Exelon Generation.

Order No. EA-12-049

RS-14-206

August 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: Third 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. Exelon Generation Company, LLC 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), dated February 28, 2014 (RS-14-008)

8. 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. References 6 and 7 provided the first and second six-month status reports, respectively, pursuant to Section IV, Condition C.2, of Reference 1 for Byron Station. The purpose of this letter is to provide the third 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 8.

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 August 2014.

Respectfully submitted,

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

Enclosure:

1. Byron Station, Units 1 and 2 Third 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
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Illinois Emergency Management Agency - Division of Nuclear Safety

Enclosure

Byron Station, Units 1 and 2

Third 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

(47 pages)

Byron Station, Units 1 and 2

Third 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

The following milestone(s) have been completed since February 28, 2014 and are current as of July 31, 2014.

- 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 Strategic Alliance for FLEX Emergency Response National SAFER Response Center	Complete	
	Submit Six (6) month Updates		
Aug 2013	Update 1	Complete	
Feb 2014	Update 2	Complete	
Aug 2014	Update 3	Complete with	

			this submittal		
Feb 2015		Update 4	Not Started		
Aug 2015		Update 5	Not Started		
Unit 1	Unit 2	Modification Development		Unit 1	Unit 2
Aug 2014	Dec 2013	• Phase 1 modifications	Started	April 2015	Aug 2014
Aug 2014	Dec 2013	• Phase 2 modifications	Started	April 2015	Aug 2014
Aug 2014	Dec 2013	• Phase 3 modifications	Complete – modifications are not required		
Unit 1	Unit 2	Modification Implementation			
Sept 2015	Oct 2014	• Phase 1 modifications	Started		
Sept 2015	Oct 2014	• Phase 2 modifications	Started		
Sept 2015	Oct 2014	• Phase 3 modifications	Complete – modifications are not required		
		Procedure Development		Unit 1	Unit 2
Oct 2014		• Strategy procedures	Started	Sept 2015	
Apr 2014		• Validate Procedures (NEI 12-06, Sect. 11.4.3)	Started	Sept 2015	Sept 2014
Oct 2014		• Maintenance procedures	Started		
Jun 2014		Staffing analysis	Complete		
Oct 2014		Storage Plan and construction	Started		
Oct 2014		FLEX equipment acquisition	Started		
Oct 2014		Training completion	Started		
Aug 2014		National SAFER Response Center Operational	Started		
Sept 2015		Unit 1 Implementation date	Started		
Oct 2014		Unit 2 Implementation date	Started		

4 Changes to Compliance Method

Change 1

Section: General Integrated Plan Elements PWR – Key site assumptions to implement NEI 12-06 strategies.

Reason for Change: Site FLEX storage locations have been identified.

Change: The site storage building will consist of one robust building housing "N" FLEX equipment and a commercial building housing "+1" FLEX equipment. Both buildings will be located outside the protected area north of the main parking lot. In addition, the site strategy will have several strategic temporary hoses and electrical cables staged within robust structures in the plant.

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: Site calculations are being refined as parts of the FLEX strategy development.

Change:

1. Change RCS cool down setpoint to 260 psig based on calculation BYR99-010/BRW-99-0017-I, Documentation of the Basis of the Emergency Operating Procedures (EOP) Setpoints. (Ref.7)
2. Adjusted the timeline limit for DC load shed completion to 65 minutes based on calculation BYR14-060/BRW-14-0080-E, Unit 1(2) 125 VDC Battery FLEX Coping Calculation – Common Calc – Beyond Design Basis (Ref. 8).
3. Adjusted the timeline limit for restoration of division 2 125 volt DC charger AC power to be completed within 6 hours to ensure the 8-hour requirement is met based on calculation BYR14-060/BRW-14-0080-E, Unit 1(2) 125 VDC Battery FLEX Coping Calculation – Common Calc – Beyond Design Basis (Ref. 8).
4. Adjusted the timeline and timeline limit for deploying hoses in the fuel handling building to 6 - 10 hours and 10.94 hours respectively, based on BYR13-240/BRW-13-0222-M, Spent Fuel Pool Boil Off Analysis during an ELAP Event (Ref. 9).
5. Added an additional action to setup high pressure FLEX pump and hoses at 12 to 16 hours to ensure they are available to supply borated make-up to the RCS and inject prior to entering Reflux Cooling. Injection must take please within 17 hours of the event based on calculation BYR13-239/BRW-13-0221-M, RCS Boration Analysis during an ELAP Event (Ref. 10) and Dave Flahive letter, (Ref. 24).
6. Added an additional activity in the time line to repower a UHS 480v Substation to establish make up before 17 hours to the UHS, based on the calculation BYR14-119 UHS Volume Analysis during an ELAP Event (Ref. 23).
7. Adjusted the timeline for the activity of staging and connecting the med head flex pump to allow for hose deployment time

