Ferrante, Fernando

From: Jeff Circle
Sent: Friday, March 06, 2009 12:26 PM
To: Antonios Zoulis; Fernando J Ferrante; James Vail; Jeffrey Mitman
Cc: Melanie Galloway; Mark Cunningham
Subject: FW: Oconee Flood Guidance
Attachments: EM 5.3 - Dam Failure.pdf

FYI - Here is the procedure that I mentioned to most of you that Duke was working on. This is part of the commitments they made in their 50.54(f) response. It assumes a great deal of lead time, rapid cool down and depress., and operator actions to provide DHR via each unit's OTSG during the flood. There are still many questions on its feasibility.

From: Raman Pichumani
Sent: Friday, March 06, 2009 9:25 AM
To: Jeff Circle
Subject: FW: Oconee Flood Guidance

FYI

Dr. Raman Pichumani, Ph.D., P.E.
Office of Nuclear Reactor Regulation
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From: David Skeen
Sent: Thursday, March 05, 2009 6:27 PM
To: Patrick Hiland; Kamal Manoly; Meena Khanna; Raman Pichumani
Subject: FW: Oconee Flood Guidance

FYI - Oconee's interim guidance on external flooding

From: Davenport, Berry G [mailto:bgdavenport@duke-energy.com]
Sent: Thursday, March 05, 2009 6:10 PM
To: John Stang; Melanie Galloway; David Skeen; Andy Hutto
Cc: Brown, Timothy D; Freudenberger, Richard J
Subject: Oconee Flood Guidance

Attached is a copy of Engineering Manual E.M. 5.3, Beyond Design Basis Mitigation Strategies for Jocassee Dam Failure. This document provides instructions and guidance for the TSC to use to mitigate a catastrophic failure of the Jocassee Dam. It was developed and implemented to satisfy the commitment made in our September 26, 2008 letter to have such guidance in place by the end of February 2009.

E.M. 5.3 is used in concert with existing Abnormal Procedure AP/0/A/1700/006, Natural Disaster. This AP has been revised to include instructions to implement the EM in the event either Condition B or Condition A is declared for the Jocassee Dam. The AP is not included in this email, but if a copy is needed, please advise. Thanks!

Graham Davenport

Graham Davenport
Manager, Oconee Regulatory Compliance
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~~This e-mail and its attachments contain proprietary Duke Energy information that is privileged, confidential, and protected in accordance with 10 CFR 2.390(d).~~

Duke Energy.	**Oconee Nuclear Site Engineering Manual**

Section Title: E.M. 5.3 – Evaluations by Station Management in the TSC - Beyond Design Basis Mitigation Strategies for External Flood Mitigation

Revision No.: 3

Approved By:	Jim Kammer *via e-mail (MB Lynch)*	Approved Date: 10/13/10
Issued/Revised By:	M. Brandon Lynch	Issued/Revised Date: 10/07/10
Reviewed By:	Paul Mabry	Original Date: 02/19/09
Reviewed By (Ops)	David P. Garland	Review Date: 10/11/10
Reviewed By: (EP)	Robert Taylor	Review Date: 10/12/10
		Effective Date: 10/13/10

Document Revision Description

REVISION NO.	PAGES or SECTIONS REVISED AND DESCRIPTION
0	Original issue
1	• Deleted Enclosure 1.1 Prepare RCS for Flood Conditions due to the implementation of AP/0/A/1700/047 – External Flood Mitigation. • Updated Enclosure 1.4 with optimized instrumentation information • Revised drawings throughout due to new approach to strategies that no longer utilizes the HPSW System • Updated Enclosure 1.3 for OTSG Makeup with Hale Pump or fire truck • Added Enclosure 1.8 for strategy for flooding containment as SAMG consideration • Renumbered Enclosures
2	• Changed document title for clarification • Updated timeline • Added reference to OMP 1-18 Attachment G • Changed document throughout to align with updated strategy of fixed suction source from CTP 1 • Added Section 5.0 Communications Equipment • Updated to ensure evacuation of non-essential personnel begins early in Condition B • Added relocation of portable diesel generators • Renumbered Enclosures • Added Enclosure 1.10 • Added Enclosure 1.11
3	• Corrected typographical errors • Combined enclosure 1.3 and 1.8 to eliminate fire truck strategy • Updated timeline to correct times due to flood modeling revision

Table of Contents

1.0 Procedure Entry Conditions

The TSC has been activated per AP/0/A/1700/047 – External Flood Mitigation because the Oconee OSM has been notified of one of the following declarations related to the Jocassee Dam:

- Condition B - Potentially Hazardous Situation is Developing – A situation where failure may develop, but preplanned actions taken during certain events (i.e., major floods, earthquakes, etc.) may prevent or mitigate failure. The potentially hazardous situation may allow days or weeks for response and time to take remedial action.
- Condition A - Failure is Imminent or Has Occurred - A failure at the dam has occurred or is about to occur and minutes to days may be allowed to respond dependent upon the proximity to the dam. Response includes the immediate movement of downstream residents to higher ground. State and local governments will be notified.

2.0 Objective

The purpose of this document is to provide the TSC additional strategies regarding the mitigation of external flooding to the site following a catastrophic failure of Jocassee Dam. The intent of these strategies is to provide cooling capabilities to Units 1, 2, and 3 in order to prevent core damage. While this document was written specifically for external flooding of the site following a failure of Jocassee Dam, these strategies can also be applied to other Beyond Design Basis (BDB) events at the discretion of the Emergency Coordinator. However, AP/0/A/1700/047 - External Flood Mitigation performs many prerequisite actions that are necessary for this guidance to be effective. Use of this document may require actions completed in AP/0/A/1700/047 - External Flood Mitigation. Additionally, use of this guidance may require the declaration of 10CFR50.54(x). The criteria for declaration of 10CFR50.54(x) are outlined in OMP – 1-18 Attachment G (Actions Outside Procedures).

3.0 Event Description and Timeline

A catastrophic failure of the Jocassee Dam could result in a slow moving wave of water moving south along the main channel of the upper Keowee reservoir. Updated flooding studies completed in 2009 indicate that the peak wave may impact the Keowee Dam and West Saddle Dam at approximately two hours following the failure of the Jocassee Dam. This peak wave could over-top the Keowee Dam and West Saddle Dam, resulting in a breach of these dams. Following the possible failure of Keowee, the tailrace would fill and water would rise into the main Oconee yard inundating the SSF, rendering the facility inoperable. Additionally, these studies show the intake canal dike is also very likely to fail. Therefore, site flooding is largely impacted by the likely intake canal dike failure. Based on the 2009 flooding studies, peak yard flooding should occur at approximately three and a half hours following the initiation of a failure of the Jocassee Dam. In addition to inundating the SSF, the flood water would also cover the switchyard, resulting in an extended loss of all offsite power. While there should be some amount of time between the overtopping of Keowee and inundation of the switchyard, for the purposes of this document, it is assumed that the inundation of the switchyard immediately follows the overtopping of Keowee. The 2009 flooding studies also predict that the flood water will recede ten to eleven hours following the failure of Jocassee, as described above.

The following is an estimated timeline of a External Flood Mitigation event:

NOTE: This timeline is an estimate for information purposes only. The actual event could be <u>slower</u> or <u>faster</u> (Reference AP/0/A/1700/047 - External Flood Mitigation).

- **<u>Time 0.00 Hours</u>** – Initiation of Jocassee Dam failure is assumed.
- **<u>Time 1.55 Hours</u>** – ONS Intake Canal water height reaches elevation 802' (Hale pump building begins to flood).
- **<u>Time 1.98 hours</u>** – Flood waters crest both the Keowee Main and West Saddle Dams (Elev. 815').
- **<u>Time 2.09 hours</u>** – Conservatively assume both bridges on Highway 183 are lost due to flood waters.
- **<u>Time 2.25 hours</u>** – Flood waters rise in tailrace beginning to flood Turbine Building via drain.
- **<u>Time 2.87 hours</u>** – Flood waters crest the Intake Canal Dike (Elev. 815') and begins flooding the ONS yard. Conservatively assume CT-5 is lost at this time. Also, Little River Dam is overtopping resulting in a loss of Highway 130 route to ONS.
- **<u>Time 3.03 hours</u>** – SSF Function is lost as flood waters in the ONS yard begin overtopping SSF flood wall (Elev. 803.5').
- **<u>Time 3.18 hours</u>** – Penetration rooms are NOT accessible as flood waters in the ONS yard reach elevation 809'.
- **<u>Time 3.71 hours</u>** – Flood waters in the ONS yard reach the 1st peak elevation of 815.5' (19.5' above yard level).
- **<u>Time 3.81 hours</u>** – Penetration rooms are accessible as flood waters recede below elevation 809'.
- **<u>Time 6.27 hours</u>** – Flood waters have receded to approximately 2' (Elev. 798') in the ONS yard.
- **<u>Time 7.93 hours</u>** – Flood waters have receded to approximately 1' (Elev. 797') in the ONS yard.

This document describes the actions that should be considered by the TSC following the failure of the Jocassee Dam to address the resulting flooding before, during, and after it reaches the Oconee site.

4.0 Plant Status Considerations for the Event

- A Station Blackout is assumed to occur approximately 2.75 hours following the initiation of failure of the Jocassee Dam. This power outage will last an extended period of time.
- The resulting flood peak elevation is expected to be 19.5 feet (Elev. 815.5') of water in the ONS yard.
- The SSF is assumed to be lost approximately 3 hours into the event due to flooding overtopping the SSF flood wall.
- Primary makeup capabilities will be lost for an extended period of time after loss of all site power.

5.0 Communications Equipment

The following are available means to communicate during a Jocassee flooding event in order of priority. If Plant radio Channel 6 does not work, switch to Plant radio Channel 1, then ITAC-4, as necessary.

<u>1st choice - Operations radio Plant Channel 6:</u> Available on all OPS and Security plant radios. Repeater is power backed up and above flood plain.

<u>2nd choice - Plant radio Channel 1:</u> Available on all OPS, SPOC, and Security plant radios. Repeater is UPS backed-up for 4 hours after loss of power and located on top of Auxiliary Building.

<u>3rd choice - ITAC-4 radio:</u> This is a special radio that is available to OPS, SPOC, and Security. Repeater is power backed up and above flood plain. Offsite Agencies can communicate on this radio. Radios are located in SPOC Supervisor's office, Unit 1&2 Control Room, Unit 3 Control Room, and the TSC.

<u>Other options available:</u>
- Plant phones until the site is flooded. Plant phone system is located on 2nd floor of the Oconee Office Building.
- Operations radio Plant Channel 1. Available on all OPS and Security plant radios. Repeater is UPS backed-up for 4 hours after loss of power and located on top of Aux Bldg.
- Operations radio Plant Channel 2. Line of site use only.
- Satellite phone in Control Room
- Security Cell phone (CAS is 864-973-5901. SAS is 864-973-5902.)
- Personal Cell phones

6.0 If at Any Time Actions

- **If at Any Time**, Condition A is declared, notify Operations to ensure 2CCW-516 is OPEN.

- **If at Any Time**, the SSF is rendered unavailable, **Initiate Section 8.0.**
- **If At Any Time**, flood waters have receded below 809' and Penetration rooms are accessible, notify SPOC to perform **Enclosure 1.4 – Portable Instrumentation**
- **If At Any Time**, flood waters have receded below 809' and Penetration rooms are accessible, notify Operations to perform **Enclosure 1.9 – Post Flood OTSG Level Control**
- **If at Any Time**, Core Damage has occurred, **Initiate Section 10.0.**

7.0 Mitigating Actions Required BEFORE Flood Waters Reach ONS

Upon receiving entry conditions into a Condition B **OR** Condition A event, initiate the actions below:

NOTE: Bridges may be damaged by eventual flooding, consider the need for aerial transportation for equipment needed from off-site resources.

1. Evacuate all non-essential personnel from the ONS site at the earliest available time after Condition B or Condition A has been declared.
2. **Notify** portable pump operator to initiate pump operation and charge fire hose to verify hose functionality.
3. Perform **Enclosure 1.1 – Relocation of Equipment to High Ground**

   NOTE:
   - **The Hale Pump and EFM Pump will require ~275 gallons of diesel fuel per day during continuous operation.**
   - **Other equipment (i.e. portable diesel generators, skid steer, etc.) may also require diesel fuel depending on usage.**

4. Obtain a minimum of 800 gallons of diesel fuel for plant recovery equipment and stage at CTP 1&2.
   a. Contact Garage at extension 4088/4144
      i. ONS Garage fuel truck has the following storage capacity:
         - Diesel - 1700 gallon
         - Gasoline – 600 gallon
   b. Contact any of the following local vendors:
      i. Lowry Oil Company - 9-864-882-2441
      ii. Lindsay Oil Company - 9-864-882-4226
      iii. Acree Oil Company - 9-864-882-7593
5. Perform **Enclosure 1.2 – Makeup to Chemical Treatment Ponds 1&2**

6. Contact McGuire Nuclear Station and Catawba Nuclear Station to obtain an additional Hale Portable Pump from each site. All 3 sites utilize the Hale FP1500 portable pump; therefore the McGuire and Catawba Stations pumps will add redundancy to the Oconee Hale Pump.
   a. MNS OSM - 980-875-4266
   b. CNS OSM - 803-701-3250
7. Obtain heavy duty equipment for removal of debris following flooding (skid steer, bulldozer, etc.) and stage at the location established in Enclosure 1.1.
8. Allocate resources to print all necessary documents in section **11.0 - Reference Documents.**
9. Assemble remaining personnel after all actions are completed in one of the following locations to prepare for mitigation after flood waters have receded:
   a. 5th floor Turbine Building (Turbine Deck)
   b. 3rd floor or above of the Oconee Office Building
   c. EWST area
   d. World of Energy
   e. Operations Training Center

8.0 Mitigating Actions Required DURING ONS Site Flooding

If At Any Time, the SSF is rendered unavailable, take the actions below:

1. **Notify** Operations to align portable pump to Feed OTSG's per AP/0/A/1700/047 - External Flood Mitigation sections 4A, 4B, and 4C.
2. **Notify** Operations to depressurize OTSG's per AP/0/A/1700/047 - External Flood Mitigation sections 4A, 4B, and 4C.
3. **Notify** portable pump operator to Initiate pump operation per **Enclosure 1.3 – OTSG Makeup with Portable Pump.**
4. **If At Any Time,** flood waters have receded below 809' and Penetration rooms are accessible, notify SPOC to perform **Enclosure 1.4 – Portable Instrumentation**
5. **If At Any Time,** flood waters have receded below 809' and Penetration rooms are accessible, notify Operations to perform **Enclosure 1.9 – Post Flood OTSG Level Control**

9.0 Mitigating Actions Required AFTER Flood Waters Recede

After flood waters have receded, begin plant recovery actions below:

1. Perform **Enclosure 1.10 – Post Flood Equipment Inspection**
2. Perform **Enclosure 1.5 – SFP Cooling Using Portable Pump**

3. Perform **Enclosure 1.6 – Long Term Plant Recovery Strategies.**

10.0 SAMG Mitigating Actions in the Event of Core Damage

1. Perform **Enclosure 1.7 – Flooding Containment from the Hale Portable Pump.**
2. Refer to EM 5.2 (Evaluation by Station Management in the TSC – Beyond Design Basis Mitigation Strategies) for further Extensive Damage Mitigation strategies such as:
    a. Spraying a Radiological Release
    b. BWST Makeup from Hale Portable Pump

11.0 Reference Documents

NOTE: Many of the documents listed below may already be available in the TSC and do not need to be printed.

From RP/0/B/1000/022:

Repair Procedures	
EM/0/A/0050/001	Procedure To Provide Emergency Power To An HPI Pump Motor From The ASW Switchgear
IP/0/A/0050/002	Site Damage Control Procedure
IP/0/A/0050/006	Appendix "R" Motor Operated Valve Cable Verification
MP/0/A/1300/020	Pump - Ingersoll-Rand - High Pressure Injection - Removal And Replacement Of Pump And Motor
MP/0/A/1300/040	Generic - Alignment
MP/0/A/3009/012	Emergency Plan For Replacement Of HPI, LPI, And LPSW Motors Following A Fire In Turbine Building Or Auxiliary Building
MP/0/A/3009/017	Visual PM Inspection And Electrical Motor Tests
MP/0/A/3009/020	B Motor - Electric - Removal, Replacement, And Post Maintenance Testing
MP/0/A/3009/XXX (series)	Various ONS and Keowee Hydro Station Motor Inspection and Maintenance Procedures
Submersible Pump Procedures	
AM/0/A/1300/059	Pump - Submersible - Emergency SSF Water Supply - Installation And Removal
IP/0/A/0050/003	Procedure To Provide Power For SSF Submersible Sump Pump At Intake Structure
Spent Fuel Pool Water Level Recovery	
AM/0/A/3009/012A	Emergency Plan For Refilling Spent Fuel Pools
Operations Controlling Procedures	
EP/1/A/1800/001	Emergency Operating Procedure
EP/2/A/1800/001	Emergency Operating Procedure
EP/3/A/1800/001	Emergency Operating Procedure
OP/0/A/1102/024	Plant Assessment And Alignment Following Major Site Damage

OP/0/A/1102/025	Cooldown Following Major Site Damage
OP/0/A/1104/052	SSW System
Chemistry Procedures	
CP/1/A/2002/004 E	Unit One Reactor Coolant Sampling During An Appendix "R" Accident
CP/2/A/2002/004 E	Unit Two Reactor Coolant Sampling During An Appendix "R" Accident
CP/3/A/2002/004 E	Unit Three Reactor Coolant Sampling During An Appendix "R" Accident

ADDITIONAL INFORMATION

			Enclosure/ Reference
HALE PORTABLE PUMP			
Operating Instruction for Hale Portable Pump (Normal Conditions)			OP/0/A/1106/042
Hale Portable Pump Operation			Enclosure 1.9
Hale Portable Pump Operating Head Curve			Enclosure 1.10
STEAMING OTSG & NATURAL CIRCULATION CONSIDERATIONS			
Operating Atmospheric Dump Valves During an Accident That Requires Operation of The SSF			EM 5.1
Natural Circulation Cooldown Considerations			EM 5.1
Steaming A Steam Generator With Water in The Steam Line			EM 5.1
SPENT FUEL POOL MAKEUP/COOLING SOURCES			
SF Pool Makeup from Hale Portable pump (500 gpm)			AP/1&2,3/1700/035
Spray SF Pool from Hale Portable pump (400 gpm)			AP/1&2,3/1700/035
Makeup to SF Pool from HPSW (500 gpm)			AP/1&2,3/1700/035
Makeup and Monitoring of the SFP and Recovery From a Boiling Condition			EM 5.1
Loss Of Spent Fuel Pool Level (available MU paths to the SF Pool)			EM 5.1
Enhanced SFP Air Circulation			EM 5.1
Scrubbing of SFP Environment			EM 5.1
ELEVATED WATER STORAGE TANK (EWST) MAKEUP SOURCES			
Refill The EWST			EM 5.1 & EOP
HPSW procedure			OP/0/A/1104/011
INSTRUMENTATION OPTIONS AFTER A FIRE/EXPLOSION EVENT			
BWST level instrument-Appendix R			IP/0/A/0050/002
Appendix R instrument options:			IP/0/A/0050/002
HPI FLOW BWST LEVEL	LPI FLOW RB Level	LPSW Flow to LPI Coolers	

12.0 Enclosures

Enclosure 1.1 - Relocation of Equipment to High Ground

Enclosure 1.2 - Makeup to Chemical Treatment Ponds 1 & 2

Enclosure 1.3 - OTSG Makeup with Portable Pump

Enclosure 1.4 - Portable Instrumentation

Enclosure 1.5 - SFP Cooling Using Portable Pump

Enclosure 1.6 - Long Term Plan Recovery Strategies

Enclosure 1.7 - Flooding Containment from the Portable Pump

Enclosure 1.8 - Half Portable Pump Head Curve

Enclosure 1.9 - Post Flood OTSG Level Control

Enclosure 1.10 - Post Flood Equipment Inspection

Enclosure 1.1 - Relocation of Equipment to High Ground

NOTES:
- **Coordinate relocation activities with Security.**
- **Fire hose has been routed across the yard between the SSF and OOB and may block access from that direction.**

1. Determine location for staging of equipment above maximum flood level (815'6") to one of the following locations listed in order of preference:
   a. EWST area

   NOTE: Road access from the following locations may be limited and require moving security barriers

   b. World of Energy
   c. Operations Training Center

2. Relocate the following equipment to the location selected in step 1:
   a. (6) 6500 Watt portable diesel generators
      i. (1) located in Hazmat trailer staged directly south of OOB adjacent to the fire/rescue truck
      ii. (5) located in building 8019 (Appendix R warehouse)
   b. Appendix R equipment (refer to enclosures 4.12 and 4.13 of RP/0/B/1000/022 for storage location of equipment)
   c. Tools required for removal and installation of Appendix R pump motors, cables, valve control panels, etc.
   d. Heavy equipment (i.e., bulldozer, bobcat, etc.) that may be needed to remove debris between staging area and TB/AB (if available).

3. If not completed in AP/0/A/1700/047, relocate the Hale pump and Extensive Damage Mitigation (EDM) trailer to CTP1.

Enclosure 1.2 - Makeup to Chemical Treatment Ponds 1&2

NOTE:

- **Both of the following fire hydrants will become submerged during flooding.**
- **Ensure fire hoses used are secured to prevent whipping during makeup to CTP 1&2.**
- **5" hose is located in EDM Trailer and Building 8019**
- **Makeup to CTP 1 BEFORE CTP 2**
- **CTP 1 ~ 3,200,000 gallons at full pond**
- **CTP 2 ~ 1,600,000 gallons at full pond**

There is an administrative limit of 72" level (~1,100,000 gallons) in CTP 1 per CP/0/A/4002/006 to provide adequate water inventory for OTSG makeup for Jocassee flood mitigation. However, the purpose of this enclosure is to provide additional inventory in CTP 1&2 for OTSG makeup.

1. Connect 5 inch fire hose to **FPS-HY-0040** (located East of CTP 1 in the bus loop) and route hose to the desired CTP for makeup to provide stored water inventory. (water source - HPSW)

2. A municipal water supplied fire hydrant is located on Hwy 183 approximately 1/4 mile from the World of Energy entrance toward Walhalla and Salem. If needed, connect 5 inch hose and route to the desired CTP for makeup to provide stored water inventory. (water source – City of Seneca Municipal Water Supply)

NOTE: Reference the following drawings for further information on CTP 1&2:

- **OM-118-002-001 – Pond Elevations**
- **OM-118-002-002 – CTP 1 Grading and Volume vs. Level Information**
- **OM-118-002-003 - CTP 2 Grading and Volume vs. Level Information**

Enclosure 1.3 - OTSG Makeup with Portable Pump

NOTE: Use of this enclosure is for external flooding event mitigation strategies addressed in this Engineering Manual only. Quarterly testing or training activities will utilize OP/0/A/1106/042 for guidance to operate the Hale Portable Pump (HPP).

NOTE: Reference AP/0/A/1700/047 - External Flood Mitigation for Valve alignments, hose routing, and connection diagrams.

NOTE: The Hale Portable Pump (HPP) and the External Flood Mitigation (EFM) Pump are a Hale model FP1500 and both can be operated using this enclosure.

1. Enclosure Entry Conditions:
   a. TSC has been notified that the SSF has been flooded and is no longer available for makeup to the OTSG's.
2. Introduction
   a. The purpose of this enclosure is to supply water from a Portable Pump to the Once Through Steam Generators (OTSG's) via the Auxiliary Service Water (ASW) System.
   b. Both the EFM Pump and the Hale Pump will be staged at CTP 1. The pump not used to supply the OTSG's will be available if the primary pump fails to operate.
3. Actions

NOTE: A rubber mallet may be needed to remove 6" suction cap. This is located in the tool box on the front of the Hale pump trailer.

3.0) Stage the Hale pump on the CTP 1 Dike at the CTP 1 pump structure cat walk to allow suction from the pre-installed suction piping

3.1) Remove 6" suction cap

3.2) Remove 5" Storz discharge cap

3.3) Attach 5" storz fire hose to 5" storz pump discharge

3.4) Attach 6" elbow to 6" pump suction

3.5) Use rubber mallet to tighten threaded connection as necessary

3.6) Attach pre-staged 6" suction hose located at CTP – 1 pump structure catwalk to the 6" elbow attached in step 3

3.7) Ensure the HPP drains are closed:
   a. Close the Pump drain
   b. Close No. 1 Discharge drain
   c. Close No. 2 Discharge drain

3.8) Ensure the Gearbox Cooler Valve (1/4 turn valve with Blue Handle) is Open

3.9) **When** notified by TSC to initiate pump operation, start HPP Engine

CAUTION: Do <u>NOT</u> hold pump primer > 45 seconds. Pump damage may result.

3.10) Immediately pull both primer handles and hold until the suction hose is visibly seen to be water solid or water discharges from the vent priming line under the pump.

NOTE: When pump prime is achieved, water is visible in suction hose and there is a sudden change in the sound coming from the pump.

3.11) Release primer handle(s)

3.12) <u>IF</u> pump prime is <u>NOT</u> achieved in 30 to 40 seconds, perform the following:
   a. Turn Key Switch **OFF**
   b. Check suction hose & fittings for vacuum leaks
   c. Start engine with Key Switch
   d. Pull & hold one or both Primer Handles

3.13) When suction hose is water solid, release primer handle(s)

3.14) Notify the TSC that the HPP is ready to makeup to OTSG's

3.15) **When** notified by the TSC that flow from the portable pump is required,

   a. **Then** Open the 5" HPP discharge valve.

3.16) Press mode push button to ensure Hale Pump is in PSI mode.

NOTE: Pump discharge pressure may be altered after initial OTSG makeup during flooding as directed by the TSC.

3.17) Utilize INC/DEC push buttons to set Hale Pump Discharge pressure to **180 PSI.**

3.18) Open the diesel cover panel from the side opposite the control panel to allow adequate ventilation for the diesel engine.

3.19) Monitor HPP operation every 30 minutes:
a. Monitor suction strainer to ensure it does not become clogged
b. Monitor fuel gage

3.20) **IF** the HPP fuel level reaches 1/2 tank level, **then** relocate fuel truck at CTP 1&2 as necessary to refuel.

3.21) **When** notified by the TSC the HPP is no longer required, **Then** perform the following steps for shutdown:
a. Press DEC until engine idle speed is reached.
b. Turn key switch to OFF.
c. Close 5" discharge valve.
d. Open pump drain valves:
e. Pump drain
f. No. 1 discharge valve
g. No. 2 discharge valve

3.22) Disconnect Suction hoses and tether to CTP – 1 pump structure catwalk

3.23) If notified by the TSC to restart HPP, re-perform this enclosure to restart HPP.

Enclosure 1.4 - Portable Instrumentation

NOTE:
- **Refer to Table 1.4.1 for Instrumentation penetration information**
- **Refer to Table 1.4.2 for Type K Thermocouple conversion charts**
- **Fluke 724 Instruments needed for this enclosure are located in the EOP Cabinet in the Unit 2 Auxiliary Building 5th floor elevator lobby**

Portable test equipment will be used to connect to the identified points in this table in order to obtain data that can be used to determine the following process parameters: Core Exit Thermocouples (CETC), Once Through Steam Generator (OTSG) Level, and Reactor Coolant System (RCS) Pressure.

For the CETC measurement, connect a standard Digital Multimeter (DMM) on the mvdc scale to the +/- termination points in the identified electrical penetration. The measured millivolt value can then be compared to the Type K thermocouple Table to determine the corresponding temperature in degrees F. Typical DMMs currently in use on the Duke NGD system are Fluke 45, Fluke 189, Agilent 34401A.

For all of the remaining applications which utilize a 4-20 maDC two-wire transmitter as the process sensor, connect a standalone 24 VDC power supply capable of driving a minimum of 500 ohms and a DMM on the madc scale in series with the identified +/- termination points. The measured madc value can then be compared to the referenced procedure enclosure or table (page 10 of 10) to determine the corresponding process value. Various manufacturer and model number 24 VDC power supplies are in use on the Duke NGD system. It should be noted that some of these supplies do require an external 120 VAC source for operation. Typical DMMs currently in use are identified above. If available, a multifunction calibrator such as the Fluke 744 could be used to provide the 24 VDC power and the 4-20 maDC measurement in one portable device.

Table 1.4.1, Instrumentation Options AFTER a External Flood Event
Unit 1 Test Instrumentation Information

NOTE: Use of the following information requires at least 3 Multimeters and personnel located on 818' platform in Penetration Room

Parameter	Component	Penetration	Platform Level	M&TE Connection	Measured Units	Conversion Reference	Reference Drawings	Reference Drawings
OTSG Level	1FDWLT0080	EC-4	818'	18A+ & 18B-	4 to 20 mAdc = 0 to 388 inches	IP/0/A/0275/019A Enclosure 11.3.2	O-785-F	O-767-A-21
OTSG Level	1FDWLT0081	EC-4	818'	18D+ & 18E-	4 to 20 mAdc = 0 to 388 inches	IP/0/A/0275/019A Enclosure 11.3.5	O-785-F	O-767-A-21
RCS Pressure	1RCPT0021P	EA13	826'+9"	12B+ & 12A-	4 to 20 mAdc = 0 to 2500 psig	IP/0/A/0310/003B Enclosure 11.3.1	O-720-A	O-767-A-20
RCS Pressure	1RCPT0023P	EC-4	818'	11E+ & 11D-	4 to 20 mAdc = 0 to 2500 psig	IP/0/A/0310/004B Enclosure 11.2.1	O-720-A	O-767-A-21
Parameter	**Core Location**	**Penetration**	**Platform Level**	**Connector/Pin**	**Measured Units**	**Conversion Reference**	**Reference Drawings**	**Reference Drawings**
CETC	F-8	ED-2	818'	9-7+ & 9-8-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-783	O-767-A-52
CETC	H-5	ED-1	818'	2C+ & 2D-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-783	O-767-A-51
CETC	G-13	ED-4	818'	2C+ & 2D-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-783	O-767-A-54
CETC	E-11	ED-4	818'	2A+ & 2B-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-783	O-767-A-54
CETC	D-10	ED-3	818'	9-7+ & 9-8-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-783	O-767-A-53
CETC	C-9	ED-3	818'	9-1+ & 9-2-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-783	O-767-A-53
CETC	B-8	ED-3	818'	9-4+ & 9-5-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-783	O-767-A-53
CETC	D-5	ED-2	818'	9-4+ & 9-5-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-783	O-767-A-52
CETC	E-4	ED-2	818'	9-1+ & 9-2-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-783	O-767-A-52
CETC	H-1	ED-1	818'	2A+ & 2B-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-783	O-767-A-51
CETC	L-2	ED-1	818'	1H+ & 1J-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-783	O-767-A-51
CETC	D-14	ED-4	818'	1H+ & 1J-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-783	O-767-A-54
CETC	C-13	ED-4	818'	1E+ & 1E-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-783	O-767-A-54

Table 1.4.1, Instrumentation Options AFTER a External Flood Event
Unit 2 Test Instrumentation Information

NOTE: Use of the following information requires at least 3 Multimeters and personnel at the 818' platform in the Penetration Room

Parameter	Component	Penetration	Platform Level	M&TE Connection	Measured Units	Conversion Reference	Reference Drawings	Reference Drawings
OTSG Level	2FDWLT0080	EA-13	826'+9"	12D+ & 12E-	4 to 20 mAdc = 0 to 388 inches	IP/0/A/0275/019A Enclosure 11.3.3	O-1785-F	O-1767-A-20
OTSG Level	2FDWLT0081	EA-13	826'+9"	12A+ & 12B-	4 to 20 mAdc = 0 to 388 inches	IP/0/A/0275/019A Enclosure 11.3.6	O-1785-F	O-1767-A-20
RCS Pressure	2RCPT0021P	EC-4	818'	11B+ & 11A-	4 to 20 mAdc = 0 to 2500 psig	IP/0/A/0310/003B Enclosure 11.3.2	O-1720-A	O-1767-A-21
RCS Pressure	2RCPT0023P	EA-13	826'+9"	18A+ & 18B-	4 to 20 mAdc = 0 to 2500 psig	IP/0/A/0310/004B Enclosure 11.2.2	O-1720-A	O-1767-A-20
Parameter	**Core Location**	**Penetration**	**Platform Level**	**Connector/Pin**	**Measured Units**	**Conversion Reference**	**Reference Drawings**	**Reference Drawings**
CETC	H-8	ED-3	818'	7E+ & 7F-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-1783	O-1767-A-59
CETC	G-9	ED-3	818'	8A+ & 8B-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-1783	O-1767-A-59
CETC	N-8	ED-3	818'	2E+ & 2B-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-1783	O-1767-A-59
CETC	N-9	ED-3	818'	2H+ & 2J-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-1783	O-1767-A-59
CETC	M-10	ED-3	818'	8E+ & 8F-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-1783	O-1767-A-59
CETC	L-11	ED-3	818'	6A+ & 6B-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-1783	O-1767-A-59
CETC	K-12	ED-3	818'	6C+ & 6D-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-1783	O-1767-A-59
CETC	H-13	ED-3	818'	6E+ & 6F-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-1783	O-1767-A-59
CETC	M-3	ED-3	818'	1E+ & 1F-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-1783	O-1767-A-59
CETC	N-4	ED-3	818'	1H+ & 1J-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-1783	O-1767-A-59
CETC	P-6	ED-3	818'	3A+ & 3B-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-1783	O-1767-A-59
CETC	R-7	ED-3	818'	3C+ & 3D-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-1783	O-1767-A-59
CETC	R-10	ED-3	818'	3E+ & 3F-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-1783	O-1767-A-59
CETC	O-12	ED-3	818'	6H+ & 6J-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-1783	O-1767-A-59
CETC	M-14	ED-3	818'	7A+ & 7B-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-1783	O-1767-A-59

Table 1.4.1, Instrumentation Options AFTER a External Flood Event
Unit 3 Test Instrumentation Information

NOTE: Use of the following information requires at least 3 Multimeters and personnel at the 818' platform in the Penetration Room

Parameter	Component	Penetration	Platform Level	M&TE Connection	Measured Units	Conversion Reference	Reference Drawings	Reference Drawings
OTSG Level	3FDWLT0080	EA-13	826'+9"	12D+ & 12D-	4 to 20 mAdc = 0 to 388 inches	IP/0/A/0275/019A Enclosure 11.3.2	O-2785-F	O-2767-A-20
OTSG Level	3FDWLT0081	EA-13	826'+9"	12A+ & 12B-	4 to 20 mAdc = 0 to 388 inches	IP/0/A/0275/019A Enclosure 11.3.5	O-2785-F	O-2767-A-20
RCS Pressure	3RCPT0021P	EC-4	818'	11B+ & 11A-	4 to 20 mAdc = 0 to 2500 psig	IP/0/A/0310/003B Enclosure 11.3.3	O-2720-A	O-2767-A-21
RCS Pressure	3RCPT0023P	EA-13	826'+9"	18B+ & 18A-	4 to 20 mAdc = 0 to 2500 psig	IP/0/A/0310/004B Enclosure 11.2.3	O-2720-A	O-2767-A-20
Parameter	**Core Location**	**Penetration**	**Platform Level**	**Connector/Pin**	**Measured Units**	**Conversion Reference**	**Reference Drawings**	**Reference Drawings**
CETC	H-8	ED-3	818'	10E+ & 10F-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-2783	O-2767-A-59
CETC	G-9	ED-3	818'	8A+ & 8B-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-2783	O-2767-A-59
CETC	N-8	ED-3	818'	2E+ &2F-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-2783	O-2767-A-59
CETC	N-9	ED-3	818'	2H+ & 2J-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-2783	O-2767-A-59
CETC	M-10	ED-3	818'	8E+ & 8F-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-2783	O-2767-A-59
CETC	L-11	ED-3	818'	6A+ & 6B-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-2783	O-2767-A-59
CETC	K-12	ED-3	818'	6C+ & 6D-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-2783	O-2767-A-59
CETC	H-13	ED-3	818'	6E+ & 6F-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-2783	O-2767-A-59
CETC	M-3	ED-3	818'	1E+ & 1F-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-2783	O-2767-A-59
CETC	N-4	ED-3	818'	1H+ & 1J-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-2783	O-2767-A-59
CETC	P-6	ED-3	818'	3A+ & 3B-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-2783	O-2767-A-59
CETC	R-7	ED-3	818'	3C+ & 3D-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-2783	O-2767-A-59
CETC	R-10	ED-3	818'	3E+ & 3F-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-2783	O-2767-A-59
CETC	O-12	ED-3	818'	6H+ & 6J-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-2783	O-2767-A-59
CETC	M-14	ED-3	818'	10A+ & 10B-	0.397 to 51.000 mV = 50 to 2300 F	Type K Thermocouple Table	O-2783	O-2767-A-59

Table 1.4.2, Instrumentation Options <u>AFTER</u> a External Flood Event
Type K Thermocouple Table

K°F

TABLE 10 *Type K Thermocouple — thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
	Thermoelectric Voltage in Millivolts											
-450	-6.456	-6.456	-6.457	-6.457	-6.458							-450
-440	-6.446	-6.448	-6.449	-6.450	-6.451	-6.452	-6.453	-6.454	-6.454	-6.455	-6.456	-440
-430	-6.431	-6.433	-6.435	-6.436	-6.438	-6.440	-6.441	-6.443	-6.444	-6.445	-6.446	-430
-420	-6.409	-6.411	-6.414	-6.416	-6.419	-6.421	-6.423	-6.425	-6.427	-6.429	-6.431	-420
-410	-6.380	-6.383	-6.386	-6.389	-6.392	-6.395	-6.398	-6.401	-6.404	-6.406	-6.409	-410
-400	-6.344	-6.348	-6.352	-6.355	-6.359	-6.363	-6.366	-6.370	-6.373	-6.377	-6.380	-400
-390	-6.301	-6.306	-6.310	-6.315	-6.319	-6.323	-6.328	-6.332	-6.336	-6.340	-6.344	-390
-380	-6.251	-6.257	-6.262	-6.267	-6.272	-6.277	-6.282	-6.287	-6.292	-6.296	-6.301	-380
-370	-6.195	-6.201	-6.207	-6.213	-6.218	-6.224	-6.230	-6.235	-6.241	-6.246	-6.251	-370
-360	-6.133	-6.139	-6.146	-6.152	-6.158	-6.165	-6.171	-6.177	-6.183	-6.189	-6.195	-360
-350	-6.064	-6.071	-6.078	-6.085	-6.092	-6.099	-6.106	-6.113	-6.119	-6.126	-6.133	-350
-340	-5.989	-5.997	-6.004	-6.012	-6.020	-6.027	-6.035	-6.042	-6.049	-6.057	-6.064	-340
-330	-5.908	-5.917	-5.925	-5.933	-5.941	-5.949	-5.957	-5.965	-5.973	-5.981	-5.989	-330
-320	-5.822	-5.831	-5.840	-5.848	-5.857	-5.866	-5.874	-5.883	-5.891	-5.900	-5.908	-320
-310	-5.730	-5.739	-5.749	-5.758	-5.767	-5.776	-5.786	-5.795	-5.804	-5.813	-5.822	-310
-300	-5.632	-5.642	-5.652	-5.662	-5.672	-5.682	-5.691	-5.701	-5.711	-5.720	-5.730	-300
-290	-5.529	-5.540	-5.550	-5.561	-5.571	-5.581	-5.592	-5.602	-5.612	-5.622	-5.632	-290
-280	-5.421	-5.432	-5.443	-5.454	-5.465	-5.476	-5.487	-5.497	-5.508	-5.519	-5.529	-280
-270	-5.308	-5.320	-5.331	-5.343	-5.354	-5.365	-5.377	-5.388	-5.399	-5.410	-5.421	-270
-260	-5.190	-5.202	-5.214	-5.226	-5.238	-5.250	-5.261	-5.273	-5.285	-5.296	-5.308	-260
-250	-5.067	-5.079	-5.092	-5.104	-5.117	-5.129	-5.141	-5.153	-5.166	-5.178	-5.190	-250
-240	-4.939	-4.952	-4.965	-4.978	-4.991	-5.003	-5.016	-5.029	-5.042	-5.054	-5.067	-240
-230	-4.806	-4.820	-4.833	-4.847	-4.860	-4.873	-4.886	-4.900	-4.913	-4.926	-4.939	-230
-220	-4.669	-4.683	-4.697	-4.711	-4.724	-4.738	-4.752	-4.766	-4.779	-4.793	-4.806	-220
-210	-4.527	-4.542	-4.556	-4.570	-4.584	-4.599	-4.613	-4.627	-4.641	-4.655	-4.669	-210
-200	-4.381	-4.396	-4.411	-4.425	-4.440	-4.455	-4.469	-4.484	-4.498	-4.513	-4.527	-200
-190	-4.231	-4.246	-4.261	-4.276	-4.291	-4.306	-4.321	-4.336	-4.351	-4.366	-4.381	-190
-180	-4.076	-4.091	-4.107	-4.123	-4.138	-4.154	-4.169	-4.185	-4.200	-4.215	-4.231	-180
-170	-3.917	-3.933	-3.949	-3.965	-3.981	-3.997	-4.013	-4.029	-4.044	-4.060	-4.076	-170
-160	-3.754	-3.771	-3.787	-3.803	-3.820	-3.836	-3.852	-3.869	-3.885	-3.901	-3.917	-160
-150	-3.587	-3.604	-3.621	-3.638	-3.655	-3.671	-3.688	-3.705	-3.721	-3.738	-3.754	-150
-140	-3.417	-3.434	-3.451	-3.468	-3.486	-3.503	-3.520	-3.537	-3.554	-3.571	-3.587	-140
-130	-3.243	-3.260	-3.278	-3.295	-3.313	-3.330	-3.348	-3.365	-3.382	-3.400	-3.417	-130
-120	-3.065	-3.083	-3.101	-3.119	-3.136	-3.154	-3.172	-3.190	-3.207	-3.225	-3.243	-120
-110	-2.884	-2.902	-2.920	-2.938	-2.957	-2.975	-2.993	-3.011	-3.029	-3.047	-3.065	-110
-100	-2.699	-2.718	-2.736	-2.755	-2.773	-2.792	-2.810	-2.829	-2.847	-2.865	-2.884	-100
-90	-2.511	-2.530	-2.549	-2.568	-2.587	-2.605	-2.624	-2.643	-2.662	-2.680	-2.699	-90
-80	-2.320	-2.339	-2.359	-2.378	-2.397	-2.416	-2.435	-2.454	-2.473	-2.492	-2.511	-80
-70	-2.126	-2.146	-2.165	-2.185	-2.204	-2.223	-2.243	-2.262	-2.282	-2.301	-2.320	-70
-60	-1.929	-1.949	-1.969	-1.988	-2.008	-2.028	-2.048	-2.067	-2.087	-2.106	-2.126	-60
-50	-1.729	-1.749	-1.770	-1.790	-1.810	-1.830	-1.850	-1.869	-1.889	-1.909	-1.929	-50
-40	-1.527	-1.547	-1.568	-1.588	-1.608	-1.628	-1.649	-1.669	-1.689	-1.709	-1.729	-40
-30	-1.322	-1.343	-1.363	-1.384	-1.404	-1.425	-1.445	-1.466	-1.486	-1.507	-1.527	-30
-20	-1.114	-1.135	-1.156	-1.177	-1.198	-1.218	-1.239	-1.260	-1.281	-1.301	-1.322	-20
-10	-0.905	-0.926	-0.947	-0.968	-0.989	-1.010	-1.031	-1.052	-1.073	-1.094	-1.114	-10
0	-0.692	-0.714	-0.735	-0.756	-0.778	-0.799	-0.820	-0.841	-0.862	-0.883	-0.905	0
0	-0.692	-0.671	-0.650	-0.628	-0.607	-0.586	-0.564	-0.543	-0.521	-0.500	-0.478	0
10	-0.478	-0.457	-0.435	-0.413	-0.392	-0.370	-0.349	-0.327	-0.305	-0.284	-0.262	10
20	-0.262	-0.240	-0.218	-0.197	-0.175	-0.153	-0.131	-0.109	-0.088	-0.066	-0.044	20
30	-0.044	-0.022	0.000	0.022	0.044	0.066	0.088	0.110	0.132	0.154	0.176	30
40	0.176	0.198	0.220	0.242	0.264	0.286	0.308	0.330	0.353	0.375	0.397	40

Table 1.4.2, Instrumentation Options AFTER a External Flood Event
Type K Thermocouple Table

TABLE 10 *Type K Thermocouple — thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F*

K°F

Thermoelectric Voltage in Millivolts

°F	0	1	2	3	4	5	6	7	8	9	10	°F
50	0.397	0.419	0.441	0.463	0.486	0.508	0.530	0.552	0.575	0.597	0.619	50
60	0.619	0.642	0.664	0.686	0.709	0.731	0.753	0.776	0.798	0.821	0.843	60
70	0.843	0.865	0.888	0.910	0.933	0.955	0.978	1.000	1.023	1.045	1.068	70
80	1.068	1.090	1.113	1.136	1.158	1.181	1.203	1.226	1.249	1.271	1.294	80
90	1.294	1.316	1.339	1.362	1.384	1.407	1.430	1.453	1.475	1.498	1.521	90
100	1.521	1.543	1.566	1.589	1.612	1.635	1.657	1.680	1.703	1.726	1.749	100
110	1.749	1.771	1.794	1.817	1.840	1.863	1.886	1.909	1.931	1.954	1.977	110
120	1.977	2.000	2.023	2.046	2.069	2.092	2.115	2.138	2.161	2.184	2.207	120
130	2.207	2.230	2.253	2.276	2.298	2.321	2.344	2.367	2.390	2.413	2.436	130
140	2.436	2.459	2.483	2.506	2.529	2.552	2.575	2.598	2.621	2.644	2.667	140
150	2.667	2.690	2.713	2.736	2.759	2.782	2.805	2.828	2.851	2.874	2.897	150
160	2.897	2.920	2.944	2.967	2.990	3.013	3.036	3.059	3.082	3.105	3.128	160
170	3.128	3.151	3.174	3.197	3.220	3.244	3.267	3.290	3.313	3.336	3.359	170
180	3.359	3.382	3.405	3.428	3.451	3.474	3.497	3.520	3.544	3.567	3.590	180
190	3.590	3.613	3.636	3.659	3.682	3.705	3.728	3.751	3.774	3.797	3.820	190
200	3.820	3.843	3.866	3.889	3.912	3.935	3.958	3.981	4.004	4.027	4.050	200
210	4.050	4.073	4.096	4.119	4.142	4.165	4.188	4.211	4.234	4.257	4.280	210
220	4.280	4.303	4.326	4.349	4.372	4.395	4.417	4.440	4.463	4.486	4.509	220
230	4.509	4.532	4.555	4.578	4.601	4.623	4.646	4.669	4.692	4.715	4.738	230
240	4.738	4.760	4.783	4.806	4.829	4.852	4.874	4.897	4.920	4.943	4.965	240
250	4.965	4.988	5.011	5.034	5.056	5.079	5.102	5.124	5.147	5.170	5.192	250
260	5.192	5.215	5.238	5.260	5.283	5.306	5.328	5.351	5.374	5.396	5.419	260
270	5.419	5.441	5.464	5.487	5.509	5.532	5.554	5.577	5.599	5.622	5.644	270
280	5.644	5.667	5.690	5.712	5.735	5.757	5.779	5.802	5.824	5.847	5.869	280
290	5.869	5.892	5.914	5.937	5.959	5.982	6.004	6.026	6.049	6.071	6.094	290
300	6.094	6.116	6.138	6.161	6.183	6.205	6.228	6.250	6.272	6.295	6.317	300
310	6.317	6.339	6.362	6.384	6.406	6.429	6.451	6.473	6.496	6.518	6.540	310
320	6.540	6.562	6.585	6.607	6.629	6.652	6.674	6.696	6.718	6.741	6.763	320
330	6.763	6.785	6.807	6.829	6.852	6.874	6.896	6.918	6.941	6.963	6.985	330
340	6.985	7.007	7.029	7.052	7.074	7.096	7.118	7.140	7.163	7.185	7.207	340
350	7.207	7.229	7.251	7.273	7.296	7.318	7.340	7.362	7.384	7.407	7.429	350
360	7.429	7.451	7.473	7.495	7.517	7.540	7.562	7.584	7.606	7.628	7.650	360
370	7.650	7.673	7.695	7.717	7.739	7.761	7.783	7.806	7.828	7.850	7.872	370
380	7.872	7.894	7.917	7.939	7.961	7.983	8.005	8.027	8.050	8.072	8.094	380
390	8.094	8.116	8.138	8.161	8.183	8.205	8.227	8.250	8.272	8.294	8.316	390
400	8.316	8.338	8.361	8.383	8.405	8.427	8.450	8.472	8.494	8.516	8.539	400
410	8.539	8.561	8.583	8.605	8.628	8.650	8.672	8.694	8.717	8.739	8.761	410
420	8.761	8.784	8.806	8.828	8.851	8.873	8.895	8.918	8.940	8.962	8.985	420
430	8.985	9.007	9.029	9.052	9.074	9.096	9.119	9.141	9.163	9.186	9.208	430
440	9.208	9.231	9.253	9.276	9.298	9.320	9.343	9.365	9.388	9.410	9.432	440
450	9.432	9.455	9.477	9.500	9.522	9.545	9.567	9.590	9.612	9.635	9.657	450
460	9.657	9.680	9.702	9.725	9.747	9.770	9.792	9.815	9.837	9.860	9.882	460
470	9.882	9.905	9.927	9.950	9.973	9.995	10.018	10.040	10.063	10.086	10.108	470
480	10.108	10.131	10.153	10.176	10.199	10.221	10.244	10.267	10.289	10.312	10.334	480
490	10.334	10.357	10.380	10.402	10.425	10.448	10.471	10.493	10.516	10.539	10.561	490
500	10.561	10.584	10.607	10.629	10.652	10.675	10.698	10.720	10.743	10.766	10.789	500
510	10.789	10.811	10.834	10.857	10.880	10.903	10.925	10.948	10.971	10.994	11.017	510
520	11.017	11.039	11.062	11.085	11.108	11.131	11.154	11.176	11.199	11.222	11.245	520
530	11.245	11.268	11.291	11.313	11.336	11.359	11.382	11.405	11.428	11.451	11.474	530
540	11.474	11.497	11.519	11.542	11.565	11.588	11.611	11.634	11.657	11.680	11.703	540

