Exelon Generation®

Order No. EA-12-049

RS-14-008

February 28, 2014

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Byron Station, Units 1 and 2
Facility Operating License Nos. NPF-37 and NPF-66
NRC Docket Nos. STN 50-454 and STN 50-455

Subject: Second Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)

References:

1. NRC Order Number EA-12-049, " Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," dated March 12, 2012
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
3. NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," Revision 0, dated August 2012
4. Exelon Generation Company, LLC's Initial Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049), dated October 25, 2012
5. Exelon Generation Company, LLC Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049), dated February 28, 2013 (RS-13-018)
6. Exelon Generation Company, LLC First Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049), dated August 28, 2013 (RS-13-115)
7. NRC letter to Exelon Generation Company, LLC, Byron Station, Units 1 and 2 – Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Order EA-12-049 (Mitigation Strategies) (TAC Nos. MF0893 and MF0894), dated December 17, 2013

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

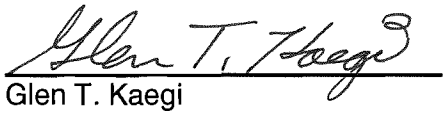
Reference 1 required submission of an initial status report 60 days following issuance of the final interim staff guidance (Reference 2) and an overall integrated plan pursuant to Section IV, Condition C. Reference 2 endorses industry guidance document NEI 12-06, Revision 0 (Reference 3) with clarifications and exceptions identified in Reference 2. Reference 4 provided the EGC initial status report regarding mitigation strategies. Reference 5 provided the Byron Station, Units 1 and 2 overall integrated plan.

Reference 1 requires submission of a status report at six-month intervals following submittal of the overall integrated plan. Reference 3 provides direction regarding the content of the status reports. Reference 6 provides the first six-month status report pursuant to Section IV, Condition C.2, of Reference 1 for Byron Station. The purpose of this letter is to provide the second six-month status report pursuant to Section IV, Condition C.2, of Reference 1, that delineates progress made in implementing the requirements of Reference 1. The enclosed report provides an update of milestone accomplishments since the last status report, including any changes to the compliance method, schedule, or need for relief and the basis, if any. The enclosed report also addresses the NRC Interim Staff Evaluation Open and Confirmatory Items contained in Reference 7.

This letter contains no new regulatory commitments. If you have any questions regarding this report, please contact David P. Helker at 610-765-5525.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 28th day of February 2014.

Respectfully submitted,



Glen T. Kaegi
Director - Licensing & Regulatory Affairs
Exelon Generation Company, LLC

Enclosure:

1. Byron Station, Units 1 and 2 Second Six-Month Status Report for the Implementation of Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events

cc: Director, Office of Nuclear Reactor Regulation
NRC Regional Administrator - Region III
NRC Senior Resident Inspector - Byron Station, Units 1 and 2
NRC Project Manager, NRR - Byron Station, Units 1 and 2
Ms. Jessica A. Kratchman, NRR/JLD/PMB, NRC
Mr. Jack R. Davis, NRR/DPR/MSD, NRC
Mr. Eric E. Bowman, NRR/DPR/MSD, NRC
Mr. Jeremy S. Bowen, NRR/DPR/MSD/MSPB, NRC
Mr. Robert L. Dennig, NRR/DSS/SCVB, NRC
Mr. Peter Bamford, NRR/DPR/MSD/MSPB, NRC
Illinois Emergency Management Agency - Division of Nuclear Safety

Enclosure

Byron Station, Units 1 and 2

Second Six-Month Status Report for the Implementation of Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events

(30 pages)

Byron Station, Units 1 and 2

Second Six-Month Status Report for the Implementation of Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events

1 Introduction

Byron Station developed an Overall Integrated Plan (Reference 1 in Section 8), documenting the diverse and flexible strategies (FLEX), in response to Reference 2. This enclosure provides an update of milestone accomplishments since submittal of the last status report, including any changes to the compliance method, schedule, or need for relief/relaxation and the basis, if any.

2 Milestone Accomplishments

None.

3 Milestone Schedule Status

The following provides an update to Attachment 2 of the Overall Integrated Plan. It provides the activity status of each item, and whether the expected completion date has changed. The dates are planning dates subject to change as design and implementation details are developed.

Site: Byron

Original Target Completion Date	Activity	Status	Revised Target Completion Date
	Submit 60 Day Status Report	Complete	
	Submit Overall Integrated Implementation Plan	Complete	
	Contract with RRC	Complete	
	Submit 6 Month Updates:		
Aug 2013	Update 1	Complete	
Feb 2014	Update 2	Complete with this submittal	
Aug 2014	Update 3	Not Started	
Feb 2015	Update 4	Not Started	
Aug 2015	Update 5	Not Started	

Unit 1	Unit 2	Modification Development		
Aug 2014	Dec 2013	• Phase 1 modifications	Detailed Designs Started	
Aug 2014	Dec 2013	• Phase 2 modifications	Detailed Designs Started	
Aug 2014	Dec 2013	• Phase 3 modifications	Not Started	
Unit 1	Unit 2	Modification Implementation		
Sept 2015	Oct 2014	• Phase 1 modifications	Not Started	
Sept 2015	Oct 2014	• Phase 2 modifications	Not Started	
Sept 2015	Oct 2014	• Phase 3 modifications	Not Started	
		Procedure Development		
Oct 2014		• Strategy procedures	Started	
Apr 2014		• Validate Procedures (NEI 12-06, Sect. 11.4.3)	Started	
Oct 2014		• Maintenance procedures	Not Started	
Jun 2014		Staffing analysis	Not Started	
Oct 2014		Storage Plan and construction	Started	
Oct 2014		FLEX equipment acquisition	Started	
Oct 2014		Training completion	Started	
Aug 2014		Regional Response Center Operational	Started	
Sept 2015		Unit 1 Implementation date	Not Started	
Oct 2014		Unit 2 Implementation date	Not Started	

4 Changes to Compliance Method

Change 1

Section: Multiple Sections

Reason for Change: For consistency throughout this project we have chosen to utilize the calculations of the WCAP-17601-P for our reference calculations.

Reason for Change: With engineering review and judgment the values from the WCAP are bounding.

Change 2

Section: General Integrated Plan Elements PWR - Provide a sequence of events and identify any time constraint required for success including the technical basis for the time constraint.

Reason for Change: Modification design details were refined as parts of the standardized modification design process and manual actions have been added and verified to accomplish these tasks.

Change:

1. Added new step to close the 2 S/G PORVs that have battery backup when it is verified that there is no Auxiliary Feedwater. This will conserve S/G inventory and provide symmetric cooling as required in the WCAP-17601-P.
2. Added new step to shed DC Loads as recommended by WCAP-17601-P along with procedure reference 1/2BFSG-4, ELAP DC Load Shed/Management.
3. Added new step to align the AF pump SX cooling water FLEX supply within two (2) hours of pump start to prevent overheating from the short cycle of the cooling water along with the procedure reference of 1/2BFSG-2, Alternate AFW/EFW Suction Source.
4. Added new step to deploy all hoses and connections in the FHB for alternate SFP fill and RCS inventory/boration strategies, before the FHB becomes uninhabitable due to SFP boiling. This is expected to occur within six (6) hours of the event initiation and will be governed by procedures 0BwFSG-5, Initial Assessment and FLEX Equipment Staging Unit 0, and 0BwFSG-11, Alternate SFP Make-Up and Cooling.

