should be opened (i.e., to limit RC pressure increase) and HPI pumps started. The HPI flow should be throttled as necessary to keep the RC pressure below the RV P-T limit.

If PTS guidance is invoked, or will be invoked due to HPI initiation, then RC pressure must be controlled in accordance with the PTS guidance per Rule 3.0. After initiating HPI and opening the PORV, throttling HPI may be necessary to maintain RC pressure in accordance with PTS guidance.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
LSCM	13.2
LHT	5.1, 5.2, 5.4, 6.1, 6.4.5, 6.4.6 and 6.4.7
EHT	18.1, 18.4.5 and 18.4.7
SGTR	17.4

4.0 CUES

- Incore Thermocouple Temperature
- SCM monitor and associated alarms
- SPDS displays and associated alarms
- P-T display and associated alarms
- SG level
- SG pressure
- RC temperature
- MFW flow
- EFW flow
- Verbal alert by plant staff that indications of inadequate primary to secondary heat transfer are occurring.
- [plant specific cues]

5.0 PERFORMANCE INDICATORS

- Operation of MU pump and MU valve controls
- Operation of HPI pump and HPI valve controls
- Operation of LPI pump and LPI valve controls
- Operation of LPI to HPI supply valve controls
- Operation of PORV and PORV block valve controls
- [plant specific performance indicators]

6.0 FEEDBACK

- MU pump status indication
- Associated MU valve status indication
- HPI valves status indication
- HPI pump status indication
- MU/HPI flow
- PORV and PORV block valve status indication
- Verbal notification by plant staff of MU/HPI flow
- Incore thermocouple temperatures
- [plant specific feedback indicators]

CT-15: TERMINATE HPI COOLING

Fulfillment of this CT requires the following:

If the RCS is subcooled:

- Establish MU and letdown.
- Establish slightly decreasing RCS temperature and pressure.
- Close the PORV and PORV block valve, if necessary.
- Ensure HPVs are closed.
- If RCS leakage < normal MU system capacity, stop HPI.
- Stabilize RCS pressure and temperature.

If the RCS is saturated:

- Close the PORV and PORV block valve, if necessary.
- Ensure HPVs are closed.

1.0 PLANT CONDITIONS

The GEOG prescribes performance of this CT when primary to secondary heat transfer has been established following initiation of HPI cooling.

2.0 ASSOCIATED GEOG BASES

Once heat transfer has been restored, it is necessary to establish controlled decay heat removal. This requires recovering from HPI cooling, if initiated, by closing the PORV and HPVs, if open, and controlling HPI (HPI/MU) flow. The primary to secondary heat transfer rate should be controlled by adjusting the TBVs or ADVs to maintain the RC temperature at the present value or to begin a controlled cooldown.

If the RCS is saturated, when primary to secondary heat transfer is restored, full HPI flow must be maintained. Termination of HPI cooling in this situation only requires closing the PORV and HPVs, if open.

Termination of HPI cooling allows reclosure of the RCS pressure boundary, thus terminating RC flow to the RB through the PORV.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
IV.B	29.1, 29.2, 29.3, 29.4, 29.5 and 29.8

4.0 CUES

- SCM monitor and associated alarms
- SPDS displays and associated alarms
- P-T display and associated alarms
- Verbal alert by plant staff that primary to secondary heat transfer has been restored
- [plant specific cues]

5.0 PERFORMANCE INDICATORS

- Operation of letdown valve controls
- Operation of TBV/ADV controls
- Operation of PORV and HPV controls
- Operation of MU/HPI pump and valve controls
- [plant specific performance indicators]

6.0 FEEDBACK

- PORV and HPV status indications
- MU/HPI pump and valve status indications
- TBV/ADV status indications
- MU/HPI flow
- Letdown flow and temperature
- Verbal indication from plant staff of HPI cooling status
- [plant specific feedback)

CT-26: RESTORE FEED TO A DRY SG (intact or trickle feed)

Fulfillment of this CT requires the following:

When establishing feed flow for trickle feed ensure trickle feed can be established without causing detrimental affects to personnel and key equipment.

If RCP(s) are running, establish FW to the SG(s) and control FW flow to maintain RCS cooldown rate within limits. EFW flow is established at ≤ 450 GPM total flow and MFW flow is established at ≤ 200,000 LBM/HR total flow.

If no RCPs are running, establish EFW or MFW through the EFW nozzles and control FW flow to maintain RCS cooldown rate within limits. FW flow through the EFW nozzles is established at ≤ 200 GPM (EFW or MFW) total flow.

1.0 PLANT CONDITIONS

The GEOG prescribes performance of this CT when restoring feed flow to a dry SG.

2.0 ASSOCIATED GEOG BASES

If it is decided to perform the cooldown by using trickle feeding, it will be necessary to control the rate of FW addition to the SGs to maintain RCS cooldown limits. The FW flow rate should be adjusted to get the desired cooldown rate. If possible EFW should be used to limit SG thermal stresses. If MFW is used with the MFW nozzles, it will only be effective with forced flow.

A SG with a steam line break inside the RB should not be trickle fed if the steam release to the RB is determined to be inappropriate. Also, trickle feed should not be attempted if it would be detrimental to personnel or key equipment.

Once heat transfer is restored in the SG, feed rates can be adjusted as necessary to control the cooldown and SG tube-to-shell ΔT.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
LHT	1.0
EHT	7.3, 7.3.1 and 18.4.2

4.0 CUES

- Low SG level alarms
- Low SG pressure alarms
- Verbal alert by plant staff that no SG is available for heat transfer
- [plant specific cues]

5.0 PERFORMANCE INDICATORS

- Operation of EFW/MFW pump controls
- Operation of EFW/MFW valve controls
- [plant specific performance indicators]

6.0 FEEDBACK

- EFW/MFW flow
- SG level and pressure
- RCS pressure and temperature
- Verbal alert by plant staff of EFW/MFW flow status
- [plant specific feedback]

B.2 DESCRIPTION OF CTs BASED ON: MITIGATE EXCESSIVE HEAT FLOW FROM CORE TO HEAT SINKS

CT-11: CONTROL SG PRESSURE (adjust TBVs/ADVs) TO:

MAINTAIN RC TEMPERATURE CONSTANT

OR

MAINTAIN APPROPRIATE COOLDOWN RATE

Fulfillment of this CT requires the following:

Control of turbine bypass system using TBVs/ADVs manually to maintain desired header pressure if header pressure is not properly controlled following a reactor trip. In the event of a station blackout, RC temperature should be maintained constant (do not initiate cooldown with TBVs/ADVs) and non-essential steam loads should be isolated. If following initiation of the [secondary plant protection system] automatic isolation valves are not in proper alignment, then align valves manually.