Table 1.4.2, Instrumentation Options AFTER a External Flood Event
Type K Thermocouple Table

K°F **TABLE 10** *Type K Thermocouple — thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
						Thermoelectric Voltage in Millivolts						
550	11.703	11.726	11.749	11.772	11.795	11.818	11.841	11.864	11.887	11.910	11.933	550
560	11.933	11.956	11.978	12.001	12.024	12.047	12.070	12.093	12.116	12.140	12.163	560
570	12.163	12.186	12.209	12.232	12.255	12.278	12.301	12.324	12.347	12.370	12.393	570
580	12.393	12.416	12.439	12.462	12.485	12.508	12.531	12.554	12.577	12.600	12.624	580
590	12.624	12.647	12.670	12.693	12.716	12.739	12.762	12.785	12.808	12.831	12.855	590
600	12.855	12.878	12.901	12.924	12.947	12.970	12.993	13.016	13.040	13.063	13.086	600
610	13.086	13.109	13.132	13.155	13.179	13.202	13.225	13.248	13.271	13.294	13.318	610
620	13.318	13.341	13.364	13.387	13.410	13.433	13.457	13.480	13.503	13.526	13.549	620
630	13.549	13.573	13.596	13.619	13.642	13.665	13.689	13.712	13.735	13.758	13.782	630
640	13.782	13.805	13.828	13.851	13.874	13.898	13.921	13.944	13.967	13.991	14.014	640
650	14.014	14.037	14.060	14.084	14.107	14.130	14.154	14.177	14.200	14.223	14.247	650
660	14.247	14.270	14.293	14.316	14.340	14.363	14.386	14.410	14.433	14.456	14.479	660
670	14.479	14.503	14.526	14.549	14.573	14.596	14.619	14.643	14.666	14.689	14.713	670
680	14.713	14.736	14.759	14.783	14.806	14.829	14.853	14.876	14.899	14.923	14.946	680
690	14.946	14.969	14.993	15.016	15.039	15.063	15.086	15.109	15.133	15.156	15.179	690
700	15.179	15.203	15.226	15.250	15.273	15.296	15.320	15.343	15.366	15.390	15.413	700
710	15.413	15.437	15.460	15.483	15.507	15.530	15.554	15.577	15.600	15.624	15.647	710
720	15.647	15.671	15.694	15.717	15.741	15.764	15.788	15.811	15.834	15.858	15.881	720
730	15.881	15.905	15.928	15.952	15.975	15.998	16.022	16.045	16.069	16.092	16.116	730
740	16.116	16.139	16.163	16.186	16.209	16.233	16.256	16.280	16.303	16.327	16.350	740
750	16.350	16.374	16.397	16.421	16.444	16.468	16.491	16.515	16.538	16.561	16.585	750
760	16.585	16.608	16.632	16.655	16.679	16.702	16.726	16.749	16.773	16.796	16.820	760
770	16.820	16.843	16.867	16.890	16.914	16.937	16.961	16.984	17.008	17.031	17.055	770
780	17.055	17.078	17.102	17.125	17.149	17.173	17.196	17.220	17.243	17.267	17.290	780
790	17.290	17.314	17.337	17.361	17.384	17.408	17.431	17.455	17.478	17.502	17.526	790
800	17.526	17.549	17.573	17.596	17.620	17.643	17.667	17.690	17.714	17.738	17.761	800
810	17.761	17.785	17.808	17.832	17.855	17.879	17.902	17.926	17.950	17.973	17.997	810
820	17.997	18.020	18.044	18.068	18.091	18.115	18.138	18.162	18.185	18.209	18.233	820
830	18.233	18.256	18.280	18.303	18.327	18.351	18.374	18.398	18.421	18.445	18.469	830
840	18.469	18.492	18.516	18.539	18.563	18.587	18.610	18.634	18.657	18.681	18.705	840
850	18.705	18.728	18.752	18.776	18.799	18.823	18.846	18.870	18.894	18.917	18.941	850
860	18.941	18.965	18.988	19.012	19.035	19.059	19.083	19.106	19.130	19.154	19.177	860
870	19.177	19.201	19.224	19.248	19.272	19.295	19.319	19.343	19.366	19.390	19.414	870
880	19.414	19.437	19.461	19.485	19.508	19.532	19.556	19.579	19.603	19.626	19.650	880
890	19.650	19.674	19.697	19.721	19.745	19.768	19.792	19.816	19.839	19.863	19.887	890
900	19.887	19.910	19.934	19.958	19.981	20.005	20.029	20.052	20.076	20.100	20.123	900
910	20.123	20.147	20.171	20.194	20.218	20.242	20.265	20.289	20.313	20.336	20.360	910
920	20.360	20.384	20.407	20.431	20.455	20.479	20.502	20.526	20.550	20.573	20.597	920
930	20.597	20.621	20.644	20.668	20.692	20.715	20.739	20.763	20.786	20.810	20.834	930
940	20.834	20.857	20.881	20.905	20.929	20.952	20.976	21.000	21.023	21.047	21.071	940
950	21.071	21.094	21.118	21.142	21.165	21.189	21.213	21.236	21.260	21.284	21.308	950
960	21.308	21.331	21.355	21.379	21.402	21.426	21.450	21.473	21.497	21.521	21.544	960
970	21.544	21.568	21.592	21.616	21.639	21.663	21.687	21.710	21.734	21.758	21.781	970
980	21.781	21.805	21.829	21.852	21.876	21.900	21.924	21.947	21.971	21.995	22.018	980
990	22.018	22.042	22.066	22.089	22.113	22.137	22.160	22.184	22.208	22.232	22.255	990
1000	22.255	22.279	22.303	22.326	22.350	22.374	22.397	22.421	22.445	22.468	22.492	1000
1010	22.492	22.516	22.540	22.563	22.587	22.611	22.634	22.658	22.682	22.705	22.729	1010
1020	22.729	22.753	22.776	22.800	22.824	22.847	22.871	22.895	22.919	22.942	22.966	1020
1030	22.966	22.990	23.013	23.037	23.061	23.084	23.108	23.132	23.155	23.179	23.203	1030
1040	23.203	23.226	23.250	23.274	23.297	23.321	23.345	23.368	23.392	23.416	23.439	1040

Table 1.4.2, Instrumentation Options AFTER a External Flood Event
Type K Thermocouple Table

K°F

TABLE 10 *Type K Thermocouple — thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F*

°F	0	1	2	3	4	5	6	7	8	9	10	°F
	Thermoelectric Voltage in Millivolts											
1050	23.439	23.463	23.487	23.510	23.534	23.558	23.581	23.605	23.629	23.652	23.676	1050
1060	23.676	23.700	23.723	23.747	23.771	23.794	23.818	23.842	23.865	23.889	23.913	1060
1070	23.913	23.936	23.960	23.984	24.007	24.031	24.055	24.078	24.102	24.126	24.149	1070
1080	24.149	24.173	24.197	24.220	24.244	24.267	24.291	24.315	24.338	24.362	24.386	1080
1090	24.386	24.409	24.433	24.457	24.480	24.504	24.527	24.551	24.575	24.598	24.622	1090
1100	24.622	24.646	24.669	24.693	24.717	24.740	24.764	24.787	24.811	24.835	24.858	1100
1110	24.858	24.882	24.905	24.929	24.953	24.976	25.000	25.024	25.047	25.071	25.094	1110
1120	25.094	25.118	25.142	25.165	25.189	25.212	25.236	25.260	25.283	25.307	25.330	1120
1130	25.330	25.354	25.377	25.401	25.425	25.448	25.472	25.495	25.519	25.543	25.566	1130
1140	25.566	25.590	25.613	25.637	25.660	25.684	25.708	25.731	25.755	25.778	25.802	1140
1150	25.802	25.825	25.849	25.873	25.896	25.920	25.943	25.967	25.990	26.014	26.037	1150
1160	26.037	26.061	26.084	26.108	26.132	26.155	26.179	26.202	26.226	26.249	26.273	1160
1170	26.273	26.296	26.320	26.343	26.367	26.390	26.414	26.437	26.461	26.484	26.508	1170
1180	26.508	26.532	26.555	26.579	26.602	26.626	26.649	26.673	26.696	26.720	26.743	1180
1190	26.743	26.767	26.790	26.814	26.837	26.861	26.884	26.907	26.931	26.954	26.978	1190
1200	26.978	27.001	27.025	27.048	27.072	27.095	27.119	27.142	27.166	27.189	27.213	1200
1210	27.213	27.236	27.260	27.283	27.306	27.330	27.353	27.377	27.400	27.424	27.447	1210
1220	27.447	27.471	27.494	27.517	27.541	27.564	27.588	27.611	27.635	27.658	27.681	1220
1230	27.681	27.705	27.728	27.752	27.775	27.798	27.822	27.845	27.869	27.892	27.915	1230
1240	27.915	27.939	27.962	27.986	28.009	28.032	28.056	28.079	28.103	28.126	28.149	1240
1250	28.149	28.173	28.196	28.219	28.243	28.266	28.289	28.313	28.336	28.360	28.383	1250
1260	28.383	28.406	28.430	28.453	28.476	28.500	28.523	28.546	28.570	28.593	28.616	1260
1270	28.616	28.640	28.663	28.686	28.710	28.733	28.756	28.780	28.803	28.826	28.849	1270
1280	28.849	28.873	28.896	28.919	28.943	28.966	28.989	29.013	29.036	29.059	29.082	1280
1290	29.082	29.106	29.129	29.152	29.176	29.199	29.222	29.245	29.269	29.292	29.315	1290
1300	29.315	29.338	29.362	29.385	29.408	29.431	29.455	29.478	29.501	29.624	29.548	1300
1310	29.548	29.571	29.594	29.617	29.640	29.664	29.687	29.710	29.733	29.757	29.780	1310
1320	29.780	29.803	29.826	29.849	29.873	29.898	29.919	29.942	29.965	29.989	30.012	1320
1330	30.012	30.035	30.058	30.081	30.104	30.128	30.151	30.174	30.197	30.220	30.243	1330
1340	30.243	30.267	30.290	30.313	30.336	30.359	30.382	30.405	30.429	30.452	30.475	1340
1350	30.475	30.498	30.521	30.544	30.567	30.590	30.613	30.637	30.660	30.683	30.706	1350
1360	30.706	30.729	30.752	30.775	30.798	30.821	30.844	30.868	30.891	30.914	30.937	1360
1370	30.937	30.960	30.983	31.006	31.029	31.052	31.075	31.098	31.121	31.144	31.167	1370
1380	31.167	31.190	31.213	31.236	31.260	31.283	31.306	31.329	31.352	31.375	31.398	1380
1390	31.398	31.421	31.444	31.467	31.490	31.513	31.536	31.559	31.582	31.605	31.628	1390
1400	31.628	31.651	31.674	31.697	31.720	31.743	31.766	31.789	31.812	31.834	31.857	1400
1410	31.857	31.880	31.903	31.926	31.949	31.972	31.995	32.018	32.041	32.064	32.087	1410
1420	32.087	32.110	32.133	32.156	32.179	32.202	32.224	32.247	32.270	32.293	32.316	1420
1430	32.316	32.339	32.362	32.385	32.408	32.431	32.453	32.476	32.499	32.522	32.545	1430
1440	32.545	32.568	32.591	32.614	32.636	32.659	32.682	32.705	32.728	32.751	32.774	1440
1450	32.774	32.796	32.819	32.842	32.865	32.888	32.911	32.933	32.956	32.979	33.002	1450
1460	33.002	33.025	33.047	33.070	33.093	33.116	33.139	33.161	33.184	33.207	33.230	1460
1470	33.230	33.253	33.275	33.298	33.321	33.344	33.366	33.389	33.412	33.435	33.458	1470
1480	33.458	33.480	33.503	33.526	33.548	33.571	33.594	33.617	33.639	33.662	33.685	1480
1490	33.685	33.708	33.730	33.753	33.776	33.798	33.821	33.844	33.867	33.889	33.912	1490
1500	33.912	33.935	33.957	33.980	34.003	34.025	34.048	34.071	34.093	34.116	34.139	1500
1510	34.139	34.161	34.184	34.207	34.229	34.252	34.275	34.297	34.320	34.343	34.365	1510
1520	34.365	34.388	34.410	34.433	34.456	34.478	34.501	34.524	34.546	34.569	34.591	1520
1530	34.591	34.614	34.637	34.659	34.682	34.704	34.727	34.750	34.772	34.795	34.817	1530

Table 1.4.2, Instrumentation Options AFTER a External Flood Event
Type K Thermocouple Table

K°F

TABLE 10 *Type K Thermocouple — thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F*

Thermoelectric Voltage in Millivolts

°F	0	1	2	3	4	5	6	7	8	9	10	°F
1540	34.817	34.840	34.862	34.885	34.908	34.930	34.953	34.975	34.998	35.020	35.043	1540
1550	35.043	35.065	35.088	35.110	35.133	35.156	35.178	35.201	35.223	35.246	35.268	1550
1560	35.268	35.291	35.313	35.336	35.358	35.381	35.403	35.426	35.448	35.471	35.493	1560
1570	35.493	35.516	35.538	35.560	35.583	35.605	35.628	35.650	35.673	35.695	35.718	1570
1580	35.718	35.740	35.763	35.785	35.807	35.830	35.852	35.875	35.897	35.920	35.942	1580
1590	35.942	35.964	35.987	36.009	36.032	36.054	36.076	36.099	36.121	36.144	36.166	1590
1600	36.166	36.188	36.211	36.233	36.256	36.278	36.300	36.323	36.345	36.367	36.390	1600
1610	36.390	36.412	36.434	36.457	36.479	36.501	36.524	36.546	36.568	36.591	36.613	1610
1620	36.613	36.635	36.658	36.680	36.702	36.725	36.747	36.769	36.792	36.814	36.836	1620
1630	36.836	36.859	36.881	36.903	36.925	36.948	36.970	36.992	37.014	37.037	37.059	1630
1640	37.059	37.081	37.104	37.126	37.148	37.170	37.193	37.215	37.237	37.259	37.281	1640
1650	37.281	37.304	37.326	37.348	37.370	37.393	37.415	37.437	37.459	37.481	37.504	1650
1660	37.504	37.526	37.548	37.570	37.592	37.615	37.637	37.659	37.681	37.703	37.725	1660
1670	37.725	37.748	37.770	37.792	37.814	37.836	37.858	37.881	37.903	37.925	37.947	1670
1680	37.947	37.969	37.991	38.013	38.036	38.058	38.080	38.102	38.124	38.146	38.168	1680
1690	38.168	38.190	38.212	38.235	38.257	38.279	38.301	38.323	38.345	38.367	38.389	1690
1700	38.389	38.411	38.433	38.455	38.477	38.499	38.522	38.544	38.566	38.588	38.610	1700
1710	38.610	38.632	38.654	38.676	38.698	38.720	38.742	38.764	38.786	38.808	38.830	1710
1720	38.830	38.852	38.874	38.896	38.918	38.940	38.962	38.984	39.006	39.028	39.050	1720
1730	39.050	39.072	39.094	39.116	39.138	39.160	39.182	39.204	39.226	39.248	39.270	1730
1740	39.270	39.292	39.314	39.335	39.357	39.379	39.401	39.423	39.445	39.467	39.489	1740
1750	39.489	39.511	39.533	39.555	39.577	39.599	39.620	39.642	39.664	39.686	39.708	1750
1760	39.708	39.730	39.752	39.774	39.796	39.817	39.839	39.861	39.883	39.905	39.927	1760
1770	39.927	39.949	39.970	39.992	40.014	40.036	40.058	40.080	40.101	40.123	40.145	1770
1780	40.145	40.167	40.189	40.211	40.232	40.254	40.276	40.298	40.320	40.341	40.363	1780
1790	40.363	40.385	40.407	40.429	40.450	40.472	40.494	40.516	40.537	40.559	40.581	1790
1800	40.581	40.603	40.624	40.646	40.668	40.690	40.711	40.733	40.755	40.777	40.798	1800
1810	40.798	40.820	40.842	40.864	40.885	40.907	40.929	40.950	40.972	40.994	41.015	1810
1820	41.015	41.037	41.059	41.081	41.102	41.124	41.146	41.167	41.189	41.211	41.232	1820
1830	41.232	41.254	41.276	41.297	41.319	41.341	41.362	41.384	41.405	41.427	41.449	1830
1840	41.449	41.470	41.492	41.514	41.535	41.557	41.578	41.600	41.622	41.643	41.665	1840
1850	41.665	41.686	41.708	41.730	41.751	41.773	41.794	41.816	41.838	41.859	41.881	1850
1860	41.881	41.902	41.924	41.945	41.967	41.988	42.010	42.032	42.053	42.075	42.096	1860
1870	42.096	42.118	42.139	42.161	42.182	42.204	42.225	42.247	42.268	42.290	42.311	1870
1880	42.311	42.333	42.354	42.376	42.397	42.419	42.440	42.462	42.483	42.505	42.526	1880
1890	42.526	42.548	42.569	42.591	42.612	42.633	42.655	42.676	42.698	42.719	42.741	1890
1900	42.741	42.762	42.783	42.805	42.826	42.848	42.869	42.891	42.912	42.933	42.955	1900
1910	42.955	42.976	42.998	43.019	43.040	43.062	43.083	43.104	43.126	43.147	43.169	1910
1920	43.169	43.190	43.211	43.233	43.254	43.275	43.297	43.318	43.339	43.361	43.382	1920
1930	43.382	43.403	43.425	43.446	43.467	43.489	43.510	43.531	43.552	43.574	43.595	1930
1940	43.595	43.616	43.638	43.659	43.680	43.701	43.723	43.744	43.765	43.787	43.808	1940
1950	43.808	43.829	43.850	43.872	43.893	43.914	43.935	43.957	43.978	43.999	44.020	1950
1960	44.020	44.041	44.063	44.084	44.105	44.126	44.147	44.169	44.190	44.211	44.232	1960
1970	44.232	44.253	44.275	44.296	44.317	44.338	44.359	44.380	44.402	44.423	44.444	1970
1980	44.444	44.465	44.486	44.507	44.528	44.550	44.571	44.592	44.613	44.634	44.655	1980
1990	44.655	44.676	44.697	44.719	44.740	44.761	44.782	44.803	44.824	44.845	44.866	1990
2000	44.866	44.887	44.908	44.929	44.950	44.971	44.992	45.014	45.035	45.056	45.077	2000
2010	45.077	45.098	45.119	45.140	45.161	45.182	45.203	45.224	45.245	45.266	45.287	2010
2020	45.287	45.308	45.329	45.350	45.371	45.392	45.413	45.434	45.455	45.476	45.497	2020

Table 1.4.2, Instrumentation Options AFTER a External Flood Event
Type K Thermocouple Table

K°F

TABLE 10 *Type K Thermocouple — thermoelectric voltage as a function of temperature (°F); reference junctions at 32 °F*

Thermoelectric Voltage in Millivolts

°F	0	1	2	3	4	5	6	7	8	9	10	°F
2030	45.497	45.518	45.539	45.560	45.580	45.601	45.622	45.643	45.664	45.685	45.706	2030
2040	45.706	45.727	45.748	45.769	45.790	45.811	45.832	45.852	45.873	45.894	45.915	2040
2050	45.915	45.936	45.957	45.978	45.999	46.019	46.040	46.061	46.082	46.103	46.124	2050
2060	46.124	46.145	46.165	46.186	46.207	46.228	46.249	46.269	46.290	46.311	46.332	2060
2070	46.332	46.353	46.374	46.394	46.415	46.436	46.457	46.477	46.498	46.519	46.540	2070
2080	46.540	46.560	46.581	46.602	46.623	46.643	46.664	46.685	46.706	46.726	46.747	2080
2090	46.747	46.768	46.789	46.809	46.830	46.851	46.871	46.892	46.913	46.933	46.954	2090
2100	46.954	46.975	46.995	47.016	47.037	47.057	47.078	47.099	47.119	47.140	47.161	2100
2110	47.161	47.181	47.202	47.223	47.243	47.264	47.284	47.305	47.326	47.346	47.367	2110
2120	47.367	47.387	47.408	47.429	47.449	47.470	47.490	47.511	47.531	47.552	47.573	2120
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2140	47.778	47.798	47.819	47.839	47.860	47.880	47.901	47.921	47.942	47.962	47.983	2140
2150	47.983	48.003	48.024	48.044	48.065	48.085	48.105	48.126	48.146	48.167	48.187	2150
2160	48.187	48.208	48.228	48.248	48.269	48.289	48.310	48.330	48.350	48.371	48.391	2160
2170	48.391	48.411	48.432	48.452	48.473	48.493	48.513	48.534	48.554	48.574	48.595	2170
2180	48.595	48.615	48.635	48.656	48.676	48.696	48.717	48.737	48.757	48.777	48.798	2180
2190	48.798	48.818	48.838	48.859	48.879	48.899	48.919	48.940	48.960	48.980	49.000	2190
2200	49.000	49.021	49.041	49.061	49.081	49.101	49.122	49.142	49.162	49.182	49.202	2200
2210	49.202	49.223	49.243	49.263	49.283	49.303	49.323	49.344	49.364	49.384	49.404	2210
2220	49.404	49.424	49.444	49.465	49.485	49.505	49.525	49.545	49.565	49.585	49.605	2220
2230	49.605	49.625	49.645	49.666	49.686	49.706	49.726	49.746	49.766	49.786	49.806	2230
2240	49.806	49.826	49.846	49.866	49.886	49.906	49.926	49.946	49.966	49.986	50.006	2240
2250	50.006	50.026	50.046	50.066	50.086	50.106	50.126	50.146	50.166	50.186	50.206	2250
2260	50.206	50.226	50.246	50.266	50.286	50.306	50.326	50.346	50.366	50.385	50.405	2260
2270	50.405	50.425	50.445	50.465	50.485	50.505	50.525	50.545	50.564	50.584	50.604	2270
2280	50.604	50.624	50.644	50.664	50.684	50.703	50.723	50.743	50.763	50.783	50.802	2280
2290	50.802	50.822	50.842	50.862	50.882	50.901	50.921	50.941	50.961	50.981	51.000	2290
2300	51.000	51.020	51.040	51.060	51.079	51.099	51.119	51.139	51.158	51.178	51.198	2300
2310	51.198	51.217	51.237	51.257	51.276	51.296	51.316	51.336	51.355	51.375	51.395	2310
2320	51.395	51.414	51.434	51.453	51.473	51.493	51.512	51.532	51.552	51.571	51.591	2320
2330	51.591	51.611	51.630	51.650	51.669	51.689	51.708	51.728	51.748	51.767	51.787	2330
2340	51.787	51.806	51.826	51.845	51.865	51.885	51.904	51.924	51.943	51.963	51.982	2340
2350	51.982	52.002	52.021	52.041	52.060	52.080	52.099	52.119	52.138	52.158	52.177	2350
2360	52.177	52.197	52.216	52.235	52.255	52.274	52.294	52.313	52.333	52.352	52.371	2360
2370	52.371	52.391	52.410	52.430	52.449	52.468	52.488	52.507	52.527	52.546	52.565	2370
2380	52.565	52.585	52.604	52.623	52.643	52.662	52.681	52.701	52.720	52.739	52.759	2380
2390	52.759	52.778	52.797	52.817	52.836	52.855	52.875	52.894	52.913	52.932	52.952	2390
2400	52.952	52.971	52.990	53.010	53.029	53.048	53.067	53.087	53.106	53.125	53.144	2400
2410	53.144	53.163	53.183	53.202	53.221	53.240	53.260	53.279	53.298	53.317	53.336	2410
2420	53.336	53.355	53.375	53.394	53.413	53.432	53.451	53.470	53.490	53.509	53.528	2420
2430	53.528	53.547	53.566	53.585	53.604	53.623	53.643	53.662	53.681	53.700	53.719	2430
2440	53.719	53.738	53.757	53.776	53.795	53.814	53.833	53.852	53.871	53.890	53.910	2440
2450	53.910	53.929	53.948	53.967	53.986	54.005	54.024	54.043	54.062	54.081	54.100	2450
2460	54.100	54.119	54.138	54.157	54.176	54.195	54.214	54.233	54.252	54.271	54.289	2460
2470	54.289	54.308	54.327	54.346	54.365	54.384	54.403	54.422	54.441	54.460	54.479	2470
2480	54.479	54.498	54.517	54.536	54.554	54.573	54.592	54.611	54.630	54.649	54.668	2480
2490	54.668	54.687	54.705	54.724	54.743	54.762	54.781	54.800	54.819	54.837	54.856	2490
2500	54.85											2500

Enclosure 1.5 - SFP Cooling Using Portable Pump

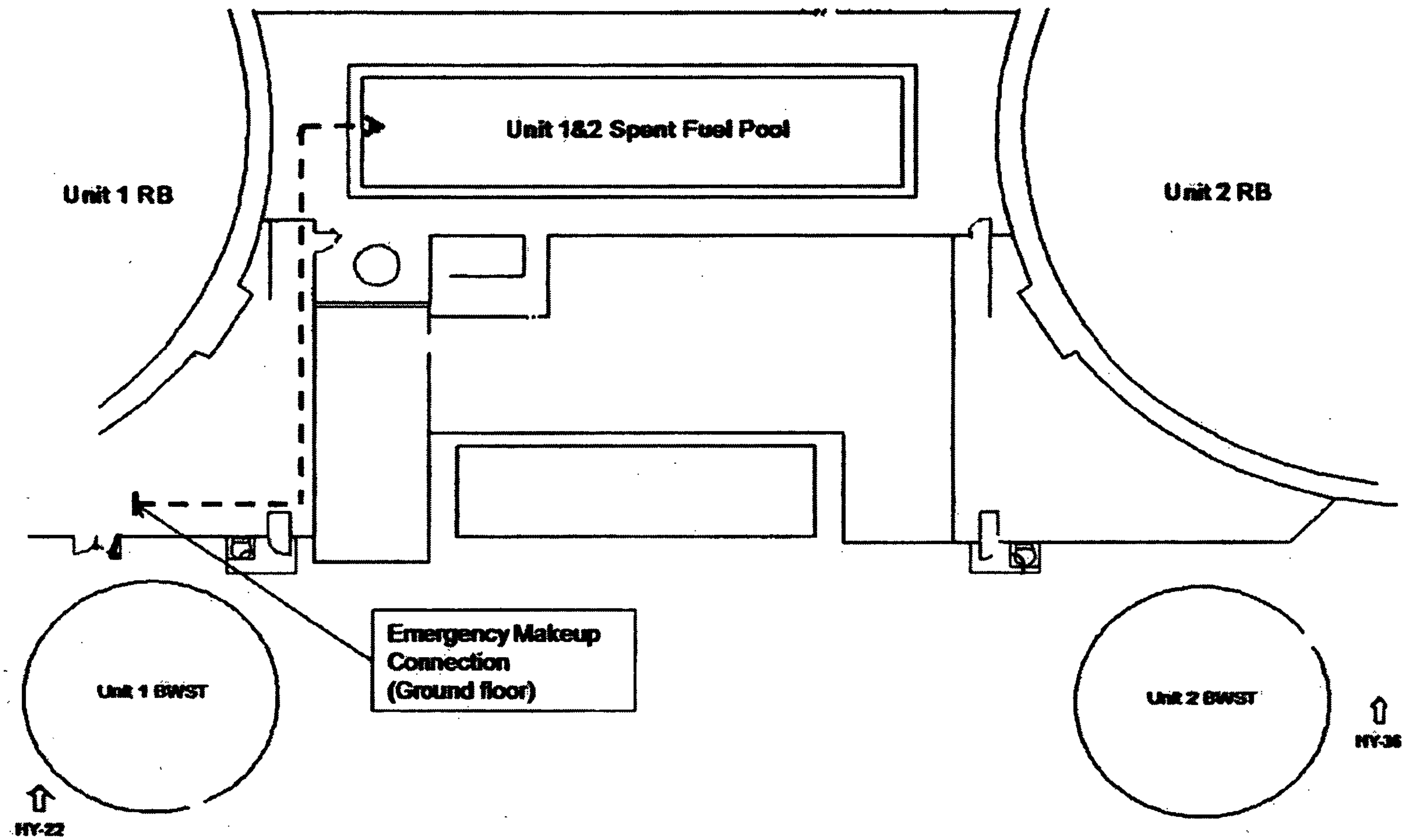
NOTE:	**Volume vs. Level for SFP's**
	Unit 1&2 = 1512 gal/0.1 foot
	Unit 3 = 1041 gal/0.1 foot

Per analysis in OSC-619, Spent Fuel should not be uncovered before approximately 72 hours into a loss of Spent Fuel Cooling event. Therefore, this enclosure addresses long term cooling of the SFP.

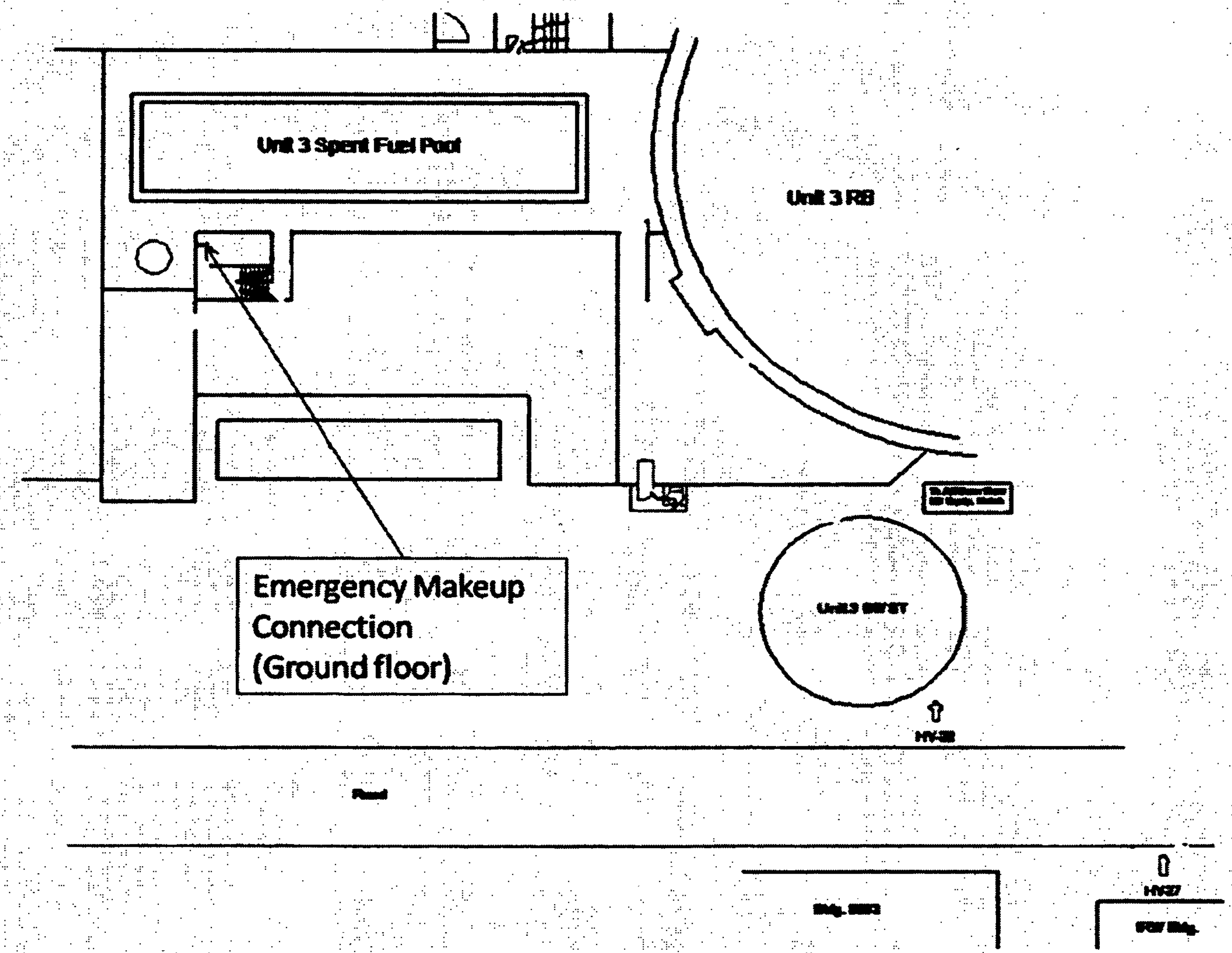
NOTE: Drawings 1.5.1 and 1.5.2 indicate locations of SFP emergency makeup pipe flanges.

1. Route Hoses from either the HPP or the EFM Pump to the SFP emergency makeup pipe flange.
2. Connect Hoses to the SFP emergency flange makeup pipe flange (located in the Unit 1&2 and Unit 3 Cask Decon room) with flange adapters and bolts located in the EDM trailer (reference **Drawing 1.5.3**).
3. Makeup to SFP's as necessary to maintain SFP level due to SFP boiling.
4. Evaluate need to monitor SFP level based on makeup rate to ensure SFP's do not overflow.
5. If SFP overflows, secure makeup and drop gate at CTP 3 if possible.

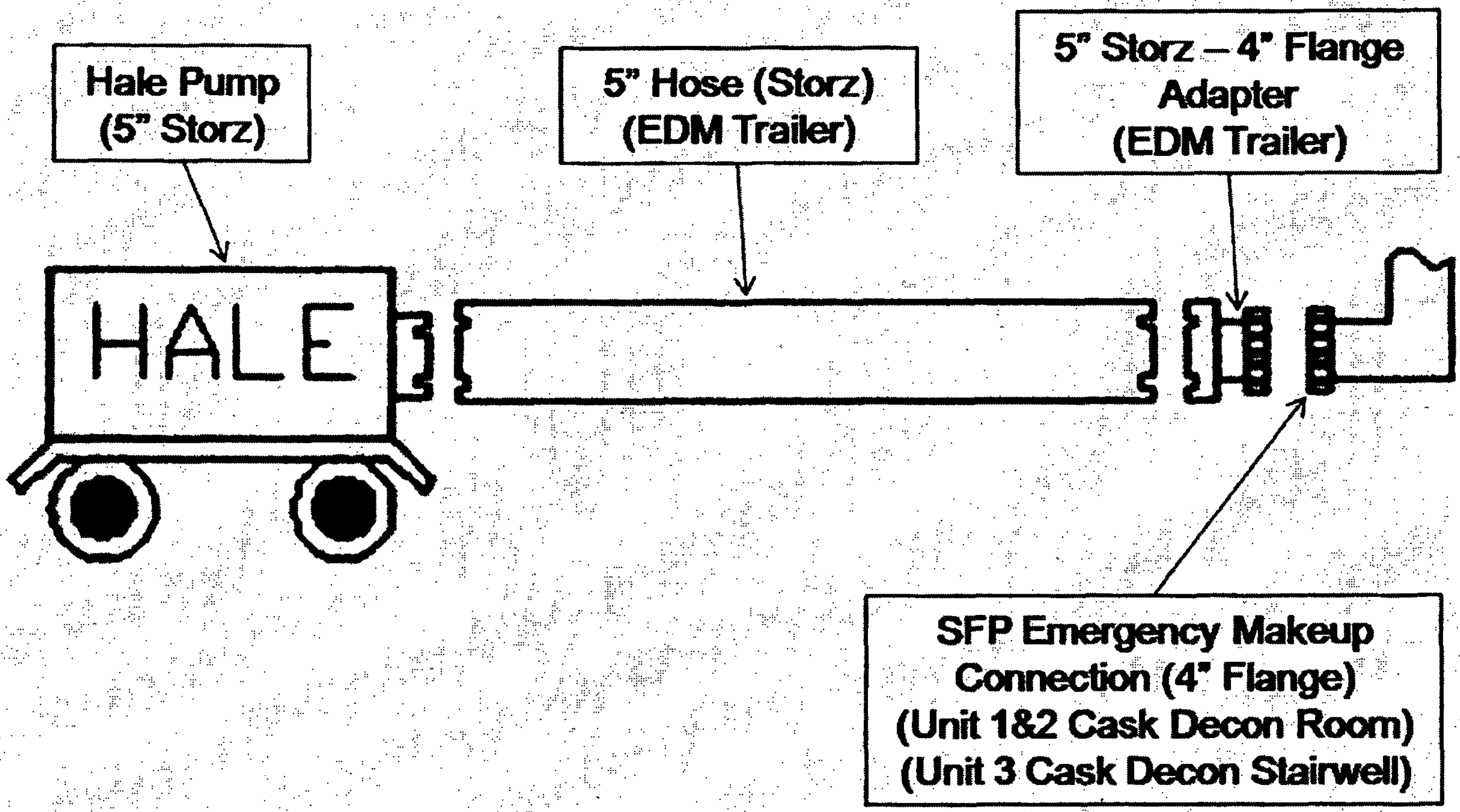
Drawing 1.5.1 – Unit 1&2 SFP Makeup Connection Hose Pull



Drawing 1.5.2 – Unit 3 SFP Makeup Connection Hose Pull



Drawing 1.5.3 - SFP Makeup Connection Diagram



Enclosure 1.6 - Long Term Plant Recovery Strategies

1. Locate and restore a source of 4KV power to the site.
2. Connect 4KV power to Appendix R switchgear trailer.
3. Establish LPI decay heat removal for all units.
4. Establish Primary makeup using any of the following:
    a. SSF RC Makeup
    b. HPI
    c. LPI
    d. CF
    e. CS

NOTE: To continue secondary heat removal using the Portable pump, makeup to CTP-1 is required. (CTP-1 Inventory is only 24 hours)

5. Continue Secondary heat removal using any of the following:
    a. Hale Portable Pump(s)
    b. EFM Pump
    c. EFDW
    d. SSF ASW
    e. LPSW
    f. CCW
    g. HPSW
6. Establish long term workforce strategies
    a. Determine workforce requirements and how to rotate workforce to meet plant needs
    b. Consider using workforce from MNS and CNS to supplement the ONS workforce
    c. Determine if roads are passable to allow workforce access to plant
    d. If necessary contact Duke Energy Aviation for use of corporate helicopter fleet
    e. Consider housing workforce on site; sleeping arrangements, food, etc.
    f. Contact SC EMD for any off site assistance needed

Enclosure 1.7 - Flooding Containment from the Portable Pump

NOTE: This enclosure is for use as a contingency if other strategies have been ineffective. In addition to this strategy, SAMG strategies should be considered.

1. Introduction

The purpose of this enclosure is to provide capability for flooding containment to mitigate a Core Ex-Vessel event (similar to SAMG strategy for a core Ex-Vessel event).

The following equipment needed to support this strategy is located in the EDM trailer:

- Tools and door stops
- 1,2,3 BS-26 thread to Storz connection

The following valves are used to support this strategy:

NOTE: Building Spray (BS) valves in this Enclosure are UNIT SPECIFIC.
Equipment Name and Location as listed in the Equipment Database are located below:

Equipment Tag				Equipment Name	Location Description
1	BS	VA	0001	1A RBS HDR ISOL (PENE #13)	AB, EL.809+03, COL.Qa67, RM.402, 20' NW OF ELEVATOR
1	BS	VA	0002	1B RBS HDR ISOL (PENE #14)	AB, EL.809+03, COL.X69, RM.409, 20' NE OF DOOR
1	BS	VA	0013	1A RBS PUMP TEST	E PEN RM 10' HIGH, 20'N ELE
1	BS	VA	0018	1B RBS PUMP TEST	E PEN RM, 9' HIGH 15' SW ELE
1	BS	VA	0021	RBS TEST LINE TO BWST BLOCK	E PEN RM 11' HIGH, 15' SW ELE
1	BS	VA	0026	BS EMERGENCY CONNECTION	AB ELEV.809+06 COL. Q69 RM.402
2	BS	VA	0001	2A RBS HDR ISOL (PENE #13)	AB, EL.809+03, COL.Q78, RM.407, 12' W OF DOOR COL.Q78
2	BS	VA	0002	2B RBS HDR ISOL (PENE #14)	AB, EL.809+03, COL.X78, RM.410, 5'E OF DOOR
2	BS	VA	0013	2A RBS PUMP TEST	E PEN RM 8' HIGH, 30'S, 10'W OF DOOR
2	BS	VA	0018	2B RBS PUMP TEST	E PEN RM, 8' HIGH 20' W OF DOOR
2	BS	VA	0021	RBS TEST LINE TO BWST BLOCK	E PEN RM 8' HIGH, 20' W OF DOOR
2	BS	VA	0026	BS EMERGENCY CONNECTION	AB ELEV.809+04 COL.Q79 RM.407
3	BS	VA	0001	3A RBS HDR ISOL (PENE #13)	AB, EL.809+03, COL.Qa94, RM.452, 33'S, 12'W OF DOOR
3	BS	VA	0002	3B RBS HDR ISOL (PENE #14)	AB, EL.809+03, COL.X93, RM.456, 36'S, 5'E OF DOOR
3	BS	VA	0013	3A RBS PUMP TEST	E PEN RM 8' HIGH, 30'S, 10'W OF DOOR
3	BS	VA	0018	3B RBS PUMP TEST	E PEN RM, 8' HIGH 20' W OF DOOR
3	BS	VA	0021	RBS TEST LINE TO BWST BLOCK	E PEN RM 8' HIGH, 20' W OF DOOR
3	BS	VA	0026	BS EMERGENCY CONNECTION	AB ELEV.809+06 COL.Q93 RM.452

2. Actions

2.1. Notify Maintenance to route 5" hose from the Hale Portable Pump to the Auxiliary Building.
2.2. Notify Operations to route a 5" and/or 3" hoses from the staging area to the East Penetration Room of all three units.
2.3. Ensure closed _BS-26 (BS Emergency Connection).
2.4. For unit 1, install elbow on 1BS-26 (BS Emergency Connection).
2.5. Install hose connector on BS-26 (BS Emergency Connection).
2.6. Attach 5" hose to the hose connector on BS-26 (BS Emergency Connection).
2.7. Align the Building Spray recirculation system to allow containment to be flooded via the Hale Portable Pump:

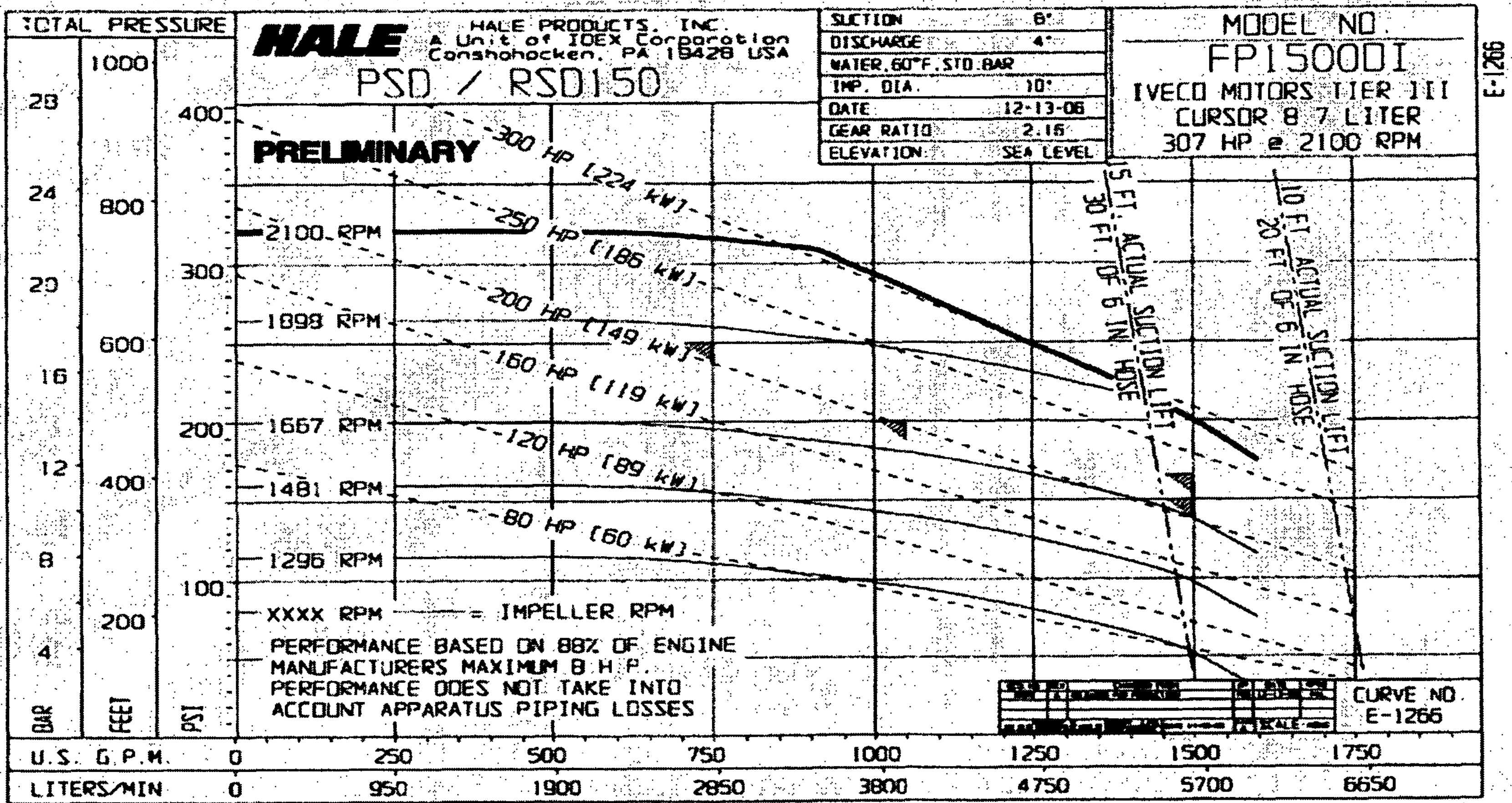
2.7.1. To utilize the 'A' BS header, align per the following:
2.7.1.1. Close _BS-18 (B BS Header Isolation)
2.7.1.2. Open _BS-13(A BS Header Isolation)
2.7.1.3. Close _BS-21(RBS Test Line to BWST Block)
2.7.1.4. Open _BS-1 ('A' BS Header Isolation/Control Valve)

2.7.2. To utilize the 'B' BS header, align per the following:
2.7.2.1. Open _BS-18 (B BS Header Isolation)
2.7.2.2. Close _BS-13(A BS Header Isolation)
2.7.2.3. Close _BS-21(RBS Test Line to BWST Block)
2.7.2.4. Open _BS-2 ('B' BS Header Isolation/Control Valve)

2.7.3. To utilize both the 'A' and 'B' BS header, align per the following:
2.7.3.1. Open _BS-18 (B BS Header Isolation)
2.7.3.2. Open _BS-13(A BS Header Isolation)
2.7.3.3. Close _BS-21(BS Recirc to BWST)
2.7.3.4. Open _BS-2 ('B' BS Header Isolation/Control Valve)
2.7.3.5. Open _BS-1 ('A' BS Header Isolation/Control Valve)

2.8. Open BS-26 (BS Emergency Connection)
2.9. Contact the operator at the Hale Portable Pump to start the pump and adjust flow to the desired rate (> 300 gpm) per Enclosure 1.9.
2.10. Limit total volume of makeup to 200,000 gallons. Above 200,000 gallons, the SSF RCMU pump will be flooded and not available for event mitigation.
2.11. When the appropriate volume has been added to Containment, secure makeup by Closing BS-26 (BS Emergency Connection

Enclosure 1.8 - Hale Portable Pump Head Curve



Enclosure 1.9 - Post Flood OTSG Level Control

The purpose of this enclosure is to manipulate plant equipment to re-establish OTSG level within instrumentation scale and establish long term natural circulation.

