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A045

PROGRESS ENERGY

CRYSTAL RIVER UNIT 3

PLANT OPERATING MANUAL

EM-225

DUTIES OF THE TECHNICAL SUPPORT CENTER ACCIDENT ASSESSMENT TEAM

TABLE OF CONTENTS

1.0 PURPOSE

This procedure provides guidance for the establishment and operation of the Technical Support Center Accident Assessment Team (AAT), for the determination of core and fission product barrier status, and for the interface with the Dose Assessment Team. Information from these assessments will be used in conjunction with other guidance for development of accident mitigation strategies. This procedure also provides guidance to the AAT to perform actions described in the EOPs. [NOCS 062718]

2.0 REFERENCES

2.1 Developmental References

2.1.1 Response Technical Manual (RTM-96); USNRC; Volume 1, Rev. 3

2.1.2 Radiological Emergency Response Plan

2.1.3 Emergency Operating Procedures (EOPs)

2.1.4 NUREG-1228, Source Term Estimation During Incident Response to Severe Nuclear Power Plant Accidents

2.1.5 B&W Technical Bases Document

2.1.6 FPC IOC CR97-0122, Dated 12/23/97

2.1.7 NEI 91-04, Revision 1, Severe Accident Issue Closure Guidelines

2.1.8 FPC IOC SE99-0184, Dated 9/14/99

2.1.9 EEM-99-018, Rev. 0 Operating Limits for SWP-1A/SWP-1B under Minimum Flow Conditions.

2.1.10 EM-202, Duties of the Emergency Coordinator

2.1.11 EM-102, Operation of Technical Support Center

2.1.12 EM-103, Operation and Staffing of the CR-3 Control Room During Emergency Classification

2.1.13 CP-151, External Reporting Requirements

3.0 PERSONNEL INDOCTRINATION

3.1 Definitions

3.1.1 Accident Assessment Team (AAT) - Consists of Coordinator, TSC Ringdown Communicator, Control Room Ringdown Communicator, Engineer, Operations Support, and NRC Communicator.

3.1.2 Candidate High Level Actions (CHLA) - Actions described in the CR-3 Severe Accident Guideline which could be taken to mitigate a Severe Accident and are deemed appropriate based on Plant Damage Conditions.

3.1.3 Critical Safety Functions (CSFs) - Those functions needed to ensure adequate core cooling and to preserve the integrity of the fission product barriers thereby protecting the health and safety of the general public and plant personnel. They include: reactivity control, coolant inventory control, decay heat removal capability, fission product barrier status, electrical power availability and control complex status.

3.1.4 Emergency Action Levels (EALs) - Conditions or indications that may be used as thresholds for initiating specific emergency measures (see EM-202, Enclosure 1).

3.1.5 Plant Damage Conditions (PDC) - Damage conditions used in the CR-3 Severe Accident Guideline to describe the status of the reactor coolant system, reactor core, and the containment during the progression of a Severe Accident.

3.1.6 Protective Action Recommendations (PARs) - Emergency measures recommended for purposes of preventing or minimizing radiological exposures to the Energy Complex personnel or members of the general public.

3.1.7 Severe Accident - An accident (beyond that assumed in the CR-3 design and licensing basis) that results in catastrophic fuel rod failure, core degradation and fission product release into the Rx vessel, Reactor Building or the environment.

3.2 Responsibilities

3.2.1 Control Room Ringdown Communicator

- Reports to the Control Room and establishes communication with the TSC Ringdown Communicator on the Accident Assessment Ringdown phone. Brief TSC Ringdown Communicator on operator actions that are in progress.
- Relays status of overall plant conditions, operator activities and questions to the TSC AAT.
- Relays instructions to Control Room Operators for mitigating actions as directed by the Emergency Coordinator (EC).
- If a Severe Accident is occurring, directs Control Room personnel regarding actions to take to mitigate the Severe Accident, based on actions approved by the TSC EC.
- Relay request for support from the Control Room to OSC teams, via TSC Ringdown Communicator.
- Once TSC is operational, request extra plant operators (if available) be sent to OSC for in plant support.
- Inform TSC of in plant operator actions that are being performed.

3.2.2 AAT Coordinator

- Informs the EC of any developments in plant status that may impact EALs and PARs.
- Ensures appropriate AAT personnel have staffed the TSC.
- Ensures additional AAT members are notified as needed.
- Identifies plant parameters to be tracked.
- Coordinates AAT activities and ensures that team members remain focused on objectives.
- Keeps the EC informed of AAT activities.
- If a Severe Accident is occurring, reviews recommended Candidate High Level Actions and mitigation plans prior to submitting to the Emergency Coordinator. [NOCS 100056]
- If a Severe Accident is occurring, coordinates efforts of the Accident Assessment team to ensure the development of mitigation strategies using the CR-3 Severe Accident Guideline.
- If additional resources are needed, coordinates with the EOF Technical Support Team to provide required support.
- Establishes communications with the Emergency Operating Facility (EOF) Technical Support Team, if the EOF is staffed.
- Approve Enclosure 12 to request operator actions outside CCHE or maintenance repair activities that have been initiated by the Control Room or AAT. This request should be processed through TSC Repairs Coordinator to the OSC.

3.2.3 TSC Ringdown Communicator

- Establishes communications with the Control Room Ringdown Communicator on the Accident Assessment Ringdown phone.
- Relays information on changing radiological conditions and maintenance activities to the Control Room.
- Relays plant conditions from the Control Room to the TSC AAT.
- Maintains the Accident Assessment Team Log.
- Relays information and directions to the Control Room of actions required to mitigate a Severe Accident based on approved Candidate High Level Actions.
- Monitors progression through EOPs and APs.
- Initiate Enclosure 12 to request operator actions outside CCHE or maintenance repair activities for the OSC that is requested by the Control Room or AAT.

3.2.4 AAT Engineers

- Assesses plant conditions and provides engineering support for developing accident mitigation strategies as needed.
- Aids in determining additional Engineering resources.
- Monitors plant parameters for indications of core damage and status of fission product barriers.
- During Severe Accident conditions, evaluates plant parameters, determines Plant Damage Conditions, and develops Candidate High Level Action recommendations using appropriate calculational aids from the CR-3 Severe Accident Guideline.

3.2.5 AAT Operations Support

- Monitors overall plant status during an emergency with emphasis on Critical Safety Functions.
- Functions as a technical resource for Operations in assessing plant conditions and in development of accident mitigation strategies that are outside the scope of Emergency Operating Procedures (EOPs). [NOCS 13010]
- Maintains the CSF Status Board at the TSC.
- During Severe Accident Conditions, provides support to the AAT Engineers in determining Plant Damage Conditions and developing mitigation strategies using the CR-3 Severe Accident Guideline.
- Coordinates/processes requests for operator actions or maintenance support activities through the TSC Repairs Coordinator using Enclosure 12.
- Determine emergency and non-emergency notifications to the NRC as defined in CP-151, External Reporting Requirements.

3.2.6 NRC Communicator [NOCS 96042]

- Maintains an open, continuous communication line on the Emergency Notification System with the NRC Operations Center upon request by the Headquarters Operations Officer.
- Log times NRC is notified of Emergency Classification changes and Protective Action Recommendations.
- Make emergency and non-emergency notifications to the NRC as defined in CP-151, External Reporting Requirements.

3.2.7 EOF Technical Support Team

- Functions as a technical resource for the EOF Director in development of PARs by monitoring plant conditions (particularly the CSFs).
- Assists the TSC AAT team as needed in development of mitigation strategies and in research of solutions to plant problems.
- Responsible for the development of long-term recovery plans.

3.2.8 Emergency Coordinator (EC) or designee

- Controls all activities at CR-3 during activation of the Radiological Emergency Response Plan.
- Implements EM-202.
- Determines EAL and PAR changes based on information obtained from the Accident Assessment Team and Dose Assessment Team.
- Functions as the decision maker during a Severe Accident. The EC will approve all recommended Severe Accident mitigation strategies prior to implementation.
- Is authorized to declare 10CFR50.54(x and y) to implement emergency actions deemed necessary to protect the health and safety of the public. A separate notification is required to the NRC for each occasion. Once a Severe Accident is declared, only one notification to the NRC is required.

3.2.9 Dose Assessment Team

- Supports the Accident Assessment team with on-site radiological data and with chemical and radiological analysis of samples as needed to assess the accident.
- Provides Plant Radiation Monitor readings and assessments.
- Provides projected radiological data (on-site and off-site doses, dose rates, and deposition) (> 1 hour to obtain).
- Provides RCS PASS data (> 1 hour to obtain) on Radionuclide composition, Chloride concentration, Dissolved Hydrogen concentration, and Boron concentration.
- Provides Reactor Building and/or Auxiliary Building Atmosphere Radionuclide composition (> 1 hour to obtain).
- Provides in-plant radiological data.
- Provides chemical and radiological analysis of OTSGs and secondary samples.
- Provides Reactor Building sump boron concentration (> 1 hour to obtain).

3.3 Limits And Precautions

3.3.1 Under Severe Accident Conditions, plant instrumentation may provide false or highly inaccurate readings due to harsh environments beyond their qualifications. Several instruments should be monitored along with trends to assess plant conditions.

4.0 INSTRUCTIONS

4.1 Accident Assessment Initiation

4.1.1 AAT Coordinator or designee: PERFORM the duties of Enclosure 1, AAT Coordinator Checklist.

4.1.2 TSC Ringdown Communicator: PERFORM the duties of Enclosure 3, TSC Ringdown Communicator Checklist.

4.1.3 AAT Operations Support member: PERFORM the duties of Enclosure 4, AAT Operations Support Checklist.

4.1.4 AAT Engineers: PERFORM the duties of Enclosure 5, AAT Engineers Checklist.

4.1.5 Control Room Ringdown Communicator: REPORT to the Control Room and PERFORM the duties of Enclosure 6, Control Room Ringdown Communicator Checklist.

4.1.6 NRC Communicator: PERFORM the duties of Enclosure 7, NRC Communicator Checklist.

AAT COORDINATOR CHECKLIST

- ☐ Badge IN at TSC card reader and place name on TSC Staffing Board.
- ☐ Notify the EC that the Accident Assessment Team is operational when ALL of the following are accomplished:
  - ☐ Determine Critical Safety Functions (Enclosure 2)
  - ☐ Ability to brief EC on plant status to include impact of EALs or PARs through use of either SPDS or phone link established with Control Room.
- ☐ Determine current plant status and conditions.
- ☐ Ensure Enclosure 2 is complete. (normally by AAT Operations support)
- ☐ Ensure Critical Safety Functions Status Board is updated.
- ☐ Ensure phone link between Control Room and TSC Ringdown Communicators.
- ☐ Evaluate plant conditions and assist the EC in making timely and proper Emergency Classifications and Protective Action Recommendations.
- ☐ Ensure each AAT position is staffed. Request Security to contact additional AAT members as needed. (Refer to "Emergency Response Personnel Roster".)
  - ☐ Operations Support: _____
  - ☐ TSC Ringdown Communicator: _____
  - ☐ Control Room Ringdown Communicator: _____
  - ☐ 2 Engineers: _____
  - ☐ NRC Communicator: _____
- ☐ Ensure all AAT members have badged in at TSC Card Reader.
- ☐ Determine parameters or parameter groups (SPDS and RECALL) to monitor and ensure the desired parameters are displayed.
- ☐ Ensure times and results of significant actions are documented throughout the emergency.
- ☐ Ensure AAT performs applicable enclosures in EM-225.
- ☐ Ensure OSC repair priorities are appropriate for plant conditions.
- ☐ Ensure the EC is informed of significant AAT activities and changes in plant status.
- ☐ If the EOF is staffed, establish communication with the EOF Technical Support Team using plant extensions (6720, 6205).
- ☐ During TSC briefing ensure Critical Safety Functions are addressed.
- ☐ Approve Enclosure 12 requests for operator actions outside CCHE or maintenance repair activities that have been initiated by the Control Room or AAT. This request should go through TSC Repairs Coordinator to the OSC.

TSC BRIEFING GUIDELINE

Refer to Enclosures 8 and 10 to aid in this evaluation.

I. REACTOR SHUTDOWN

Yes ☐ No ☐

II. CORE ADEQUATELY COOLED

Yes ☐ No ☐

III. FISSION PRODUCT BARRIER ASSESSMENT (Use Enclosure 8, Part III)

Fuel Clad:	Intact ☐	Potential Loss ☐	Loss ☐
RCS:	Intact ☐	Potential Loss ☐	Loss ☐
Containment:	Intact ☐	Potential Loss ☐	Loss ☐

IV. EMERGENCY ELECTRICAL POWER STATUS

Off-Site Power Available? Yes ☐ No ☐

ES Bus Energized? Yes ☐ No ☐

Emergency Diesel Generator Available? Yes ☐ No ☐

DC Power Available? Yes ☐ No ☐

V. CONTROL COMPLEX STATUS

Ventilation / Cooling Available? Yes ☐ No ☐

* Necessary Instrumentation Available? Yes ☐ No ☐

VI. OTHER CONDITIONS / CHALLENGES

_____

_____

_____

_____

_____

_____

_____

* Necessary refers to specific instruments and annunciators that are needed to identify, diagnose, and track the problems that are causing the emergency.

TSC RINGDOWN COMMUNICATOR CHECKLIST

- ☐ Establish contact with the Control Room Communicator via the Accident Assessment Ringdown phone.

- ☐ Ensure the Control Room is informed of changing radiological conditions, ongoing TSC maintenance and repair activities, accident mitigation priorities and operator actions outside the CCHE.