Change 3

Section: Maintain Core Cooling & Heat Removal – PWR Installed Equipment Phase 1 and Maintain RCS Inventory Control - PWR Installed Equipment Phase 1

Reason for Change: Site alignment with Nuclear Energy Institute (NEI) position paper dated September 18, 2013, entitled "Position Paper: Shutdown/ Refueling Modes"

Change: Change last paragraph to the following:

Cold Shutdown and Refueling: When in Cold Shutdown and Refueling, many variables exist which impact the ability to cool the core. In the event of an ELAP during these Modes, installed plant systems cannot be relied upon to cool the core, thus transition to Phase 2 will be required sooner. All efforts will be made to expeditiously provide core cooling and minimize heat-up and

repressurization. Exelon has a program in place (Ref. 3) to determine the time to boil for all conditions during shutdown periods.

To accommodate the activities of vessel disassembly and refueling, water levels in the reactor vessel and the reactor cavity are often changed. The most limiting condition is the case in which the reactor head is removed and water level in the vessel is at or below the reactor vessel flange. If an ELAP/LUHS occurs during this condition then (depending on the time after shutdown) boiling in the core may occur quite rapidly. Deploying and implementation of portable FLEX pumps to supply injection flow must commence immediately from the time of the event. This should be plausible because more personnel are on site during outages to provide the necessary resources. Strategies for makeup water include deploying a FLEX pump to take suction from the RWST and /or UHS as described in the Phase 2 Core Cooling section. Guidance will be provided to ensure that sufficient area is available for deployment and that haul paths remain accessible without interference from outage equipment during refueling outages.

Change 4

Section: Maintain Core Cooling & Heat Removal – PWR Installed Equipment Phase 1 – Identify Modifications

Reason for Change: Modification design details have been refined as parts of the standardized modification design process

Change: (replace section with the following)

The following gaps have been identified that prevent operation of the DDAF pump:

1. DDAF pump suction flow path is not available due to CST unavailability and failure of the CST isolation valve to close and the SX suction valve to open on loss of AC power.
2. DDAF batteries are drained due to repetitive engine starts with automatic reset of low-low suction pressure trip
3. DDAF pump overheating due to cooling water recirculation flow paths within SX system cycling and overheating the pump within two (2) hours.

Gap 1 will be resolved with manual operator actions. Operators will be procedurally directed to open the SX suction valves (1/2AF006 and 1/2AF017) and close the CST isolation valves (1/2AF002) prior to starting the DDAF pump.

Gap 2 will be resolved by modifying the DDAF pump logic to lock-out the pump after unsuccessful starting attempts prior to draining the battery. This lockout will be manually reset after the DDAF pump suction is realigned.

Gap 3 will be resolved by modifying the DDAF pump SX cooling water flow path. The modification consists of installing a piping tee on the discharge of both Unit 1 and Unit 2 "B" SX pump discharge lines on the 330' elevation in the AB. These tees will be connected by a header and routed vertically through the AB to the 383' elevation. On the 383' elevation, the line will tee into two lines feeding the 1/2 DDAF pump SX booster pump. This new line will be isolated during normal operation. In the event of an ELAP, this new line will be aligned and the normal SX cooling supply to the DDAF pump SX booster pump will be isolated.

Change 5

Section: Maintain Core Cooling & Heat Removal – PWR Portable Equipment Phase 1, 2 and 3 - Key Reactor parameters and Maintain RCS Inventory Control - PWR Portable Equipment Phase 1, 2 and 3 - Key Reactor parameters.

Reason for Change: FLEX strategy has been refined and draft site FSG procedures have been developed.

Change: RWST level channel _LT-931_has been identified as a required instrument for the FLEX strategy.

In addition, Core Exit Thermocouple (CET) temperature _TI-IT002, Reactor Vessel Level indicating System (RVLIS) _LI-RC020, and Post Accident Neutron monitor _NI-NR006 A/B will be re-energized per the site strategy.

Change 6

Section: Maintain Core Cooling & Heat Removal – PWR Portable Equipment Phase 2 – Identify Modifications

Reason for Change: Modification design details have been refined as parts of the standardized modification design process

Change: (replace section with the following)

The following modifications will be installed to support FLEX pump water injection into the SGs

Primary: A pipe flange connection will be attached to the B and C Auxiliary Feedwater (AF) SG injection lines at the existing test flanges within the 377' Main Steam Safety Valve (MSSV) rooms. The pipe flanges will be connected to a header and routed vertically to the 401' elevation in the B/C MSSV room. The header will be terminated with a standard FLEX connection inside the robust MSSV room above the 401' elevation. This will allow a FLEX pump to provide cooling water to the B/C SGs

Alternate: This modification is identical to the primary except it is within the A/D MSSV room. It will allow a FLEX pump to supply cooling water to the A/D SGs.

Note: Both the B/C and A/D headers in the 377' MSSV rooms will have flanges allowing a temporary hose to connect the headers and allow one FLEX pump to feed all four (4) SG's. This temporary hose will be stored within the robust Main Steam Tunnel for easy deployment.

FLEX pump suction: A tee will be installed on the A SI pump suction line, (in the B SI Pump Room). A header will be routed from the tee to the robust RWST tunnel area and terminated with a standard FLEX connection. Temporary hoses will be routed through the RWST tunnel hatch to connect this line to the FLEX pump suction located outside.

Note: The SG cooling water source is prioritized from cleanest to dirtiest. The priority is the CST (not robust) and then the UHS (River water). The Well Water system will be repowered in Phase 2 and supplied to the UHS and the medium pressure diesel FLEX pump. The RWST (Boration source) will also be available, if needed, to the medium pressure FLEX diesel pumps until the WW to FLEX pump hoses are in place. Additionally, a water filtration unit will be requested from the RRC and installed to provide purification of the UHS water source as staffing permits.

Change 7

Section: Maintain Core Cooling and Heat Removal, – PWR Portable Equipment Phase 2 - Deployment Conceptual Design – Strategy, Maintain RCS Inventory Control – PWR Portable Equipment Phase 2 - Deployment Conceptual Modifications – Strategy, Maintain Spent Fuel Pool Cooling – PWR Portable Equipment Phase 2 - Deployment Conceptual Design – Strategy, and Safety Function Support – PWR Portable Equipment Phase 2 - Deployment Conceptual Design - Strategy

Reason for Change: The site storage building will consist of one robust building housing "N" FLEX equipment and a commercial building housing "+1" FLEX equipment. The site strategy will have several strategic temporary hoses and electrical cables staged within robust structures in the plant

Change: (replace section with the following)

The required FLEX equipment needed for Core Cooling, RCS Inventory Control, Spent Fuel Pool Cooling and Safety Function Support will be stored in a FLEX building and transported to a pre-identified staging location. Hoses and electrical cables to support the site coping strategy will be stored within the FLEX building or staged in the plant. The equipment deployment strategy will be validated and reported in a future six (6) month update.

Change 8

Section: Maintain Core Cooling & Heat Removal – PWR Portable Equipment Phase 3, Maintain RCS Inventory Control – PWR Portable Equipment Phase 3, Maintain Spent Fuel Pool Cooling – PWR Portable Equipment Phase 3, and Safety Functions Support – PWR Portable Equipment Phase 3.

Reason for Change: Site FLEX strategy has been refined as parts of the standardized modification design process and through detailed reviews.