Actions:
After flood waters have receded below elevation 809' and Penetration rooms become available, perform the following actions to control OTSG level as directed by the TSC.

NOTE: Start Up Range (SUR) level will be provided by SPOC technician in East/West Penetration rooms.

Align the following valves as necessary to feed the appropriate OTSG(s) to maintain 240" – 260" SUR level.

If At Any Time, Sub-cooling Margin is lost, Increase and maintain SG levels at Loss of Sub-Cooling Margin (LOSCM) setpoint per EP/*/A/1800/001

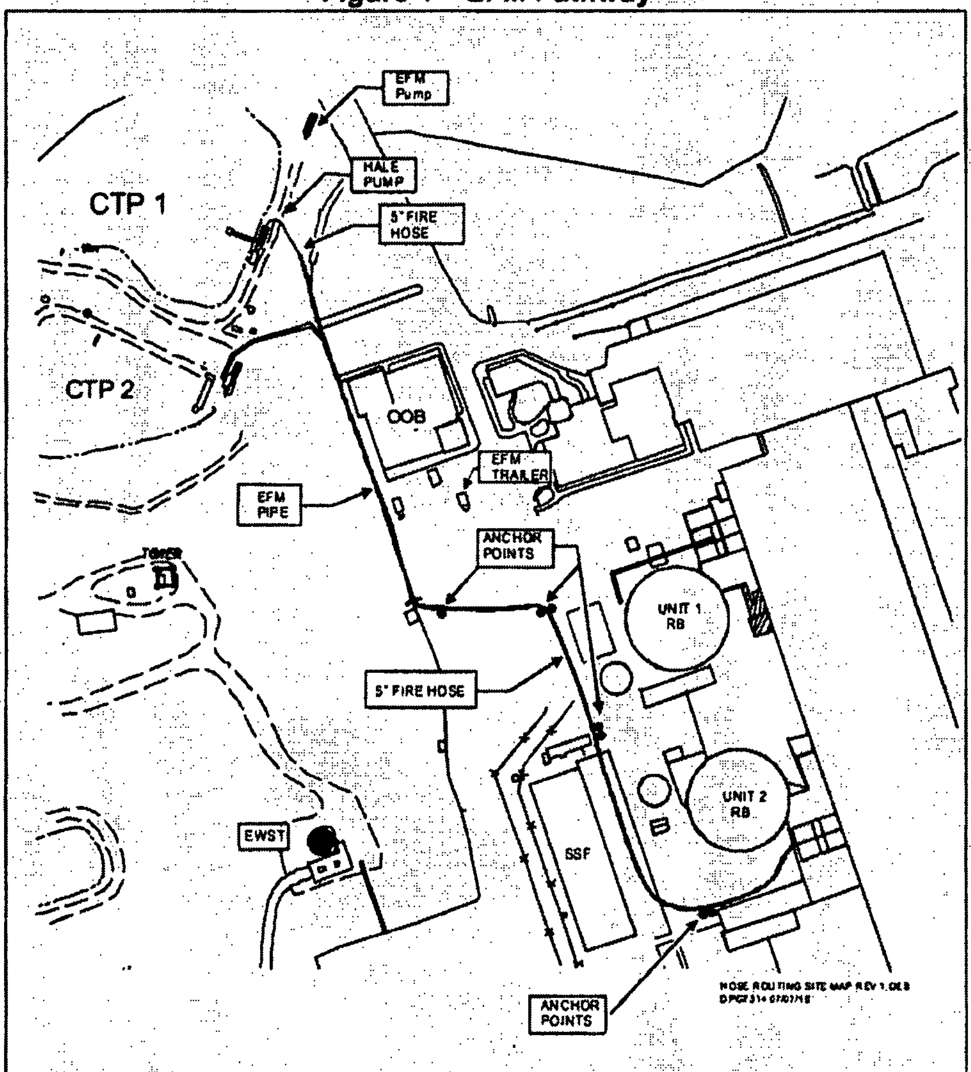
- For Unit 1
  - SG 1A:
    - Throttle 1CCW-104 (ASW to 1A S/G Stop)(U1 East Pen Room)(~40 feet from ladder to West Pen Room)
  - SG 1B
    - Throttle 1CCW-108 (ASW to 1B S/G Stop)(U1 West Pen Room)(Directly in front of entry door ~ 30 feet)
- For Unit 2
  - SG 2A:
    - Throttle 2CCW-112 (ASW to 2A S/G Stop) (U2 East Pen Room)(R-76)
  - SG 2B:
    - Throttle 2CCW-116 (ASW to 2B S/G Stop) (U2 West Pen Room)(W-75)
- For Unit 3
  - SG 3A:
    - Throttle 3CCW-120 (ASW to 3A S/G Stop) (U3 East Pen Room)(R-91)
  - SG 3B:
    - Throttle 3CCW-124 (ASW to 3B S/G Stop) (U3 West Pen Room)(W-90)

Enclosure 1.10 - Post Flood Equipment Inspection

After flood waters have receded and ONS yard is accessible, perform the following:

1. Walkdown fire hose routed along the designated EFM pathway per Figure 1 to verify hoses are intact without leakage.

Figure 1 – EFM Pathway



2. **IF** any fire hose sections are kinked, attempt to straighten hoses to resolve the flow restriction.

3. **IF** any fire hose sections are damaged or leaking, notify the operator at the Hale pump or EFM pump to shutdown pump to allow hose replacement.

4. Retrieve necessary equipment from the EFM trailer that has been staged at the EWST area.

5. Replace any damaged or leaking fire hose.

6. Notify operator at the Hale pump or EFM pump to initiate pump operation to continue OTSG makeup.

Duke Energy Oconee Nuclear Station **Evaluations by Station Management in the TSC - Beyond Design Basis Mitigation Strategies for Jocassee Dam Failure**	Procedure No. **EM 5.3**
	Revision No. **000**
	Electronic Reference No. **OAP000H6**

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Oconee Nuclear Site Engineering Manual

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Revision No.: 0

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0	Original issue

Table of Contents

1.0 Introduction

The purpose of this document is to provide the TSC additional strategies regarding the mitigation of external floods to the site following a catastrophic failure of Jocassee Dam. While this document was written specifically for external flooding of the site following a failure of Jocassee Dam, these strategies can also be applied to other Beyond Design Basis (BDB) events at the discretion of the emergency coordinator. Use of this guidance may require the declaration of 10CFR50.54(x).

2.0 Description of Event

A catastrophic failure of the Jocassee Dam could result in a slow moving wave of water and debris moving south along the main channel of the upper Keowee reservoir. Flooding studies completed in 1992 indicate that the peak wave may impact the Keowee Dam at approximately five hours following the failure of Jocassee Dam. This peak wave could over-top the Keowee Dam, resulting in a breach of this dam. Following the possible failure of Keowee, the tailrace would fill and water would back up into the main Oconee yard inundating the SSF, rendering the facility inoperable. In addition to inundating the SSF, the flood water would also cover the switchyard, resulting in a loss of all offsite power. While there should be some amount of time between the failure of Keowee and inundation of the switchyard and SSF, for the purposes of this document, it is assumed that the inundation of the switchyard and SSF immediately follows the overtopping and failure of Keowee.

The 1992 flooding studies also predict that the flood water will recede ten to eleven hours following the failure of Jocassee, or five to six hours following the failure of Keowee, as described above.

This document describes the actions that should be considered by the TSC following the failure of Jocassee, but before the resulting flood water reaches the Oconee site, those actions that should be considered as the flood waters reach the Oconee site, and those actions that should be considered following the recession of the flood waters.

3.0 Condition A - Jocassee Dam failure has occurred or is Imminent

Note: A Condition B event may precede a Condition A event, therefore some of the following actions may have already been accomplished.

Upon receiving entry conditions into a Condition A event, initiate the actions below:

1. Contact McGuire Nuclear Station and Catawba Nuclear Station to obtain Hale Pump from each site. All 3 sites utilize the Hale FP1500 pump, therefore the McGuire and Catawba Stations pumps will add redundancy to the Oconee Hale Pump.
    a. MNS OSM - 704-875-4266
    b. CNS OSM - 803-701-3250

NOTE: Bridges may be damaged by eventual flooding, consider the need for aerial transportation for equipment needed from off-site resources.

2. Contact Keowee Fire Department via 9-911 to obtain a fire truck for use on site following flooding. Stage fire truck at Elevated Water Storage Tank.
3. Allocate resources to print documents from Section 5.0 - Reference Documents.
4. Secure a supply of diesel fuel for plant recovery equipment and stage at the location established in Enclosure 1.2.
   a. Contact Garage at 4088/4144
   b. Contact any of the following local vendors:
      i. Lowry Oil Company - 9-864-882-2441
      ii. Lindsay Oil Company - 9-864-882-4226
      iii. Acree Oil Company - 9-864-882-7593

NOTE: The Hale Pump will require 350 gallons/day.

5. Secure heavy duty equipment for removal of debris following flooding (skid steer, bulldozer,etc.) and stage at location established in Enclosure 1.2.
6. Perform **Enclosure 1.1 - Prepare RCS for Plant Flood Conditions**
7. Perform **Enclosure 1.2 - Relocation of Equipment to High Ground**
8. Perform **Enclosure 1.3 - Makeup to Chemical Treatment Ponds 1&2**
9. Perform **Enclosure 1.4 - Supplying High Pressure Service Water (HPSW) System with Fire Truck or Hale Portable Pump for OTSG Makeup**
10. Perform **Enclosure 1.5 - Portable Instrumentation**
11. Perform **Enclosure 1.6 - SFP cooling via HPSW/Hale Portable Pump**

NOTE: If sufficient resources are not available, Enclosure 1.6 can be done after flood waters have receded.

12. Assemble Personnel after all actions are completed in one of the following locations to prepare for mitigation after flood waters have receded:
   a. 5th floor Turbine Building (Turbine Deck)
   b. World of Energy
   c. ISFSI

NOTE: The Clemson Operations Center is located across from the intersection of HWY 183 and the CCW Intake Road.

   d. Clemson Operations Center (formerly Geotechnical Center)
   e. 3rd floor or above of the Oconee Office Building

After flood waters have receded, begin plant recovery actions below:

1. Perfrom **Enclosure 1.7 - Relocation of Equipment for Plant Recovery**
2. Perform **Enclosure 1.4 - Supplying High Pressure Service Water (HPSW) System with Fire Truck or Hale Portable Pump for OTSG Makeup**
3. Perform **Enclosure 1.5 - Portable Instrumentation**
4. Perfrom **Enclosure 1.8 - Long term plant recovery strategies**

4.0 Condition B - Potentially Hazardous Flooding Situation is Developing

Upon receiving entry conditions into a Condition B event, initiate the actions below:

1. Contact McGuire Nuclear Station and Catawba Nuclear Station to obtain Hale Pump from each site. All 3 sites utilize the Hale FP1500 pump, therefore the McGuire and Catawba Stations pumps will add redundancy to the Oconee Hale Pump.
   a. MNS OSM - 704-875-4266
   b. CNS OSM - 803-701-3250

NOTE: Bridges may be damaged by eventual flooding, consider the need for aerial transportation for equipment needed from off-site resources.

2. Contact Keowee Fire Department via 9-911 to obtain a fire truck for use on site following flooding. Stage fire truck at Elevated Water Storage Tank.
3. Allocate resources to print documents from Section 5.0 - Reference Documents.
4. Secure a supply of diesel fuel for plant recovery equipment and stage at the location established in Enclosure 1.2.
   a. Contact Garage at 4088/4144
   b. Contact any of the following local vendors:
      i. Lowry Oil Company - 9-864-882-2441
      ii. Lindsay Oil Company - 9-864-882-4226
      iii. Acree Oil Company - 9-864-882-7593

NOTE: The Hale Pump will require 350 gallons/day.

5. Secure heavy duty equipment for removal of debris following flooding (skid steer, bulldozer,etc.) and stage at the location established in Enclosure 1.2
6. Perform **Enclosure 1.2 - Relocation of Equipment to High Ground**
7. Perform **Enclosure 1.3 - Makeup to Chemical Treatment Ponds 1&2**
8. Perform **Enclosure 1.4 - Supplying High Pressure Service Water (HPSW) System with Fire Truck or Hale Portable Pump for OTSG Makeup**

9. Perform **Enclosure 1.5 - Portable Instrumentation**
10. Perform **Enclosure 1.6 - SFP cooling via HPSW/Hale Portable Pump**

NOTE: If sufficient resources are not available, Enclosure 1.6 can be done after flood waters have receded.

11. Assemble Personnel after all actions are completed in one of the following locations to prepare for mitigation after flood waters have receded:
    a. 5th floor Turbine Building (Turbine Deck)
    b. World of Energy
    c. ISFSI

NOTE: The Clemson Operations Center is located across from the intersection of HWY 183 and the CCW Intake Road.

    d. Clemson Operations Center (formerly Geotechnical Center)
    e. 3rd floor or above of the Oconee Office Building

After flood waters have receded, begin plant recovery actions below:

1. Perfrom **Enclosure 1.7 - Relocation of Equipment for Plant Recovery**
2. Perform **Enclosure 1.4 - Supplying High Pressure Service Water (HPSW) System with Fire Truck or Hale Portable Pump for OTSG Makeup**
3. Perform **Enclosure 1.5 - Portable Instrumentation**
4. Perform **Enclosure 1.8 - Long term plant recovery strategies**

5.0 Reference Documents

From RP/0/B/1000/022:

Repair Procedures	
EM/0/A/0050/001	Procedure To Provide Emergency Power To An HPI Pump Motor From The ASW Switchgear
IP/0/A/0050/002	Site Damage Control Procedure
IP/0/A/0050/006	Appendix "R" Motor Operated Valve Cable Verification
MP/0/A/1300/020	Pump - Ingersoll-Rand - High Pressure Injection - Removal And Replacement Of Pump And Motor
MP/0/A/1300/040	Generic - Alignment
MP/0/A/3009/012	Emergency Plan For Replacement Of HPI, LPI, And LPSW Motors Following A Fire In Turbine Building Or Auxiliary Building
MP/0/A/3009/017	Visual PM Inspection And Electrical Motor Tests
MP/0/A/3009/020	B Motor - Electric - Removal, Replacement, And Post Maintenance Testing
MP/0/A/3009/XXX (series)	Various ONS and Keowee Hydro Station Motor Inspection and Maintenance Procedures
Submersible Pump Procedures	
AM/0/A/1300/059	Pump - Submersible - Emergency SSF Water Supply - Installation And Removal
IP/0/A/0050/003	Procedure To Provide Power For SSF Submersible Sump Pump At Intake Structure
Spent Fuel Pool Water Level Recovery	
AM/0/A/3009/012A	Emergency Plan For Refilling Spent Fuel Pools
Operations Controlling Procedures	
AP/0/A/1700/025	Standby Shutdown Facility Emergency Operating Procedure
EP/1/A/1800/001	Emergency Operating Procedure
EP/2/A/1800/001	Emergency Operating Procedure
EP/3/A/1800/001	Emergency Operating Procedure
OP/0/A/1102/024	Plant Assessment And Alignment Following Major Site Damage
OP/0/A/1102/025	Cooldown Following Major Site Damage
OP/0/A/1104/052	SSW System
Chemistry Procedures	
CP/1/A/2002/004 E	Unit One Reactor Coolant Sampling During An Appendix "R" Accident
CP/2/A/2002/004 E	Unit Two Reactor Coolant Sampling During An Appendix "R" Accident
CP/3/A/2002/004 E	Unit Three Reactor Coolant Sampling During An Appendix "R" Accident

6.0 Enclosures

ENCLOSURE 1.1 - PREPARE RCS FOR PLANT FLOOD CONDITIONS
ENCLOSURE 1.2 - RELOCATION OF EQUIPMENT TO HIGH GROUND
ENCLOSURE 1.3 - MAKEUP TO CHEMICAL TREATMENT PONDS 1&2
ENCLOSURE 1.4 - SUPPLYING HIGH PRESSURE SERVICE WATER (HPSW) SYSTEM WITH FIRE TRUCK OR HALE PORTABLE PUMP FOR OTSG MAKEUP
ENCLOSURE 1.5 - PORTABLE INSTRUMENTATION
ENCLOSURE 1.6 - SFP COOLING VIA HPSW/HALE PORTABLE PUMP
ENCLOSURE 1.7 - RELOCATION OF EQUIPMENT FOR PLANT RECOVERY
ENCLOSURE 1.8 - LONG TERM PLANT RECOVERY STRATEGIES
ENCLOSURE 1.9 - HALE PORTABLE PUMP OPERATION
ENCLOSURE 1.10 - HALE PORTABLE PUMP HEAD CURVE
ENCLOSURE 1.11 - JOCASSEE DAM FAILURE FLOOD INUNDATION MAP

Additional Information

	Enclosure/ Reference
HALE PORTABLE PUMP	
Operating Instruction for Hale Portable Pump (Normal Conditions)	OP/0/A/1106/042
Hale Portable Pump Operation	Enclosure 1.9
Prepare RCS for Plant Flood Conditions	Enclosure 1.1
Hale Portable Pump Operating Head Curve	Enclosure 1.10
Hose Pull for EDM Strategies (From pump to staging area)	Drawings 1.4.1,1.4.2,1.4.3
STEAMING OTSG & NATURAL CIRCULATION CONSIDERATIONS	
Operating Atmospheric Dump Valves During an Accident That Requires Operation of The SSF	EM 5.1
Natural Circulation Cooldown Considerations	EM 5.1
Steaming A Steam Generator With Water in The Steam Line	EM 5.1
Manually Depressurizing OTSG	EOP
SPENT FUEL POOL MAKEUP/COOLING SOURCES	
SF Pool Makeup from Hale Portable pump (500 gpm)	AP/1&2,3/1700/035
Spray SF Pool from Hale Portable pump (400 gpm)	AP/1&2,3/1700/035
Makeup to SF Pool from HPSW (500 gpm)	AP/1&2,3/1700/035
Makeup and Monitoring of the SFP and Recovery From a Boiling Condition	EM 5.1
Loss Of Spent Fuel Pool Level (available MU paths to the SF Pool)	EM 5.1
Unit 1&2 SF Pool Hose Pull Strategies	Drawing 1.6.1,1.6.3
Unit 3 SF Pool Hose Pull Strategies	Drawing 1.6.2,1.6.3
Enhanced SFP Air Circulation	EM 5.1
Scrubbing of SFP Environment	EM 5.1
ELEVATED WATER STORAGE TANK (EWST) MAKEUP SOURCES	
Refill The EWST	EM 5.1 & EOP
HPSW procedure	OP/0/A/1104/011
INSTRUMENTATION OPTIONS AFTER A FIRE/EXPLOSION EVENT	
BWST level instrument-Appendix R	IP/0/A/0050/002
Recovery of CETC indication from RB Penetration	Table 1.5.1

Recovery of OTSG level indication from RB Penetration			Table 1.5.1
Recovery of RB Pressure indication from RB Penetration			Table 1.5.1
Appendix R instrument options:			IP/0/A/0050/002
HPI FLOW BWST LEVEL	LPI FLOW RB Level	LPSW Flow to LPI Coolers	

Enclosure 1.1 - Prepare RCS for Plant Flood Conditions

Direct operators on all units to perform the following actions:

1. Immediately dispatch an operator to open the following to unisolate the HPSW header relief valves: (525 Switchyard)
   HPSW-269 (X Spare Shunt Reactor 500KV Swyd Mulsifyer Block)
   HPSW-270 (Y Spare Shunt Reactor 500KV Swyd Mulsifyer Block)
2. Ensure one licensed operator (SRO or RO) for each unit and one NEO are staged in the SSF to maintain communication with the Control Room.
3. Immediately initiate powering the Standby Bus from a dedicated Lee CT per OP/0/A/1107/003 (100KV Power Supply) enclosure (Charging Standby Bus #1 And Bus #2 From Lee Steam Station For Backup Power).

NOTE: Increasing Pressurizer level will require entry into TS 3.4.12 for LTOP concerns. This is necessary to maximize RCS inventory to protect the core.

4. As plant cools down, begin increasing Pressurizer level to 350".
5. If normal power from Switchyard is lost, then perform the following:
   a. Dispatch operators at the Atmospheric Dump Valves for each unit to open ADV block valves and prepare for use of the ADV control valves per EOP Encl 5.24 (Operation of the ADVs).
   b. If RCS > 250°F, then direct ADV operators to throttle ADV control valves to continue RCS cool down to 250°F.
   c. If RCS ≤ 250°F, then direct ADV operators to fully open ADV control valves.
6. If CCW pumps are lost, then perform the following:
   a. Secure all LPSW Pumps (Units 1&2,3).
   b. Depress "Close 1" and "Close 2" on the TURB BLDG FLOOD EMER CLOSING ALL CCWP DISCH VALVES control switch.
7. If Main Feedwater is lost, then ensure available EFDW pumps operating.
8. If the operating RCP trips, then fill the SGs to 388" XSUR.
9. If all feedwater (Main and Emergency) is lost, then perform the following:
   a. Ensure RCPs secured.
   b. Direct operators at SSF to establish SSF ASW to the SGs per Encl 5.34 (Aligning SSF-ASW for SG Feed) of EP/*/A/1800/001.
   c. Direct SSF operator to fill the SGs to 388" XSUR.
10. If HPI pumps are lost, then manually actuate ES Digital Channels 1,2,5, and 6.
11. If the SSF begins to flood, then perform the following:
    a. Dispatch an operator to the East and West Penetration Room of each unit in communication with the Control Room.

NOTE: Fully opening the ADVs may result in a temporary interruption of natural circulation due to shrinkage in the RCS. Natural Circulation will re-establish after RCS inventory reheats.

b. Direct operators at the ADVs to fully open ADVs.

12. If SSF ASW is lost, direct the operators in the penetration rooms to throttle open the following valves as required to maintain SG Level 240 - 388 " XSUR from the HPSW system via Hale Pump/Fire Truck:
    a. Unit 1
        i. 1CCW-104 (Aux Service Water to 1A SG Stop)
        ii. 1CCW-108 (Aux Service Water to 1B SG Stop)
    b. Unit 2
        iii. 2CCW-112 (Aux Service Water to 2A SG Stop)
        iv. 2CCW-116 (Aux Service Water to 2B SG Stop)
    c. Unit 3
        v. 3CCW-120 (Aux Service Water to 3A SG Stop)
        vi. 3CCW-124 (Aux Service Water to 3B SG Stop)
13. Long term RCS decay heat removal considerations:
    a. Maintain RCS temperature < 260°F to maintain integrity of RCP seals
    b. Rate of RCS natural circulation flow will decrease over time (RCS natural circulation decay heat removal transport time will increase over time)
    c. RCS pressure will slowly decrease as pressurizer cools off. RC pressure will stabilize when Pzr becomes water solid.
    a. Monitor CETC temperature, RCS pressure, OTSG level, and RCS Subcooling Margin

Enclosure 1.2 - Relocation of Equipment to High Ground

NOTE: Coordinate relocation activities with Security.

1. Determine location for staging of safe shutdown equipment above maximum flood level to one of the following locations listed in order of preference:
   a. ISFSI yard
   b. Clemson Operations Center (formerly Geotechnical Center)
   c. World of Energy
2. Relocate the following safe shutdown equipment to the location selected in step
   a. Appendix R equipment (refer to enclosures 4.12 and 4.13 of RP/0/B/1000/022 for storage location of equipment)
   b. Mobile crane
   c. Diesel fuel truck (if available)
   d. Tools required for removal and installation of Appendix R pump motors, cables, valve control panels, etc.
   e. Heavy equipment that may be needed to remove debris between staging area and TB/AB (if available).
3. Relocate the following safe shutdown equipment to the Elevated Water Storage Tank:
   a. Hale pump and EDM trailer.

Enclosure 1.3 - Makeup to Chemical Treatment Ponds 1&2

Caution: Both of the following fire hydrants will become submerged during flooding.

NOTE: FPS-HY-0040 must be isolated before it becomes submerged to reduce demand on HPSW system while the site is flooded.

NOTE: Ensure fire hose is secure to prevent whipping during makeup to CTP 1.

1. Connect 5 inch fire hose to FPS-HY-0040 (located East of CTP 1 in the bus loop) and route hose to CTP 1 for makeup to provide stored water inventory for use after flood waters have receded. (Water source - HPSW)
2. A municipal water supplied fire hydrant is located on Hwy 183 approximately 1/4 mile from the World of Energy entrance toward Walhalla and Salem. If needed, connect 5 inch hose and route to CTP 1 for makeup to provide stored water inventory for use after flood waters have receded. (Source – Municipal Water)

Enclosure 1.4 - Supplying High Pressure Service Water (HPSW) System with Fire Truck or Hale Portable Pump for OTSG Makeup

NOTE: The following equipment will be utilized in this enclosure:

0CCW-309 - ASW Pump Discharge Drain - AB, RM 128 (ELEV. 771)

2CCW-516 - ASW Emergency Connection - AB ELEV.783+06 COL. S76 (CC Cooler Rm)

FPS-HY-0025 - Fire Hydrant #25 - 4' East of Base of EWST

FPS-HY-0036 - Fire Hydrant #36 - West side of Unit 2 BWST

1. Introduction
    a. The purpose of this enclosure is to supply water from a fire truck or the Hale Portable Pump to the HPSW System for OTSG makeup.
    b. The HPSW system, in turn, will supply water to the OTSGs via the Station Auxiliary Service Water System.
    c. This enclosure must be completed before the flood waters arrive.
    d. Both the fire truck and the Hale Portable Pump will be staged at the Elevated Water Storage Tank (EWST). The pump not used to supply the HPSW System will be available for relocation to an alternate water source once the flood waters have receded.
    e. Located in the EDM trailer is the following equipment needed to support this strategy:
        i. Tools and door stops
        ii. 2CCW-516 thread to Storz connection
        iii. 5 inch fire hose
        iv. 3 inch fire hose
        v. Fire hydrant thread to Storz connection
    f. Located in Unit 1&2,3 Spent Fuel Pool Change Room is the following equipment that can be used to support this strategy:
        i. 3 inch fire hose
        ii. (2) 2.5" X 2.5" X 5" Wye
2. Actions
    a. Notify Maintenance to layout a 5" hose from the fire truck or Hale Portable Pump to FPS-HY-0025 located at the EWST. (Ref. Drawing 1.4.3)
    b. Notify Operations to close 0CCW-309

c. Notify Operations to route a 5" from FPS-HY-0036 to the ASW system (2CCW-516) by routing to the affected Unit by utilizing Drawing 1.4.1 (Hose Pull for OTSG makeup from Hale Portable Pump or FPS-HY-0036).

d. Attach hose connection on 2CCW-516.

e. Open 2CCW-516 and FPS-HY-0036.

   i. The HPSW System is now available to supply the SGs via the EWST and the station ASW System.

f. Layout the suction hose from the fire truck or Hale Portable Pump into the flood waters.

g. Open FPS-HY-0025 and start the pump located on the fire truck or start the Hale Portable Pump.

   i. If the Hale Portable Pump is used, start the pump per Enclosure 1.9

   ii. The HPSW System is now being supplied by the fire truck or Hale Portable Pump.

h. Relocate the pump on the EWST access road as required to compensate for changes in elevation of the flood waters.

i. When the flood waters have receded:

   i. Secure the pump in operation

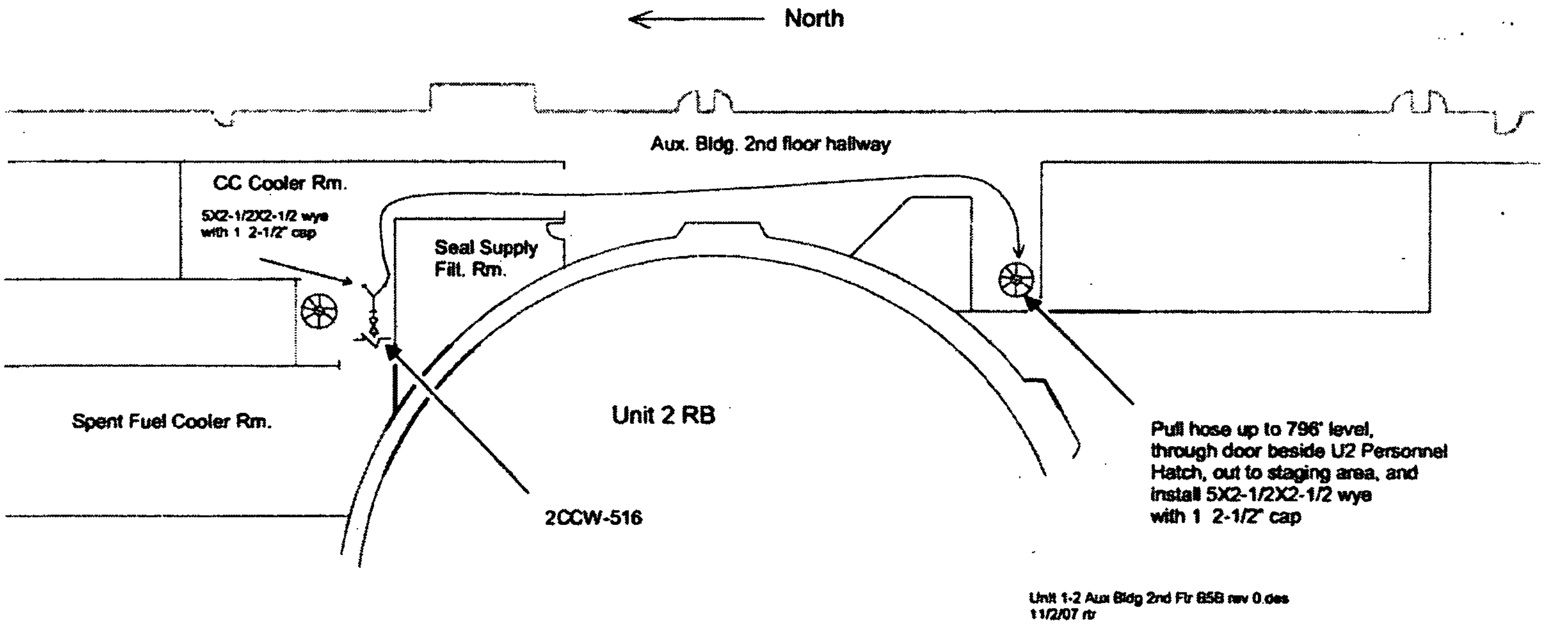
   ii. Close FPS-HY-0025

   iii. Disconnect the hose between the fire hydrant and the pump.

j. Relocate the fire truck and/or the Hale Portable Pump to alternate sources of water (see Enclosure 1.7).

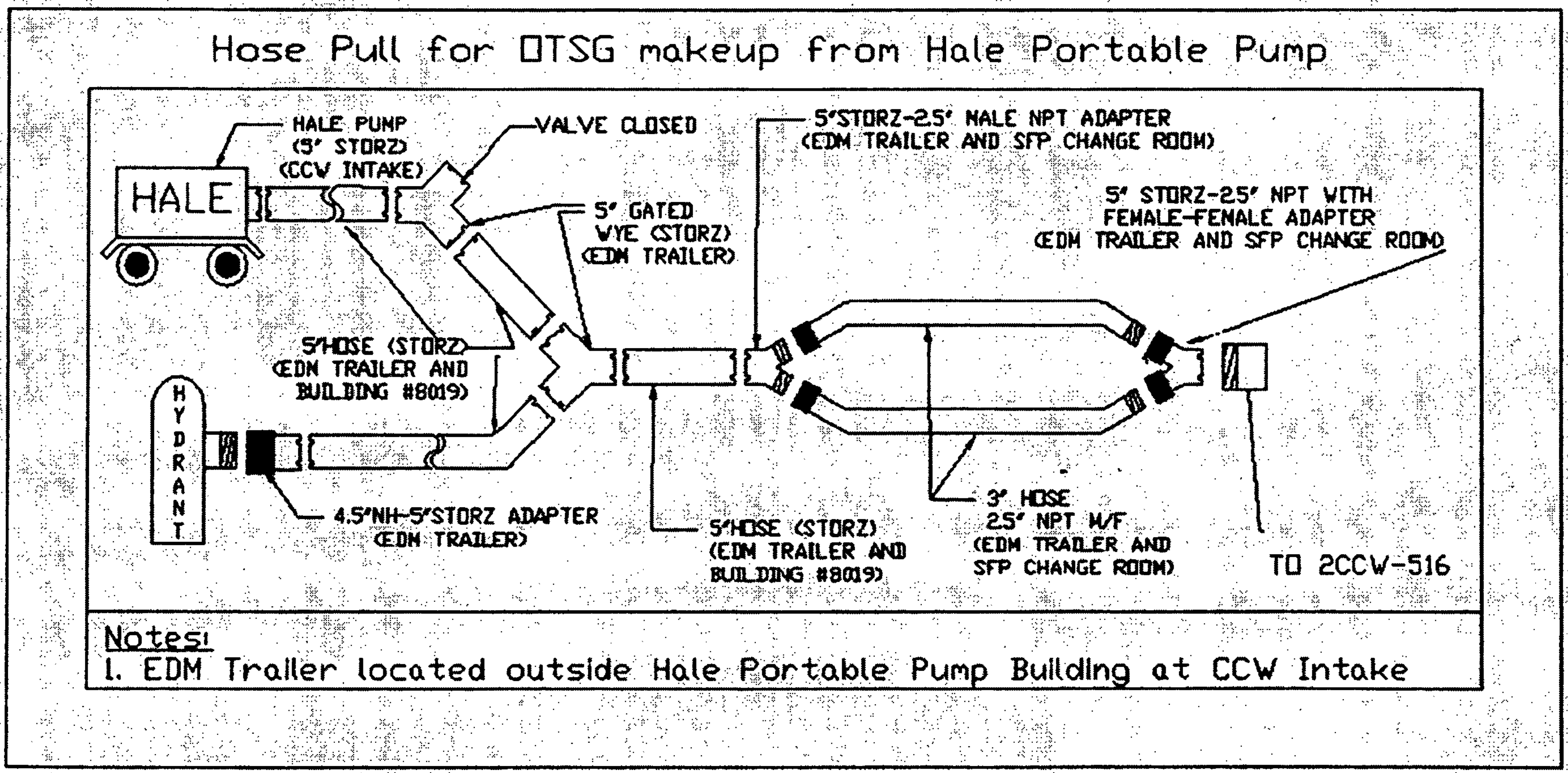
NOTE: While equipment is relocated to alternate sources of water, the EWST will provide OTSG makeup for 3.5 hours.

Drawing 1.4.1
Hose Pull for OTSG makeup from Hale Portable Pump or FPS-HY-0036

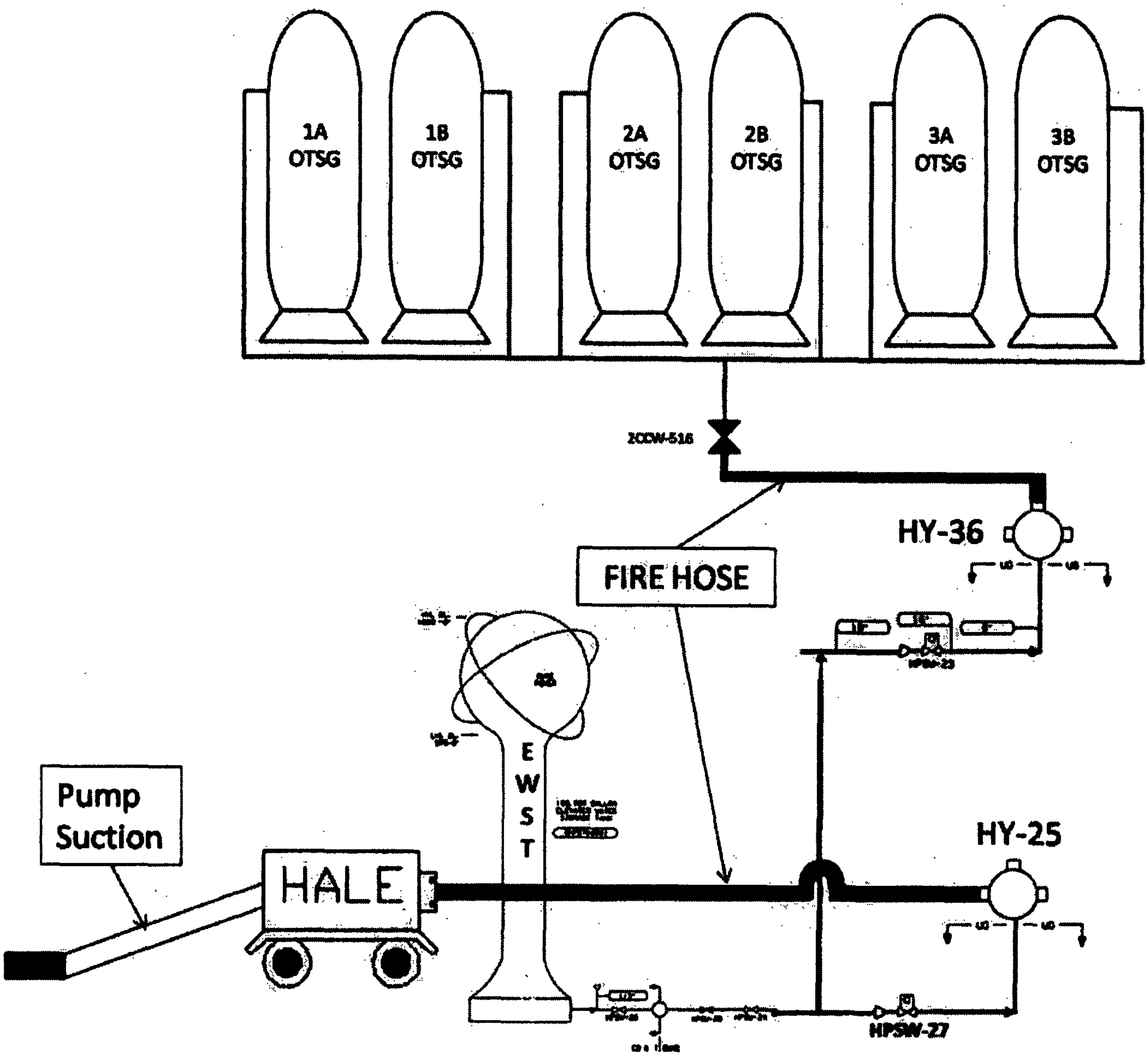


Drawing 1.4.2

Hose Pull for OTSG makeup from Hale Portable Pump



Drawing 1.4.3
Simplified Flow Diagram for OTSG Makeup During Flooding



Enclosure 1.5 - Portable Instrumentation

Portable test equipment will be used to connect to the identified points in this table in order to obtain data that can be used to determine the following process parameters: Core Exit Thermocouples (CETC), Once Through Steam Generator (OTSG) Level, and Reactor Coolant System (RCS) Pressure.

For the CETC measurement, connect a standard Digital Multimeter (DMM) on the mvdc scale to the +/- termination points in the identified electrical penetration. The measured millivolt value can then be compared to the Type K thermocouple Table to determine the corresponding temperature in degrees F. Typical DMMs currently in use on the Duke NGD system are Fluke 45, Fluke 189, Agilent 34401A.

For all of the remaining applications which utilize a 4-20 madc two-wire transmitter as the process sensor, connect a stand alone 24 vdc power supply capable of driving a minimum of 500 ohms and a DMM on the madc scale in series with the identified +/- termination points. The measured madc value can then be compared to the referenced procedure enclosure or table (page 10 of 10) to determine the corresponding process value. Various manufacturer and model number 24 vdc power supplies are in use on the Duke NGD system. It should be noted that some of these supplies do require an external 120 vac source for operation. Typical DMMs currently in use are identified above. If available, a multifunction calibrator such as the Fluke 744 could be used to provide the 24 vdc power and the 4-20 madc measurement in one portable device.

**Table 1.5.1, Instrumentation Options After a Jocassee Dam Failure Event
Jocassee Dam Failure Test Instrumentation Information
Page 1 of 10**

PARAMETER	INSTRUMENT NUMBER	TEST EQUIPMENT CONNECTION POINT	TEST EQUIPMENT CONNECTION POINT	TEST EQUIPMENT CONNECTION POINT	MEASURED UNITS	CONVERSION REFERENCE	REFERENCE DRAWINGS	REFERENCE DRAWINGS
CETC	1IITE1602	EF - 4	TB4B	10+ & 11-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-794-A	O-767-A-66
CETC	1IITE1605	EF - 4	TB4B	7+ & 8-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-794-A	O-767-A-66
CETC	1IITE1606	EF - 4	TB4B	4+ & 5-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-794-A	O-767-A-66
CETC	1IITE1607	EF - 2	TB4B	10+ & 11-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-794-D	O-767-A-65
CETC	1IITE1608	EF - 2	TB4B	7+ & 8-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-794-D	O-767-A-65
CETC	1IITE1609	EF - 4	TB4B	1+ & 2-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-794-A	O-767-A-66
CETC	1IITE1611	EF - 2	TB4B	4+ & 5-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-794-D	O-767-A-65
CETC	1IITE1612	EF - 2	TB4B	1+ & 2-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-794-D	O-767-A-65
CETC	1IITE1613	EF - 4	TB5B	10+ & 11-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-794-A	O-767-A-66
CETC	1IITE1616	EF - 2	TB5B	10+ & 11-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-794-D	O-767-A-65
CETC	1IITE1619	EF - 4	TB5B	7+ & 8-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-794-A	O-767-A-66
CETC	1IITE1623	EF - 4	TB5B	4+ & 5-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-794-A	O-767-A-66
CETC	1IITE1624	EF - 2	TB5B	7+ & 8-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-794-D	O-767-A-65
CETC	1IITE1625	EF - 2	TB5B	4+ & 5-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-794-D	O-767-A-65
CETC	1IITE1628	EF - 2	TB5B	1+ & 2-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-794-D	O-767-A-65
CETC	1IITE1631	EF - 2	TB6B	10+ & 11-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-794-D	O-767-A-65

Table 1.5.1, Instrumentation Options After a Jocassee Dam Failure Event
Jocassee Dam Failure Test Instrumentation Information
Page 2 of 10

CETC	1IITE1632	EF - 4	TB5B	1+ & 2-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-794-A	O-767-A-66
CETC	1IITE1635	EF - 2	TB6B	7+ & 8-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-794-D	O-767-A-65
CETC	1IITE1636	EF - 4	TB6B	10+ & 11-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-794-A	O-767-A-66
CETC	1IITE1639	EF - 4	TB6B	7+ & 8-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-794-A	O-767-A-66
CETC	1IITE1642	EF - 4	TB6B	4+ & 5-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-794-A	O-767-A-66
CETC	1IITE1643	EF - 2	TB6B	4+ & 5-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-794-D	O-767-A-65
CETC	1IITE1647	EF - 4	TB6B	1+ & 2-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-794-A	O-767-A-66
CETC	1IITE1650	EF - 2	TB6B	1+ & 2-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-794-D	O-767-A-65
CETC	2IITE1602	EF - 4	TB4B	10+ & 11-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-1794-A	O-1767-A-66
CETC	2IITE1605	EF - 4	TB4B	7+ & 8-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-1794-A	O-1767-A-66
CETC	2IITE1606	EF - 4	TB4B	4+ & 5-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-1794-A	O-1767-A-66
CETC	2IITE1607	EF - 2	TB4B	10+ & 11-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-1794-D	O-1767-A-67
CETC	2IITE1608	EF - 2	TB4B	7+ & 8-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-1794-D	O-1767-A-67
CETC	2IITE1609	EF - 4	TB4B	1+ & 2-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-1794-A	O-1767-A-66
CETC	2IITE1611	EF - 2	TB4B	4+ & 5-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-1794-D	O-1767-A-67
CETC	2IITE1612	EF - 2	TB4B	1+ & 2-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-1794-D	O-1767-A-67
CETC	2IITE1613	EF - 4	TB5B	10+ & 11-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-1794-A	O-1767-A-66
CETC	2IITE1616	EF - 2	TB5B	10+ & 11-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-1794-D	O-1767-A-67
CETC	2IITE1619	EF - 4	TB5B	7+ & 8-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-1794-A	O-1767-A-66

Table 1.5.1, Instrumentation Options After a Jocassee Dam Failure Event
Jocassee Dam Failure Test Instrumentation Information

CETC	2IITE1623	EF - 4	TB5B	4+ & 5-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-1794-A	O-1767-A-66
CETC	2IITE1624	EF - 2	TB5B	7+ & 8-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-1794-D	O-1767-A-67
CETC	2IITE1625	EF - 2	TB5B	4+ & 5-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-1794-D	O-1767-A-67
CETC	2IITE1628	EF - 2	TB5B	1+ & 2-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-1794-D	O-1767-A-67
CETC	2IITE1631	EF - 2	TB6B	10+ & 11-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-1794-D	O-1767-A-67
CETC	2IITE1632	EF - 4	TB5B	1+ & 2-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-1794-A	O-1767-A-66
CETC	2IITE1635	EF - 2	TB6B	7+ & 8-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-1794-D	O-1767-A-67
CETC	2IITE1636	EF - 4	TB6B	10+ & 11-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-1794-A	O-1767-A-66
CETC	2IITE1639	EF - 4	TB6B	7+ & 8-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-1794-A	O-1767-A-66
CETC	2IITE1642	EF - 4	TB6B	4+ & 5-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-1794-A	O-1767-A-66
CETC	2IITE1643	EF - 2	TB6B	4+ & 5-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-1794-D	O-1767-A-67
CETC	2IITE1647	EF - 4	TB6B	1+ & 2-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-1794-A	O-1767-A-66
CETC	2IITE1650	EF - 2	TB6B	1+ & 2-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-1794-D	O-1767-A-67
CETC	3IITE1602	EF - 4	TB4B	10+ & 11-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-2974-A	O-2767-A-68
CETC	3IITE1605	EF - 4	TB4B	7+ & 8-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-2974-A	O-2767-A-68
CETC	3IITE1606	EF - 4	TB4B	4+ & 5-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-2974-A	O-2767-A-68
CETC	3IITE1607	EF - 3	TB4B	10+ & 11-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-2974-D	O-2767-A-69
CETC	3IITE1608	EF - 3	TB4B	7+ & 8-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-2974-D	O-2767-A-69
CETC	3IITE1609	EF - 4	TB4B	1+ & 2-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-2974-A	O-2767-A-68

Table 1.5.1, Instrumentation Options After a Jocassee Dam Failure Event
Jocassee Dam Failure Test Instrumentation Information
Page 4 of 10

CETC	3IITE1611	EF - 3	TB4B	4+ & 5-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-2974-D	O-2767-A-69
CETC	3IITE1612	EF - 3	TB4B	1+ & 2-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-2974-D	O-2767-A-69
CETC	3IITE1613	EF - 4	TB5B	10+ & 11-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-2974-A	O-2767-A-68
CETC	3IITE1616	EF - 3	TB5B	10+ & 11-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-2974-D	O-2767-A-69
CETC	3IITE1619	EF - 4	TB5B	7+ & 8-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-2974-A	O-2767-A-68
CETC	3IITE1623	EF - 4	TB5B	4+ & 5-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-2974-A	O-2767-A-68
CETC	3IITE1624	EF - 3	TB5B	7+ & 8-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-2974-D	O-2767-A-69
CETC	3IITE1625	EF - 3	TB5B	4+ & 5-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-2974-D	O-2767-A-69
CETC	3IITE1628	EF - 3	TB5B	1+ & 2-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-2974-D	O-2767-A-69
CETC	3IITE1631	EF - 3	TB6B	10+ & 11-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-2974-D	O-2767-A-69
CETC	3IITE1632	EF - 4	TB5B	1+ & 2-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-2974-A	O-2767-A-68
CETC	3IITE1635	EF - 3	TB6B	7+ & 8-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-2974-D	O-2767-A-69
CETC	3IITE1636	EF - 4	TB6B	10+ & 11-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-2974-A	O-2767-A-68
CETC	3IITE1639	EF - 4	TB6B	7+ & 8-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-2974-A	O-2767-A-68
CETC	3IITE1642	EF - 4	TB6B	4+ & 5-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-2974-A	O-2767-A-68
CETC	3IITE1643	EF - 3	TB6B	4+ & 5-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-2974-D	O-2767-A-69
CETC	3IITE1647	EF - 4	TB6B	1+ & 2-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-2974-A	O-2767-A-68
CETC	3IITE1650	EF - 3	TB6B	1+ & 2-	0.397 to 51.000 mv = 50 to 2300 F	Type K Thermocouple Table	O-2974-D	O-2767-A-69

Table 1.5.1, Instrumentation Options After a Jocassee Dam Failure Event
Jocassee Dam Failure Test Instrumentation Information
Page 5 of 10