> **NOTE**
>
> The EOF Technical Support Team can monitor the Accident Assessment Ringdown phone, but cannot speak over it.

- ☐ Maintain the Accident Assessment Team log book with all significant events, changes in plant status, and requests to and from the Control Room.

- ☐ Relay information and directions to the Control Room as appropriate.

- ☐ Monitor progression through EOPs and APs (using a copy of the applicable procedures), anticipating problems created by unavailable equipment or other unusual plant conditions. Mark place keeping aids as appropriate to allow other AAT members to determine status of procedure usage. Provide periodic status to AAT Operations Support member.

- ☐ Initiate Enclosure 12 requests for operator actions outside CCHE or maintenance repair activities for the OSC that is requested by the Control Room or AAT.

AAT OPERATIONS SUPPORT CHECKLIST
[NOCS 62764]

- ☐ Begin assessment of Critical Safety Functions to ensure adequate core cooling and fission product barrier preservation, using Enclosure 8 as applicable.

- ☐ Complete Enclosure 2 and provide the results to the AAT Coordinator. Enclosure 2 should be completed periodically or as conditions change.

- ☐ Maintain the CSF Status Board at the TSC.

- ☐ Complete Enclosure 9 and provide the results to the Dose Assessment Team Leader. If conditions change, Enclosure 9 should be reassessed and submitted to the Dose Assessment Team.

- ☐ Coordinates/processes requests for operator actions or maintenance support through the Repairs Coordinator using Enclosure 12. Refer to SP-306 for a list of EOB and EOL locations and contents.

- ☐ If RCS LOCA conditions exist, coordinate performance of EM-225A, "Post Accident RB Hydrogen Control." [NOCS 62767]

- ☐ If RCS LOCA conditions exist, coordinate performance of EM-225E, "Guidelines For Long Term Cooling."

- ☐ If SGTR exists monitor BWST depletion rate and initiate BWST MU early in the event if necessary (see Enclosure 11, page 2 of this procedure).

- ☐ If EFW or AFW is operating, coordinate performance of EM-225F, "Long Term Emergency Feedwater Management."

- ☐ If a Severe Accident is in progress, assist engineering in developing appropriate mitigation strategies using the Candidate High Level Actions in the CR-3 Severe Accident Guideline. [NOCS 100056]

- ☐ Provide appropriate input to the Communication/Report Coordinator to update Florida Nuclear Plant Emergency Notification Form Supplemental Data Sheet.

- ☐ If any diesel operated equipment is running, evaluate the following parameters (OSC support and local observation might be required to obtain information on support systems and operating parameters):
  - Diesel support systems (i.e., ventilation, fuel transfer, cooling, etc.)
  - Diesel operating parameters
  - Operating EDG load limitation (loaded and unloaded)
  - Fuel and lube oil supplies

- ☐ Determine emergency and non-emergency notifications to the NRC as defined in CP-151, External Reporting Requirements.

AAT ENGINEERS CHECKLIST
[NOCS 62764]

- ☐ Perform Enclosure 10. Perform an initial and periodic assessment of core damage and fission product barriers, and provide the results to the AAT Operations Support Member and the Dose Assessment Team Leader.

- ☐ If RCS LOCA conditions exist, coordinate performance of EM-225B, "Post-Accident Boron Concentration Management."

- ☐ If RCS LOCA conditions exist, obtain RB atmosphere I^{131} concentration and transmit value to control room (for BS pump shutdown decision making).

- ☐ Maintain the Plant Parameters Status Board (if required). Based on plant conditions, place key parameters on status board for trending.

- ☐ Monitor for conditions listed in Enclosure 11. Provide the AAT Operations Support member with recommended actions.

- ☐ If RB temperatures are elevated, coordinate the performance of EM-225C, "Post Accident Monitoring Of Reactor Building Temperature."

- ☐ If any OTSG level is $\leq$ 12.5 inches (indicating a dry OTSG), coordinate the performance of EM-225D, "Guidance For Dry OTSG Tube To Shell Delta T Monitoring And Control."

- ☐ Evaluate the effects of proposed maintenance repair activities and operational manipulations on plant equipment.

- ☐ Develop contingency plans and support emergency repair efforts as applicable.

- ☐ If a Severe Accident is in progress, develop mitigation strategies using the Candidate High Level Actions in the CR-3 Severe Accident Guideline.

- ☐ Within 7 days, ensure SW minimum flow requirements are maintained. If ES or RBIC has actuated and either SWV-353 or 354 has failed closed, establish flow to the RB coolers or ensure only 1 SW pump is running.

- ☐ Additional computers may be obtained, as needed, from nuclear administrative building (i.e., engineering laptop computers), that can be used to access documentation on the network.

CONTROL ROOM RINGDOWN COMMUNICATOR CHECKLIST

- ☐ Establish communication with the TSC Ringdown Communicator on the Accident Assessment Ringdown phone in the Control Room. Brief TSC Ringdown Communicator on operator actions that are in progress.

- ☐ Relay status of overall plant conditions, operator activities and questions to the TSC AAT.

- ☐ Relay instructions to Control Room Operators for mitigating actions as directed by the EC.

- ☐ Inform Control Room Operators of the following:
  - _____ Changes in Emergency Classifications
  - _____ TSC repair efforts
  - _____ Operators activities dispatched from the TSC/OSC
  - _____ Changing radiological conditions
  - _____ Mitigation priorities

- ☐ EOPs or APs in use by Control Room.

- ☐ If a Severe Accident is in progress, direct Control Room personnel regarding mitigation strategies, based on actions approved by the TSC Emergency Coordinator.

- ☐ Relay requests for support from the Control Room to OSC teams, via the TSC Ringdown Communicator.

- ☐ Once TSC is operational, request extra plant operators (if available) be sent to OSC for in plant support. (Ref. EM-103, Enclosure 1, Dispatching of Resources During Emergency Plan Entry)

- ☐ Inform TSC of operator actions being performed.

NRC COMMUNICATOR CHECKLIST

- ☐ Contact the TSC Report Preparation to determine if continuous communication with the NRC is required.
- ☐ Obtain copies of any previously submitted NRC reports.
- ☐ If the NRC has requested continuous communication, establish communication with the NRC Communicator on the Emergency Notification System (ENS). [NOCS 3054, 9405]
- ☐ Maintain a log book of significant communications between the NRC and CR-3, including a summary of responses to NRC questions and transmittal of information.
- ☐ Maintain an open line on the ENS until the NRC agrees to terminate communications. [NOCS 10528]
- ☐ Log time(s) when NRC is notified of Emergency Classification changes.
- ☐ Log time(s) when NRC is notified of Protective Action Recommendations.
- ☐ When communication with the NRC is not required, provide support to other AAT members as needed.
- ☐ Make emergency and non-emergency notifications to the NRC as defined in CP-151, External Reporting Requirements.

CRITICAL SAFETY FUNCTION CHECKLIST

Monitor the parameters associated with the Critical Safety Functions. The parameter tables below are for reference only. It is not intended that the tables be completed during each evaluation. Plant computer point numbers or SPDS/RECALL point numbers are listed, if available.
Using pre-established RECALL Groups based on accident type in progress is recommended.

Notify the AAT Coordinator immediately if any of the CSFs cannot be verified.

I. REACTOR SHUTDOWN STATUS

REACTIVITY CONTROL

PARAMETER	COMPUTER POINT	RECALL POINT			
All Rods at in-limits Y/N	P057	RECL-375			
Intermediate Range detector NI-3 amps	P212	RECL-150			
Intermediate Range detector NI-4 amps	P213	RECL-151			
Source Range NI-1 cps	P202	RECL-152			
Source Range NI-2 cps	P203	RECL-153			
Low Range NI-14/15		RECL-102,103			
Adequate Shutdown Margin	OP-103C Curve 18&19				

II. CORE COOLING STATUS:

ECCS/SUPPORT STATUS

PARAMETER	COMPUTER POINT	RECALL POINT			
Subcooling Margin	M114				
A HPI Pump operating		RECL-209			
B HPI Pump operating		RECL-210			
C HPI Pump operating		RECL-211			
MUV-23 flow	W704	RECL-52			
MUV-24 flow	W706	RECL-54			
MUV-25 flow	W703	RECL-51			
MUV 26 flow	W705	RECL-53			
DHPs operating A/B (run/stop)	X063 X064	RECL-207 RECL-208			
DHP-1A flow	W409	RECL-55			
DHP-1B flow	W410	RECL-56			
CFT A level	P200				
CFT B level	P201				
CFT A press					
CFT B press					
BWST level (ft)	X335	RECL-57			
RWPs operating 1/2A/2B/3A/3B					
DCPs operating A/B (yes/no)					
SWPs operating A/B/C					

SECONDARY SYSTEM STATUS

PARAMETER	COMPUTER POINT	RECALL POINT			
EFIC OTSG A press	W449	RECL-252			
EFIC OTSG B press	W452	RECL-255			
OTSG A level	S285	RECL-92			
OTSG B level	S286	RECL-93			
MFW flow A	S301	RECL-100			
MFW flow B	S302	RECL-101			
EFPs operating ½/3/7					
EFW flow to A OTSG	S300	RECL-245			
EFW flow to B OTSG	S312	RECL-247			

III. FISSION PRODUCT BARRIER ASSESSMENT:

FUEL CLAD		
☐ **INTACT**	☐ **POTENTIAL LOSS**	☐ **LOSS**
• Does NOT meet the criteria for "Potential Loss" or "Loss"	• RCS condition warrant entry into EOP-07 • Core Exit Thermocouples > 700 degrees F	• RCS conditions in (or previously in) Region 3 or Severe Accident Region • PASS indicates increased RCS activity >300μCi/gr I_{131} (refer to CH-632) • RM-G29/30 > 100 R/hr for ≥ 15 minutes • Enclosure 6 indicates failed fuel
REACTOR COOLANT SYSTEM		
☐ **INTACT**	☐ **POTENTIAL LOSS**	☐ **LOSS**
• Does NOT meet the criteria for "Potential Loss" or "Loss"	• RCS leak or OTSG tube leak requiring one or more injection valves to maintain adequate subcooling margin • RCS pressure /Tincore relationship violates NDT limits • RCS leak or OTSG tube leak results in ES actuation on low RCS pressure. • HPI/PORV or HPI/Code Safety valve cooling is in progress	• RCS leak resulting in loss of adequate subcooling margin • OTSG Tube Rupture resulting in loss of adequate subcooling margin • RM-G29/30 >10R/hr for ≥ 15 minutes
CONTAINMENT		
☐ **INTACT**	☐ **POTENTIAL LOSS**	☐ **LOSS**
• Does NOT meet the criteria for "Potential Loss" or "Loss"	• RB pressure > 54 psig • RB hydrogen concentration > 4% • RB pressure > 30 psig with NO building spray available • RMG-29 or 30 reading > 25,000 R/hr • Core conditions in severe accident region of ICC curves for >15 min	• Containment isolation is incomplete and release path to environment exists. Confirmation may be from elevated radiation readings in areas adjacent to the RB. • OTSG Tube Rupture > 10 gpm exists and prolonged steaming to atmosphere or an unisolable steam leak outside RB from affected OTSG. • Containment pressure or sump level response NOT consistent with LOCA conditions • Rapid unexplained RB pressure decrease following an initial increase

Performed By:_____ Date:_____ Time:_____

IV. EMERGENCY ELECTRICAL POWER STATUS:

OFF-SITE POWER

PARAMETER	AVAILABLE	UNAVAILABLE
500 KV SWITCHYARD		
230 KV SWITCHYARD		
OFF-SITE POWER XFRM		
BEST		

ES BUSES

PARAMETER	AVAILABLE	UNAVAILABLE
A-ES 4160V BUS		
B-ES 4160V BUS		
A- ES 480V BUS (Note 1)		
B-ES 480V BUS (Note 1)		

EMERGENCY DIESEL GENERATOR

PARAMETER	RECALL PT.	LOADED	AVAILABLE	UNAVAILABLE
A-EDG	RECL-133,171			
B-EDG	RECL-134,172			

DC ELECTRICAL

PARAMETER Note (1)	AVAILABLE	UNAVAILABLE
A-BATTERY		
B-BATTERY		
C-BATTERY		

Note (1) Battery failure will occur if associated battery chargers are de-energized.

V. CONTROL COMPLEX STATUS:

CONTROL COMPLEX VENTILATION STATUS

PARAMETER	AVAILABLE	OPERATING	UNAVAILABLE
A-TRAIN EMERGENCY RECIRC			
B-TRAIN EMERGENCY RECIRC			
A-CHILLER			
B-CHILLER			

CONTROL ROOM INSTRUMENTATION STATUS

PARAMETER	AVAILABLE	UNAVAILABLE
NNI-X		
NNI-Y		
ICS		
EFIC		
RPS		
ESAS		

COMMENTS: _____

DOSE ASSESSMENT TEAM NOTIFICATION

1. The Accident Assessment Team is responsible for supplying the Dose Assessment Team with an evaluation of the accident type, the release pathway, and the release flow rate. The accident type affects the radionuclide distribution (i.e., percentage of each isotope) used by Dose Assessment to predict off-site doses.
2. The accident type is determined by physical parameters and instrument readings throughout the plant.
3. Complete the checklist below to the extent possible and give to the Dose Assessment Team Leader.