Change: (replace section with the following)

Phase 3 equipment for Byron includes backup portable pumps and generators. The portable pumps will be capable of providing the necessary flow and pressure as outlined in Phase 2 response for Core Cooling & Heat Removal, RCS Inventory Control and Spent Fuel Pool Cooling. The portable generators will be capable of providing the necessary 480 volt power requirements as outlined in Phase 2 response for Safety Functions Support.

In addition, a water purification skid and a boration skid will be requested from the RRC to support Phase 3 strategy

Change 9

Section: Maintain Core Cooling & Heat Removal – PWR Portable Equipment Phase 3 – Strategy, Maintain RCS Inventory Control - PWR Portable Equipment Phase 3 – Strategy, Maintain Spent Fuel Pool Cooling – PWR Portable Equipment Phase 3 – Strategy, and Safety Functions Support – PWR Portable Equipment Phase 3 – Strategy.

Reason for Change: RRC will provide operating instructions for the equipment delivered to the site.

Change: (replace section with the following)

Equipment will be delivered from the RRC to the staging area. From there, the equipment will be transported to the site and hooked up by both RRC and plant personnel per the playbook. Equipment will then be operated per industry developed operating instructions.

Change 10

Section: Maintain RCS Inventory Control - PWR Portable Equipment Phase 2

Reason for Change: Draft calculations have been prepared which show the RCS accumulators inject a portion of their concentrated boric acid inventory maintaining the reactor subcritical.

Change: (replace section with the following)

Phase 2 RCS inventory control and boration will be achieved within 24 hours via a portable pump. The pump suction will be from the RWST. The discharge will be into the CV/SI pump discharge line downstream of the CV/SI pump. A calculation is in progress to validate the time frame and any change to this will be provided in a future six (6) month update.

Electrical power to support the FLEX strategy is described in the Safety Function Support section.

Change 11

Section: Maintain RCS Inventory Control - PWR Portable Equipment Phase 2 - Identify modifications

Reason for Change: Modification design details have been refined as parts of the standardized modification design process

Change: (replace section with the following)

The following FLEX modifications will be installed to support inventory and boration of the RCS:

FLEX pump discharge: The "B" CV pump discharge header, downstream of check valve _CV8481B, will be modified with a tee and a standard FLEX connection (Alternate). The flow path goes through a normally closed MOV _SI8801A/B which can be manually opened or the "B" train MOV can be electrically opened after the FLEX DG energizes the associated Div 2 ESF Bus.

FLEX pump suction: The "B" SI pump discharge header, downstream of _SI8921B, will be modified with a tee. A header will be routed from a tee to the RWST tunnel and terminated with a standard FLEX connection (Primary). Deployment of this flow path will be contingent on primary pressure conditions less than 1750 psig due to the SI discharge header relief valves.

FLEX pump Suction: A tee will be installed on the "A" SI pump suction line, (In the "B" SI Pp Room). A header will be routed from the tee to the robust RWST tunnel area and terminated

with a standard FLEX connection. Temporary hoses will be routed through the RWST tunnel hatch to connect this line to the FLEX pump suction located outside.

Note: The RCS Inventory water source priority is the respective Unit's RWST.

A Boration skid will be requested from the RRC to provide a borated make-up source as needed.

Change 12

Section: Maintain Spent Fuel Pool Cooling – PWR Installed Equipment Phase 1

Reason for Change: The spent fuel pool area vent path strategy has been developed.

Change: Replace - Evaluation of the spent fuel pool area for steam and condensation has not yet been performed. The results of this evaluation and the vent path strategy, if needed, will be provided in a future six (6) month update.

With the following: A Spent Fuel Pool Vent path will be provided by opening the Fuel Handling Building track way roll-up door. The site does have manual actions within the Fuel Handling building. The actions include setting up SFP make-up temporary hoses and the RCS inventory control alternate injection path hoses. The site plans to perform these manual actions prior to the onset of SFP boiling. The actions will be directed by the FSGs being developed.

The SFP environment has the potential to communicate with the Aux Building via the FHB supply ducting, due to the FHB Supply dampers failing open on a loss of AC. It is reasonable to assume this flow path will be isolated by fire damper 0VA413Y. The fire damper will close when its fusible link melts shortly after reaching a set point of 165 F. Due to this damper arrangement and lack of motive force, minimal FHB atmosphere should be dispersed into the AB.

Change 13

Section: Maintain Spent Fuel Pool Cooling – PWR Portable Equipment Phase 1, 2 and 3 - Key SFP parameters.

Reason for Change: SFP design has identified the EPNs for the SFP level instrumentation.

Change: Replace SFP Level: (component # TBD) with Spent Fuel pool level: 0LI-FC001B and 0LI-FC002B

Change 14

Section: Maintain Spent Fuel Pool Cooling – PWR Installed Equipment Phase 2

Reason for Change: The spent fuel pool cooling and area vent path strategy has been developed

Change: (replace section with the following)

The SFP cooling will be achieved with one of the following methods:

The primary method will be repowering the installed 0FC03PA, 0A refueling water purification pump, utilizing the 480V Flex generator connection described in the Safety Functions Support section. The RWST with the installed piping will be used as the suction source. The discharge will use the existing 0A refueling water purification pump discharge piping directly to the SFP.

The secondary method will be achieved with a portable FLEX diesel pump and temporary hoses routed to the SFP via the FHB track way. The FLEX pump suction will be from Well Water, UHS or RWST.

A Spent Fuel Pool Vent path will be provided by opening the FHB track way roll-up door. The site does have manual actions within the spent fuel pool building to setup pool make-up temporary hoses and route the RCS inventory alternate connection hoses. The site plans to perform these manual actions prior to the onset of SFP boiling. The actions will be directed by the FSGs being developed.

The SFP environment has the potential to communicate with the Aux Building via the FHB supply ducting, because the FHB Supply dampers fail open on a loss of AC. It is reasonable to assume this flow path will be isolated by fire damper 0VA413Y. The fire damper will close when its fusible link melts shortly after reaching a set point of 165F. Due to this damper arrangement and lack of motive force, minimal FHB atmosphere should be dispersed in to the AB

Change 15

Section: Maintain Spent Fuel Pool Cooling – PWR Portable Equipment Phase 2 – Identify modifications

Reason for Change: The Spent fuel pool make-up strategy has changed. No modifications will be required for Phase 2 Spent Fuel Pool Cooling.

Change: (replace section with the following)

The primary make-up strategy will use the installed 0FC03PA, 0A refueling water purification pump, and associated piping as directed by 0BFSG-11, Alternate SFP Make Up and Cooling. The pump will be repowered as part of the site plan to re-energize safety related 480V buses with a FLEX generator. The pump's suction source is the RWST. Its discharge piping provides flow directly to the SFP. Make-up to the RWST can be performed by completing EDMG-1, Extensive Damage Mitigation Guideline Attachment 10.

The alternate make-up strategy will be via temporary hoses routed from a FLEX pump to a spray nozzle located in the vicinity of the SFP. The temporary hose / spray nozzle required to be routed within the FHB will be stored in that building and deployed prior to the onset of SFP boiling.

FHB vent path will be established by opening the FHB track way rollup door.

Change 16

Section: Safety Support Function – PWR Portable Equipment Phase 1, 2 and 3 - Key Parameters.

Reason for Change: FLEX strategy has been refined and draft site FSG procedures have been developed.