1.0 PLANT CONDITIONS

The GEOG prescribes performance of this CT for situations where excessive RCS cooling may be occurring due to poor steam pressure control immediately following reactor trip.

2.0 ASSOCIATED GEOG BASES

Following a reactor trip, SG pressures should be controlled using the TBVs/ADVs to prevent initial RCS cooldown. In the event that [secondary plant protection system] actuation is necessary the operator provides appropriate operation of this system for its control and plant stabilization. Proper control of SG pressures leads to enhanced transient mitigation capability of the plant as normal heat removal systems remain available.

If a station blackout occurs, then secondary steam pressure should be controlled to prevent RCS cooldown and contraction.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
VSSV	5.0, 10.b and 12.0
EHT	6.2

4.0 CUES

- SPDS displays and associated alarms
- P-T display and associated alarms
- [secondary plant protection system] alarms
- Verbal alert by plant staff that cooldown rate is excessive
- [plant specific cues]

5.0 PERFORMANCE INDICATORS

- Operation of TBV/ADV controls
- Operation of [secondary plant protection system] controls
- Operation of associated steam valve controls
- [plant specific performance indicators]

6.0 FEEDBACK

- RC temperature and pressure
- SG pressure
- Verbal notification by plant staff of cooldown rates
- [secondary plant protection system] status indication
- Associated steam valve status indications
- [plant specific feedback]

CT-16: FW FLOW CONTROL

Fulfillment of this CT requires the following:
Properly controlling EFW and MFW to mitigate excessive primary to secondary heat transfer and securing FW flow to affected SG(s) if any SG operating level > [SG high level]

1.0 PLANT CONDITIONS

The GEOG prescribes performance of this CT for situations where too much FW flow exists. Such situations can cause excessive primary to secondary heat transfer and/or damage to plant equipment.

2.0 ASSOCIATED GEOG BASES

Following shutdown of the reactor and main turbine, feedwater flow and SG levels should be checked because if the feedwater system is still operating at full capacity (not normal situation following a reactor trip), possible carryover and main steam line flooding can occur within one minute of reactor trip. It is also necessary to ensure proper feedwater flow exists for conditions other than immediate post-trip.

Secondary plant protection systems may actuate automatically during an extended or rapid overcooling. Should this occur, it is necessary to verify whether or not these systems have actuated properly and, if not, to perform the appropriate actions manually.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
VSSV	4.a, 4.b and 12.0
EHT	4.0 and 6.2

4.0 CUES

- [SG high level] alarm
- SPDS displays and associated alarms
- P-T display and associated alarms
- [secondary plant protection system] alarms
- Verbal alert by plant staff that FW flow rates are excessive
- [plant specific cues]

5.0 PERFORMANCE INDICATORS

- Operation of MFW/EFW pump controls
- Operation of associated MFW/EFW valve controls
- Operation of [secondary plant protection system] controls
- [plant specific performance indicators]

6.0 FEEDBACK

- RC temperature and pressure
- SG level and pressure
- Verbal notification by plant staff of FW flow rates
- [secondary plant protection system] status indication
- MFW/EFW pump status indications
- Associated MFW/EFW valve status indications
- [plant specific feedback]

CT-17: ISOLATE OVERCOOLING SG(s)

Fulfillment of this CT requires the following:
Operation of [secondary plant protection system] to isolate affected (overcooling) SG(s)
and/or
manual isolation of overcooling SG(s) by closing all steam and FW valves to the affected SG(s).

1.0 PLANT CONDITIONS

The GEOG prescribes performance of this CT when excessive primary to secondary heat transfer occurs and mitigation requires isolation of affected SG(s).

2.0 ASSOCIATED GEOG BASES

If the overcooling SG has been identified then that SG should be isolated, otherwise both SGs should be isolated. Isolating a SG means to stop all FW flow (MFW and AFW) and steam flow (e.g., close TBVs, ADVs, steam supply to FW pumps, MSIVs etc.). FW flow should be maintained to the unaffected SG and cooling stabilized using the unaffected SG.

Isolation of a SG or both SGs should always follow a logical progression of increasingly more drastic attempts to isolate the SG. For example, if the overcooling is not severe it may be possible to close both the TBVs and ADVs as well as the auxiliary steam valves thus isolating the SG. If this does not work, then for those plants which have main steam isolation valves, the main steam isolation valve should then be closed. For severe overcooling situations, [secondary plant protection system] will likely actuate.

Inappropriate mitigative actions can cause loss of both SGs even if only one SG is faulted; such a situation would cause degradation of the transient mitigation capability of the plant.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
VSSV	4.a, 4.b and 12.0
EHT	4.0 and 6.2

4.0 CUES

- SPDS displays and associated alarms
- P-T display and associated alarms
- [secondary plant protection system] alarms
- Verbal alert by plant staff that primary to secondary heat transfer is excessive
- [plant specific cues]

5.0 PERFORMANCE INDICATORS

- Operation of associated FW pump and valve controls
- Operation of associated steam valve (included TBVs/ADVs) controls
- Operation of [secondary plant protection system] controls
- [plant specific performance indicators]

6.0 FEEDBACK

- RC temperature and pressure
- SG level and pressure
- Verbal notification by plant staff that primary to secondary heat transfer is appropriate for given plant conditions
- [secondary plant protection system] status indication
- MFW pump and valve status indications
- [plant specific feedback]

CT-18: TURBINE TRIP

Fulfillment of this CT requires the Following:

Tripping the main turbine.

1.0 PLANT CONDITIONS

The GEOG prescribes performance of this CT whenever the reactor trips.

2.0 ASSOCIATED GEOG BASES

Whenever conditions exist such that a reactor trip is required, then the normally redundant actions of tripping the reactor and main turbine should be accomplished immediately. Tripping the main turbine provides assurance of a redundant trip signal to the main turbine electro-hydraulic control unit.