OTSG Level	1FDWLT0080	EC - 4		18A+ & 18B-	4 to 20 madc = 0 to 388 inches	IP/0/A/0275/019A Enclosure 11.3.2	O-785-F	O-767-A-21
OTSG Level	1FDWLT0081	EC - 4		18D+ & 18E-	4 to 20 madc = 0 to 388 inches	IP/0/A/0275/019A Enclosure 11.3.5	O-785-F	O-767-A-21
OTSG Level	1FDWLT0082	WA13		10-20+ & 10-21-	4 to 20 madc = 0 to 388 inches	IP/0/A/0275/019A Enclosure 11.3.4	O-785-F	O-767-A-22
OTSG Level	1FDWLT0083	WA13		10-23+ & 10-24-	4 to 20 madc = 0 to 388 inches	IP/0/A/0275/019A Enclosure 11.3.7	O-785-F	O-767-A-22
OTSG Level	2FDWLT0080	EA13		12D+ & 12E-	4 to 20 madc = 0 to 388 inches	IP/0/A/0275/019A Enclosure 11.3.3	O-1785-F	O-1767-A-20
OTSG Level	2FDWLT0081	EA13		12A+ & 12B-	4 to 20 madc = 0 to 388 inches	IP/0/A/0275/019A Enclosure 11.3.6	O-1785-F	O-1767-A-20
OTSG Level	2FDWLT0082	WA1		10-20+ & 10-21-	4 to 20 madc = 0 to 388 inches	IP/0/A/0275/019A Enclosure 11.3.4	O-1785-F	O-1767-A-21
OTSG Level	2FDWLT0083	WA1		10-23+ & 10-24-	4 to 20 madc = 0 to 388 inches	IP/0/A/0275/019A Enclosure 11.3.7	O-1785-F	O-1767-A-21
OTSG Level	3FDWLT0080	EA13		12D+ & 12E-	4 to 20 madc = 0 to 388 inches	IP/0/A/0275/019A Enclosure 11.3.2	O-2785-F	O-2767-A-20
OTSG Level	3FDWLT0081	EA13		12A+ & 12B-	4 to 20 madc = 0 to 388 inches	IP/0/A/0275/019A Enclosure 11.3.5	O-2785-F	O-2767-A-20
OTSG Level	3FDWLT0082	WA1		10-19+ & 10-20-	4 to 20 madc = 0 to 388 inches	IP/0/A/0275/019A Enclosure 11.3.4	O-2785-F	O-2767-A-21
OTSG Level	3FDWLT0083	WA1		10-22+ & 10-23-	4 to 20 madc = 0 to 388 inches	IP/0/A/0275/019A Enclosure 11.3.7	O-2785-F	O-2767-A-21

Table 1.5.1, Instrumentation Options After a Jocassee Dam Failure Event
Jocassee Dam Failure Test Instrumentation Information
Page 6 of 10

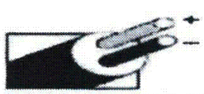
RCS Pressure	1RCPT0021P	EA13		12B+ & 12A-	4 to 20 madc = 0 to 2500 psig	IP/0/A/0310/003B Enclosure 11.3.1	O-720-A	O-767-A-20
RCS Pressure	1RCPT0022P	WA13		10-34+ & 10-35-	4 to 20 madc = 0 to 2500 psig	IP/0/A/0310/005B Enclosure 11.2.1	O-720-A	O-767-A-22
RCS Pressure	1RCPT0023P	EC4		11E+ & 11D-	4 to 20 madc = 0 to 2500 psig	IP/0/A/0310/004B Enclosure 11.2.1	O-720-A	O-767-A-21
RCS Pressure	2RCPT0021P	EC4		11B+ & 11A-	4 to 20 madc = 0 to 2500 psig	IP/0/A/0310/003B Enclosure 11.3.2	O-1720-A	O-1767-A-21
RCS Pressure	2RCPT0022P	WA1		10-34+ & 10-35-	4 to 20 madc = 0 to 2500 psig	IP/0/A/0310/005B Enclosure 11.2.2	O-1720-A	O-1767-A-21
RCS Pressure	2RCPT0023P	EA13		18A+ & 18B-	4 to 20 madc = 0 to 2500 psig	IP/0/A/0310/004B Enclosure 11.2.2	O-1720-A	O-1767-A-20
RCS Pressure	3RCPT0021P	EC4		11B+ & 11A-	4 to 20 madc = 0 to 2500 psig	IP/0/A/0310/003B Enclosure 11.3.3	O-2720-A	O-2767-A-21
RCS Pressure	3RCPT0022P	WA1		10-35+ & 10-34-	4 to 20 madc = 0 to 2500 psig	IP/0/A/0310/005B Enclosure 11.2.3	O-2720-A	O-2767-A-21
RCS Pressure	3RCPT0023P	EA13		18B+ & 18A-	4 to 20 madc = 0 to 2500 psig	IP/0/A/0310/004B Enclosure 11.2.3	O-2720-A	O-2767-A-20

Table 1.5.1, Instrumentation Options After a Jocassee Dam Failure Event
Jocassee Dam Failure Test Instrumentation Information
Page 7 of 10

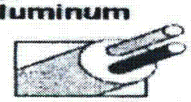
PENETRATION	ELEVATION		PENETRATION	ELEVATION
1-EF2	812		1-EC4	824
1-EF4	812		2-EC4	824
2-EF2	812		3-EC4	824
2-EF4	812		1WA-13	833
3-EF3	812		2WA-1	833
3-EF4	812		3WA-1	833
1EA-13	832			
2EA-13	832			
3EA-13	832			
PREPARED BY: Marshall Lynn				
REVIEWED BY: Eddie Welch				

Table 1.5.1, Instrumentation Options After a Jocassee Dam Failure Event
Jocassee Dam Failure Test Instrumentation Information
Page 8 of 10

MAXIMUM TEMPERATURE RANGE
Thermocouple Grade
– 328 to 2282°F
– 200 to 1250°C
Extension Grade
32 to 392°F
0 to 200°C
LIMITS OF ERROR
(whichever is greater)
Standard: 2.2°C or 0.75% Above 0°C
2.2°C or 2.0% Below 0°C
Special: 1.1°C or 0.4%
COMMENTS, BARE WIRE ENVIRONMENT:
Clean Oxidizing and Inert; Limited Use in Vacuum or Reducing; Wide Temperature Range; Most Popular Calibration
TEMPERATURE IN DEGREES °F
REFERENCE JUNCTION AT 32°F



Nickel-Chromium vs. Nickel-Aluminum



Revised Thermocouple Reference Tables

TYPE K
Reference Tables
N.I.S.T.
Monograph 175
Revised to
ITS-90

Thermoelectric Voltage in Millivolts

°F	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	°F
-450							-6.458	-6.457	-6.457	-6.456	-6.456	-450
-440	-6.458	-6.455	-6.454	-6.454	-6.453	-6.452	-6.451	-6.450	-6.449	-6.448	-6.446	-440
-430	-6.446	-6.445	-6.444	-6.443	-6.441	-6.440	-6.438	-6.436	-6.435	-6.433	-6.431	-430
-420	-6.431	-6.429	-6.427	-6.426	-6.423	-6.421	-6.419	-6.416	-6.414	-6.411	-6.409	-420
-410	-6.409	-6.406	-6.404	-6.401	-6.398	-6.395	-6.392	-6.389	-6.386	-6.383	-6.380	-410
-400	-6.380	-6.377	-6.373	-6.370	-6.366	-6.363	-6.359	-6.355	-6.352	-6.348	-6.344	-400
-390	-6.344	-6.340	-6.336	-6.332	-6.328	-6.323	-6.319	-6.315	-6.310	-6.306	-6.301	-390
-380	-6.301	-6.296	-6.292	-6.287	-6.282	-6.277	-6.272	-6.267	-6.262	-6.257	-6.251	-380
-370	-6.251	-6.246	-6.241	-6.236	-6.230	-6.224	-6.219	-6.213	-6.207	-6.201	-6.195	-370
-360	-6.195	-6.189	-6.183	-6.177	-6.171	-6.165	-6.158	-6.152	-6.146	-6.139	-6.133	-360
-350	-6.133	-6.126	-6.119	-6.113	-6.106	-6.099	-6.092	-6.085	-6.079	-6.071	-6.064	-350
-340	-6.064	-6.057	-6.049	-6.042	-6.035	-6.027	-6.020	-6.012	-6.004	-5.997	-5.989	-340
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°F	0	1	2	3	4	5	6	7	8	9	10	°F

°F	0	1	2	3	4	5	6	7	8	9	10	°F
100	1.521	1.543	1.566	1.589	1.612	1.635	1.657	1.680	1.703	1.726	1.749	100
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
°F	0	1	2	3	4	5	6	7	8	9	10	°F

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Table 1.5.1, Instrumentation Options After a Jocassee Dam Failure Event
Jocassee Dam Failure Test Instrumentation Information
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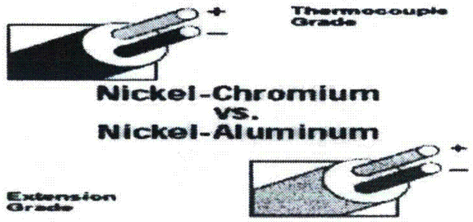
Revised Thermocouple Reference Tables

TYPE K

Reference Tables N.I.S.T. Monograph 175 Revised to ITS-90



Nickel-Chromium vs. Nickel-Aluminum

MAXIMUM TEMPERATURE RANGE
Thermocouple Grade
– 328 to 2282°F
– 200 to 1250°C
Extension Grade
32 to 392°F
0 to 200°C
LIMITS OF ERROR
(whichever is greater)
Standard: 2.2°C or 0.75% Above 0°C
2.2°C or 2.0% Below 0°C
Special: 1.1°C or 0.4%
COMMENTS, BARE WIRE ENVIRONMENT:
Clean Oxidizing and Inert; Limited Use in Vacuum or Reducing; Wide Temperature Range; Most Popular Calibration.
TEMPERATURE IN DEGREES °F
REFERENCE JUNCTION AT 32°F

Thermoelectric Voltage in Millivolts

°F	0	1	2	3	4	5	6	7	8	9	10	°F
700	15.179	15.203	15.226	15.250	15.273	15.296	15.320	15.343	15.366	15.390	15.413	700
710	15.413	15.437	15.460	15.483	15.507	15.530	15.554	15.577	15.600	15.624	15.647	710
720	15.647	15.671	15.694	15.717	15.741	15.764	15.788	15.811	15.834	15.858	15.881	720
730	15.881	15.905	15.929	15.952	15.975	15.999	16.022	16.045	16.069	16.092	16.116	730
740	16.116	16.139	16.163	16.186	16.209	16.233	16.256	16.280	16.303	16.327	16.350	740
750	16.350	16.374	16.397	16.421	16.444	16.468	16.491	16.514	16.538	16.561	16.585	750
760	16.585	16.608	16.632	16.656	16.679	16.702	16.726	16.749	16.773	16.796	16.820	760
770	16.820	16.843	16.867	16.890	16.914	16.937	16.961	16.984	17.008	17.031	17.055	770
780	17.055	17.078	17.102	17.125	17.149	17.172	17.196	17.220	17.243	17.267	17.290	780
790	17.290	17.314	17.337	17.361	17.384	17.408	17.431	17.455	17.478	17.502	17.526	790
800	17.526	17.549	17.573	17.596	17.620	17.643	17.667	17.690	17.714	17.738	17.761	800
810	17.761	17.785	17.808	17.832	17.856	17.879	17.902	17.926	17.950	17.973	17.997	810
820	17.997	18.020	18.044	18.068	18.091	18.115	18.138	18.162	18.185	18.209	18.233	820
830	18.233	18.256	18.280	18.303	18.327	18.351	18.374	18.398	18.421	18.445	18.469	830
840	18.469	18.492	18.516	18.539	18.563	18.587	18.610	18.634	18.657	18.681	18.705	840
850	18.705	18.728	18.752	18.776	18.799	18.823	18.846	18.870	18.894	18.917	18.941	850
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
°F	0	1	2	3	4	5	6	7	8	9	10	°F

°F	0	1	2	3	4	5	6	7	8	9	10	°F
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
°F	0	1	2	3	4	5	6	7	8	9	10	°F

Z-219

Table 1.5.1, Instrumentation Options After a Jocassee Dam Failure Event
Jocassee Dam Failure Test Instrumentation Information
Page 10 of 10

MAXIMUM TEMPERATURE RANGE
Thermocouple Grade
– 328 to 2282°F
– 200 to 1350°C
Extension Grade
32 to 392°F
0 to 200°C
LIMITS OF ERROR
(whichever is greater)
Standard: 2.2°C or 0.75% Above 0°C
2.2°C or 2.0% Below 0°C
Special: 1.1°C or 0.4%
COMMENTS, BARE WIRE ENVIRONMENT:
Clean Oxidizing and Inert; Limited Use in Vacuum or Reducing; Wide Temperature Range; Most Popular Calibration
TEMPERATURE IN DEGREES °F
REFERENCE JUNCTION AT 32°F

Thermocouple Grade

Nickel-Chromium vs. Nickel-Aluminum

Extension Grade

Revised Thermocouple Reference Tables

TYPE K

Reference Tables
N.I.S.T. Monograph 175
Revised to ITS-90

Thermoelectric Voltage in Millivolts

°F	0	1	2	3	4	5	6	7	8	9	10	°F
1900	42.741	42.762	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1900
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°F	0	1	2	3	4	5	6	7	8	9	10	°F

°F	0	1	2	3	4	5	6	7	8	9	10	°F
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2470	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2470
2480	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2480
2490	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2490
2500	54.856	54.875	54.894									2500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

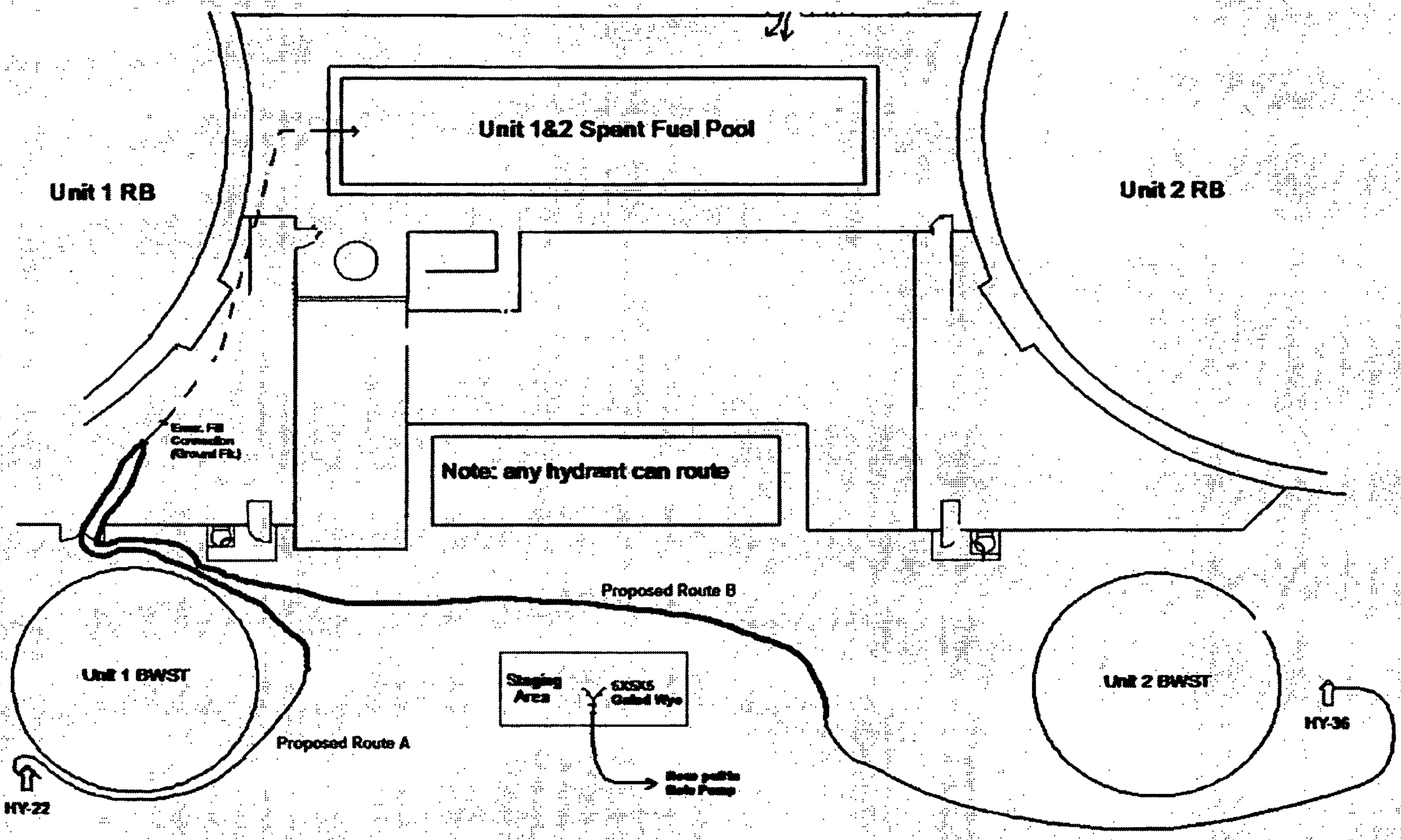
Enclosure 1.6 - SFP cooling via HPSW/Hale Portable Pump

NOTE:	**Volume Vs. Level for SFP's**
	Unit 1&2 = 1512 gal/0.1 foot
	Unit 3 = 1041 gal/0.1 foot

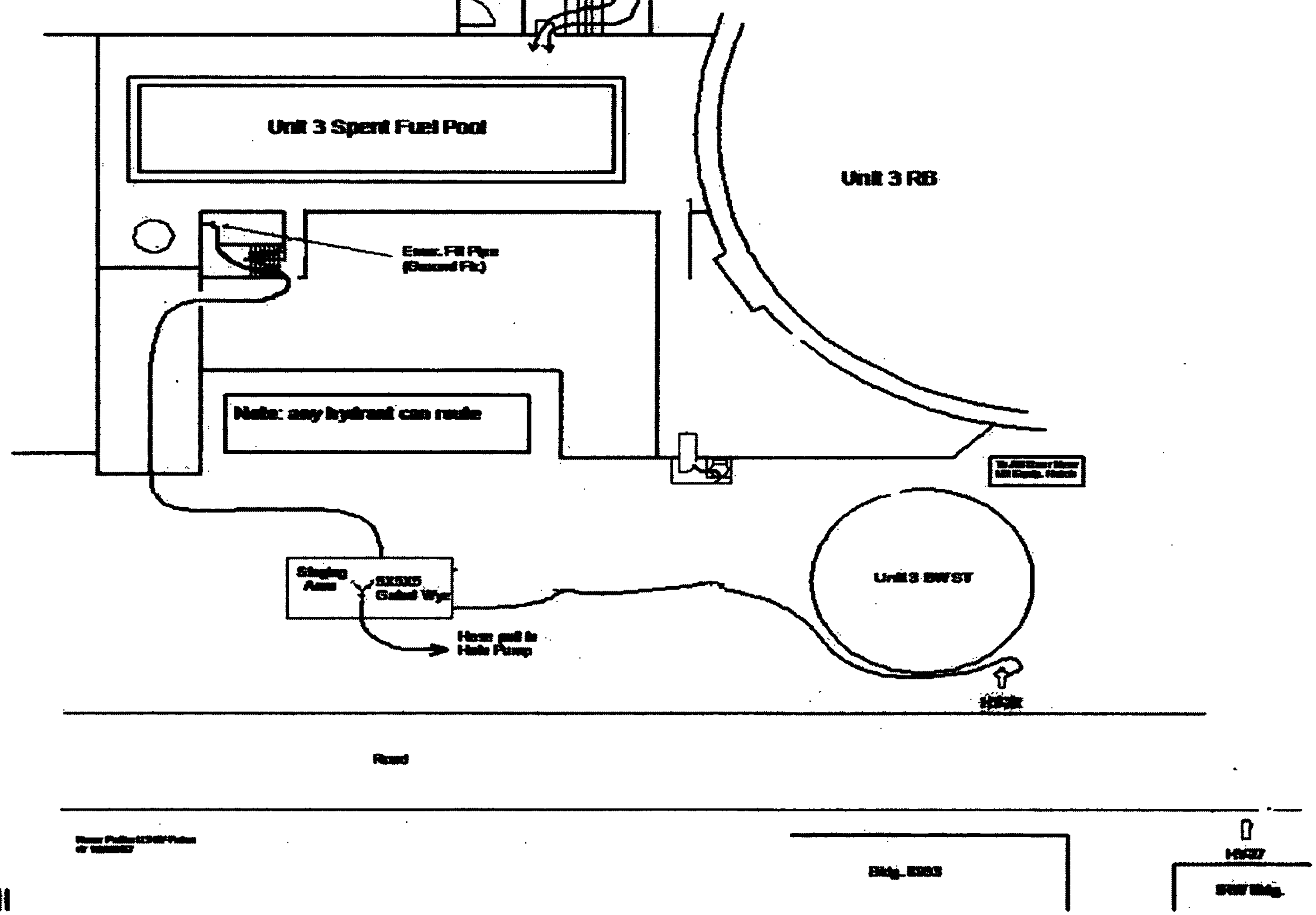
Per analysis in OSC-619, SFP boiling should not occur before 72 hours into a loss of Spent Fuel Cooling event. Therefore, this enclosure addresses long term cooling of the SFP.

1. Route Hoses from the closest fire hydrant in the yard to the SFP emergency makeup pipe flange per drawing 1.6.1
2. Connect Hoses to the SFP emergency flange makeup pipe flange (located in the Unit 1&2 and Unit 3 Cask Decon room) with flange adapters and bolts located in the EDM trailer (reference Drawing 1.6.3).
3. Open hydrants as needed to makeup to Spent Fuel Pools.
4. Evaluate need to monitor SFP level based on makeup rate to ensure SFP's do not overflow.
5. If SFP overflows, secure makeup and drop gate at CTP 3 if possible.

Drawing 1.6.1 – Unit 1&2 SFP Makeup Connection Hose Pull

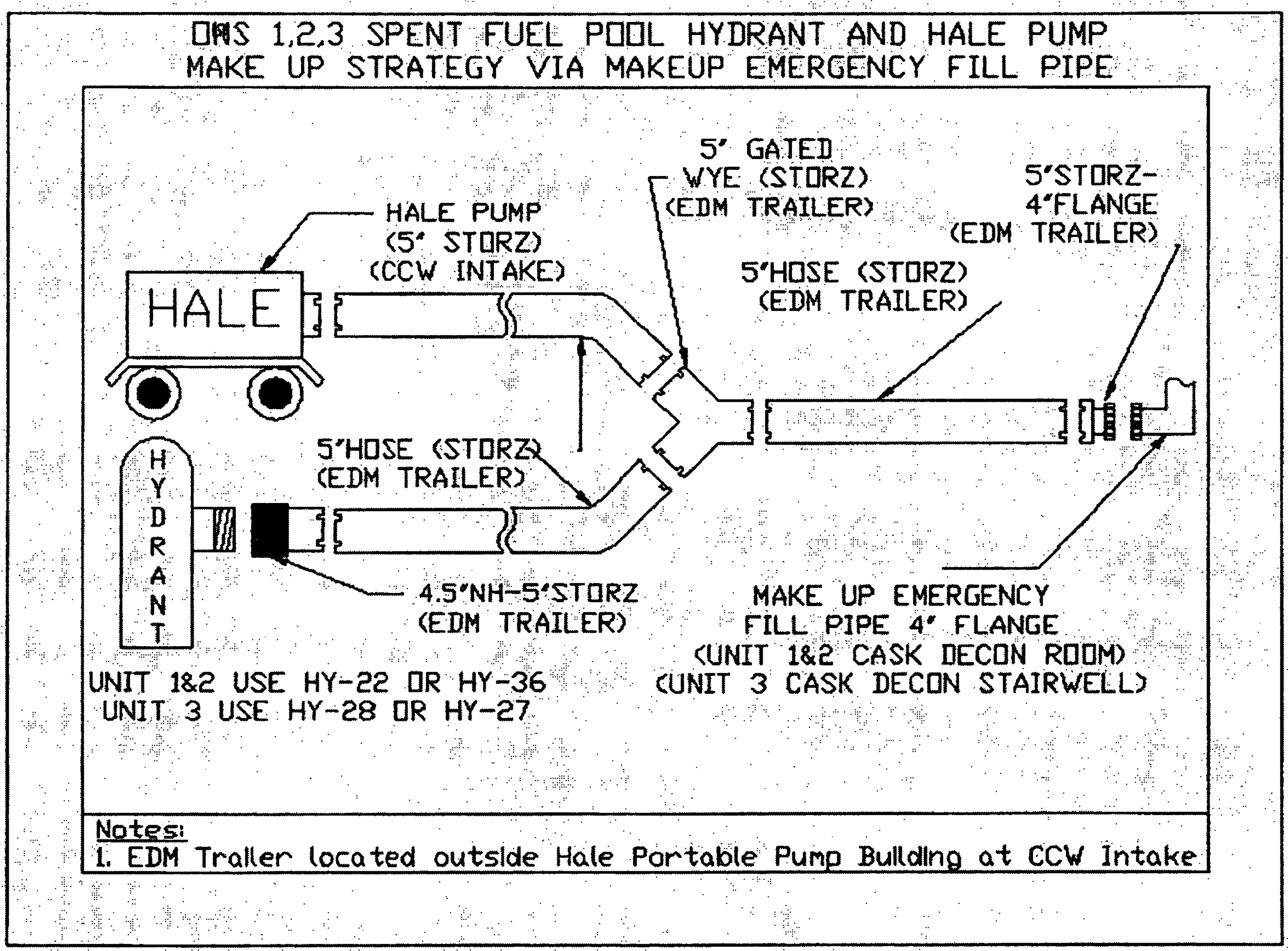


Drawing 1.6.2 – Unit 3 SFP Makeup Connection Hose



Pull

Drawing 1.6.3 - SFP Makeup Connection Diagram



Enclosure 1.7 - Relocation of Equipment for Plant Recovery

NOTE: Drawing 1.4.2 can be used for connecting equipment for plant recovery.

After the flood waters have receded, equipment will need to be relocated to begin activities for plant recovery. The following equipment will need to be relocated:

1. Hale Portable Pump
   a. The Hale Portable Pump should be moved to the following potential suctions sources based on availability:
      i. CCW Intake - The Hale Portable Pump should be moved to the boat ramp on the north side of the Hale Portable Pump building to take suction from the CCW Intake Canal. This is the preferred suction source.
      ii. Chemical Treatment Pond (CTP) 1 & 2 - The Hale Portable Pump can be moved to CTP 1&2 to as an alternate suction source. CTP 1 has approximately 3.2 million gallons and CTP 2 has approximately 1.6 million gallons of potential inventory at full capacity. CTP 1&2 inventory varies, therefore, the CTP with the most inventory should be used initially.
      iii. Auxiliary Building - The Hale Portable Pump can be moved into the Auxiliary Building via the Hot Machine Shop to take suction from the Hot Machine Shop Tunnel as an alternate suction source. This will also aid in evacuating water from the flooded Auxiliary Building.
2. EDM Trailer
   a. Move the EDM Trailer as needed to support the Hale Portable Pump and hose routing.
3. Keowee Fire Truck
   a. The Keowee fire truck can be moved to the same location as the Hale Portable Pump but consideration should be given to locating the fire truck at an alternate location, if available.
4. The following Items can be moved as needed to support plant recovery activities:
   a. Crane
   b. Fuel Truck
   c. Fire truck from KFD
   d. Appendix R equipment

Enclosure 1.8 - Long term plant recovery strategies

1. Align Keowee fire truck/Hale Pump to provide refill of SFP.
2. Restore source of 4KV power to the site.
3. Connect 4KV power to Appendix R switchgear trailer
4. Utilize following procedures to establish LPI cooling on affected units:
    a. OP/0/A/1102/025
    b. RP/0/B/1000/022 (Lists all procedures required for recovery actions)

Enclosure 1.9 - Hale Portable Pump Operation

1.0 Introduction

Use of this enclosure is for Beyond Design Basis event mitigation strategies addressed in this Engineering Manual only. Quarterly test or training activities will utilize the OP for guidance.

2.0 Actions

1. Stage the Hale Portable Pump suction hose
    a. Attached the suction hose to the pump discharge
    b. Place the end with floating strainer into the flood waters (ensure the strainer is covered in water and not near trash that could clog the strainer)
2. Ensure the Hale Portable Pump discharge drains are closed:
    a. Close the Pump drain
    b. Close No. 1 Discharge drain
    c. Close No. 2 Discharge drain
3. Start Hale Portable Pump Engine
4. Immediately pull one or both primer handles and hold until the suction hose is visibly seen to be water solid or water discharges from the vent priming line under the pump.
5. Release primer handle(s)
6. Notify the TSC that the Hale Portable Pump is ready to deliver water when the hose pulls are complete.
7. Press mode push button to ensure Hale Pump is in PSI mode.
8. Utilize INC/DEC push buttons to set Hale Pump Discharge pressure to **150 PSIG**.
9. **When** notified by the TSC that hose pulls are complete and flow is required,

    Then Open the 5" Hale Portable Pump discharge valve.
10. If fine flow control is desired, then throttle with the 5" pump discharge valve.

11. Open the diesel cover panel from the side opposite the control panel

12. Monitor Hale Portable Pump operation hourly:

    a. Monitor suction strainer to ensure it does not become clogged

    b. Monitor fuel gage

13. If the Hale Portable Pump fuel level reaches 1/2 tank level, then contact the TSC to have the pump refueled.

14. **When** the Hale Portable Pump is no longer required,

    Then perform the following steps for shutdown.

    a. 2.14.1 Press DEC until engine idle speed is reached.

    b. 2.14.2 Turn key switch to OFF.

    c. 2.15.3 Close 5" discharge valve.

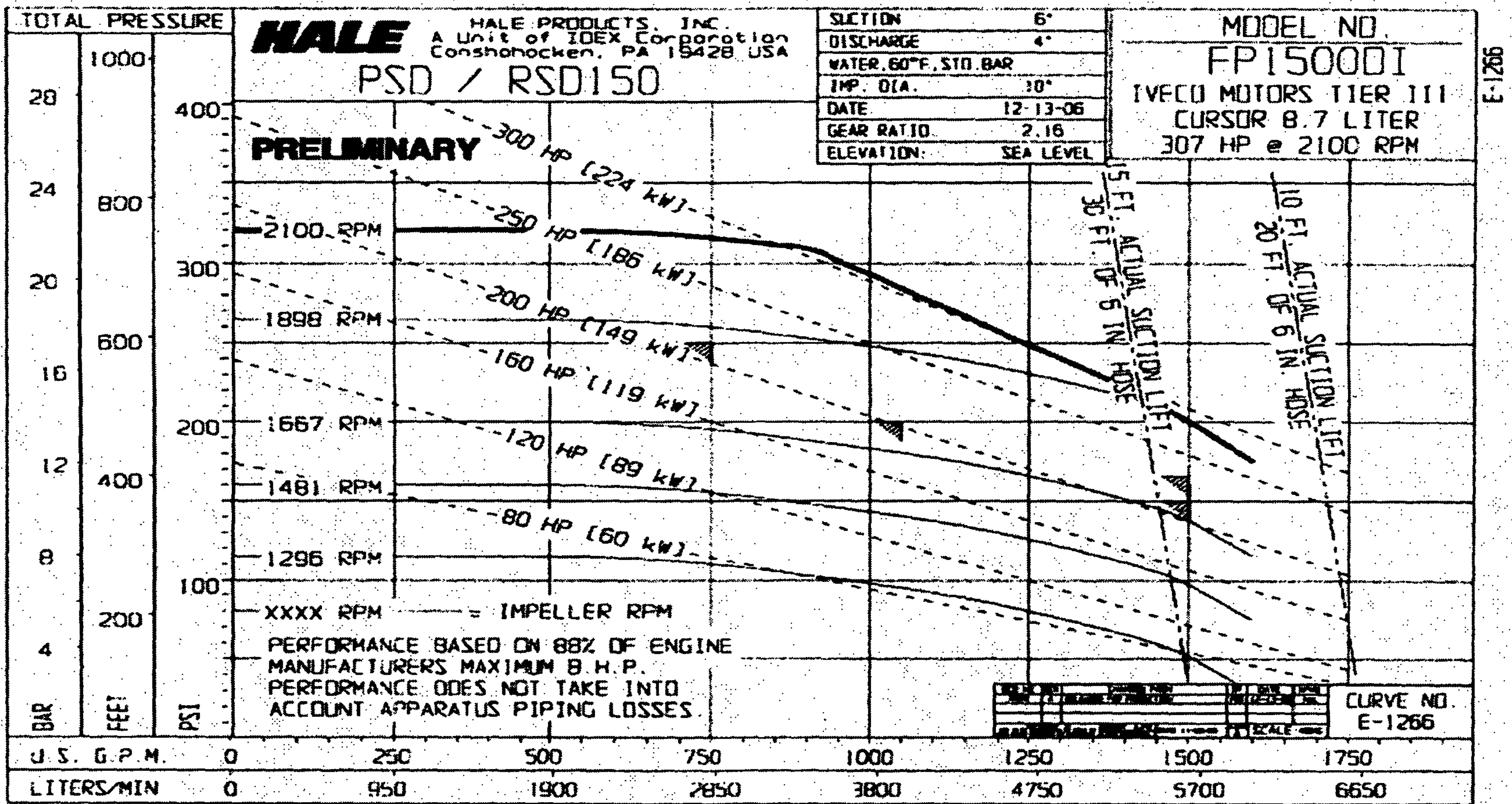
    d. 2.15.4 Open pump drain valves:

       i. Pump drain

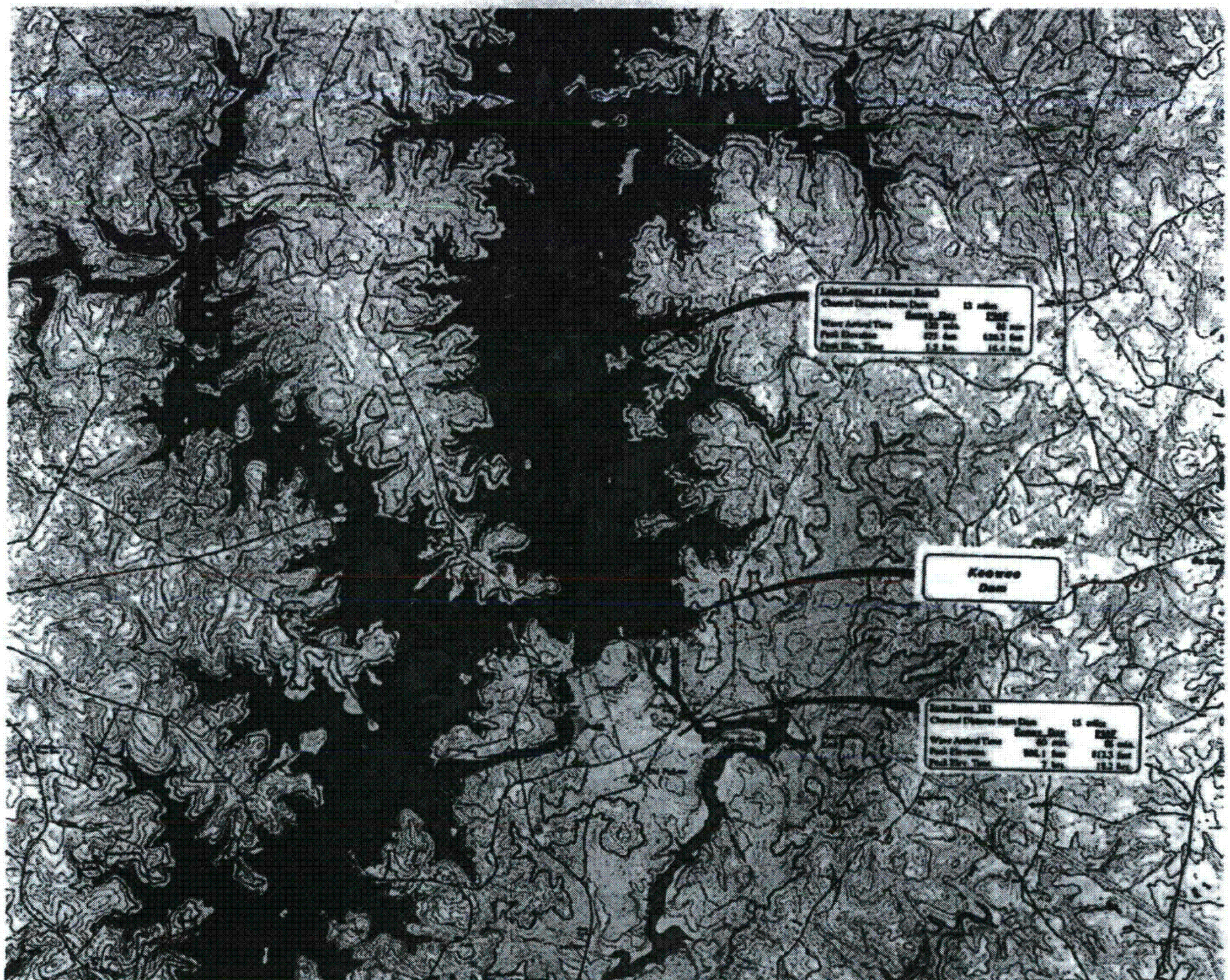
       ii. No. 1 discharge valve

       iii. No. 2 discharge valve

Enclosure 1.10 - Hale Portable Pump Head Curve



Enclosure 1.11 - Jocassee Dam Failure Flood Inundation Map



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Review of EM 5.3, "Evaluations by Station Management in the TSC – Beyond Design Basis Mitigation Strategies for Jocassee Dam Failure"

Overview

This document discusses the staff's review of Duke Energy's Oconee Nuclear Station procedure titled "Evaluation by Station Management in the TSC – Beyond Design Basis Mitigation Strategies for Jocassee Dam Failure," number EM 5.3, revision 0. The review includes two distinct parts: First, it looks at the mitigation strategy, hereafter called a procedure, and identifies problems and questions with that procedure. The comments and questions are supplied in Table 1 below.

Second, the analyst reviewed E.M. 5.3 holistically to determine the likelihood of operator failure in performing these actions. The analysts used SPAR-H for this review. SPAR-H is intended to be used for determining the failure probability of individual human actions. It contains methods for determining dependency between 2 or more actions. In this evaluation, E.M 5.3 was treated as a single action with no dependency analysis performed. The intent of this analysis is not to determine a precise answer but instead to determine a reasonable order of magnitude understanding of the factors involved and the corresponding probability of failure.

I. Procedure Questions and Comments

This procedure is a "mitigation strategy" that plant personnel will perform if a Jocassee Dam failure has occurred or appears to be imminent. As such, it is a guidance document and not a typical plant procedure that is intended to be followed verbatim. None-the-less, it should be factually accurate and not misleading. This review has identified the comments and questions as documented in Table 1 below.

Table 1
Review of Oconee Procedure E.M. 5.3

Comment Number	Page Number	Section	Comment	Commenter
1	1 and 3	3.0 and 4.0	Are the Enclosures intended to be performed in sequence or as directed by the TSC?	AH
2	1and 13	2.0 and Enclosure 1.4	The "Description" clearly states that this procedure should be performed after a Jocassee Dam failure but before the flood reaches Oconee. Enclosure 1.4 reiterates this guidance. However, Enclosure 1.4 step 1.f directs personnel to "layout the suction hose ... into the flood waters," a step that can not be performed until after the flood has arrived.	JTM

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Comment Number	Page Number	Section	Comment	Commenter
3	8	Enclosures 1.1 and 1.4	Enclosure 1.1 directs personnel to perform actions if main feedwater is lost. Enclosure 1.4 directs personnel to inject water into the secondary side of the once-through steam generators (OTSG). For injection to work, the secondary side must be depressurized. It appears that Enclosure 1.1 requires personnel to wait until the flood reaches the site and starts to effect plant equipment before personnel are directed to depressurize the plant. However, the plant must be cooled and depressurized before the flood starts to effect plant equipment as the limited equipment made available by this procedure cannot cool down the plant; it can only maintain it in a cooled down condition. The Enclosures appear to be in conflict.	JTM
4	1 and 3	3.0 and 4.0	The definition for Condition B is somewhat ambiguous with respect to the purpose of the procedure and the definition of Condition A. These definitions are also used in their Natural Disaster AP (AP-6) which sets up plant conditions prior to entering 5.3. Is the intent that Condition B events would be a potential precursor to Condition A such as a PMP event?	AH
5	3	4.0	The procedure assumes that the Oconee site will be notified to take action when there is a "Condition B" event at Jocassee Dam. During the Jocassee site visit, plant personnel indicated that the call tree with Oconee is not entered into unless there is a "Condition A" event. Has there been a change made to the procedures at the dam?	JAC
6	3	4.0	Have any of the diesel fuel vendors made a commitment or have a dedicated tanker and allocation of fuel available in the event that it is needed?	JAC
7	5	5.0	Do any of the procedures referenced for recovery of LPI account for post-flood inundation of equipment or specific recovery of power? The procedure assumes that power will be restored in time for LPI which is too optimistic.	JAC
8	8	Enclosure 1.1	The assumption is that the Hale pumper will provide the SSF-ASW feed to the OTSGs. Have there been calculations performed to assure that the degree of shrinkage of RCS at all three units do not require any additional inventory control during the flooding event?	JAC

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Comment Number	Page Number	Section	Comment	Commenter
9	9	Enclosure 1.1	If the SSF-ASW is lost, it is assumed that floodwaters have already inundated the SSF. Operators are directed to throttle open auxiliary service water valves in the penetration rooms. Will operators be able to perform these actions given the flood? The same comment is also applicable for the required continual monitoring of core exit thermocouples, RCS pressure, RCS subcooling margin, and OTSG level. Note that a 16.8-foot flood at SSF grade will be at 812.8-feet msl. Some of the penetrations are at el. 812-ft. In addition to physical feasibility given inundation, will there be sufficient personnel present to accomplish these tasks?	JAC
10	9	Enclosure 1.1	There is no guidance to trip the reactor and initiate cool down of the units. There is no guidance to increase primary boration levels to ensure that the units remain subcritical as the units are rapidly cooled. Will the units remain subcritical during rapid cool down without additional boration under all conditions?	JTM
11	11	Enclosure 1.3 Step 1	Enclosure 1.3, step 1 uses HPSW as source for filling CTPs preflood. Is it intended that the station HPSW pumps would be utilized to refill the EWST during this evolution?	AH
12	12 and 17	Enclosure 1.4 and 1.5	Enclosure 1.4 directs personnel to supply water to the OTSG. Enclosure 1.5 gives direction on how to monitor core exit temperature, steam generator level and reactor pressure. However, neither enclosure supplies guidance on the target parameter values.	JTM
13	13	Enclosure 1.4 Step 2.c	Enclosure. 1.4, step 2.c - What is it meant by "...routing to the affected Unit..."? This wording is confusing as all units are affected and there is only one possible connection for all three units (CCW-512) and one routing path specified by the figure.	AH
14	13	Enclosure 1.4	The procedure directs that suction for the Hale pumper be taken from the Elevated Water Storage Tank (EWST). Section 2.f. instructs operators to lay out suction hoses to the flood. However, the only guidance for alignment of alternate suction does not take place until Enclosure 1.7 which is entered into after floodwater has receded. The EWST only has enough OTSG inventory for about 3.5 hours. Section 2.0 assumes that floodwaters will arrive at Keowee in 5 hours and overtop it. Floodwater is assumed not to recede until 10-11 hours after the initial failure of Jocassee. Therefore, there will be a period of 5-6 hours after the inundation of the SSF where OTSG feed from the Hale pumper is necessary. Guidance for an earlier suction alignment is necessary.	JAC

Comment Number	Page Number	Section	Comment	Commenter
15	17	Enclosure 1.5	It appears Enclosure 1.5 will need to be implemented to support Steps 12 and 13 of Enclosure 1.1. How will this be coordinated and/or communicated between the operators (also see Comment Number 1 above)?	AH
16	17	Enclosure 1.5	For cooling of the RCS via the OTSG, the secondary side pressure must be maintained below the discharge pressure of the Hale and/or fire pump discharge. However, there is no requirement or guidance to monitor secondary side pressure.	JTM
17	17	Enclosure 1.5	The last paragraph states that "...table (page 10 of 10)..." It appears that this should read "...table (pages 8-10 of 10)..." to include all temperature ranges for conversion.	AH
18	17	Enclosure 1.5	This enclosure directs personnel to monitor plant parameters using portable test equipment. Some of those instruments require 120 volt AC. However, under conditions that this procedure would be used, it is highly unlikely that AC power would be available.	JTM
19	28	Enclosure 1.6	Does the Hale pump have sufficient capacity to makeup to the EWST when SFP cooling is required (at approximately 72 hrs into the event) concurrently with makeup to the OTSGs for decay heat removal?	AH
20	28	Enclosure 1.6	This Enclosure directs personnel to pump water into the spent fuel pools to cool fuel in pools. There is no requirement to monitor pool temperatures.	JTM
21	28	Enclosure 1.6	This Enclosure directs personnel to stop feeding the spent fuel pool(s) if they start to overflow. Is it the intent of this enclosure to allow the spent fuel pools to boil? If not then "fill and spill" cooling would be required to prevent boiling which appears prohibited by the guidance to stop feeding if the pool(s) start to overflow.	JTM
22	32	Enclosure 1.7	There is no guidance in this procedure to address mud, silt, and other debris that will be present in the alternate suction source to the Hale pumper during the flooding event. Are there screens or strainers that need to be cleaned periodically?	JAC

II. Human Failure Event Quantification

The analyst evaluated EM 5.3 using the SPAR-H[1] HRA methodology to obtain a rough estimate of the human error probability (HEP) for this procedure. A rigorous analysis was not performed.

[1] "The SPAR-H Human Reliability Analysis Method," NUREG/CR-6883, August 2005.

Instead SPAR-H was used to get a sense of the probability of failure. The human failure event (HFE) was defined, success criteria stipulated, cues identified and performance shaping factors evaluated. The overall human error probability from this process was high, giving a result close to one. Due to the complexity of the mitigation strategy, the lack of rigor in the evaluation and the conservative nature of the SPAR-H methodology, no greater accuracy should be construed from this analysis. A more rigorous analysis may lower the failure probability somewhat, but the final result is anticipated to be between 0.1 and 1.0.

The following discussion describes and characterizes the HFE. Finally, this information was inserted into the SPAR-H methodology via Tables 2 and 3 for quantification of the HFE.

HFE Definition

The objective of Enclosures 1.1 through 1.5 are to initiate and monitor secondary side cooling by supplying water to the high pressure service water system to the once-through steam generators (OTSG) via a Hale pump or fire truck. This analysis will look at multiple actions conducted by personnel over an extended duration (hours to days).

Description and Context Associated with Event

A Jocassee Dam failure has occurred or is imminent (Condition A as defined by the procedure). If the flood waters overtop the Keowee Dam and flood the switchyard, all onsite and offsite AC power, emergency core cooling systems and steam generator cooling via main feedwater and aux feedwater will be lost. If water level continues to rise sufficiently to inundate the SSF, then all means of cooling the core, injecting into the RCS and/or cooling the spent fuel pools will be lost.

Operator Action Success Criteria

Prior to flood levels reaching the site, the units must be brought subcritical and the secondary side depressurized sufficiently for water to be injected into the OTSG using a Hale pump or a fire truck. These pumps are hereafter collectively referred to as the Hale pump.

- Setup and prepare the Hale.
- Lay fire hose at various locations throughout the station.
- Begin injecting into the steam generators to maintain the units in cold shutdown.
- Monitor reactor coolant system (RCS) pressure, core exit temperature, and OTSG level.

Success is defined as maintaining the secondary side depressurized such that the Hale pump can inject into the SG to maintain primary system pressure below the safety relief valve lift setpoints so that the core is cooled.

Cues

- Reactor pressure
- Core exit temperature
- Steam generator level

Procedure and Relevant Steps

EM 5.3, "Evaluations by Station Management in the TSC – Beyond Design Basis Mitigation Strategies for Jocassee Dam Failure"

- Enclosure 1.1 – "Prepare RCS for Plant Flood Conditions"
- Enclosure 1.2 – "Relocation of Equipment to High Ground"
- Enclosure 1.3 – "Makeup to Chemical Treatment Ponds 1 & 2"
- Enclosure 1.4 – "Supplying High Pressure Service Water (HPSW) System with Fire Truck or Hale Portable Pump for OTSG Makeup"
- Enclosure 1.5 – "Portable Instrumentation"

Main Control Room or Local Action

All actions in this procedure are outside the main control room.