Change: DC Bus Voltage _EI-DC002, has been identified as a required instrument for the FLEX strategy.

Change 17

Section: Safety Function Support – PWR Portable Equipment Phase 2

Reason for Change: Site FLEX strategy has been refined through industry reviews and site challenges.

Change: (replace section with the following)

A portable diesel generator will provide power to one (1) division of the 480V ESF busses. Repowering at this level will permit the recovery of one division of station battery chargers, DDAFP battery chargers, MCCs powering critical equipment such as Diesel fuel oil transfer pumps, and other ESF equipment beneficial in mitigating the event.

Exelon Generation Company, LLC (Exelon) intends to maintain Operational command and control within the Main Control Room (MCR). Habitability conditions within the MCR and other areas of the plant will be maintained with a tool box approach limiting the impact of high temperatures with methods such as supplemental cooling, personnel rotation and/or availability of fluids.

The fuel handling building habitability should be maintained until the SFP begins to boil. The site does have manual actions within the Fuel Handling Building. The actions include setting up SFP make-up temporary hoses and the RCS inventory control alternate injection path hoses. The site plans to perform these manual actions prior to the onset of SFP boiling. The actions will be directed by the FSGs being developed.

Critical ventilation assets may be required to support DDAF pumps, the 0A refueling water purification pump, the station battery rooms and the miscellaneous electric equipment room component survivability. Specific analyses of these rooms are open items and will be addressed as part of the detailed engineering design phase. Closure of these items will be documented in a future six (6) month update.

Change 18

Section: Safety Function Support – PWR Portable Equipment Phase 2 – Indentify Modifications

Reason for Change: Modification design details have been refined as parts of the standardized modification design process.

Change:

The primary FLEX connection will be installed adjacent to MCC 132X and MCC 232X. An existing spare breaker within these MCCs will be modified such that its load side feed is connected to a new disconnect switch and patch panel. Temporary cables will be routed from the patch panel to the associated Unit's FLEX generator at the 401' TB track way entrance.

Once the MCC is energized, appropriate breakers will be closed to provide power to the safety related batteries.

The Alternate strategy is to provide a connection via the existing Site DC crosstie. In the event either Unit's primary FLEX strategy is unable to be implemented, DC busses 112 and 212 will be cross-tied to provide power to the site B train safety related batteries. In addition, the other required 480V critical loads will be powered up via a patch panel and TPU in the Auxiliary Building which is powered from either unit FLEX DG.

The discharge of the existing diesel fuel oil transfer pumps is being modified with a tee and isolation valve within the B main diesel generator rooms. This connection, along with temporary hoses and reenergizing the diesel fuel oil transfer pumps will provide a fuel source for the FLEX equipment.

Change 19

Section: PWR Portable Equipment Phase 2

Reason for Change: Modification design details have been refined as parts of the standardized modification design process.

Change: The Four (4) 480 VAC Generators will be 350 KW instead of the listed 500 KW.

Change 20

Section: Phase 3 Response Equipment/Commodities – Heavy Equipment

Reason for Change: Site strategy details have been refined as a result of strategy reviews

Change:

The F750 Truck has been purchased with a snow plow for debris removal. The F-750 will also be used for equipment deployment and FLEX equipment refueling.

In addition Byron will be acquiring 2 F-250, or equivalent, trucks with snow plows. They will tow the first needed Phase 2 equipment: the Flex DG for each unit.

All three trucks will then be utilized to transport additional equipment as required by the event and the Phase 2 plans.

Change 21

Section: Attachment 1A, Sequence of Events time line.

Reason for Change: Modification design details were refined as parts of the standardized modification design process and manual actions have been added and verified to accomplish these tasks.

Change: Added new steps and rearranged to reorder based on strategy updates, (see attachment 1A at end of this submittal).

1. Added new step 4 to close UPS powered SG PORVs to conserve inventory until _B AF Pp can be started.
2. Added new step 8 to perform DC load shed to extend life of 125v DC Batteries. Performed to align with WCAP-17601-P and in accordance with new 1/2BFSG-4.
3. Added new step 9 for the short cycle cooling mod for the _B AF Pumps.
4. Added new step 13 for layout of alternate strategy hoses for RCS make-up and SFP make-up in the FHB before it is not habitable.
5. Added new step 14 for SI Accumulator isolation.
6. Added new step 15 for new primary strategy for SFP make-up.
7. Changed time on step 16 to 12-14 hrs.
8. Added new step 17 for well water pump power.
9. Changed time on step 18 to 16-18 hrs to ensure boron is available when required.

Change 22

Section: Attachment 3 Conceptual Sketches

Reason for Change: Modification design details were refined as part of the standardized modification design process resulting in changes to the mechanical conceptual sketches.

Change: Current mechanical conceptual sketches are attached to this document. See Attachment 3.

5 Need for Relief/Relaxation and Basis for the Relief/Relaxation

Byron Station, Units 1 and 2 expects to comply with the order implementation date and no relief/relaxation is required at this time.

6 Open Items from Overall Integrated Plan and Draft Safety Evaluation

The following tables provide a summary of the open items documented in the Overall Integrated Plan or the Draft Safety Evaluation (SE) and the status of each item.

Section Reference	Overall Integrated Plan Open Item	Status
Key Site assumptions (p.3)	Primary and secondary storage locations have not been selected yet; once locations are finalized implementation strategies and routes will be assessed for hazard impact.	Started
Sequence of events (p.5)	The final timeline will be time validated once detailed designs are completed and procedures are developed.	Not Started
Identify how strategies will be deployed (p.6)	Identification of storage area and creation of the administrative program.	Started
Programmatic controls (p.7)	Develop an administrative program for FLEX responsibilities, and testing & maintenance.	Started
Regional Response Center plan (p.8)	Development of Byron Station's playbook.	Started
Key Reactor Parameters (p. multiple)	Identify additional parameters that are needed in order to support key actions identified in the plant procedures/guidance or to indicate imminent or actual core damage.	Started
Deployment Conceptual Design (p. multiple)	Develop the storage structure conceptual design.	Started
Maintain RCS Inventory Control, Phase 2 (p.22)	A calculation will be required for the timing of the boration and quantity required.	Started
Maintain Containment, Phase 1 (p.30)	Additional calculations will be performed to evaluate containment response.	Started

Maintain Spent Fuel Pool Cooling, Phase 1 (p.37)	Procedure development for Initial Spent fuel pool make-up with gravity drain from the RWST.	Complete – Procedures will not be developed for SFP make-up with gravity drain. The primary method for SFP make-up will be repowering the installed 0A refueling water purification pump utilizing the 480V FLEX generator connection described in the Safety Functions Support section. The RWST with the installed piping will be used as the suction source. The discharge will use the existing 0A refueling water purification pump discharge piping directly to the SFP.
Maintain Spent Fuel Pool Cooling, Phase 1 (p.37)	Initial calculations were used to determine the fuel pool timelines. Formal calculations will be performed to validate this information during development of the spent fuel pool cooling strategy detailed design.	Started
Maintain Spent Fuel Pool Cooling, Phase 1, (p.37 and p.40)	Evaluation of the spent fuel pool area for steam and condensation will be performed and used to determine if vent path strategy is needed.	Complete. A Spent Fuel Pool Vent path will be provided by opening the Fuel Handling building track way roll-up door. The site plans to perform required manual actions within the FH building prior to the onset of SFP boiling. A formal calculation will not be performed.
Safety Functions Support, Phase 2 (p.48)	Habitability conditions will be evaluated and a strategy will be developed to maintain Main Control Room.	Complete. Habitability conditions within the MCR will be maintained with a tool box approach limiting the impact of high temperatures with methods such as supplemental cooling, personnel rotation and/or

		availability of fluids.
Safety Functions Support, Phase 2 (p.48)	Critical ventilation assets may be required to support DDAF pumps, station battery rooms, miscellaneous electric equipment rooms, and fuel handling building personnel habitability and/or component survivability. Specific analyses of these rooms will be performed.	Started - Habitability conditions within the Plant will be maintained with a tool box approach limiting the impact of high temperatures with methods such as supplemental cooling, personnel rotation and/or availability of fluids. Analysis is in progress to ensure component survivability post event.