When the reactor is tripped (shutdown), steam flow to the main turbine must be stopped in order to maintain the appropriate primary to secondary heat balance. When the appropriate primary to secondary heat balance is established, the normal heat removal systems are available for plant control thus enhancing the transient mitigation capability of the plant.

If the generator output and exciter breakers have not opened, the operator should ensure that the output breaker is opened first before opening the exciter breaker. This is to prevent possibly very high reverse current and potential damage (including fire and detonation of H_2) to the main generator.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
VSSV	2.1 and 7.0
SGTR	5.0

4.0 CUES

- SPDS displays and associated alarms
- P-T display and associated alarms
- [secondary plant protection system] alarms
- Verbal alert by plant staff that all main turbine stop and control valves are not closed immediately following actuation of a reactor trip signal
- Verbal alert by plant staff that main alternator output/exciter breakers are not open immediately following actuation of a reactor trip signal
- [plant specific cues]

5.0 PLANT PERFORMANCE INDICATORS

- Operation of control room manual main turbine trip pushbutton
- Operation of [plant specific diverse main turbine trip device]
- Main turbine trip alarm
- Main turbine-generator exciter alarms
- Main turbine-generator breaker status alarms
- [plant specific performance indicators]

6.0 FEEDBACK

- RC temperature and pressure
- SG level and pressure
- Mega-Watt electric indication
- Main turbine-generator breaker status indications
- Verbal notification by plant staff of main turbine trip status
- [plant specific feedback]

III.C CRITICAL TASK DESCRIPTION OF CTs BASED ON: MAINTAIN/ESTABLISH FISSION PRODUCT BOUNDARIES

CT-3: ISOLATE POSSIBLE RCS LEAK PATHS

Fulfillment of this CT requires the following:

Close the following valves if they are available and open and it is possible to close them:
- PORV and PORV block valve
- Pressurizer spray valve and spray block valve
- RC letdown valves
- Pressurizer vent and sample valves
- Hot leg and RV head vents
- [any other plant specific leak isolation]

NOTE: Initiation of HPI cooling can result in a loss of SCM. In this case, the PORV and PORV block valve must not be closed.

1.0 PLANT CONDITIONS

The GEOG prescribes performance of this CT when SCM is lost.

2.0 ASSOCIATED GEOG BASES

All isolable leaks should be isolated, if possible. There are several possible leaks in the RCS which may be isolated by closing certain valves. These may include:

1. The PORV
2. PORV block valve
3. Pressurizer spray block and spray valve
4. Pressurizer vent valves
5. Pressurizer sample valves
6. Hot leg high point vent valves
7. Reactor vessel head vent valves

Station Blackout procedures include provisions for isolating all letdown flows and other known leak paths and closing seal return valves. Establishing seal injection when power is restored reduces primary leakage through seals.

Isolation of the letdown line is accomplished during HPI cooling.

If HPI is not available, during attempts to establish HPI cooling, then the PORV is ensured closed to reduce primary inventory losses.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
VSSV	10.b and 10.c
LSCM	8.0
LHT	6.2 and 6.4.1
EHT	18.2 and 18.4.1

4.0 CUES

- SCM monitor and associated alarms
- SPDS displays and associated alarms
- P-T display and associated alarms
- Lo and Lo-Lo RCS pressure alarms
- ESAS HPI actuation and associated ESAS alarms
- Verbal alert by plant staff that combinations of RCS pressure and temperature indicate a loss of SCM
- [plant specific cues]

5.0 PERFORMANCE INDICATORS

- Operation of associated valve controls
- [plant specific performance indicators)

6.0 FEEDBACK

- Valve status indication
- Verbal indication by plant staff of valve status
- Associated process flows
- [plant specific feedback]

CT-19: MAINTAIN RB RADIATION BOUNDARY (includes SG tubes)

Fulfillment of this CT requires the following:

During HPI cooling control RB temperature and pressure to maintain [plant specific conditions].

If RB isolation and cooling and/or RB spray systems do not actuate when their automatic start setpoints are reached, then actuate and manually align them.

Operate the RB emergency cooling system to maintain RB temperature and pressure within normal operating limits.

Operate the RB spray system if RB pressure reaches [plant specific limit].

Maintain SG tube to shell ΔTs within limits.

1.0 PLANT CONDITIONS

The GEOG prescribes operation of RB isolation and cooling systems when their respective actuation setpoints are reached. These systems should also be operated when the RB atmosphere is being degraded due to HPI cooling.

The GEOG provides guidance to maintain tube to shell ΔTs within limits. This is particularly germane in the event a cooldown must proceed and one SG is dry or HPI is initiated and the PORV is not maintained open. During HPI cooling degradation of the RB atmosphere may begin to occur, therefore, RB pressure and temperature should be controlled when HPI cooling is in effect.

2.0 ASSOCIATED GEOG BASES

Operating the RB emergency cooling system will decrease the RB pressure and temperature. Operating the RB spray system will reduce RB pressure and temperature. RB spray is expected to scrub airborne fission products from the RB atmosphere and retain them in the sump water. Operation of the RB isolation system assures containment integrity.

SG shell cooling concerns arise when one SG is isolated, for both forced and natural circulation cooldowns. In dry idle SGs, the shell is no longer cooled by steam and FW flow but rather by ambient losses. Limits pertinent to cooldowns and shell cooling are:

Normal tensile tube to shell ΔT (tubes colder): < 100°F

Compressive tube to shell ΔT (shell colder): < 50°F when RCS pressure < 1800 PSIG and tube temperature > 500°F; < 60°F all other conditions

Emergency tensile tube to shell ΔT (tubes colder): ≤ 150°F[6]

SG tube to shell tensile stresses are a function of both temperature differential and primary to secondary pressure differential. Therefore, reducing the primary to secondary differential pressure, by minimizing SCM, will aid in reducing the overall tube tensile stresses.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
VSSV	11.0
LSCM	6.0
LHT	4.0, 6.1 and 6.3
EHT	5.0, 12.0, 13.0, 18.1 and 18.3
SGTR	15.0, 17.4 and 17.6

4.0 CUES

- ESAS RB isolation & cooling alarms
- ESAS RBS alarms
- High RB pressure alarms
- SPDS displays and associated alarms
- Verbal alert by plant staff that RB pressure and temperature indicate inadequate RB cooling
- Verbal alert by plant staff that RB isolation is not complete
- Verbal alert by plant staff the SG tube to shell ΔTs are approaching limits
- [plant specific cues]

5.0 PERFORMANCE INDICATORS

- Operation of RB isolation controls
- Operation of RB emergency cooling system controls
- Operation of RB spray system controls
- Operation of EFW and RCP controls (associated with SG tube to shell ΔT limits)
- [plant specific performance indicators]

[6] Used only during SGTR emergency cooldown to $T_{hot} \exists 500°F$.