ACCIDENT TYPE

_____ **LOCA**	_____ **W G Decay Tank Rupture**	_____ **OTSG Tube Leak**
_____ **Fuel Handling**	_____ **Other:**_____	

☐ **LOSS-OF-COOLANT ACCIDENT** **TIME OF RX TRIP:**_____

a. Normal Activity _____ Clad damage ____ Fuel melt____ (from Enclosure 10)
b. Release pathway information (leak from where to where)_____
c. Release path flow rate (estimated for unmonitored releases)_____
d. Estimated duration_____ Unknown_____
e. Reactor Building spray on/off times_____
f. Aux. Bldg. Ventilation: Flow rate_____ Charcoal banks in service A:B:C:D
g. Containment pressure _____PSIG
h. Loose Parts Monitor indications No___ Yes___ Location:_____

☐ **WASTE GAS DECAY TANK RUPTURE**

a. Release pathway: Tank rupture_____ Valve leakage_____ Other_____
b. Tank volume_____ pressure_____
c. Release rate Unknown_____ Estimate _____CFM
d. Estimated duration: Unknown_____ Time_____
e. Aux. Bldg. Ventilation: Flow rate_____ Charcoal banks in service A:B:C:D

☐ **STEAM GENERATOR TUBE RUPTURE** **TIME OF RX TRIP:**_____

a. Primary-to-secondary leak rate:_____gpm
b. Core status: Cladding damage_____ Fuel melt_____ Normal_____
c. Leaking OTSG isolated: Yes_____ No_____
d. MSSV Open: Yes____ No____ ADV Open: Yes____ No____
e. Condenser vacuum: Yes____ No____ RM-A2 In Service?: Yes____ No____
f. Potential for change in status of leak: Yes_____ No_____
g. Estimated duration of leak:_____
h. Aux. Bldg. Ventilation: Flow rate_____ Charcoal banks in service A:B:C:D

☐ **FUEL HANDLING ACCIDENT**

a. Location of damaged fuel: Pool A____ Pool B____ Number of Elements_____
b. Damage caused by: Mechanical impact_____ Overheating_____ Unknown_____
c. Aux. Bldg. Ventilation: Flow rate_____ Charcoal banks in service A:B:C:D
d. Release pathway:_____ Unknown_____
e. Estimated duration_____ Unknown_____

Status as of _____ Date:_____ Completed By:_____

CORE DAMAGE ASSESSMENT

Determine if core damage has occurred using one or more of the following methods. Estimate the extent of the damage. Evaluate the status of the fission product barriers. Report the results of the evaluation to the AAT operations support member and the dose assessment team leader. Continue to re-assess core and fission product barrier status as conditions change.

☐ ESTIMATE CORE DAMAGE BASED ON RCS SAMPLES.

Core damage assessment based on Reactor Coolant samples will be evaluated by the Dose Assessment Team using CH-632, Enclosure 5. The results will be submitted to the AAT. (May take >2 hours to obtain results)

☐ ESTIMATE CORE DAMAGE BASED ON RM-G29/30 RADIATION LEVELS [NOCS 002153]

NOTE: (1) Use of RM-G29/30 for determining core status requires a failure of the RCS (i.e., LOCA or PORV open).

(2) Low monitor reading does not necessarily indicate lack of core damage. The release from the core may bypass the Containment, may be retained in the RCS, may be over a long period of time, or may not be uniformly mixed.

(3) Inconsistent readings may be due to the uneven mixing in the Containment (e.g., steam rising to the top). IT MAY TAKE SEVERAL HOURS FOR UNIFORM MIXING.

ASSUMPTIONS:

The below table assumes a short release. A long-term release cannot be characterized using these tables.

TIME	____:____	____:____	____:____	____:____	____:____
RM-G29	R/HR	R/HR	R/HR	R/HR	R/HR
RM-G30	R/HR	R/HR	R/HR	R/HR	R/HR

☐ NO CORE DAMAGE
< 100 R/HR

☐ POSSIBLE CLAD FAILURE AND GAS GAP RELEASE
100 – 25,000 R/HR WITH RB SPRAY
100 – 75,000 R/HR WITHOUT RB SPRAY

☐ POSSIBLE CORE MELTING
> 25,000 R/HR WITH RB SPRAY
> 75,000 R/HR WITHOUT RB SPRAY

CORE DAMAGE PROGRESSION ONCE UNCOVERED

☐ IF inadequate subcooling margin exists,
THEN determine if the core is uncovered.

Reactor Coolant Inventory Tracking System (RCITS) provides a continuous indication of reactor vessel head and hot leg coolant inventory trend with the reactor coolant pumps in operation or tripped. RCITS consists of an RCS Hot Leg Level Subsystem, Reactor Vessel Level Subsystem and RC Void Trending Subsystem.

The RCS Hot Leg Level Subsystem (RC-163A/B-LR1) can monitor the top of the hot leg to the bottom of the hot leg with zero flow conditions. The Reactor Vessel Level Subsystem (RC-164A/B-LR1) can monitor the top of the reactor vessel to the bottom of the hot leg with zero flow conditions. The bottom of the hot leg is approximately two feet above the top of the fuel. An off-scale low reading would indicate a high probability of loss of level below core level. Any flow (including natural circulation) in the RCS will result in a lower than actual reading. Thus, any indicated level will provide assurance that coolant level is above the core.

The Reactor Void Trend Subsystem (RC-169-XR) monitors void trends in the RCS when RCPs are running. RCP motor power and Tcold are used to infer average density of fluid passing through the pump (liquid or two-phase). A 0% reading infers no voiding, while 100% reading infers complete voiding.

Recorders are on the PSA panel in the Control Room and display on RECALL (points 62,63,64,65,70,71).

A-HOT LEG	B-HOT LEG	A-VESSEL	B-VESSEL	VOID TREND
RC-163A-LR1	RC-163B-LR1	RC-164A-LR1	RC-164B-LR1	RC-169-XR
RECALL PT 63	RECALL PT 70	RECALL PT 62	RECALL PT 65	RECALL PT 64,71

☐ CORE REMAINS COVERED

TINCORE indicates saturated conditions
RCITS indicates any level

☐ UNCOVERED FOR 15 TO 45 MINUTES

Core temperature 1800-2400°F
Fuel cladding failure (occurred in 34 minutes at Three Mile Island)
Rapid hydrogen generation
Release of fission products out of fuel pin gap (gas gap failure)
Local fuel melt

☐ UNCOVERED FOR 30 TO 90 MINUTES

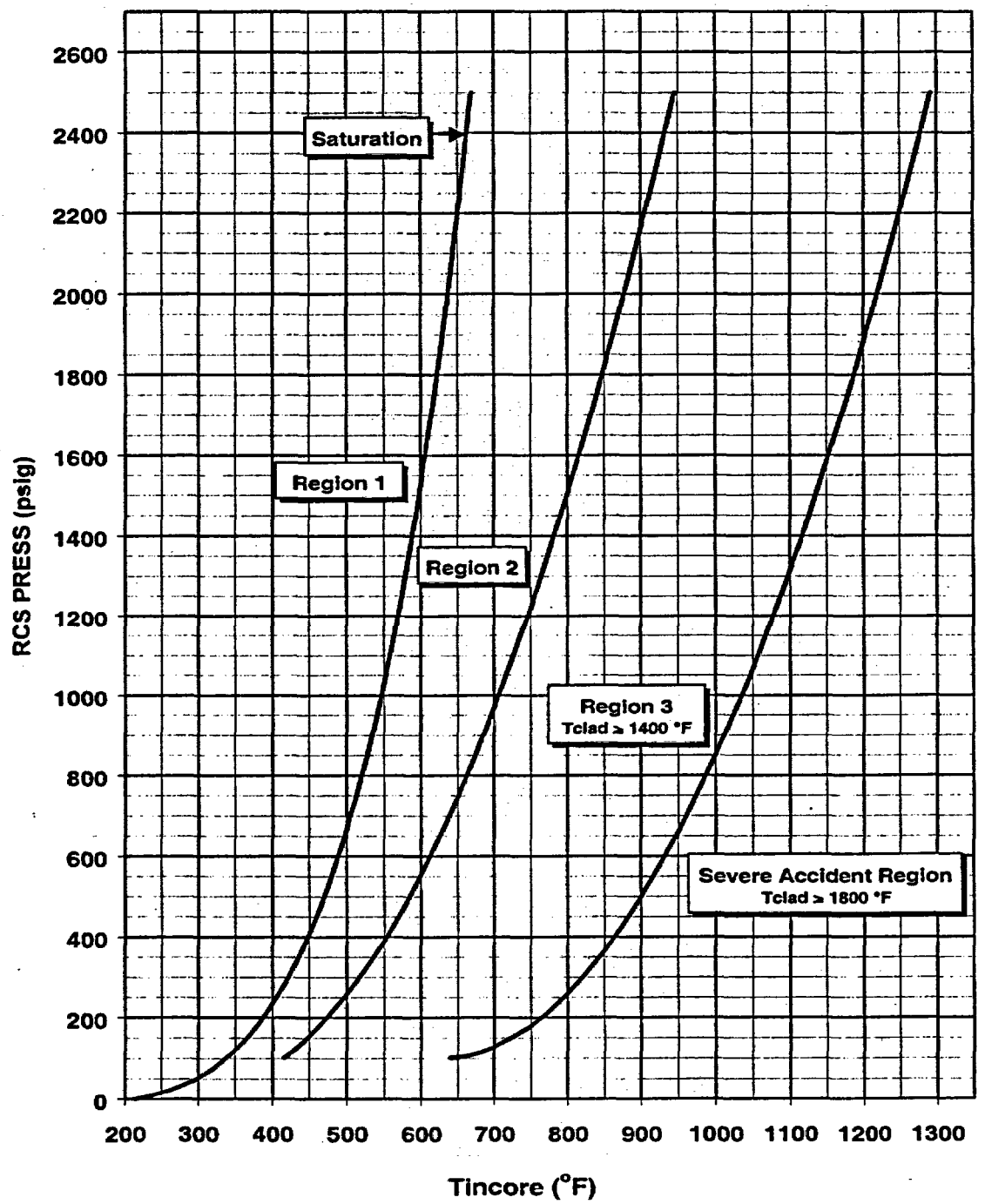
Core temperature 2400-4200°F
Possible uncoolable core
Possible slump of molten core
Rapid release of volatile fission products (grain boundary release)

☐ UNCOVERED FOR 1 TO 3+ HOURS

Core temperature > 4200°F
Maximum core melt and hydrogen generation
Maximum in-vessel fission product release
Possible melt-through of vessel

CORE DAMAGE ASSESSMENT BASED ON ICC CURVE

- ASSESS CORE DAMAGE BY PLOTTING RCS PRESSURE/INCORE TEMPERATURE ON THE ICC CURVE BELOW.
  - Regions 1 and 2 indicate no fuel damage (normal RCS activity).
  - Region 3 indicates possible gas gap failure.
  - Severe Accident Region indicates possible core melt.



TSC GUIDANCE FOR EOPs

[NOCS 62718, 62764, 62767]

This enclosure provides the relationship with the EOPs and TSC guidance during emergency events. It is management's expectation that the guidance steps will be implemented, based on the emergency condition of the plant, by either invoking 10 CFR 50.54 (x), (y), formal 10 CFR 50.59 reviews and approvals, or by existing approved procedures.

PARAMETER	EOP	TBD REF.	TSC GUIDANCE
RB Hydrogen Control	**EOP-3, 6, 7, 8**	HPIC, 5.4 III.F, 6.2, 10.0, 12.6b, 13.6b LBLO 4.4, 6.3 SBLO 12.4, 20.3, 9.3	1. Align hydrogen monitoring equipment using EOP-14, Enclosure 2, PPO Post Event Actions. 2. Monitor hydrogen concentrations using EOP-14, Enclosure 21, RB Hydrogen Monitor Log. 3. Purge RB when authorized per EM-225A. [NOCS 62767]
			Interfacing references are: EM-206 for telephone number for procurement representative to obtain recombiners MP-575 for installation of recombiners OP-417B for operation of recombiners MP-815 for installing H^2 purge flow indicators
Building Spray **Termination Criteria**	**EOP-3, 8** EOP-14 Enc 19	None	If RB sump screen blockage occurs consider alternate criteria for BSP shutdown (See EM-225E, Section 4.6) Verify all of the following before terminating Building Spray: 1. BS has been on for > or equal to 5 hours. 2. RB pressure is < 10 psig. 3. RB pressure is stable or lowering. 4. RB atmosphere is < 13 µci/cc I-131. 5. RB temperature is stable or lowering (also refer to EM-225C). 6. Concurrence is obtained from EC and Dose Assessment to terminate BS.
Continue Cooldown With DHR System	**EOP-6, 8**	FF, 11.5 NC, 11.4	Verify all of the following: 1. Begin establishing a Post Accident Recovery Plan (this can be done during plant cooldown). 2. The reactor is being cooled by DHR. 3. DHR cooling is consistent with maintaining adequate SCM. 4. The RCS is subcooled (use DH cooler outlet temperature for cooldown rates). 5. The RCS is depressurized. 6. Prohibit establishing any flow path that was isolated by the ES system unless the potential for radioactive releases is evaluated and the release path, doses, and methods have been approved by the EC. 7. Control of containment penetrations has been established. 8. Monitor and maintain RCS boron concentration for required shutdown margin.