Diagnosis (with or w/o recovery)/Execution (with or w/o recovery)/Diagnosis + Execution

The occurrence of a Jocassee Dam failure is an obvious diagnosis. Most of this procedure requires little diagnosis to layout and setup the required equipment and start injecting into the OTSGs. However, once initiated this procedure requires monitoring primary and secondary side parameters using portable test equipment. This later step is diagnostic in nature. Therefore, this is both a diagnosis and execution process. The diagnostic component of this HEP analysis refers to the monitoring of the plant parameters and adjusting the flow from the Hale pump to maintain those parameters within the desired operating bands.

Time Windows/Nominal/Mean/Median Actions Times

This procedure anticipates a minimum of 5 hours from the time of the Jocassee Dam failure until the flood waters reach the Oconee site. Within this time, station personnel must shut down the reactors and lower secondary side temperature and pressure to within the discharge pressure of the Hale pump. They must also lay various fire hoses across the site such that they can use the Hale pump to supply the fire water system and in turn use the fire water system to feed the OTSGs. Concurrently, they must monitor the primary and secondary side parameters as noted earlier (i.e., RCS pressure, core exit temperature and OTSG level).

Relevant Performance Shaping Factors

The performance shaping factors (PSF) considered from the SPAR-H methodology included:

- Available Time: It is assumed that the time available is equal to the time required.
- Stress/Stressors: Operator stress will be elevated due to the Jocassee Dam failure and the anticipated loss of all AC power with subsequent loss of both the ECCS and the SSF.
- Complexity: This process requires moderately complex activities. Setup of the Hale pump and the fire hoses is straightforward. However, monitoring of the parameters with portable test equipment at the various penetration rooms is difficult. This procedure covers many activities through the plant.
- Experience/Training: No training has been performed on this procedure.

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- Procedure: The procedure for these activities has never been performed. As documented above, this procedure has various misleading or inconsistent steps.
- Ergonomics/Man Machine Interface: Plant personnel perform all activities performed by this procedure outside the control room as directed by the TSC. Because personnel will monitor plant parameters using portable test equipment instead of the permanently-installed normal plant indication, there will be no or limited annunciation of plant parameters and there will be no labeling of plant parameters.

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Table 2
Quantification of Diagnosis Portion of HEP

SPAR HUMAN ERROR WORKSHEET

Plant: Oconee 1/2/3 Initiating Event: Jocassee Dam Failure Basic Event: E.M 5.3
Basic Event Description: Using Hale pump to cool the OTSG

Part II. ACTION WORKSHEET

PSFs	PSF Levels	Multiplier for Action	Selected PSF	Please note specific reasons for PSF level selection in this column.
Available Time	Inadequate time	P(failure) = 1.0		
	Time Available is ? the time required	10	X	
	Nominal time	1		
	Time available is ? 5x the time required	0.1		
	Time available is ? 50x the time required	0.01		
	Insufficient information	1		
Stress	Extreme	5		
	High	2	X	
	Nominal	1		
	Insufficient information	1		
Complexity	Highly	5		
	Moderately	2	X	
	Nominal	1		
	Insufficient information	1		
Experience/Training	Low	3	X	
	Nominal	1		
	High	0.5		
	Insufficient information	1		
Procedures	Not available	50		
	Incomplete	20		
	Available but poor	5	X	
	Nominal	1		
	Insufficient information	1		
Ergonomics/HMI	Missing/Misleading	50		
	Poor	10	X	
	Nominal	1		
	Good	0.5		
	Insufficient information	1		
Fitness for Duty	Unfit	P(failure) = 1.0		
	Degraded Fitness	5		
	Nominal	1	X	
	Insufficient information	1		
Work Processes	Poor	5		
	Nominal	1	X	
	Good	0.5		
	Insufficient information	1		

NHEP = **NA**

Negative PSFs adjustment (≥3 negative PSFs) = **8.57E-01**

Final Action HEP = **8.57E-01**

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Plant: Oconee 1/2/3 Initiating Event: Jocassee Dam Failure Basic Event: E.M 5.3
Basic Event Description: Using Hale pump to cool the OTSG

Part I. DIAGNOSIS WORKSHEET

PSFs	PSF Levels	Multiplier for Diagnosis	Selected PSF	Please note specific reasons for PSF level selection in this column.
Available Time	Inadequate time	P(failure) = 1.0		
	Barely adequate time (approximately 2/3 x nominal)	10		
	Nominal time	1	X	
	Extra time (between 1 and 2 x nominal and greater than 30 min)	0.1		
	Expansive time (greater than 2 x nominal and greater than 30 min)	0.01		
	Insufficient information	1		
Stress	Extreme	5		
	High	2	X	
	Nominal	1		
	Insufficient information	1		
Complexity	Highly	5		
	Moderately Complex	2	X	
	Nominal	1		
	Obvious diagnosis	0.1		
	Insufficient information	1		
Experience/ Training	Low	10	X	
	Nominal	1		
	High	0.5		
	Insufficient information	1		
Procedures	Not available	50		
	Incomplete	20		
	Available, but poor	5	X	
	Nominal	1		
	Diagnostic/symptom oriented	0.5		
	Insufficient information	1		
Ergonomics/ HMI	Missing/Misleading	50		
	Poor	10	X	
	Nominal	1		
	Good	0.5		
	Insufficient information	1		
Fitness for Duty	Unfit	P(failure) = 1.0		
	Degraded Fitness	5		
	Nominal	1	X	
	Insufficient information	1		
Work Processes	Poor	2		
	Nominal	1	X	
	Good	0.8		
	Insufficient information	1		

NHEP = NA

Negative PSFs adjustment (≥3 negative PSFs) 9.5E-01
Final Diagnosis HEP 9.5E-01

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Table 3
Quantification of Action Portion of HEP

SPAR HUMAN ERROR WORKSHEET

Plant: Oconee 1/2/3 **Initiating Event:** Jocassee Dam Failure **Basic Event:** E.M 5.3
Basic Event Description: Using Hale pump to cool the OTSG

Part II. ACTION WORKSHEET

PSFs	PSF Levels	Multiplier for Action	Selected PSF	Please note specific reasons for PSF level selection in this column
Available Time	Inadequate time	P(failure) = 1.0		
	Time available is approximatel equal to the time required	10	X	
	Nominal time	1		
	Time available is greater than or equal to 5x the time required	0.1		
	Time available is greater than or equal to 50x the time required	0.01		
	Insufficient information	1		
Stress	Extreme	5		
	High	2	X	
	Nominal	1		
	Insufficient information	1		
Complexity	Highly	5		
	Moderately	2	X	
	Nominal	1		
	Insufficient information	1		
Experience/ Training	Low	3	X	
	Nominal	1		
	High	0.5		
	Insufficient information	1		
Procedures	Not available	50		
	Incomplete	20		
	Available but poor	5	X	
	Nominal	1		
	Insufficient information	1		
Ergonomics/ HMI	Missing/Misleading	50		
	Poor	10	X	
	Nominal	1		
	Good	0.5		
	Insufficient information	1		
Fitness for Duty	Unfit	P(failure) = 1.0		
	Degraded Fitness	5		
	Nominal	1	X	
	Insufficient information	1		
Work Processes	Poor	5		
	Nominal	1	X	
	Good	0.5		
	Insufficient information	1		

NHEP = NA

Negative PSFs adjustment (≥3 negative PSFs) 8.6E-01

Final Action HEP 8.6E-01

Duke Energy Oconee Nuclear Station **Evaluations by Station Management in the TSC - Beyond Design Basis Mitigation Strategies for External Flood Mitigation**	Procedure No. **EM 5.3**
	Revision No. **003**
	Electronic Reference No. **OAP000H6**

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ISSUED

Mitman, Jeffrey

From: Mitman, Jeffrey
Sent: Monday, December 13, 2010 4:56 PM
To: Rogers, Walt
Subject: ONS AP/0/A/1700/047 External Flood Mitigation

Walt, ONS strategy EM 5.3 referrers to ONS AP/0/A/1700/047 External Flood Mitigation. I've looked on the Region II Training website and cannot find it. Could you get me a copy of this procedure.

Thanks.

Jeff Mitman

-----Original Message-----
From: Rogers, Walt
Sent: Monday, December 13, 2010 3:41 PM
To: Mitman, Jeffrey
Subject: FW: ONS Revised EM 5.3

-----Original Message---
From: Sabisch, Andrew
Sent: Monday, December 13, 2010 12:56 PM
To: Rogers, Walt
Subject: RE: ONS Revised EM 5.3

Walt,

Here is the latest revision

Andy

-----Original Message-----
From: Rogers, Walt
Sent: Monday, December 13, 2010 9:47 AM
To: Sabisch, Andrew
Subject: FW: ONS Revised EM 5.3

Can you email the most current rev of EM 5.3

-----Original Message-----
From: Mitman, Jeffrey
Sent: Friday, December 10, 2010 4:03 PM
To: Rogers, Walt
Subject: RE: ONS Revised EM 5.3

Walt, next week is fine.

Jeff

-----Original Message-----
From: Rogers, Walt
Sent: Friday, December 10, 2010 8:11 AM
To: Mitman, Jeffrey

L/8

Subject: RE: ONS Revised EM 5.3

do you need today or will next week be OK

From: Mitman, Jeffrey
Sent: Thursday, December 09, 2010 6:10 PM
To: Rogers, Walt
Subject: ONS Revised EM 5.3

Walt, back in 2009, Duke supplied us with a draft of their EM 5.3 on mitigating strategies on failure of Jocassee. Have the updated this document and if so can you get me a copy?

Thanks.

Jeff

Duke Energy Oconee Nuclear Station **External Flood Mitigation**	Procedure No. AP/0/A/1700/047
	Revision No. 007
Continuous Use	Electronic Reference No. OP009999

PERFORMANCE

* * * * * * * * * * UNCONTROLLED FOR PRINT * * * * * * * * * *

(ISSUED) - PDF Format

PROCEDURE AT EFM NOT USABLE WRT
EFM TIE DOWN IN CONSTRUCTION AREA:

75 EM 5.3 → FUEL USAGE ←
1 M gal AVAILABLE

[redacted]

~~All pages in this document marked~~
~~"Withheld from Public Disclosure Under 10CFR 2.390(d)(1)~~

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1. Entry Conditions

NOTE

- Condition A - Failure is Imminent or Has Occurred - A failure at the dam has occurred or is about to occur and minutes to days may be allowed to respond dependent upon the proximity to the dam. Response includes the immediate movement of downstream residents to higher ground. State and local governments will be notified.
- Condition B - Potentially Hazardous Situation is Developing - A situation where failure may develop, but preplanned actions taken during certain events (i.e., major floods, earthquakes, etc.) may prevent or mitigate failure. The potentially hazardous situation may allow days or weeks for response and time to take remedial action.

Notification of any of the following for the Jocassee dam or dikes:

- Condition A (Failure of one or more dam/dike is imminent or has occurred)
- Condition B (Potentially hazardous flooding situation is developing)
- Jocassee Hydro or Hydro Central reports an unplanned abnormal situation has occurred that is below the Condition B threshold that could adversely affect dam or dike integrity.

2. Automatic Systems Actions

None

3. Immediate Manual Actions

None

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4. Subsequent Actions

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

This AP is directed by Unit 1 CR SRO unless otherwise designated by the OSM.

4.1 Verify one or more of the following has been declared for the Jocassee dam or dikes: __ Condition A (Failure of one or more dam/dike is imminent or has occurred) __ Condition B (Potentially hazardous flooding situation is developing)	__ **GO TO** Step 4.7.

Jocassee → Call comes from: Jocassee Procedure.

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

Unit Status

One or more of the following has been declared for the Jocassee dam or dikes:

- Condition A (Failure of one or more dam/dike is imminent or has occurred)
- Condition B (Potentially hazardous flooding situation is developing)

NOTE

The following are available means to communicate during a Jocassee flooding event in order of priority. If Plant radio Channel 6 does not work, switch to Plant radio Channel 1, then ITAC-4, as necessary.

1st choice: Plant radio Channel 6. Available on all OPS, SPOC, and Security plant radios. Repeater is power backed up and above flood plain.

2nd choice: Plant radio Channel 1. Available on all OPS, SPOC, and Security plant radios. Repeater is UPS backed-up for 4 hours after loss of power and located on top of Aux Bldg.

3rd choice: ITAC-4 radio. This is a special radio that is available to OPS, SPOC, and Security. Repeater is power backed up and above flood plain. Offsite Agencies can communicate on this radio. Radios are located in SPOC Supervisor's office, Unit 1&2 Control Room, Unit 3 Control Room, and the TSC.

Other options and communication information:

- Plant Channel 2. Line of sight use only.
- Plant phones until the site is flooded. Plant phone system is located on 2nd floor of the Oconee Office Building.
- Satellite phone in Control Room
- Security Cell phone (Central Alarm Station (CAS) is 864-973-5901. Secondary Alarm Station (SAS) is 864-973-5902.)
- Personal Cell phones

4.2 __ Announce AP entry using the PA system.	
4.3 __ Notify OSM to **PERFORM** Encl 5.1 (OSM Actions for External Flood Mitigation).	
4.4 __ Notify WCC personnel to **PERFORM** Encl 5.2 (Work Control Actions for External Flood Mitigation).	

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4.5 Notify <u>all</u> units to **PERFORM** applicable section: __ Section 4A (Unit 1 External Flood Mitigation Preparation) __ Section 4B (Unit 2 External Flood Mitigation Preparation) __ Section 4C (Unit 3 External Flood Mitigation Preparation)	
4.6 __ **WHEN** conditions permit, **THEN EXIT** this procedure.	

••• END •••

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
Unit Status ONS has been notified by Jocassee Hydro <u>or</u> Hydro Central that an abnormal situation has occurred that is below the Condition B threshold.	
4.7 __ Ensure OSM <u>and</u> STA have been notified of the situation.	
4.8 __ **IAAT** <u>one or more</u> of the following are declared for the Jocassee dam <u>or</u> dikes: __ Condition A (Failure of one <u>or</u> more dam/dike is imminent <u>or</u> has occurred) __ Condition B (Potentially hazardous flooding situation is developing) **THEN GO TO** Step 4.2.	
4.9 Notify Civil Engineering Supervisor.	

IF AT ANY TIME:

(4.8) **Condition A <u>or</u> Condition B has been declared for the Jocassee dam <u>or</u> dikes ... (follow guidance to shutdown and cooldown the units)**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4.10 Notify the following of the Jocassee Dam abnormal condition: __ Site VP __ Station Mgr __ OPS Superintendent	
4.11 __ Initiate restoration of following systems to service from <u>any</u> in progress maintenance activities <u>or</u> surveillance testing, if possible: • SSF Systems (SSF D/G, RCMUPs, SSF ASW) • CT-5 • 4160v Power System (Main Feeder <u>or</u> Standby Bus) • EFDW System • Station ASW Pump/Switchgear • ADVs • Hale Pump <u>and</u> Extensive Damage Mitigation (EDM) Trailer	
4.12 __ Initiate a PIP <u>and</u> request an engineering evaluation.	
4.13 __ Notify OSM to track issue using the Action Register process.	
4.14 __ **WHEN** conditions permit, **THEN EXIT** this procedure.	

••• **END** •••

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External Flood Mitigation Preparation

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. __ Verify Unit 1 is in MODE 1 - 3.	__ **GO TO** Step 49.

NOTE

- When the reactor is tripped, EOP IMAs <u>and</u> Symptoms Check should be performed and then continue with this procedure.
- Priority should be given to performing this procedure over EOP Subsequent Actions. EOP Subsequent Actions can continue as resources allow.
- SG level setpoints in this AP take precedence over those specified in the EOP.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2. **IAAT** Condition A exists for the Jocassee dam <u>or</u> dikes, **THEN** trip the reactor.	__ **IF** the reactor is critical, **THEN PERFORM** AP/29 (Rapid Unit Shutdown) to shutdown the reactor.
3. **WHEN** the reactor is shutdown, **THEN** continue.	
4. Open the following: __ 1HP-24 __ 1HP-25	Dispatch an operator to locally open <u>affected</u> valve: (A-1-118, N end of 1&2 HPI Hatch Area, East wall) __ 1HP-24 (1A HPI BWST Suction) __ 1HP-25 (1B HPI BWST Suction)
5. __ Verify <u>any</u> RCS loop has <u>two</u> RCPs operating.	__ **GO TO** Step 7.

NOTE

It is preferred to leave the 1A1 RC PUMP operating to provide Pzr Spray.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. Secure RCPs, as necessary, to establish <u>one RCP per loop</u> operation.	

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NOTE

- Technical Specification cooldown rate is as follows:
  ≤ 100°F/hr when > 280°F
  ≤ 50°F/hr when ≤ 280°F
- With NO stuck rods, SDM is adequate to 240°F.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. __ Commence cooldown to 240 - 250°F at the maximum allowable TS rate.	
8. Have BOP operator initiate Encl 5.3A (Unit 1 Parallel Activities).	

NOTE

- Due to difference in SG level setpoints, EFW will raise levels to 30" XSUR when EFW Pumps are started.
- The TD EFDW Pump will have a reduced capacity below 250 psig steam pressure. If one MD EFDWP is out of service, guidance for feeding both SGs with a single MD EFDWP is available in EOP Encl 5.9 (Extended EFW Operation).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. Start the following: __ 1A MD EFDWP __ 1B MD EFDWP	1. __ Start the 1TD EFDW PUMP. 2. __ GO TO Step 11.
10. __ Position 1TD EFDW PUMP to PULL TO LOCK.	
11. __ Log entry in TS 3.7.5 (Emergency Feedwater (EFW) System).	
12. __ Verify Emergency Feedwater available to feed SGs.	__ GO TO Step 14.
13. __ Trip both Main FDW Pumps.	
14. __ Begin increasing Pzr level to 200" - 220".	

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

2CCW-516 is locked with plant lock. Keys are available in all Operations Emergency Equipment lockers if operator does not have a key.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
15. __ **IAAT** <u>either</u> of the following exists: __ Condition A is declared __ <u>All</u> Units RCS Temperature < 250°F **THEN** dispatch <u>operators</u> to open the following: __ 1CCW-104 (Aux Service Water to 1A S/G Stop) (A-4, U1 East Pen Rm, col R70) __ 1CCW-108 (Aux Service Water to 1B S/G Stop) (A-4, U1 West Pen Rm, behind AHU 1-19) __ 2CCW-516 (ASW Emergency Connection) (A-2, CC Cooler Rm, Col S76)	$\boxed{\text{(2) NEO'S}}$ BACK PRESSURE FROM S/G → CHECK VALVE ??

NOTE

OAC <u>or</u> EOP Encl 5.18 (P/T Curves) may be used to provide RCP NPSH.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16. While maintaining the following: __ Lowest SCM ≥ 25°F __ RCP NPSH Begin lowering RCS pressure to establish 290 - 300 psig, using the following as necessary: __ De-energize Pressurizer Heaters. __ Open 1RC-1.	

IF AT ANY TIME:

(15) Condition A is declared **OR** RCS Temperature < 250°F ... (align Station ASW system for use by portable pump)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
17. _ **IAAT** <u>all</u> the following exist: __ <u>All</u> SCMs > 0°F __ ES Bypass Permit satisfied __ RCS pressure controllable **THEN** perform Step 18.	__ **GO TO** Step 19.
18. Bypass <u>applicable</u> ES as follows: To Bypass HPI: Depress ES CH A,B,C HPI BYPASS pushbuttons __ Depress BYPASS for Diverse HPI To Bypass LPI: __ Depress ES CH A,B,C LPI BYPASS pushbuttons __ Depress BYPASS for Diverse LPI	1. __ **IF** ≥ 2 ES bypass channels <u>fail to bypass</u>, **THEN** perform <u>either</u>: Hold RCS pressure above actuation setpoint until <u>at least two</u> ES bypass channels are bypassed. __ Place <u>both</u> ODD and EVEN voters to OVERRIDE. 2. __ **IF** <u>applicable</u> Diverse actuation circuit fails to bypass, **THEN** place the <u>applicable</u> Diverse actuation circuit to OVERRIDE. 3. **IF** ODD and EVEN voters are placed in OVERRIDE, **THEN** notify OSM to consult Technical Specifications.
19. _ **WHEN** SG pressure < 700 psig, **THEN** select OFF for the following: <u>Both</u> digital channels on AFIS HEADER A. _ <u>Both</u> digital channels on AFIS HEADER B.	
20. **IAAT** RCS temperature is < 400°F, **THEN** initiate Encl 5.7A (Unit 1 LTOP Actions).	

IF AT ANY TIME:

(15) Condition A is declared **OR** RCS Temperature < 250°F ... (align Station ASW system for use by portable pump)

(17) All SCMs > 0°F **AND** ES Bypass Permit satisfied **AND** RCS pressure controllable ... (bypass ES as necessary)

(20) RCS temperature is < 400°F ... (initiate Encl 5.7A (Unit 1 LTOP Actions))

(21) TBVs are lost.... (use ADVs)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
21. __ **IAAT** TBVs are lost, **THEN** perform Steps 22 - 23.	__ **GO TO** Step 24.
22. __ Dispatch operators to Unit 1 ADVs to perform EOP Encl 5.24 (Operation of the ADVs). (PS)	
23. Control SG pressure, as necessary, by directing operator at ADVs to throttle the following: __ 1MS-162 (1A MS Line Atmospheric Dump Control) __ 1MS-164 (1B MS Line Atmospheric Dump Control)	
24. __ Verify Jocassee is in Condition B.	__ **GO TO** Step 26.
25. __ Notify TSC to evaluate placing Aux Boiler in service <u>or</u> continue the cooldown to LPI and maintain SGs available.	

IF AT ANY TIME:

(15) Condition A is declared **OR** RCS Temperature < 250°F ... (align Station ASW system for use by portable pump)

(17) <u>All</u> SCMs > 0°F **AND** ES Bypass Permit satisfied **AND** RCS pressure controllable ... (bypass ES as necessary)

(20) RCS temperature is < 400°F ... (initiate Encl 5.7A (Unit 1 LTOP Actions))

(21) TBVs are lost.... (use ADVs)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE The intent of Step 26 is to have SG levels as high as possible if power is lost due to flooding conditions to allow time to transfer to another SG feed source.	
26. __ Begin increasing SG levels to LOSCM setpoint.	WHICH IS → SG PRESS RB TEMP/PRESS
NOTE • AP/25 (SSF Emergency Operating Procedure) is **NOT** applicable with RCS temperature < 525°F. Encl 5.8A (SSF Operation for Unit 1) contains guidance for use of SSF for External Flooding Events. BEYOND DESIGN BASIS ? • EOP Rule 3 is **NOT** applicable due to TB Flooding.	
27. __ **IAAT** the ability to feed SGs with Main <u>and</u> Emergency FDW is lost, **THEN** perform Steps 28 - 30.	__ **GO TO** Step 31.
28. __ Trip <u>all</u> RCPs. ✓	
29. __ Direct operator at SSF to establish SSF ASW feed per Encl 5.8A (SSF Operation for Unit 1). ✓	
30. __ Close 1HP-20.	__ Direct operator at SSF to close 1HP-20 from the SSF Control Room.
31. __ **IAAT** SSF was being used **AND** SSF is **NO** longer available, **THEN GO TO** Step 41.	
32. __ **WHEN** RCS pressure is < 800 psig, **THEN** dispatch an operator to remove white tags <u>and</u> close the following (Unit 1 Equip Rm): __ 1XO-F5C (1CF-1 BKR (1A CFT DISCH)) __ 1XP-F5C (1CF-2 BKR (1B CFT DISCH ISOL))	

IF AT ANY TIME:

(15) Condition A is declared **OR** RCS Temperature < 250°F ... (align Station ASW system for use by portable pump)

(17) All SCMs > 0°F **AND** ES Bypass Permit satisfied **AND** RCS pressure controllable ... (bypass ES as necessary)

(20) RCS temperature is < 400°F ... (initiate Encl 5.7A (Unit 1 LTOP Actions))

(21) TBVs are lost.... (use ADVs)

(27) the ability to feed SGs with Main and Emergency FDW is lost ... (trip all RCPs and notify SSF operator to feed SGs)

(31) SSF was being used **AND** SSF is **NO** longer available... (feed SGs with portable pump)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
33. __ **IAAT** breakers for CFT discharge isolation valves are closed, **AND** RCS pressure is controllable, **THEN** close the following: __ 1CF-1 __ 1CF-2	
34. __ **WHEN** RCS pressure is < 600 psig, **THEN** select RC LR PRESS ENABLE switch to ON.	
35. __ **IAAT** RCS temperature is 325°F - 330°F, **THEN** ensure <u>all</u> of the following: A. __ Ensure Encl 5.7A (Unit 1 LTOP Actions) is complete. B. __ Establish a dedicated LTOP operator per OP/1/A/1104/049 (LOW TEMPERATURE OVERPRESSURE PROTECTION (LTOP)). C. __ Appropriate TS have been entered, as applicable.	
36. __ **WHEN** RC LR PRESS is < 475 psig, **AND** T_{cold} is < 350°F, **THEN** place 1RC-66 SETPOINT SELECTOR in LOW.	

NOTE

It is preferred to leave the 1A1 RCP operating to provide Pzr Spray.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
37. __ **WHEN** RC LR PRESS is 290 - 300 psig, **THEN** reduce RCPs to one for the unit.	
38. __ **WHEN** RCS temperature is 240 - 250°F, **THEN** stabilize RCS temperature <u>and</u> pressure.	

IF AT ANY TIME:

(15) Condition A is declared **OR** RCS Temperature < 250°F ... (align Station ASW system for use by portable pump)

(17) All SCMs > 0°F **AND** ES Bypass Permit satisfied **AND** RCS pressure controllable ... (bypass ES as necessary)

(20) RCS temperature is < 400°F ... (initiate Encl 5.7A (Unit 1 LTOP Actions))

(21) TBVs are lost.... (use ADVs)

(27) the ability to feed SGs with Main and Emergency FDW is lost ... (trip all RCPs and notify SSF operator to feed SGs)

(31) SSF was being used **AND** SSF is **NO** longer available... (feed SGs with portable pump)

(33) breakers for CFT discharge isolation valves are closed **AND** RCS pressure is controllable ... (close 1CF-1 and 1CF-2)

(35) RCS temperature is 325°F - 330°F ... (ensure LTOP established)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

Station Management may consider going on LPI, but maintaining SGs available to allow for SG heat removal using SSF or portable pump until initiating event conditions are resolved.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
39. __ Continue at direction of Station Management.	
40. __ **WHEN** conditions permit, **THEN EXIT** this procedure.	

•••**END**•••

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
Unit Status The ability to feed SGs with SSF ASW has been lost.	
41. __ Notify the TSC SG feed has been lost <u>and</u> request permission to use portable pump to feed SGs.	
42. __ **WHEN** permission to use portable pump is given, **THEN** continue.	
43. __ Notify portable pump operator to start the portable pump to feed SGs per Encl 5.11 (Portable Pump Operation). (PS)	
44. Ensure the following are open: __ 1CCW-104 (Aux Service Water to 1A S/G Stop) (A-4, U1 East Pen Rm, col R70) 1CCW-108 (Aux Service Water to 1B S/G Stop) (A-4, U1 West Pen Rm, behind AHU 1-19)	
45. Direct operators at ADVs to <u>fully open</u> the following: __ 1MS-162 (1A MS Line Atmospheric Dump Control) __ 1MS-154 (1A MS Line Atmospheric Vent Block) __ 1MS-164 (1B MS Line Atmospheric Dump Control) __ 1MS-156 (1B MS Line Atmospheric Vent Block)	

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

If Penetration Rooms are accessible, SPOC will use portable instrumentation to read the following at the penetrations:

- A and B SG Level (SUR)
- A and B Loop RCS Pressure
- CETC

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
46. __ **IAAT** Penetration rooms are accessible, **THEN** notify TSC to have SPOC implement EM 5.3(Evaluations by Station Management in the TSC - Beyond Design Basis Mitigation Strategies for External Flood Mitigation) Encl (Portable Instrumentation) for Unit 1.	
47. __ **IAAT** SG level indication is available, **THEN** maintain appropriate SG levels: • Subcooled: 240 – 260" SUR • Saturated: LOSCM setpoint Throttle the following, as necessary: __ 1CCW-104 (Aux Service Water to 1A S/G Stop) (A-4, U1 East Pen Rm, col R70) __ 1CCW-108 (Aux Service Water to 1B S/G Stop) (A-4, U1 West Pen Rm, behind AHU 1-19)	
48. __ **WHEN** conditions permit, **THEN EXIT** this procedure.	

••• END •••

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

<u>Unit Status</u>
Unit is MODE 4 <u>or</u> below.

<u>NOTE</u>
It is preferred to have SGs available for heat removal <u>or</u> Fuel Transfer Canal filled, if possible.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
49. Notify the Outage Control Center (OCC) to review Encl 5.10 (OCC Information for Unit in Mode 4 – 6).	
50. __ Verify RCS loops dropped.	__ **GO TO** Step 52.
51. __ Initiate efforts to raise RCS level to the highest level possible based on plant configuration.	
52. __ **IAAT** SG's are available to feed <u>and</u> steam, **AND** Condition A exists for the Jocassee dam <u>or</u> dikes, **THEN** dispatch an operator to the SSF.	
53. __ **IAAT** SSF is staffed **AND** DHR is lost due to flooding, **THEN** perform Steps 54 - 56.	__ **GO TO** Step 57.
54. __ Trip <u>all</u> RCPs.	
55. __ Direct operator at SSF to establish SSF ASW feed per Encl 5.8A (SSF Operation for Unit 1).	
56. __ Close 1HP-20.	__ Direct operator at SSF to close 1HP-20 from the SSF Control Room.
57. __ Verify SG's are available to feed <u>and</u> steam.	__ **GO TO** Step 61.
58. Open the following: __ 1CCW-104 (Aux Service Water to 1A S/G Stop) (A-4, U1 East Pen Rm, col R70) __ 1CCW-108 (Aux Service Water to 1B S/G Stop) (A-4, U1 West Pen Rm, behind AHU 1-19)	

IF AT ANY TIME:

(52) SG's are available to feed and steam **AND** Condition A is declared for Jocassee dam ... (dispatch and operator to the SSF)

(53) SSF is staffed **AND** DHR is lost due to flooding ... (Trip RCPs, feed SG's, isolate seal return)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
59. __ Dispatch operators to Unit 1 ADVs to perform EOP Encl 5.24 (Operation of the ADVs). **(PS)**	
60. Direct operators at ADVs to <u>fully open</u> the following: __ 1MS-162 (1A MS Line Atmospheric Dump Control) __ 1MS-154 (1A MS Line Atmospheric Vent Block) __ 1MS-164 (1B MS Line Atmospheric Dump Control) __ 1MS-156 (1B MS Line Atmospheric Vent Block)	
61. __ Verify RCS loops are dropped.	__ **GO TO** Step 63.
62. __ Notify Containment Closure Coordinator to implement Contingency Actions in OP/1/A/1502/009 (Containment Closure Control).	
63. __ Initiate RB evacuation of non-essential personnel using REACTOR BUILDING EVACUATION alarm.	
64. Verify at least <u>one</u> of RB Personnel Hatch doors is closed: __ PERSONNEL HATCH INNER DOOR __ PERSONNEL HATCH OUTER DOOR	__ Dispatch an operator to close <u>at least one</u> door of RB <u>Personnel</u> Hatch.

IF AT ANY TIME:

(52) SG's are available to feed <u>and</u> steam **AND** Condition A is declared for Jocassee dam ... (dispatch and operator to the SSF)

(53) SSF is staffed **AND** DHR is lost due to flooding ... (Trip RCPs, feed SG's, isolate seal return)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

Due to the forces of potential flood waters, the maintenance procedure will require a minimum of 14 bolts be installed.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
65. __ Notify SPOC to close RB Equipment Hatch per AM/0/A/1400/002B (Equipment Hatch - Reactor Building - Emergency Closing) due to potential External Flooding.	
66. Verify at least one RB Emergency Personnel Hatch door is closed: __ EMERGENCY HATCH INNER DOOR EMERGENCY HATCH OUTER DOOR	__ Notify SPOC to remove any obstructions and close the outer door per AM/0/A/1400/032 (Emergency Hatch - Emergency Actions For Containment Closure).
67. __ Initiate Encl 5.9 (Energizing the Standby Bus from Central Switchyard).	
68. __ **WHEN** conditions permit, **THEN EXIT** this procedure.	

•••END•••

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External Flood Mitigation Preparation

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. __ Verify Unit 2 is in MODE 1 - 3.	**GO TO** Step 50.

NOTE

- When the reactor is tripped, EOP IMAs <u>and</u> Symptoms Check should be performed and then continue with this procedure.
- Priority should be given to performing this procedure over EOP Subsequent Actions. EOP Subsequent Actions can continue as resources allow.
- SG level setpoints in this AP take precedence over those specified in the EOP.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2. __ **IAAT** Condition A exists for the Jocassee dam <u>or</u> dikes, **THEN** trip the reactor.	__ **IF** the reactor is critical, **THEN PERFORM** AP/29 (Rapid Unit Shutdown) to shutdown the reactor.
3. __ **WHEN** the reactor is shutdown, **THEN** continue.	
4. Open the following: __ 2HP-24 __ 2HP-25	Dispatch an operator to locally open <u>affected</u> valve: (A-1-118, U1&2 HPI Hatch Area, East wall) __ 2HP-24 (2A HPI BWST Suction) __ 2HP-25 (2B HPI BWST Suction)
5. __ Verify <u>any</u> RCS loop has <u>two</u> RCPs operating.	__ **GO TO** Step 7.

NOTE

It is preferred to leave the 2B1 RC PUMP operating to provide Pzr Spray.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. __ Secure RCPs, as necessary, to establish <u>one RCP per loop</u> operation.	

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

- Technical Specification cooldown rate is as follows:
  ≤ 100°F/hr when > 280°F
  ≤ 50°F/hr when ≤ 280°F
- With NO stuck rods, SDM is adequate to 240°F.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. Commence cooldown to 240 - 250°F at the maximum allowable TS rate.	
8. Have BOP operator initiate Encl 5.3B (Unit 2 Parallel Activities).	

NOTE

- Due to difference in SG level setpoints, EFW will raise levels to 30" XSUR when EFW Pumps are started.
- The TD EFDW Pump will have a reduced capacity below 250 psig steam pressure. If one MD EFDWP is out of service, guidance for feeding both SGs with a single MD EFDWP is available in EOP Encl 5.9 (Extended EFW Operation).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. Start the following: __ 2A MD EFDWP 2B MD EFDWP	1. __ Start the 2TD EFDW PUMP. 2. __ GO TO Step 11.
10. __ Position 2TD EFDW PUMP to PULL TO LOCK.	
11. __ Log entry in TS 3.7.5 (Emergency Feedwater (EFW) System).	
12. __ Verify Emergency Feedwater available to feed SGs.	GO TO Step 14.
13. __ Trip <u>both</u> Main FDW Pumps.	
14. __ Begin increasing Pzr level to 200" - 220".	

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
15. __ **IAAT** <u>either</u> of the following exists: __ Condition A is declared __ <u>All</u> Units RCS Temperature < 250°F **THEN** perform the following: A. Dispatch operators to open the following: __ 2CCW-112 (Aux Service Water to 2A S/G Stop) (A-4, U2 East Pen Rm, col R76) __ 2CCW-116 (Aux Service Water to 2B S/G Stop) (A-4, U2 West Pen Rm, col W75 B. __ Ensure Unit 1 has dispatched an operator to open 2CCW-516 (ASW Emergency Connection) (A-2, CC Cooler Rm, Col S76).	

NOTE

OAC <u>or</u> EOP Encl 5.18 (P/T Curves) may be used to provide RCP NPSH.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16. While maintaining the following: __ Lowest SCM ≥ 25°F __ RCP NPSH Begin lowering RCS pressure to establish 290 - 300 psig, using the following as necessary: __ De-energize Pressurizer Heaters. Open 2RC-1.	

IF AT ANY TIME:

(15) Condition A is declared **OR** RCS Temperature < 250°F ... (align Station ASW system for use by portable pump)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
17. IAAT <u>all</u> the following exist: __ <u>All</u> SCMs > 0°F __ ES Bypass Permit satisfied __ RCS pressure controllable **THEN** perform Steps 18 - 19.	**GO TO** Step 20.
18. __ Verify <u>new</u> ES system installed.	1. __ Bypass ES, as necessary. 2. __ **GO TO** Step 20.
19. Bypass <u>applicable</u> ES as follows: To Bypass HPI: __ Depress ES CH A,B,C HPI BYPASS pushbuttons __ Depress BYPASS for Diverse HPI To Bypass LPI: __ Depress ES CH A,B,C LPI BYPASS pushbuttons __ Depress BYPASS for Diverse LPI	1. __ **IF** ≥ 2 ES bypass channels <u>fail to bypass</u>, **THEN** perform <u>either</u>: __ Hold RCS pressure above actuation setpoint until <u>at least two</u> ES bypass channels are bypassed. __ Place <u>both</u> ODD <u>and</u> EVEN voters to OVERRIDE. 2. __ **IF** <u>applicable</u> Diverse actuation circuit fails to bypass, **THEN** place the <u>applicable</u> Diverse actuation circuit to OVERRIDE. 3. __ **IF** ODD <u>and</u> EVEN voters are placed in OVERRIDE, **THEN** notify OSM to consult Technical Specifications.

IF AT ANY TIME:

(15) Condition A is declared **OR** RCS Temperature < 250°F ... (align Station ASW system for use by portable pump)

(17) <u>All</u> SCMs > 0°F **AND** ES Bypass Permit satisfied **AND** RCS pressure controllable ... (bypass ES as necessary)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
20. __ **WHEN** SG pressure < 700 psig, **THEN** select OFF for the following: __ Both digital channels on AFIS HEADER A. __ Both digital channels on AFIS HEADER B.	
21. __ **IAAT** RCS temperature is < 400°F, **THEN** initiate Encl 5.7B (Unit 2 LTOP Actions).	
22. __ **IAAT** TBVs are lost, **THEN** perform Steps 23 - 24.	__ **GO TO** Step 25.
23. __ Dispatch operators to Unit 2 ADVs to perform EOP Encl 5.24 (Operation of the ADVs). **(PS)**	
24. Control SG pressure, as necessary, by directing operator at ADVs to throttle the following: __ 2MS-162 (2A MS Line Atmospheric Dump Control) 2MS-164 (2B MS Line Atmospheric Dump Control)	
25. Verify Jocassee is in Condition B.	__ **GO TO** Step 27.
26. __ Notify TSC to evaluate placing Aux Boiler in service or continue the cooldown to LPI and maintain SGs available.	

IF AT ANY TIME:

(15) Condition A is declared **OR** RCS Temperature < 250°F ... (align Station ASW system for use by portable pump)

(17) All SCMs > 0°F **AND** ES Bypass Permit satisfied **AND** RCS pressure controllable ... (bypass ES as necessary)

(21) RCS temperature is < 400°F ... (initiate Encl 5.7B (Unit 2 LTOP Actions))

(22) TBVs are lost.... (use ADVs)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE The intent of Step 27 is to have SG levels as high as possible if power is lost due to flooding conditions to allow time to transfer to another SG feed source.	
27. __ Begin increasing SG levels to LOSCM setpoint.	
NOTE • AP/25 (SSF Emergency Operating Procedure) is **NOT** applicable with RCS temperature < 525°F. Encl 5.8B (SSF Operation for Unit 2) contains guidance for use of SSF for External Flooding Events. • EOP Rule 3 is **NOT** applicable due to TB Flooding.	
28. __ **IAAT** the ability to feed SGs with Main <u>and</u> Emergency FDW is lost, **THEN** perform Steps 29 - 31.	__ **GO TO** Step 32.
29. Trip <u>all</u> RCPs.	
30. Direct operator at SSF to establish SSF ASW feed per Encl 5.8B (SSF Operation for Unit 2).	
31. Close 2HP-20.	Direct operator at SSF to close 2HP-20 from the SSF Control Room.
32. **IAAT** SSF was being used **AND** SSF is **NO** longer available **THEN GO TO** Step 42.	
33. __ **WHEN** RCS pressure is < 800 psig, **THEN** dispatch an operator to remove white tags <u>and</u> close the following (Unit 2 Equip Rm): __ 2XO-F5C (2CF-1 BKR (2A CFT DISCH ISOL)) __ 2XP-F4C (2CF-2 BKR (2B CFT DISCH ISOL))	

IF AT ANY TIME:

(15) Condition A is declared **OR** RCS Temperature < 250°F ... (align Station ASW system for use by portable pump)

(17) <u>All</u> SCMs > 0°F **AND** ES Bypass Permit satisfied **AND** RCS pressure controllable ... (bypass ES as necessary)

(21) RCS temperature is < 400°F ... (initiate Encl 5.7B (Unit 2 LTOP Actions))

(22) TBVs are lost.... (use ADVs)

(28) the ability to feed SGs with Main <u>and</u> Emergency FDW is lost ... (trip all RCPs and notify SSF operator to feed SGs)

(32) SSF was being used **AND** SSF is **NO** longer available... (feed SGs with portable pump)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
34. __ **IAAT** breakers for CFT discharge isolation valves are closed, **AND** RCS pressure is controllable, **THEN** close the following: __ 2CF-1 __ 2CF-2	
35. __ **WHEN** RCS pressure is < 600 psig, **THEN** select RC LR PRESS ENABLE switch to ON.	
36. **IAAT** RCS temperature is 325°F - 330°F, **THEN** perform the following: A. __ Ensure Encl 5.7B (Unit 2 LTOP Actions) is complete. B. Establish a dedicated LTOP operator per OP/2/A/1104/049 (LOW TEMPERATURE OVERPRESSURE PROTECTION (LTOP)). C. __ Appropriate TS have been entered, as applicable.	
37. __ **WHEN** RC LR PRESS is < 475 psig, **AND** T_{cold} is < 350°F, **THEN** place 2RC-66 SETPOINT SELECTOR in LOW.	

NOTE
It is preferred to leave the 2B1 RCP operating to provide Pzr Spray.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
38. __ **WHEN** RC LR PRESS is 290 - 300 psig, **THEN** reduce RCPs to one for the unit.	
39. __ **WHEN** RCS temperature is 240 - 250°F, **THEN** stabilize RCS temperature <u>and</u> pressure.	

IF AT ANY TIME:

(15) Condition A is declared **OR** RCS Temperature < 250°F ... (align Station ASW system for use by portable pump)

(17) <u>All</u> SCMs > 0°F **AND** ES Bypass Permit satisfied **AND** RCS pressure controllable ... (bypass ES as necessary)

(21) RCS temperature is < 400°F ... (initiate Encl 5.7B (Unit 2 LTOP Actions))

(22) TBVs are lost.... (use ADVs)

(28) the ability to feed SGs with Main <u>and</u> Emergency FDW is lost ... (trip all RCPs and notify SSF operator to feed SGs)

(32) SSF was being used **AND** SSF is **NO** longer available... (feed SGs with portable pump)

(34) breakers for CFT discharge isolation valves are closed **AND** RCS pressure is controllable ... (close 2CF-1 and 2CF-2)

(36) RCS temperature is 325°F - 330°F ... (ensure LTOP established)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

Station Management may consider going on LPI, but maintaining SGs available to allow for SG heat removal using SSF or portable pump until initiating event conditions are resolved.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
40. __ Continue at direction of Station Management.	
41. __ **WHEN** conditions permit, **THEN EXIT** this procedure.	

••• END •••

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
Unit Status The ability to feed SGs with SSF ASW has been lost.	
42. __ Notify the TSC SG feed has been lost <u>and</u> request permission to use portable pump to feed SGs.	
43. **WHEN** permission to use portable pump is given, **THEN** continue.	
44. __ Notify portable pump operator to start the portable pump to feed SGs per Encl 5.11 (Portable Pump Operation). (PS)	
45. Ensure the following are open: __ 2CCW-112 (Aux Service Water to 2A S/G Stop) (A-4, U2 East Pen Rm, col R76) __ 2CCW-116 (Aux Service Water to 2B S/G Stop) (A-4, U2 West Pen Rm, col W75)	
46. Direct operators at ADVs to <u>fully open</u> the following: __ 2MS-162 (2A MS Line Atmospheric Dump Control) __ 2MS-154 (2A MS Line Atmospheric Vent Block) __ 2MS-164 (2B MS Line Atmospheric Dump Control) __ 2MS-156 (2B MS Line Atmospheric Vent Block)	

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

If Penetration Rooms are accessible, SPOC will use portable instrumentation to read the following at the penetrations:

- A and B SG Level (SUR)
- A and B Loop RCS Pressure
- CETC

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
47. __ **IAAT** Penetration rooms are accessible, **THEN** notify TSC to have SPOC implement EM 5.3(Evaluations by Station Management in the TSC - Beyond Design Basis Mitigation Strategies for External Flood Mitigation) Encl (Portable Instrumentation) for Unit 2.	
48. __ **IAAT** SG level indication is available, **THEN** maintain appropriate SG levels: • Subcooled: 240 - 260" SUR • Saturated: LOSCM setpoint Throttle the following, as necessary: __2CCW-112 (Aux Service Water to 2A S/G Stop) (A-4, U2 East Pen Rm, col R76) __2CCW-116 (Aux Service Water to 2B S/G Stop) (A-4, U2 West Pen Rm, col W75)	
49. __ **WHEN** conditions permit, **THEN EXIT** this procedure.	

••• END •••

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
Unit Status Unit is MODE 4 or below.	
NOTE It is preferred to have SGs available for heat removal or Fuel Transfer Canal filled, if possible.	
50. Notify the Outage Control Center (OCC) to review Encl 5.10 (OCC Information for Unit in Mode 4 – 6).	
51. __ Verify RCS loops dropped.	__ **GO TO** Step 53.
52. Initiate efforts to raise RCS level to the highest level possible based on plant configuration.	
53. __ **IAAT** SG's are available to feed and steam, **AND** Condition A exists for the Jocassee dam or dikes, **THEN** dispatch an operator to the SSF.	
54. **IAAT** SSF is staffed **AND** DHR is lost due to flooding, **THEN** perform Steps 55 - 57.	__ **GO TO** Step 58.
55. __ Trip all RCPs.	
56. __ Direct operator at SSF to establish SSF ASW feed per Encl 5.8B (SSF Operation for Unit 2).	
57. __ Close 2HP-20.	__ Direct operator at SSF to close 2HP-20 from the SSF Control Room.
58. __ Verify SG's are available to feed and steam.	__ **GO TO** Step 62.
59. Open the following: 2CCW-112 (Aux Service Water to 2A S/G Stop) (A-4, U2 East Pen Rm, col R76) __ 2CCW-116 (Aux Service Water to 2B S/G Stop) (A-4, U2 West Pen Rm, col W75)	

IF AT ANY TIME:

(53) SG's are available to feed <u>and</u> steam **AND** Condition A is declared for Jocassee dam ... (dispatch and operator to the SSF)

(54) SSF is staffed **AND** DHR is lost due to flooding ... (Trip RCPs, feed SG's, isolate seal return)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
60. Dispatch operators to Unit 2 ADVs to perform EOP Encl 5.24 (Operation of the ADVs). **(PS)**	
61. Direct operators at ADVs to <u>fully open</u> the following: 2MS-162 (2A MS Line Atmospheric Dump Control) __ 2MS-154 (2A MS Line Atmospheric Vent Block) __ 2MS-164 (2B MS Line Atmospheric Dump Control) __ 2MS-156 (2B MS Line Atmospheric Vent Block)	
62. __ Verify RCS loops are dropped.	__ **GO TO** Step 64.
63. __ Notify Containment Closure Coordinator to implement Contingency Actions in OP/2/A/1502/009 (Containment Closure Control).	
64. __ Initiate RB evacuation of non-essential personnel using REACTOR BUILDING EVACUATION alarm.	
65. Verify at least <u>one</u> of RB Personnel Hatch doors is closed: __ PERSONNEL HATCH INNER DOOR __ PERSONNEL HATCH OUTER DOOR	__ Dispatch an operator to close <u>at least one</u> door of RB <u>Personnel</u> Hatch.

IF AT ANY TIME:

(53) SG's are available to feed and steam **AND** Condition A is declared for Jocassee dam ... (dispatch and operator to the SSF)

(54) SSF is staffed **AND** DHR is lost due to flooding ... (Trip RCPs, feed SG's, isolate seal return)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE Due to the forces of potential flood waters, the maintenance procedure will require a minimum of 14 bolts be installed.	
66. __ Notify SPOC to close RB Equipment Hatch per AM/0/A/1400/002B (Equipment Hatch - Reactor Building - Emergency Closing) due to potential External Flooding.	
67. Verify at least one RB Emergency Personnel Hatch door is closed: __ EMERGENCY HATCH INNER DOOR __ EMERGENCY HATCH OUTER DOOR	__ Notify SPOC to remove any obstructions and close the outer door per AM/0/A/1400/032 (Emergency Hatch - Emergency Actions For Containment Closure).