Interim Safety Evaluation Open Item Byron's ISE Response			**Status**
Line Number	Item Number	Description	Answer
1	Open Item 3.2.1.8.A	Core Subcriticality- The NRC staff has not endorsed the industry-proposed position paper regarding boron mixing. The licensee has indicated that Byron is planning on following this methodology. Thus, further resolution of this issue will be necessary in the next phase of the audit process.	Started- Byron will abide by the position expressed by the NRC staff in the letter dated January 8, 2014 regarding the boron mixing issue for PWRs (Adams Accession No. ML13276A183). The NRC letter states that the NRC staff has reviewed the information submitted to date and concluded that use of the industry approach dated August 15, 2013, entitled "Westinghouse Response to NRC Generic Request for Additional Information (RAI) on Boron Mixing in Support of the Pressurized Water Reactor Owners Group (PWROG)," ML13235A135, is acceptable with clarifications listed in the letter. The analyses and evaluations supporting the OIP will demonstrate that the FLEX RCS makeup pump is being implemented one-hour prior to the loop flow rate decreasing below the loop flow rate

			corresponding to single-phase natural circulation for the assumed highest applicable leakage rate at normal operating pressure and temperature for the reactor coolant pump seals and unidentified reactor coolant system leakage
	Confirmatory Items		
2	3.1.1.1.A	Storage & Protection of FLEX equipment - Confirm final design of FLEX storage structure conforms to NEI 12-06, Sections 5.3.1, 7.3.1, and 8.3.1 for storage considerations for the hazards applicable to Byron.	Started - The site FLEX equipment storage structure is under development and will comply with the requirements of 12-06, Sections 5.3.1, 7.3.1, and 8.3.1 for storage considerations for the hazards applicable to Byron. The FLEX storage buildings will consist of one robust building housing "N" FLEX equipment and one commercial building housing the "+1" FLEX equipment.
3	3.1.1.3.A	Procedural Interface Considerations (Seismic) – Confirm procedure for measuring key instruments at containment penetrations using portable instrument.	Started - 1/2 BFSG-7, Loss of Vital Instrument or Control Power, is being developed. It will provide guidance to measure key instruments at appropriate locations within the plant.
4	3.1.1.4.A	Off-Site Resources – Confirm RRC local staging area and method of transportation to the site in future 6-month update.	Started.
5	3.1.5.1.A	Protection of Equipment (High Temperature) - Confirm FLEX storage structure will maintain FLEX equipment at a temperature range to ensure its likely function when called upon.	Started - The FLEX storage buildings ventilation systems will be designed as required by code and to maintain the FLEX equipment in a ready state. The minimum temperature will be maintained at or above 32°F and the maximum building temperature will be maintained by natural air ventilation utilizing vents. Temperature information from Byron's UFSAR indicates the site extreme

			temperatures range is from a maximum of 102°F to a minimum of -20°F.
6	3.1.5.3.A	Deployment of Equipment (High Temperature) - Confirm that the effects of high temperature on FLEX equipment have been evaluated in the locations they are intended to operate.	Started - Temperature information from Byron's UFSAR indicates the extreme Temperatures up to a maximum of 102°F. FLEX equipment is being ordered with temperature limits to ensure it will function in the extreme temperature conditions applicable to the site.
7	3.2.1.A	RCS cooling & RCS inventory control - Specify which analysis performed in WCAP-17601 is being applied to Byron. Additionally, justify the use of that analysis by identifying and evaluating the important parameters and assumptions demonstrating that they are representative of Byron and appropriate for simulating the ELAP transient.	Started - The WCAP-17601-P will be evaluated to ensure that it is bounding for Byron.
8	3.2.1.1.A	NOTRUMP - Confirm that the use of NOTRUMP in the ELAP analysis is limited to the flow conditions before reflux condensation initiates. This includes specifying an acceptable definition for reflux condensation cooling.	Started - Byron will use generic ELAP analyses performed with the NOTRUMP computer code to support the mitigating strategy in its Overall Integrated Plan (OIP). The use of NOTRUMP was limited to the thermal-hydraulic conditions before reflux condensation initiates. The initiation of reflux condensation cooling is defined when the one hour centered moving average (CMA) of the flow quality at the top of the SG U-tube bend exceeds 0.1 in any one loop.
9	3.2.1.1.B	ELAP Analysis - Confirm calculations to verify no nitrogen injection into RCS during depressurization.	Started - Engineering calculations are being performed to verify RCS Pressure will be held above the point of accumulator N2 injection until the accumulator isolation

			valves (_SI8808s) are closed.
10	3.2.1.1.C	Confirm analysis for secondary side SG fouling due to the use of abnormal water sources (RWST, well water, SX water)	Complete - A water analysis is not planned for Byron Station. Procedural guidance will be developed utilizing the cleanest to dirtiest water. The SG cooling water source is prioritized from cleanest to dirtiest. The priority is the CST (not robust) and then the UHS (River water). The Well Water system will be repowered in Phase 2 and supplied to the UHS and the medium pressure diesel FLEX pump. The RWST (boration source) will also be available, if needed, to the medium pressure FLEX diesel pumps until the WW to FLEX pump hoses are in place. Additionally, a water filtration unit will be requested from the RRC and installed to provide purification of the UHS water source as staffing permits.
11	3.2.1.1.D	Complete analysis for length of time prior to depletion of the RWST and determine whether additional boration equipment is needed for Phase 3 coping strategy.	Started. The RWST volume of 450,000 gallons with maximum output of 470 gpm will last ~14 hours once this flow is initiated. The 470 gpm flow rate will not be initiated at the beginning of the event. The RCS inventory and Boration of 40 gpm will not be required for ~ 20 hours. The 130 gpm required for SFP make-up will not be required for ~ 12 hours. The SG make-up of 300 gpm should not be required. The site has 2 RWSTs that can be used for FLEX on either unit. A boration skid will be requested from the RRC.
12	3.2.1.2.B	Reactor Coolant Pump (RCP)	Started

