Duke Energy®

T. PRESTON GILLESPIE, Jr.
Vice President
Oconee Nuclear Station

Duke Energy
ON01VP / 7800 Rochester Hwy.
Seneca, SC 29672

864-873-4478
864-873-4208 fax
T.Gillespie@duke-energy.com

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10 CFR 50.4

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
11555 Rockville Pike
Rockville, MD 20852

SUBJECT: Duke Energy Carolinas, LLC (Duke Energy)
Oconee Nuclear Station (ONS), Units 1, 2, and 3
Docket Nos. 50-269, 50-270, and 50-287
Renewed License Nos. DPR-38, DPR-47, and DPR-55

Submittal of the ONS Overall Integrated Plan, in accordance with the March 12, 2012, Commission Order to Modify Licenses With Regard To Requirements for Mitigation Strategies for Beyond Design Basis External Events, EA-12-049

REFERENCE:

1. NRC Letter, E.J. Leeds (NRC) to All Power Reactor Licensees and Holders of Construction Permits in Active or Deferred Status, *Order to Modify Licenses With Regard To Requirements for Mitigation Strategies for Beyond Design Basis External Events, EA-12-049*, dated March 12, 2012, Accession No. ML12054A736
2. NRC Interim Staff Guidance JLD-ISG-2012-01, *Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events, Revision 0,* dated August 29, 2012, Accession No. ML12229A174
3. Nuclear Energy Institute document NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," Revision 0, August 21, 2012 (ADAMS Accession No.ML12242A378)

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued an Order (Reference 1) to Duke Energy. Reference 1 was immediately effective and directs Duke Energy to develop, implement, and maintain guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool capabilities in the event of a beyond-design-basis external event. Specific requirements are outlined in Attachment 2 of Reference 1.

Reference 1 requires submission of an overall integrated plan, including a description of how compliance with the requirements described in Attachment 2 are to be achieved, to the Commission for review by February 28, 2013, and subsequent submission of interim status reports at six-month intervals following submittal of the overall integrated plan. Pursuant to Section IV, Condition C.1 of Reference 1, Duke Energy hereby submits to the Commission for its review the enclosed overall integrated plan for Oconee Nuclear Station.

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The Enclosure contains the current design information as of the writing of this letter, much of which is still preliminary, pending completion of on-going evaluations and analyses. As further design details and associated procedure guidance are finalized, supplemental information will be communicated to the Staff in the six-month status reports required by Reference 1.

This letter contains no new regulatory commitments.

If you have any questions or require additional information, please contact David Haile of ONS Regulatory Affairs, at (864) 873-4742.

I declare under the penalty of perjury that the foregoing is true and correct. Executed on February 28, 2013.

Sincerely,

TP Gillespie

T. P. Gillespie Jr., Vice President,
Oconee Nuclear Station

Enclosure:

Oconee Nuclear Station (ONS), Units 1, 2, and 3, Mitigating Strategies (FLEX) Overall Integrated Plan

xc:

Mr. Victor M. McCree, Administrator, Region II
U.S. Nuclear Regulatory Commission
Marquis One Tower
245 Peachtree Center Ave., NE, Suite 1200
Atlanta, GA 30303-1257

Mr. Eric J. Leeds, Director, Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
One White Flint North, Mailstop 13-H16M
11555 Rockville Pike
Rockville, MD 20852-2738

Mr. John P. Boska, Project Manager (ONS)
(By electronic mail only)
U. S. Nuclear Regulatory Commission
One White Flint North, M/S O-8G9A
11555 Rockville Pike
Rockville, MD 20852

Mr. Ed Crowe
NRC Senior Resident Inspector
Oconee Nuclear Station

~~Contains Security Sensitive Information -~~
~~Withhold from public disclosure under 10 CFR 2.390(d)(1)~~

ENCLOSURE

OCONEE NUCLEAR STATION (ONS)
UNITS 1, 2, AND 3

DOCKET NOS. 50-269, 50-270, and 50-287

MITIGATING STRATEGIES (FLEX) OVERALL INTEGRATED PLAN

General Integrated Plan Elements (PWR & BWR)	
Determine Applicable Extreme External Hazard *Input the hazards applicable to the site; seismic, external flood, high winds, snow, ice, cold, high temps. Describe how NEI 12-06 Sections 5 – 9 were applied and the basis for why the plant screened out for certain hazards* **Ref: NEI 12-06, Section 4.0 -9.0 JLD-ISG-2012-01, Section 1.0**	Seismic Hazard Assessment: The seismic criteria for Oconee Nuclear Station (ONS) include two design response spectra: Maximum Hypothetical Earthquake (MHE) and Design Basis Earthquake (DBE), also referred to as Safe Shutdown Earthquake (SSE) and Operating Basis Earthquake (OBE) respectively. The Peak Ground Acceleration for the MHE and the DBE are 0.10g and 0.05g, respectively for structures founded on rock. For structures founded on overburden, the Peak Ground Acceleration for the MHE for Class 1 Structures is 0.15g (Reference 61). These values constitute the design basis of ONS. Per NEI 12-06, Section 5.2, all sites will consider seismic hazard in their FLEX strategies. External Flood Assessment: ONS has extensive licensing consideration, analysis, correspondence and pending actions with respect to flooding. There are two separate external flooding events that potentially put water in the ONS yard. One of the current licensing basis external floods is a local intense precipitation event defined by the UFSAR Section 2.4.2.2. The other flooding event is defined in the June 22, 2010 Confirmatory Action Letter (CAL) as a postulated upstream dam failure (Reference 14). Both of these modeled scenarios produce flooding in the ONS yard. Maximum external flood levels in the yard are bounded by a postulated upstream dam failure. Since the CAL was submitted, ONS has taken defense in depth steps by constructing two flood protection features. These two features keep portions of the site dry and limit water heights in the yard. These features are not credited in ONS current licensing basis. However, additional analysis has been performed to prove these added features lower the modeled water heights (Reference 48). Separate analysis is currently underway to define new flooding hazards for both the local intense precipitation event (Open Item 1) and the sunny day upstream dam failure event (Open Item 2). These analyses are driven by the NRC 10 CFR 50.54(f) Recommendation 2.1, Flood Hazard Reevaluation. Therefore, ONS will consider a flood event in its FLEX strategies. High Wind Hazard Assessment: Using Figures 7-1 and 7-2 from NEI 12-06, it was determined the ONS site is in Region 3 which indicates tornado winds should not exceed 179 mph. However, hurricane winds could produce 140 mph peak gusts. Therefore, ONS will consider a high wind hazard. Extreme Cold Assessment: Per NEI 12-06 Section 8, ONS will consider between 8 and 10 inches of snow and is considered a Level 5 (most severe) in ice storm severity: meaning there is potential for catastrophic destruction to power lines and/or existence of extreme amounts of ice. Extreme High Temperature Assessment: Per NEI 12-06 Section 9, all sites will consider temperatures in excess of 110 °F. The applicable extreme external hazards at ONS are Seismic, Flood, High Wind, Extreme Cold, and Extreme High Temperatures.

General Integrated Plan Elements (PWR & BWR)	
Key Site assumptions to implement NEI 12-06 strategies. *Provide key assumptions associated with implementation of FLEX Strategies.* **Ref: NEI 12-06, Section 3.2.1**	1. Any future Station Blackout (SBO) or Extended Loss of Alternating Current Power (ELAP) Rule is assumed to be consistent with Order EA-12-049 (Reference 3) and JLD-ISG-2012-01 (Reference 4). Different or additional requirements in the Rule may necessitate a change in the plans made in the ONS response to Order EA-12-049. 2. The NRC 10 CFR 50.54(f) Recommendation 2.1, Seismic Reevaluation does not result in changes to the current design basis. In other words, it is assumed that the seismic re-evaluation does not adversely impact the equipment that forms a part of the ONS FLEX strategy. Any changes to the seismic design basis may require a change to the plans in the ONS response to Order EA-12-049. 3. Systems, structures, and components (SSC) will be considered seismically robust if they: • Are constructed to ONS QA-1 or Category I criteria, • Meet the requirements to be robust relative to the SSE using Seismic Qualification Utility Group (SQUG) procedures , • Meet the requirements to be robust relative to the SSE using EPRI 1012023, *Experience Based Seismic Verification Guidelines for Piping Systems*, • Meet the requirements to be robust relative to the SSE using EPRI 1019199, *Experience Based Seismic Verification Guidelines for Piping and Tubing Systems*, • Meet the requirements to be robust relative to the SSE using other industry recognized codes like AWWA D100, or • Are demonstrated via a shake table. 4. Personnel access to and qualification of equipment that forms a part of the FLEX strategy assumes no core damage. 5. For events with no advance warning, per NEI 12-06 Section 12.1, on-site resources will be used to cope with the first two phases of the event and for a minimum of the first 24 hours of the event. Emergency Response Organization (ERO) personnel are assumed to begin arriving at 6 hours and the site ERO will be staffed at 24 hours after the event. 6. Phase 3 resources (personnel and equipment) are assumed to start arriving within 24 hours in accordance with the Regional Resource Center (RRC) playbook (Open Item 9). All resources from the RRC are assumed to be available within 72 hours. 7. This plan defines strategies capable of mitigating a simultaneous loss of all alternating current (AC) power and loss of normal access to the ultimate heat sink resulting from a beyond-design-basis external event (BDBEE) by providing adequate capability to maintain or restore core cooling, containment, and Spent Fuel Pool (SFP) cooling capabilities at all units on a site. Though specific strategies are being developed, due to the inability to anticipate all possible scenarios, the strategies are also diverse and flexible to encompass a wide range of possible conditions. These pre-planned strategies developed to

General Integrated Plan Elements (PWR & BWR)	
	protect the public health and safety will be incorporated into the unit emergency operating procedures in accordance with established Emergency Operating Procedure (EOP) change processes, and their impact to the design basis capabilities of the unit evaluated under 10 CFR 50.59. The plant Technical Specifications contain the limiting conditions for normal unit operations to ensure that design safety features are available to respond to a design basis accident and direct the required actions to be taken when the limiting conditions are not met. The result of the beyond-design-basis event may place the plant in a condition where it cannot comply with certain Technical Specifications and/or with its Security Plan, and, as such, may warrant invocation of 10 CFR 50.54(x) and/or 10 CFR 73.55(p). 8. The flood re-evaluation pursuant to the 10 CFR 50.54(f) letter of March 12, 2012 is not completed, and therefore not assumed in this submittal. Defense in depth measures have been put in place to minimize flood levels onsite in response to the CAL for upstream dam failure. Based on analysis of the effects of the defense in depth measures, flood levels onsite are estimated to peak at 4.9 feet (Reference 48). For conservatism, a maximum flood level of 10 feet (Elevation 806') will be utilized in the development of mitigating strategies (Open Item 2). 9. The ONS "FLEX Strategy" is based on A) events with pre-warning (External Flood) and B) events with no warning (Seismic).
Extent to which the guidance, JLD-ISG-2012-01 and NEI 12-06, are being followed. Identify any deviations to JLD-ISG-2012-01 and NEI 12-06. *Include a description of any alternatives to the guidance, and provide a milestone schedule of planned action.* **Ref: JLD-ISG-2012-01 NEI 12-06 13.1**	Conformance with NEI 12-06 is expected with the following exception: The exception that the Standby Shutdown Facility (SSF) Diesel Generator will be considered available for Phase 1 coping until Phase 2 FLEX equipment has been deployed and is capable of being placed into operation, was presented to the NRC on November 8, 2012 (Reference 50). NEI 12-06, 3.2.1.3: (2) "All sources of emergency on-site AC power and Station Blackout (SBO) alternate AC power sources are assumed to be not available and not imminently recoverable" and (6) "Permanent plant equipment that is contained in structures with designs that are robust with respect to seismic events, floods, and high winds, and associated missiles, are available" Justification: The SSF is robust as described in (6) above. The SSF is credited for: • The safe shutdown requirements for fire protection • A seismic event resulting in a circulating water pipe break which floods the Turbine Building (internal flood) • Physical Security concerns • SBO when Turbine Driven Emergency Feedwater (TDEFW) is unavailable The SSF diesels are provided solely for operation of SSF equipment and are disconnected from normal/emergency electrical distribution system (similar to a diesel/turbine driven pump). The SSF Reactor Coolant (RC) makeup system provides Reactor Coolant Pump (RCP) seal

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	injection and seal cooling independent of the High Pressure Injection (HPI) system. The SSF Auxiliary Service Water (ASW) system provides auxiliary feedwater flow independent of the main feedwater, emergency feedwater, and station auxiliary feedwater systems. The SSF system: • Normally aligned to 4160V switchgear for house loads from the unit 2 main feeder bus. • During emergency operation the SSF electrical equipment is independent of plant electrical equipment. • SSF pumps are independent of plant equipment. • Oconee's Phase 1 Coping Strategy assumes, during a complete loss of AC power event, that all three Units' Turbine Driven Emergency Feedwater (TDEFW) Pumps are also instantly unavailable at T=0. (Any one TDEFW Pump can be aligned to any or all three Units). In an SSF mitigated event, the SSF is not connected to the offsite or onsite emergency AC power systems. Procedures, protective relaying, and interlocks ensure SSF systems are only supplied from the SSF (Reference 30, 41, and 42). The full capability of Phase 2 using portable equipment/strategies will be deployed with the time critical aspects beginning upon recognition of an ELAP event.
Provide a sequence of events and identify any time constraint required for success including the technical basis for the time constraint. *Strategies that have a time constraint to be successful should be identified with a technical basis and a justification provided that the time can reasonably be met (for example, a walkthrough of deployment).* *Describe in detail in this section the technical basis for the time constraint identified on the sequence of events timeline Attachment 1A* *See attached sequence of events timeline (Attachment 1A).* *Technical Basis Support information, see attached*	See Attachment 1A-1 and Attachment 1A-2 Note: This section involves Open Items which are not explicitly identified or referenced in this section, but are addressed within the key plant safety and support functions sections of the integrated plan. Discussion of ELAP New Time Constraints Identified in Attachment 1A: Seismic: 1. 45 min - 2 hrs – Crew determines event is ELAP and enters FLEX Support Guidelines (FSG). Crew exhausts all efforts to regain power in the EOP Blackout tab. Input from Charlotte SOC (System Operating Center) confirms that return of grid is not possible. FSGs will be developed. 2. 2 - 3 hrs - Perform additional Vital Battery deep load shedding. Extension in battery life to be determined based upon load shed analysis. Provides Main Control Room (MCR) indication of key variables to gain margin with respect to Phase 2 FLEX deployment time. 3. 2 - 12 hrs - Crew begins cool down of Reactor Coolant System (RCS) using SSF and Atmospheric Dump Valves (ADVs), limited only by the ability to maintain pressurizer level. FSGs to direct a cool down using the ADV while feeding from the SSF will have to be developed. This cool down using the SSF will utilize both steam generators (SGs). Current licensing for the SSF does not permit cool down below 525°F. ONS site specific analysis will be performed to support this action.

General Integrated Plan Elements (PWR & BWR)	
NSSS Significant Reference Analysis Deviation Table (Attachment 1B) **Ref: NEI 12-06, Section 3.2.1.7** **JLD-ISG-2012-01, Section 2.1**	4. 2 - 72 hrs - FLEX equipment deployed: Portable diesel-driven pump with suction from intake canal feeding 1 SG per unit. Establish Reactor Coolant System Makeup (RCMU) using one of the following: • Repowered SSF RCMU pump with suction from SFP • Portable low capacity, high head pump taking suction from missile protected portion of borated water storage tank (BWST) Open core flood tank (CFT) vent valves or close CFT isolation valves using power from portable generators. Repower required electrical loads, install portable lighting and ventilation fans for the vital battery rooms, electrical equipment rooms, and control rooms. FSGs will be developed that will direct deploying FLEX Equipment and strategies. Strategies to deploy SG Makeup pumps exist, time will have to be determined. Repower of the SSF RCMUP will require new analysis to determine time. Installation of portable makeup pump supplying makeup from the BWST will require new analysis. Venting the CFTs or isolating CFTs will require new analysis. Repower of all electrical loads will require new analysis. New analysis required for time to install portable lighting and ventilation fans for the vital battery rooms, electrical equipment rooms, and control rooms. Deployment must be completed before end of Phase 1 coping. 5. 12 -72 hrs - Feed SGs with high capacity low head diesel driven portable pump taking suction from the Lake Keowee intake. Make up to RCS using one of two options in action item 4 above. Cool down and maintain RCS temp 240 - 250 °F. FSGs will be developed directing the cool down using 1 S/G per unit and making up from one of the two options in 4 above. ONS site specific analysis to support cool down will be developed. <u>Flood:</u> 1. 8 - 72 hours - When the flood recedes, Establish FLEX RCS makeup Makeup to RCS using one of the following: • Repowered SSF RCMUP with suction from SFP. • Portable low capacity, high head pump taking suction from missile protected portion of BWST. · Connect the portable instrumentation in Electrical Penetration Rooms. Install portable lighting and ventilation fans for the Electrical Penetration Rooms. FSGs will be developed that will direct deploying FLEX Equipment and strategies. Repower of the SSF RCMUP will require new analysis to determine time. Installation of portable makeup pump supplying makeup from the BWST will require new analysis. Time to deploy and connect the portable instrumentation panel will be determined as well as portable lighting and ventilation fans.