IF AT ANY TIME:

(53) SG's are available to feed and steam **AND** Condition A is declared for Jocassee dam ... (dispatch and operator to the SSF)

(54) SSF is staffed **AND** DHR is lost due to flooding ... (Trip RCPs, feed SG's, isolate seal return)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

- CCW-8 must be closed de-energized prior to submersion by lake water.
- CCW Emergency Discharge Siphon Flow may have been established automatically as a result of loss of power.
- CCW-8 will **NOT** close if 1CCW-1 - 6, 2CCW-7, and 3CCW-93 are full open.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
68. __ Verify CCW-8 is open.	**GO TO** Step 76.
69. __ Verify 1CCW-1 - 6 are closed.	__ Throttle 1CCW-1 - 6.
70. __ Verify 2CCW-7 is closed.	Throttle 2CCW-7.
71. __ Verify 3CCW-93 is closed.	__ Throttle 3CCW-93.
72. __ Close CCW-8.	
73. Perform the following: __ Close 1CCW-1 - 6. __ Place 1CCW-1 - 6 switch in PULL TO LOCK.	
74. Notify Unit 2 to perform the following: __ Close 2CCW-7. __ Place 2CCW-7 switch in PULL TO LOCK.	
75. Notify Unit 3 to perform the following: __ Close 3CCW-93. __ Place 3CCW-93 switch in PULL TO LOCK.	
76. __ Dispatch an operator to open 1DP-F5C (CCW-8 Bkr (Emerg CCW Disch to Tailrace)) (T-3/L-24).	
77. **WHEN** conditions permit, **THEN EXIT** this procedure.	

• • • END • • •

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. __ Verify Unit 3 is in MODE 1 - 3.	__ GO TO Step 49.

NOTE

- When the reactor is tripped, EOP IMAs and Symptoms Check should be performed and then continue with this procedure.
- Priority should be given to performing this procedure over EOP Subsequent Actions. EOP Subsequent Actions can continue as resources allow.
- SG level setpoints in this AP take precedence over those specified in the EOP.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2. IAAT Condition A exists for the Jocassee dam or dikes, **THEN** trip the reactor.	__ **IF** the reactor is critical, **THEN PERFORM** AP/29 (Rapid Unit Shutdown) to shutdown the reactor.
3. __ **WHEN** the reactor is shutdown, **THEN** continue.	
4. Open the following: __ 3HP-24 __ 3HP-25	Dispatch an operator to locally open affected valve: (A-1-158, U3 HPI Hatch Area, S end) __ 3HP-24 (3A HPI BWST Suction) __ 3HP-25 (3B HPI BWST Suction)
5. __ Verify any RCS loop has two RCPs operating.	**GO TO** Step 7.

NOTE

It is preferred to leave the 3B1 RC PUMP operating to provide Pzr Spray.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. __ Secure RCPs, as necessary, to establish one RCP per loop operation.	

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

- Technical Specification cooldown rate is as follows:
  ≤ 100°F/hr when > 280°F
  ≤ 50°F/hr when ≤ 280°F
- With NO stuck rods, SDM is adequate to 240°F.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. __ Commence cooldown to 240 - 250°F at the maximum allowable TS rate.	
8. Initiate BOP Encl 5.3C (Unit 3 Parallel Activities).	

NOTE

- Due to difference in SG level setpoints, EFW will raise levels to 30" XSUR when EFW Pumps are started.
- The TD EFDW Pump will have a reduced capacity below 250 psig steam pressure. If one MD EFDWP is out of service, guidance for feeding both SGs with a single MD EFDWP is available in EOP Encl 5.9 (Extended EFW Operation).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. Start the following: __ 3A MD EFDWP __ 3B MD EFDWP	1. __ Start the 3TD EFDW PUMP. 2. __ GO TO Step 11.
10. _ Position 3TD EFDW PUMP to PULL TO LOCK.	
11. __ Log entry in TS 3.7.5 (Emergency Feedwater (EFW) System).	
12. Verify Emergency Feedwater available to feed SGs.	__ GO TO Step 14.
13. __ Trip <u>both</u> Main FDW Pumps.	
14. __ Begin increasing Pzr level to 200" - 220".	

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
15. **IAAT** <u>either</u> of the following exists: __ Condition A is declared __ <u>All</u> Units RCS Temperature < 250°F **THEN** perform the following: A. Dispatch operators to open the following: __ 3CCW-120 (Aux Service Water to 3A S/G Stop) (A-4, U3 East Pen Rm, col R91) __ 3CCW-124 (Aux Service Water to 3B S/G Stop) (A-4, U3 West Pen Rm, col W90) B. __ Ensure Unit 1 has dispatched an operator to open 2CCW-516 (ASW Emergency Connection) (A-2, CC Cooler Rm, Col S76).	

NOTE

OAC <u>or</u> EOP Encl 5.18 (P/T Curves) may be used to provide RCP NPSH.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16. While maintaining the following: __ Lowest SCM ≥ 25°F __ RCP NPSH Begin lowering RCS pressure to establish 290 - 300 psig, using the following as necessary: De-energize Pressurizer Heaters. Open 3RC-1.	

IF AT ANY TIME:

(15) Condition A is declared **OR** RCS Temperature < 250°F ... (align Station ASW system for use by portable pump)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
17. __ **IAAT** <u>all</u> the following exist: __ <u>All</u> SCMs > 0°F __ ES Bypass Permit satisfied __ RCS pressure controllable **THEN** perform Step 18.	__ **GO TO** Step 19.
18. Bypass <u>applicable</u> ES as follows: To Bypass HPI: __ Depress ES CH A,B,C HPI BYPASS pushbuttons __ Depress BYPASS for Diverse HPI To Bypass LPI: __ Depress ES CH A,B,C LPI BYPASS pushbuttons __ Depress BYPASS for Diverse LPI	1. __ **IF** ≥ 2 ES bypass channels <u>fail to bypass</u>, **THEN** perform <u>either</u>: Hold RCS pressure above actuation setpoint until <u>at least two</u> ES bypass channels are bypassed. __ Place <u>both</u> ODD <u>and</u> EVEN voters to OVERRIDE. 2. __ **IF** <u>applicable</u> Diverse actuation circuit fails to bypass, **THEN** place the <u>applicable</u> Diverse actuation circuit to OVERRIDE. 3. __ **IF** ODD <u>and</u> EVEN voters are placed in OVERRIDE, **THEN** notify OSM to consult Technical Specifications.
19. **WHEN** SG pressure < 700 psig, **THEN** select OFF for the following: __ <u>Both</u> digital channels on AFIS HEADER A. __ <u>Both</u> digital channels on AFIS HEADER B.	
20. **IAAT** RCS temperature is < 400°F, **THEN** initiate Encl 5.7C (Unit 3 LTOP Actions).	

IF AT ANY TIME:

(15) Condition A is declared **OR** RCS Temperature < 250°F ... (align Station ASW system for use by portable pump)

(17) <u>All</u> SCMs > 0°F **AND** ES Bypass Permit satisfied **AND** RCS pressure controllable ... (bypass ES as necessary)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
21. __ IAAT TBVs are lost, **THEN** perform Steps 22 - 23.	__ **GO TO** Step 24.
22. __ Dispatch operators to Unit 3 ADVs to perform EOP Encl 5.24 (Operation of the ADVs). **(PS)**	
23. Control SG pressure, as necessary, by directing operator at ADVs to throttle the following: __ 3MS-162 (3A MS Line Atmospheric Dump Control) __ 3MS-164 (3B MS Line Atmospheric Dump Control)	
24. __ Verify Jocassee is in Condition B.	**GO TO** Step 26.
25. __ Notify TSC to evaluate placing Aux Boiler in service or continue the cooldown to LPI and maintain SGs available.	

External Flood Mitigation Preparation

IF AT ANY TIME:

(15) Condition A is declared **OR** RCS Temperature < 250°F ... (align Station ASW system for use by portable pump)

(17) <u>All</u> SCMs > 0°F **AND** ES Bypass Permit satisfied **AND** RCS pressure controllable ... (bypass ES as necessary)

(20) RCS temperature is < 400°F ... (initiate Encl 5.7C (U3 LTOP Actions))

(21) TBVs are lost.... (use ADVs)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE The intent of Step 26 is to have SG levels as high as possible if power is lost due to flooding conditions to allow time to transfer to another SG feed source.	
26. __ Begin increasing SG levels to LOSCM setpoint.	
NOTE • AP/25 (SSF Emergency Operating Procedure) is **NOT** applicable with RCS temperature < 525°F. Encl 5.8C (SSF Operation for Unit 3) contains guidance for use of SSF for External Flooding Events. • EOP Rule 3 is **NOT** applicable due to TB Flooding.	
27. __ **IAAT** the ability to feed SGs with Main <u>and</u> Emergency FDW is lost, **THEN** perform Steps 28 - 30.	__ **GO TO** Step 31.
28. __ Trip <u>all</u> RCPs.	
29. Direct operator at SSF to establish SSF ASW feed per Encl 5.8C (SSF Operation for Unit 3)	
30. Close 3HP-20.	__ Direct operator at SSF to close 3HP-20 from the SSF Control Room.
31. __ **IAAT** SSF was being used **AND** SSF is **NO** longer available, **THEN GO TO** Step 41.	
32. __ **WHEN** RCS pressure is < 800 psig, **THEN** dispatch an operator to remove white tags <u>and</u> close the following (Unit 3 Equip Rm): 3XO-F5C (3CF-1 BKR (3A CFT DISCH ISOL)) 3XP-F5C (3CF-2 BKR (3B CFT DISCH ISOL))	

IF AT ANY TIME:

(15) Condition A is declared **OR** RCS Temperature < 250°F ... (align Station ASW system for use by portable pump)

(17) All SCMs > 0°F **AND** ES Bypass Permit satisfied **AND** RCS pressure controllable ... (bypass ES as necessary)

(20) RCS temperature is < 400°F ... (initiate Encl 5.7C (Unit 3 LTOP Actions))

(21) TBVs are lost.... (use ADVs)

(27) the ability to feed SGs with Main and Emergency FDW is lost ... (trip all RCPs and notify SSF operator to feed SGs)

(31) SSF was being used **AND** SSF is **NO** longer available... (feed SGs with portable pump)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
33. **IAAT** breakers for CFT discharge isolation valves are closed, **AND** RCS pressure is controllable, **THEN** close the following: __ 3CF-1 __ 3CF-2	
34. __ **WHEN** RCS pressure is < 600 psig, **THEN** select RC LR PRESS ENABLE switch to ON.	
35. __ **IAAT** RCS temperature is 325°F - 330°F, **THEN** perform the following: A. __ Ensure Encl 5.7C (Unit 3 LTOP Actions) is complete. B. __ Establish a dedicated LTOP operator per OP/3/A/1104/049 (LOW TEMPERATURE OVERPRESSURE PROTECTION (LTOP)). C. __ Appropriate TS have been entered, as applicable.	
36. __ **WHEN** RC LR PRESS is < 475 psig, **AND** T_{cold} is < 350°F, **THEN** place 3RC-66 SET POINT SELECTOR in LOW.	

NOTE

It is preferred to leave the 3B1 RCP operating to provide Pzr Spray.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
37. __ **WHEN** RC LR PRESS is 290 - 300 psig, **THEN** reduce RCPs to one for the unit.	
38. __ **WHEN** RCS temperature is 240 - 250°F, **THEN** stabilize RCS temperature <u>and</u> pressure.	

IF AT ANY TIME:

(15) Condition A is declared **OR** RCS Temperature < 250°F ... (align Station ASW system for use by portable pump)

(17) All SCMs > 0°F **AND** ES Bypass Permit satisfied **AND** RCS pressure controllable ... (bypass ES as necessary)

(20) RCS temperature is < 400°F ... (initiate Encl 5.7C (Unit 3 LTOP Actions))

(21) TBVs are lost.... (use ADVs)

(27) the ability to feed SGs with Main and Emergency FDW is lost ... (trip all RCPs and notify SSF operator to feed SGs)

(31) SSF was being used **AND** SSF is **NO** longer available... (feed SGs with portable pump)

(33) breakers for CFT discharge isolation valves are closed **AND** RCS pressure is controllable ... (close 3CF-1 and 3CF-2)

(35) RCS temperature is 325°F - 330°F ... (ensure LTOP established)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

Station Management may consider going on LPI, but maintaining SGs available to allow for SG heat removal using SSF or portable pump until initiating event conditions are resolved.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
39. __ Continue at direction of Station Management.	
40. __ **WHEN** conditions permit, **THEN EXIT** this procedure.	

• • • END • • •

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
Unit Status The ability to feed SGs with SSF ASW has been lost.	
41. Notify the TSC SG feed has been lost <u>and</u> request permission to use portable pump to feed SGs.	
42. __ **WHEN** permission to use portable pump is given, **THEN** continue.	
43. Notify portable pump operator to start the portable pump to feed SGs per Encl 5.11 (Portable Pump Operation). (PS)	
44. Ensure the following are open: __ 3CCW-120 (Aux Service Water to 3A S/G Stop) (A-4, U3 East Pen Rm, col R91) __ 3CCW-124 (Aux Service Water to 3B S/G Stop) (A-4, U3 West Pen Rm, col W90)	
45. Direct operators at ADVs to <u>fully open</u> the following: __ 3MS-162 (3A MS Line Atmospheric Dump Control) __ 3MS-154 (3A MS Line Atmospheric Vent Block) __ 3MS-164 (3B MS Line Atmospheric Dump Control) __ 3MS-156 (3B MS Line Atmospheric Vent Block)	

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

If Penetration Rooms are accessible, SPOC will use portable instrumentation to read the following at the penetrations:

- A and B SG Level (SUR)
- A and B Loop RCS Pressure
- CETC

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
46. __ **IAAT** Penetration rooms are accessible, **THEN** notify TSC to have SPOC implement EM 5.3(Evaluations by Station Management in the TSC - Beyond Design Basis Mitigation Strategies for External Flood Mitigation) Encl (Portable Instrumentation) for Unit 3.	
47. __ **IAAT** SG level indication is available, **THEN** maintain appropriate SG levels: • Subcooled: 240 – 260" SUR • Saturated: LOSCM setpoint Throttle the following, as necessary: __ 3CCW-120 (Aux Service Water to 3A S/G Stop) (A-4, U3 East Pen Rm, col R91) __ 3CCW-124 (Aux Service Water to 3B S/G Stop) (A-4, U3 West Pen Rm, col W90)	
48. **WHEN** conditions permit, **THEN EXIT** this procedure.	

• • • **END** • • •

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
Unit Status Unit 3 is MODE 4 or below.	
NOTE It is preferred to have SGs available for heat removal or Fuel Transfer Canal filled, if possible.	
49. __ Notify the Outage Control Center (OCC) to review Encl 5.10 (OCC Information for Unit in Mode 4 – 6).	
50. Verify RCS loops dropped.	__ **GO TO** Step 52.
51. Initiate efforts to raise RCS level to the highest level possible based on plant configuration.	
52. __ **IAAT** SG's are available to feed and steam, **AND** Condition A exists for the Jocassee dam or dikes, **THEN** dispatch an operator to the SSF.	
53. __ **IAAT** SSF is staffed **AND** DHR is lost due to flooding, **THEN** perform Steps 54 - 56.	__ **GO TO** Step 57.
54. Trip all RCPs.	
55. __ Direct operator at SSF to establish SSF ASW feed per Encl 5.8C (SSF Operation for Unit 3).	
56. Close 3HP-20.	__ Direct operator at SSF to close 3HP-20 from the SSF Control Room.
57. __ Verify SG's are available to feed and steam.	__ **GO TO** Step 61.
58. Open the following: __ 3CCW-120 (Aux Service Water to 3A S/G Stop) (A-4, U3 East Pen Rm, col R91) __ 3CCW-124 (Aux Service Water to 3B S/G Stop) (A-4, U3 West Pen Rm, col W90)	

IF AT ANY TIME:

(52) SG's are available to feed and steam **AND** Condition A is declared for Jocassee dam ... (dispatch and operator to the SSF)

(53) SSF is staffed **AND** DHR is lost due to flooding ... (Trip RCPs, feed SG's, isolate seal return)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
59. __ Dispatch operators to Unit 3 ADVs to perform EOP Encl 5.24 (Operation of the ADVs). **(PS)**	
60. Direct operators at ADVs to <u>fully open</u> the following: 3MS-162 (3A MS Line Atmospheric Dump Control) __3MS-154 (3A MS Line Atmospheric Vent Block) __3MS-164 (3B MS Line Atmospheric Dump Control) __3MS-156 (3B MS Line Atmospheric Vent Block)	
61. __ Verify RCS loops are dropped.	__ **GO TO** Step 63.
62. Notify Containment Closure Coordinator to implement Contingency Actions in OP/3/A/1502/009 (Containment Closure Control).	
63. __ Initiate RB evacuation of non-essential personnel using REACTOR BUILDING EVACUATION alarm.	
64. Verify at least <u>one</u> of RB Personnel Hatch doors is closed: PERSONNEL HATCH INNER DOOR __PERSONNEL HATCH OUTER DOOR	__ Dispatch an operator to close <u>at least one</u> door of RB <u>Personnel</u> Hatch.

Unit 3
External Flood Mitigation Preparation

IF AT ANY TIME:

(52) SG's are available to feed <u>and</u> steam **AND** Condition A is declared for Jocassee dam ... (dispatch and operator to the SSF)

(53) SSF is staffed **AND** DHR is lost due to flooding ... (Trip RCPs, feed SG's, isolate seal return)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE Due to the forces of potential flood waters, the maintenance procedure will require a minimum of 14 bolts be installed.	
65. __ Notify SPOC to close RB <u>Equipment</u> Hatch per AM/0/A/1400/002B (Equipment Hatch - Reactor Building - Emergency Closing) due to potential External Flooding.	
66. Verify at least <u>one</u> RB Emergency Personnel Hatch door is closed: __ EMERGENCY HATCH INNER DOOR __ EMERGENCY HATCH OUTER DOOR	Notify SPOC to remove any obstructions <u>and</u> close the outer door per AM/0/A/1400/032 (Emergency Hatch - Emergency Actions For Containment Closure).
67. __ **WHEN** conditions permit, **THEN EXIT** this procedure.	

• • • END • • •

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE "ONS Emergency - Bridges" may be necessary if dam failure is imminent.	
1. __ Activate TSC/OSC per RP/0/B/1000/002 (Control Room Emergency Coordinator Procedure).	
2. __ Classify event using RP/0/B/1000/001 (Emergency Classification).	
3. _ Initiate a Site Assembly using RP/0/B/1000/009 (Procedure For Site Assembly).	
4. __ Initiate increased staffing by notifying overtime shift to report to site, as necessary, based on current staff levels.	
5. __ Reference Encl 5.6 (External Flood Mitigation Information) and provide oversight on event progression.	

SLC 16.13.11 → 8 NEO's
5 SRO's -3 UNIT
1 WK
1 NEO SUP

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. __ **IAAT** Condition A is declared, **AND** both of the following exist: __ Site Assembly is complete __ TSC is **NOT** staffed **THEN** perform the following: A. __ Notify Security to assist in relocation of personnel in low lying areas on site to the World of Energy or OPS Training Center. B. __ Make the following announcement: "Attention Site Personnel. Attention Site Personnel. All Personnel in the following areas should relocate to the World of Energy or OPS Training Center: • Maintenance Training Facility • Oconee Garage • Oconee Complex • Security Firing Range"	NON-ESSENTIAL PERSONNEL PCR ON CLARIFICATION OF WHO TO EVACUATE.
7. __ Prior to flood waters overtopping Keowee Dam, perform a crew brief and radio check.	
8. __ **WHEN** the TSC is staffed, **THEN** direct TSC Emergency Coordinator to refer to EM 5.3 (Evaluations by Station Management in the TSC - Beyond Design Basis Mitigation Strategies for External Flood Mitigation).	

IF AT ANY TIME:

(6) Condition A is declared **AND** Site Assembly is complete **AND** TSC is **NOT** staffed ... (notify security to relocate personnel in low lying areas and make PA announcement)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

It is permissible to perform AP/35 (Loss of SFP Cooling and/or Level) Encl 5.14 (SFP Temperature and Level Monitoring) without meeting the Entry Conditions.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. Initiate the following to monitor SF Pool temperature <u>and</u> level: {6} __ Unit 1-2 AP/35 (Loss of SFP Cooling and/or Level) Encl 5.14 (SFP Temperature and Level Monitoring) __ Unit 3 AP/35 (Loss of SFP Cooling and/or Level) Encl 5.14 (SFP Temperature and Level Monitoring)	
10. __ **WHEN** conditions permit, **THEN EXIT** this enclosure.	

• • • **END** • • •

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Work Control Actions for External Flood Mitigation

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE A copy of Encl 5.5 (Hose Routing and Hale Pump Relocation) is pre-staged on back door of EFM Trailer. (VERIFY ←) ✓	
1. Notify SPOC to take the following to the EFM Trailer <u>and</u> perform Encl 5.5 (Hose Routing and Hale Pump Relocation): <u>(PS)</u> (VERIFY #ALL!) __ ITAC-4 radio (in SPOC Supv Office) __ Plant radio on Channel 6	→ SPOC STAFFING – 7 PEOPLE COPY OF PROCEDURE <u>AVAILABLE</u> ↳ IN EFM
2. __ Dispatch <u>at least</u> two operators to perform Encl 5.4 (Portable Pump Alignment to Station ASW).	→ SPECIAL →
3. __ Notify Keowee Hydro (x-3327) of the Jocassee Dam status.	→ WHAT DOES KHU DO? —
NOTE Assisting SPOC with Hale Pump <u>and</u> EDM Trailer is a high priority task.	
4. Notify Security (x-2309, 2222) of the following: __ Jocassee Dam status ✓ __ To call in additional Security personnel to assist in potential site evacuation. Bring Security vehicle to PAP to assist SPOC in relocating Hale Pump <u>and</u> EDM Trailer from Intake to CTP-1 <u>when requested by SPOC</u>.	# OF PEOPLE TO MOVE & SECURITY → LOGISTICS OF RELOCATION OR PERSONNEL VS SITE EVACUATION
5. __ **WHEN** conditions permit, **THEN EXIT** this enclosure.	

•••END•••

COPY JOCASSEE EAP?

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WHEN DOES BOP PROCEED TO HVAC ROOM

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. __ **PERFORM** Encl 5.9 (Energizing the Standby Bus from Central Switchyard).	
2. __ Verify 1A CBAST PUMP is available to borate the RCS.	__ **GO TO** Step 11 to use the 1A BLEED TRANSFER PUMP.

NOTE

LHRA "E" MASTER key will be needed for access to LDST Hatch Area. The keys are the same for all 3 units although there is a Unit 1 and a Unit 2 sealed box in the WCC and a Unit 3 in the Unit 3 Control Room Procedures Room (by the north CR door).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3. Dispatch an operator to open 1CS-72 (CBAST to Letdown Filter Inlet) (A-2, LDST Hatch area).	
4. Open the following: __ 1HP-17 __ 1HP-18	
5. __ Open 1CS-64.	
6. __ Open 1HP-16.	
7. Perform the following on 1HP-15 controller: __ Select "S". __ Enter 3100 gallon batch size. __ Select "P".	
8. __ Place 1A CBAST PUMP to AUTO.	
9. __ **WHEN** notified 1CS-72 (CBAST to Letdown Filter Inlet) is open, **THEN** place 1A CBAST PUMP to ON.	
10. __ **GO TO** Step 18.	

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
11. Dispatch an operator to align 1A RC Bleed Transfer Pump to CBAST as follows: A. Ensure closed 1CS-60 (1A Bleed Xfer Pump Suction Tie) (A-1 BTP Rm). B. Close 1CS-148 (1A BHUT Outlet Block) (A-1 BTP Rm). C. __ Open 1CS-150 (1A Bleed Xfer Pump Suction Tie) (A-1 BTP Rm). D. __ Close 1CS-48 (1A BHUT Recirc) (A-1-Unit 1 BTP Rm). E. __ Open 1CS-66 (CBAST Tie To Bleed Xfer Pumps Suction) (A-1 hallway 8' S/ col 65).	
12. Open the following: __ 1HP-17 __ 1HP-18	
13. __ Open 1CS-64.	
14. __ Open 1HP-16.	
15. Perform the following on 1HP-15 controller: __ Select "S". __ Enter 3100 gallon batch size. __ Select "P". __ Select "Auto".	
16. __ Open 1CS-46.	

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
17. __ **WHEN** notified that the following alignment is complete: __ 1CS-60 (1A Bleed Xfer Pump Suction Tie) closed __ 1CS-148 (1A BHUT Outlet Block) closed __ 1CS-150 (1A Bleed Xfer Pump Suction Tie) open __ 1CS-48 (1A BHUT Recirc) closed 1CS-66 (CBAST Tie To Bleed Xfer Pumps Suction) open **THEN** start 1A BLEED TRANSFER PUMP.	

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
18. __ **IAAT** LDST > 90", **THEN** cycle 1HP-14 to BLEED, as necessary, to maintain level 50 - 95".	
19. __ Dispatch an operator to emergency purge the electrical generator using <u>Unit 1 EOP</u> Encl 5.17 (Generator Emergency Hydrogen Purge).	
20. Verify the reactor was shut down using AP/29 (Rapid Unit Shutdown).	__ **GO TO** Step 22.
21. __ **GO TO** Step 39.	
22. Ensure the following in DUMP: __ 1HD-37 __ 1HD-52	
23. __ Stop 1E1 HTR DRN PUMP.	
24. __ Place 1HD-254 switch to OPEN.	
25. __ Stop 1E2 HTR DRN PUMP.	
26. Place 1HD-276 switch to OPEN.	
27. Stop the following pumps: __ 1D1 HTR DRN PUMP __ 1D2 HTR DRN PUMP	
28. Ensure the following are stopped: __ 1A MSRH DRN PUMP __ 1B MSRH DRN PUMP	
29. __ Close 1SSH-9.	
30. Verify 1C COND BOOSTER PUMP operating.	1. __ Align CBPs for <u>one</u> pump operation. 2. __ **GO TO** Step 32.
31. Stop the following: __ 1A COND BOOSTER PUMP __ 1B COND BOOSTER PUMP	

IF AT ANY TIME:

(18) LDST > 90 ... (cycle 1HP-14, as necessary, to maintain level 50 - 95")

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
32. __ Place control switch for one shutdown CBP in AUTO.	
33. __ Stop all but one HWP.	
34. __ Place control switch for one idle HWP in AUTO.	
35. __ Ensure CBP LOAD SHED DEFEAT switch is positioned to a running CBP.	
36. __ Ensure HWP LOAD SHED DEFEAT switch is positioned to a running HWP.	
37. Close the following valves: 1MS-76 __ 1MS-79	
38. Start the following: __ TURBINE TURNING GEAR OIL PUMP __ 1A through 1E TURBINE BRNG OIL LIFT PUMP __ TURBINE MOTOR SUCTION PUMP	

IF AT ANY TIME:

(18) LDST > 90 ... (cycle 1HP-14, as necessary, to maintain level 50 - 95")

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
39. __ Initiate EOP Encl 5.9 (Extended EFDW Operation).	
40. __ Open 1AS-40 while closing 1MS-47.	
41. __ **IAAT** the boron addition is complete, **THEN** perform Steps 42 - 45.	**GO TO** Step 46.
42. __ Verify 1A CBAST PUMP was used for the boron addition.	1. __ Stop 1A BLEED TRANSFER PUMP. 2. __ Close 1CS-46. 3. __ **GO TO** Step 44.
43. __ Place 1A CBAST PUMP to MAN.	
44. Ensure 1HP-15 Controller reset for Normal Operations. A. __ Select "STOP" on 1HP-15 Controller to begin resetting batch size. B. __ Select "START" on 1HP-15 Controller to complete resetting batch size. C. __ Ensure 1HP-15 Controller Start/Stop set to "START". D. __ Ensure 1HP-15 Controller mode selector set to "MANUAL". E. __ Ensure 1HP-15 Controller valve position set to 100% open. F. __ Ensure 1HP-15 Controller display selector set to "P". G. __ Ensure 1HP-15 Controller display indicates "0".	
45. __ Close 1HP-16.	

IF AT ANY TIME:

(18) LDST > 90 ... (cycle 1HP-14, as necessary, to maintain level 50 - 95")

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

A copy of AP/47 (External Flood Mitigation) is available in the SSF Control Room file cabinet.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
46. **IAAT** Condition A is declared for the Jocassee dam <u>or</u> dikes, **THEN** perform Steps 47 - 50.	**GO TO** Step 51.
47. Proceed to the SSF with the following to standby for further direction: __ Plant radio with Channel 6 __ ITAC-4 radio __ NEO	
48. __ **WHEN** at the SSF, **THEN** establish communication with Unit 1 control room.	
49. __ Dispatch NEO to close FO-130 (SSF Fuel Oil Day Tank Vent Isolation) (SSF Diesel Engine Rm NW corner, Col D9).	
50. __ **WHEN** <u>all</u> units that have SG heat transfer available have staffed the SSF, **THEN** latch <u>all</u> dogs on the watertight door.	

IF AT ANY TIME:

(18) LDST > 90 ... (cycle 1HP-14, as necessary, to maintain level 50 - 95")

(46) Condition A is declared for the Jocassee dam <u>or</u> dikes ... (perform Steps to go to the SSF)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
51. __ As time permits <u>and</u> resources allow, begin preparation for LTOP by initiating Encl 5.7A (Unit 1 LTOP Actions).	
52. __ **WHEN** conditions permit, **THEN EXIT** this enclosure.	

••• END •••

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

Unit 1 is powering the Stdby Bus from CT-5 via Central Switchyard.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. __ Verify 2A CBAST PUMP is available to borate the RCS.	__ **GO TO** Step 10 to use the 2A BLEED TRANSFER PUMP.

NOTE

LHRA "E" MASTER key will be needed for access to LDST Hatch Area. The keys are the same for <u>all</u> 3 units although there is a Unit 1 and a Unit 2 sealed box in the WCC and a Unit 3 in the Unit 3 Control Room Procedures Room (by the north CR door).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2. __ Dispatch an operator to open 2CS-72 (CBAST Header to Letdown Filter Inlet) (A-2, LDST Hatch area).	
3. Open the following: __ 2HP-17 __ 2HP-18	
4. __ Open 2CS-64.	
5. __ Open 2HP-16.	
6. Perform the following on 2HP-15 controller: __ Select "S". __ Enter 3100 gallon batch size. __ Select "P".	
7. __ Place 2A CBAST PUMP to AUTO.	
8. __ **WHEN** notified 2CS-72 (CBAST to Letdown Filter Inlet) is open, **THEN** place 2A CBAST PUMP to ON.	
9. __ **GO TO** Step 17.	

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. Dispatch an operator to align 2A RC Bleed Transfer Pump to CBAST as follows: A. __ Ensure closed 2CS-60 (Bleed Transfer Pump Suction Tie) (A-1 BTP Rm). B. __ Close 2CS-148 (2A BHUT Outlet Block) (A-1 BTP Rm). C. __ Open 2CS-150 (2A Bleed Transfer Pump Suction Tie) (A-1 BTP Rm). D. __ Close 2CS-48 (2A BHUT Recirc) (A-1-Unit 2 BTP Rm). E. __ Open 2CS-66 (CBAST Tie To Bleed Xfer Pumps Suction) (A-1-hallway N of Col 82, reach rod operated).	
11. Open the following: __ 2HP-17 __ 2HP-18	
12. __ Open 2CS-64.	
13. __ Open 2HP-16.	
14. Perform the following on 2HP-15 controller: __ Select "S". __ Enter 3100 gallon batch size. __ Select "P". __ Select "Auto".	
15. __ Open 2CS-46.	

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16. __ **WHEN** notified that the following alignment is complete: __ 2CS-60 (Bleed Transfer Pump Suction Tie) closed __ 2CS-148 (2A BHUT Outlet Block) closed __ 2CS-150 (2A Bleed Transfer Pump Suction Tie) open __ 2CS-48 (2A BHUT Recirc) closed __ 2CS-66 (CBAST Tie To Bleed Xfer Pumps Suction) open **THEN** start 2A BLEED TRANSFER PUMP.	

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
17. __ **IAAT** LDST > 90", **THEN** cycle 2HP-14 to BLEED, as necessary, to maintain level 50 - 95".	

NOTE

- CCW-8 must be de-energized prior to submersion by lake water.
- CCW Emergency Discharge Siphon Flow may have been established automatically as a result of loss of power.
- CCW-8 will **NOT** close if 1CCW-1 - 6, 2CCW-7, and 3CCW-93 are full open.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
18. __ Verify CCW-8 is open.	__ **GO TO** Step 26.
19. __ Verify 1CCW-1 - 6 are closed.	Throttle 1CCW-1 - 6.
20. Verify 2CCW-7 is closed.	__ Throttle 2CCW-7.
21. __ Verify 3CCW-93 is closed.	__ Throttle 3CCW-93.
22. Close CCW-8.	
23. Perform the following: __ Close 1CCW-1 - 6. __ Place 1CCW-1 - 6 switch in PULL TO LOCK.	
24. Notify Unit 2 to perform the following: __ Close 2CCW-7. __ Place 2CCW-7 switch in PULL TO LOCK.	
25. Notify Unit 3 to perform the following: Close 3CCW-93. __ Place 3CCW-93 switch in PULL TO LOCK.	

NOTE

The same NEO can perform the next two steps.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
26. __ Dispatch an operator to open 1DP-F5C (CCW-8 Bkr (Emerg CCW Disch to Tailrace)) (T-3/L-24).	

IF AT ANY TIME:

(17) LDST > 90 ... (cycle 2HP-14, as necessary, to maintain level 50 - 95")

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
27. Dispatch an operator to emergency purge the electrical generator using <u>Unit 2 EOP</u> Encl 5.17 (Generator Emergency Hydrogen Purge).	
28. __ Verify the reactor was shut down using AP/29 (Rapid Unit Shutdown).	__ **GO TO** Step 30.
29. __ **GO TO** Step 47.	
30. Ensure the following in DUMP: __ 2HD-37 __ 2HD-52	
31. __ Stop 2E1 HTR DRN PUMP.	
32. __ Place 2HD-254 switch to OPEN.	
33. __ Stop 2E2 HTR DRN PUMP.	
34. __ Place 2HD-276 switch to OPEN.	
35. Stop the following pumps: __ 2D1 HTR DRN PUMP __ 2D2 HTR DRN PUMP	
36. Ensure the following are stopped: __ 2A MSRH DRN PUMP __ 2B MSRH DRN PUMP	
37. __ Close 2SSH-9.	
38. __ Verify 2C COND BOOSTER PUMP operating.	1. __ Align CBPs for <u>one</u> pump operation. 2. __ **GO TO** Step 40.
39. Stop the following: __ 2A COND BOOSTER PUMP __ 2B COND BOOSTER PUMP	

IF AT ANY TIME:

(17) LDST > 90 ... (cycle 2HP-14, as necessary, to maintain level 50 - 95")

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
40. Place control switch for one shutdown CBP in AUTO.	
41. __ Stop all but one HWP.	
42. __ Place control switch for one idle HWP in AUTO.	
43. __ Ensure CBP LOAD SHED DEFEAT switch is positioned to a running CBP.	
44. __ Ensure HWP LOAD SHED DEFEAT switch is positioned to a running HWP.	
45. Close the following valves: 2MS-76 __ 2MS-79	
46. Start the following: __ TURBINE TURNING GEAR OIL PUMP __ 2A through 2E TURBINE BRNG OIL LIFT PUMP TURBINE MOTOR SUCTION PUMP	

IF AT ANY TIME:

(17) LDST > 90 ... (cycle 2HP-14, as necessary, to maintain level 50 - 95")

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
47. __ Initiate EOP Encl 5.9 (Extended EFDW Operation).	
48. Open 2AS-40 while closing 2MS-47.	
49. __ **IAAT** the boron addition is complete, **THEN** perform Steps 50 - 53.	__ **GO TO** Step 54.
50. __ Verify 2A CBAST PUMP was used for the boron addition.	1. __ Stop 2A BLEED TRANSFER PUMP. 2. Close 2CS-46. 3. **GO TO** Step 52.
51. __ Place 2A CBAST PUMP to MAN.	
52. __ Ensure 2HP-15 Controller reset for Normal Operations. A. Select "STOP" on 2HP-15 Controller to begin resetting batch size. B. Select "START" on 2HP-15 Controller to complete resetting batch size. C. __ Ensure 2HP-15 Controller Start/Stop set to "START". D. Ensure 2HP-15 Controller mode selector set to "MANUAL". E. Ensure 2HP-15 Controller valve position set to 100% open. F. __ Ensure 2HP-15 Controller display selector set to "P". G. __ Ensure 2HP-15 Controller display indicates "0".	
53. __ Close 2HP-16.	

IF AT ANY TIME:

(17) LDST > 90 ... (cycle 2HP-14, as necessary, to maintain level 50 - 95")

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE A copy of AP/47 (External Flood Mitigation) is available in the SSF Control Room file cabinet.	
54. __ **IAAT** Condition A is declared for the Jocassee dam <u>or</u> dikes, **THEN** perform Steps 55 - 59.	__ **GO TO** Step 60.
55. Proceed to the SSF with the following to standby for further direction: __ Plant radio with Channel 6 ITAC-4 radio	
56. __ Verify Unit 1 was in MODE 1 - 3 prior to shutdown.	__ Dispatch a NEO to assist with SSF operation.
57. __ Establish communication with Unit 2 control room.	
58. __ Ensure NEO has been dispatched to close FO-130 (SSF Fuel Oil Day Tank Vent Isolation) (SSF Diesel Engine Rm NW corner, Col D9).	
59. **WHEN** <u>all</u> units that have SG heat transfer available have staffed the SSF, **THEN** ensure <u>all</u> dogs on the watertight door are latched.	

IF AT ANY TIME:

(17) LDST > 90 ... (cycle 2HP-14, as necessary, to maintain level 50 - 95")

(54) Condition A is declared for the Jocassee dam <u>or</u> dikes ... (perform Steps to go to the SSF)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
60. As time permits and resources allow, begin preparation for LTOP by initiating Encl 5.7B (Unit 2 LTOP Actions).	
61. __ **WHEN** conditions permit, **THEN EXIT** this enclosure.	

•••END•••

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE Unit 1 is powering the Stdby Bus from CT-5 via Central Switchyard.	
1. Verify 3A CBAST PUMP is available to borate the RCS.	**GO TO** Step 10 to use the 3A BLEED TRANSFER PUMP.
NOTE LHRA "E" MASTER key will be needed for access to LDST Hatch Area. The keys are the same for <u>all</u> 3 units although there is a Unit 1 and a Unit 2 sealed box in the WCC and a Unit 3 in the Unit 3 Control Room Procedures Room (by the north CR door).	
2. __ Dispatch an operator to open 3CS-72 (CBAST to Letdown Filter Inlet) (A-2, LDST Hatch area).	
3. Open the following: __ 3HP-17 __ 3HP-18	
4. __ Open 3CS-64.	
5. __ Open 3HP-16.	
6. Perform the following on 3HP-15 controller: __ Select "S". __ Enter 3100 gallon batch size. __ Select "P".	
7. __ Place 3A CBAST PUMP to AUTO.	
8. __ **WHEN** notified 3CS-72 (CBAST to Letdown Filter Inlet) is open, **THEN** place 3A CBAST PUMP to ON.	
9. **GO TO** Step 17.	

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10. Dispatch an operator to align 3A RC Bleed Transfer Pump to CBAST as follows: A. __ Ensure closed 3CS-60 (Bleed Transfer Pump Suction Tie) (A-1, Unit 3 BTP Pump). B. __ Close 3CS-148 (3A BHUT Outlet Block) (A-1-Unit 3 BTP Rm). C. __ Open 3CS-150 (Bleed Transfer Pump 3A Suction Tie) (A-1, Unit 3 BTP Rm). D. __ Close 3CS-48 (3A BHUT Recirc) (A-1-Unit 3 BTP Rm) E. __ Open 3CS-66 (CBAST Tie to Bleed Xfer Pumps Suction) (A-1-Hallway; 10' S Col 96).	
11. Open the following: __ 3HP-17 __ 3HP-18	
12. __ Open 3CS-64.	
13. __ Open 3HP-16.	
14. Perform the following on 3HP-15 controller: __ Select "S". __ Enter 3100 gallon batch size. __ Select "P". __ Select "Auto".	
15. __ Open 3CS-46.	

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16. __ **WHEN** notified that the following alignment is complete: __ 3CS-60 (Bleed Transfer Pump Suction Tie) closed __ 3CS-148 (3A BHUT Outlet Block) closed __ 3CS-150 (Bleed Transfer Pump 3A Suction Tie) open __ 3CS-48 (3A BHUT Recirc) closed __ 3CS-66 (CBAST Tie to Bleed Xfer Pumps Suction) open **THEN** start 3A BLEED TRANSFER PUMP.	

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
17. __ IAAT LDST > 90", **THEN** position 3HP-14 to BLEED maintain level 50 - 95".	
18. __ Dispatch an operator to emergency purge the electrical generator using Unit 3 EOP Encl 5.17 (Generator Emergency Hydrogen Purge).	
19. __ Verify the reactor was shut down using AP/29 (Rapid Unit Shutdown).	**GO TO** Step 21.
20. __ **GO TO** Step 38.	
21. Ensure the following in DUMP: __ 3HD-37 __ 3HD-52	
22. __ Stop 3E1 HTR DRN PUMP.	
23. __ Place 3HD-254 switch to OPEN.	
24. __ Stop 3E2 HTR DRN PUMP.	
25. __ Place 3HD-276 switch to OPEN.	
26. Stop the following pumps: __ 3D1 HTR DRN PUMP __ 3D2 HTR DRN PUMP	
27. Ensure the following are stopped: __ 3A MSRH DRN PUMP __ 3B MSRH DRN PUMP	
28. __ Close 3SSH-9.	
29. __ Verify 3C COND BOOSTER PUMP operating.	1. __ Align CBPs for one pump operation. 2. __ **GO TO** Step 31.
30. Stop the following: __ 3A COND BOOSTER PUMP __ 3B COND BOOSTER PUMP	

IF AT ANY TIME:

(17) LDST > 90 ... (cycle 3HP-14, as necessary, to maintain level 50 - 95")

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
31. __ Place control switch for <u>one</u> shutdown CBP in AUTO.	
32. Stop <u>all but one</u> HWP.	
33. __ Place control switch for <u>one</u> idle HWP in AUTO.	
34. __ Ensure CBP LOAD SHED DEFEAT switch is positioned to a running CBP.	
35. __ Ensure HWP LOAD SHED DEFEAT switch is positioned to a running HWP.	
36. Close the following valves: __ 3MS-76 __ 3MS-79	
37. Start the following: __ TURBINE TURNING GEAR OIL PUMP __ 3A through 3E TURBINE BRNG OIL LIFT PUMP __ TURB MOTOR SUCTION PUMP	

IF AT ANY TIME:

(17) LDST > 90 ... (cycle 3HP-14, as necessary, to maintain level 50 - 95")

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
38. Initiate EOP Encl 5.9 (Extended EFDW Operation).	
39. __ Open 3AS-40 while closing 3MS-47.	
40. __ IAAT the boron addition is complete, **THEN** perform Steps 41 - 44.	__ **GO TO** Step 45.
41. Verify 3A CBAST PUMP was used for the boron addition.	1. __ Stop 3A BLEED TRANSFER PUMP. 2. __ Close 3CS-46. 3. __ **GO TO** Step 43.
42. __ Place 3A CBAST PUMP to MAN.	
43. __ Ensure 3HP-15 Controller reset for Normal Operations. A. __ Select "STOP" on 3HP-15 Controller to begin resetting batch size. B. __ Select "START" on 3HP-15 Controller to complete resetting batch size. C. Ensure 3HP-15 Controller Start/Stop set to "START". D. Ensure 3HP-15 Controller mode selector set to "MANUAL". E. __ Ensure 3HP-15 Controller valve position set to 100% open. F. __ Ensure 3HP-15 Controller display selector set to "P". G. Ensure 3HP-15 Controller display indicates "0".	
44. __ Close 3HP-16.	

IF AT ANY TIME:

(17) LDST > 90 ... (cycle 3HP-14, as necessary, to maintain level 50 - 95")

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

A copy of AP/47 (External Flood Mitigation) is available in the SSF Control Room file cabinet.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
45. __ **IAAT** Condition A is declared for the Jocassee dam or dikes, **THEN** perform Steps 46 - 50.	**GO TO** Step 51.
46. Proceed to the SSF with the following to standby for further direction: __ Plant radio with Channel 6 __ ITAC-4 radio	
47. Verify either of the following was in MODE 1 - 3 prior to shutdown: __ Unit 1 __ Unit 2	__ Dispatch a NEO to assist with SSF operation.
48. __ Establish communication with Unit 3 control room.	
49. Ensure NEO has been dispatched to close FO-130 (SSF Fuel Oil Day Tank Vent Isolation) (SSF Diesel Engine Rm NW corner, Col D9).	
50. __ **WHEN** all units that have SG heat transfer available have staffed the SSF, **THEN** latch all dogs on the watertight door.	

IF AT ANY TIME:

(17) LDST > 90 ... (cycle 3HP-14, as necessary, to maintain level 50 - 95")

(45) Condition A is declared for the Jocassee dam or dikes ... (perform Steps to go to the SSF)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
51. __ As time permits and resources allow, begin preparation for LTOP by initiating Encl 5.7C (Unit 3 LTOP Actions).	
52. **WHEN** conditions permit, **THEN EXIT** this enclosure.	

••• **END** •••

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

The following are available means to communicate during a Jocassee flooding event in order of priority. If Plant radio Channel 6 does not work, switch to Plant radio Channel 1, then ITAC-4, as necessary.

1st choice: Plant radio Channel 6. Available on all OPS, SPOC, and Security plant radios. Repeater is power backed up and above flood plain.

2nd choice: Plant radio Channel 1. Available on all OPS, SPOC, and Security plant radios. Repeater is UPS backed-up for 4 hours after loss of power and located on top of Aux Bldg.

3rd choice: ITAC-4 radio. This is a special radio that is available to OPS, SPOC, and Security. Repeater is power backed up and above flood plain. Offsite Agencies can communicate on this radio. Radios are located in SPOC Supervisor's office, Unit 1&2 Control Room, Unit 3 Control Room, and the TSC.

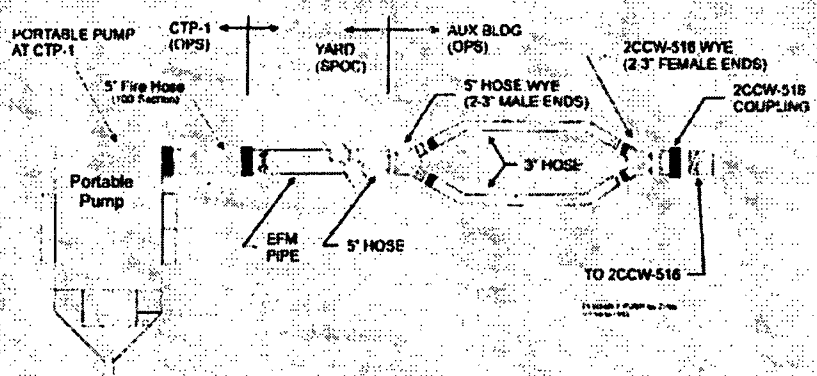
Other options and communication information:

- Plant Channel 2. Line of sight use only.
- Plant phones until the site is flooded. Plant phone system is located on 2nd floor of the Oconee Office Building.
- Satellite phone in Control Room
- Security Cell phone (Central Alarm Station (CAS) is 864-973-5901. Secondary Alarm Station (SAS) is 864-973-5902.)
- Personal Cell phones

1. Obtain <u>all</u> the following:
   - __ Plant Radio with Channel 6 (OPS Radio)
   - __ ITAC-4 radio (located in TSC)
   - __ Extra battery for <u>each</u> radio

Figure 1

Hose Pull for OTSG Makeup From Portable Pump



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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

- Hose and couplings are located outside of Unit 2 Seal Supply Filter Room.
- SPOC will be routing 5″ fire hose to Unit 2 AB roll up door per Encl 5.5 (Hose Routing and Hale Pump Relocation).
- Steps 2 - 10 may be performed in any order or parallel.

2. Locate the following equipment in External Flood Mitigation (EFM) Equipment Storage Box outside Unit 2 Seal Supply Filter Rm:

✓	Qty	Item
	1	5″ Hose Wye (2 - 3″ male ends)
	1	2CCW-516 Wye (2 - 3″ female ends)
	1	2CCW-516 coupling (pipe thread to STORZ)
	10	50 ft sections of 3″ fire hose reverse wound (male end out)
	1	Door Stop
	1	Strap Wrench

NOTE

Residual water from previous valve stroke test may be present when pipe cap is removed.