TSC GUIDANCE FOR EOPs

PARAMETER	EOP	TBD REF.	TSC GUIDANCE
Steaming an Isolated OSTG for TRACC	**EOP-6**	III.E	Steaming an affected OTSG may be desirable for the following reasons: o Increase cooldown rate o Prevent challenging tube to shell dT limits o Prevent idle loop voiding when in natural circulation. All of the following conditions should be evaluated to determine if steaming an affected OTSG is appropriate: 1) BWST > 35 ft* **AND** 2) Affected OTSG Level < 90%** **AND** 3) Any of the following conditions exists: • Steaming is required to avoid core damage • Estimated OTSG leakage times RCS DE I-131 concentrations is < 0.4 $\frac{\text{OTSG Leakage (gpm)}}{\text{Initial RCS DE I-131 (µci/gm)}} < 0.4$ • Wind is blowing off-shore (Off-shore winds originate from NNE to SE sectors 011.2° to 146.3°) * If BWST level is < 35 ft, then determine if adequate BWST level is available for long term cooldown (Ref calc M89-1089) prior to steaming the OTSG. ** If OTSG level is > 90%, then determine if OTSG level is low enough to prevent water carry-over. As long as water level can be ensured to be below the bottom of the main steam outlet nozzles there should not be any carry-over concern.
BWST Makeup	**EOP-6**	III.E	Monitor BWST level trend and evaluate depletion rate. Ensure adequate BWST inventory is available to support RCS cooldown to DHR. Evaluation should include the following: o Primary to secondary leak rate o BWST available inventory o BWST depletion rate o Current RCS temperature o BWST volume required to support cooldown (refer to OP-304) o Potential for leak rate increase (leak before break) IF ECCS water supplies are insufficient to support cooldown to DHR, THEN, make preparations to initiate BWST makeup from spent fuel pools. o Refer to EM-225E, Enclosure 11, BWST Refill from Spent Fuel Pool

TSC GUIDANCE FOR EOPs

PARAMETER	EOP	TBD REF.	TSC GUIDANCE
RCS Leakage No Longer Exists	**EOP-8**	None	1. The RCS is capable of being cooled by DHR. 2. Prohibit establishing any flow path that was isolated by the ES system unless the potential for radioactive releases is evaluated and the release path, doses, and methods have been approved by the EC. 3. Begin DHR.
Break size > 1 HPI Pump Capability or Unable to transition to DHR	**EOP-8**	None	1. Establish a Post Accident Recovery Plan. This plan is dependent on the scope of the applicable Emergency Event. 2. The Post Accident Recovery Plan is approved by the PNSC, and applicable regulatory agencies as determined by FPC Management. 3. Prohibit establishing any flow path that was isolated by the ES system unless the potential for radioactive releases is evaluated and the release path, doses, and methods have been approved by the EC. 4. The availability of borated water sources for required shutdown margin is maintained until the actions of the Post Accident Recovery Plan are completed or to the extent that plant and public safety is ensured. 5. Post and label protected train boundaries for the borated water sources and components that are available.

TSC GUIDANCE FOR EOPs

PARAMETER	EOP	TBD REF.	TSC GUIDANCE
Break size < 1 HPI Pump Capability and able to transition to DHR	**EOP-8**	None	1. Transition to DHR cooldown. 2. Establish a Post Accident Recovery Plan. This plan is dependent on the scope of the applicable Emergency Event. 3. The Post Accident Recovery Plan is approved by the PNSC, and applicable regulatory agencies as determined by FPC Management. 4. Prohibit establishing any flow path that was isolated by the ES system unless the potential for radioactive releases is evaluated and the release path, doses, and methods have been approved by the EC. 5. The availability of borated water sources for required shutdown margin is maintained until the actions of the Post Accident Recovery Plan are completed or to the extent that plant and public safety is ensured. 6. Post and label protected train boundaries for the borated water sources and components that are available.
Establishing Primary to Secondary Heat Transfer to One or Both OTSGs		SS-2	1. Refer to the entry conditions and recommendations of the Emergency Operating Procedures Technical Basis Document (TBD), Section SS-2 for guidance related to establishing primary to secondary heat transfer to one or both OTSGs. 2. Accident Assessment personnel in the TSC will provide recommended guidance to the EC for when and how to establish heat transfer using one or both OTSGs. 3. The EC will approve any actions recommended.
Termination of HPI and Shutdown of RCPs	**EOP-8**	LBLO, 2.2, 3.0	1. Recommended guidance is to stop HPI pumps and trip running RCPs when LPI flow has been in excess of 1400 gpm in each injection line for at least 20 minutes. Accident Assessment personnel will evaluate plant conditions and provide recommendations to the EC. 2. The EC will approve any actions recommended.
Control of Radioactive Release Paths from Containment Penetration Valves	**EOP-8**	SBLO 12.0	1. Prohibit establishing any flow path that was isolated by the ES system unless the potential for radioactive releases is evaluated and the release path, doses and methods have been approved by the EC.
Monitoring of RB Sump Level, RB Sump Boron Concentration, and RB Sump pH	**EOP-8**	None Other: IOC CR 97-0122	**NOTE: With the installation of the TSP baskets, pH data is not required but still desired if feasible.** 1. Accident Assessment personnel to monitor and trend RB sump level, boron concentration, and pH at intervals recommended by the EC. 2. Data for sump pH and boron concentration to be obtained using CH-632 or other PNSC approved alternate methods dependent on the Emergency Event.

TSC GUIDANCE FOR EOPs

PARAMETER	EOP	TBD REF.	TSC GUIDANCE
Venting of Non-Condensable Gases	**EOP-8**	None	1. Once subcooling margin is regained, all of the noncondensable gas production will have ceased. However, as the RCS is depressurized these gases will come out of solution and should be vented. If natural circulation is lost to an available OTSG, Accident Assessment personnel will recommend to the EC when to vent noncondensable gases. 2. The EC will approve any actions recommended.
Reactor is Being Adequately Cooled Using HPI or LPI and OTSG Cooling is No Longer Desired	**EOP-8**	SBLO, 17.7	1. Verify TBVs/ADVs are closed. 2. Fill available OTSGs to 90%. 3. Close EFW/AFW/MFW Valves. 4. Stop all EFW/AFW Pumps. 5. Stop MFWPs and MFWBPs.
Boron Concentration Management When Adequate Sub Cooling Margin Does Not Exist (Boron Precipitation)	**EOP-8 EOP-14, Enc. 20**	None	Refer to EM-225B **NOTE: If a failure of ES MCC 3AB has occurred, ensure repair efforts are initiated to repower auxiliary pressurizer spray valve RCV-53 prior to the onset of boron precipitation.**
RB Temperature Monitoring (To Preserve EQ Standards)			Refer to EM-225C
Feeding a Dry OTSG (Tube to Shell Delta T Monitoring and Control)	**EOP-5, 9 EOP-14, Enc. 3**	III.D, 12.0 III.E, 17.7 NC, 5.2, 5.3, 6.4	Refer to EM-225D
Long-Term Core Cooling Using the RB Sump	**EOP-8**	LBLO, 6.4a, 6.4b, 6.6, 6.7	Refer to EM-225E
EFW or AFW is Operating	**EOP-14, Enc. 7 Enc. 22**		Refer to EM-225F
TBP-3 is Running. TBP-2 is Not Running. Generator Purge Complete	**EOP-14, Enc. 14**		TBP-3 will drain non-1E battery during LOOP. Stopping TBP-3 before 24 hours may result in Turbine bearing damage. Refer to IOC SE-99-0184

TSC GUIDANCE FOR EOPs

PARAMETER	EOP	TBD REF.	TSC GUIDANCE
Concentrated BA addition made and flush water not available.	**EOP-14, Enc 18**	None	If concentrated BA is allowed to remain in the boron injection path piping (letdown/DH purification piping) the BA will eventually cool down and solidify. Timely action is required to preclude this condition. 1. Direct the control room to reestablish a continuous BA injection at a flow rate of 2 – 3 GPM (Batch controller is the preferred method). 2. Monitor RCS boron concentration. DO NOT allow RCS boron concentration to exceed the values listed in FSAR Table 4-10. 3. Evaluate the following options. • If plant conditions permit, expedite restoration of RCS letdown (or DH purification). • If plant condition permit expedite restoration of power to at least one source of flush water (DWP-1A, DWP-1B, WDP-5A, WDP-5B, or WDP-5C. • If BA flow rate and AB temperature conditions permit, evaluate securing continuous BA addition and performing periodic batch additions to prevent boron solidification. 4. IF letdown or DH purification flow is established, THEN direct the control room to STOP concentrated BA additions. 5. IF any flush water source becomes available, THEN direct the control room to STOP concentrated BA additions and perform a line flush using EOP-14, Enclosure 18. Refer to EEM-01-021, FSAR Table 4-10

TSC GUIDANCE FOR EOPs

PARAMETER	EOP	TBD REF	TSC GUIDANCE
Indications of RB sump screen blockage have occurred.	**EOP-14 Enc. 19**	None	ECCS pumps have been aligned to the RB sump and are now showing signs of sump screen blockage (flow oscillations, pump amp swings). Per EOP-14, Enclosure 19, LPI flows should have been reduced to 1400 gpm per pump. At least one BSP should be secured. If both trains of LPI are in service HPI should be secured. If only one train of LPI is in service, one train of HPI must be aligned to the operable LPI pump in piggy back mode. 1. Verify proper ECCS pump configuration 2. Closely monitor ECCS pump parameters and Incore temperatures 3. Expedite BWST refill operation from spent fuel pool using EM-225E Enclosures 11 and 12. 4. Expedite mixing of boric acid for BAST makeup per OP-403B, Section 4.2, Boric Acid Production. 5. Refer to EM-225E, Section 4.6, Contingency Actions for RB Sump Screen Blockage, for specific guidance.

(SAMPLE)

TSC ACCIDENT ASSESSMENT TEAM
OSC Request Form

REQUEST NO. (UNIQUE NUMBER)	INITIATED BY: (AAT MEMBER)	TIME	DATE
REQUESTED ACTION(S):			
CONSEQUENCES IF NOT PERFORMED:			
TIME FRAME REQ'D	TAG NO:	TRAIN:	LOCATION:
APPROVAL (AAT COORDINATOR)			TIME:
RECEIVED BY: (TSC REPAIR COORDINATOR)			TIME:

INSTRUCTIONS:

1. Use this form for each requested action from the Control Room, or Accident Assessment Team (multiple steps of EOPs/APs may be covered by one request)
2. Obtain approval from the AAT Coordinator
3. Obtain acknowledgement from TSC Repairs Coordinator
4. Make copy and give original to TSC Repairs Coordinator
5. Give copy to TSC Ringdown Communicator
6. Feedback to the Control Room on status of request.

SPDS OR RECALL DISPLAY SETUP FOR TSC PROJECTION SCREENS

NOTE: REBOOTING ANY OF THE TSC COMPUTERS WILL RESULT IN AN ALARM IN THE MAIN CONTROL ROOM. CALL THE CONTROL ROOM BEFORE REBOOTING ANY TSC COMPUTER.

- ☐ GO TO "TSC-1" COMPUTER IN THE AAT ROOM. TURN ON THE MONITOR. TSC-1 TELLS THE COMPUTERS IN THE PROJECTION ROOM (CALLED SPARE AND RECALL 2) WHAT TO DISPLAY.
- ☐ IF "*PICS MMI*" (THE CONTROLLING PROGRAM) IS NOT RUNNING, THEN DOUBLE CLICK ON THE "*PICS MMI*" ICON TO START THE CONTROLLING PROGRAM. (NOTE: IF A FULL SCREEN DISPLAY OF SPDS PREVENTS SEEING ANY WINDOWS BUTTONS, MINIMIZE THE SPDS DISPLAY USING "CONTROL M")
- ☐ IF SELECTING AN SPDS DISPLAY, THEN GO TO "*LAUNCH*" AND "*SPDS REMOTE*" TO DISPLAY THE CONTROLLER WINDOW.
- ☐ IF SELECTING A RECALL DISPLAY, THEN GO "*LAUNCH*" AND "*DISPLAY CONTROL*" TO DISPLAY THE CONTROLLER WINDOW.
- ☐ SELECT THE COMPUTER IN THE PROJECTION ROOM THAT WILL DISPLAY THE SPDS OR RECALL GROUP. CLICK ON EITHER "*SPARE OR RECALL 2.* (DON'T USE RECALL 1)
- ☐ SELECT THE SPECIFIC DISPLAY DESIRED:
  - FOR RECALL, SELECT ONE OF THE PRE-ESTABLISHED DISPLAYS FROM THE "*WORKSPACES*" DROP DOWN MENU, AND CLICK "OPEN"
  - FOR A SPECIFIC SPDS DISPLAY, JUST CLICK ON THE DESIRED BUTTONS OR USE THE KEYBOARD (REFER TO THE LAMINATED CARD FOR COMMANDS).
- ☐ CLICK "*BRING TO FRONT*" BUTTON ON EITHER THE SPDS OR RECALL CONTROL WINDOW.
- ☐ GO TO THE TOUCH SCREEN (LOCATED IN THE MAIN TSC ROOM) WHICH CONTROLS THE PROJECTION SCREENS. SELECT THE LEFT, CENTER, OR RIGHT SCREEN THAT YOU WANT TO USE, USING THE FOLLOWING RELATIONSHIP:

IF THE DESIRED DISPLAY IS ON THIS COMPUTER IN THE PROJECTION ROOM	THEN SELECT THIS LABEL ON THE TOUCH SCREEN FOR THE DESIRED PROJECTION SCREEN.
SPARE	SPARE
RECALL 2	RECALL/SPDS 2
RECALL 1 *	RECALL/SPDS 1

* NOTE: RECALL 1 CAN ONLY BE CONTROLLED FROM THE PROJECTION ROOM AND IS NORMALLY ALIGNED TO SPDS. TO CHANGE THE DISPLAY ON RECALL 1, GO INSIDE THE PROJECTION ROOM AND TURN ON THE MONITOR. ENSURE THE MONITOR PLUG IS CONNECTED TO RECALL 1. USE THE KEY BOARD TO SELECT THE DESIRED DISPLAY.