General Integrated Plan Elements (PWR & BWR)	
	2. 24 hrs - Provide alternate source of feed using embedded condenser circulation water (CCW) water to replenish Chemical Treatment Pond 1 (CTP-1) for next 5.75 days. CTP-1 contains at least 1E6 gallons of water which will supply inventory for 3 units for 24 hours. Water in CCW lines could add approximately 5.75 days. FSGs to access this water and transfer to CTP-1 will be developed along with determination of time to align the equipment. For technical basis support information, see "NSSS Significant Reference Analysis Deviation Table" (Attachment 1-B)
Identify how strategies will be deployed in all modes. *Describe how the strategies will be deployed in all modes.* **Ref: NEI 12-06, Section 13.1.6**	Deployment routes shown in attached sketches will be utilized to transport FLEX equipment to the deployment areas. The identified paths and deployment areas will be accessible during all modes of operation. This deployment strategy will be included within an administrative program in order to keep pathways clear or actions to clear the pathways (Open Item 3). Connections for portable equipment will be sized for all modes. Portable FLEX equipment will have the capacity for all modes. Deployment routes are shown in the following figures: Figure 1, Figure 2, Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8, Figure 9

Provide a milestone schedule. This schedule should include:
• **Modifications timeline**
  ○ **Phase 1 Modifications**
  ○ **Phase 2 Modifications**
  ○ **Phase 3 Modifications**
• **Procedure guidance development complete**
  ○ **Strategies**
  ○ **Maintenance**
• **Storage plan (reasonable protection)**
• **Staffing analysis completion**
• **FLEX equipment acquisition timeline**
• **Training completion for the strategies**
• **Regional Response Centers operational**
 	
Ref: NEI 12-06, Section 13.1
	The dates specifically required by the order are obligated or committed dates. Other dates are planned dates subject to change. Updates will be provided in the periodic (six month) status reports.
	
	See attached milestone schedule in Attachment 2.

Identify how the programmatic controls will be met. **Ref: NEI 12-06, Section 11** **JLD-ISG-2012-01, Section 6.0** *Provide a description of the programmatic controls*	ONS will implement programmatic controls in accordance with NEI 12-06 as defined below (Open Item 4). Procedures and guidelines will be reviewed and revised and/or generated as required to address additional programmatic controls as a result of FLEX requirements. Equipment associated with these strategies will be procured as commercial equipment with design, storage, maintenance, testing, and configuration control in accordance with NEI 12-06 Section 11.1.

General Integrated Plan Elements (PWR & BWR)	
equipment protection, storage and deployment and equipment quality. See section 11 in NEI 12-06. Storage of equipment, 11.3, will be documented in later sections of this template and need not be included in this section. See section 6.0 of JLD-ISG-2012-01.	Installed structures, systems and components pursuant to 10 CFR 50.63(a) will continue to meet augmented guidelines of RG 1.155 Station Blackout. The unavailability of equipment and applicable connections that directly performs a FLEX mitigation strategy will be managed using plant equipment control guidelines developed in accordance with NEI 12-06 Section 11.5 (Open Item 5). Programs and processes will be established to assure personnel proficiency in the mitigation of beyond design basis external events is developed and maintained in accordance with NEI 12-06 Section 11.6 (Open Item 6). The FLEX strategies and basis will be maintained in overall FLEX basis documents (Open Item 7). Existing plant configuration control procedures will be modified (Open Item 8) to ensure that changes to the plant design, physical plant layout, roads, buildings, and miscellaneous structures will not adversely impact the approved FLEX strategies in accordance with NEI 12-06, Section 11.8.
Describe training plan *List training plans for affected organizations or describe the plan for training development.*	Training will be initiated through the Systematic Approach to Training (SAT) process. Training will be developed and provided to all involved plant personnel based on any procedural changes or new procedures developed to address and identify FLEX activities. Applicable training will be completed prior to the implementation of FLEX (Open Item 6).
Describe Regional Response Center plan *Discussion in this section may include the following information and will be further developed as the Regional Response Center development is completed.* • *Site-specific RRC plan* • *Identification of the primary and secondary RRC sites* • *Identification of any alternate equipment sites (i.e. another nearby site with compatible equipment that can be deployed)* • *Describe how delivery to the site is acceptable* • *Describe how all requirements in NEI 12-06 are identified*	The industry will establish two (2) Regional Response Centers (RRC) to support utilities during a BDBEE. Each RRC will hold five (5) sets of equipment, four (4) of which will be able to be fully deployed when requested, the fifth set will have equipment in a maintenance cycle. Equipment will be moved from an RRC to a local assembly area, established by the Strategic Alliance of FLEX Emergency Response (SAFER) team and the utility. Communications will be established between the affected nuclear site and the SAFER team and required equipment moved to the site as needed. First arriving equipment, as established during development of the nuclear site's playbook, will be delivered to the site within 24 hours from the initial request. A contract has been signed between the site and the Pooled Equipment Inventory Company to provide Phase 3 services and equipment (Open Item 9).

Maintain Core Cooling & Heat Removal

PWR Installed Equipment (Phase 1)

Determine Baseline coping capability with installed coping[1] modifications not including FLEX modifications, utilizing methods described in Table 3-2 of NEI 12-06:

- **AFW/EFW**
- **Depressurize SG for Makeup with Portable Injection Source**
- **Sustained Source of Water**

Ref: JLD-ISG-2012-01, Section 2 and 3

Provide a general description of the coping strategies using installed equipment including station modifications that are proposed to maintain core cooling. Identify methods (AFW/EFW) and strategies utilized to achieve this coping time.

Seismic:

At the initiation of the event, operators will enter the Emergency Operating Procedure (EOP) (Reference 51). During the performance of immediate manual actions, an operator on each affected unit will be dispatched to the SSF. The control room supervisor (CRS) will transfer to the station blackout tab of the EOP and attempt to regain power by running the restoration of power enclosure. The FLEX support guidelines (FSGs) will be implemented (Open Item 4) when the enclosure actions fail to restore power and it becomes apparent that power restoration is not achievable in the near term.

The SSF is designed to operate for 72 hours (UFSAR 9.6.3.2 RCS Makeup System). The Phase 1 reliance on the SSF will only be as long as needed to deploy the Phase 2 FLEX equipment. However, while Phase 1 coping capabilities remain viable; they will continue to be utilized. The operator at the SSF will align SSF ASW within 14 minutes. This is a Time Critical Action (TCA) that has been validated using licensed operators (Reference 65). The SSF ASW pump will take suction from the CCW intake crossover line and discharge to both steam generators on each unit. RCS pressure will be maintained between 1950 and 2250 psig with an RCS temperature of 550 to 555°F (Reference 30). When the determination is made to enter FSGs due to an ELAP, the SSF operator will isolate letdown and begin an RCS cool down using SSF ASW and plant ADVs (Open Item 10). The atmospheric dump valves are manual valves located in the turbine building on the 5th floor. An assessment will be completed to verify the seismic robustness of the ADVs and adequate accessibility after an event (Open Item 11).

Pressurizer level will be maintained and cool down rate will be established, limited only by the ability to maintain pressurizer level on scale (Open Item 10).

Flood:

At the initiation of the event, operators will enter the approved abnormal procedure for flood mitigation. All three units will begin shutdown. Operations will run three enclosures simultaneously. (Reference 25)

The CRS enclosure: trips unit, borates RCS to Cold Shutdown (CSD) conditions, closes Core Flood Tank (CFT) isolation valves, increases levels in Pzr and SGs, and begins plant cool down to 240 - 250°F.

The Operations Shift Manager (OSM) enclosure: activates operational support center/ technical support center (OSC/TSC), classifies event, conducts site assembly, requests increased staffing, and directs SFP monitoring.

The Work Control Center Senior Reactor Operator (WCC SRO) enclosure: dispatches operators and maintenance to align portable pump and notifies Security. A change will be made to the WCC SRO enclosure to notify Maintenance, Single Point of Contact (SPOC) to pre-stage the FLEX portable instrumentation in the Penetration Rooms (Open Item 4).

[1] Coping modifications consist of modifications installed to increase initial coping time, i.e. generators to preserve vital instruments or increase operating time on battery powered equipment.

Maintain Core Cooling & Heat Removal

PWR Installed Equipment (Phase 1)

The ≈3 hours before SSF function is lost as flood waters in the ONS yard begin overtopping the SSF flood wall allows time to perform all the above actions as well as begin the cool down (Reference 18).

Details:

Provide a brief description of Procedures / Strategies / Guidelines *Confirm that procedure/guidance exists or will be developed to support implementation.*	• Guidance to align and operate the SSF is contained in approved abnormal operating procedure (Reference 30), • Guidance to perform flood actions is contained in an approved abnormal operating procedure (Reference 25), and approved engineering manual directive (Reference 18). • FSGs will be developed to implement FLEX strategies in accordance with PWROG generic FLEX support guidelines (Open Item 4).
Identify modifications *List modifications and describe how they support coping time.*	No modifications are required to support Phase 1 coping actions.
Key Reactor Parameters *List instrumentation credited for this coping evaluation phase.*	SEISMIC EVENT **SSF:** For a seismic event, Phase 1 coping will utilize the SSF to provide steam generator feed. While operating from the SSF, the following SSF dedicated instrumentation with indications located in the SSF control room will be used (Reference 41, 42, and 55, and UFSAR Section 7.5.2.2.1 and Table 9-16).

1. RCS Pressure	4. Steam Generator Level
2. RCS Thot & RCS Tcold	5. ASW Flow
3. Pressurizer Level	6. Five (5) Core Exit T/Cs

Note that Reactor coolant system heat removal can be directly monitored by RCS parameters and controlled by SG level without SG pressure indication (Reference 42 and UFSAR Section 9.6.4.6.2).

Main Control Room: The following Main Control Room instrumentation powered from 120 VAC battery backed vital panelboards remains available to support core cooling and heat removal (Reference 33, 43, and 56). A load shedding analysis will be performed to determine the length of time this instrumentation will be available. (Open Item 12)

1. RCS Wide Range Pressure	5. Steam Generator Pressure
2. RCS Thot	6. Core Exit T/Cs
3. Pressurizer Level	7. RVLIS
4. Steam Generator Level	

FLOOD EVENT
As previously discussed, based on the advanced warning of a flood, instrumentation normally used to support core cooling and heat removal will be available for Phase 1 coping.

Notes: None.

Maintain Core Cooling & Heat Removal

PWR Portable Equipment (Phase 2)

Provide a general description of the coping strategies using on-site portable equipment including station modifications that are proposed to maintain core cooling. Identify methods and strategies utilized to achieve this coping time.

Seismic:
Phase 2 Core cooling will be achieved with a high capacity low head portable diesel driven pump. The pump suction will come from the plant intake canal at a location separate from the intake pump structure (Figure 1). The discharge will be into one of two SG feed options.

Primary Strategy: Station ASW feed lines through the existing tap upstream of the units manual throttle valves (Figure 3). This single tap feeds a header that supplies all three units (Open Item 13).

Note: When the new Protected Service Water (PSW) modification is completed the Station ASW line will be replaced with a PSW line that will perform the same function (Open Item 17).

Alternate Strategy: Three individual unit connections to the SSF ASW, upstream of the SSF ASW control valves (Open Item 13) (Figure 4).

Flood:
Phase 2 Core cooling will be achieved with a high capacity low head portable diesel driven pump. The pump suction will come from Chemical Treatment Pond 1 (CTP-1). The discharge will be into one of two SG feed options (Figure 2).

Primary Strategy: Station ASW feed lines through the existing tap upstream of the units manual throttle valves (Figure 3). When the new Protected Service Water (PSW) modification is completed, the Station ASW line will be replaced with a PSW line that will perform the same function (Open Item 15).

Alternate Strategy: Connection to the SSF ASW lines, upstream of the SSF ASW control valves (Open Item 15) (Figure 4).

Administrative controls ensure there is always enough water in CTP-1 to supply cooling for 24 hours (Reference 52 and 62). Phase 2 core cooling will be sustained beyond the initial capability of CTP-1, by using the water volume retained in the embedded CCW piping. Operator action to break siphon is required to maximize CCW water retention. These actions must be taken during the 2.86 hours prior to inundation (Reference 25). Modifications are required to enable the siphon break actions. Access to the CCW inventory is achieved by opening CCW manway 1A4 or 1B4 inserting a diesel driven submersible pump, and discharging to CTP-1 (Figure 9). The CCW inventory coupled with the water in CTP-1 provides cooling for approximately 6.75 days (Open Item 16).

Details:

Provide a brief description of Procedures / Strategies / Guidelines *Confirm that procedure/guidance exists or will be developed to support implementation with a description of the procedure / strategy / guideline.*	Site-specific procedures and/or FSGs will be developed using industry guidance to address the criteria in NEI 12-06, Section 11.4 (Open Item 4). **Flood:** Guidance to perform actions is contained in approved abnormal operation procedure (External Flood Mitigation). New guidance must be developed to perform preemptive siphon break actions within 2.86 hours and to establish transfer flow from CCW to CTP-1 within 24 hours after CTP-1 feed begins (Open Item 16).

Maintain Core Cooling & Heat Removal	
PWR Portable Equipment (Phase 2)	
Identify modifications *List modifications necessary for Phase 2*	• PSW Feed line will replace Station ASW line. This existing modification is in progress (Open Item 17). • Taps to the SSF ASW lines will be installed (Open Item 18). • Portable pumps, portable submersible pump drive unit, and hose pathway strategies to be shown on design drawings, equipment database, design basis documents, etc (Open Item 8). • Valves for breaking siphons in embedded CCW piping (Open Item 19).
Key Reactor Parameters *List instrumentation credited or recovered for this coping evaluation.*	SEISMIC EVENT Main Control Room: (Reference 33, 43, 56, and 59) 1. RCS Wide Range Pressure* 2. RCS T_{hot} & RCS T_{cold} (T_{cold} will need separate re-power) 3. Pressurizer Level 4. Steam Generator Level* 5. Steam Generator Pressure 6. Core Exit T/Cs* 7. RVLIS FLOOD EVENT Indication for the same variables listed in a seismic event will be available using portable instrumentation in the East Penetration Room. (Open Item 20) * Indications currently required by Reference 18 and 25, and will be first priority to restore.
Storage / Protection of Equipment : **Describe storage / protection plan or schedule to determine storage requirements**	
Seismic *List Protection or schedule to protect*	Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06, Section 11. The structures will be built prior to the FLEX implementation date (Open Item 21). The ONS procedures and programs are being developed to address storage structure requirements, deployment path requirements, and FLEX equipment requirements relative to the hazards applicable to ONS (Open Item 4).
Flooding *List Protection or schedule to protect* Note: If stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level.	Oconee intends to locate the FLEX storage facility above flood levels currently identified in the NRC's January 28, 2011, Safety Evaluation regarding the CAL (Reference 63), unless better informed by ongoing flood hazard re-analysis and flooding mitigation modification plans (Open Item 21).
Severe Storms with High Winds *List Protection or schedule to protect*	Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06, section 11. The structures will be built prior to the FLEX implementation date (Open Item 21). The ONS procedures and programs are being developed to address storage structure requirements, deployment path requirements, and FLEX equipment requirements relative to the hazards applicable to ONS (Open Item 4).

Maintain Core Cooling & Heat Removal	
PWR Portable Equipment (Phase 2)	
Snow, Ice, and Extreme Cold *List Protection or schedule to protect*	Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06, Section 11. The structures will be built prior to the FLEX implementation date (Open Item 21). The ONS procedures and programs are being developed to address storage structure requirements, deployment path requirements, and FLEX equipment requirements relative to the hazards applicable to ONS (Open Item 4).
High Temperatures *List Protection or schedule to protect*	Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06, Section 11. The structures will be built prior to the FLEX implementation date (Open Item 21). The ONS procedures and programs are being developed to address storage structure requirements, deployment path requirements, and FLEX equipment requirements relative to the hazards applicable to ONS (Open Item 4).

Deployment Conceptual Design
(Attachment 3 contains Conceptual Sketches)

Strategy	**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
Phase 2 core cooling strategy Primary and Alternate: • Equipment deployed outside is stored in a FLEX equipment storage building. • Some equipment to complete Primary Strategy inside connections may be pre-staged in the Aux Bldg. • FLEX hoses stacked in hose trailers for easy flaking. • Towing vehicles and debris clearing machinery are deployed from the FLEX equipment storage building. • Pumps, hoses, fittings, generators are trailer mounted for ease of deployment.	• SG Feed Connections (Open Item 18) • FLEX Equipment Storage Building (Open Item 21)	Connections are located inside the Aux Bldg on QA-1 or seismically robust piping.
Deploy submersible pump in CCW embedded piping via manways.	Breaking siphons on CCW embedded piping (Open Item 19).	CCW embedded piping is robust.
Notes: None.		

Maintain Core Cooling & Heat Removal

PWR Portable Equipment (Phase 3)

Provide a general description of the coping strategies using Phase 3 equipment including modifications that are proposed to maintain core cooling. Identify methods and strategies utilized to achieve this coping time.

At the end of Phase 2, based on preliminary analysis the RCS will be between 240 to 250°F (Open Item 10).

Continue to steam SGs using the diesel driven pump and ADVs while allowing RCS pressure to slowly decrease as RCS temperature decreases until a Decay Heat Removal (DHR) capability is available.

The Phase 3 capability is to sustain Phase 2 SG makeup by:

(a) Supplying spare makeup pumps and redundant capability
(b) Integrate filtration and demineralization

Additionally, a Phase 3 strategy [offsite resources] will have to be developed for flood to establish logistics for delivery (and purification/filtration) of raw water to the site (CTP-1) at an estimated rate of approximately 700,000 gpd within approximately 6 days (Open Item 23).