6.0 FEEDBACK

- RB isolation valve status indication
- RB emergency cooling system status indication
- RB spray system status indication
- RB emergency cooling and RB spray flow
- RB pressure and temperature
- RCS temperature and SG shell temperature
- Verbal indication by plant staff that RB pressure and temperature are decreasing
- Verbal indication by plant staff the SG tube to shell ΔTs are decreasing
- [plant specific feedback]

CT-20: RCS PRESSURE CONTROL TO PREVENT EXCEEDING RV P-T LIMITS AND COMPLY WITH PTS GUIDANCE

Fulfillment of this CT requires the following:

Throttling HPI to prevent exceeding the RV P-T limit and to meet PTS guidance if PTS guidance is invoked.

Operation of normal and auxiliary spray (if available), the PORV and/or the pressurizer vent to control RCS pressure to prevent exceeding the RV P-T limit and meet PTS guidance, if invoked.

1.0 PLANT CONDITIONS

The GEOG prescribes performance of this CT when plant conditions due to excessive RCS cooling, high RCS pressure or the combination of the two could challenge the RV P-T limit or invoke PTS guidance per Rule 3.0.

2.0 ASSOCIATED GEOG BASES

The RV must be operated within the restrictions imposed by both the RV P-T technical specifications and PTS criteria. This requires control of RCS pressure. Normally, RCS pressure is reduced by spraying the pressurizer with the normal spray system. In the event normal spray is not available, auxiliary spray (if available), the PORV and/or pressurizer vent may be used to reduce RCS pressure.

If the HPI system is operating, it must be throttled to prevent overpressurizing the RCS when SCM exists by keeping RCS pressure < the RV P-T limit and meeting PTS guidance when it is invoked.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
LSCM	2.0
LHT	6.1, 6.4.3 and 8.0
EHT	9.0 and 18.4.3
SGTR	7.0 and 17.4

4.0 CUES

- High RCS pressure alarm
- ESAS HPI actuation alarm
- Alert by plant staff that the RV P-T limit is being approached
- Alert by plant staff that conditions invoking PTS guidance are imminent.
- [plant specific cues]

5.0 PERFORMANCE INDICATORS

- Operation of spray controls (normal and/or auxiliary)
- Operation of HPI pump and associated HPI valve controls
- Operation of PORV and pressurizer vent valve controls
- [plant specific performance indicators]

6.0 FEEDBACK

- RCS pressure and temperature
- HPI flow
- HPI pump and associated HPI valve status indications
- PORV and pressurizer vent valve status indications
- Spray valve status indications (normal and/or auxiliary)
- [plant specific feedback]

CT-25: RCS TEMPERATURE CONTROL TO LIMIT RV HEAD STRESS

Fulfillment of this CT requires the following:

During subcooled NC cooldown with a void in the RV head, limit the RCS cooldown rate to ≤ 50°F/HR.

1.0 PLANT CONDITIONS

The GEOG prescribes performance of this CT during NC cooldown with a void in the RV head.

2.0 ASSOCIATED GEOG BASES

With a RV head void and the core outlet subcooled, the maximum permissible RCS cooldown rate below 500°F is 50°F/HR based on stresses produced in the RV closure head and upper shell region. If the core outlet is saturated, this limit is not applicable.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
LSCM	12.3
SGTR	21.0

4.0 CUES

- Alert by plant staff that RV head level instruments indicate presence of a RV head void
- Alert by plant staff of opposite trending between RCS pressure and PZR and/or MU tank level <u>and</u> that hot leg level instruments do not indicate voids <u>or</u> NC exists in two loops
- Alert by plant staff of difficulty in reducing RCS pressure
- Alert by plant staff that RV head fluid or RV head vent line temperature at T_{sat}
- [plant specific cues]

5.0 PERFORMANCE INDICATORS

- Operation of TBV/ADV controls
- [plant specific performance indicators]

6.0 FEEDBACK

- Verbal notification by plant staff of cooldown rates
- [plant specific feedback]

III.D CRITICAL TASK DESCRIPTION OF CTs BASED ON: MAINTAIN ACCEPTABLE LIMITS OF RADIATION RELEASES DUE TO SGTR INDUCED RB BYPASS

CT-21: LIMIT UNCONTROLLED RADIATION RELEASE

Fulfillment of this CT requires the following:

During SGTR mitigation:

- Attempt to control PZR level such that it does not continually decrease by increasing MU or HPI flow and reducing letdown flow
- If the reactor has not tripped, then perform controlled shutdown to prevent lifting MSSVs.
- Isolate non-essential steam loads from affected SG(s).
- If required to prevent exceeding [SG overfill setpoint] or [radiation limit], use emergency cooldown rate limit to 500°F.

1.0 PLANT CONDITIONS

The GEOG prescribes this CT during mitigation of a SGTR.

2.0 ASSOCIATED GEOG BASES

If pressurizer level can be controlled, then the operator's ability to perform a controlled shutdown is greatly enhanced. Whenever possible power should be reduced as quickly as possible, but in a controlled manner, to well within the turbine bypass system capacity before tripping the reactor to prevent lifting of the MSSVs. This includes cases where maximum MU or HPI flow and letdown isolation are required to keep up with the tube leak and maintain pressurizer level. Power reduction is intended to minimize atmospheric radiation releases due to SG safety valve operation. Also, if a reactor trip can be averted through controlled operations, then ability to mitigate the transient is expected to be enhanced as normal transition from power operations to a controlled cooldown occurs.

Isolating non-essential steam loads from the affected SG(s) reduces the number of possible paths available for radiation to travel from the affected SG(s) to plant areas and the environment.