- ☐ TO CHANGE TO DIFFERENT COMPUTERS, (I.E. SPARE OR RECALL 2) "DISCONNECT" AND RE-PERFORM THE ABOVE STEPS AS DESIRED.
- ☐ IF SPDS AND RECALL ARE RUNNING ON THE SAME COMPUTER (SPARE OR RECALL 2) USE THE "BRING TO FRONT" BUTTON ON TSC-1 TO SELECT WHAT DISPLAY WILL BE SHOWN.

VALIDATION TEST CASE

DISPLAY THE STATION BLACKOUT RECALL GROUP ON THE LEFT PROJECTION SCREEN
AND
DISPLAY THE ICC CURVES FROM SPDS ON THE CENTER DISPLAY

Revision Summary

SECTION	CHANGE
Step 2.1.6 Step 3.1.6	Editorial corrections
Step 3.2.9	Deleted responsibility to perform CH-362, Enclosure 5. This is not a DAT responsibility. PRR#101845 written to add responsibility to EM-102 and/or 104 as applicable.
Enclosure 2	Revised Enclosure 2, section III to eliminate "regained" column. Change is being made in support of a similar change being made to the state notification form (see EM-202, Enclosure 2) . Section IV, "ES Buses" changed to "ES Bus". "Diesel Generator's" changed to "Diesel Generator." (PRR# 93338)
Enclosure 4	Deleted the words "for plant condition information" from bullet 11. (PRR# 84385) Deleted reference to Enclosure 8 which is not required for the new notification form.
Enclosure 5	Added step to obtain and transmit RB I131 concentration to control room for BS pump shutdown decision making.
Enclosure 8	Revised page 5 to eliminate "regained" column. Change is being made in support of a similar change being made to the state notification form (see EM-202, Enclosure 2) . Revised wording slightly to clarify "Intact" description. (PRR# 93338)
Enclosure 11	Page 1, Building Spray Termination – Added bullet stating that >5 hour requirement may be waived if indications of sump screen blockage exist with a reference to EM-225E. Page 2, BWST Makeup – revised guidance to perform BWST refill IAW EM-225E, Enclosure 11. This is a new enclosure that allows BWST refill from the SF pools using a main SF pump. Use of this method allows for quicker addition of borated water and eliminates the need for BWST recirculation prior to injection. Page 7, Indications of RB Sump Blockage – this section provides basic response actions to TSC personnel if they are notified by the control room that indications of RB sump blockage have occurred. Enclosure 11 references EM-225E for primary mitigation actions.
Enclosure 12	Revised instructions to allow multiple EOP/AP actions to be performed with single request. (PRR# 94902). Corrected position title for AAT Coordinator.
Enclosure 13 (new)	Added new Enclosure 13 to provide guidance for setting up SPDS/Recall displays on TSC displays (PRR# 94271)

PROGRESS ENERGY

CRYSTAL RIVER UNIT 3

PLANT OPERATING MANUAL

EM-225E

GUIDELINES FOR LONG TERM COOLING

TABLE OF CONTENTS

1.0 PURPOSE

The purpose of this procedure is to provide guidance to the TSC Accident Assessment Team for maintaining long term core cooling post LOCA.

2.0 REFERENCES

2.1 Developmental References

2.1.1 Babcock and Wilcox Topical Report BAW-10103A, Rev. 3, ECCS Analysis of B&W's 177-FA Lowered-Loop NSS

2.1.2 Calculation M90-0021, Building Spray and Decay Heat Pump NPSH a/r

2.1.3 Calculation I97-0008, LPI Crossover Flow Loop Accuracy Calculation

2.1.4 Calculation I91-0001, DH (LPI) Flow Indication and Control Loop Error Calculation

2.1.5 Calculation M98-0003, TSC Guidance For LPI Cross-Connect (Framatome Technologies Document 51-5001075-01)

2.1.6 Framatome Technologies Document 74-1152414, Emergency Operating Procedures Technical Bases Document

2.1.7 Calculation I90-0021, Decay Heat Removal Heat Exchanger Outlet Temperature Loop Accuracy Calculation

2.1.8 Calculation I88-0011, Containment Sump and Building Flood Level Indication

2.1.9 Calculation I91-0012, BWST Level Accuracy

2.1.10 Calculation M94-0053, Allowable MUT-1 Indicated Overpressure vs. Indicated Level

2.1.11 Calculation M95-0005, Minimum BWST Level to Prevent Vortexing during Drawdown

2.1.12 MAR 90-06-10-02, Reactor Building Instrument and Valve Relocation

2.1.13 Calculation M90-0023, Reactor Building Flooding

2.1.14 Calculation F98-0015, Minimum HPI flow for CR-3 at 72 hours post-LOCA

2.1.15 EEM98-001, MU/HPI Pump Qualification

2.1.16 Calculation I89-0036, Make-up/HPI Flow Loop Accuracy (High Range)

2.1.17 Calculation I89-0037, Make-up/HPI Flow Loop Accuracy (Low Range)

2.1.18 EEI98-001, HPI Total Flow Uncertainty

2.1.19 BAW-2374, Rev.1, Risk-Informed Assessment of Once-Through Steam Generator Tube Thermal Loads due to Breaks in Reactor Coolant System Upper Hot Leg Large-Bore Piping.

3.0 PERSONNEL INDOCTRINATION

3.1 Definitions

- Duration of Long Term Core Cooling - The time period between the Onset of Long Term Core Cooling, and the End of ECCS Cooling.

- ECCS Suction Transfer - This necessary operator action involves manual alignments to allow the active ECCS, and Reactor Building Spray components to take suction from the Reactor Building sump.

- Emergency Core Cooling Systems (ECCS) - Active components (i.e., High Pressure Injection, Low Pressure Injection, associated flow paths), combined with the passive systems (i.e., Core Flood Tanks (CFT) and the Borated Water Storage Tank), required to be operable to ensure the initial condition assumptions of the accident analysis are met.

- End of ECCS Cooling - The time after a LOCA, when the core has been removed from the Reactor Vessel or other permanent means of core cooling has been established.

  - Long Term Cooling Modes - There are three methods that may be available for long term core cooling. The three methods in their order of preference are:

    - Both LPI trains operating and providing flow through their respective injection lines.

    - One LPI train operating and providing flow through its respective injection line, and providing a suction source for the associated HPI pump.

    - One LPI train operating and providing flow through both LPI injection paths through the discharge cross-tie line.

- Onset of Long Term Core Cooling - The time after a LOCA, when operator action is required to ensure the ECCS systems are properly aligned, and the minimum performance requirements are met.

3.2 Responsibilities

- The TSC Accident Assessment Team is responsible for the following:

  - Monitoring ECCS system performance and providing recommendations to the EC regarding changes in the established flow paths.

  - Provide input to recovery plans for failed equipment, placing emphasis on the need for at least two ECCS injection paths before, during, and after required maintenance activities.

  - Assess plant conditions and equipment availability to determine the safest and most effective method to achieve LPI injection through both injection paths.

3.3 Limits And Precautions

- To ensure adequate NPSH is maintained, total actual decay heat pump flow from RB sump must be maintained ≤ 2986 gpm. This is derived from the following:
  - 2200 gpm indicated LPI flow (plus instrument uncertainties)
  - 600 gpm HPI flow (derived from hydraulic analysis)
- Total HPI flow must be limited 72 hours post accident to ensure long term mission time requirements are met.
- Any changes to the flow limits associated with Enclosures 4 through 10 must consider the following:
  - LPI pump NPSH
  - Instrumentation uncertainty
  - Required LPI flow
  - Required HPI flow
  - HPI pump mission time limitations
- Do not perform LPI crosstie during boron precipitation mitigation activities.
- Due to MOV considerations, limit bumps (motor starts) of the HPI valves to 5 consecutive times.
  - If more than 5 consecutive bumps are required, 1 bump may be performed every 7 minutes.
  - After a cooling period of 1.5 hours, 5 consecutive bumps may again be performed.
- If piggyback operations are in progress, do not perform LPI crosstie until one of the following is met:
  - DHHE outlet temperature ≤ 130ºF AND > 32 hours since shutdown.
  - DHHE outlet temperature > 130ºF to ≤ 175ºF AND > 81 hours since shutdown.
- Prior to starting equipment, ensure adequate EDG load margin is available per EOP-13, Rule 5, "EDG Control".
- For work located in the Radiation Control Area, due consideration must be given to the ALARA program. This will likely result in special precautions and preparations.
- If indicated RB water level exceeds 6.0 feet, instrumentation may be lost.
- The HPI pump mission time study has qualified the pumps for a two month period. This analyzed mission time, relative to previous operational time, should be considered during decisions related to alignment changes.

4.0 INSTRUCTIONS

4.1 Emergency LPI Crosstie And Piggyback Operations

- IF HPI piggyback operations are required,
  AND multiple failures result in the inability to align the ECCS systems for piggyback operation,
  THEN obtain EC concurrence and perform Enclosure 10, Emergency LPI Crosstie.

- IF only HPI pumps are taking suction from the BWST,
  THEN level can be lowered to 2.5 feet (actual) or 3.5 feet (indicated).

4.2 Long Term Cooling Requirements

NOTE

Refilling the BWST will provide additional ECCS inventory for RCS injection in the unlikely event that severe RB Sump screen blockage occurs.

- As soon as possible after ECCS SUCTION TRANSFER is complete notify the OSC to begin refilling the BWST from the spent fuel pools by performing Enclosures 11 and 12 of this procedure.
- Notify OSC to commence Boric Acid production per OP-403B, Section 4.2
- The most desired long term cooling mode of operation is to supply LPI injection through both injection lines. Review plant conditions for the safest method for achieving this alignment

NOTE

- Adequate SCM may be lost during HPI flow reduction. Analysis has shown the flow rates listed below will ensure continued core cooling. Loss of adequate SCM during establishment of the flow rates below is acceptable.
- If adequate SCM does not exist, the flow limits below supersede the EOP requirement for full HPI.
- The flow limits below are only valid when the flow path is limited to the HPI valves. Other configurations (recirc, seal injection, normal makeup) must be individually evaluated.

- IF total HPI flow is > 500 gpm,
  THEN provide direction to the Control Room to maintain HPI flow within the following limits (balanced between available digital low range indicators):

	≤ 64 hours	> 64 hours and < 72 hours	≥ 72 hours without Adequate SCM	≥ 72 hours with Adequate SCM
1 HPI pump	Per EOP-13, Rule 2	Control HPI flow within applicable ≥ 72 hour limit.	> 440 gpm < 500 gpm	< 500 gpm
2 HPI pumps 4 indicators	Per EOP-13, Rule 2	Control HPI flow within applicable ≥ 72 hour limit.	> 440 gpm < 760 gpm	< 760 gpm
2 HPI pumps 3 indicators	Per EOP-13, Rule 2	Control HPI flow within applicable ≥ 72 hour limit.	> 440 gpm < 560 gpm	< 560 gpm

- After the EOP has been completed, request Control Room trending of the operating components by performance of:
  - Enclosure 1, ECCS Flow Log, every 24 hours
  - Enclosure 2, Long Term Cooling Equipment Log, every 12 hours

4.3 RB Water Level Control

- Monitor and maintain the RB water level in the appropriate level limits. Consult with engineering personnel for the minimum and maximum levels for current plant conditions.

- If RB water level is lowering, perform walk downs of accessible areas to determine leakage location. If the AB is not accessible, the Control Room radiation monitoring reading may be helpful in determination.

> **NOTE**
>
> Analysis indicates that a large break LOCA may result in steam generator tube failure due to stresses induced by tube to shell differential temperatures.

- If RB water level is lowering and no AB leakage exists consider the following:

  - Inadvertent pumping, i.e., RB sump pumps, RCDT pumps
  - Leaking ECCS flow path isolation valves, i.e., DHP recirc to BWST, DHP recirc to SF pools, HPI pump recirc to MUT, RB spray recirc to BWST, etc.
  - Possible SGTR

- If the leaking component is found, review available equipment to determine possible Long Term Core Cooling alignments to allow faulted equipment isolation.

- If RB water level loss has occurred consult with engineering personnel to ensure remaining ECCS water inventories (RB sump and BWST) are sufficient to support Long Term Core Cooling.

- IF ECCS water supplies are insufficient to support Long Term Core Cooling, THEN, make preparations to initiate BWST makeup from an available source.

  - Spent Fuel Pool (refer to OP-406)
  - DW/boric acid addition (refer to OP-403B)

- Reduction in RB sump boron concentration may be indicative of the need to perform boron precipitation mitigation.

- Rising RB water level and lowering boron concentration may be indicative of unborated water leaking to containment. The following are possible sources of unborated water:

  - SW system
  - CI system
  - DW system
  - FW systems (AFW, EFW, MFW)
  - DC system via DHHEs

- RB sump boron concentration must be maintained to ensure the Rx remains shutdown. If unborated water is leaking to the RB, attempt isolation efforts.

- IF RB sump water must be drained/pumped to prevent exceeding RB flood plane, THEN the storage location must be evaluated to prevent excessive dose rates and releases.