Details:

Provide a brief description of Procedures / Strategies / Guidelines *Confirm that procedure/guidance exists or will be developed to support implementation with a description of the procedure/strategy/guideline.*	Site-specific procedures and/or FSGs will be developed using industry guidance to address the criteria in NEI 12-06, Section 11.4 (Open Item 4). Flood • Establish FSGs to continue water makeup to CTP-1 using offsite resources (Open Item 4).
Identify modifications *List modifications necessary for Phase 3*	None.
Key Reactor Parameters *List instrumentation credited or recovered for this coping evaluation.*	Same as Phase 2.

Deployment Conceptual Design
(Attachment 3 contains Conceptual Sketches)

Strategy	**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
Same as Phase 2.	Same as Phase 2.	Same as Phase 2.

Notes: None.

Maintain RCS Inventory Control
PWR Installed Equipment (Phase 1)
Determine Baseline coping capability with installed coping[2] modifications not including FLEX modifications, utilizing methods described in Table 3-2 of NEI 12-06: • **Low Leak RCP Seals or RCS makeup required** • **All Plants Provide Means to Provide Borated RCS Makeup**
Provide a general description of the coping strategies using installed equipment including modifications that are proposed to maintain core cooling. Identify methods (Low Leak RCP Seals and/or borated high pressure RCS makeup) and strategies utilized to achieve this coping time. Seismic: The SSF is designed to operate for 72 hours per UFSAR 9.6.3.2 RCS Makeup System. The Phase 1 reliance on the SSF will only be as long as needed to deploy the Phase 2 FLEX equipment. The operator at the SSF will align Reactor Coolant Makeup (RCMU) to supply Reactor Coolant Pump (RCP) seals within 20 minutes. This is a Time Critical Action that has been validated using licensed operators (Reference 65). Activation of the SSF within the required time maintains RCP seal function. The SSF RCMUP will take suction from the Spent Fuel Pool (SFP) and discharge to the RCP seal injection lines, to provide both boration of the RCS along with RCS make up and RCP seal cooling (Reference 41). A minimum RCP Seal leakage of 8 gpm per unit will be included in the cool down analysis; which is consistent with WCAP Section 4.4.3 (Reference 5) for seals that do not experience overheating (Open Item 10). Flood: Because of the advanced warning and conservative time assumed before the loss of plant components (3 hours), the RCS will be fully borated using existing plant equipment before normal equipment is lost (Reference 64). Pressurizer level will be increased to accommodate normal RCS leakage (Reference 25). Similarly, a minimum RCP Seal leakage of 8 gpm per unit will be included in the cool down analysis for a Flood Event; which is consistent with WCAP Section 4.4.3 (Reference 5) for seals that do not experience overheating (Open Item 10).

Details:	
Provide a brief description of Procedures / Strategies / Guidelines *Confirm that procedure/guidance exists or will be developed to support implementation*	Seismic: Guidance to align and operate the SSF is contained in approved abnormal operating procedure (Reference 30). (SSF AOP). Flood: Guidance to perform actions is contained in approved abnormal operating procedure (External Flood Mitigation).
Identify modifications *List modifications*	None required.

[2] Coping modifications consist of modifications installed to increase initial coping time, i.e. generators to preserve vital instruments or increase operating time on battery powered equipment.

Maintain RCS Inventory Control

PWR Installed Equipment (Phase 1)

Key Reactor Parameters
List instrumentation credited for this coping evaluation.

SEISMIC EVENT

SSF: For a seismic event, Phase 1 coping will utilize the SSF to provide RCS makeup capability. While operating from the SSF, the following SSF dedicated instrumentation with indications located in the SSF control room will be used for RCS inventory control (Reference 41, 42, 55, and UFSAR Section 7.5.2.2.1 and Table 9-16).

1. RCS Pressure	3. Pressurizer Level
2. RCS T_{hot} & RCS T_{cold}	4. Five (5) Core Exit T/Cs

Main Control Room: The following Main Control Room instrumentation powered from 120 VAC battery backed vital panelboards remains available to support RCS inventory control (Reference 43 and 56). A load shedding analysis will be performed to determine the length of time this instrumentation will be available (Open Item 12).

1. RCS Wide Range Pressure	4. Core Exit T/Cs
2. RCS T_{hot}	5. RVLIS
3. Pressurizer Level	6. Excore NI-1, 2
7. RB Normal and Emergency Sump Level	

FLOOD EVENT

As previously discussed, based on the advanced warning of a flood, instrumentation normally used to support RCS inventory control remains available for Phase 1 coping.

Maintain RCS Inventory Control

PWR Portable Equipment (Phase 2)

Provide a general description of the coping strategies using on-site portable equipment including modifications that are proposed to maintain core cooling. Identify methods (Low Leak RCP Seals and/or borated high pressure RCS makeup) and strategies utilized to achieve this coping time.

Seismic:
RCS boration and makeup will be accomplished using one of two makeup strategies:

With no power to the CF Tank isolation valves, CFT contents include pressurized nitrogen gas that could expand into the RCS; which could potentially block natural circulation flow. Strategies are to prevent CF gas injection as follows:

- Isolation/venting of CF Tank to prevent nitrogen injection, after FLEX makeup strategy established.

Primary Strategy:

- Repowering SSF RCMUP. Suction will be from the SFP to the RCP seal injection lines (Open Item 22).
- Repower CFT vent valves (CF-4 & CF-5) using portable equipment to allow venting nitrogen pressure off the tanks therefore preventing nitrogen injection into the RCS. (Open Item 22)

Alternate Strategy:

- Portable or prestaged high pressure low flow (40 gpm) injection pump taking a suction from the missile protected portion of the Borated Water Storage Tank (BWST) and discharging into existing vent lines on the High Pressure Injection (HPI) injection header (Open Item 25).
- Repower CFT isolation valves (CF-1 and CF-2) using portable equipment to allow isolation of the Core Flood Tanks (CFTs) to prevent nitrogen injection into the RCS (Open Item 22).

Flood:
RCS boration is accomplished during shutdown.

Makeup will be accomplished using either of the previous makeup options.

CF-1 and CF-2 are closed during Phase 1 (Reference 25).

Details:	
Provide a brief description of Procedures / Strategies / Guidelines *Confirm that procedure/guidance exists or will be developed to support implementation*	Site-specific procedures and/or FSGs will be developed using industry guidance to address the criteria in NEI 12-06, Section 11.4 (Open Item 4).
Identify modifications *List modifications*	• Repower the SSF RCMUP (Open Item 22). • Repower CFT Isolation or Vent Valves (Open Item 22). • Provide suction tap on outlet of BWST (Open Item 25). • Provide connection to HPI injection header (Open Item 25). • Install portable high pressure pump (Open Item 22 and 25).

Maintain RCS Inventory Control	
PWR Portable Equipment (Phase 2)	
Key Reactor Parameters *List instrumentation credited or recovered for this coping evaluation.*	SEISMIC EVENT Main Control Room: (Reference 33, 43, 56, 58, and 59) 1. RCS Wide Range Pressure* 2. RCS T_{hot} & RCS T_{cold} (T_{cold} will need separate repower) 3. Pressurizer Level 4. Core Exit T/Cs* 5. RVLIS 6. Excore NI-1 & 2 7. RB Normal and Emergency Sump Level 8. RCS High Point Vent Valve position indication (requires separate repower) 9. RCS Head Vent Valve position indication (requires separate repower) FLOOD EVENT Indication for the same variables listed in a seismic event will be available using portable instrumentation in the East Electrical Penetration Room (Open Item 20). * Indications currently required by Reference 18 and 25, will be first priority to restore.
Storage / Protection of Equipment: **Describe storage / protection plan or schedule to determine storage requirements**	
Seismic *List Protection or schedule to protect*	Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06, Section 11. The structures will be built prior to the FLEX implementation date (Open Item 21). The ONS procedures and programs are being developed to address storage structure requirements, deployment path requirements, and FLEX equipment requirements relative to the hazards applicable to ONS (Open Item 4).
Flooding *List Protection or schedule to protect* Note: if stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level.	Oconee intends to locate the FLEX storage facility above the current flood levels as identified in Reference 63 unless better informed by ongoing flood hazard re-analysis and flooding mitigation modification plans (Open Item 21).
Severe Storms with High Winds *List Protection or schedule to protect*	Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06, Section 11. The structures will be built prior to the FLEX implementation date (Open Item 21). The ONS procedures and programs are being developed to address storage structure requirements, deployment path requirements, and FLEX equipment requirements relative to the hazards applicable to ONS (Open Item 4).

Maintain RCS Inventory Control			
PWR Portable Equipment (Phase 2)			
Snow, Ice, and Extreme Cold *List Protection or schedule to protect*	Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06, Section 11. The structures will be built prior to the FLEX implementation date (Open Item 21). The ONS procedures and programs are being developed to address storage structure requirements, deployment path requirements, and FLEX equipment requirements relative to the hazards applicable to ONS (Open Item 4).		
High Temperatures *List Protection or schedule to protect*	Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06, Section 11. The structures will be built prior to the FLEX implementation date (Open Item 21). The ONS procedures and programs are being developed to address storage structure requirements, deployment path requirements, and FLEX equipment requirements relative to the hazards applicable to ONS (Open Item 4).		
Deployment Conceptual Modification **(Attachment 3 contains Conceptual Sketches)**			
Strategy		**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use.		*Identify modifications*	*Identify how the connection is protected*
Phase 2 inventory makeup strategy Primary and Alternate: • Equipment deployed outside is stored in a FLEX equipment storage building. • Some equipment to complete Alternate strategy inside connections may be prestaged in the Aux Bldg. • Towing vehicles and debris clearing machinery are deployed from the FLEX equipment storage building. • Pumps, hoses, and fittings are trailer mounted for ease of deployment.		• HPI Injection Header Connections (Open Item 25). • FLEX Equipment Storage Building (Open Item 21).	Connections are inside the Aux Bldg on QA-1 or seismically robust piping.
Deploy portable power distribution equipment • Generators, transformers, power panel boards, and associated cabling.		Repower SSF RCMUP or portable high pressure pump, CFT isolation or vent valves, RCS Head and Loop vent valves (Open Item 22).	Connections will be on or within QA-1 or robust SSCs (MCCs, power panelboards, electrical terminal blocks, etc.)
Notes: None.			

Maintain RCS Inventory Control

PWR Portable Equipment (Phase 3)

Provide a general description of the coping strategies using Phase 3 equipment including modifications that are proposed to maintain core cooling. Identify methods (Low Leak RCP Seals and/or borated high pressure RCS makeup) and strategies utilized to achieve this coping time.

At the end of Phase 2, based on preliminary analysis the RCS will be between 240 to 250°F (Open Item 10).

The Phase 3 capability is to sustain RCS Phase 2 makeup by:

(a) supplying spare makeup pumps, generators, and redundant capability
(b) supplying boration

RCS makeup will be controlled using one of the following strategies from Phase 2:

Primary Strategy: SSF RCMUP repowered in Phase 2. Suction will be from the SFP to the RCP seal injection lines (Open Item 22).

Alternate Strategy: Portable high pressure low flow injection pump taking suction from the missile protected portion of the BWST and discharging into existing vent lines on the HPI injection header (Open Item 25).

Details:

Provide a brief description of Procedures / Strategies / Guidelines *Confirm that procedure/guidance exists or will be developed to support implementation*	Site-specific procedures and/or FSGs will be developed using industry guidance to address the criteria in NEI 12-06, Section 11.4 (Open Item 4).
Identify modifications *List modifications*	None.
Key Reactor Parameters *List instrumentation credited or recovered for this coping evaluation*	Same as Phase 2.

Deployment Conceptual Modification
(Attachment 3 contains Conceptual Sketches)

Strategy	Modifications	Protection of connections
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
Same as Phase 2.	Same as Phase 2.	Same as Phase 2.

Notes: None.

Maintain Containment	
PWR Installed Equipment (Phase 1)	
Determine Baseline coping capability with installed coping[3] modifications not including FLEX modifications, utilizing methods described in Table 3-2 of NEI 12-06: • **Containment Spray** • **Hydrogen igniters (ice condenser containments only)**	
Provide a general description of the coping strategies using installed equipment including modifications that are proposed to maintain containment. Identify methods (containment spray/Hydrogen igniter) and strategy(ies) utilized to achieve this coping time. Based on planned mitigating strategies and preliminary reviews of existing analysis (Reference 19 and 24), containment integrity is not expected to be challenged for 72 hours. Additional analysis will be required beyond 72 hours. Therefore, there are no Phase 1 actions required at this time. (Open Item 26). ONS does not have ice condenser containments.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	N/A
Identify modifications	N/A
Key Containment Parameters *List instrumentation credited for this coping evaluation.*	SEISMIC EVENT An indication of containment pressure during Phase 1 coping is not required based on preliminary reviews of existing containment response analysis (Reference 19 and 24) for a loss of AC power event. Re-power will be addressed in Phase 2. FLOOD EVENT An indication of containment pressure during Phase 1 coping is not required based on preliminary reviews of existing containment response analysis (Reference 19 and 24) for a loss of AC power event. Re-power will be addressed in Phase 2.
Notes: None.	

[3] Coping modifications consist of modifications installed to increase initial coping time, i.e. generators to preserve vital instruments or increase operating time on battery powered equipment.

Maintain Containment	
PWR Portable Equipment (Phase 2)	
Provide a general description of the coping strategies using on-site portable equipment including modifications that are proposed to maintain core cooling. Identify methods (containment spray/hydrogen igniters) and strategies utilized to achieve this coping time. Based on planned mitigating strategies and preliminary reviews of existing analysis (Reference 19 and 24), containment integrity is not expected to be challenged for 72 hours. Additional analysis will be required beyond 72 hours (Open Item 26).	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines *Confirm that procedure/guidance exists or will be developed to support implementation*	Site-specific procedures and/or FSGs will be developed using industry guidance to address the criteria in NEI 12-06, Section 11.4 (Open Item 4).
Identify modifications *List modifications*	None.
Key Containment Parameters *List instrumentation credited or recovered for this coping evaluation.*	SEISMIC EVENT Wide Range RB Pressure *(Note: Not a priority item based on preliminary review of existing containment response analysis)* FLOOD EVENT Indication of Wide Range RB Pressure will be available using portable instrumentation in the East Electrical Penetration Room.
Storage / Protection of Equipment: **Describe storage / protection plan or schedule to determine storage requirements**	
Seismic *List how equipment is protected or schedule to protect*	Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06, Section 11. The structures will be built prior to the FLEX implementation date (Open Item 21). The ONS procedures and programs are being developed to address storage structure requirements, deployment path requirements, and FLEX equipment requirements relative to the hazards applicable to ONS (Open Item 4).
Flooding *List how equipment is protected or schedule to protect*	Oconee intends to locate the FLEX storage facility above the current flood levels as identified in Reference 63 unless better informed by ongoing flood hazard re-analysis and flooding mitigation modification plans (Open Item 21).
Severe Storms with High Winds *List how equipment is protected or schedule to protect*	Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06, Section 11. The structures will be built prior to the FLEX implementation date (Open Item 21). The ONS procedures and programs are being developed to address storage structure requirements, deployment path requirements, and FLEX equipment requirements relative to the hazards applicable to ONS (Open Item 4).

<table>
<tr><th colspan="4">Maintain Containment</th></tr>
<tr><th colspan="4">PWR Portable Equipment (Phase 2)</th></tr>
<tr><td>Snow, Ice, and Extreme Cold
List how equipment is protected or schedule to protect</td><td colspan="3">Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06, Section 11. The structures will be built prior to the FLEX implementation date (Open Item 21).

The ONS procedures and programs are being developed to address storage structure requirements, deployment path requirements, and FLEX equipment requirements relative to the hazards applicable to ONS (Open Item 4).</td></tr>
<tr><td>High Temperatures
List how equipment is protected or schedule to protect</td><td colspan="3">Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06, Section 11. The structures will be built prior to the FLEX implementation date (Open Item 21).

The ONS procedures and programs are being developed to address storage structure requirements, deployment path requirements, and FLEX equipment requirements relative to the hazards applicable to ONS (Open Item 4).</td></tr>
<tr><td colspan="4">Deployment Conceptual Modification
(Attachment 3 contains Conceptual Sketches)</td></tr>
<tr><td>Strategy</td><td colspan="2">Modifications</td><td>Protection of connections</td></tr>
<tr><td>Identify Strategy including how the equipment will be deployed to the point of use.</td><td colspan="2">Identify modifications</td><td>Identify how the connection is protected</td></tr>
<tr><td>None.</td><td colspan="2">None.</td><td>None.</td></tr>
<tr><td colspan="4">Notes: None.</td></tr>
</table>

Maintain Containment			
PWR Portable Equipment (Phase 3)			
Provide a general description of the coping strategies using Phase 3 equipment including modifications that are proposed to maintain core cooling. Identify methods (containment spray/hydrogen igniters) and strategies utilized to achieve this coping time. See Phase 2 Response.			
Details:			
Provide a brief description of Procedures / Strategies / Guidelines *Confirm that procedure/guidance exists or will be developed to support implementation*	Site-specific procedures and/or FSGs will be developed using industry guidance to address the criteria in NEI 12-06, Section 11.4 (Open Item 4).		
Identify modifications *List modifications*	None.		
Key Containment Parameters *List instrumentation credited or recovered for this coping evaluation.*	Same as Phase 2.		
Deployment Conceptual Modification **(Attachment 3 contains Conceptual Sketches)**			
Strategy	**Modifications**	**Protection of connections**	
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*	
Same as Phase 2.	Same as Phase 2.	Same as Phase 2.	
Notes: None.			