The typical plant design allows for 40 cycles of an emergency cooldown to 500°F T_{hot} at 240°F/hr. This rate is allowed for any SGTR event. However, it is recommended that the use of this emergency cooldown rate be limited to situations where:

a) the affected SG level(s) will reach the SG level limit before the SG can be isolated using the normal cooldown rate, including the use of SG drains if available, or

b) activity release rates are projected to reach the integrated limit before 500°F T_{hot} at the normal cooldown rate.

The emergency cooldown rate is recommended for the two cases noted because several large SGTRs and/or a relatively high percentage of failed fuel already exist. In these cases, it is most important to prevent liquid discharge through the MSSVs and limit the duration of high activity release rates.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
SGTR	1.0, 4.1, 4.3 and 9.1

4.0 CUES

- Main steam line radiation alarm
- Local area radiation alarm(s)
- Letdown line radiation alarm
- SG high level alarm
- Pressurizer low level alarm
- Verbal alert by plant staff that a SGTR is occurring and the reactor has not tripped
- [plant specific cues]

5.0 PERFORMANCE INDICATORS

- Operation of MU/HPI pump controls
- Operation of MU/HPI valve controls
- Operation of letdown valve controls
- Operation of TBV/ADV controls
- Operation of [plant specific steam load isolation valves]
- [plant specific performance indicators]

6.0 FEEDBACK

- Pressurizer level
- Letdown flow
- MU/HPI flow
- RCS temperature
- Local area radiation level(s)
- Verbal alert by plant staff of pressurizer level status
- Verbal alert by plant staff of RCS cooldown rate
- [plant specific feedback]

CT-7: MINIMIZE SCM

Fulfillment of this CT requires the following:
Maintain RCS pressure close to but above minimum allowable SCM and, if applicable, the RCP NPSH limit.

1.0 PLANT CONDITIONS

The GEOG prescribes performance of this CT during SGTR mitigation when SCM is greater than the minimum allowable.

2.0 ASSOCIATED GEOG BASES

Except when RCP NPSH limits are applicable and are more restrictive, RCS pressure should be maintained close to, but above, the minimum SCM to minimize RCS-SG ΔP. The reason for minimizing RCS-SG ΔP is to reduce the leak flowrate from primary to secondary to as low as possible. Therefore, this procedure (minimizing SCM) is desirable whenever possible during SGTR mitigation.

Reducing the leak flowrate from the RCS to the secondary side of a SG reduces RCS losses and when accomplished with an impaired steam system (e.g., weeping MSSV and MSL leak) should reduce integrated radiation releases from the impaired system. If the level of the leaking SG can be maintained within normal operating limits, then the SG will remain available for continued use during the cooldown, thus enhancing the transient mitigation capability of the plant.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
SGTR	7.0

4.0 CUES

- SCM monitor and associated alarms
- SPDS displays and associated alarms
- P-T display and associated alarms
- Verbal alert by plant staff that SCM may be reduced
- [plant specific cues]

5.0 PERFORMANCE INDICATORS

- Operation of MU/HPI pump and valve controls
- Operation of normal or auxiliary spray valve controls
- Operation of PORV and/or pressurizer vent valve controls
- [plant specific performance indicators]

6.0 FEEDBACK

- SCM meter and/or plant SPDS and/or P-T display
- RCS pressure and temperature
- MU/HPI pump and valve status indications
- Normal and auxiliary spray valve status indications
- PORV and pressurizer vent valve status indications
- Verbal indication by plant staff that SCM is being controlled per PTS guidance
- [plant specific feedback]

CT-22: REDUCE STEAMING/ISOLATE AFFECTED SGs (includes use of SG drains)

Fulfillment of this CT requires the following:

When RCS pressure < 1000 PSIG stop feeding and steaming the most affected SG if it is not required for the cooldown.

When RCS pressure < 1000 PSIG terminate steaming of the most affected SG if [radiation limit] is approached and both SGs are available.

Steam affected SGs to maintain level < [overfill setpoint]. If steaming alone cannot prevent SG fill, then use SG drains (if available) to maintain SG level below [overfill setpoint]. Isolate SG(s) if steaming and draining cannot prevent overfill and maintain RCS and isolated SG pressures < 1000 PSIG by use of [primary and secondary relief paths].

1.0 PLANT CONDITIONS

Performance of this CT, as prescribed by the GEOG, is situationally dependent as follows:

a) If both SGs are available and steaming of the most affected SG is not required, then feeding and steaming of the most affected SG is stopped when RCS pressure is < 1000 PSIG.

b) If both SGs are available and the [radiation limit] is approached, then steaming of the most affected SG is terminated when RCS pressure < 1000 PSIG.

c) If steaming will not prevent SG overfill, then SG drains (if available) are used. If steaming and draining cannot prevent SG overfill, then the affected SG is isolated and RCS and SG pressures are maintained < 1000 PSIG using [primary and secondary relief paths].

2.0 ASSOCIATED GEOG BASES

The more probable tube rupture scenario is a tube leak in one SG with both SGs available. The preferred mitigation strategy is therefore isolation of the affected SG following the initial cooldown and depressurization to < 1000 PSIG. This limits the radiological consequences of the event, but does require cooldown to DHRS operation using one SG.

Both SGs are always used in the initial cooldown and depressurization to < 1000 PSIG. Prevention of MSSV lift on the affected SG(s) is integral to the goal of minimizing off-site release, and assurance requires RCS temperatures at or below 500°F in order to maintain SCM when RCS pressure is ≤ 1000 PSIG. Once this initial cooldown and RCS depressurization to < 1000 PSIG is completed, then SG isolation can be considered.

There are limitations on continued steaming of a SG with a SGTR. These limitations consider the overriding concerns of SGTR transients that dictate the isolation of the SG(s) and initiation of HPI cooling, if necessary. These limits are based on integrated radiation dose reaching predetermined values and SG filling due to tube leakage despite steaming to achieve maximum allowable cooldown rate.