4.4 Long Term Core Cooling Mode Alignment Changes

- The most desired long term cooling mode of operation is to supply LPI injection through both injection lines.
- Enclosure 3 describes the "Functional Goals" of the alternate cooling modes established by Enclosures 4 through 10 of this procedure.
- If power failures exist, using OP-700 series procedures ensure required equipment is energized.
- During transitions to LPI crosstie mode of operation, the Control Room will ask for TSC assistance for HPI termination. Ensure all the following exist prior to allowing HPI pump shutdown:
  - Stable LPI crosstie flow with in the limits of the applicable enclosure.
  - Tincore is NOT rising.
  - RCS pressure is NOT rising.
- If the above conditions are not observed, direct the Control Room to re-establish HPI injection flow by performing the following:
  1. Throttle the injection valves until total injection flow is > minimum pump flow.
  2. Close the recirc valves.
  3. Establish maximum allowable injection flow.
- During LPI crosstie operations, if stable LPI flow within the limits of the applicable enclosure can not be maintained, provide direction to the Control Room to establish HPI piggyback.
  - If Enclosures 8 or 9 are used to establish piggyback, the status statement will not be met. The two status statements regarding LPI system alignment are intended for normal transitions with adequate core cooling.
  - Provided the associated LPI train indicated flow is ≤ 2200 gpm, adequate NPSH margin exists for HPI pump operation.
- IF RB water level losses threaten the ability to maintain Long Term Core Cooling, THEN, consider establishing core cooling using normal decay heat removal.

4.5 Maintenance During Long Term Cooling

- Prior to performing maintenance activities, any necessary temporary shielding must be installed, and the associated piping flushed.
- Storage location for draining and flushing operations must be evaluated to prevent excessive dose rates and releases.
- A possible flushing activity may be to drain or pump water from the BWST or SF pools to a suitable storage location.

4.6 Contingency Actions for RB Sump Screen Blockage

CAUTION

- **Contingency actions contained in EOP-14, Enclosure 19 mitigate symptoms of RB sump screen blockage by significantly reducing ECCS flow through the sump screen. As long as ECCS pumps are aligned to the RB sump, the potential for further blockage exists.**
- **Actions specified in this section are outside the CR3 design basis and must be performed in accordance with 10 CFR 50.54 sections X and Y.**

- IF notified by the control room that indications of RB sump screen blockage have occurred,
  THEN perform the following:
  - Notify EC that sump blockage has occurred.
  - Notify the OSC to expedite BWST refill operations (Enclosures 11 and 12).
  - Ensure Boric Acid Production is in progress per OP-403B.

NOTE

- **RCITS reactor vessel level instrumentation indicates the water level from the top of the reactor vessel head to the bottom of the hot leg. A hot leg or cold leg LOCA in the nozzle belt region may result in no indicated reactor vessel level even with full ECCS flow rate.**
- **ECCS flow may impact RCITS reactor vessel level indication.**

- Notify AAT to closely monitor RCS / ECCS conditions:
  - RB Sump level indication
  - ECCS pump flow rates for symptoms of cavitation/ vortexing
  - RCS incore temperature trends
  - RCS subcooling margin
  - RCITS reactor vessel level indication
  - RB pressure / temperature
  - RB radiation levels / Iodine activity

4.6 Contingency Actions for RB Sump Screen Blockage (Cont'd)

- IF one train of RB spray is still in operation (per EOP-14, Enclosure 19),
  THEN consult with engineering personnel and dose assessment to determine if alternate shutdown criteria can be established.
  - Consider actual plant radiation levels
  - Consider RB atmospheric I^{131} trend (if available).
  - Consider status of ECCS systems and Incore thermocouple trends. If ECCS systems are functioning normally and Incore trends indicate adequate core cooling the potential for a delayed release is low.
  - Consider the projected offsite thyroid dose from airborne RB releases. If the dose projection exceeds 5 REM thyroid, RB spray should be maintained, if possible, to reduce RB Iodine concentrations (the 5 REM limit should preserve DBA assumptions for both dose and CR Habitability calculations.
  - If containment temperature / pressure are elevated consider using two RB cooling units (in ES mode) in lieu of RB spray.

- IF indications of sump blocking return,
  THEN provide direction to the Control Room to further reduce ECCS injection flow.
  - Throttle ECCS flow as required to achieve a stable operating point. **The minimum flow to provide assured core cooling is full flow (4 nozzles) from 1 HPI pump.**
  - At LPI flow rates < 800 gpm LPI instrument uncertainty becomes significant. Consider going to HPI piggy back mode.
  - Closely monitor ECCS pump parameters and Incore temperatures.
  - IF only one train of ECCS is in operation,
    AND HPI is operating in piggy back mode,
    THEN direct the control room to OPEN all available HPI valves and CLOSE the LPI valve.

4.6 Contingency Actions for RB Sump Screen Blockage (Cont'd)

CAUTION

- **If ECCS suction must be realigned to the BWST, ECCS flow rates significantly greater than two times W_{VAP} are undesirable since they will accelerate BWST depletion.**
- **Because break location is unknown ECCS flow must be injected through at least 2 nozzles.**
- **200 gpm minimum HPI flow allows MUP recirculation valves to remain closed.**

- IF ECCS pump suction flow from RB sump is interrupted due to sump blockage, OR ECCS flow cannot be maintained ≥full flow (4 nozzles) from 1 HPI pump), THEN provide direction to the Control Room to reestablish ECCS injection flow from the BWST.
  - Ensure BWST level sufficient to support HPI pump operation.
  - Align one HPI pump to BWST per Enclosure 14.
  - Maintain ECCS total flow rate two times W_{VAP} (Enclosure 13) OR 200 gpm (Whichever is greater).
  - Direct the Control Room to divide ECCS flow evenly between all available HPI nozzles.
  - Closely monitor ECCS pump parameters and Incore temperatures
  - WHEN HPI flow from BWST has been established, THEN calculate time to BWST depletion based on initial BWST level and HPI flow rate.
  - Notify control room of minimum allowable BWST level to support HPI pump operation at current flow rate.
  - Reg. Guide 1.97 instrumentation will be submerged by the additional inventory, and may subsequently fail. Consult with engineering personnel to predict potential instrument failures and identify any available alternate instrumentation.
  - Additional borated water inventory may adversely affect RB sump water chemistry. Consult with chemistry and engineering personnel to develop a plan for maintaining RB water chemistry within expected post accident range.

- Develop alternative methods for recovering the RB sump or continuing injection from alternate source.
  - Consider back washing the RB sump screen by performing a DH drop line dump to sump evolution per EOP-14, Enclosure 20.
  - Consider cyclic operation of an LPI pump from RB sump. Direct pump operation on RB sump level indication. Ensure pump is stopped if indications of pump distress are observed.
  - Consider aligning 1 HPI pump to MUT. Maintain MUT level by feeding from RCBTs and BASTs.
  - Consult with engineering personnel to determine minimum acceptable HPI flow rate. Maintain injection flow rate ≥ W_{VAP} (Enclosure 13).
  - If CFTs were isolated before being fully depleted consider reopening CF isolation valves.
  - Consult with engineering personnel to determine if plant conditions will support a transition to DHR.
  - Refer to the CR3 Severe Accident Guideline

4.7 Long Term Cooling Termination

- WHEN the End of ECCS Cooling occurs, THEN exit this procedure.

ECCS FLOW LOG

Time Note 1	HPI flow Notes 2 and 3	A LPI flow Note 2	B LPI flow Note 2	LPI Crosstie flow Note 2

1) Suggested minimum time interval is 24 hours.

2) If an increasing trend is noted without a corresponding decrease in RCS pressure or increase in valve position, notify the TSC.

3) HPI flows must be maintained within the limits of Section 4.2

LONG TERM COOLING EQUIPMENT LOG

DHP-1A Computer Points (See Note 1)									
R250									
X318									
X319									
X320									

DHP-1B Computer Points (See Note 1)									
R251									
X321									
X322									
X323									

MUP-1A Computer Points (See Note 1)									
X324									
X326									
X325									
X070									
X366									
T217									
S292									
S294									

MUP-1B Computer Points (See Note 1)									
X327									
X329									
X328									
X071									
X367									
T253									
S311									
S295									

MUP-1C Computer Points (See Note 1)									
X330									
X332									
X331									
X072									
A298									
T236									
T216									
S296									

LONG TERM COOLING EQUIPMENT LOG (CONT'D)

BSP-1A Computer Points (See Note 1)									
X313									
X312									
X314									

BSP-1B Computer Points (See Note 1)									
X316									
X315									
X317									

Note 1: These instruments are not safety related or EQ qualified. However, this data may be useful for trending equipment condition.

OPERATOR ENCLOSURE FUNCTIONAL GOALS

Enclosure	Functional Goal
4	To provide LPI flow through both injection lines using DHP-1A. This alignment allows maintenance on the following equipment: • All HPI pumps • DHP-1B, provided the recirculation fluid down stream of DHV-111 does not result in excessive dose rates. The only alignment that should be performed from this alignment is starting the opposite LPI train.
5	To provide LPI flow through both injection lines using DHP-1B. This alignment allows maintenance on the following equipment: • All HPI pumps • DHP-1A, provided the recirculation fluid down stream of DHV-110 does not result in excessive dose rates. The only alignment that should be performed from this alignment is starting the opposite LPI train.
6	To provide LPI flow through A Train LPI using DHP-1A. Provided DHP-1B is operating, this alignment allows maintenance activities on all HPI pumps.
7	To provide LPI flow through B Train LPI using DHP-1B. Provided DHP-1A is operating, this alignment allows maintenance activities on all HPI pumps.
8	To provide HPI injection using the A Train ES selected HPI pump. This alignment allows maintenance on the following equipment: • Secured HPI pumps • DHP-1B
9	To provide HPI injection using the B Train ES selected HPI pump. This alignment allows maintenance on the following equipment: • Secured HPI pumps • DHP-1A
10	To provide emergency alignments should Piggyback alignments fail.

A LPI TRAIN CROSSTIE

ACTIONS DETAILS

STATUS

- **ECCS suction transfer has been completed.**
- **DHP-1A is operating.**
- **A Train ES selected MUP is operating in piggyback.**
- **BSP-1B is shutdown.**
- **LPI crosstie NOT in progress.**
- **DHHE outlet TEMP is ≤ 130ºF AND > 32 hours have elapsed since Rx shutdown.**

  OR

  DHHE outlet TEMP is > 130ºF to ≤ 175ºF AND > 81 hours have elapsed since Rx shutdown.

NOTE

Tincore should be closely monitored while changing ECCS alignments.

4.1 ___ Ensure B ES selected MUP is stopped.

___ **MUP-1B**
___ MUP-1C

4.2 ___ IF both LPI pumps are running,
THEN stop DHP-1B.

A LPI TRAIN CROSSTIE (CONT'D)

ACTIONS	DETAILS
4.3 ___ Isolate B LPI Train.	• Ensure the following valves closed: ___ DHV-35 ___ DHV-40 ___ DHV-43 ___ DHV-211 ___ DHV-12 • ___ Select BSV-4 to "MAN" and closed. • ___ Select DHV-111 to "MAN" and closed.

A LPI TRAIN CROSSTIE (CONT'D)

ACTIONS	DETAILS
4.4 ___ Adjust DHV-110 setpoint to 1600 gpm.	

NOTE

During crosstie DHV-111 must remain in manual.

4.5 ___ Establish LPI crosstie.	1 ___ Ensure DHV-6 is open. 2 Open LPI crosstie valves: ___ DHV-8 ___ DHV-7 3 ___ Throttle DHV-111 to achieve LPI crosstie flow of 900 (800 to 1000) gpm on DH-38-FI1 4 ___ Adjust DHV-110 setpoint to obtain A Train LPI flow of 2100 (2000 to 2200) gpm on DH-1-FI1

A LPI TRAIN CROSSTIE (CONT'D)

ACTIONS	DETAILS
4.6 ___ Stop HPI flow.	1 ___ IF HPI flow is > 300 gpm, THEN throttle HPI flow to 300 (200 to 400) gpm. 2 Open all HPI recirc to sump valves: ___ MUV-543 ___ MUV-544 ___ MUV-545 ___ MUV-546 3 Close all HPI valves: ___ MUV-23 ___ MUV-24 ___ MUV-25 ___ MUV-26
4.7 ___ WHEN the TSC directs termination of the MUP, THEN stop the operating MUP.	1 Stop the A ES selected MUP: ___ MUP-1A ___ MUP-1B 2 ___ Close DHV-11

A LPI TRAIN CROSSTIE (CONT'D)

ACTIONS	DETAILS

NOTE

During crosstie DHV-111 must remain in manual.

4.8 ___ Increase LPI flow.

1 ___ Throttle DHV-111 to obtain LPI crosstie flow of 1250 (1150 to 1350) gpm on DH-38-FI1

2 ___ Adjust DHV-110 setpoint to achieve A Train LPI flow 2700 (2600 to 2800) gpm on DH-1-FI1

4.9 ___ Close all HPI recirc to sump valves.

___ MUV-543
___ MUV-544
___ MUV-545
___ MUV-546

B LPI TRAIN CROSSTIE

ACTIONS | DETAILS

STATUS

- **ECCS suction transfer has been completed.**
- **DHP-1B is operating.**
- **B Train ES selected MUP is operating in piggyback.**
- **BSP-1A is shutdown.**
- **LPI crosstie NOT in progress.**
- **DHHE outlet TEMP is ≤ 130ºF AND > 32 hours have elapsed since Rx shutdown.**

  OR

  DHHE outlet TEMP is > 130ºF to ≤ 175ºF AND > 81 hours have elapsed since Rx shutdown.

NOTE

Tincore should be closely monitored while changing ECCS alignments.

5.1 ___ Ensure A ES selected HPI pump is stopped.