Maintain Spent Fuel Pool Cooling	
PWR Installed Equipment (Phase 1)	
Determine Baseline coping capability with installed coping[4] modifications not including FLEX modifications, utilizing methods described in Table 3-2 of NEI 12-06: • **Makeup with Portable Injection Source**	
Provide a general description of the coping strategies using installed equipment including modifications that are proposed to maintain spent fuel pool cooling. Identify methods (makeup via portable injection source) and strategies utilized to achieve this coping time. Upon a loss of power/loss of SF cooling: • Abnormal procedures contain curves that predict SFP temperatures versus times and heat loads. (Reference 27 and 28) • The Engineering Manual, Emergency Response Plan has guidance to establish vent paths (Reference 46). Per design drawings Reference 12 and 13, time to boil is estimated at 6.1 hours (U3 pool) and 7 hours (U1/U2 pool). These values are based on the licensed abnormal heat load (full core offload) of 30.8 million BTU/hr for U3 pool and 34 million BTU/hr for the U1/U2 pool (Reference 40). Design analysis also supports that sufficient coping time exists to establish inventory makeup in Phase 2 prior to fuel damage (Reference 45). SFP level indication will be available via NRC Order EA 12-051.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines *Confirm that procedure/guidance exists or will be developed to support implementation*	Approved abnormal operating procedures contain guidance for monitoring level and determining when to establish makeup to the SFP. (Reference 27 and 28)
Identify modifications *List modifications*	Modifications to SFP level instruments per NRC Order EA 12-051.
Key SFP Parameters *List instrumentation credited or recovered for this coping evaluation.*	Spent Fuel Pool Primary Level Spent Fuel Pool Alternate Level In accordance with NRC Order EA 12-051 and NEI 12-02.
Notes: None.	

[4] Coping modifications consist of modifications installed to increase initial coping time, i.e. generators to preserve vital instruments or increase operating time on battery powered equipment.

Maintain Spent Fuel Pool Cooling

PWR Portable Equipment (Phase 2)

Provide a general description of the coping strategies using on-site portable equipment including modifications that are proposed to maintain spent fuel pool cooling. Identify methods (makeup via portable injection source) and strategies utilized to achieve this coping time.

Actions to be taken prior to the onset of boiling include:

- Verify Operation of SFP level instrumentation.
- Installation of the B.5.b SFP spray nozzle and routing the flexible hose from the spray nozzle to the accessible staging location outside.

The capability to provide 200 gpm per unit as required per Table D-3 in NEI 12-06 will be provided (Open Item 27). This capability bounds the maximum boil off rates (Reference 12 and 13).

Based on preliminary analysis, one pump can supply both Spent Fuel Pools (Open Item 27).

For the U1/U2 pool, the boil down time to reach a level approximately 10' above the fuel racks is 36 hours. To reach a level 1' above the fuel racks is 72 hours. The maximum rate of inventory loss considering 29 gpm RCMU feed to both units and 56.9 gpm boil off is 114.9 gpm (Reference 12).

For U3, the maximum rate of inventory loss considering 29 gpm RCMU feed to U3 and 33.3 gpm boil off is 62.3 gpm. Boil down times are bounded by the U1/U2 pool (Reference 13).

Seismic:
Analysis will be performed to verify SF cooling can be achieved with a portable diesel driven pump (Open Item 27). The pump suction will come from the plant intake canal at a location separate from the intake pump structure (Figure 1). The discharge will be into one of two connection options.

Primary Strategy: Permanently installed Spent Fuel Pool fill line located in the Unit 1 and Unit 3 Cask Decontamination Rooms (Figure 5 and 6). Analysis will be performed to verify seismic robustness (Open Item 28).

Alternate Strategy: Flexible hose pulled from the spray nozzle at the pool deck to the staging location outside (Figure 7 and 8).

Flood:
Analysis will be performed to verify SF cooling can be achieved with a portable diesel driven pump (Open Item 27). The pump suction will come from CTP-1 (Figure 2). The discharge will be into one of two connection options.

Primary Strategy: Permanently installed Spent Fuel Pool fill line located in the Unit 1 and Unit 3 Cask Decontamination Rooms (Figure 5 and 6). Analysis will be performed to verify seismic robustness (Open Item 28).

Alternate Strategy: Flexible hose pulled from the spray nozzle at the pool deck to the staging location outside (Figure 7 and 8).

See Phase 2 response for Core Cooling for sustaining CTP-1 inventory.

Maintain Spent Fuel Pool Cooling	
PWR Portable Equipment (Phase 2)	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines *Confirm that procedure/guidance exists or will be developed to support implementation*	Site-specific procedures and/or FSGs will be developed using industry guidance to address the criteria in NEI 12-06, Section 11.4 (Open Item 4).
Identify modifications *List modifications*	None required.
Key SFP Parameter *List instrumentation credited or recovered for this coping evaluation.*	Spent Fuel Pool Primary Level Spent Fuel Pool Alternate Level In accordance with NRC Order EA 12-051 and NEI 12-02.
Storage / Protection of Equipment: **Describe storage / protection plan or schedule to determine storage requirements**	
Seismic *List how equipment is protected or schedule to protect*	Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06, Section 11. The structures will be built prior to the FLEX implementation date (Open Item 21). The ONS procedures and programs are being developed to address storage structure requirements, deployment path requirements, and FLEX equipment requirements relative to the hazards applicable to ONS (Open Item 4).
Flooding *List how equipment is protected or schedule to protect*	Oconee intends to locate the FLEX storage facility above the current flood levels as identified in Reference 63 unless better informed by ongoing flood hazard re-analysis and flooding mitigation modification plans (Open Item 21).
Severe Storms with High Winds *List how equipment is protected or schedule to protect*	Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06, Section 11. The structures will be built prior to the FLEX implementation date (Open Item 21). The ONS procedures and programs are being developed to address storage structure requirements, deployment path requirements, and FLEX equipment requirements relative to the hazards applicable to ONS (Open Item 4).
Snow, Ice, and Extreme Cold *List how equipment is protected or schedule to protect*	Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06, Section 11. The structures will be built prior to the FLEX implementation date (Open Item 21). The ONS procedures and programs are being developed to address storage structure requirements, deployment path requirements, and FLEX equipment requirements relative to the hazards applicable to ONS (Open Item 4).
High Temperatures *List how equipment is protected or schedule to protect*	Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06, Section 11. The structures will be built prior to the FLEX implementation date (Open Item 21). The ONS procedures and programs are being developed to address storage structure requirements, deployment path requirements, and FLEX equipment requirements relative to the hazards applicable to ONS (Open Item 4).

Maintain Spent Fuel Pool Cooling		
PWR Portable Equipment (Phase 2)		
Deployment Conceptual Design (Attachment 3 contains Conceptual Sketches)		
Strategy	**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
Phase 2 inventory makeup strategy Option 1 and Option 2: • Equipment deployed outside is stored in a FLEX equipment storage building. • Some equipment to complete Option 2 inside connections may be pre-staged in the Aux Bldg. • Towing vehicles and debris clearing machinery are deployed from the bunker. • Pumps, hoses, and fittings are trailer mounted for ease of deployment.	None.	The fill line connections are in the Aux Bldg (Open Item 28). FLEX hose is deployed all the way to the pool deck.
Notes: None.		

Maintain Spent Fuel Pool Cooling			
PWR Portable Equipment (Phase 3)			
Provide a general description of the coping strategies using Phase 3 equipment including modifications that are proposed to maintain spent fuel pool cooling. Identify methods (makeup via portable injection source) and strategies utilized to achieve this coping time. Phase 2 will leave the SFPs with inventory makeup capability. The Phase 3 capability is to sustain Phase 2 Spent Fuel Pool makeup by: (a) supplying spare makeup pumps and redundant capability (b) integrate filtration and demineralization (c) the capability to add boron as needed See Phase 3 response for Core Cooling for sustaining CTP-1 inventory.			
Details:			
Provide a brief description of Procedures / Strategies / Guidelines *Confirm that procedure/guidance exists or will be developed to support implementation*	Site-specific procedures and/or FSGs will be developed using industry guidance to address the criteria in NEI 12-06, Section 11.4 (Open Item 4).		
Identify modifications *List modifications*	None		
Key SFP Parameter *List instrumentation credited or recovered for this coping evaluation.*	Spent Fuel Pool Primary Level Spent Fuel Pool Alternate Level In accordance with NRC Order EA 12-051 and NEI 12-02.		
Deployment Conceptual Design **(Attachment 3 contains Conceptual Sketches)**			
Strategy		**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use.		*Identify modifications*	*Identify how the connection is protected*
Same as Phase 2.		Same as Phase 2.	Same as Phase 2.
Notes: None.			

Safety Functions Support

PWR Installed Equipment Phase 1

Determine Baseline coping capability with installed coping[5] modifications not including FLEX modifications.

Provide a general description of the coping strategies using installed equipment including station modifications that are proposed to maintain and/or support safety functions. Identify methods and strategies utilized to achieve coping times.

For the bounding T=0 event (Seismic), Phase 1 coping will initially rely on the SSF and the associated SSF control room instrumentation.

SSF Instrumentation

1. RCS Pressure	3. Pressurizer Level	5. ASW Flow
2. RCS T_{hot} & RCS T_{cold}	4. Steam Generator Level	6. Five (5) Core Exit T/Cs

(Reference 41, 42, 55, and UFSAR Section 7.5.2.2.1 and Table 9-16)
Note that Reactor coolant system heat removal can be directly monitored by RCS parameters and controlled by SG level without SG pressure indication (Reference 42 and UFSAR Section 9.6.4.6.2).

Main control instrumentation fed from the vital I&C buses will remain available as described below.

Essential Instrumentation and Vital I&C
A vital battery load reduction analysis will be completed to determine expected battery life with manual stripping of all loads except those components and instrumentation that are essential to supporting the FLEX strategy (Open Item 12). Extension of battery life is to provide margin for deployment of FLEX equipment for Phase 2. This instrumentation is consistent with the instrumentation outlined in PWROG generic FLEX Support Guidelines and Interfaces and NEI 12-06.

The load reduction scheme will require removal of non-essential loads beginning at T+2hrs, the estimated time to identify an event as an ELAP condition, with completion of load shedding within 3 hours.

The instrumentation and components that are powered from the vital buses and are required to support the strategy are as follows:

1. RCS Wide Range Pressure	4. Steam Generator Level	7. RVLIS
2. RCS Thot	5. Steam Generator Pressure	8. Excore NI-1,2
3. Pressurizer Level	6. Core Exit T/Cs	9. RB Normal and Emergency Sump Level

(Reference 7, 43, and 56)

For the bounding event with advanced warning (Flood), normal plant equipment and instrumentation will be available to support Phase 1 coping.

HVAC
Upon loss of AC power, all Auxiliary Building power is lost, and thus no HVAC systems are available. Abnormal procedures for degraded control room area cooling include steps to open electrical cabinet doors and control room doors (Reference 66 and 67). Based on a preliminary review of existing analyses (Reference 53), no additional actions are expected to be required during Phase 1. Additional analysis will be required (Open Item 32).

[5] Coping modifications consist of modifications installed to increase initial coping time, i.e. generators to preserve vital instruments or increase operating time on battery powered equipment.

Safety Functions Support	
PWR Installed Equipment Phase 1	
Lighting NFPA 805 lighting is available in many areas where manual actions (eg. connecting hoses, power cables, or operating pumps or compressors) are necessary. The NFPA 805 lights have self contained batteries with an 8 hour life (Reference 57). An evaluation will be performed to determine if there are areas where manual actions are performed that do not have existing NFPA 805 lighting (Open Item 29). Communication Strategies to mitigate a loss of communication systems will be developed in accordance with the response to 10 CFR 50.54(f) Recommendation 9.3 and NEI 12-01. (Open Item 30). Staffing An ERO Staffing Analysis will be performed in accordance with 10 CFR 50.54(f) Recommendation 9.3 and NEI 12-01 which will include ensuring adequate on-shift and augmented staff are available to support, install, and operate FLEX mitigation strategy equipment (Open Item 31).	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines *Confirm that procedure/guidance exists or will be developed to support implementation.*	Site-specific procedures and/or FSGs will be developed using industry guidance to address the criteria in NEI 12-06, Section 11.4 (Open Item 4).
Identify modifications *List modifications and describe how they support coping time.*	None.
Key Parameters *List instrumentation credited for this coping evaluation phase.*	As noted above.
Notes: None.	

Safety Functions Support

PWR Portable Equipment Phase 2

Provide a general description of the coping strategies using on-site portable equipment including station modifications that are proposed to maintain and/or support safety functions. Identify methods and strategies utilized to achieve coping times.

Essential Instrumentation and Vital I&C

The key reactor parameters that must be monitored in Phase 2 are the same that must be monitored in Phase 1 with the addition of the following (these parameters are not fed from the vital buses):

1. RCS T_{cold}	3. RB Wide Range Pressure
2. RCS High Point Vent Valve position indication	4. RCS Head Vent Valve position indication

(Reference 58 and 59).

Power will be maintained to those parameters that are fed from the vital I&C panelboards by repowering the vital battery chargers with portable power distribution equipment which will recharge the vital batteries and ultimately repower the vital 120 VAC panelboards via the vital inverters. The above identified parameters that are not fed from the vital panelboards will be repowered directly from the portable power distribution system. This will be the primary repower strategy (Open Item 22).

The alternate repower strategy will use portable instrumentation installed in the Electrical Penetration Rooms to repower the key instrumentation parameters. Instrumentation parameters will be repowered on a priority bases starting with those variables currently required by References 18 and 25. The alternate repower strategy supports Phase 2 coping for the maximum flood event and minimizes reliance on installed infrastructure with respect to all other BDBEEs (Open Item 20).

HVAC

Further analysis will be performed (Open Item 32).

Potential mitigating strategies may include:

- Opening electrical cabinet doors
- Opening control room doors
- Opening battery room doors
- Opening penetration room doors
- Opening electrical equipment room doors
- Installing fans
- Installing spot coolers

Once the vital battery chargers are repowered by the portable power distribution equipment, hydrogen buildup within the battery rooms will begin to occur due to a lack of ventilation. Based on a preliminary review of existing analysis (Reference 22), there will be adequate time to implement Phase 2 portable ventilation strategies prior to hydrogen concentrations becoming a concern. Additional analysis will be required (Open Item 24).

Lighting

Hard hat LED lights will be procured to ensure operators can safely move through the plant during an ELAP.

Additional portable lighting will be procured to provide lighting in the yard, to replace some of the emergency lighting once it is depleted and to enhance lighting in other areas of the plant as deemed necessary (Open Item 29).

Communication

Strategies to mitigate loss of communication systems will be developed in accordance with 10 CFR 50.54(f), Recommendation 9.3 and NEI 12-01. (Open Item 30).

Safety Functions Support

PWR Portable Equipment Phase 2

Portable Power Distribution

A portable power distribution scheme will be developed to repower required equipment using portable diesel generators, transformers, power panels and cables. Equipment required to be re-powered include:

- Vital battery chargers
- Core Flood Tank (CFT) isolation valves (Primary) or Core Flood Tank Vent Valves (Alternate)
- Reactor High Point Vent Valves and the Reactor Head Vent Valves
- RCS T_{cold}
- RB wide range pressure indications
- SSF RCMUP (Primary) or portable high pressure reactor makeup pump (Alternate)
- Portable lighting
- Portable HVAC equipment for the control rooms, penetration rooms, electrical equipment rooms, and vital battery rooms

Permanent connections will be installed or identified (such as MCC back feed receptacles or terminal blocks) to provide power to existing components from the portable power distribution equipment (Open Item 22).

Connection points in electrical penetrations or electrical terminal blocks in the Penetration Rooms will be identified to support connection of portable instrumentation and repower capability for the reactor high point and head vent valves as an alternate approach (Open Item 20).

Fuel Oil for Portable Equipment

Fuel oil will initially be provided from the buried SSF Diesel Engine Fuel Oil Storage Tank (maintains a minimum of 25,000 gallons) (Reference 54 and 60) using portable fuel oil transfer pumps. The fuel oil will transferred to a refueling trailer for FLEX equipment refueling. A fuel oil analysis will need to be performed to determine daily consumption rates and verify storage requirements. (Open Item 14).

Staffing

An ERO Staffing Analysis will be performed in accordance with 10 CFR 50.54(f), Section 9.3 and NEI 12-01 which will include ensuring adequate on-shift and augmented staff are available to support, install, and operate FLEX mitigation strategy equipment (Open Item 31).

Details:	
Provide a brief description of Procedures / Strategies / Guidelines *Confirm that procedure/guidance exists or will be developed to support implementation with a description of the procedure / strategy / guideline.*	Site-specific procedures and/or FSGs will be developed using industry guidance to address the criteria in NEI 12-06, Section 11.4 (Open Item 4).
Identify modifications *List modifications necessary for Phase 2*	• Repower required loads (Open Item 22). • Repower required loads at electrical penetrations or electrical terminal blocks in the penetration rooms (Open Item 20).
Key Parameters *List instrumentation credited or recovered for this coping evaluation.*	As previously identified.