8. Updated the timeline for the name change of the National SAFER Response Center.
9. Added an additional activity in the time line to Set up and Establish ventilation in the AEER and the MCR within 5.15 hours, based on calculation BYR13-236/BRW-13-218-M Control Room and Auxiliary Electric Equipment Room heat up and Ventilation during an ELAP, dated June 2014 DRAFT, (Ref.15).
10. Added additional information to Timeline for the Phase 2 High Head Pump to establish makeup prior to entering reflux cooling, based on WCAP 17601-P and Westinghouse Letter LTR-FSE-14-61 Rev.0-A dated July 17, 2014 (Ref.24)

Change 3

Section: General Integrated Plan Elements PWR – Identify how strategies will be deployed in all modes

Reason for Change: Site FLEX storage locations and deployment routes have been identified.

Change: The deployment paths from the FLEX storage building to the FLEX equipment staging area have been identified. At least two deployment routes are available to most staging areas providing travel options in the event one path becomes unavailable as a result of the BDBEE. In areas where only one deployment path is available, consideration has been given for debris removal as part of the FLEX deployment strategy.

Change 4

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

Reason for Change: Calculation BYR99-010/BRW-99-0017-I, Documentation of the Basis of the Emergency Operating Procedures (EOP) Setpoints (Ref. 7), has determined the SG pressure at which the RCS cool down will stop to prevent safety injection accumulator nitrogen addition into the RCS.

Change: Change second paragraph to the following:

Within 90 minutes, operators will commence cooling down the plant at approximately 75°F/hr to a steam generator (SG) pressure of 260 psig. RCS temperature will stabilize between 420°F and 410°F at this SG pressure. SG pressure of 260 psig corresponds to RCS pressure necessary to inject a majority of the borated water in the SI accumulators. This will ensure RCS pressure is above the minimum pressure to preclude injection of accumulator nitrogen into the RCS.

Change 5

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

Reason for Change: Gap 3 pipe routing has changed as part of the standardized modification design process.

Change: 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 2 “B” SX pump discharge lines on the 330’ elevation in the auxiliary building (AB). These tees will be connected by a header and routed vertically through the AB to the 364’ elevation. On the 364’ elevation this line will tee into two separate lines and be routed vertically into the DDAF pump rooms. In the DDAF pump rooms, it will be connected via a tee to the 1/2 B DDAF pump SX booster pump suction. This new line will be isolated during normal operation. In the event of an ELAP, this new line will be unisolated and the normal SX cooling supply to the DDAF pump SX booster pump will be isolated.

Change 6

Section: Maintain Core Cooling & Heat Removal – PWR Portable Equipment Phase 1, 2 and 3 - Key Reactor parameters, Maintain RCS Inventory Control - PWR Portable Equipment Phase 1, 2 and 3 - Key Reactor parameters, Maintain Spent Fuel Pool Cooling – PWR Portable Equipment Phase 1, 2 and 3 - Key SFP parameters, and Safety Support Function – PWR Portable Equipment Phase 1, 2 and 3 - Key Parameters.

Reason for Change: All the key parameters supporting FLEX Strategy have been determined.

Change: All key parameters are listed in Attachment A of this document.

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 FLEX equipment deployment strategy has been refined.

Change: (replace section with the following).

The “N” FLEX equipment will be stored in one robust building and the “+1” FLEX equipment will be stored in a commercial building. The robust and commercial buildings will be located adjacent to each other outside the protected area, North of the main parking lot. Primary and alternate deployment routes for FLEX equipment have been identified and are being recorded within the site program document.