		Seal Leakage - In some plant designs, the cold legs could experience temperatures as high as 580°F before cooldown commences. This is beyond the qualification temperature (550°F) of the 0-rings used in the RCP seals. For those Westinghouse designs, a discussion should be provided to justify that (1) the integrity of the associated 0-rings will be maintained at the temperature conditions experienced during the ELAP event, and (2) the seal leakage rate of 21 gpm/seal used in the ELAP is adequate and acceptable.	
13	3.2.1.2.E	RCP Seal Leakage Rates - The licensee is requested to provide the manufacturer and model number of the RCP seals and discuss whether or not the RCP and seal combination complies with a seal leakage model described in WCAP-17601.	Complete - The Byron RCPs are model 93A. This aligns with the seal leakage model listed in WCAP 17601-P analysis as shown in Table 5.3.1.7-1
14	3.2.1.3.A	Decay Heat- Verify that the Integrated Plan update provides the details of the WCAP 17601-P methodology to include the values of certain key parameters used to determine the decay heat levels. Address the adequacy of the values used.	Started - From the WCAP-17601-P page 4-13 and the NEI 12-06 section 3.2.1.2 the methodology of decay heat values of ANS 5.1-1979+2 sigma is being evaluated to ensure it bounds the NEI 12-06 3.2.1.2 assumption of 100 days at 100% power.
15	3.2.1.4.A	Initial Values for Key Plant Parameters and Assumptions- Confirm WCAP-17601-P analyses are bounding for Byron for strategy response or verify plant-specific analyses if more restrictive limits are used due to more restrictive plant specific	Started – The WCAP-17601-P will be evaluated to ensure that it is bounding for Byron.

		limits.	
16	3.2.1.4.B	Initial Values for Key Plant Parameters and Assumptions- Confirm calculations to validate 8 hours run time limit on DDAF pump batteries and DDAF room temp for pump operation and human occupancy. Also, confirm site phase 2 staffing study confirms the required time can be met for refilling diesel day tank.	Started – The Phase 2 staffing study, scheduled for April 2014, results will be provided in a future six (6) month update. Calculations for AF Battery run time are in progress and will be provided in a future six (6) month update. Room temperatures will be controlled under the tool box approach limiting the impact of high temperatures with methods such as supplemental cooling, personnel rotation and/or availability of fluids.
17	3.2.1.5.A	Monitoring Instruments and Control- Confirm additional parameters evaluated for use in plant procedures/guidance or to indicate imminent or actual core damage.	Started - The required instrumentation listed in the Byron Station OIP is consistent with NEI 12-06. The RWST level channel LT-931 has been identified as a required instrument for the FLEX strategy. In addition, Core Exit Thermocouple (CETC) temperature TI-IT002, Reactor Vessel Level indicating System (RVLIS) LI-RC020, and Post Accident Neutron monitor NI-NR006 A/B will be re-energized, as staffing permits.
18	3.2.1.6.A	Sequence of Events - Confirm that the final timeline has been time validated after detailed designs are completed and procedures are developed. The results may be provided in a future six (6) month update.	Started - The final time line will be validated after the detailed design is completed and will be provided in a future six (6) month update.
19	3.2.1.6.B	Sequence of Events - Confirm analysis to validate Phase 2 pump capacities.	Started - Analysis for the Phase 2 pump capacity is in progress and will be provided in a future six (6) month update.
20	3.2.1.9.A	Use of portable pumps - Confirm final design of strategies meets "use of portable pumps"	Started - The current design of our FLEX strategies utilizing the procedures being written, BCA 0.0

		guideline in NEI 12-06 Section 3.2.2 Guideline 13.	along with the BFSG Series will ensure that the plant operators will have the guidance and direction to adequately cooldown and depressurize the plant to allow the cooling flows from our specified Phase 2 equipment and will meet the requirements of NEI 12-06 section 3.2.2 guideline 13.
21	3.2.2.A	SFP cooling -Verify procedure for SFP makeup via gravity drain; confirm verification of timeline for performing the strategy; and confirm evaluation of SFP area for steam and condensation affects.	Started -The Spent fuel pool make-up via gravity drain from the RWST is not being developed. The final time line will be validated after the detailed design is completed and will be provided in a future six (6) month update. The SFP environment has the potential to communicate with the Auxiliary Building via the FHB supply ducting, because the FHB Supply dampers fail open on a loss of AC. It is reasonable to assume this flow path will be isolated by fire damper 0VA413Y. The fire damper will close when its fusible linkmelts shortly after reaching a set point of 165F. Due to this damper arrangement and lack of motive force, minimal FHB atmosphere should be dispersed in to the AB A Spent Fuel Pool Vent path will be provided by opening the SFP track way roll-up door. The site does have manual actions within the spent fuel pool building to setup pool make-up temporary hoses. The site plans to perform these manual actions prior to the onset of SFP boiling. The actions will be directed by the FSGs being developed.
22	3.2.3.A	Containment - Confirm containment reanalysis supports	Started – Containment calculations are in progress and the results will

		no Phase 1, 2, and 3 mitigation strategies are required because containment pressure and temperature are maintained within acceptable limits.	be provided in a future six (6) month update.
23	3.2.3.B	Containment - Confirm evaluation performed for the need to monitor containment temperature.	Started – Containment calculations are in progress and the results will be provided in a future six (6) month update.
24	3.2.4.1.A	Equipment cooling - Confirm modification has been performed to prevent DDAF pump from overheating due to cooling water recirculation flow paths within the SX system cycling and overheating the pump within 1 hour.	Started – This modification is in detailed design phase and procedures are being drafted to align the flowpath within the required two (2) hours of the pump start.
25	3.2.4.2.A	Ventilation - Equipment Cooling - Review licensee's evaluation of loss of ventilation effects on equipment in various rooms (DDAF pump room, battery rooms, control room, miscellaneous electrical equipment rooms)	Started – Calculations are in progress for the various rooms listed. The results will be provided in a future six (6) month update.
26	3.2.4.2.B	A discussion is needed on the extreme high/low temperatures effects of the battery's capability to perform its function for the duration of the ELAP event and hydrogen gas ventilation during recharging batteries during Phase 2 and 3.	Started - Calculations are in progress and the results will be provided in a future six (6) month update.
27	3.2.4.3.A	Heat Tracing - Confirm that potential adverse impacts from a loss of heat tracing and normal heating on any equipment credited for ELAP mitigation are adequately addressed. In particular, ensure an RCS inventory and source of borated water is available for a BDBEE associated with extreme cold,	Started – The study of adverse effects of cold weather conditions on available RCS inventory sources will be performed and communicated in a future six (6) month update. Additionally, RRC boration equipment will be provided with a method to ensure availability of

		ice, and snow.	borated water.
28	3.2.4.4.A	Communications - Confirm that upgrades to the site's communications systems have been completed.	Started
29	3.2.4.6.A	Personnel Habitability - Review licensee's evaluation of loss of ventilation effects on personnel habitability and accessibility.	Complete - Habitability conditions within the MCR and other areas of the plant will be maintained with a tool box approach limiting the impact of high temperatures with methods such as supplemental cooling, personnel rotation and/or availability of fluids.
30	3.2.4.7.A	Water Sources - Justify the time at which SG dryout will occur.	Complete - Based on WCAP-17601-P Table 5.4.1.1-1 Case 2A S/G dryout would occur at 3,670 seconds, (61.16 minutes).
31	3.2.4.8.A	Electrical Power Sources / Isolation and interactions- confirm class 1E equipment is protected from faults in portable/FLEX equipment and multiple sources do not attempt to power electrical buses.	Started - Electrical isolation will be provided as part of the FLEX procedural guidance. For example; feed breakers 1425X and 2425X for 480V bus 132X and 232X will be opened prior to re-energizing these 480 volt buses with the FLEX Generator.
32	3.2.4.9.A	Portable Equipment Fuel - Confirm that complete analysis of fuel usage requirements has been developed after the specific FLEX equipment is identified and the fuel usage is determined. A discussion is needed on maintaining the quality of fuel stored in the tanks for extended periods of time.	Started - The Unit 1 and Unit 2 "B" tanks contain 100,000 gallons of fuel. It is reasonable to assume the site fuel supply will last until roads can be reopened and local tanks can replenish the supply. The site has an additional 100,000 gallons contained in the "A" train tanks, but it is not available to the Diesel fuel oil transfer pumps without additional modifications. The site also has 125,000 gallons and 50,000 gallons storage tanks that are not robust and must be assumed unavailable, but would be used if available. The complete analysis of fuel usage requirements will be