Safety Functions Support	
PWR Portable Equipment Phase 2	
Storage / Protection of Equipment : **Describe storage / protection plan or schedule to determine storage requirements**	
Seismic *List how equipment is protected or schedule to protect*	Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06, Section 11. The structures will be built prior to the FLEX implementation date (Open Item 21). The ONS procedures and programs are being developed to address storage structure requirements, deployment path requirements, and FLEX equipment requirements relative to the hazards applicable to ONS (Open Item 4).
Flooding *List how equipment is protected or schedule to protect* Note: If stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level.	Oconee intends to locate the FLEX equipment storage building above the current CAL Flood levels as identified in Reference 63 unless better informed by ongoing flood hazard re-analysis and flooding mitigation modification plans (Open Item 21).
Severe Storms with High Winds *List how equipment is protected or schedule to protect*	Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06, Section 11. The structures will be built prior to the FLEX implementation date (Open Item 21). The ONS procedures and programs are being developed to address storage structure requirements, deployment path requirements, and FLEX equipment requirements relative to the hazards applicable to ONS (Open Item 4).
Snow, Ice, and Extreme Cold *List how equipment is protected or schedule to protect*	Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06, Section 11. The structures will be built prior to the FLEX implementation date (Open Item 21). The ONS procedures and programs are being developed to address storage structure requirements, deployment path requirements, and FLEX equipment requirements relative to the hazards applicable to ONS (Open Item 4).
High Temperatures *List how equipment is protected or schedule to protect*	Structures to provide protection of the FLEX equipment will be constructed to meet the requirements identified in NEI 12-06, Section 11. The structures will be built prior to the FLEX implementation date (Open Item 21). The ONS procedures and programs are being developed to address storage structure requirements, deployment path requirements, and FLEX equipment requirements relative to the hazards applicable to ONS (Open Item 4).

Deployment Conceptual Design **(Attachment 3 contains Conceptual Sketches)**		
Strategy	**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
See Individual Strategies.	See Individual Strategies.	See Individual Strategies.
Notes: None.		

Safety Functions Support

PWR Portable Equipment Phase 3

Provide a general description of the coping strategies using Phase 3 equipment including modifications that are proposed to maintain and/or support safety functions. Identify methods and strategies utilized to achieve coping times.

Sustain Phase 2 capabilities with redundant and replacement equipment from the Regional Support Centers.

Refueling
Establish offsite Fuel Oil delivery logistics (Open Item 9).

Details:

Provide a brief description of Procedures / Strategies / Guidelines *Confirm that procedure/guidance exists or will be developed to support implementation with a description of the procedure / strategy / guideline.*	Site-specific procedures and/or FSGs will be developed using industry guidance to address the criteria in NEI 12-06, Section 11.4 (Open Item 4).
Identify modifications *List modifications necessary for Phase 3*	Same as Phase 2.
Key Parameters *List instrumentation credited or recovered for this coping evaluation.*	Same as Phase 2.

Deployment Conceptual Design
(Attachment 3 contains Conceptual Sketches)

Strategy	Modifications	Protection of connections
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
Same as Phase 2.	Same as Phase 2.	Same as Phase 2.

Notes: None.

ONS Mitigating Strategies (FLEX) Integrated Plan

PWR Portable Equipment Phase 2							
Use and (potential / flexibility) diverse uses						*Performance Criteria*	*Maintenance*
List portable equipment	Core Cooling	RCS Inventory	SFP	Instrumentation	Accessibility		Maintenance / PM requirements
Two (2) High Flow/Low Head Diesel Driven Pumps	X		X			Minimum of 130 gpm per unit or 390 gpm total, @ approximately 15 psig	Maintenance will be performed in accordance with NEI 12-06, Section 11.5 (Open Item 5)
One (1) Medium Flow/Low Head Diesel Driven Pump			X			Minimum of 250 gpm per pool or 500 gpm total @ approximately 15 psig	Maintenance will be performed in accordance with NEI 12-06, Section 11.5 (Open Item 5)
Fire Hose with Storz Connectors	X	X	X			5 inch hose (length TBD) &3 inch hose (length TBD)	Maintenance will be performed in accordance with NEI 12-06, Section 11.5 (Open Item 5)
Four (4) 600 VAC Generator		X		X	X	500 KVA	Maintenance will be performed in accordance with NEI 12-06, Section 11.5 (Open Item 5)
2 diesel driven hydraulic power unit trailers	X	X	X			Size for pump specified next line ≈18 gpm/2800 psi	Maintenance will be performed in accordance with NEI 12-06, Section 11.5 (Open Item 5)
2 Hydraulic drive sump pumps	X	X	X			500 gpm @ 60 ft head	Maintenance will be performed in accordance with NEI 12-06, Section 11.5 (Open Item 5)
(2)Pneumatic Sump Pumps					X	1500 gpm	Maintenance will be performed in accordance with NEI 12-06, Section 11.5 (Open Item 5)
Diesel Air Compressor to drive sump pumps					X		Maintenance will be performed in accordance with NEI 12-06, Section 11.5 (Open Item 5)
(1) Diesel Fuel Transfer pump/ gasoline driven	X	X	X	X	X		Maintenance will be performed in accordance with NEI 12-06, Section 11.5 (Open Item 5)
Fuel Oil Refueling Truck/Trailer	X	X	X	X	X		Maintenance will be performed in accordance with NEI 12-06, Section 11.5 (Open Item 5)

The equipment and performance criteria provided in this list are best estimates based on information available at the time the list was developed and may change as designs are finalized and implementation proceeds. Therefore, the list is not considered to be final nor regulatory commitments.

PWR Portable Equipment Phase 2							
Use and (potential / flexibility) diverse uses						*Performance Criteria*	*Maintenance*
List portable equipment	Core Cooling	RCS Inventory	SFP	Instrumentation	Accessibility		Maintenance / PM requirements
Heavy Trailer Tow Truck	X	X	X	X	X		Maintenance will be performed in accordance with NEI 12-06, Section 11.5 (Open Item 5)
Front end loader	X	X	X	X	X		Maintenance will be performed in accordance with NEI 12-06, Section 11.5 (Open Item 5)
Fire Hose Trailers	X	X	X				Maintenance will be performed in accordance with NEI 12-06, Section 11.5 (Open Item 5)
Electric Conductor Trailers		X		X			Maintenance will be performed in accordance with NEI 12-06, Section 11.5 (Open Item 5)
Indoor LED Lighting Strings					X		Maintenance will be performed in accordance with NEI 12-06, Section 11.5 (Open Item 5)
Portable Fans					X		Maintenance will be performed in accordance with NEI 12-06, Section 11.5 (Open Item 5)
Portable Spot Coolers					X		Maintenance will be performed in accordance with NEI 12-06, Section 11.5 (Open Item 5)
Minimum of 4 Portable Generators					X	Approx. 120 VAC, 6 KW	Maintenance will be performed in accordance with NEI 12-06, Section 11.5 (Open Item 5)
Hydraulic Hoses w/ Quick Connects		X					Maintenance will be performed in accordance with NEI 12-06, Section 11.5 (Open Item 5)
Flexible Electric Conductor						Total feet & size TBD	Maintenance will be performed in accordance with NEI 12-06, Section 11.5 (Open Item 5)

The equipment and performance criteria provided in this list are best estimates based on information available at the time the list was developed and may change as designs are finalized and implementation proceeds. Therefore, the list is not considered to be final nor regulatory commitments.

ONS Mitigating Strategies (FLEX) Integrated Plan

PWR Portable Equipment Phase 2							
Use and (potential / flexibility) diverse uses						*Performance Criteria*	*Maintenance*
List portable equipment	Core Cooling	RCS Inventory	SFP	Instrumentation	Accessibility		Maintenance / PM requirements
Minimum of 2 trailer mounted Boom and Battery\Manual Wench	X	X	X			2000 lb. actual capacity	Maintenance will be performed in accordance with NEI 12-06, Section 11.5 (Open Item 5)
Minimum of 4 portable power distribution panel board/transformer trailers		X		X		Approx. 600 Amps, other specs TBD Transformers: 600/208 VAC & 600/120 VAC	Maintenance will be performed in accordance with NEI 12-06, Section 11.5 (Open Item 5)
Four (4) Diesel or Electric Low Capacity/High Pressure Pumps		X				RCS Makeup Approx. 40 gpm @ 2000 psig	Maintenance will be performed in accordance with NEI 12-06, Section 11.5 (Open Item 5)

The equipment and performance criteria provided in this list are best estimates based on information available at the time the list was developed and may change as designs are finalized and implementation proceeds. Therefore, the list is not considered to be final nor regulatory commitments.

ONS Mitigating Strategies (FLEX) Integrated Plan

PWR Portable Equipment Phase 3							
Use and (potential / flexibility) diverse uses						*Performance Criteria*	*Notes*
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		
One (1) 5.8 MW 6.9 kV Generator	X		X	X	X	5.8 MW 6.9 kV	Will supply power to one safety train and be used for plant recovery.
Demin Water Skid	X					500 gpm capacity	
Boric Acid addition skid			X				
Raw water Logistics	X		X			Approx. 700,000 gpd	
Fuel Oil Logistics	X		X				
Raw Water Filtration Units	X		X			500 gpm	
Four (4) High Flow/Low Head Diesel Driven Pumps	X		X			Per the RRC pump spec.	
Fire Hose with Storz Connectors	X		X			5 inch hose (length TBD) & 3 inch hose (length TBD)	
Three (3) 600 VAC Generator	X			X	X	500 KVA	
One (1) Diesel Fuel Transfer pump - gasoline driven	X			X	X		
One (1) Fuel Oil Refueling Truck/Trailer	X			X	X		
Portable Fans					X		
Portable Spot Coolers					X		
Minimum of 4 Portable Generators				X		Approx. 120 VAC, 6 KW	
Three (3) Diesel or Electric, Low Capacity, High Pressure Pumps	X					RCS Makeup Approx. 40 gpm @ 2000 psig	

The equipment and performance criteria provided in this list are best estimates based on information available at the time the list was developed and may change as designs are finalized and implementation proceeds. Therefore, the list is not considered to be final nor regulatory commitments.

Phase 3 Response Equipment/Commodities	
Item	**Notes**
Radiation Protection Equipment • Survey instruments • Dosimetry • Off-site monitoring/sampling	Analysis will be performed to determine radiation protection equipment requirements (Open Item 9).
Commodities • Food • Potable water	Analysis will be performed to determine commodities requirements (Open Item 9).
Fuel Requirements	Add information on site specific fuel consumption rates and available supplies. (Open Item 9 and 14).
Heavy Equipment • Transportation equipment • Debris clearing equipment	Transportation equipment will be provided to move to large skids/trailer mounted equipment provided from offsite (Open Item 9).

Attachment 1A-1
Sequence of Events Timeline - Seismic Response

Note: The SSF is designed to operate for 72 hours (UFSAR 9.6.3 Standby Shutdown Facility System Descriptions). Deployment of Phase 2 FLEX equipment will begin as soon as ELAP condition is recognized.

Action item	Elapsed Time	Action	ELAP New Time Constraint Y/N [6]	Remarks / Applicability
	0	**3 Unit Trip on LOOP**		Plant @100% power
1	60 sec	Emergency Operating Procedure implemented	N	Existing; approved Procedure
2	60 sec - 20 min	AP/25 SSF EOP implemented: Feed SG within 14 min Supply RCP seals within 20 min Stabilize RCS pressure 1950 to 2250 psig.	N	Time Critical Action upon the loss of RCP seal injection and Component Cooling. Guidance for stabilization directed by AP/25.
3a	20 min -. 1 hr	Crew follows guidance in EOP Blackout Tab to stabilize plant	N	Load shed inverters, Align ADVs, Purge H_2 from generators, Start Station Backup Diesel Instrument Air System compressors, etc.
3b	20 min -. 1 hr	Crew enters AP/1-2,3/1700/035 (Loss of SFP Cooling and/or Level)	N	Sets up checks of SFP level and temperature. Addresses increases in SFP (Spent Fuel Pool) temperature due to loss of cooling. Will spray pool and/or makeup with portable diesel driven pump as necessary.
4	45 min - 2 hrs	Crew determines event is ELAP and enters FSGs	Y	Crew exhausts all efforts to regain power in the EOP Blackout tab. Input from Charlotte SOC (System Operating Center) confirms that return of grid is not possible. FSGs will be developed (Open Item 4).
5a	2-3 hrs	Perform additional Vital Battery deep load shedding	Y	Extension in battery life to be determined based upon load shed analysis. Provides MCR indication of key variables to gain margin with respect to Phase 2 FLEX deployment times (Open Item 12).
5b	2hr - 12 hrs	Crew begins cool down of RCS using SSF and ADVs, limited only by the ability to maintain pressurizer level.	Y	FSGs to direct a cooldown using the ADV while feeding from the SSF will have to be developed (Open Item 4). This cooldown using the SSF will utilize both SGs. Current licensing for the SSF does not permit cooldown below 525°F. ONS site specific analysis will be performed to support this action (Open Item 10).

[6] Instructions: If No or NA is selected, provide justification in the remark column.
If yes is selected, include a technical basis discussion as required by NEI 12-06, Section 3.2.1.7.

ONS Mitigating Strategies (FLEX) Integrated Plan

Action item	Elapsed Time	Action	ELAP New Time Constraint Y/N [6]	Remarks / Applicability
5c	2hr – 72 hrs	FLEX equipment deployed: Portable diesel-driven pump with suction from intake canal feeding 1 SG per unit Establish RCSMU using one of the following: • Repowered SSF RCMU pump with suction from SFP • Portable low capacity, high head makeup pump taking suction from missile protected portion of BWST Repower CFT vent valves or CFT isolation valves using power from portable generators to allow venting or isolation of CF tanks once RCSMU established. Repower required electrical loads. Install portable lighting and ventilation fans for the vital battery rooms, electrical equipment rooms, and control rooms.	Y	FSGs will be developed that will direct deploying FLEX Equipment and strategies (Open Item 4). Strategies to deploy pump exist, time will have to be determined. Repower of the SSF RCMUP will require new analysis to determine time. Installation of portable makeup pump supplying makeup from the BWST will require new analysis. Venting the CFTs or isolating CFTs will require new analysis. Repower of all electrical loads will require new analysis (Open Item 22). New analysis required for time to install portable lighting (Open Item 29) and ventilation fans for the vital battery rooms, electrical equipment rooms, and control rooms. Deployment must be completed before end of Phase 1 coping.
6	12hrs-72hrs	Feed SGs with high capacity low head diesel driven portable pump taking suction from the Lake Keowee intake. Make up to RCS using one of two options in action item 5c. Cool down and maintain RCS temp 240 - 250 °F.	Y	FSGs will be developed directing the cooldown using 1 S/G per unit (Open Item 4) and making up from one of the two options in 5c. ONS site specific analysis to support cooldown will be developed (Open Item 10).
7	72 hr	End of generic WCAP analysis	NA	End of analytical simulation.

ONS Mitigating Strategies (FLEX) Integrated Plan

Attachment 1A-2
Sequence of Events Timeline - Flood Response

Note: All three units will be shutdown, required boron added, and the maximum Tech Spec cool down rate established during the 3.0 hours before the flood inundates the site.

Action item	Elapsed Time	Action	ELAP New Time Constraint Y/N [7]	Remarks / Applicability
	0	**Condition A declaration for Jocassee dam**		Plant @100% power
1	60 sec	AP/47 (External Flood Mitigation) implemented	N	Existing; approved Abnormal Procedure for external flooding.
2a	60 sec - 3.0 hrs	CRS: trips unit, Borates RCS to CSD conditions, closes CFT isolations, increases levels in Pzr and SGs, and begins plant cool down.	N	Approved guidance, run by control room team. Completed before flood hits site.
2b	60 sec - 3.0 hrs	OSM activates OSC/TSC, classifies event, conducts site assembly, request increased staffing, and directs SFP monitoring.	N	Approved guidance, run by OSM. Completed before flood hits site.
2c	60 sec - 3.0 hrs	WCC SRO: Dispatches operators and maintenance to align portable Hale Pump, notifies maintenance to pre-stage the portable instrumentation in the Pen Rooms and notifies Security.	N	Approved guidance, run by WCC SRO, completed before flood hits site. Request to stage portable instrumentation will be added to AP-47.
3a	2.86 hrs	Flood crests Intake Canal Dike and begins flooding ONS yard. (Power is assumed to be lost)	N	
3b	2.86 hrs	Crew enters AP/1-2,3/1700/035 (Loss of SFP Cooling and/or Level)	N	Addresses increases in SFP (Spent Fuel Pool) temperature due to loss of cooling. Will spray pool and/or makeup with portable diesel driven pump as necessary after flood recedes.
4	3.00 hrs	SSF lost	N	
5	3.00 hr - 72 hrs	Open ADVs (Atmospheric Dump Valves) Feed SGs with Hale pump taking suction from CTP 1.	N	Action directed by AP-47 on loss on all feed.
6	8.00 hr - 72 hrs	When the flood recedes, establish FLEX RCS makeup: Makeup to RCS using one of the following: • Repowered SSF RCMUP with suction from SFP. • Portable low capacity, high head pump taking suction from missile protected portion of BWST. Connect the portable instrumentation. Install portable lighting and ventilation fans for the Electrical Penetration Rooms.	Y	FSGs will be developed that will direct deploying FLEX Equipment and strategies (Open Item 4). Repower of the SSF RCMUP will require new analysis to determine time (Open Item 22). Installation of portable makeup pump supplying makeup from the BWST will require new analysis (Open Item 25). Time to deploy and connect the portable instrumentation panel will be determined as well as the portable lighting (Open Item 20) and ventilation fans.
7	24 hr	Provide alternate source of feed using embedded CCW water to replenish CTP 1 for next 5.75 days.	Y	CTP-1 contains at least 1E6 gallons of water which will supply inventory for 3 units for 24 hours. Water in CCW lines could add approximately 5.75 days (Open Item 16). FSGs to access this water and transfer to CTP-1 will be developed along with determination of time to align the equipment (Open Item 4).
8	72 hr	End of generic WCAP analysis		End of analytical simulation

[7] Instructions: If No or NA is selected, provide justification in the remark column.
If yes is selected, include a technical basis discussion as required by NEI 12-06, Section 3.2.1.7.