3. __ Using strap wrench, remove pipe cap from 2CCW-516 (ASW Emergency Connection) (A-2, CC Cooler Rm, Col S76).

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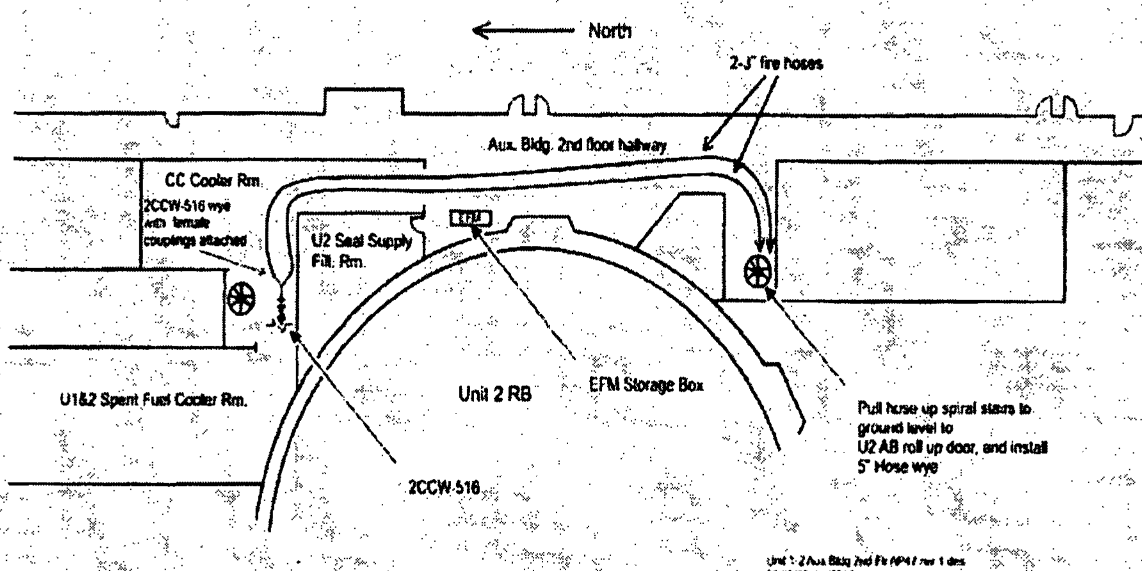
ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. __ Connect "2CCW-516 coupling" to 2CCW-516 (ASW Emergency Connection) (A-2, CC Cooler Rm, Col S76).	
5. __ Connect the "2CCW-516 Wye" to "2CCW-516 coupling" installed in previous step.	

NOTE

- A door stop for holding door open at top of spiral staircase is available in EFM Equipment Storage Box.
- Fire hoses are intentionally reverse rolled to allow deployment from 2CCW-516 to Unit 2 AB roll up door.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. __ Attach 3" fire hose to each coupling and route to Unit 2 AB roll up door through spiral staircase per Figure 2 below.	

Figure 2



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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7. __ Connect the "5" Hose Wye" to each fire hose.	
8. __ Meet SPOC at Unit 2 AB roll up door.	
9. __ Connect the "5" Hose Wye" to the 5" fire hose.	
10. __ Close CCW-309 (Aux Service Water Pump Disch Drain) (A-1, Rm 128 at discharge of Station ASW Pump).	**NOTE** Pipe wrench is available in tool bag in OPS Emergency Equipment cabinet (1st floor Aux Bldg). __ Install a pipe cap.
11. __ Proceed to CTP-1.	
12. __ **WHEN** at CTP-1, **THEN** locate 2 - 50' sections of 5" fire hose staged at EFM Pump.	
13. __ Connect the 2 - 50' sections of 5" fire hose to create 1 - 100' section.	
14. __ Route fire hose down CTP-1 dike to the EFM pipe.	
15. __ Connect fire hose to EFM pipe.	

NOTE

- The Hale Pump will be used first. The External Flood Mitigation (EFM) Pump that is staged at CTP-1 will be the back-up pump in the event the Hale Pump fails.
- The suction hose is beside the CTP-1 platform attached to the floating strainer in CTP-1.
- The discharge hose is the 5" fire hose routed down the CTP-1 dike to the EFM pipe.

16. **WHEN** SPOC brings Hale Pump from the intake, **THEN GO TO** Encl 5.11 (Portable Pump Operation). **(PS)**	

• • • **END** • • •

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

The following are available means to communicate during a Jocassee flooding event in order of priority. If Plant radio Channel 6 does not work, switch to Plant radio Channel 1, then ITAC-4, as necessary.

1st choice: Plant radio Channel 6. Available on all OPS, SPOC, and Security plant radios. Repeater is power backed up and above flood plain.

2nd choice: Plant radio Channel 1. Available on all OPS, SPOC, and Security plant radios. Repeater is UPS backed-up for 4 hours after loss of power and located on top of Aux Bldg.

3rd choice: ITAC-4 radio. This is a special radio that is available to OPS, SPOC, and Security. Repeater is power backed up and above flood plain. Offsite Agencies can communicate on this radio. Radios are located in SPOC Supervisor's office, Unit 1&2 Control Room, Unit 3 Control Room, and the TSC.

Other options and communication information:

- Plant Channel 2. Line of sight use only.
- Plant phones until the site is flooded. Plant phone system is located on 2nd floor of the Oconee Office Building.
- Satellite phone in Control Room
- Security Cell phone (Central Alarm Station (CAS) is 864-973-5901. Secondary Alarm Station (SAS) is 864-973-5902.)
- Personal Cell phones

1. __ Ensure Plant radio is on Channel 6.	

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

- The EFM Trailer (External Flood Mitigation) is located on the south side of the Oconee Office Building.
- The EDM Trailer (Extensive Damage Mitigation) is located at the CCW intake boat ramp.
- Operations will be connecting fire hose from 2CCW-516 (ASW Emergency Connection) to Unit 2 Aux Bldg roll up door to connect to 5" fire hose from the External Flood Mitigation (EFM) Pipe.
- Keys for Fire Rescue Truck are in OOB 1st floor elevator lobby North Wall key box (combination 4911).
- A trailer hitch is available in box on the front of the External Flood Mitigation (EFM) Trailer.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2. __ Obtain keys for Fire Rescue or equivalent truck. w/keys	__ **IF NO** truck is available, **THEN** the hose will be flaked by hand.

CAUTION

Due to the short tongue on the EFM trailer, sharp turns with the towing vehicle may cause truck bumper to contact trailer resulting in damage to the trailer.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3. __ Connect External Flood Mitigation (EFM) Trailer to the Fire Rescue or equivalent truck.	1. __ Lay and connect fire hose on white marked EFM path from EFM pipe (southwest side of OOB near trench) to Unit 2 AB roll up door (reference Figure 1 on Page 13 of 13). 2. __ Assist Operations in making connections in Unit 2 work area. 3. **GO TO** Step 10.

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. __ Remove any wheel chocks and place in EFM Trailer.	

NOTE

- Key for fence gate at Unit 2 AB roll up door is in EFM Trailer tool box.
- Steps 5 - 7 can be performed in any order or parallel, as needed.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. __ Using Fire Rescue or equivalent truck, flake 5" fire hose in EFM Trailer from Unit 2 AB roll up door to EFM pipe (southwest side of OOB near trench) on white marked EFM path (reference Figure 1 on Page 13 of 13).	DATE ON HOSES FOR PRESSURE TEST
6. __ Using choker and shackle, secure hose to anchor points noted on Figure 1 on Page 13 of 13.	
7. Assist Operations in making connections at the Unit 2 AB roll up door.	
8. Using Fire Rescue or equivalent truck, take EFM Trailer to the EWST and chock wheels.	

NOTE

Keys should **NOT** be left in the truck if this is a drill due to Security regulations.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. __ Verify this is a drill.	__ **IF** this is an emergency, **THEN** ensure keys are left in the truck.
10. __ Verify SPOC vehicle or equivalent truck is available to move equipment.	1. __ Notify Security (x-2309, 2222) to bring Security truck to PAP. 2. Meet Security at the PAP and go to Hale Pump Bldg. 3. __ **GO TO** Step 13.
11. __ Notify Security (x-2309, 2222) to take Security truck to Hale Pump Bldg (CCW Intake boat ramp).	
12. __ Meet Security at Hale Pump Bldg.	

SECURITY MINIMUM STAFFING
FOR FLOOD MITIGATION
(1) SITE RELOCATION → TIME
(1) # OF PEOPLE
(2) MOVE HALE PUMP

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

Combination lockbox located on Hale Pump Bldg personnel access door contains keys to building and padlocks on EDM Trailer. Combination is 3271. These keys will need to remain with the Hale Pump and EDM Trailer to ensure access to both.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13. __ Obtain keys to Hale Pump and EDM Trailer.	

NOTE

A trailer hitch is located in toolbox on front of EDM trailer.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14. __ Connect EDM Trailer to truck and secure for towing.	
15. __ Remove wheel chocks and place in EDM Trailer.	
16. __ Verify another truck is available to take Hale Pump.	1. __ Have one Technician initiate Steps 17 - 22 in parallel to moving EDM Trailer. 2. __ Take EDM Trailer to CTP-1. 3. __ Stage EDM Trailer on suitable surface at CTP-1 that doesn't block access to entrance or the dike. 4. __ Chock wheels to prevent rolling. 5. __ Disconnect EDM Trailer from truck. 6. __ Return to Hale Pump Bldg to get Hale Pump Trailer. 7. __ Ensure Steps 17 - 22 are complete. 8. __ **GO TO** Step 23.

NOTE

Exhaust flapper and tools necessary to perform this enclosure are located in storage box on the front of the Hale Pump Trailer.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
17. __ Disconnect Hale Pump exhaust discharge from installed exhaust duct.	
18. __ Install exhaust flapper on Hale Pump exhaust.	
19. __ Disconnect the 4 drain hoses located under the rear of the Hale Pump.	

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
20. Unplug battery charger <u>and</u> engine block heater.	
21. __ Raise 4 corner stabilizer jacks.	

NOTE
A Non-venting Fuel Cap is located in toolbox on front of Hale Pump trailer in a pink FME bag. [5]

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
22. Perform the following on Hale Pump: [5] A. __ Replace Vented Fuel Cap with Non-venting Fuel Cap. B. __ Store Vented Fuel Cap in toolbox on front of Hale Pump trailer.	

NOTE
A trailer hitch is located in toolbox on front of Hale Pump trailer.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
23. __ Connect Hale Pump Trailer to the truck <u>and</u> secure for towing.	
24. __ Release parking brake located on left-hand side of trailer tongue.	
25. Verify two trucks are being used to re-locate Hale Pump <u>and</u> EDM Trailer.	1. Take Hale Pump to the CTP-1. 2. __ Stage Hale Pump on CTP-1 dike with back of trailer at the suction hose. 3. __ Chock wheels to prevent rolling. 4. __ Level Hale Pump with stabilizer jacks. 5. __ **GO TO** Step 32.
26. Take Hale Pump <u>and</u> EDM Trailer to CTP-1.	
27. Stage Hale Pump on CTP-1 dike with back of trailer at the suction hose.	
28. Level Hale Pump with stabilizer jacks.	
29. __ Chock wheels to prevent rolling.	
30. __ Stage EDM Trailer on suitable surface at CTP-1 <u>that doesn't block access to entrance or the dike</u>.	
31. __ Chock wheels to prevent rolling.	

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE A Vented Fuel Cap is located in toolbox on front of Hale Pump trailer. {5}	
32. Perform the following on Hale Pump: {5} A. __ Replace Non-venting Fuel Cap with Vented Fuel Cap. B. __ Store Non-venting Fuel Cap in toolbox on front of Hale Pump trailer.	
33. __ Notify the OSM of the completion of this enclosure.	
34. Ensure keys for the following are left with operator: __ Hale Pump __ EDM Trailer __ Truck	
35. Return to plant to assist with other necessary activities.	

••• END •••

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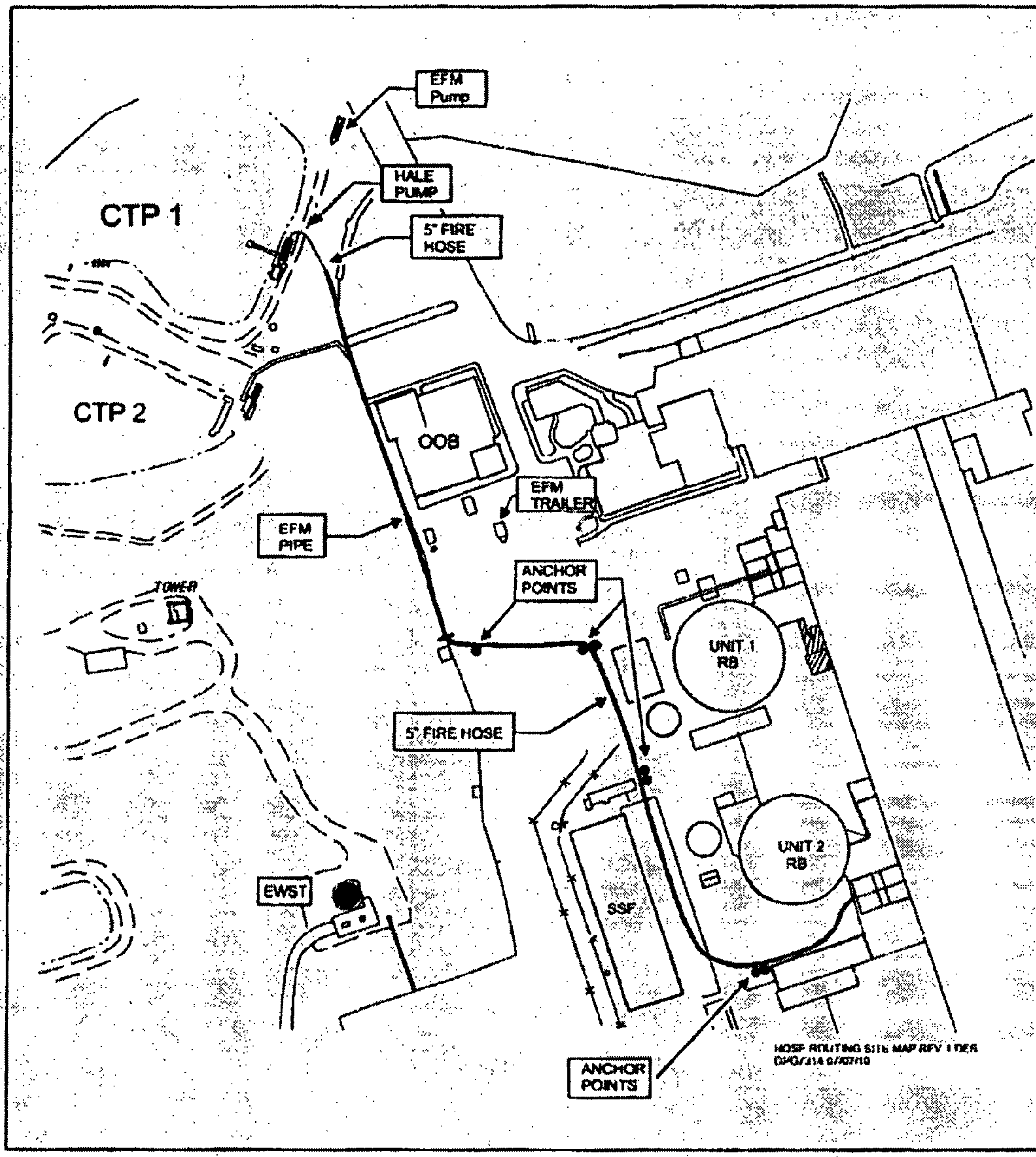
Figure 1


EFM Pump
HALE PUMP
5" FIRE HOSE
CTP 1
CTP 2
OOB
EFM TRAILER
EFM PIPE
ANCHOR POINTS
TOWER
UNIT 1 RB
5" FIRE HOSE
UNIT 2 RB
SSF
EWST
ANCHOR POINTS

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WHEN DOES SITE LOSE POWER?

Enclosure 5.6
External Flood Mitigation Information

NOTE

- This timeline is an estimate for information purposes only.[3] The actual event could be slower or faster and actual water heights may vary.
- T=0 is dam failure, **NOT** when Condition B is declared.

COPY OF TIME TRUK?

Time (hours:minutes)

0:00 – Initiation of Jocassee Dam failure is assumed.

1:33 – ONS Intake Canal water height reaches elevation 802' (Hale pump building begins to flood).

No Power **1:58** – Flood waters crest both the Keowee Main Dams and West Saddle (Elev. 815').

2:05 – Conservatively assume both bridges on Highway 183 are lost due to flood waters.

2:15 – Flood waters rise in tailrace beginning to flood Turbine Building via drain.

2:52 – Flood waters crest the Intake Canal Dike (Elev. 815') and begins flooding the ONS yard. Conservatively assume CT-5 is lost at this time. Also, Little River Dam is overtopping resulting in a loss of Highway 130 route to ONS.

3:01 – SSF Function is lost as flood waters in the ONS yard begin overtopping SSF flood wall (Elev. 803.5').

3:10 – Penetration rooms are **NOT** accessible as flood waters in the ONS yard reach elevation 809'.

3:42 – Flood waters in the ONS yard reach the 1st peak elevation of 815.5' (19.5' above yard level).

3:48 – Penetration rooms are accessible as flood waters recede below elevation 809'.

6:16 – Flood waters have receded to approximately 2' (Elev. 798') in the ONS yard.

7:55 – Flood waters have receded to approximately 1' (Elev. 797') in the ONS yard.

High Priority Item	Critical Time	Performed by	Procedure Location
Route hose & move Equipment	Prior flooding yard (Elev 796')	OPS, SPOC, & Security	Encl 5.4 (OPS) Encl 5.5 (SPOC & Security)
Open 2CCW-516	Prior flooding yard (Elev 796')	NEO	Section 4A
Isolate CF Tanks	Prior to loss of CT-5	NEO	Section 4A, 4B, 4C
Isolate Seal Return	Prior to loss of SSF	CR Team or SSF operator	Section 4A, 4B, 4C
RCS @ 250F/300#	Prior to loss of RCPs (loss of switchyard)	CR Team	Section 4A, 4B, 4C

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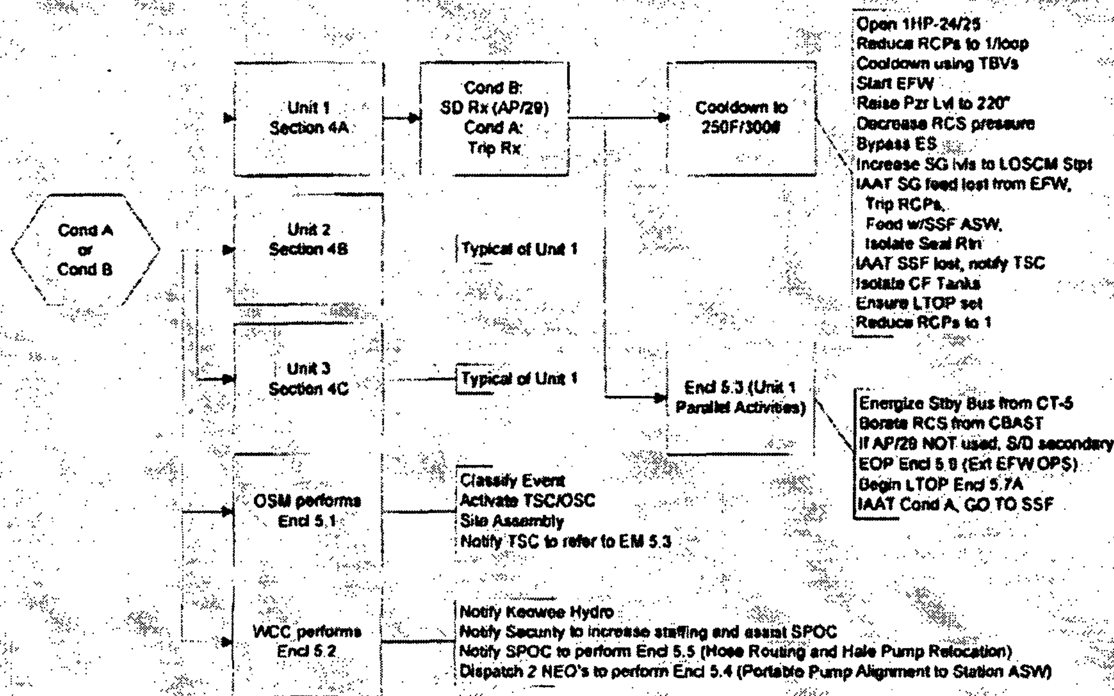
AP/47 Simplified Flow Diagram for Oversight



1,050,000 gal H_2O in CTP #1 → How to VERIFY?

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. Prepare "Do Not Operate" White Tags for the following: __ 1CF-1 HW __ 1CF-2 HW __ 1HP-26 HW __ 1HP-27 HW __ 1XO-F5C (1CF-1 BKR (1A CFT DISCH)) __ 1XP-F5C (1CF-2 BKR (1B CFT DISCH ISOL)) 1XS1-F5E (1HP-26 BKR (ES-1 1A HP INJ)) __ 1XS2-F3C (1HP-27 BKR (ES-2 1B HP INJ)) __ 1HP-409 CR switch __ 1HP-410 CR switch	

NOTE

Priority should be given to SPOC performing hose route and equipment relocation. Additional resources should be called in as necessary.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2. __ Notify SPOC to perform LTOP instrument calibration for Unit 1 per IP/0/A/0200/047 (Reactor Coolant System LTOP Instrument Calibration).	
3. Hang White Tags on the following: __ 1CF-1 HW (R-1, NW under 1A CFT) __ 1CF-2 HW (R-1, SW under 1B CFT)	__ Log TS 3.4.12 (Low Temperature Overpressure Protection (LTOP) System) entry and take required actions.
4. Hang White Tags on the following: __ 1HP-26 HW (A-4, East Pen Rm) __ 1HP-27 HW (A-4, West Pen Rm)	__ Log TS 3.4.12 (Low Temperature Overpressure Protection (LTOP) System) entry and take required actions.

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. Close valves <u>and</u> White Tag the following switches: __ 1HP-409 __ 1HP-410	__ Log TS 3.4.12 (Low Temperature Overpressure Protection (LTOP) System) entry <u>and</u> take required actions.
6. __ **WHEN** RCS pressure < 800 psig **AND** <u>both</u> the following are closed: __ 1CF-1 __ 1CF-2 **THEN** open <u>and</u> White Tag the following: __ 1XO-F5C (1CF-1 BKR (1A CFT DISCH)) __ 1XP-F5C (1CF-2 BKR (1B CFT DISCH ISOL))	__ Log TS 3.4.12 (Low Temperature Overpressure Protection (LTOP) System) entry <u>and</u> take required actions.
7. __ **WHEN** RCS temperature < 350°F, **THEN** perform the following: A. Close valves <u>and</u> White Tag the following switches: __ 1HP-26 __ 1HP-27 B. Open <u>and</u> White Tag the following: __ 1XS1-F5E (1HP-26 BKR (ES-1 1A HP INJ)) __ 1XS2-F3C (1HP-27 BKR (ES-2 1B HP INJ))	Log TS 3.4.12 (Low Temperature Overpressure Protection (LTOP) System) entry <u>and</u> take required actions.
8. __ Notify the CR SRO of the completion of this enclosure.	
9. __ **WHEN** conditions permit, **THEN EXIT** this Enclosure.	

• • • END • • •

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. Prepare "Do Not Operate" White Tags for the following: __ 2CF-1 HW __ 2CF-2 HW __ 2HP-26 HW __ 2HP-27 HW __ 2XO-F5C (2CF-1 BKR (2A CFT DISCH ISOL)) __ 2XP-F4C (2CF-2 BKR (2B CFT DISCH ISOL)) __ 2XS4-F4B (2HP-26 BKR (ES-1 2A HP INJ TO REACTOR INLET)) __ 2XS5-F4B (2HP-27 BKR (ES-2 2B HP INJ)) __ 2HP-409 CR switch __ 2HP-410 CR switch	

NOTE

Priority should be given to SPOC performing hose route and equipment relocation. Additional resources should be called in as necessary.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2. __ Notify SPOC to perform LTOP instrument calibration for Unit 2 per IP/0/A/0200/047 (Reactor Coolant System LTOP Instrument Calibration).	
3. Hang White Tags on the following: __ 2CF-1 HW (R-1, SW under 2A CFT) __ 2CF-2 HW (R-1, NW under 2B CFT)	__ Log TS 3.4.12 (Low Temperature Overpressure Protection (LTOP) System) entry <u>and</u> take required actions.
4. Hang White Tags on the following: __ 2HP-26 HW (A-4-East Pen Rm) __ 2HP-27 HW (A-4-West Pen Rm)	__ Log TS 3.4.12 (Low Temperature Overpressure Protection (LTOP) System) entry <u>and</u> take required actions.

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. Close valves <u>and</u> White Tag the following switches: __ 2HP-409 __ 2HP-410	__ Log TS 3.4.12 (Low Temperature Overpressure Protection (LTOP) System) entry <u>and</u> take required actions.
6. **WHEN** RCS pressure < 800 psig **AND** <u>both</u> the following are closed: __ 2CF-1 __ 2CF-2 **THEN** open <u>and</u> White Tag the following: __ 2XO-F5C (2CF-1 BKR (2A CFT DISCH ISOL)) __ 2XP-F4C (2CF-2 BKR (2B CFT DISCH ISOL))	__ Log TS 3.4.12 (Low Temperature Overpressure Protection (LTOP) System) entry <u>and</u> take required actions.
7. **WHEN** RCS temperature < 350°F, **THEN** perform the following: A. Close valves <u>and</u> White Tag the following switches: __ 2HP-26 __ 2HP-27 B. Open <u>and</u> White Tag the following: __ 2XS4-F4B (2HP-26 BKR (ES-1 2A HP INJ TO REACTOR INLET)) __ 2XS5-F4B (2HP-27 BKR (ES-2 2B HP INJ))	Log TS 3.4.12 (Low Temperature Overpressure Protection (LTOP) System) entry <u>and</u> take required actions.
8. __ Notify the CR SRO of the completion of this enclosure.	
9. __ **WHEN** conditions permit, **THEN EXIT** this Enclosure.	

• • • END • • •

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. Prepare "Do Not Operate" White Tags for the following: __ 3CF-1 HW __ 3CF-2 HW __ 3HP-26 HW __ 3HP-27 HW __ 3XO-F5C (3CF-1 BKR (3A CFT DISCH ISOL)) __ 3XP-F5C (3CF-2 BKR (3B CFT DISCH ISOL)) __ 3XS4-F4B (3HP-26 BKR (ES-1 3A HPI INJ)) __ 3XS5-F4B (3HP-27 BKR (ES-2 3B HPI INJ)) __ 3HP-409 CR switch __ 3HP-410 CR switch	

NOTE

Priority should be given to SPOC performing hose route and equipment relocation. Additional resources should be called in as necessary.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2. __ Notify SPOC to perform LTOP instrument calibration for Unit 3 per IP/0/A/0200/047 (Reactor Coolant System LTOP Instrument Calibration).	
3. Hang White Tags on the following: __ 3CF-1 HW (R-1, SW under 3A CFT) __ 3CF-2 HW (R-1, W side under 3B CFT)	Log TS 3.4.12 entry <u>and</u> take required actions.
4. Hang White Tags on the following: __ 3HP-26 HW (A-4 East Pen Rm) __ 3HP-27 HW (A-4 West Pen Rm)	Log TS 3.4.12 entry <u>and</u> take required actions.

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. Close valves <u>and</u> White Tag the following switches: __ 3HP-409 3HP-410	Log TS 3.4.12 (Low Temperature Overpressure Protection (LTOP) System) entry <u>and</u> take required actions.
6. __ **WHEN** RCS pressure < 800 psig **AND** <u>both</u> the following are closed: __ 3CF-1 __ 3CF-2 **THEN** open <u>and</u> White Tag the following: __ 3XO-F5C (3CF-1 BKR (3A CFT DISCH ISOL)) __ 3XP-F5C (3CF-2 BKR (3B CFT DISCH ISOL))	__ Log TS 3.4.12 (Low Temperature Overpressure Protection (LTOP) System) entry <u>and</u> take required actions.
7. __ **WHEN** RCS temperature < 350°F, **THEN** perform the following: A. Close valves <u>and</u> White Tag the following switches: __ 3HP-26 3HP-27 B. Open <u>and</u> White Tag the following: 3XS4-F4B (3HP-26 BKR (ES-1 3A HPI INJ)) __ 3XS5-F4B (3HP-27 BKR (ES-2 3B HPI INJ))	Log TS 3.4.12 (Low Temperature Overpressure Protection (LTOP) System) entry <u>and</u> take required actions.
8. Notify the CR SRO of the completion of this enclosure.	
9. __ **WHEN** conditions permit, **THEN EXIT** this Enclosure.	

• • • END • • •

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

The following are available means to communicate during a Jocassee flooding event in order of priority. If Plant radio Channel 6 does not work, switch to Plant radio Channel 1, then ITAC-4, as necessary.

1st choice: Plant radio Channel 6. Available on all OPS, SPOC, and Security plant radios. Repeater is power backed up and above flood plain.

2nd choice: Plant radio Channel 1. Available on all OPS, SPOC, and Security plant radios. Repeater is UPS backed-up for 4 hours after loss of power and located on top of Aux Bldg.

3rd choice: ITAC-4 radio. This is a special radio that is available to OPS, SPOC, and Security. Repeater is power backed up and above flood plain. Offsite Agencies can communicate on this radio. Radios are located in SPOC Supervisor's office, Unit 1&2 Control Room, Unit 3 Control Room, and the TSC.

Other options and communication information:

- Plant Channel 2. Line of sight use only.
- Plant phones until the site is flooded. Plant phone system is located on 2nd floor of the Oconee Office Building.
- Satellite phone in Control Room
- Security Cell phone (Central Alarm Station (CAS) is 864-973-5901. Secondary Alarm Station (SAS) is 864-973-5902.)
- Personal Cell phones

NOTE

Based on inundation models, flood waters will be below the SSF HVAC room.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. __ IAAT water is observed over-topping the SSF wall or flowing under doors, **THEN GO TO** Step 41.	

IF AT ANY TIME:

(1) water is observed over-topping the SSF wall or flowing under doors ... (Secure SSF RC Makeup, Trip SSF DG, notify CR, and go to SSF HVAC Rm)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2. Perform the following at 1XSF 600V MOTOR CONTROL CENTER in the SSF HVAC room: A. __ Open 1XSF-F5A (1XSF Norm Fdr Bkr From 1X8) <u>and</u> remove Kirk Key. B. __ Using Kirk Key, close 1XSF-F3A (1XSF Emerg Fdr Bkr From OXSF).	
3. __ Verify SSF AUX SERVICE WTR PUMP is operating.	__ **GO TO** Step 5.
4. __ **GO TO** Step 15.	

NOTE

One or more units may be performing this enclosure for the respective unit. The first unit to begin this enclosure will take the lead in starting the SSF diesel.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. __ Verify SSF diesel being started by Unit 2 <u>or</u> Unit 3 personnel.	__ **GO TO** Step 7.
6. __ **WHEN** SSF AUX SERVICE WTR PUMP is operating, **THEN GO TO** Step 15.	
7. Depress DIESEL EMERGENCY START pushbutton.	
8. Verify SSF diesel operating.	1. __ Notify <u>affected</u> Unit Control Rooms that the SSF Diesel start was unsuccessful. 2. **EXIT** this enclosure.

IF AT ANY TIME:

(1) water is observed over-topping the SSF wall or flowing under doors ... (Secure SSF RC Makeup, Trip SSF DG, notify CR, and go to SSF HVAC Rm)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. __ Open OTS1-1.	1. Notify affected Unit Control Rooms that the SSF Diesel start was unsuccessful. 2. __ **EXIT** this enclosure.
10. __ **WHEN** 3 seconds have elapsed, **THEN** close OTS1-4.	1. Notify affected Unit Control Rooms that the SSF power transfer was unsuccessful. 2. __ **EXIT** this enclosure.
11. __ Close OTS1-3.	
12. __ Close OXSF-4B.	
13. __ Start the Diesel Engine Service Water Pump.	1. __ Depress RESET DIESEL GEN EMER START pushbutton. 2. __ Depress SSF DIESEL EMERGENCY STOP pushbutton. 3. __ Notify affected Unit Control Rooms that the SSF Diesel start was unsuccessful. 4. __ **EXIT** this enclosure.
14. __ Start SSF AUX SERVICE WTR PUMP.	
15. __ Close 1CCW-268.	
16. __ Open 1CCW-287.	
17. __ Notify Unit 1 CRO that SSF ASW Pump is operating and ready to feed.	
18. Ensure the following are closed: __ 1HP-3 __ 1HP-4 __ 1HP-20	

IF AT ANY TIME:

(1) water is observed over-topping the SSF wall or flowing under doors ... (Secure SSF RC Makeup, Trip SSF DG, notify CR, and go to SSF HVAC Rm)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
19. __ **IAAT** the CRO directs feeding, **THEN** perform Steps 20 - 23.	__ **GO TO** Step 24.
20. __ Verify feeding 1A SG is desired.	__ **GO TO** Step 22.
21. Open 1CCW-269.	
22. __ Verify feeding 1B SG is desired.	__ Close 1FDW-347.

NOTE

Once initiated, a continuous flow should be maintained to avoid unnecessary thermal cycling of EFDW nozzles.

23. Throttle the following as required to obtain OTSG level 240 - 260" **NOT** to exceed total flow limit for <u>all</u> three units per Table 1 below: __ 1CCW-268 __ 1CCW-410 (SSF ASW Pump To S/G Supply Bypass) (SSF basement catwalk)	

Table 1

Total SSF-ASW Flow Limits

- Time since Rx shutdown ≤ 1 hr: ≤ 1275 total SSF-ASW flow to <u>all</u> three units
- Time since Rx shutdown > 1 hr: ≤ 1000 total SSF-ASW flow to <u>all</u> three units

24. **IAAT** <u>both</u> SGs are being fed, **AND** balancing flow between SGs is desired, **THEN** adjust the following as required: __ 1CCW-269 __ 1FDW-347	

IF AT ANY TIME:

(1) water is observed over-topping the SSF wall or flowing under doors ... (Secure SSF RC Makeup, Trip SSF DG, notify CR, and go to SSF HVAC Rm)

(19) the CRO directs feeding ... (align valves and feed)

(24) both SGs are being fed **AND** balancing flow between SGs is desired ... (balance flows)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
25. __ **IAAT** Pzr level is ≥ 90", **THEN** cycle the following as needed to maintain RCS pressure stable: __ UNIT 1 PZR HTRS GROUP B __ UNIT 1 PZR HTRS GROUP C	
26. __ **IAAT** <u>all</u> the following exist: __ RCS Temperature > 260°F __ NO HPI Seal Injection __ NO CC **THEN** perform Steps 27 - 28.	__ **GO TO** Step 29.
27. __ Position OVERRIDE RC MAKEUP PUMP switch to START.	
28. Verify RC MAKEUP PUMP operating.	1. __ **IF** RC pressure < 2355 psig, **THEN** position RC PRESS INTLK BYPASSS (RCMUP) switch to BYPASS. 2. __ **IF** RC MAKEUP PUMP **NOT** operating **AND** RC pressure < 2355 psig, **THEN** perform the following: A. Open the following valves: __ 1SF-97 __ 1SF-82 __ 1HP-398 B. __ Position RC MAKEUP PUMP switch to ON.

IF AT ANY TIME:

(1) water is observed over-topping the SSF wall or flowing under doors ... (Secure SSF RC Makeup, Trip SSF DG, notify CR, and go to SSF HVAC Rm)

(19) the CRO directs feeding ... (align valves and feed)

(24) <u>both</u> SGs are being fed **AND** balancing flow between SGs is desired ... (balance flows)

(25) Pzr level is ≥ 90" ... (cycle Pzr heaters to maintain RCS pressure stable)

(26) RCS Temperature > 260°F **AND NO** HPI seal injection **AND NO** CC ... (start SSF RC Makeup Pump)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
29. __ **IAAT** RC Makeup Pump is operating **AND** Pzr level is increasing, **THEN** perform Step 30.	__ **GO TO** Step 31.

CAUTION

Damage to the motor for 1HP-426 may occur if the valve is cycled too frequently. To prevent damage, the valve should only be operated either fully open or fully closed and only as required to stay within the bands provided.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
30. Perform the following to stabilize RCS pressure <u>and</u> maintain Pzr level 90 - 310": [7] A. __ Open 1HP-428. B. __ Cycle 1HP-426, as required.	__ **IF** Pzr level continues to increase, **THEN** perform the following to stabilize RCS pressure <u>and</u> maintain Pzr level 90 - 310": [7] A. __ Open 1HP-417. B. __ Cycle 1HP-426, as required. __ **IF** Pzr level **CANNOT** be maintained < 310", **THEN** consult TSC for guidance on need to cycle SSF RC Makeup <u>or</u> cooldown.
31. __ **IAAT** SSF-ASW feed is **NO** longer required, **THEN** close the following: __ 1CCW-268 __ 1CCW-410 (SSF ASW Pump To S/G Supply Bypass) __ 1CCW-287 __ 1CCW-269	

IF AT ANY TIME:

(1) water is observed over-topping the SSF wall or flowing under doors ... (Secure SSF RC Makeup, Trip SSF DG, notify CR, and go to SSF HVAC Rm)

(19) the CRO directs feeding … (align valves and feed)

(24) <u>both</u> SGs are being fed AND balancing flow between SGs is desired … (balance flows)

(25) Pzr level is ≥ 90" ... (cycle Pzr heaters to maintain RCS pressure stable)

(26) RCS Temperature > 260°F AND NO HPI seal injection AND NO CC ... (start SSF RC Makeup Pump)

(29) RC Makeup Pump is operating AND Pzr level is increasing ... (control Pzr level)

(31) SSF-ASW feed is NO longer required ... (secure SG feed from SSF ASW)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
32. __ IAAT SSF RCMU was established for Unit 1, **AND** shutdown is desired, **THEN** perform the following: A. Position OVERRIDE RC MAKEUP PUMP switch to STOP. B. __ Position RC MAKEUP PUMP switch to OFF. C. __ Ensure RC PRESS INTLK BYPASS (RCMUP) switch is positioned to NORMAL. D. Close the following: 1SF-97 1SF-82 __ 1HP-398 1HP-428 __ 1HP-426 __ 1HP-417	

NOTE

Remaining plant actions need only be performed by one unit. Each unit has this enclosure in their EOP and remaining actions are identical in all enclosures. Determination of which unit should take the lead in performing these actions should be based on the number of units performing this enclosure and manpower availability.

33. __ Determine which unit will perform the remaining actions of this enclosure.	
34. Verify Unit 2 or 3 will perform remaining actions.	__ **GO TO** Step 36.
35. __ **WHEN** Station Management approves, **THEN EXIT** this enclosure.	

• • • END • • •

IF AT ANY TIME:

(1) water is observed over-topping the SSF wall or flowing under doors ... (Secure SSF RC Makeup, Trip SSF DG, notify CR, and go to SSF HVAC Rm)

(19) the CRO directs feeding … (align valves and feed)

(24) both SGs are being fed **AND** balancing flow between SGs is desired … (balance flows)

(25) Pzr level is ≥ 90" ... (cycle Pzr heaters to maintain RCS pressure stable)

(26) RCS Temperature > 260°F **AND NO** HPI seal injection **AND NO** CC ... (start SSF RC Makeup Pump)

(29) RC Makeup Pump is operating **AND** Pzr level is increasing ... (control Pzr level)

(31) SSF-ASW feed is **NO** longer required ... (secure SG feed from SSF ASW)

(32) SSF RCMU was established for Unit 1 **AND** shutdown is desired ... (secure SSF RC Makeup)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

Unit Status

Unit 1 has taken the lead to perform the remaining steps in this enclosure.

NOTE

Diversion of SSF Diesel Service Water discharge to the yard drain must be completed between 1 hour and 45 minutes and 2 hours of Emergency Start of SSF Diesel Generator.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
36. __ **IAAT** 1 hour and 45 minutes have elapsed since Emergency Start of SSF Diesel Generator, **THEN** perform the following: A. __ Open CCW-384 (Jacket Cooling Water To Yard Drain Isolation) (SSF D/G Rm, SW of B Diesel). B. __ Close CCW-286 (SSF Diesel Cooling Jacket Return) (SSF Pump Rm). C. __ Throttle CCW-285 (SSF Diesel Service Water Pump Discharge) to maintain 500 gpm through D/G (SSF Pump Rm).	
37. __ **IAAT** SSF Control Room temperature exceeds 85°F, **THEN** perform <u>one</u> of the following: __ Notify TSC to install portable spot coolers **OR** __ Remove power from SSF Security Computer as follows: A. __ Notify Security that power will be removed from the SSF Security Computer. B. __ Notify Local Information Technology (LIT) to remove power from the SSF Security Computer to reduce heat load.	

IF AT ANY TIME:

(1) water is observed over-topping the SSF wall or flowing under doors ... (Secure SSF RC Makeup, Trip SSF DG, notify CR, and go to SSF HVAC Rm)

(19) the CRO directs feeding ... (align valves and feed)

(24) <u>both</u> SGs are being fed **AND** balancing flow between SGs is desired ... (balance flows)

(25) Pzr level is ≥ 90" ... (cycle Pzr heaters to maintain RCS pressure stable)

(26) RCS Temperature > 260°F **AND NO** HPI seal injection **AND NO** CC ... (start SSF RC Makeup Pump)

(29) RC Makeup Pump is operating **AND** Pzr level is increasing ... (control Pzr level)

(31) SSF-ASW feed is **NO** longer required ... (secure SG feed from SSF ASW)

(32) SSF RCMU was established for Unit 1 **AND** shutdown is desired ... (secure SSF RC Makeup)

(36) 1 hour and 45 minutes have elapsed since Emergency Start of SSF Diesel Generator) ... (divert SSF diesel cooling water to yard drain)

(37) SSF Control Room temperature exceeds 85°F ... (notify SPOC or remove power)

<table>
<tr><th>ACTION/EXPECTED RESPONSE</th><th>RESPONSE NOT OBTAINED</th></tr>
<tr><td>38. __ Verify D/G operation within the following limits: [8]
<table>
<tr><th>Parameter</th><th>Limits</th></tr>
<tr><td>D/G Voltage</td><td>4160 - 4260 V</td></tr>
<tr><td>D/G Frequency</td><td>59.4 - 60.6 Hz</td></tr>
</table></td><td>__ IF D/G Voltage is outside limit, THEN adjust VOLTAGE REGULATOR to <u>maintain</u> D/G voltage 4160 - 4260 V.

IF D/G Frequency is outside limit, THEN adjust GOVERNOR CONTROL to <u>maintain</u> D/G frequency 59.7 - 60.3 Hz.</td></tr>
<tr><td>39. Verify D/G SER WTR PUMP FLOW 500 - 600 gpm.</td><td>_ Dispatch an operator to throttle CCW-285 (SSF Diesel Service Water Pump Discharge) to maintain 500 gpm through the Diesel Engine (SSF Pump Room).</td></tr>
<tr><td>40. __ WHEN Station Management approves, THEN EXIT this enclosure.</td><td></td></tr>
</table>

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
Unit Status Flood waters are overtopping the SSF wall.	
41. __ Ensure SSF RC Makeup Pump is secured.	
42. Close the following: 1SF-82 __ 1SF-97 __ 1HP-398 __ 1HP-426 __ 1HP-428	
43. __ **WHEN** all units have stopped SSF RC Makeup Pump and closed valves in Step 42, **THEN** continue.	
44. __ Depress RESET DIESEL GEN EMER START pushbutton.	
45. __ Depress SSF DIESEL EMERGENCY STOP pushbutton.	
46. __ Notify CR that SSF has been secured due to flooding.	
47. __ Re-locate all SSF personnel to the SSF HVAC room.	
48. __ **WHEN** Station Management approves, **THEN EXIT** this enclosure.	

•••END•••

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

The following are available means to communicate during a Jocassee flooding event in order of priority. If Plant radio Channel 6 does not work, switch to Plant radio Channel 1, then ITAC-4, as necessary.

1st choice: Plant radio Channel 6. Available on all OPS, SPOC, and Security plant radios. Repeater is power backed up and above flood plain.

2nd choice: Plant radio Channel 1. Available on all OPS, SPOC, and Security plant radios. Repeater is UPS backed-up for 4 hours after loss of power and located on top of Aux Bldg.

3rd choice: ITAC-4 radio. This is a special radio that is available to OPS, SPOC, and Security. Repeater is power backed up and above flood plain. Offsite Agencies can communicate on this radio. Radios are located in SPOC Supervisor's office, Unit 1&2 Control Room, Unit 3 Control Room, and the TSC.

Other options and communication information:

- Plant Channel 2. Line of sight use only.
- Plant phones until the site is flooded. Plant phone system is located on 2nd floor of the Oconee Office Building.
- Satellite phone in Control Room
- Security Cell phone (Central Alarm Station (CAS) is 864-973-5901. Secondary Alarm Station (SAS) is 864-973-5902.)
- Personal Cell phones

1. __ Ensure Plant radio is on Channel 6.	

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

- The EFM Trailer (External <u>Flood</u> Mitigation) is located on the south side of the Oconee Office Building.
- The EDM Trailer (Extensive <u>Damage</u> Mitigation) is located at the CCW intake boat ramp.
- Operations will be connecting fire hose from 2CCW-516 (ASW Emergency Connection) to Unit 2 Aux Bldg roll up door to connect to 5" fire hose from the External Flood Mitigation (EFM) Pipe.
- Keys for Fire Rescue Truck are in OOB 1st floor elevator lobby North Wall key box (combination 4911).
- A trailer hitch is available in box on the front of the External Flood Mitigation (EFM) Trailer.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2. __ Obtain keys for Fire Rescue <u>or</u> equivalent truck. WHERE	__ **IF NO** truck is available, **THEN** the hose will be flaked by hand.

CAUTION

Due to the short tongue on the EFM trailer, sharp turns with the towing vehicle may cause truck bumper to contact trailer resulting in damage to the trailer.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3. __ Connect External Flood Mitigation (EFM) Trailer to the Fire Rescue <u>or</u> equivalent truck.	1. __ Lay <u>and</u> connect fire hose on white marked EFM path from EFM pipe (southwest side of OOB near trench) to Unit 2 AB roll up door (reference Figure 1 on Page 13 of 13). 2. __ Assist Operations in making connections in Unit 2 work area. 3. **GO TO** Step 10.

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. __ Remove <u>any</u> wheel chocks <u>and</u> place in EFM Trailer.	

NOTE

- Key for fence gate at Unit 2 AB roll up door is in EFM Trailer tool box.
- Steps 5 - 7 can be performed in any order or parallel, as needed.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. __ Using Fire Rescue <u>or</u> equivalent truck, flake 5" fire hose in EFM Trailer from Unit 2 AB roll up door to EFM pipe (southwest side of OOB near trench) on white marked EFM path (reference Figure 1 on Page 13 of 13).	DATE ON HOSES FOR PRESSURE TEST
6. __ Using choker <u>and</u> shackle, secure hose to anchor points noted on Figure 1 on Page 13 of 13.	
7. Assist Operations in making connections at the Unit 2 AB roll up door.	
8. Using Fire Rescue <u>or</u> equivalent truck, take EFM Trailer to the EWST <u>and</u> chock wheels.	

NOTE

Keys should **NOT** be left in the truck if this is a drill due to Security regulations.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. __ Verify this is a drill.	__ **IF** this is an emergency, **THEN** ensure keys are left in the truck.
10. __ Verify SPOC vehicle <u>or</u> equivalent truck is available to move equipment.	1. __ Notify Security (x-2309, 2222) to bring Security truck to PAP. 2. Meet Security at the PAP <u>and</u> go to Hale Pump Bldg. 3. __ **GO TO** Step 13.
11. __ Notify Security (x-2309, 2222) to take Security truck to Hale Pump Bldg (CCW Intake boat ramp).	
12. Meet Security at Hale Pump Bldg.	SECURITY MINIMUM STAFFING FOR FLOOD MITIGATION ① SITE RELOCATION → TIME ② # OF PEOPLE ③ MOVE HALE PUMP

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE Combination lockbox located on Hale Pump Bldg personnel access door contains keys to building and padlocks on EDM Trailer. Combination is 3271. These keys will need to remain with the Hale Pump and EDM Trailer to ensure access to both.	
13. __ Obtain keys to Hale Pump and EDM Trailer.	
NOTE A trailer hitch is located in toolbox on front of EDM trailer.	
14. __ Connect EDM Trailer to truck and secure for towing.	
15. __ Remove wheel chocks and place in EDM Trailer.	
16. __ Verify another truck is available to take Hale Pump.	1. __ Have one Technician initiate Steps 17 - 22 in parallel to moving EDM Trailer. 2. __ Take EDM Trailer to CTP-1. 3. __ Stage EDM Trailer on suitable surface at CTP-1 that doesn't block access to entrance or the dike. 4. __ Chock wheels to prevent rolling. 5. __ Disconnect EDM Trailer from truck. 6. __ Return to Hale Pump Bldg to get Hale Pump Trailer. 7. __ Ensure Steps 17 - 22 are complete. 8. **GO TO** Step 23.
NOTE Exhaust flapper and tools necessary to perform this enclosure are located in storage box on the front of the Hale Pump Trailer.	
17. __ Disconnect Hale Pump exhaust discharge from installed exhaust duct.	
18. __ Install exhaust flapper on Hale Pump exhaust.	
19. __ Disconnect the 4 drain hoses located under the rear of the Hale Pump.	