___ MUP-1A
___ MUP-1B

B LPI TRAIN CROSSTIE (CONT'D)

ACTIONS	DETAILS
5.2 ___ IF both LPI pumps are running, THEN stop DHP-1A	
5.3 ___ Isolate A LPI Train.	• Ensure the following are closed: ___ DHV-34 ___ DHV-39 ___ DHV-42 ___ DHV-210 ___ DHV-11 • ___ Select BSV-3 to "MAN" and closed. • ___ Select DHV-110 to "MAN" and closed.

B LPI TRAIN CROSSTIE (CONT'D)

ACTIONS	DETAILS
5.4 ___ Adjust DHV-111 setpoint to 1600 gpm.	

NOTE

During crosstie DHV-110 must remain in manual.

5.5 ___ Establish LPI crosstie.	1 ___ Ensure DHV-5 is open. 2 Open LPI crosstie valves: ___ DHV-8 ___ DHV-7 3 ___ Throttle DHV-110 to achieve LPI crosstie flow of 900 (800 to 1000) gpm on DH-38-FI1 4 ___ Adjust DHV-111 setpoint to achieve B Train LPI flow of 2100 (2000 to 2200) gpm on DH-1-FI2

B LPI TRAIN CROSSTIE (CONT'D)

ACTIONS	DETAILS
5.6 ___ Stop HPI flow.	1 ___ IF HPI flow is > 300 gpm, THEN throttle HPI flow to 300 (200 to 400) gpm.
	2 Open all HPI recirc to sump valves:
	___ MUV-543
	___ MUV-544
	___ MUV-545
	___ MUV-546
	3 Close all HPI valves:
	___ MUV-23
	___ MUV-24
	___ MUV-25
	___ MUV-26

B LPI TRAIN CROSSTIE (CONT'D)

ACTIONS	DETAILS
5.7 ___ WHEN the TSC directs termination of the MUP, THEN stop the operating MUP.	1 Stop the B ES selected MUP: ___ MUP-1B ___ MUP-1C 2 ___ Close DHV-12

NOTE

During crosstie DHV-110 must remain in manual.

5.8 ___ Increase LPI flow.	1 ___ Throttle DHV-110 to achieve LPI crosstie flow of 1250 (1150 to 1350) gpm on DH-38-FI1 2 ___ Adjust DHV-111 setpoint to achieve B Train LPI flow of 2700 (2600 to 2800) gpm on DH-1-FI2

5.9 ___ Close all HPI recirc to sump valves.	___ MUV-543 ___ MUV-544 ___ MUV-545 ___ MUV-546

STARTING A TRAIN LPI PUMP

ACTIONS | DETAILS

STATUS

- **ECCS suction transfer has been completed.**
- **DHP-1B is operating.**
- **B Train ES selected MUP is operating in piggyback.**

  OR

  LPI crosstie in progress.

NOTE

Tincore should be closely monitored while changing ECCS alignments.

6.1 ___ Ensure proper alignment for the A Train LPI system.

1 Ensure the following valves are closed:

___ DHV-34

___ DHV-39

___ DHV-11

2 ___ IF LPI crosstie is NOT in progress, THEN close DHV-110

3 ___ Ensure DHV-42 is open.

4 ___ Ensure DHV-5 is open.

STARTING A TRAIN LPI PUMP (CONT'D)

ACTIONS	DETAILS
6.2 ___ Start A Train LPI. [Rule 5, EDG Control]	1 Ensure required cooling pumps are operating: ___ DCP-1A ___ RWP-3A 2 ___ Start DHP-1A 3 ___ Ensure DHV-210 is open.
6.3 ___ IF LPI crosstie operations are in progress, THEN stop crosstie flow.	• Close LPI crosstie valves: ___ DHV-8 ___ DHV-7
6.4 ___ Ensure LPI flow is properly controlled.	• Ensure LPI control valves are in "AUTO" and set for 2000 gpm: ___ DHV-110 ___ DHV-111

STARTING A TRAIN LPI PUMP (CONT'D)

	ACTIONS	DETAILS
6.5 ___	WHEN all the following exist: ___ A Train LPI flow > 1400 gpm ___ B Train LPI flow > 1400 gpm THEN stop HPI.	1 Stop B ES selected MUP: ___ MUP-1B ___ MUP-1C 2 ___ Close DHV-12
6.6 ___	Increase LPI flow.	• Adjust LPI control valve setpoints to 2700 gpm: (2600 to 2800) gpm on DH-1-FI1 and DH-1-FI2 ___ DHV-110 ___ DHV-111

STARTING B TRAIN LPI PUMP

ACTIONS DETAILS

STATUS

- **ECCS suction transfer has been completed.**
- **DHP-1A is operating.**
- **A Train ES selected MUP is operating in piggyback.**

  OR

- **LPI crosstie in progress.**

NOTE

Tincore should be closely monitored while changing ECCS alignments.

7.1 ___ Ensure proper alignment for the B Train LPI system.

1 Ensure the following valves are closed:

___ DHV-35

___ DHV-40

___ DHV-12

2 ___ IF LPI crosstie is NOT in progress, THEN close DHV-111

3 ___ Ensure DHV-43 is open.

4 ___ Ensure DHV-6 is open.

STARTING B TRAIN LPI PUMP (CONT'D)

ACTIONS	DETAILS
7.2 ___ Start B Train LPI. [Rule 5, EDG Control]	1 Ensure required cooling pumps are operating: ___ DCP-1B ___ RWP-3B 2 ___ Start DHP-1B 3 ___ Ensure DHV-211 is open.
7.3 ___ IF LPI crosstie operations are in progress, THEN stop crosstie flow.	• Close LPI crosstie valves: ___ DHV-8 ___ DHV-7
7.4 ___ Ensure LPI flow is properly controlled.	• Ensure LPI control valves in "AUTO" and set for 2000 gpm: ___ DHV-110 ___ DHV-111

STARTING B TRAIN LPI PUMP (CONT'D)

ACTIONS	DETAILS
7.5 ___ WHEN all the following exist: ___ A Train LPI flow > 1400 gpm ___ B Train LPI flow > 1400 gpm THEN stop HPI.	1 Stop A ES selected MUP: ___ MUP-1A ___ MUP-1B 2 ___ Close DHV-11
7.6 ___ Increase LPI flow.	• Adjust LPI control valve setpoints to 2700 gpm: (2600 to 2800) gpm on DH-1-FI1 and DH-1-FI2 ___ DHV-110 ___ DHV-111

ESTABLISHING A TRAIN PIGGYBACK

ACTIONS | DETAILS

STATUS

- **ECCS suction transfer has been completed.**
- **Both LPI trains are operating and providing flow.**
- **LPI crosstie NOT in progress.**

NOTE

Tincore should be closely monitored while changing ECCS alignments.

8.1 ___ Ensure proper HPI alignment.

1 MUP recirc to MUT valves closed:

___ MUV-53

___ MUV-257

2 HPI recirc to sump valves closed:

___ MUV-543

___ MUV-544

___ MUV-545

___ MUV-546

3 HPI valves are open or throttled as directed by the TSC:

___ MUV-23

___ MUV-24

___ MUV-25

___ MUV-26

ESTABLISHING A TRAIN PIGGYBACK (CONT'D)

ACTIONS	DETAILS
8.2 ___ Align DHP-1A discharge to MUP suction.	• ___ Open DHV-11
8.3 ___ Ensure DHP-1A flow is within limits.	• ___ Ensure DHV-110 in "AUTO" and set for 2000 gpm.
8.4 ___ Start A Train HPI. [Rule 5, EDG Control]	• Start the A ES selected MUP and required cooling pumps: ___ MUP-1A ___ MUP-1B
8.5 ___ Stop B Train ECCS pumps.	1 Ensure the B ES selected MUP stopped: ___ MUP-1B ___ MUP-1C 2 ___ Ensure DHP-1B is stopped. 3 ___ Close DHV-12 4 ___ Close DHV-6

ESTABLISHING A TRAIN PIGGYBACK (CONT'D)

	ACTIONS	DETAILS
8.6	___ IF ≥ 72 hrs post accident, THEN ensure HPI flow is within limits (use digital low range).	• ___ IF adequate SCM does NOT exist, THEN throttle HPI flow to 470 gpm (440 to 500 gpm). • ___ IF adequate SCM exists, THEN throttle HPI flow to < 500 gpm.
8.7	___ IF < 72 hrs post accident, THEN ensure HPI flow is within limits (use digital low range).	• ___ IF adequate SCM does NOT exist, THEN establish full HPI. • ___ IF adequate SCM exists, THEN throttle HPI to maintain minimum adequate SCM.

ESTABLISHING B TRAIN PIGGYBACK

ACTIONS | DETAILS

STATUS

- **ECCS suction transfer has been completed.**
- **Both LPI trains are operating and providing flow.**
- **LPI crosstie NOT in progress.**

NOTE

Tincore should be closely monitored while changing ECCS alignments.

9.1 ___ Ensure proper HPI alignment.

1 MUP recirc to MUT valves closed:

___ MUV-53

___ MUV-257

2 HPI recirc to sump valves closed:

___ MUV-543

___ MUV-544

___ MUV-545

___ MUV-546

3 HPI valves are open or throttled as directed by the TSC:

___ MUV-23

___ MUV-24

___ MUV-25

___ MUV-26

ESTABLISHING B TRAIN PIGGYBACK (CONT'D)

	ACTIONS	DETAILS
9.2	___ Align DHP-1B discharge to MUP suction.	• ___ Open DHV-12
9.3	___ Ensure DHP-1B flow is within limits.	• ___ Ensure DHV-111 in "AUTO" and set for 2000 gpm.
9.4	___ Start B Train HPI. [Rule 5, EDG Control]	• Start the B ES selected MUP and required cooling pumps: ___ MUP-1B ___ MUP-1C
9.5	___ Stop A Train ECCS pumps.	1 Ensure the A ES selected MUP is stopped: ___ MUP-1A ___ MUP-1B 2 ___ Ensure DHP-1A is stopped. 3 ___ Close DHV-11 4 ___ Close DHV-5

ESTABLISHING B TRAIN PIGGYBACK (CONT'D)

	ACTIONS	DETAILS
9.6 ___	IF ≥ 72 hrs post accident, THEN ensure HPI flow is within limits (use digital low range).	• ___ IF adequate SCM does NOT exist, THEN throttle HPI flow to 470 gpm (440 to 500 gpm). • ___ IF adequate SCM exists, THEN throttle HPI flow to < 500 gpm.
9.7 ___	IF < 72 hrs post accident, THEN ensure HPI flow is within limits (use digital low range).	• ___ IF adequate SCM does NOT exist, THEN establish full HPI. • ___ IF adequate SCM exists, THEN throttle HPI to maintain minimum adequate SCM.

EMERGENCY LPI CROSSTIE AND PIGGYBACK OPERATIONS

ACTIONS | DETAILS

STATUS

- **At least 1 LPI pump is operating.**
- **Multiple failures have resulted in the inability to establish Piggyback.**

10.1 ___ IF all the following exist:

___ LPI flow exists

___ Only 1 LPI train is operating

THEN crosstie LPI trains.

1 Ensure DHP isolation valve on idle train is closed:

___ DHV-210 (A Train)

___ DHV-211 (B Train)

2 Ensure LPI block valve on idle train is open:

___ DHV-5 (A Train)

___ DHV-6 (B Train)

3 Ensure LPI control valve on idle train is closed:

___ DHV-110 (A Train)

___ DHV-111 (B Train)

4 Open LPI crosstie valves:

___ DHV-8

___ DHV-7

5 Establish the following flows using DHV-110 and DHV-111:

___ LPI crosstie flow
1250 (1150 to 1350) gpm
on DH-38-FI1

___ Operating LPI train flow
2700 (2600 to 2800) gpm

EMERGENCY LPI CROSSTIE AND PIGGYBACK OPERATIONS (CONT'D)

ACTIONS	DETAILS
10.2 ___ IF RCS PRESS prevents LPI flow, THEN establish alternate piggyback alignment.	• Open the necessary valves: ___ DHV-11 ___ DHV-12 ___ MUV-62 ___ MUV-69

BWST REFILL FROM SF POOL

ACTIONS | DETAILS

STATUS

BWST refill from SF Pool desired.

11.1 ___ Establish SF cooling with SFP-1A and SFHE-1A per OP-406, Section 4.1.

[Rule 5, EDG Control]

11.2 ___ Verify SF pool boron concentration $\geq$ 2270 ppm.

BWST REFILL FROM SF POOL

ACTIONS	DETAILS
11.3 ___ Align SFP-1B for BWST refill.	1 ___ Ensure SFP-1B stopped 2 Ensure the following valves are closed: ___ SFV-12 "SFP COMMON SUCTION ISOLATION" ___ SFV-34 "SFP-1A/1B DISCHARGE CROSSTIE" ___ SFV-35 "SFP-1A/1B DISCHARGE CONTROL TO FUEL TRANSFER CANAL" ___ SFV-43 "SFHE-1A/1B TO SFFL-1A/1B ISOLATION" ___ SFV-50 "SFHE OUTLET CROSSTIE" ___ SFV-87 "DHP TO SFFL-1A/1B ISOLATION" ___ SFV-89 "SPENT FUEL HEADER TO DHP SUCTION ISOLATION" 3 Ensure the following valves are open: ___ SFV-7 "SFP-1A/1B SUCTION CROSSTIE" ___ SFV-11 "SFP-1B SUCTION ISOLATION" ___ SFV-46 "SFHE-1A/1B TO BWST ISOLATION" ___ SFV-37 "SFHE-1B INLET ISOLATION" ___ SFV-49 "SFHE-1B OUTLET ISOLATION"

BWST REFILL FROM SF POOL

ACTIONS	DETAILS

NOTE

If SFV-28 has been previously positioned per Detail 6 of this Enclosure, Detail 4 may be omitted.