Attachment 1B
NSSS Significant Reference Analysis Deviation Table

Item	Parameter of interest	WCAP value (WCAP-17601-P August 2012 Revision 0)	WCAP page	Plant applied value	Gap and discussion
1	RCS Makeup	Assumes no makeup	throughout	Makeup supplied less than 20 mins after ELAP.	Makeup provided by SSF RCMU pump. Maintains RCP seal cooling until RCS temperature is below 500°F. The SSF is designed to operate for 72 hours.
2	TDEFDWP Steam Supply	Assumes adequate steam generator pressure maintained to support running the TDEFWP.	4.2.1.6	TDEFWP fails. No steam supply.	Steam generator feed supplied from SSF ASW Pump < 14 mins after ELAP.
3	Cool down	Assumes 75°F/hr cool down established at 2 hours.	4.2.1.19	Cool down matched to SSF RCMUP capacity.	SSF RCMUP supplies 29 gpm RCMU. Cool down, started at recognition of ELAP event (approx. 2 hours), is limited to maintain pressurizer level considering this MU capability. Site specific analysis in progress.
4	Asymmetric SG Feed	Assumes both SGs are fed for 2 hours then feed SG on loop opposite the pressurizer.	5.3.3.2	Feed both SGs maintaining temperature until ELAP identified. Begin cool down using both SGs fed from SSF ASW. Continue feeding both SGs until SSF no longer in use. Feed one SG preferably in loop opposite the pressurizer.	SSF RCMU and ASW feed are designed to operate for 72 hours. When SSF is no longer in use, feed SGs with portable diesel driven pump following WCAP strategy. Site specific analysis in progress.

Attachment 2 - Milestone Schedule

Activity	Feb '13	Mar '13	Apr '13	May '13	Jun '13	July '13	Aug '13	Sep '13	Oct '13	Nov '13	Dec '13	Jan '14	Feb '14	Mar '14	Apr '14	May '14	Jun '14	July '14	Aug '14	Sep '14	Oct '14	Nov '14	Dec '14	Jan '15	Feb '15	Mar '15	Apr '15	May '15	Jun '15	July '15	Aug '15	Sep '15	Oct '15	Nov '15	Dec '15	Jan '16	Feb '16	Mar '16	Apr '16	May '16	Jun '16	July '16	Aug '16	Sep '16	Oct '16	Nov '16
Licensing Actions																																												
Submit Integrated Plan																																												
6 Month Status Update																																												
Implementation Complete																																												
Modifications																																												
Develop Modifications																																												
Procurement																																												
Identify Significant Material/Equipment																																												
Material/Equipment Procurement/Delivery																																												
Implementation Walkdowns																																												
Conduct N-1 Outage Walkdowns									U2						U3						U1																									
Conduct Implementation Walkdowns																															U2							U3					U1		
Staffing																																												
Conduct Staffing Analysis																																												
Training																																												
Develop Training Program																													U2						U3						U1				
Implement Training																														U2						U3						U1			
Procedures																																												
Develop FLEX Supporting Guidelines (FSGs)																	U1, U2, & U3																												
Develop Maintenance Procedures																	U1, U2, & U3																												
Regional Response Centers																																												
Develop Strategies/Playbook with RRC																																												
Install Offsite Delivery Pad																																												
Implementation																																												
Implement Modifications																													U2						U3						U1				

"The dates and sequences provided in this milestone schedule are best estimates based on information available at the time the schedule was developed and may change as designs are finalized and construction proceeds. Therefore, these dates and sequences are not considered to be regulatory commitments."

Attachment 3 - Conceptual Sketches

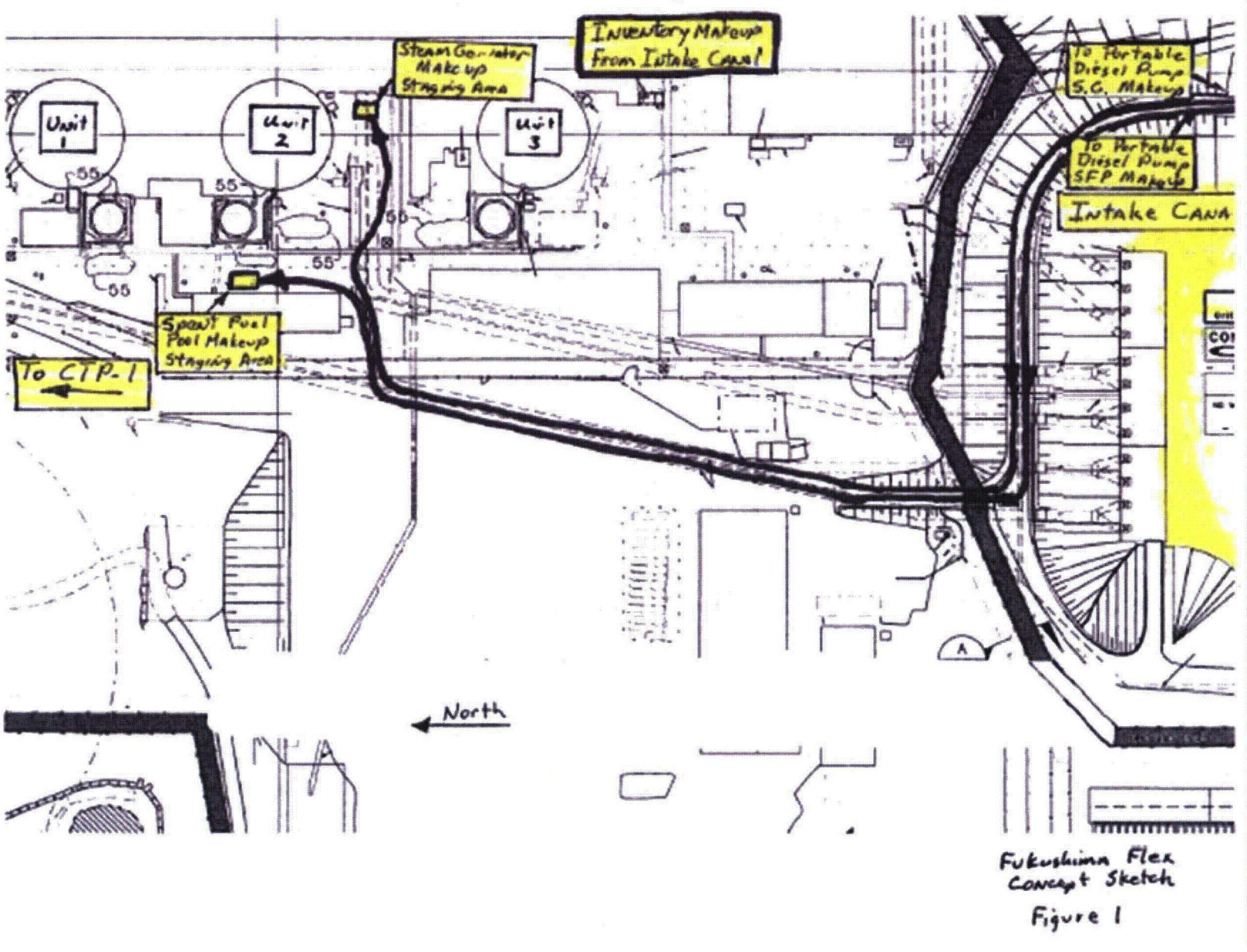


Figure 1

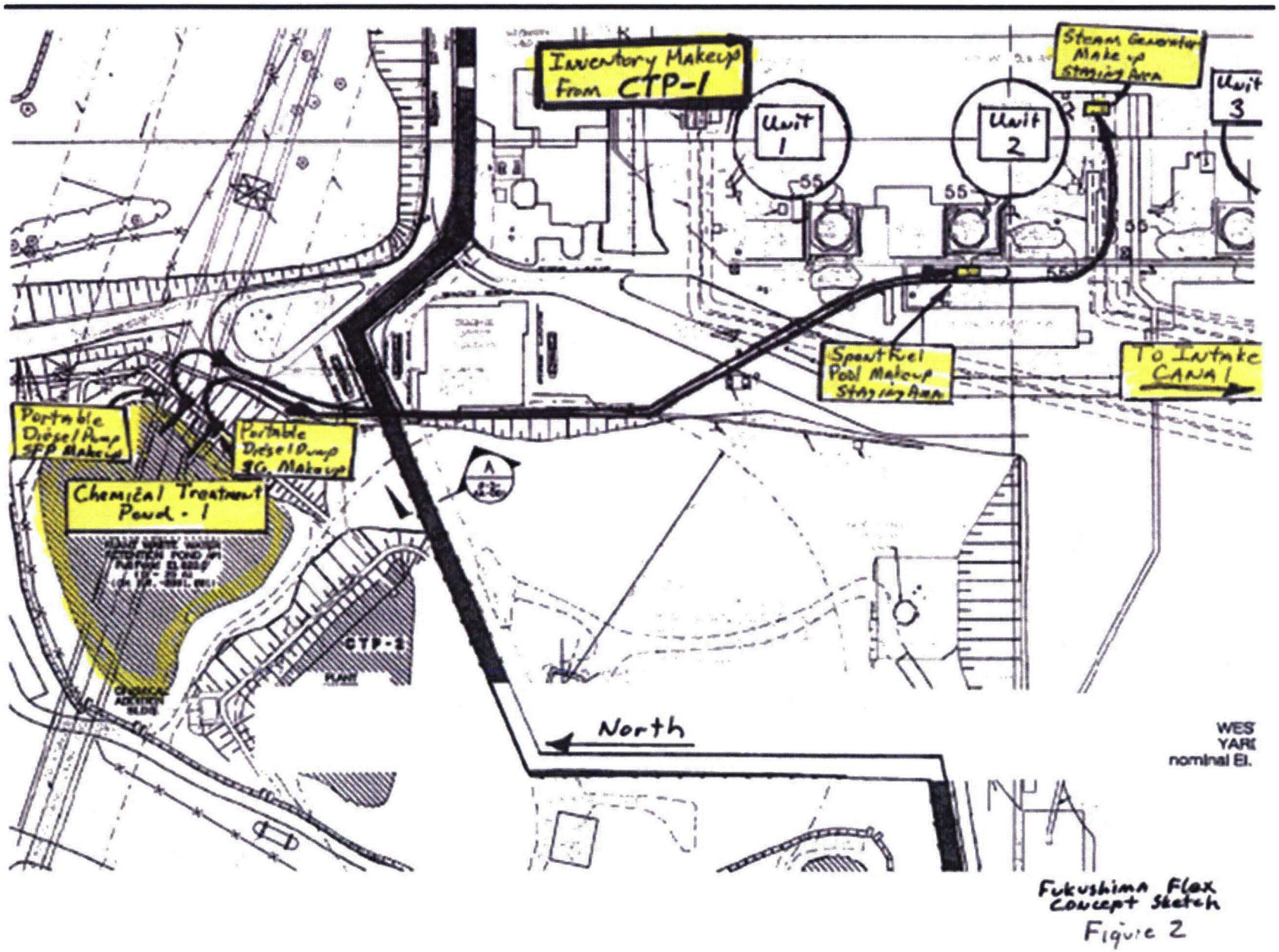

Inventory Makeup From CTP-1
Steam Generator Make up Staging Area
Unit 1
Unit 2
Unit 3
Spent Fuel Pool Makeup Staging Area
To Intake CANAL
Portable Diesel Pump SFP Makeup
Portable Diesel Pump SG Makeup
Chemical Treatment Pond - 1
CTP-2
North
WES
YARI
nominal El.
Fukushima Flex Concept Sketch
Figure 2

Figure 2

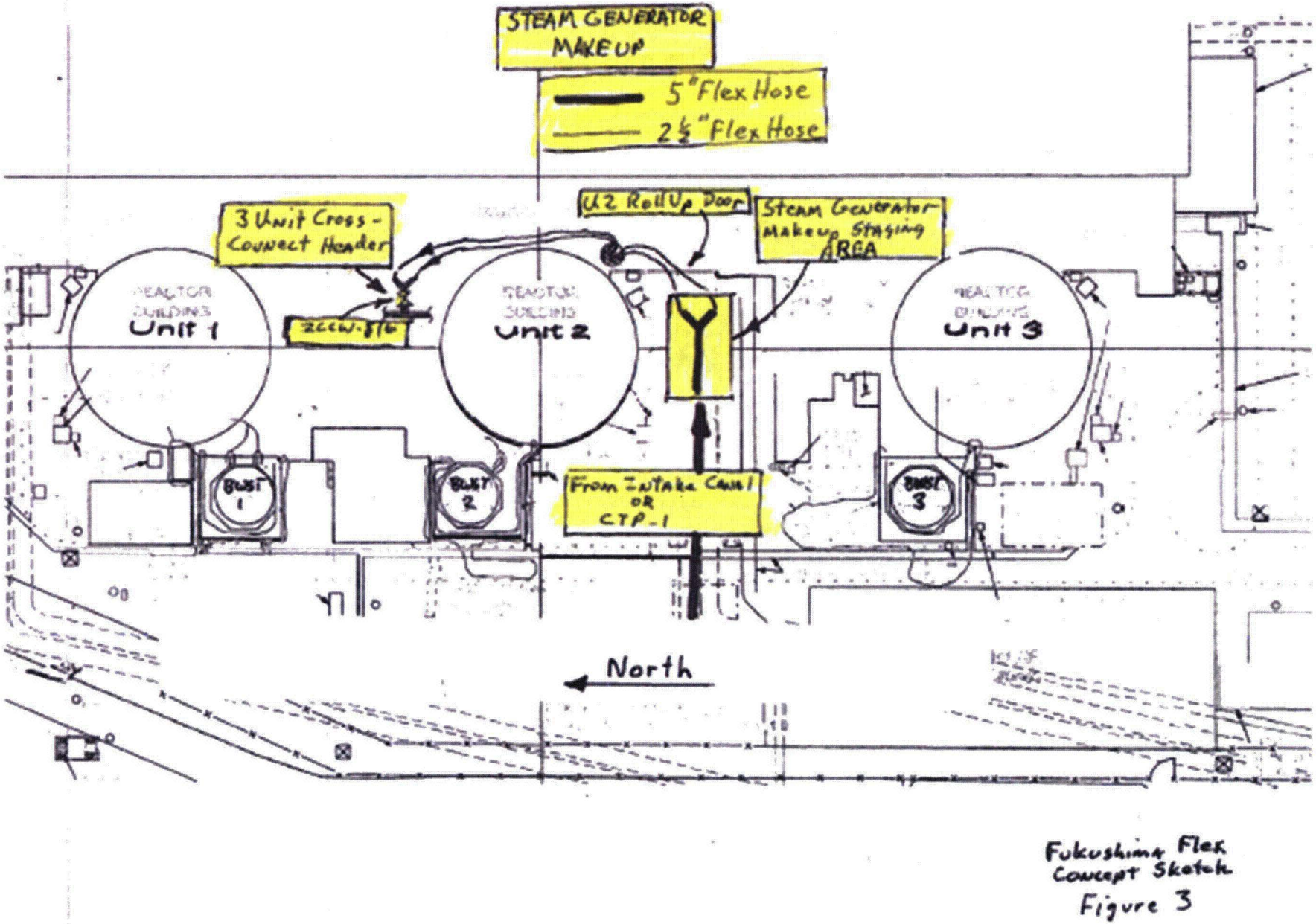

STEAM GENERATOR MAKEUP
5" Flex Hose
2½" Flex Hose
3 Unit Cross-Connect Header
U2 Roll Up Door
Steam Generator Makeup Staging AREA
Unit 1
Unit 2
Unit 3
From Intake Canal OR CTP-1
North
Fukushima Flex Concept Sketch
Figure 3