			developed after the specific FLEX equipment is identified and fuel use is determined. Replacement fuel will be ordered with the same fuel quality standards of current fuel.
33	3.2.4.10.A	Load reduction to conserve dc power- Confirm sizing calculations for FLEX generators and details of load shedding.	Started – AC Power Diesel sizing calculations for the FLEX DG are being performed in the electrical modification package to reenergize the required AC Bus. DC Load shedding will be performed in accordance with BFSG-4, ELAP DC Load Shed/Management, being developed.

7 Potential Draft Safety Evaluation Impacts

There are no potential impacts to the Draft Safety Evaluation identified at this time.

8 References

The following references support the updates to the Overall Integrated Plan described in this enclosure.

1. Byron Station, Units 1 and 2, "Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)," dated February 28, 2013 (RS-13-018).
2. NRC Order Number EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," dated March 12, 2012.
3. NEI 12-06 Rev. 0, Diverse and Flexible Coping Strategies (FLEX) Implementation Guide, dated August 2012.
4. Byron Station's First Six Month Status Report for the Implementation of FLEX, dated August 28, 2013.
5. Byron Station, Units 1 and 2 – Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Order EA-12-049 (Mitigating Strategies) (TAC NOS. MF0893 AND MF0894), dated December 17, 2013.

9 Attachments

1A Sequence of Events Timeline

3 Updated Mechanical One Line Diagrams

Attachment 1A

Sequence of Events Timeline

Action item	Elapsed Time	Action	Time Constraint Y/N [1]	Remarks / Applicability
The times to complete actions in the Events Timeline are based on operating judgment, the conceptual designs, and the current supporting analyses. The final timeline will be time validated once detailed designs are completed, procedures are developed, and the results will be provided in a future six (6) month update.				
1	0	Event Starts, BDBEE occurs, Unit 1 and Unit 2 reactors automatically trip and all rods are inserted. Loss of off-site power (LOOP) affecting both units occurs	NA	Plant @100% power
2	1 min	Emergency Operating Procedures, (EOPs) and Station Black Out, (SBO), Procedures are entered.	NA	_BCA 0.0, Loss of All AC Power, action.
3	5-50 mins	Verify DDAF Pp is operating properly.	Y – 1 hour	_BCA 0.0, Loss of All AC Power, action. 1/2BFSG-2
4	5-15 mins	MCR closes C & D S/G PORVs to conserve inventory. The C& D S/G PORVs are still energized and would control in auto to maintain S/G Pressure.	Y – 15 mins	_BCA 0.0, Loss of All AC Power, action, As referenced in WCAP-17601-P and Operator judgment.
5	10-30 mins	Attempt starting Emergency D/G's	NA	_BCA 0.0, Loss of All AC Power, action.
6	30 mins	ELAP condition recognized and ELAP Procedures are entered.	NA	_BCA 0.0, Loss of All AC Power, attachment B for ELAP
7	30 mins to	Connect FLEX 480V AC generators to ESF bus _32X and verify they are supplying power to Div 2 - 125V DC	Y – 3.6	Reference: EC-EVAL # 391872

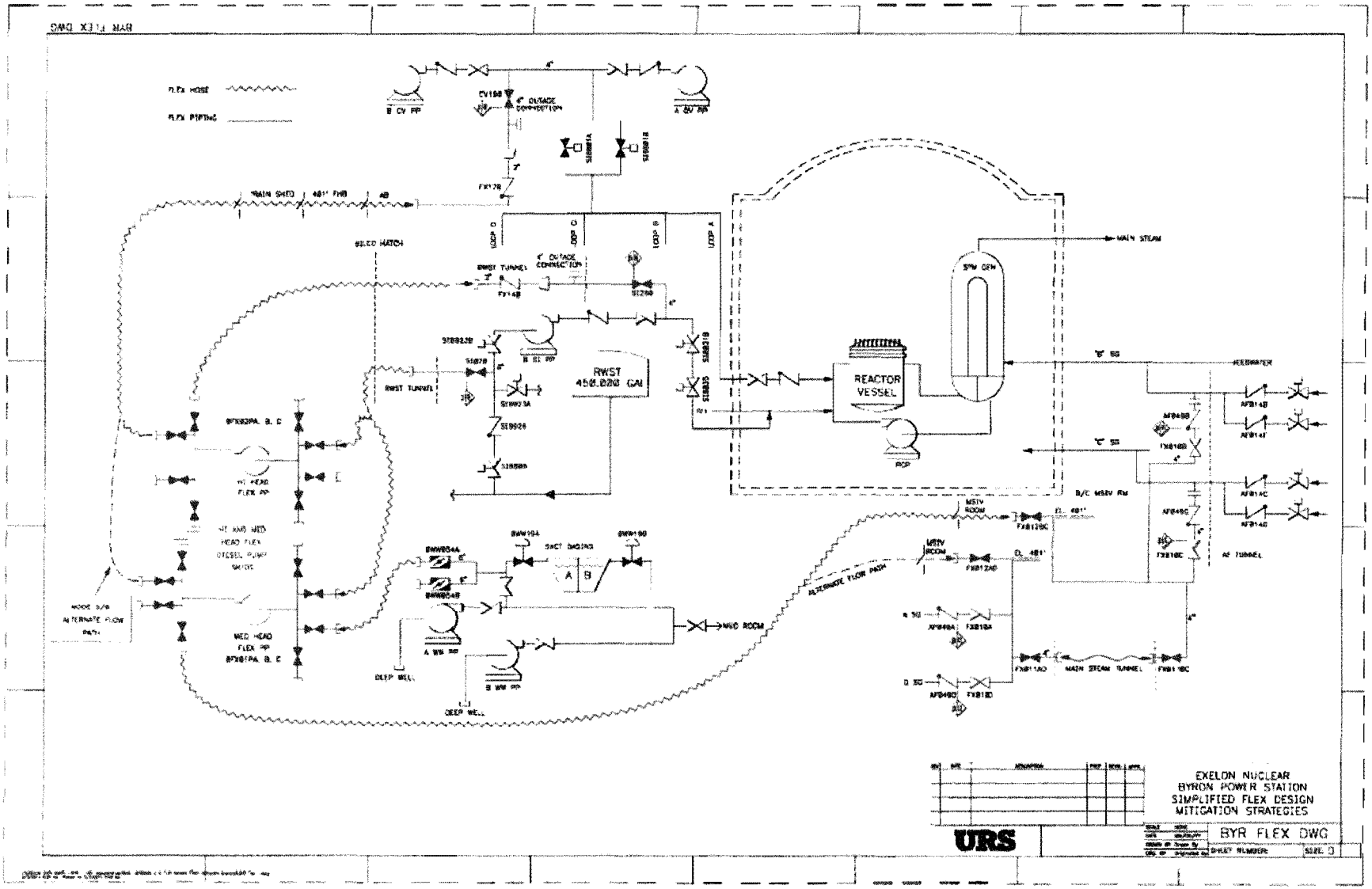
[1] Instructions: Provide justification if No or NA is selected in the remark column
If yes include technical basis discussion as requires by NEI 12-06 section 3.2.1.7