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
20. Unplug battery charger <u>and</u> engine block heater.	
21. __ Raise 4 corner stabilizer jacks.	

NOTE

A Non-venting Fuel Cap is located in toolbox on front of Hale Pump trailer in a pink FME bag. (5)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
22. Perform the following on Hale Pump: (5) A. __ Replace Vented Fuel Cap with Non-venting Fuel Cap. B. __ Store Vented Fuel Cap in toolbox on front of Hale Pump trailer.	

NOTE

A trailer hitch is located in toolbox on front of Hale Pump trailer.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
23. __ Connect Hale Pump Trailer to the truck <u>and</u> secure for towing.	
24. __ Release parking brake located on left-hand side of trailer tongue.	
25. Verify two trucks are being used to re-locate Hale Pump <u>and</u> EDM Trailer.	1. __ Take Hale Pump to the CTP-1. 2. __ Stage Hale Pump on CTP-1 dike with back of trailer at the suction hose. 3. __ Chock wheels to prevent rolling. 4. __ Level Hale Pump with stabilizer jacks. 5. __ **GO TO** Step 32.
26. Take Hale Pump <u>and</u> EDM Trailer to CTP-1.	
27. Stage Hale Pump on CTP-1 dike with back of trailer at the suction hose.	
28. Level Hale Pump with stabilizer jacks.	
29. __ Chock wheels to prevent rolling.	
30. __ Stage EDM Trailer on suitable surface at CTP-1 <u>that doesn't block access to entrance or the dike</u>.	
31. __ Chock wheels to prevent rolling.	

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

A Vented Fuel Cap is located in toolbox on front of Hale Pump trailer. [5]

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
32. Perform the following on Hale Pump: [5] A. __ Replace Non-venting Fuel Cap with Vented Fuel Cap. B. __ Store Non-venting Fuel Cap in toolbox on front of Hale Pump trailer.	
33. Notify the OSM of the completion of this enclosure.	
34. Ensure keys for the following are left with operator: __ Hale Pump EDM Trailer __ Truck	
35. Return to plant to assist with other necessary activities.	

• • • END • • •

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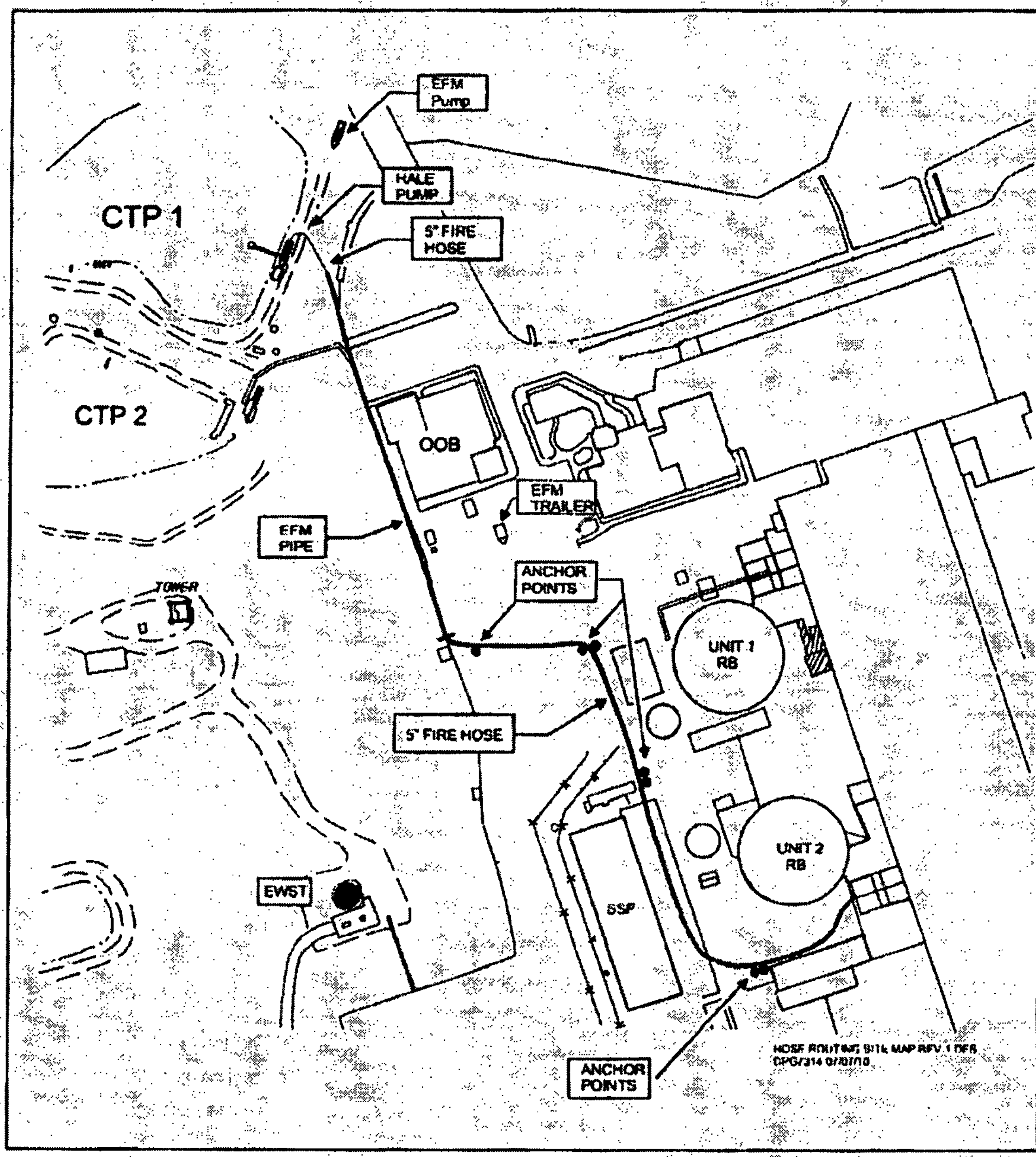
Figure 1


EFM Pump
HALE PUMP
5" FIRE HOSE
CTP 1
CTP 2
OOB
EFM TRAILER
EFM PIPE
ANCHOR POINTS
TOWER
UNIT 1 RB
5" FIRE HOSE
UNIT 2 RB
SSP
EWST
ANCHOR POINTS

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WHEN DOES SITE LOSS POWER?

NOTE

- This timeline is an estimate for information purposes only.(3) The actual event could be slower or faster and actual water heights may vary.
- T=0 is dam failure, **NOT** when Condition B is declared.

COPY OF TIME TRIAL?

Time (hours:minutes)

0:00 – Initiation of Jocassee Dam failure is assumed.

1:33 – ONS Intake Canal water height reaches elevation 802' (Hale pump building begins to flood).

No Power **1:58** – Flood waters crest both the Keowee Main Dams and West Saddle (Elev. 815').

2:05 – Conservatively assume both bridges on Highway 183 are lost due to flood waters.

2:15 – Flood waters rise in tailrace beginning to flood Turbine Building via drain.

2:52 – Flood waters crest the Intake Canal Dike (Elev. 815') and begins flooding the ONS yard. Conservatively assume CT-5 is lost at this time. Also, Little River Dam is overtopping resulting in a loss of Highway 130 route to ONS.

3:01 – SSF Function is lost as flood waters in the ONS yard begin overtopping SSF flood wall (Elev. 803.5').

3:10 – Penetration rooms are **NOT** accessible as flood waters in the ONS yard reach elevation 809'.

3:42 – Flood waters in the ONS yard reach the 1st peak elevation of 815.5' (19.5' above yard level).

3:48 – Penetration rooms are accessible as flood waters recede below elevation 809'.

6:16 – Flood waters have receded to approximately 2' (Elev. 798') in the ONS yard.

7:55 – Flood waters have receded to approximately 1' (Elev. 797') in the ONS yard.

High Priority Item	Critical Time	Performed by	Procedure Location
Route hose & move Equipment	Prior flooding yard (Elev 796')	OPS, SPOC, & Security	Encl 5.4 (OPS) Encl 5.5 (SPOC & Security)
Open 2CCW-516	Prior flooding yard (Elev 796')	NEO	Section 4A
Isolate CF Tanks	Prior to loss of CT-5	NEO	Section 4A, 4B, 4C
Isolate Seal Return	Prior to loss of SSF	CR Team or SSF operator	Section 4A, 4B, 4C
RCS @ 250F/300#	Prior to loss of RCPs (loss of switchyard)	CR Team	Section 4A, 4B, 4C

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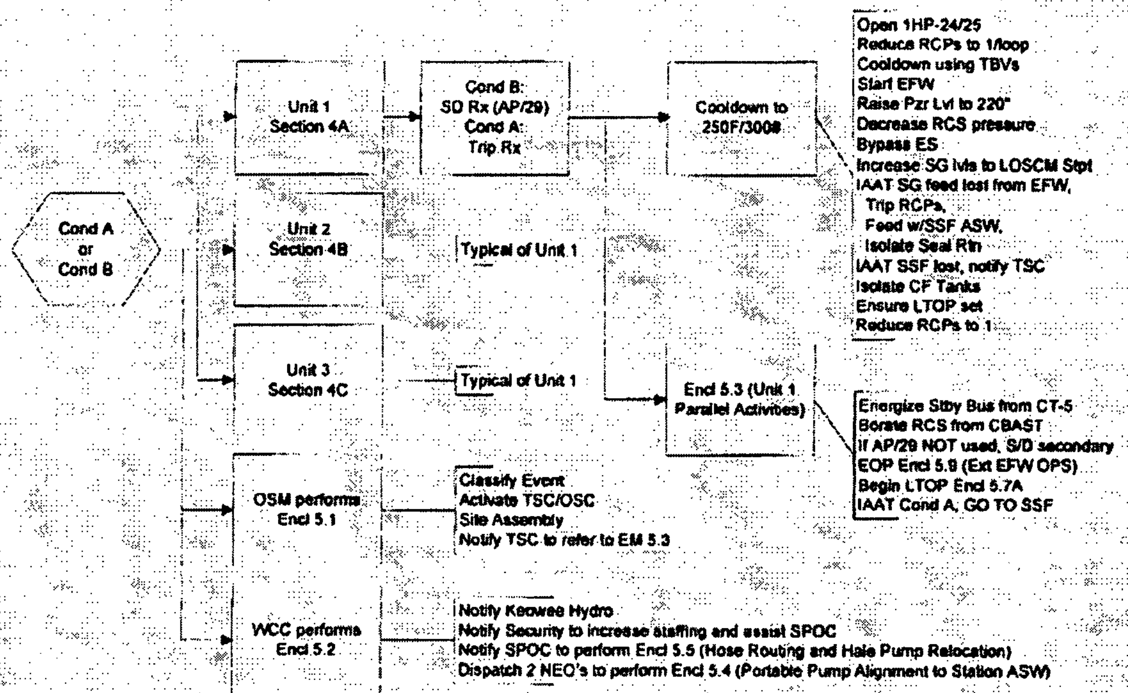
AP/47 Simplified Flow Diagram for Oversight



1,000,000 gal H_2O in CTP#1 → How to verify?

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. Prepare "Do Not Operate" White Tags for the following: __ 1CF-1 HW __ 1CF-2 HW __ 1HP-26 HW __ 1HP-27 HW __ 1XO-F5C (1CF-1 BKR (1A CFT DISCH)) __ 1XP-F5C (1CF-2 BKR (1B CFT DISCH ISOL)) 1XS1-F5E (1HP-26 BKR (ES-1 1A HP INJ)) __ 1XS2-F3C (1HP-27 BKR (ES-2 1B HP INJ)) __ 1HP-409 CR switch __ 1HP-410 CR switch	

NOTE

Priority should be given to SPOC performing hose route and equipment relocation. Additional resources should be called in as necessary.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2. __ Notify SPOC to perform LTOP instrument calibration for Unit 1 per IP/0/A/0200/047 (Reactor Coolant System LTOP Instrument Calibration).	
3. Hang White Tags on the following: __ 1CF-1 HW (R-1, NW under 1A CFT) __ 1CF-2 HW (R-1, SW under 1B CFT)	__ Log TS 3.4.12 (Low Temperature Overpressure Protection (LTOP) System) entry <u>and</u> take required actions.
4. Hang White Tags on the following: __ 1HP-26 HW (A-4, East Pen Rm) __ 1HP-27 HW (A-4, West Pen Rm)	__ Log TS 3.4.12 (Low Temperature Overpressure Protection (LTOP) System) entry <u>and</u> take required actions.

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. Close valves <u>and</u> White Tag the following switches: 1HP-409 1HP-410	__ Log TS 3.4.12 (Low Temperature Overpressure Protection (LTOP) System) entry <u>and</u> take required actions.
6. __ **WHEN** RCS pressure < 800 psig **AND** <u>both</u> the following are closed: __ 1CF-1 __ 1CF-2 **THEN** open <u>and</u> White Tag the following: __ 1XO-F5C (1CF-1 BKR (1A CFT DISCH)) __ 1XP-F5C (1CF-2 BKR (1B CFT DISCH ISOL))	__ Log TS 3.4.12 (Low Temperature Overpressure Protection (LTOP) System) entry <u>and</u> take required actions.
7. __ **WHEN** RCS temperature < 350°F, **THEN** perform the following: A. Close valves <u>and</u> White Tag the following switches: __ 1HP-26 __ 1HP-27 B. Open <u>and</u> White Tag the following: 1XS1-F5E (1HP-26 BKR (ES-1 1A HP INJ)) __ 1XS2-F3C (1HP-27 BKR (ES-2 1B HP INJ))	Log TS 3.4.12 (Low Temperature Overpressure Protection (LTOP) System) entry <u>and</u> take required actions.
8. __ Notify the CR SRO of the completion of this enclosure.	
9. __ **WHEN** conditions permit, **THEN EXIT** this Enclosure.	

••• END •••

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. Prepare "Do Not Operate" White Tags for the following: __ 2CF-1 HW __ 2CF-2 HW __ 2HP-26 HW __ 2HP-27 HW __ 2XO-F5C (2CF-1 BKR (2A CFT DISCH ISOL)) __ 2XP-F4C (2CF-2 BKR (2B CFT DISCH ISOL)) __ 2XS4-F4B (2HP-26 BKR (ES-1 2A HP INJ TO REACTOR INLET)) __ 2XS5-F4B (2HP-27 BKR (ES-2 2B HP INJ)) __ 2HP-409 CR switch __ 2HP-410 CR switch	

NOTE

Priority should be given to SPOC performing hose route and equipment relocation. Additional resources should be called in as necessary.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2. __ Notify SPOC to perform LTOP instrument calibration for Unit 2 per IP/0/A/0200/047 (Reactor Coolant System LTOP Instrument Calibration).	
3. Hang White Tags on the following: __ 2CF-1 HW (R-1, SW under 2A CFT) __ 2CF-2 HW (R-1, NW under 2B CFT)	__ Log TS 3.4.12 (Low Temperature Overpressure Protection (LTOP) System) entry <u>and</u> take required actions.
4. Hang White Tags on the following: __ 2HP-26 HW (A-4-East Pen Rm) __ 2HP-27 HW (A-4-West Pen Rm)	__ Log TS 3.4.12 (Low Temperature Overpressure Protection (LTOP) System) entry <u>and</u> take required actions.

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. Close valves <u>and</u> White Tag the following switches: __ 2HP-409 __ 2HP-410	__ Log TS 3.4.12 (Low Temperature Overpressure Protection (LTOP) System) entry <u>and</u> take required actions.
6. **WHEN** RCS pressure < 800 psig **AND** <u>both</u> the following are closed: 2CF-1 2CF-2 **THEN** open <u>and</u> White Tag the following: __ 2XO-F5C (2CF-1 BKR (2A CFT DISCH ISOL)) __ 2XP-F4C (2CF-2 BKR (2B CFT DISCH ISOL))	__ Log TS 3.4.12 (Low Temperature Overpressure Protection (LTOP) System) entry <u>and</u> take required actions.
7. **WHEN** RCS temperature < 350°F, **THEN** perform the following: A. Close valves <u>and</u> White Tag the following switches: __ 2HP-26 __ 2HP-27 B. Open <u>and</u> White Tag the following: __ 2XS4-F4B (2HP-26 BKR (ES-1 2A HP INJ TO REACTOR INLET)) __ 2XS5-F4B (2HP-27 BKR (ES-2 2B HP INJ))	Log TS 3.4.12 (Low Temperature Overpressure Protection (LTOP) System) entry <u>and</u> take required actions.
8. __ Notify the CR SRO of the completion of this enclosure.	
9. __ **WHEN** conditions permit, **THEN EXIT** this Enclosure.	

• • • END • • •

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. Prepare "Do Not Operate" White Tags for the following: __ 3CF-1 HW __ 3CF-2 HW __ 3HP-26 HW __ 3HP-27 HW __ 3XO-F5C (3CF-1 BKR (3A CFT DISCH ISOL)) __ 3XP-F5C (3CF-2 BKR (3B CFT DISCH ISOL)) 3XS4-F4B (3HP-26 BKR (ES-1 3A HPI INJ)) __ 3XS5-F4B (3HP-27 BKR (ES-2 3B HPI INJ)) __ 3HP-409 CR switch __ 3HP-410 CR switch	

NOTE

Priority should be given to SPOC performing hose route and equipment relocation. Additional resources should be called in as necessary.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2. __ Notify SPOC to perform LTOP instrument calibration for Unit 3 per IP/0/A/0200/047 (Reactor Coolant System LTOP Instrument Calibration).	
3. Hang White Tags on the following: __ 3CF-1 HW (R-1, SW under 3A CFT) __ 3CF-2 HW (R-1, W side under 3B CFT)	Log TS 3.4.12 entry <u>and</u> take required actions.
4. Hang White Tags on the following: __ 3HP-26 HW (A-4-East Pen Rm) 3HP-27 HW (A-4-West Pen Rm)	Log TS 3.4.12 entry <u>and</u> take required actions.

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. Close valves <u>and</u> White Tag the following switches: __ 3HP-409 3HP-410	Log TS 3.4.12 (Low Temperature Overpressure Protection (LTOP) System) entry <u>and</u> take required actions.
6. __ **WHEN** RCS pressure < 800 psig **AND** <u>both</u> the following are closed: __ 3CF-1 __ 3CF-2 **THEN** open <u>and</u> White Tag the following: __ 3XO-F5C (3CF-1 BKR (3A CFT DISCH ISOL)) __ 3XP-F5C (3CF-2 BKR (3B CFT DISCH ISOL))	__ Log TS 3.4.12 (Low Temperature Overpressure Protection (LTOP) System) entry <u>and</u> take required actions.
7. __ **WHEN** RCS temperature < 350°F, **THEN** perform the following: A. Close valves <u>and</u> White Tag the following switches: __ 3HP-26 __ 3HP-27 B. Open <u>and</u> White Tag the following: 3XS4-F4B (3HP-26 BKR (ES-1 3A HPI INJ)) __ 3XS5-F4B (3HP-27 BKR (ES-2 3B HPI INJ))	Log TS 3.4.12 (Low Temperature Overpressure Protection (LTOP) System) entry <u>and</u> take required actions.
8. Notify the CR SRO of the completion of this enclosure.	
9. __ **WHEN** conditions permit, **THEN EXIT** this Enclosure.	

• • • END • • •

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

The following are available means to communicate during a Jocassee flooding event in order of priority. If Plant radio Channel 6 does not work, switch to Plant radio Channel 1, then ITAC-4, as necessary.

1st choice: Plant radio Channel 6. Available on all OPS, SPOC, and Security plant radios. Repeater is power backed up and above flood plain.

2nd choice: Plant radio Channel 1. Available on all OPS, SPOC, and Security plant radios. Repeater is UPS backed-up for 4 hours after loss of power and located on top of Aux Bldg.

3rd choice: ITAC-4 radio. This is a special radio that is available to OPS, SPOC, and Security. Repeater is power backed up and above flood plain. Offsite Agencies can communicate on this radio. Radios are located in SPOC Supervisor's office, Unit 1&2 Control Room, Unit 3 Control Room, and the TSC.

Other options and communication information:

- Plant Channel 2. Line of sight use only.
- Plant phones until the site is flooded. Plant phone system is located on 2nd floor of the Oconee Office Building.
- Satellite phone in Control Room
- Security Cell phone (Central Alarm Station (CAS) is 864-973-5901. Secondary Alarm Station (SAS) is 864-973-5902.)
- Personal Cell phones

NOTE

Based on inundation models, flood waters will be below the SSF HVAC room.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. __ **IAAT** water is observed over-topping the SSF wall or flowing under doors, **THEN GO TO** Step 41.	

IF AT ANY TIME:

(1) water is observed over-topping the SSF wall or flowing under doors ... (Secure SSF RC Makeup, Trip SSF DG, notify CR, and go to SSF HVAC Rm)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2. Perform the following at 1XSF 600V MOTOR CONTROL CENTER in the SSF HVAC room: A. __ Open 1XSF-F5A (1XSF Norm Fdr Bkr From 1X8) <u>and</u> remove Kirk Key. B. __ Using Kirk Key, close 1XSF-F3A (1XSF Emerg Fdr Bkr From OXSF).	
3. __ Verify SSF AUX SERVICE WTR PUMP is operating.	__ **GO TO** Step 5.
4. __ **GO TO** Step 15.	

NOTE

One or more units may be performing this enclosure for the respective unit. The first unit to begin this enclosure will take the lead in starting the SSF diesel.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. __ Verify SSF diesel being started by Unit 2 <u>or</u> Unit 3 personnel.	__ **GO TO** Step 7.
6. __ **WHEN** SSF AUX SERVICE WTR PUMP is operating, **THEN GO TO** Step 15.	
7. Depress DIESEL EMERGENCY START pushbutton.	
8. Verify SSF diesel operating.	1. __ Notify <u>affected</u> Unit Control Rooms that the SSF Diesel start was unsuccessful. 2. **EXIT** this enclosure.

IF AT ANY TIME:

(1) water is observed over-topping the SSF wall or flowing under doors ... (Secure SSF RC Makeup, Trip SSF DG, notify CR, and go to SSF HVAC Rm)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9. __ Open OTS1-1.	1. Notify <u>affected</u> Unit Control Rooms that the SSF Diesel start was unsuccessful. 2. __ **EXIT** this enclosure.
10. __ **WHEN** 3 seconds have elapsed, **THEN** close OTS1-4.	1. Notify <u>affected</u> Unit Control Rooms that the SSF power transfer was unsuccessful. 2. __ **EXIT** this enclosure.
11. __ Close OTS1-3.	
12. __ Close OXSF-4B.	
13. __ Start the Diesel Engine Service Water Pump.	1. __ Depress RESET DIESEL GEN EMER START pushbutton. 2. __ Depress SSF DIESEL EMERGENCY STOP pushbutton. 3. __ Notify <u>affected</u> Unit Control Rooms that the SSF Diesel start was unsuccessful. 4. __ **EXIT** this enclosure.
14. __ Start SSF AUX SERVICE WTR PUMP.	
15. __ Close 1CCW-268.	
16. __ Open 1CCW-287.	
17. __ Notify Unit 1 CRO that SSF ASW Pump is operating and ready to feed.	
18. Ensure the following are closed: __ 1HP-3 __ 1HP-4 __ 1HP-20	

IF AT ANY TIME:

(1) water is observed over-topping the SSF wall or flowing under doors ... (Secure SSF RC Makeup, Trip SSF DG, notify CR, and go to SSF HVAC Rm)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
19. __ **IAAT** the CRO directs feeding, **THEN** perform Steps 20 - 23.	__ **GO TO** Step 24.
20. __ Verify feeding 1A SG is desired.	__ **GO TO** Step 22.
21. Open 1CCW-269.	
22. __ Verify feeding 1B SG is desired.	__ Close 1FDW-347.

NOTE

Once initiated, a continuous flow should be maintained to avoid unnecessary thermal cycling of EFDW nozzles.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
23. Throttle the following as required to obtain OTSG level 240 - 260" **NOT** to exceed total flow limit for <u>all</u> three units per Table 1 below: __ 1CCW-268 __ 1CCW-410 (SSF ASW Pump To S/G Supply Bypass) (SSF basement catwalk)	

Table 1

Total SSF-ASW Flow Limits

- Time since Rx shutdown ≤ 1 hr: ≤ 1275 total SSF-ASW flow to <u>all</u> three units
- Time since Rx shutdown > 1 hr: ≤ 1000 total SSF-ASW flow to <u>all</u> three units

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
24. **IAAT** <u>both</u> SGs are being fed, **AND** balancing flow between SGs is desired, **THEN** adjust the following as required: __ 1CCW-269 __ 1FDW-347	

IF AT ANY TIME:

(1) water is observed over-topping the SSF wall or flowing under doors ... (Secure SSF RC Makeup, Trip SSF DG, notify CR, and go to SSF HVAC Rm)

(19) the CRO directs feeding … (align valves and feed)

(24) <u>both</u> SGs are being fed **AND** balancing flow between SGs is desired … (balance flows)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
25. __ **IAAT** Pzr level is ≥ 90", **THEN** cycle the following as needed to maintain RCS pressure stable: __ UNIT 1 PZR HTRS GROUP B __ UNIT 1 PZR HTRS GROUP C	
26. __ **IAAT** <u>all</u> the following exist: __ RCS Temperature > 260°F __ **NO** HPI Seal Injection __ **NO** CC **THEN** perform Steps 27 - 28.	__ **GO TO** Step 29.
27. __ Position OVERRIDE RC MAKEUP PUMP switch to START.	
28. __ Verify RC MAKEUP PUMP operating.	1. __ **IF** RC pressure < 2355 psig, **THEN** position RC PRESS INTLK BYPASSS (RCMUP) switch to BYPASS. 2. __ **IF** RC MAKEUP PUMP **NOT** operating **AND** RC pressure < 2355 psig, **THEN** perform the following: A. Open the following valves: __ 1SF-97 __ 1SF-82 __ 1HP-398 B. __ Position RC MAKEUP PUMP switch to ON.

IF AT ANY TIME:

(1) **water is observed over-topping the SSF wall or flowing under doors ... (Secure SSF RC Makeup, Trip SSF DG, notify CR, and go to SSF HVAC Rm)**

(19) **the CRO directs feeding ... (align valves and feed)**

(24) **<u>both</u> SGs are being fed AND balancing flow between SGs is desired ... (balance flows)**

(25) **Pzr level is ≥ 90" ... (cycle Pzr heaters to maintain RCS pressure stable)**

(26) **RCS Temperature > 260°F AND NO HPI seal injection AND NO CC ... (start SSF RC Makeup Pump)**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
29. __ **IAAT** RC Makeup Pump is operating **AND** Pzr level is increasing, **THEN** perform Step 30.	__ **GO TO** Step 31.

CAUTION

Damage to the motor for 1HP-426 may occur if the valve is cycled too frequently. To prevent damage, the valve should only be operated either fully open or fully closed and only as required to stay within the bands provided.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
30. Perform the following to stabilize RCS pressure <u>and</u> maintain Pzr level 90 - 310": (7) A. __ Open 1HP-428. B. __ Cycle 1HP-426, as required.	__ **IF** Pzr level continues to increase, **THEN** perform the following to stabilize RCS pressure <u>and</u> maintain Pzr level 90 - 310": (7) A. __ Open 1HP-417. B. __ Cycle 1HP-426, as required. __ **IF** Pzr level **CANNOT** be maintained < 310", **THEN** consult TSC for guidance on need to cycle SSF RC Makeup <u>or</u> cooldown.
31. __ **IAAT** SSF-ASW feed is **NO** longer required, **THEN** close the following: __ 1CCW-268 __ 1CCW-410 (SSF ASW Pump To S/G Supply Bypass) __ 1CCW-287 __ 1CCW-269	

IF AT ANY TIME:

(1) water is observed over-topping the SSF wall or flowing under doors ... (Secure SSF RC Makeup, Trip SSF DG, notify CR, and go to SSF HVAC Rm)

(19) the CRO directs feeding ... (align valves and feed)

(24) <u>both</u> SGs are being fed AND balancing flow between SGs is desired ... (balance flows)

(25) Pzr level is ≥ 90" ... (cycle Pzr heaters to maintain RCS pressure stable)

(26) RCS Temperature > 260°F AND NO HPI seal injection AND NO CC ... (start SSF RC Makeup Pump)

(29) RC Makeup Pump is operating AND Pzr level is increasing ... (control Pzr level)

(31) SSF-ASW feed is NO longer required ... (secure SG feed from SSF ASW)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
32. __ **IAAT** SSF RCMU was established for Unit 1, **AND** shutdown is desired, **THEN** perform the following: A. Position OVERRIDE RC MAKEUP PUMP switch to STOP. B. __ Position RC MAKEUP PUMP switch to OFF. C. __ Ensure RC PRESS INTLK BYPASS (RCMUP) switch is positioned to NORMAL. D. Close the following: 1SF-97 1SF-82 __ 1HP-398 1HP-428 __ 1HP-426 __ 1HP-417	

NOTE

Remaining plant actions need only be performed by one unit. Each unit has this enclosure in their EOP and remaining actions are identical in all enclosures. Determination of which unit should take the lead in performing these actions should be based on the number of units performing this enclosure and manpower availability.

33. __ Determine which unit will perform the remaining actions of this enclosure.	
34. __ Verify Unit 2 or 3 will perform remaining actions.	__ **GO TO** Step 36.
35. __ **WHEN** Station Management approves, **THEN EXIT** this enclosure.	

• • • END• • •

IF AT ANY TIME:

(1) water is observed over-topping the SSF wall or flowing under doors ... (Secure SSF RC Makeup, Trip SSF DG, notify CR, and go to SSF HVAC Rm)

(19) the CRO directs feeding ... (align valves and feed)

(24) <u>both</u> SGs are being fed **AND** balancing flow between SGs is desired ... (balance flows)

(25) Pzr level is ≥ 90" ... (cycle Pzr heaters to maintain RCS pressure stable)

(26) RCS Temperature > 260°F **AND NO** HPI seal injection **AND NO** CC ... (start SSF RC Makeup Pump)

(29) RC Makeup Pump is operating **AND** Pzr level is increasing ... (control Pzr level)

(31) SSF-ASW feed is **NO** longer required ... (secure SG feed from SSF ASW)

(32) SSF RCMU was established for Unit 1 **AND** shutdown is desired ... (secure SSF RC Makeup)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

Unit Status

Unit 1 has taken the lead to perform the remaining steps in this enclosure.

NOTE

Diversion of SSF Diesel Service Water discharge to the yard drain must be completed between 1 hour and 45 minutes and 2 hours of Emergency Start of SSF Diesel Generator.

36. __ **IAAT** 1 hour and 45 minutes have elapsed since Emergency Start of SSF Diesel Generator.
THEN perform the following:
   A. __ Open CCW-384 (Jacket Cooling Water To Yard Drain Isolation) (SSF D/G Rm, SW of B Diesel).
   B. Close CCW-286 (SSF Diesel Cooling Jacket Return) (SSF Pump Rm).
   C. Throttle CCW-285 (SSF Diesel Service Water Pump Discharge) to maintain 500 gpm through D/G (SSF Pump Rm).

37. __ **IAAT** SSF Control Room temperature exceeds 85°F,
THEN perform one of the following:
   Notify TSC to install portable spot coolers
   OR
   __ Remove power from SSF Security Computer as follows:
      A. __ Notify Security that power will be removed from the SSF Security Computer.
      B. __ Notify Local Information Technology (LIT) to remove power from the SSF Security Computer to reduce heat load.

IF AT ANY TIME:

(1) water is observed over-topping the SSF wall or flowing under doors ... (Secure SSF RC Makeup, Trip SSF DG, notify CR, and go to SSF HVAC Rm)

(19) the CRO directs feeding ... (align valves and feed)

(24) both SGs are being fed **AND** balancing flow between SGs is desired ... (balance flows)

(25) Pzr level is ≥ 90" ... (cycle Pzr heaters to maintain RCS pressure stable)

(26) RCS Temperature > 260°F **AND NO** HPI seal injection **AND NO** CC ... (start SSF RC Makeup Pump)

(29) RC Makeup Pump is operating **AND** Pzr level is increasing ... (control Pzr level)

(31) SSF-ASW feed is **NO** longer required ... (secure SG feed from SSF ASW)

(32) SSF RCMU was established for Unit 1 **AND** shutdown is desired ... (secure SSF RC Makeup)

(36) 1 hour and 45 minutes have elapsed since Emergency Start of SSF Diesel Generator) ... (divert SSF diesel cooling water to yard drain)

(37) SSF Control Room temperature exceeds 85°F ... (notify SPOC or remove power)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
38. __ Verify D/G operation within the following limits: [8]	__ **IF** D/G Voltage is outside limit, **THEN** adjust VOLTAGE REGULATOR to maintain D/G voltage 4160 - 4260 V.
	__ **IF** D/G Frequency is outside limit, **THEN** adjust GOVERNOR CONTROL to maintain D/G frequency 59.7 - 60.3 Hz.

Parameter	Limits
D/G Voltage	4160 - 4260 V
D/G Frequency	59.4 - 60.6 Hz

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
39. __ Verify D/G SER WTR PUMP FLOW 500 - 600 gpm.	__ Dispatch an operator to throttle CCW-285 (SSF Diesel Service Water Pump Discharge) to maintain 500 gpm through the Diesel Engine (SSF Pump Room).
40. __ **WHEN** Station Management approves, **THEN EXIT** this enclosure.	

• • • END • • •

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
Unit Status Flood waters are overtopping the SSF wall.	
41. Ensure SSF RC Makeup Pump is secured.	
42. Close the following: __ 1SF-82 __ 1SF-97 __ 1HP-398 __ 1HP-426 __ 1HP-428	
43. __ **WHEN** all units have stopped SSF RC Makeup Pump and closed valves in Step 42, **THEN** continue.	
44. __ Depress RESET DIESEL GEN EMER START pushbutton.	
45. __ Depress SSF DIESEL EMERGENCY STOP pushbutton.	
46. __ Notify CR that SSF has been secured due to flooding.	
47. __ Re-locate all SSF personnel to the SSF HVAC room.	
48. __ **WHEN** Station Management approves, **THEN EXIT** this enclosure.	

• • • **END** • • •

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Enclosure 5.9

Energizing the Standby Bus from Central Switchyard

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. Verify with TCC the following breaker positions: __ OCB 41 (Central White) closed __ OCB 35 (Fant Black) closed CS 90 (Central Tie) open __ CS 11 (Oconee PSW) closed	__ Notify TCC to position breakers.
2. Ensure the following: __ OCB 101 closed __ SK1 CT-4 STBY BUS 1 FEEDER open SK2 CT-4 STBY BUS 2 FEEDER open __ SL1 CT-5 STBY BUS 1 FEEDER open SL2 CT-5 STBY BUS 2 FEEDER open	
3. Ensure the following are open: $S1_1$ STBY BUS 1 TO MFB1 __ $S2_1$ STBY BUS 2 TO MFB2 __ $S1_2$ STBY BUS 1 TO MFB1 $S2_2$ STBY BUS 2 TO MFB2 __ $S1_3$ STBY BUS 1 TO MFB1 $S2_3$ STBY BUS 2 TO MFB2	
4. Ensure the following transfer switches are in MAN: __ CT-5 BUS 1 AUTO/MAN __ CT-5 BUS 2 AUTO/MAN	
5. Position the following in CENTRAL position: __ SL1 & SL2 TRIP INTERLOCK DEFEAT CH 1 SL1 & SL2 TRIP INTERLOCK DEFEAT CH 2	

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6. Close the following breakers: __ SL1 CT5 STBY BUS 1 FEEDER __ SL2 CT5 STBY BUS 2 FEEDER	
7. __ Verify voltage indicated on STANDBY BUS 1 <u>and</u> STANDBY BUS 2.	__ Request assistance.
8. Ensure the following transfer switches are in AUTO: __ CT-5 BUS 1 AUTO/MAN __ CT-5 BUS 2 AUTO/MAN	
9. Notify the following that the standby bus is energized from Central Switchyard via CT-5: __ Unit 1 CR SRO __ Unit 2 CR SRO __ Unit 3 CR SRO	
10. __ **WHEN** Station Management approves, **THEN EXIT** this enclosure.	

• • • END • • •

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1. If the RCS is intact with the loops dropped and the following are exist:
   - SG Handholes installed
   - SG Manways installed
   - RV Head intact
   - PZR Relief Valves installed

   then have Operations perform activities to raise the RCS loops with nitrogen to make the SGs available. SGs are required for EFM strategies.
2. If the RCS is in mid-loop, determine if SG lower manways can be installed with limiting bolting to provide a leak barrier and allow RCS level to be raised.
3. With the RV Head removed, expedite making the FTC watertight and have Operations begin a fast fill of the FTC through the LPI system.
4. If decay heat removal is lost and the RCS is vented, consider RV makeup using the Hale or EFM pump through *BS-26 (BS Emergency Connection) via RB Spray and LPI test line to LPI Headers as soon as conditions permit.

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE • The Hale Portable Pump and the External Flood Mitigation (EFM) Pump are Hale model FP1500 <u>and</u> <u>either</u> can be operated using this enclosure. • <u>Both</u> the EFM <u>and</u> Hale Pumps will be staged at CTP-1.	
1. Using rubber mallet from pump tool box on front of pump, remove 6″ suction cap.	
2. __ Remove 5″ Storz discharge cap.	
3. __ Attach 5″ Storz fire hose to 5″ Storz pump discharge.	
4. __ Attach 6″ elbow to 6″ pump suction.	
5. __ Use rubber mallet to tighten suction threaded connection.	
6. Attach pre-staged 6″ suction hose located at CTP-1 pump structure catwalk to the 6″ elbow attached in Step 4.	
7. Close the following drains: __ Pump drain __ No. 1 Discharge drain No. 2 Discharge drain	
NOTE Gearbox Cooler Valve is a quarter turn valve with a blue handle. [redacted]	
8. __ Ensure Gearbox Cooler Valve is open.	
9. Open diesel engine cover panel on opposite side of the control panel to allow adequate ventilation.	
10. __ Notify the OSM that <u>all</u> hose routing is complete <u>and</u> request permission to charge hose to check for leakage.	
11. Verify OSM agrees with charging hose to check for leakage.	__ **GO TO** Step 24.

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE If the key is NOT in the switch, a spare key is located in the lock box on tool box on the front of the trailer. Lock combination is 3271.	
12. __ Using key switch, start the portable pump.	
CAUTION Do **NOT** hold pump primer > 45 seconds to prevent pump damage.	
NOTE When pump prime is achieved, water is visible in suction hose and there is a sudden change in the sound coming from the priming pumps. Water may discharge from the vent priming line under the pump.	
13. Prime pump as follows: A. __ Pull <u>both</u> primer handles <u>and</u> hold. B. __ **WHEN** <u>either</u> of the following occur: __ Pump is primed __ 30 - 40 seconds has elapsed **THEN** release priming handles.	
14. __ Verify pump prime was successful.	1. __ Stop pump by turning key switch OFF. 2. __ Check suction hose <u>and</u> fittings for vacuum leaks. 3. __ **GO TO** Step 12.
15. __ Open the 5" pump discharge valve.	
16. Press MODE to ensure pump is in PSI mode.	
17. __ Using INC/DEC buttons, set pump discharge pressure to 180 psi.	→ What is ~~pump~~ pressure @ ASW piping Δ in elevation Line losses
18. __ Walk down hoses to inspect for leakage.	

Pump curve for vall pump - [illegible] MSL into S/G
[illegible]

- Brandon Lynch / Paul Maybre Calculation CCW - 5/6
Amount of flow at pressure

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
19. __ **WHEN** hoses inspection is complete, **THEN** continue.	
20. __ Press IDLE to allow engine to return to idle speed.	
21. __ Turn key switch to OFF.	
22. __ Close 5" discharge valve.	
23. Notify the following that <u>all</u> hose routing is complete <u>and</u> you are standing by to feed SGs, if requested: __ OSM __ Unit 1 CR SRO __ Unit 2 CR SRO __ Unit 3 CR SRO	

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
24. __ **WHEN** directed to feed SGs, **THEN** continue.	

NOTE

If the key is **NOT** in the switch, a spare key is located in the lock box on tool box on the front of the trailer. Lock combination is 3271.

25. Using the key switch, start the portable pump.	

CAUTION

Do **NOT** hold pump primer > 45 seconds to prevent pump damage.

NOTE

When pump prime is achieved, water is visible in suction hose and there is a sudden change in the sound coming from the priming pumps. Water may discharge from the vent priming line under the pump.

26. Prime pump as follows: A. __ Pull <u>both</u> primer handles <u>and</u> hold. B. __ **WHEN** <u>either</u> of the following occur: __ Pump is primed __ 30 – 40 seconds has elapsed **THEN** release priming handles.	
27. __ Verify pump prime was successful.	1. __ Stop pump by turning key switch OFF. 2. __ Check suction hose <u>and</u> fittings for vacuum leaks. 3. __ **GO TO** Step 25.
28. __ Open the 5" pump discharge valve.	
29. __ Press MODE to ensure pump is in PSI mode.	
30. __ Using INC and DEC buttons, set pump discharge pressure to 180 psi.	

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ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
31. Monitor pump operation: __ Fuel gauge __ Suction strainer to ensure **NOT** becoming clogged.	
32. __ **IAAT** fuel level reaches ½ tank level, **THEN** refuel.	
33. __ **WHEN** notified that pump operation is **NO** longer required, **THEN** continue.	
34. __ Press IDLE to allow engine to return to idle speed.	
35. __ Turn key switch to OFF.	
36. __ Close 5" discharge valve.	
37. Open the following drains: __ Pump drain __ No. 1 Discharge drain __ No. 2 Discharge drain	
38. __ Disconnect suction hose <u>and</u> tether to CTP-1 pump structure catwalk.	
39. __ Remove suction elbow <u>and</u> replace cap on pump suction.	
40. __ Disconnect discharge hose <u>and</u> replace cap.	

••• END •••

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Appendix

1. This procedure is considered Reactivity Management Related.
2. PIP-10-0887 - CA # 14 provides reason for this procedure development.
3. Timeline is based on the supporting information for the design flood event currently known as Case 2 between Duke and the NRC. Based on information provided in draft report dated October 2009, entitled "Oconee Nuclear Station, Jocassee-Keowee Dam Breach Study, March 2009 Report Addendum", provided by HDR/DTA.
4. PIP 08-05113. ONS commitment to provide interim guidance to address mitigation of postulated flood events that render SSF inoperable in response to NRC 10CFR50.54(f) request. Guidance for Jocassee Dam failure was originally contained in AP/0/A/1700/006 (Natural Disaster) and was moved to this AP.
5. PIP-O-10-10724 - CA # 2: Added use of Non-Venting Fuel Cap during movement of Hale Pump to prevent spill of fuel.
6. PIP G-11-0705: Based on events of Fukushima Daiichi nuclear disaster March 11, 2011, guidance is being added to procedures that could result in a Loss of SFP cooling and/or level to monitor the SFP. This procedure is linked to AP/1-2/A/1700/035 and AP/3/A/1700/035. This guidance is added in response to INPO IER 11-2.
7. PIP O-11-6700, Engineering identified that the SSF Pressurizer heater breakers in the Reactor Building are not temperature qualified for the RB environment during an SSF event. This could result in the breakers tripping open and losing the SSF Pzr Heaters after the plant has been previously stable. Without a pressurizer bubble, letdown may be needed to control RCS pressure and Pzr Lvl.
8. Voltage limits established per AP/0/A/1700/025. See Revision 52 for basis.

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IF AT ANY TIME:

Subsequent Actions

(4.8) Condition A or Condition B has been declared for the Jocassee dam or dikes ... (follow guidance to shutdown and cooldown the units)

Section 4A (Unit 1 External Flood Mitigation Preparation)

(2) Condition A exists for the Jocassee dam or dikes ... (Trip the Rx)

(15) Condition A is declared **OR** RCS Temperature < 250°F ... (align Station ASW system for use by portable pump)

(17) All SCMs > 0°F **AND** ES Bypass Permit satisfied **AND** RCS pressure controllable ... (bypass ES as necessary)

(20) RCS temperature is < 400°F ... (initiate Encl 5.7A (Unit 1 LTOP Actions))

(21) TBVs are lost.... (use ADVs)

(27) the ability to feed SGs with Main and Emergency FDW is lost ... (trip all RCPs and notify SSF operator to feed SGs)

(31) SSF is being used **AND** SSF is **NO** longer available... (feed SGs with portable pump)

(33) breakers for CFT discharge isolation valves are closed **AND** RCS pressure is controllable ... (close 1CF-1 and 1CF-2)

(35) RCS temperature is 325°F - 330°F ... (ensure LTOP established)

(44) notified by TSC to align portable pump to feed SGs ... (direct operators to open 1CCW-104 and 1CCW-108)

(45) notified by TSC to depressurize SGs ... (direct operators at ADVs to fully open the ADV control valves)

(52) SG's are available to feed and steam **AND** Condition A is declared for Jocassee dam ... (dispatch and operator to the SSF)

(53) SSF is staffed **AND** DHR is lost due to flooding ... (Trip RCPs, feed SG's, isolate seal return)

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<u>Section 4B (Unit 2 External Flood Mitigation Preparation)</u>

(2) Condition A exists for the Jocassee dam <u>or</u> dikes ... (Trip the Rx)

(15) Condition A is declared **OR** RCS Temperature < 250°F ... (align Station ASW system for use by portable pump)

(17) <u>All</u> SCMs > 0°F **AND** ES Bypass Permit satisfied **AND** RCS pressure controllable ... (bypass ES as necessary)

(21) RCS temperature is < 400°F ... (initiate Encl 5.7B (Unit 2 LTOP Actions))

(22) TBVs are lost.... (use ADVs)

(28) the ability to feed SGs with Main <u>and</u> Emergency FDW is lost ... (trip all RCPs and notify SSF operator to feed SGs)

(32) SSF is being used **AND** SSF is **NO** longer available... (feed SGs with portable pump)

(34) breakers for CFT discharge isolation valves are closed **AND** RCS pressure is controllable ... (close 2CF-1 and 2CF-2)

(36) RCS temperature is 325°F - 330°F ... (ensure LTOP established)

(45) notified by TSC to align portable pump to feed SGs ... (direct operators to open 2CCW-112 and 2CCW-116)

(46) notified by TSC to depressurize SGs ... (direct operators at ADVs to <u>fully open</u> the ADV control valves)

(53) SG's are available to feed <u>and</u> steam **AND** Condition A is declared for Jocassee dam ... (dispatch and operator to the SSF)

(54) SSF is staffed **AND** DHR is lost due to flooding ... (Trip RCPs, feed SG's, isolate seal return)

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Section 4C (Unit 3 External Flood Mitigation Preparation)

(2) Condition A exists for the Jocassee dam or dikes ... (Trip the Rx)

(15) Condition A is declared **OR** RCS Temperature < 250°F ... (align Station ASW system for use by portable pump)

(17) All SCMs > 0°F **AND** ES Bypass Permit satisfied **AND** RCS pressure controllable ... (bypass ES as necessary)

(20) RCS temperature is < 400°F ... (initiate Encl 5.7C (Unit 3 LTOP Actions))

(21) TBVs are lost .... (use ADVs)

(27) the ability to feed SGs with Main and Emergency FDW is lost ... (trip all RCPs and notify SSF operator to feed SGs)

(31) SSF is being used **AND** SSF is **NO** longer available... (feed SGs with portable pump)

(33) breakers for CFT discharge isolation valves are closed **AND** RCS pressure is controllable ... (close 3CF-1 and 3CF-2)

(35) RCS temperature is 325°F - 330°F ... (ensure LTOP established)

(44) notified by TSC to align portable pump to feed SGs ... (direct operators to open 3CCW-120 and 3CCW-124)

(45) notified by TSC to depressurize SGs ... (direct operators at ADVs to fully open the ADV control valves)

(52) SG's are available to feed and steam **AND** Condition A is declared for Jocassee dam ... (dispatch and operator to the SSF)

(53) SSF is staffed **AND** DHR is lost due to flooding ... (Trip RCPs, feed SG's, isolate seal return)

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