Figure 3

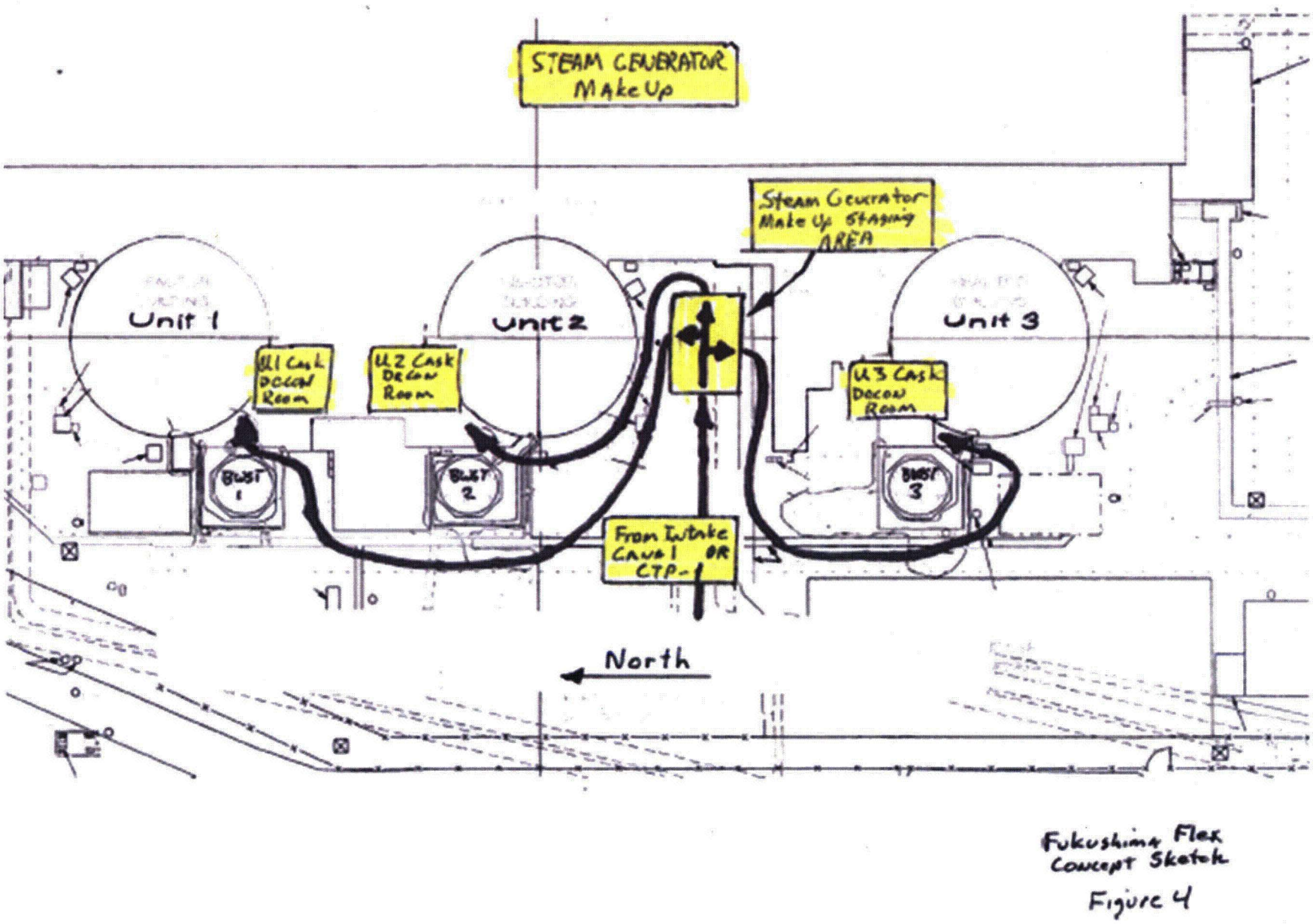

STEAM GENERATOR Make Up
Steam Generator Make Up Staging AREA
Unit 1
Unit 2
Unit 3
U1 Cask Decon Room
U2 Cask Decon Room
U3 Cask Decon Room
BUST 1
BUST 2
BUST 3
From Intake Canal OR CTP-1
North
Fukushima Flex Concept Sketch
Figure 4

Figure 4

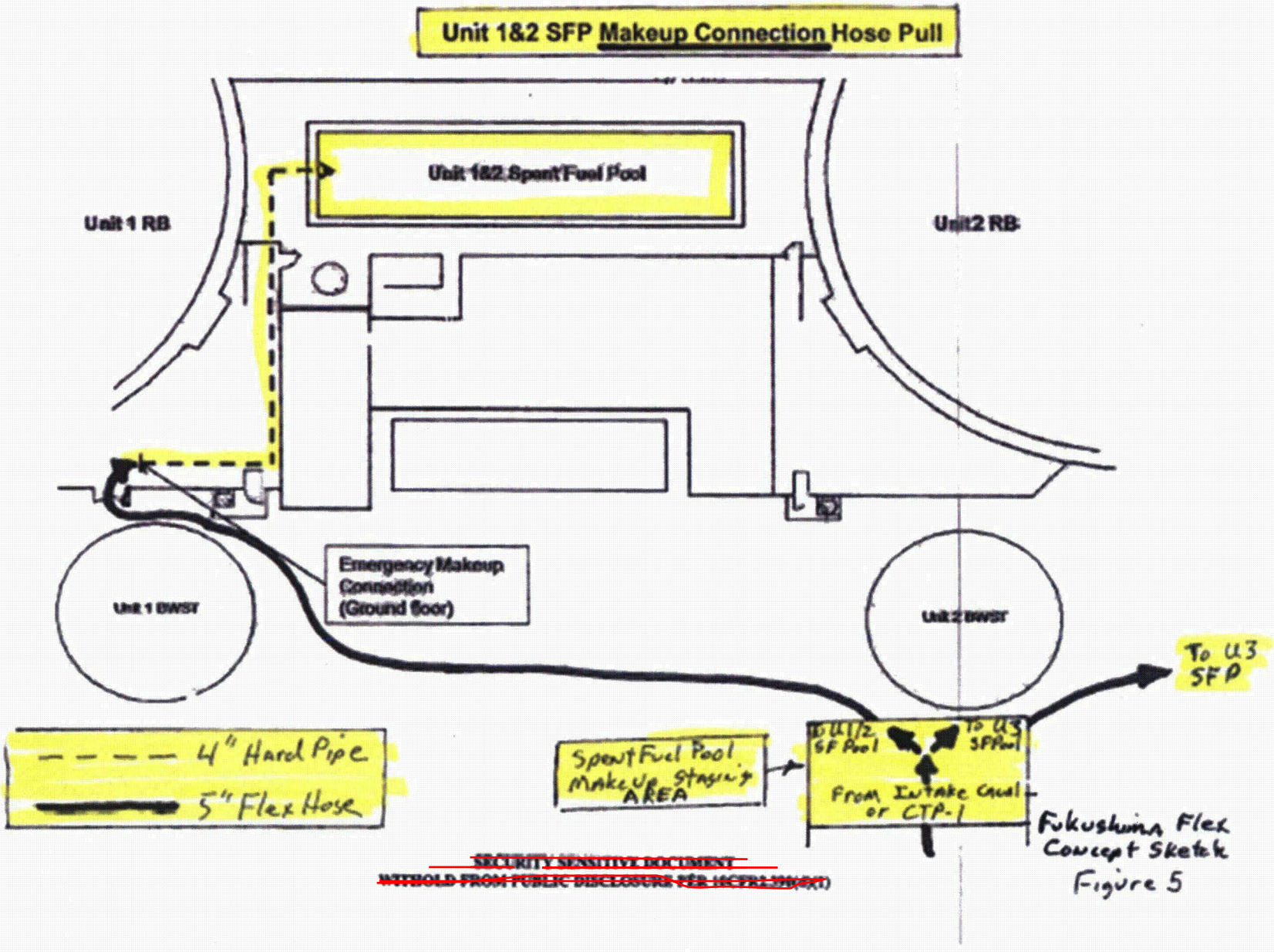
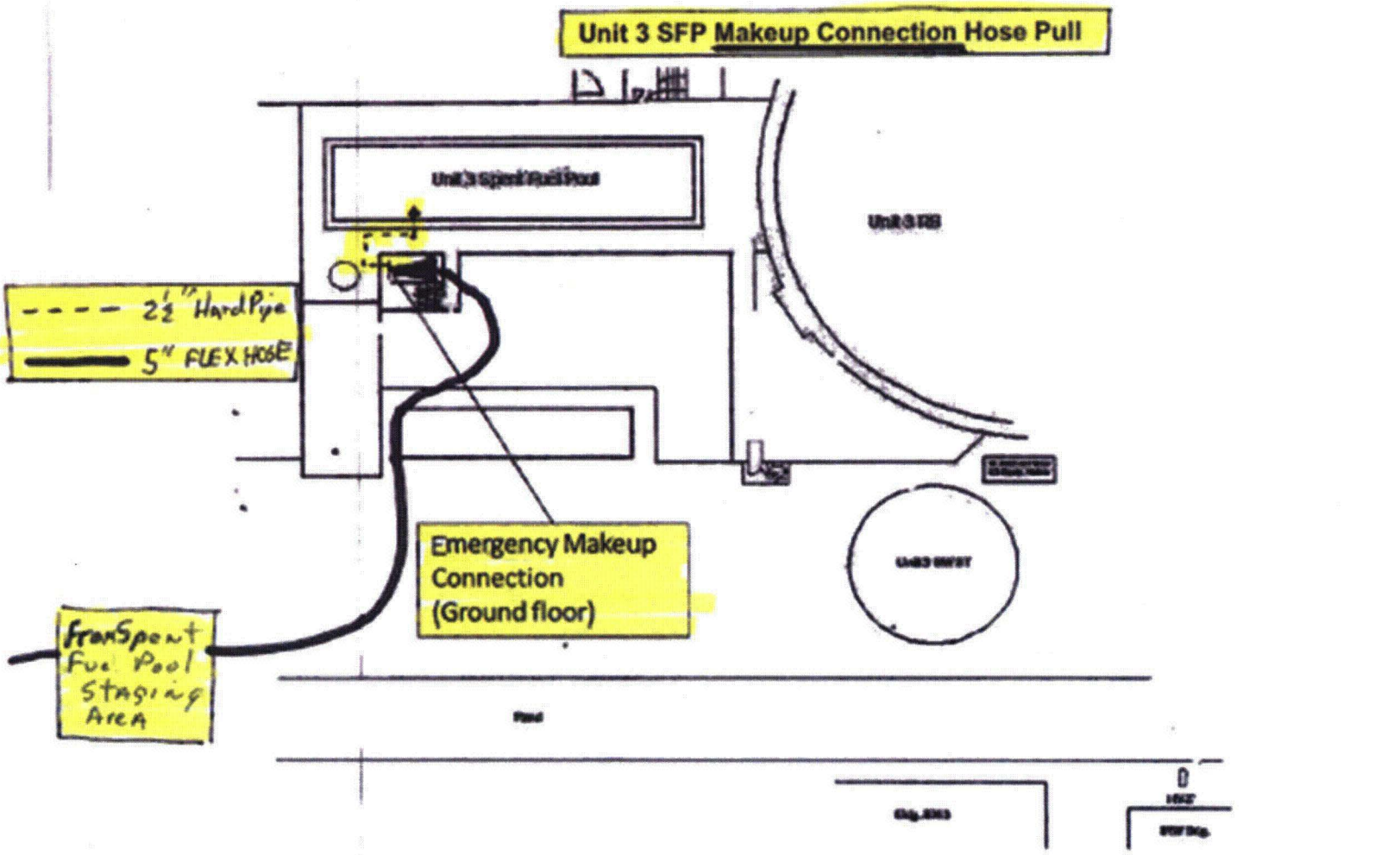

Unit 1&2 SFP Makeup Connection Hose Pull
Unit 1&2 Spent Fuel Pool
Unit 1 RB
Unit2 RB
Emergency Makeup Connection (Ground floor)
Unit 1 BWST
Unit 2 BWST
To U3 SFP
4" Hard Pipe
5" Flex Hose
Spent Fuel Pool Makeup Staging AREA
U1/2 SF Pool
To U3 SFPool
From Intake Canal or CTP-1
Fukushima Flex Concept Sketch
Figure 5
~~SECURITY SENSITIVE DOCUMENT~~
~~WITHHOLD FROM PUBLIC DISCLOSURE PER 10CFR2.390(d)(1)~~

Figure 5



~~SECURITY SENSITIVE DOCUMENT~~
~~WITHOLD FROM PUBLIC DISCLOSURE PER 10CFR2.390(d)(1)~~

Figure 6

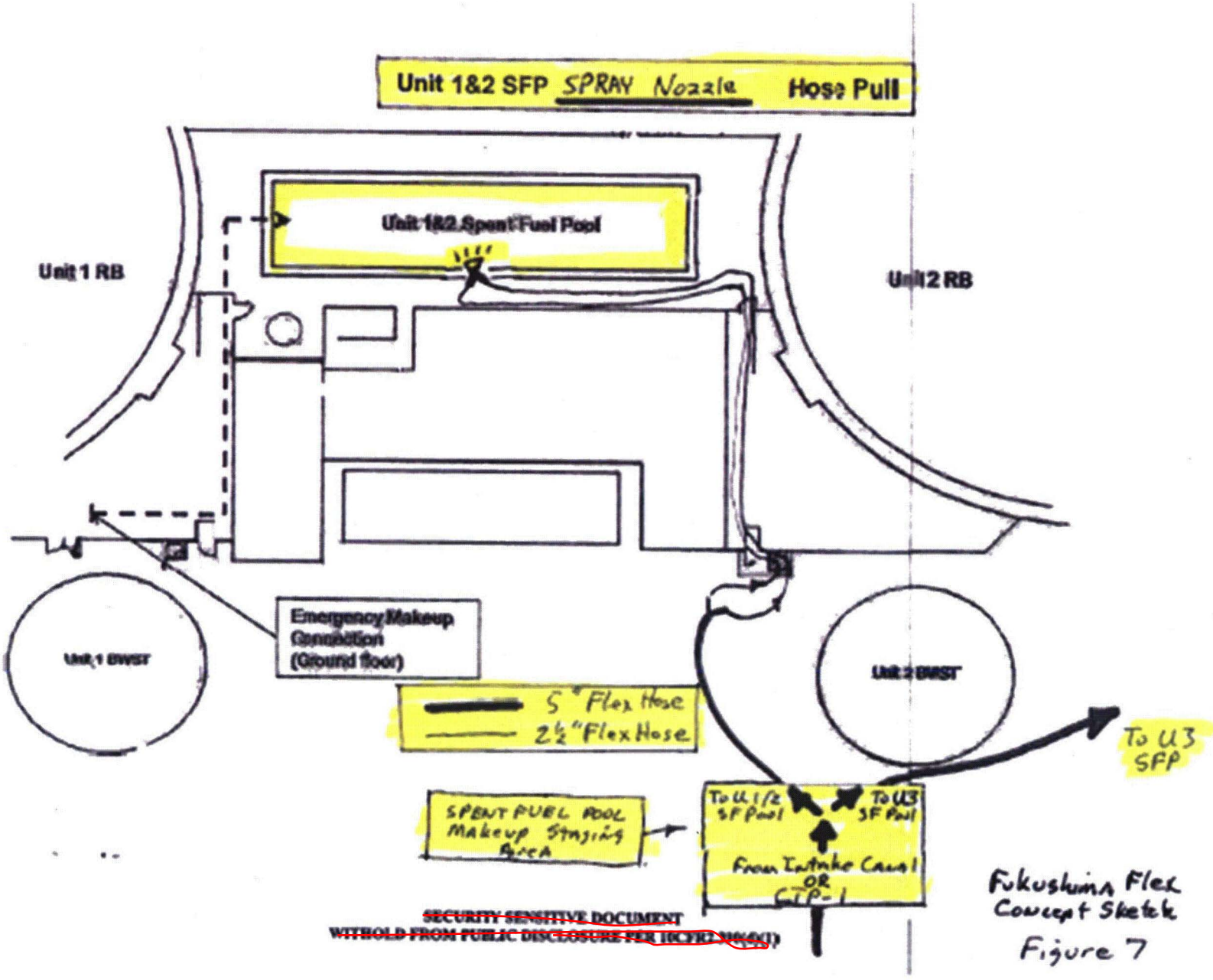

Unit 1&2 SFP SPRAY Nozzle
Hose Pull
Unit 1&2 Spent Fuel Pool
Unit 1 RB
Unit 2 RB
Emergency Makeup Connection (Ground floor)
5" Flex Hose
2½" Flex Hose
To U3 SFP
SPENT FUEL POOL Makeup Staging Area
To U1/2 SF Pool
To U3 SF Pool
From Intake Canal OR CTP-1
SECURITY SENSITIVE DOCUMENT
WITHOLD FROM PUBLIC DISCLOSURE PER 10CFR 2.390(d)(1)
Fukushima Flex Concept Sketch
Figure 7