SGs isolated due to SG fill criteria pose concerns related to liquid passing through MSSVs. MSSVs should be prevented from passing liquid, since their failure to reseat becomes more probable. For this reason, RCS and SG pressures are maintained < 1000 PSIG by use of [primary and secondary relief paths]. These relief paths may include such things as letdown, PZR vents, HPVs, the PORV, TBVs and ADVs.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
SGTR	13.0, 14.0, 17.1, 17.2, 17.5 and 18.0

4.0 CUES

- Alert by plant staff that integrated radiation releases are approaching [plant specific limit]
- [SG high level] alarm
- [plant specific cues]

5.0 PERFORMANCE INDICATORS

- Operation of SG drain valve controls
- Operation of affected SG(s) steam and FW isolation valve controls
- Operation of TBV/ADV controls
- Operation of [primary and secondary relief paths] valve controls
- [plant specific performance indicators]

6.0 FEEDBACK

- SG(s) level and pressure
- RCS pressure
- MFW/EFW flow
- MFW/EFW pump and valve status indication
- Affected SG(s) steam valve status indication
- TBV/ADV status indication
- SG drain valve status indication
- [primary and secondary relief paths] status indication
- Verbal indication from plant staff of affected SG(s) steaming rate
- [plant specific feedback]

III.E CRITICAL TASK DESCRIPTION OF CTs BASED ON: REACTIVITY CONTROL TO PROVIDE ADEQUATE SHUTDOWN MARGIN

CT-23: ESTABLISH AND MAINTAIN REACTOR SHUTDOWN REQUIREMENTS

Fulfillment of this CT requires the following:

Actuation of the manual reactor trip pushbutton, to backup the automatic trip and/or provide the necessary reactor trip, anytime the reactor trips or should have tripped (includes trips mandated by SGTR guidance).

If all rods do not insert (except group 8), boration is commenced to achieve [acceptable shutdown margin].

During cooldown due to EHT or SGTR, ensure adequate shutdown margin is maintained.

Restart RCP only when localized boron dilution will not cause recriticality.

1.0 PLANT CONDITIONS

The GEOG prescribes performance of this CT when the reactor trip is required and during cooldown due to EHT or SGTR mitigation.

2.0 ASSOCIATED GEOG BASES

When a reactor trip occurs or should occur, the operator must initiate rod insertion signals and maintain decreasing reactor power. If more than one rod remains stuck out, the operator should begin boration to increase the shutdown margin.

During cooldown, due to EHT or cooldown to DHR during SGTR mitigation, shutdown margin must be maintained by adding boron to the RCS as necessary.

Certain transient conditions can result in localized boron dilution in the RCS. A restart of an RCP with sufficient localized deboration could result in a return to criticality. These conditions can develop whenever RCS voids exist.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
VSSV	1.0 and 3.0

EHT	10.0
SGTR	4.3, 5.0 and 12.0
RCP Restart	5.0

4.0 CUES

- RPS channel alarms
- Reactor trip alarm
- Turbine trip alarm
- RCS pressure and temperature alarms
- SPDS displays and associated alarms
- P-T display and associated alarms
- Verbal alert by plant staff that reactor shutdown requirements have not been met
- [plant specific cues]

5.0 PERFORMANCE INDICATORS

- Operation of manual reactor trip pushbutton
- Operation of boric acid addition pump controls
- Operation of boric acid addition valve controls
- Operation of RCP start switches.
- [plant specific performance indicators]

6.0 FEEDBACK

- Nuclear instruments
- Control rod status indication
- Verbal indication from plant staff of reactor shutdown status
- [plant specific feedback]

CT-24: SHUTDOWN REACTOR - ATWS

Fulfillment of this CT requires the following:

Actuation of the manual reactor trip pushbutton, to backup the automatic trip and/or provide the necessary reactor trip, anytime the reactor trips or should have tripped (includes trips mandated by SGTR guidance).

In the event the reactor fails to trip, in response to automatic and manual demands, then perform the following:

- Deenergize CRDMs [prioritized list of available breakers]
- Begin maximum boric acid addition to RCS as necessary
- Maintain adequate primary to secondary heat transfer; if MFW lost, trip main turbine and initiate EFW
- Do not continue until the reactor is shutdown

1.0 PLANT CONDITIONS

The GEOG prescribes performance of this CT following failure of reactor trip either by automatic and/or manual push button commands.

2.0 ASSOCIATED GEOG BASES

ATWS could occur due to a failure of the RPS to initiate a reactor trip signal upon one of the reactor trip parameters reaching its trip limit or the control and safety rods failing to insert once the RPS trip signal is given automatically or manually. A Diverse Scram System (DSS) is provided, independent of the RPS, to minimize the potential for an ATWS event. However, the operator must recognize and react to any of the reactor trip parameters that exceeds its limit but does not cause a reactor trip.

The reactor can be generating more heat than the emergency feedwater system can remove. For this reason, attempts should be made to maintain operation of the MFW system to remove adequate heat to prevent overpressurizing the RCS. In this situation, the manual reactor trip button has been actuated but reactor power is not < the plant specific reactor power level for verification of a reactor trip. Therefore, the reactor has not been shut down and there has been a failure of all or most of the control and safety rods to insert into the reactor core. Given that RPS, DSS and the manual reactor trip have failed to trip the reactor, then immediate actions to shut down the reactor by the alternate methods should be initiated. These methods include trip of CRDM breakers and maximum rate of boron addition to the RCS. Once the control and safety rods are successfully tripped into the core, or sufficient boric acid has been added to provide an adequate shutdown margin, the reactor will be shut down. Adequate shutdown margin must be maintained during cooldown due to EHT and SGTR mitigation.

The priority action at this point is the shutdown of the reactor. This should be achieved prior to taking additional mitigating actions because post-trip transient mitigation, from this point forward, is based on the assumption that the reactor is shutdown (subcritical).

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
VSSV	1.0, 1.2, 1.3, 1.4, 1.5 and 1.6

4.0 CUES

- RPS channel alarms
- Turbine trip alarm
- RCS pressure and temperature alarms
- SPDS displays and associated alarms
- P-T display and associated alarms
- Verbal alert by plant staff that reactor shutdown requirements have not been met
- [plant specific cues]

5.0 PERFORMANCE INDICATORS

- Operation of MFW/EFW controls
- Operation of main turbine trip controls
- Operation of control rod drive feeder breakers
- Operation of emergency boration equipment controls
- [plant specific performance indicators]

6.0 FEEDBACK

- MFW/EFW flow
- Main turbine trip alarm
- Nuclear instruments
- Control rod status indication
- Control rod drive breaker status indication
- Emergency boration equipment status indication
- Verbal indication from plant staff of reactor shutdown status
- [plant specific feedback]

III.F DESCRIPTION OF CTs BASED ON: PREVENT DEGRADATION OF THE MITIGATION CAPABILITY OF THE PLANT

CT-8: ELECTRICAL POWER ALIGNMENT

Fulfillment of this CT requires the following:
If station auxiliary power is not available, then perform the following:
Initiate proper operation of emergency AC supply. In the event that no emergency AC supply (or alternate AC source) is available, then perform [SBO procedure] and continue attempts to restore AC power.