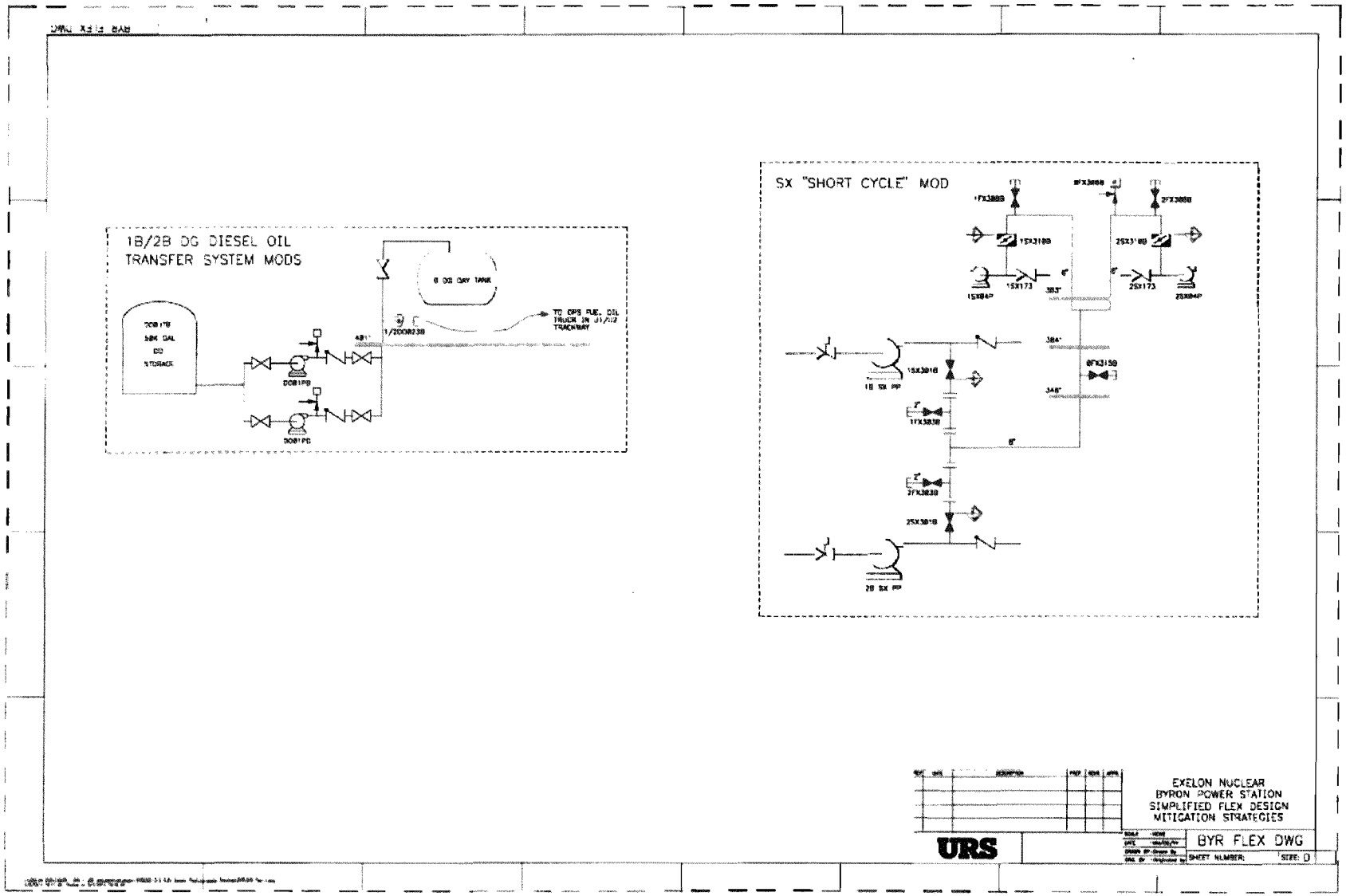
	3.6 hrs	battery chargers	hrs	Battery Coping Time For The 125V DC ESF Battery Banks, dated February 8, 2013
8	35- 75 mins	Operators dispatched to perform DC Bus Load Shed	Y – 3.6 hrs	Required by WCAP-17601-P and directed by 1/2BFSG-4
9	55 mins to 90 mins	SX Short Cycle Cooling EC is aligned to cool the B AF Pp within 1 hour after pump start.	Y -2 hour	_BCA 0.0, Loss of All AC Power, action & 1/2BFSG-2
10	1.5 hrs	Start depressurization of S/Gs to 300 psia at approximately 75°F/hr cooldown with SG PORV local/manual operation. SG feed is controlled with Local/Manual operation of AFW flow control valves.	Y - 2 hrs	_BCA 0.0, Loss of All AC Power, action. As referenced in WCAP-17601-P
11	2.25 hrs	SI Accumulator borated water begins to inject into the RCS	NA	Operator Judgment
12	4 hrs	Maintain RCS 300 psia /~420°F with SG PORV operation. WCAP-17601-P section 5.2.1 page 5-4 Maintain SG level.	N	Operator Judgment
13	4-6 hrs	Deploy all hoses and connections in FHB for Alternate strategies for SFP Fill and RCS Inventory make up via the B CV Pp discharge connections before FHB becomes uninhabitable from SFP Boiling	Y-6 hrs	Directed from 0BFSG-5 and 0BFSG-11
14	5 – 7 hrs	Isolate SI Accumulators	N	1/2BFSG -10
15	12 hrs	Initiate SFP Make up via 0A FC Purification pump as required for level and temperature control	NA	0BFSG-11
16	12 - 14 hrs	Connect Phase 2 med head FLEX Pumps and ensure they are available to supply make-up to the SG's.	NA	1/2BFSG-5
17	14 - 16 hrs	Hook up FLEX DG to restore power to a SX Tower 480 substation "Z" Bus for Deep Well Pump, (WW)	NA	0BFSG-5
18	16 - 18 hrs	Stage and connect Phase 2 high pressure FLEX Pumps and ensure they are available to supply borated make-up to the RCS.	NA	1/2BFSG-5
19	20-22 hrs	Establish Well Water as a makeup source of clean water	N/A	0BFSG-5

20	24 hrs	Regional Response Center (RRC) resources begin arriving on site.	NA	RRC Response Guide
21	24 - 72 hrs	Continue to maintain critical functions of Core Cooling (via DDAF), RSC Inventory Control (via FLEX pump injection to RCS) and SFP Cooling (via FLEX pump injection to SFP). Utilize initial RRC equipment and resources as a spare capacity.	NA	End of analytical simulation

Attachment 3

Updated Mechanical One Line Diagrams




1B/2B DG DIESEL OIL
TRANSFER SYSTEM MODS
SX "SHORT CYCLE" MOD
EXELON NUCLEAR
BYRON POWER STATION
SIMPLIFIED FLEX DESIGN
MITIGATION STRATEGIES
URS
BYR FLEX DWG