Figure 7

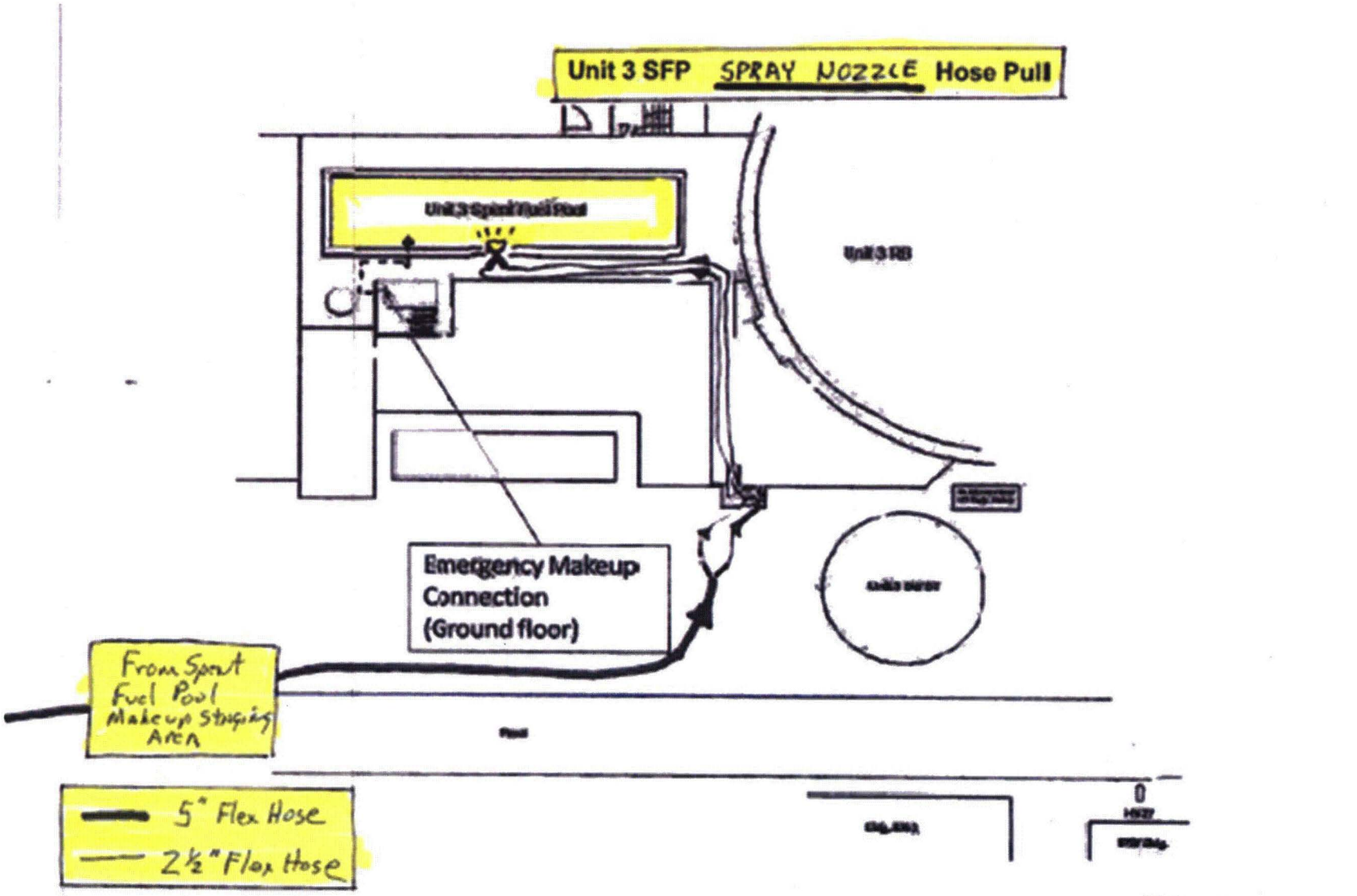

Unit 3 SFP SPRAY NOZZLE Hose Pull
Emergency Makeup Connection (Ground floor)
From Spent Fuel Pool Makeup Staging Area
5" Flex Hose
2½" Flex Hose
SECURITY SENSITIVE DOCUMENT
WITHOLD FROM PUBLIC DISCLOSURE PER
Fukushima Flex Concept Sketch
Figure 8

Figure 8

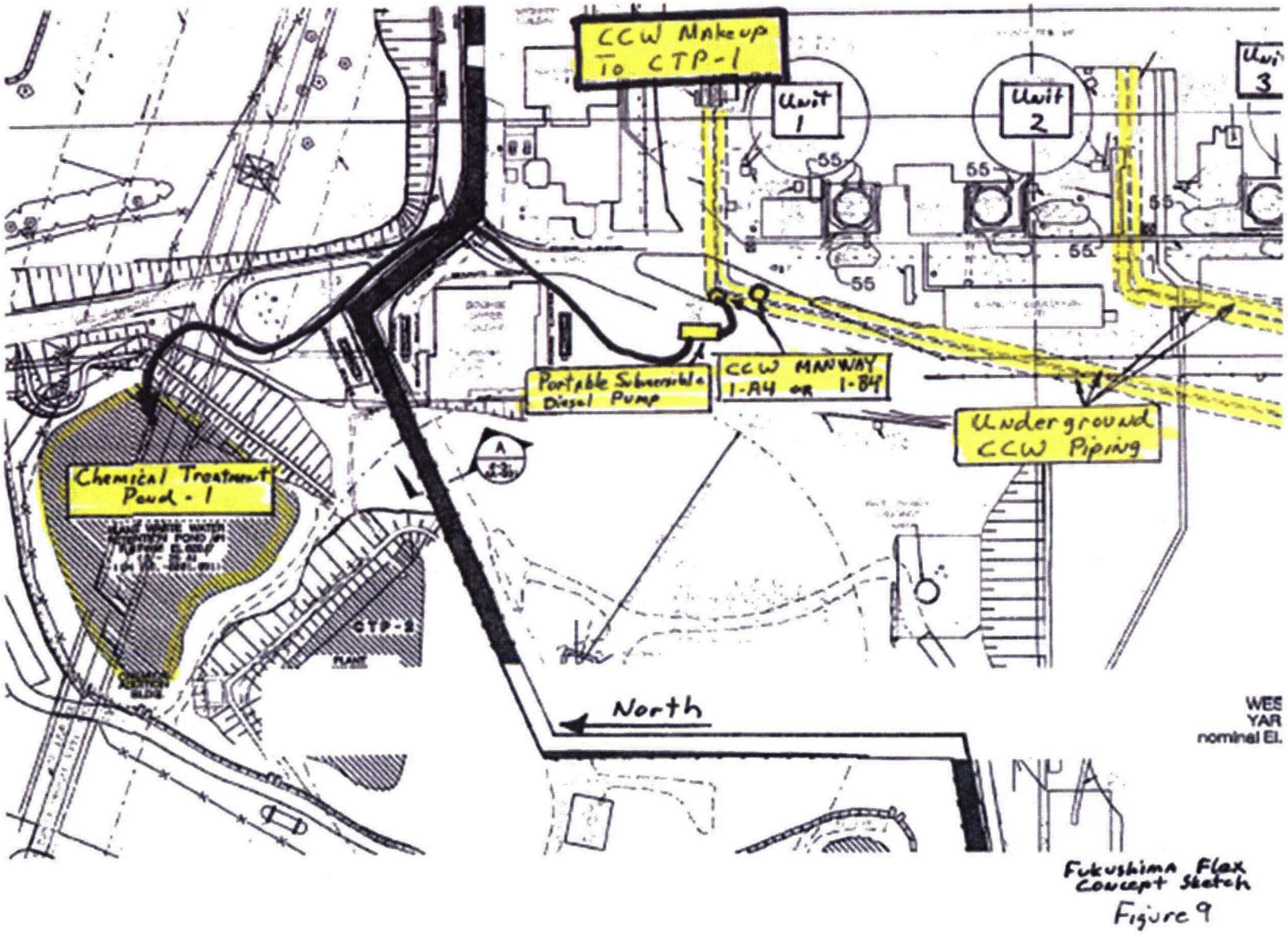

CCW Makeup To CTP-1
Unit 1
Unit 2
Unit 3
55
55
55
55
Portable Submersible Diesel Pump
CCW MANWAY 1-A4 OR 1-B4
Underground CCW Piping
Chemical Treatment Pond - 1
CTP-2
North
WES
YAR
nominal El.
Fukushima Flex Concept Sketch
Figure 9

Figure 9

Attachment 4 - References

The following references are provided for information only. Their inclusion within this document does not incorporate them into the current licensing basis (CLB) by reference nor does it imply intent to do so. References which have not been docketed are available onsite for NRC examination and inspection.

Item #[8]	Reference Description:
1	NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide", Revision 0, August 2012
2	Oconee Nuclear Station Updated Final Safety Analysis Report, Revision 21, 2011 Update
3	NRC Order EA-12-049, "Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events", March 12, 2012
4	Japan Lessons-Learned Project Directorate JLD-ISG-2012-01, "Compliance with Order EA-12-049, Order Modifying License with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events", Interim Staff Guidance, Revision 0, August 29, 2012
5	WCAP-17601-P, Reactor Coolant System Response to ELAP for Westinghouse, Combustion Engineering, and B&W, August 2012
7	PA-PSC-0965, PWROG generic FLEX Support Guidelines and Interfaces (Controlling Procedure Interface and Recommended Instruments), Revision 0, December 2012
8	NEI 12-01, Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities, Revision 0, May 2012
9	NEI 12-02, Industry Guidance for Compliance with NRC Order EA-12-051, To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, Revision 1, August 2012
12	ONS Units 1 and 2 Engineering Instructions: Loss of Spent Fuel Cooling Heat Up Times Due to Decay Heat
13	ONS Unit 3 Engineering Instructions: Loss of Spent Fuel Cooling Heat Up Times Due to Decay Heat
14	Confirmatory Action Letter – Oconee Nuclear Station, Units 1, 2 and 3 Commitments to Address External Flooding Concerns (CAL 2-10-003), June 22, 2010
18	ONS Engineering Manual: Evaluation by Station Management in the TSC - Beyond Design Basis Mitigation Strategies for External Flood Mitigation
19	ONS Calculation: Containment Response Following the Loss of All AC Power
22	ONS Calculation: Operability Evaluation for PIP 99-2499 Hydrogen Gas Generation in the Station's Battery Rooms
24	Duke Energy Calculation: Thermal Hydraulic Analyses in Support of IER L1 11-4 Extended Loss of AC Power Containment Integrity Analysis and Other Plant Support
25	Abnormal Operating Procedure: External Flood Mitigation
27	Abnormal Operating Procedure: Unit 1& 2 Loss of SFP Cooling and/or Level
28	Abnormal Operating Procedure: Unit 3 Loss of SFP Cooling and/or Level
30	Abnormal Operating Procedure: Standby Shutdown Facility Emergency Operating Procedure
33	Design Basis Specification for the 120 VAC Vital I&C Power System

[8] **Reference numbers are not sequential.** Some documents that were identified as potential references during the development of this document were not used in the final version; therefore, this table does not list them. The references that were used, maintained its original item number assigned to it during the development process.

ONS Mitigating Strategies (FLEX) Integrated Plan

Item #[8]	Reference Description:
37	EPRI 1012023, Experience Based Seismic Verification Guidelines for Piping Systems
38	EPRI 1019199, Experience Based Seismic Verification Guidelines for Piping and Tubing Systems
39	NRC Letter to Licensees, dated March 12, 2012, Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3 of the Near Term Task Force Review of Insights from the Fukushima Dai-ichi Accident
40	Design Basis Specification for the Spent Fuel Cooling System
41	Design Basis Specification for the SSF RCMU System
42	Design Basis Specification for the SSF ASW System
43	ONS Drawing: One Line Diagram 120 VAC and 125 VDC Instrumentation Vital Buses
44	NRC Order Number EA- 12-051, Order Modifying Licenses with Regard to Requirements for Reliable Spent Fuel Pool Instrumentation, dated March 12, 2012
45	ONS Calculation: Analysis for Use of Spent Fuel Pool Inventory for SSF
46	ONS Engineering Manual: Engineering Emergency Response Plan
47	AWWAD100, American Water Works Association Standard for Welded Carbon Steel Tanks for Water Storage.
48	ONS Calculation:"Resulting Flood Heights Due to Intake Dike Diversion Wall"
50	"ONS Unit 1, 2, and 3 Slides for Public Meeting on Mitigation Strategies For NRC Order EA-12-049", Nov. 2012, ADAMS Accession Number ML13004A365
51	ONS Emergency Operating Procedure, (U1, U2, & U3)
52	ONS Chemistry Procedure: Operation and Sampling of CTP-1 and CTP-2
53	ONS Calculation: Auxiliary Building GOTHIC Heat Up Analysis-PSW Event Cases
54	Technical Specification 3.10.1 SSF, SR 3.10.1.4
55	Technical Specification Bases 3.10.1, Table 3.10.1-1
56	Design Basis Specification for the Inadequate Core Cooling Monitor (ICCM)
57	ONS Instrumentation Procedure: Maintenance and Testing of Self-Contained Battery Packs on Emergency Lights
58	ONS Drawing: One Line Diagram Auxiliary Circuits 208/120 VAC
59	ONS Drawing: One Line Diagram 240/120 VAC Auxiliary Circuits Comp., ICS, and Reg. Supply
60	ONS Flow Diagram: Fuel Oil System (SSF Diesel Engines)
61	Design Basis: Specification for the Seismic Design
62	ONS Calculation: External Flood Mitigation Flow Model
63	Safety Evaluation by The Office of Nuclear Reactor Regulation Related to Duke Energy Carolinas, LLC Confirmatory Action Letter – Comments to Address Extended Flooding Concerns Closure of Inundation Site Results ONS Units 1, 2, and 3 Docket Nos 50-269, 50-270, and 50-287 dated January 28, 2011
64	ONS Calculation: Steam Generator Tube Rupture (SGTR)/Small Break Loss of Coolant Accident (SBLOCA) Boration Requirements
65	ONS Performance Test: Time Critical Actions Verification
66	Abnormal Procedure: Unit 1 & 2 Degraded Control Room Area Cooling
67	Abnormal Procedure: Unit 3 Degraded Control Room Area Cooling

Attachment 5 - Open Items

Item	Open Item Name	Item Description
1	Revised PMP HMR51 Analysis	Revised PMP analysis needed with owner accepted OSC number
2	Max flood level on site 'after modifications'	ONS Calculation: Resulting Flood Heights Due to Intake Dike Diversion Wall, is approved analysis for current interim modifications
3	Deployment Path Program	Admin program assessment needed to keep deployment path cleared
4	Procedures and FSGs	Implement programmatic controls per NEI 12-06
5	FLEX Equipment Programmatic Control	Purchase, design, testing/PMs, storage, and unavailability of FLEX equipment
6	Personnel Training	Personnel training with respect to FLEX equipment deployment and operation
7	FLEX Basis Document	FLEX basis document needs to be developed
8	Configuration Control	Modification needed for portable equipment deployment pathways, connection points, basis document, etc
9	RRC	Regional Response Center "Playbook"
10	Cool down Analysis	Cool down analysis by SA group is pending
11	ADV Survivability and Accessibility	Need verification that ADVs will survive BDBEE and will remain accessible
12	Load Shed Analysis	Vital battery deep load shed analysis to provide margin for deployment of FLEX equipment for Phase 2
13	Hydraulic Analysis for Pump Flow (Intake Canal to SGs)	Need analysis for one 3000 gpm Hale pump located near the B.5.b pump staging area, providing sufficient flow to three units for steam generator heat removal
14	Fuel Oil Consumption	Analysis needed for fuel oil with respect to consumption rates, storage capability, coping times, and delivery specification
15	Hydraulic Analysis for Pump Flow (CTP-1 to SGs)	Need analysis for one 3000 gpm Hale pump located at CTP-1 EFM staging area providing sufficient flow to three units for steam generator heat removal
16	Water in embedded CCW lines & Hydraulic Analysis for Pumping Configuration	Analysis needed on the volume of available water in the embedded CCW lines post event and corresponding hydraulic analysis for pumping configuration to transfer CCW water to CTP-1
17	PSW Modification (EC 91877)	PSW modification that replaces ASW feed line (2PSW-29 replaces 2CCW-516)
18	Alternate FLEX Connections Modification (SG Makeup)	Modification needed for three taps to the SSF ASW feed lines
19	Breaking Siphons in Embedded CCW Piping	Modification needed to add first and second siphon break taps and valves to preserve CCW inventory following a BDBEE
20	Instrumentation Repower (Alternate Repower Strategy)	Modifications for penetration room portable instrument panel and connections
21	FLEX Equipment Storage	Modification needed for FLEX equipment storage facility
22	Portable Power Distribution (Primary Repower Strategy)	Modification needed to enable repower of required loads for phase 2 coping

ONS Mitigating Strategies (FLEX) Integrated Plan

Item	Open Item Name	Item Description
23	Long term SG and SFP Makeup	Assessment needed on strategy for sustaining steam generator and SFP makeup inventory after CCW inventory is depleted ("River bed option")
24	Hydrogen Buildup Analysis	Evaluate existing analysis in OSC-7435 to ensure analysis bounds expected conditions for repower strategy
25	BWST Tap Analysis and Modification (RCS Makeup)	Hydraulic analysis for modification needed for portable pump to inject 40 gpm BWST water into RCS at (1) HPI header and (2) HPI seals. Size BWST tap for shutdown reduced inventory makeup requirements (approx. 150 gpm) using a low pressure/high capacity pump injection into 1, 2, 3, BS-26
26	Containment Analysis	Validate ONS Calculation: Containment Response Following the Loss of All AC Power is a bounding analysis for FLEX event out to 30 days
27	Hydraulic Analysis for Pump Flow (CTP-1 to SFPs & Intake Canal to SFPs)	Hydraulic Analysis needed for one 1500 gpm or larger Hale pump located near the B.5.b pump staging area, or CTP-1 providing sufficient flow to two SFPs for heat removal. Consider FLEX hose through Boggs Box and SFP fill pipe
28	Robustness of SFP Refill Lines	Need SQUG assessment of SFP refill lines with respect to seismic capabilities.
29	Lighting Evaluation	Assessment needed with respect to Appendix R lighting versus areas with FLEX actions. Develop specification of portable lighting needs
30	Communication Assessment	50.54(f), Section 9.3 communications assessment
31	NEI 12-01 Staffing Study	Phase II staffing study will be needed to support FLEX deployment
32	HVAC Analysis	Analysis needed for HVAC requirements i.e. opening doors to cabinets, opening doors (control rooms, battery rooms, and penetration rooms), installing fans, installing spot coolers, and repowering installed equipment