1.0 PLANT CONDITIONS

The GEOG prescribes performance of this CT whenever the VSSV section of the guideline is addressed. In keeping with the overall TBD mitigation philosophy, this task may follow attempts to mitigate abnormal transients.

2.0 ASSOCIATED GEOG BASES

Plant electrical power is necessary for the operation of normal and emergency plant equipment. Therefore, it is important that the plant operator provide normal AC power, usually supplied through the station auxiliary transformer(s). If normal AC power cannot be supplied, then actions are necessary to initiate operation of the emergency AC source(s) including alternate AC supplies, if applicable. If both normal and emergency AC power are lost, then a station blackout has occurred. For such events, station blackout procedures provide plant specific actions which are to be taken while efforts are being made to restore AC power.

Providing normal AC power greatly enhances the transient mitigation capability of the plant, e.g., normal RCS make up systems remain operational.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
VSSV	10.a and 10.b

4.0 CUES

- Auxiliary and emergency bus voltage low alarms
- Verbal indication by plant staff that auxiliary and emergency AC bus voltage is low
- [plant specific cues]

5.0 PERFORMANCE INDICATORS

- Operation of auxiliary/emergency AC power source controls
- [plant specific performance indicators]

6.0 FEEDBACK

- Auxiliary/emergency bus voltage normal
- Verbal indication by plant staff of auxiliary/emergency AC power equipment status
- [plant specific feedback]

CT-27: IMPLEMENTATION OF CONTROL ROOM HABITABILITY GUIDANCE

Fulfillment of this CT requires the following: [actions required for control room habitability]

1.0 PLANT CONDITIONS

The GEOG prescribes [actions required for control room habitability] when LOCA and SGTR symptoms, are present.

2.0 ASSOCIATED GEOG BASES

The bases for this CT are [plant specific SAR]. Generally, control room habitability issues are concerned with controlling control room radiation levels due to ingression of airborne fission products during a LOCA event. There may be other more site specific concerns related to such things as proximity to toxic chemicals and their possible ingression to the control room atmosphere during certain external events.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
LSCM	7.0
SGTR	10

4.0 CUES

- SCM monitor and associated alarms
- SPDS displays and associated alarms
- P-T display and associated alarms
- Lo and Lo-Lo RCS pressure alarms
- ESAS HPI actuation and associated alarms
- Verbal alert by plant staff that combinations of RCS pressure and temperature indicate a loss of SCM
- Main steam line radiation alarm
- Local area radiation alarm(s)
- [plant specific cues]

5.0 PERFORMANCE INDICATORS

[plant specific performance indicators]

6.0 FEEDBACK

[plant specific feedback]

CT-28: MAINTAIN RCS MAKE UP INVENTORY

Fulfillment of this CT requires the following:
Begin make up to the BWST during SGTR mitigation
Isolate letdown during HPI cooling

1.0 PLANT CONDITIONS

The GEOG prescribes performance of this CT when a SGTR has occurred or HPI cooling is initiated.

2.0 ASSOCIATED GEOG BASES

During SGTR mitigation, RC that leaks through a SGTR may remain in the SG(s) or be steamed to the atmosphere. If it leaks to atmosphere it is not recoverable. If it remains in the SG(s) it may or may not be recoverable depending upon plant systems; in any case it is not easily recovered for addition to the RCS (e.g., at a minimum may require boron addition before use in RCS). Because of this, make up should be established to the BWST if the SGTR is large enough to require HPI to augment RCS losses.

During HPI cooling, letdown is isolated to preclude loss of inventory outside the RB, since HPI (MU/HPI) cooling may be long-term with sump recirculation.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
LHT	6.2
EHT	18.2
SGTR	16.0

4.0 CUES

- Verbal alert by plant staff a SGTR is occurring
- Main steam line radiation monitor alarms
- Local area radiation alarms
- Verbal alert by plant staff that HPI cooling is needed
- [plant specific cues]

5.0 PERFORMANCE INDICATORS

- Operation of letdown system isolation valve controls
- [plant specific performance indicators]

6.0 FEEDBACK

- Letdown flow
- [plant specific feedback]

CT-29 MAINTAIN SG AVAILABILITY

Fulfillment of this CT requires the following:

Do not isolate a SG that has a steam leak when the RCS cooldown rate ≤ T.S. limit, the only leak is via MSSV(s) and levels in the affected SG can be properly maintained.

and

Do not isolate a SG that has a SGTR when steaming of the most affected SG is not required. In this case, feeding and steaming should be stopped but other isolation should not occur.

1.0 PLANT CONDITIONS

The GEOG prescribes performance of this CT during EHT and SGTR mitigation when complete isolation of a SG is not necessary.

2.0 ASSOCIATED GEOG BASES

<u>During EHT mitigation</u>, if the transient is due to a leaking MSSV and can be controlled within cooldown rate limits and SG level can be maintained, then SG isolation is not necessary. This allows a cooldown with reasonable control, which is preferable to isolation and dryout of a SG.

<u>During SGTR mitigation</u>, if steaming and feeding of the most affected tube ruptured SG is terminated, it should be done in a manner that allows restoration of heat transfer to that SG. Flow paths should not be isolated in a manner that involves considerable delay to reestablish. This allows expeditious use of the SG if it its use is subsequently desired.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
EHT	6.1, 6.1.1 and 6.1.2
SGTR	14.0

4.0 CUES

- Verbal alert by plant staff that a SGTR is occurring
- Main steam line radiation monitor alarms
- Local area radiation alarms
- SPDS and associated alarms
- P-T display and associated alarms
- Verbal alert by plant staff that EHT is occurring
- [plant specific cues]

5.0 PERFORMANCE INDICATORS

- Verbal alert by plant staff that cooldown with leaking MSSVs will continue
- Operation of MFW/EFW valve controls on SG with a tube rupture
- Operation of TBVs/ADVs controls on SG with a tube rupture
- Verbal alert by plant staff that tube ruptured SG feeding and steaming is terminated
- [plant specific indicators]

6.0 FEEDBACK

- RCS pressure and temperature
- MFW/EFW valve status
- TBV/ADV valve status
- [plant specific feedback]

CT-30 CONTROL RCS INVENTORY

Fulfillment of this CT requires the following:
Control MU, HPI, [plant specific systems] and letdown manually as required.