11.4 ___ Start BWST refill.

[Rule 5, EDG Control]

1 ___ Record SF Pool initial level

SF Pool Level: _____

2 ___ Record BWST initial level

BWST Level: _____

3 ___ Ensure SFV-46 OPEN

4 ___ Throttle SFV-28 "SFP-1B DISCHARGE ISOLATION" 3 turns open

5 ___ Start SFP-1B

6 ___ Throttle SFV-28 as required, to maintain SFP-1B differential pressure between 45 and 50 psig. (SF-4-PI2 minus SF-16-PI2) [NOCS 040415]

11.5 ___ WHEN SF Pool level 156 feet, THEN Stop BWST refill.

1 ___ Stop SFP-1B

2 ___ Close SFV-46

3 ___ Record SF Pool final level

SF Pool Level: _____

4 ___ Record BWST final level

BWST Level: _____

BWST REFILL FROM SF POOL

ACTIONS	DETAILS
11.6 ___ Restore SF Pool level.	• **PERFORM** Enclosure 12, SF Pool Refill, in this procedure.
11.7 ___ WHEN SF Pool level restored per Enclosure 12, AND additional BWST inventory required, THEN **GO TO** step 11.4 in this enclosure.	
11.8 ___ **EXIT** this enclosure.	

SF POOL REFILL

ACTIONS | DETAILS

STATUS

Spent Fuel Pool level restoration desired

12.1 ___ Determine total SF pool volume addition required to restore level to 159 feet.

- Perform the following calculations:

$L^{final} - L^{initial} = L\Delta$

L^{final} = final SF pool level = 159 (feet)
$L^{initial}$ = initial SF pool level _____ (feet)

$(L\Delta)$ (11100 gal. per foot) =_____(gal.)

Total Volume Addition = _____(gal.)

12.2 ___ Restore SF Pool level to 159 feet per OP-406.

- **PERFORM** OP-406, Section 4.7, Filling Spent Fuel Pools (Alternate Method).

NOTE

To expedite BWST refill consider using reduced SF pool recirculation times and preliminary sample results for boron concentration verification.

12.3 ___ WHEN SF Pool level restored to 159 feet, THEN verify SF pool boron concentration $\geq$ 2270 ppm.

SF POOL REFILL

ACTIONS	DETAILS

NOTE

OP-403BA requires 10.25 hour SF pool recirculation time prior to obtaining final SF boron concentration. To expedite BWST refill consider using the results of the preliminary (1 hour) sample.

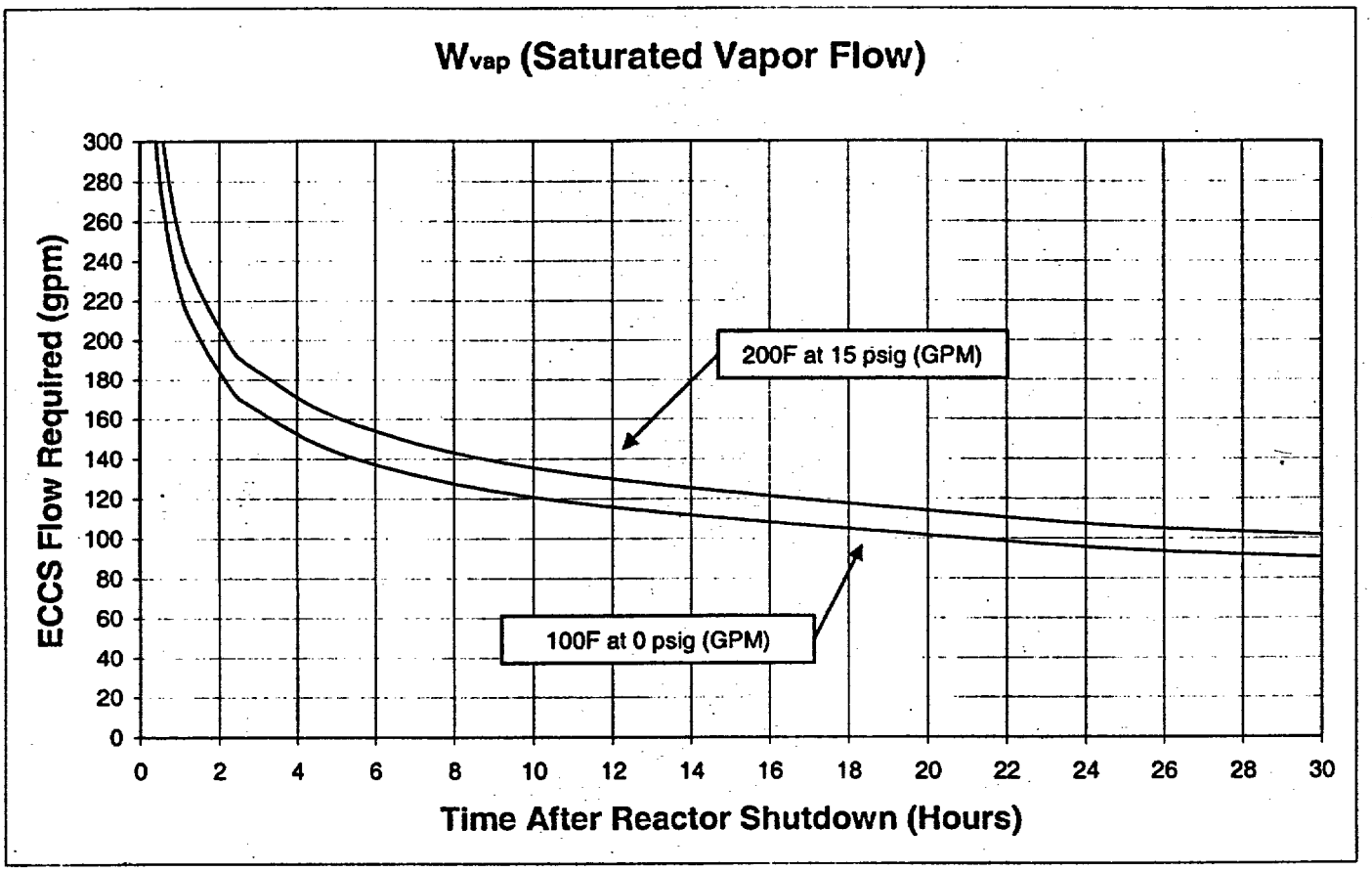
12.4 ___ IF SF Pool boron concentration < 2270 ppm, THEN increase SF pool boron per OP-403B.

- **PERFORM** OP-403B, Section 4.7, Boric Acid Addition to the SF Pools.

12.5 ___ WHEN SF Pool boron concentration verified ≥ 2270 ppm, THEN **EXIT** this enclosure.

Minimum ECCS Flows Required to Remove DH

W_{vap} (Saturated Vapor Flow) is the flow rate of water (@ 100 °F with 0 psig Reactor Building pressure; **OR** @ 200 °F with 15 psig Reactor Building pressure) that, when injected into the reactor vessel, will remove all the decay heat and exit as a saturated vapor. ECCS flow rates < W_{vap} may not keep up with vessel boil off rate and will potentially result in core damage.



NOTES

1. ECCS flow rates are not adjusted for HPI instrument uncertainty.
2. Flow Rates ≥ two times Wvap bound HPI instrument uncertainty.
3. Compare redundant HPI flow indications. If significant deviations exist consider using lowest indicated flow.

HPI FROM BWST DURING RB SUMP SCREEN BLOCKAGE

ACTIONS DETAILS

STATUS

- **ECCS suction path to RB sump unavailable due to RB sump screen blockage.**
- **ECCS (HPI) injection from BWST required**
- **TSC has verified BWST level sufficient to support HPI at reduced flow rate**

14.1 ___ Ensure all MUPs shutdown.

A Train	B Train
___ MUP-1A	___ MUP-1C
___ MUP-1B	___ MUP-1B

14.2 ___ Align desired MUP suction to BWST.

- Close LPI discharge to MUP suction:

A Train	B Train
___ DHV-11	___ DHV-12

- Open BWST to MUP suction:

A Train	B Train
___ MUV-73	___ MUV-58

HPI FROM BWST DURING RB SUMP SCREEN BLOCKAGE

ACTIONS	DETAILS
14.3 ___ Align desired MUP discharge flow path.	• Close MUP recirc to MUT valves: | A Train | B Train | |---|---| | ___ MUV-53 | ___ MUV-257 | • Close MUP recirc to RB sump valves: ___ MUV-543 ___ MUV-544 ___ MUV-545 ___ MUV-546 • Close Makeup and seal injection isolation valves: | A Train | B Train | |---|---| | ___ MUV-596 | ___ MUV-18 | | | ___ MUV-27 | • Open all available HPI valves: | A Train | B Train | |---|---| | ___ MUV-24 | ___ MUV-25 | | ___ MUV-23 | ___ MUV-26 |

HPI FROM BWST DURING RB SUMP SCREEN BLOCKAGE

ACTIONS	DETAILS
14.4 ___ Start desired MUP and required cooling pumps. [Rule 5, EDG Control]	
14.5 ___ Adjust HPI flow rate per TSC guidance.	• Split flow between all available HPI nozzles • Do not reduce HPI flow < 200 gpm.
14.6 ___ Monitor BWST level.	• Contact TSC for minimum allowable BWST level based on current HPI flow. Minimum BWST Level _____ • Notify TSC if BWST within 3 feet of minimum level
14.7 ___ IF at any time, indications of MUP cavitation or vortexing exist, THEN immediately shutdown MUP and notify TSC.	
14.8 ___ Exit this enclosure when notified by the TSC.	

REVISION SUMMARY

Section	Change
4.2	Added Guidance to section 4.2 to refill BWST IAW Enclosures 11 and 12 (new) Added Guidance to section 4.2 commence boric acid production IAW OP-403B
4.6	NRC Bulletin 2003-01, "Potential Impact of Debris Blockage On Emergency Sump Recirculation at Pressurized Water Reactors" identified a concern that a HELD within containment could loose sufficient transient material to effectively block the RB sump strainer during the recirculation (long term cooling) phase of event mitigation. The bulletin required PWRs to develop and implement compensatory actions to mitigate the effects of a sump blockage event. In response to that requirement EOP-14, Enclosure 19 has been revised to include initial response steps for mitigating a sump blockage event. Section 4.6 (new) in this procedure provides additional compensatory measures, to be implemented by the TSC, following mitigate an RB sump blockage event. The actions in this section are progressively more extreme and may violate CR3 design basis. Use of section 4.6 guidance will be implemented in accordance with 10 CFR 50.54 X and Y criteria. • Section 4.6, bullet one – this bullet directs the TSC staff to expedite BWST and BAST refill in response to an actual sump blockage event. BWST/BAST refill should be in progress per section 4.2 of this procedure. • Section 4.6, bullet two – this bullet directs the AAT to begin monitoring RCS and ECCS parameters to ensure compensatory measures implemented by the control room have been effective. A note ahs been included to remind TSC personnel of the limitations of the RCITS reactor vessel level indicting system. • Section 4.6, bullet three – directs the TSC to evaluate alternate shutdown criteria for the BSP if the EOP-14, Enclosure 19 shutdown criteria was not met. • Section 4.6, bullet four – directs additional compensatory measures to be implemented if indications of sump blockage return. The guidance directs progressively greater flow rate reductions based on curves derived from the CR3 SAG (Enclosure 13, Figures 1 and 2). • Section 4.6, bullet five – provides additional compensatory measures to be implemented if RB sump recirculation capability is lost. Guidance directs that an HPI pump be realigned to the BWST and inject flow be established IAW Enclosure 13, Figure 2). Cautionary statements are provided to assist TSC responders. • Section 4.6, bullet fix lists options to be considered for establishing alternate methods of core cooling.
Enclosure 5	Step 5.8, Detail 2 – corrected typographical error. DH-2-FI2 changed to DH-1-FI2
Enclosure 6	Step 6.6, Detail – added range of control (2600-2800 gpm) and reference to applicable flow instrumentation. (PRR# 91188)
Enclosure 7	Step 7.6, Detail – added range of control (2600-2800 gpm) and reference to applicable flow instrumentation. (PRR# 91188)
Enclosure 11	Added new Enclosure 11 which provides guidance for refilling the BWST from the SF pool. This method was selected due to it providing an immediately available source of borated BWST makeup that can be quickly transferred using a main SF cooling pump. Use of SF pool inventory eliminates the need to recirculate and sample the BWST inventory prior to use.
Enclosure 12	Added new Enclosure 12 which is to be used in conjunction with Enclosure 11 (BWST refill). It provides guidance for restoring SF Pool level following a BWST addition.

Enclosure 13	Added new Enclosure 13 to provide guidance for determining ECCS flow required to remove DH during a RB sump screen blockage event. Enclosure 13 is derived from the SAG Wvap curve. This curve shows the minimum ECCS flow rate required to cool the core and exit as saturated stream (Wvap curve). The curve will be used by TSC personnel, in conjunction with section 4.6 of this procedure, for developing compensatory action recommendations for a sump screen blocking event. The ECCS flow rate directed by this curves is below design bases requirements and should only be used in response to a sump screen blockage event in conjunction with the requirements of 10 CFR 50.54 X and Y.
Enclosure 14	Added new Enclosure 14 which provide guidance to establishing HPI from the BWST. This guidance should be used only if recirculation from the RB sump becomes impossible due to sump screen blockage.