1.0 PLANT CONDITIONS

The GEOG prescribes performance of this CT during normal post trip plant stabilization and EHT mitigation.

2.0 ASSOCIATED GEOG BASES

During normal reactor trip, appropriate control of pressurizer level contributes to proper RCS pressure/inventory control. If a symptom is not present, then HPI is not used to control pressurizer level. That is, unless a transient (symptom) is in progress, pressurizer level is adjusted with MU; HPI is not needed and can complicate achieving stability and cause unnecessary HPI nozzle thermal cycles.

During EHT mitigation, the EHT will contract the RCS inventory. This CT covers actions to be taken to reduce the pressurizer level drop by normal means such as maximizing makeup flow and minimizing RCS letdown flow. If these actions are unsuccessful in keeping the pressurizer level from decreasing to the [low level] setpoint, then HPI should be used. HPI is not normally used post-trip to counter the expected pressurizer level change due to excessive thermal cycling of the HPI nozzles and to prevent possible subsequent complications if excessive inventory is added. HPI is used if necessary to try and maintain pressurizer level on-scale and prevent the surge line from draining. Efforts to maintain pressurizer level should be controlled to not result in excessive subcooling, especially if HPI is used. Once the transient has been terminated and controlled heat removal has been established, RCS inventory control can be stabilized and, if applicable, letdown can be reestablished.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
VSSV	6.0
EHT	1.0 and 8.0

4.0 CUES

- Pressurizer Low and Lo-Lo alarms
- SCM monitor and associated alarms
- P-T display and associated alarms
- SPDS displays and associated alarms
- Verbal alert by plant staff that pressurizer level is decreasing < [low level setpoint]
- [plant specific cues]

5.0 PLANT PERFORMANCE INDICATORS

- Operation of MU system valve controls
- Operation of MU system pump controls
- Operation of letdown valve controls
- Operation of HPI valve controls
- Operation of HPI pump controls
- [plant specific performance indicators]

6.0 FEEDBACK

- Pressurizer level
- SCM
- Letdown flow
- MU flow
- HPI flow
- Verbal alert by plant staff of pressurizer level status
- [plant specific feedback]

CT-31 INSTRUMENT SYSTEMS POWER ALIGNMENT

Fulfillment of this CT requires the following:

Ensure IA system pressure is proper and that NNI/ICS power is on in accordance with [procedure number].

1.0 PLANT CONDITIONS

2.0 ASSOCIATED GEOG BASES

Certain plant control functions (e.g., feedwater flow) and indications may depend upon proper instrument air system operation. If normal automatic instrument air controls have failed to maintain proper operation, then manual corrective steps should be taken.

If NNI/ICS power is lost, it is desirable to restore it as soon as possible (this is a secondary concern and should not be necessary for transient mitigation). Even though restoration of NNI/ICS power is not required for successful transient mitigation, expeditious restoration may enhance transient management.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
VSSV	8.0 and 9.0

4.0 CUES

- Verbal alert from plant staff that instrument system(s) power alignment is not proper
- [plant specific cues]

5.0 PLANT PERFORMANCE INDICATORS

- [plant specific performance indicators]

6.0 FEEDBACK

- [plant specific feedback]

CT-32 BYPASS/REALIGN ECCS ACTUATION/COMPONENTS

Fulfillment of this CT requires the following:

When SCM exists and RCS pressure is being controlled:

- bypass ES actuation when RCS pressure is within [allowable range for ES bypass]
- close CFT isolation valves when RCS pressure is within [allowable range for CFT isolation] .

1.0 PLANT CONDITIONS

The GEOG prescribes performance of this CT during transient mitigation associated cooldown when ES systems and CFT valves should be realigned to facilitate continued transient mitigation.

2.0 ASSOCIATED GEOG BASES

Following EHT mitigation and during SGTR mitigation when SCM exists and RCS pressure is being controlled, RCS depressurization may be required. This depressurization would be to address PTS guidance, minimize SG tube stress or control primary to secondary side leakage. As long as SCM exists and the RCS pressure is under control, the ES actuation should be bypassed when conditions permit to prevent unwanted and unnecessary equipment actuation and allow equipment realignment. This will facilitate RCS depressurization and subsequent cooldown.

During SGTR mitigation and cooldown when SCM exists and RCS pressure is being controlled, injection of the CFTs is not necessary. To prevent CFT injection from unnecessarily complicating the cooldown, the CFT valves should be closed when conditions permit.

3.0 GEOG SECTION AND STEP REFERENCE

GEOG Section	Applicable Steps
EHT	11.0
SGTR	6.0 and 20.0

4.0 CUES

- Verbal alert from plant staff that RCS pressure is under control
- Verbal alert from plant staff that SCM exists
- [plant specific cues]

5.0 PLANT PERFORMANCE INDICATORS

- Operation of ES bypass controls
- Operation of CFT isolation valve controls
- [plant specific performance indicators]

6.0 FEEDBACK

- ES actuation system bypass indication
- CFT isolation valve indication
- [plant specific feedback]

IV. GEOG TAB CROSS REFERENCES

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	CT-10: Establish FW Flow And Feed SG(s) (Rules 1.0 and 4.0)	B.1-1
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	CT-14: Initiate HPI Cooling (all except Davis-Besse)	B.1-10
	CT-14: Initiate HPI Cooling (Davis-Besse only)	B.1-13
	CT-16: FW Flow Control	B.2-3
	CT-17: Isolate Overcooling SG(s)	B.2-5
	CT-18 Turbine Trip	B.2-7
	CT-19: Maintain RB Radiation Boundary (includes SG tubes)	C-3
	CT-20: RCS Pressure Control To Prevent Exceeding RV P-T Limits And Comply With PTS Guidance	C-6
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