- The site maximum flood water level is at elevation 870.9 feet resulting from a probable maximum precipitation (PMP) event. Byron plant grade elevation is at 869.0 feet and does not vary significantly across the site. The FLEX storage building floor will be constructed above the flood level to an elevation of 872 feet. A majority of the travel path elevations are between elevation 869 feet and 870 feet (Ref. 11). Some travel path locations may be covered by a small amount of water. Since the FLEX pumps and generators are trailer mounted, they should be maintained available when being deployed to different locations at the site.

- Debris removal impacts of the travel routes have been evaluated. The primary or alternate travel route will be utilized in the event one path becomes unavailable due to debris. In addition, the site has purchased an F-750 with a snow plow to assist in debris removal.
- Extreme hot and cold temperatures should have little impact on the site travel paths. Snow removal will be addressed as part of the site snow removal plan. Post event snow removal will be accomplished with a snowplow equipped FLEX truck.

Change 8

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

Reason for Change: The FLEX equipment storage building build is in progress.

Change: The FLEX storage buildings will consist of one robust building housing "N" FLEX equipment and one commercial building housing the "+1" FLEX equipment.

Change 9

Section: Maintain Containment – PWR Installed Equipment Phase 1

Reason for Change: Calculation BYR13-235/BRW-13-0217-M, Containment Pressure and Temperature Response during an ELAP Event (Ref. 12), and BYR99-010/BRW-99-0017-I, Documentation of the Basis of the Emergency Operating Procedures (EOP) Setpoints (Ref. 7), results.

Change: Update this section with the following:

There are no Phase 1 actions required.

Calculation BYR13-235/BRW-13-0217-M, Containment Pressure and Temperature Response during an ELAP Event (Ref. 12) shows it will take > 30 days for containment pressure to exceed 54.7 psia and 13.7 days for the containment temperature to exceed 200°F. The 54.7 psia and 200°F values are FSG setpoint limits.

The data also shows it would take > 30 days for the containment pressure to exceed 64.7 psia and > 30 days for the containment temperature to exceed 280°F. The 64.7 psia and 280°F values are design basis limits.

Change 10

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

Reason for Change: Calculation BYR13-240/BRW-13-0222-M, Spent Fuel Pool Boil Off Analysis during an ELAP Event (Ref. 9), results and elimination of the need to route the alternate high pressure injection path hose within the FHB.

Change: Update this section with the following:

The worst case SFP Heat Load during non-outage conditions is 32.5 Mbtu/hr. Loss of SFP cooling with this heat load results in a time to boil of 10.94 hours and 90.98 hours to the top of active fuel. 1/2BCA 0.0, Loss of All AC, directs spent fuel pool make-up at 420' elevations which will occur 24.8 hours into the event. The equipment line-up for initiating SFP make-up needs to be completed prior to the SFP Boil time of 10.94 hours into the event to ensure adequate cooling of the spent fuel is maintained.

The worst case SFP heat load during an outage is 62.9 Mbtu/hr. Loss of SFP cooling with this heat load results in a time to boil of 2.72 hours and 43.96 hours to the top of active fuel. With the entire core being located in the SFP, manpower resources normally allocated to aligning core cooling along with the Operations outage shift manpower can be allocated to aligning SFP make-up.1/2 BCA 0.0, Loss of All AC, directs spent fuel pool make-up at 420' elevations which will occur 9.8 hours into the event. Therefore, completing the equipment line-up for initiating SFP make-up 9.8 hours into the event ensures adequate cooling of the spent fuel is maintained.

A Spent Fuel Pool vent path will be provided by opening the Fuel Handling building trackway roll-up door. The site has manual actions within the Fuel Handling building, which include aligning the alternate SFP make-up flow path. The site plans to perform these manual actions prior to the onset of SFP boiling. The actions will be directed by 0BFSG-5, Initial Assessment and FLEX Equipment Strategy.

Change 11

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

Reason for Change: Elimination of the need to route the alternate high pressure injection path hose within the FHB

Change: (Delete this paragraph)

A Spent Fuel Pool Vent path will be provided by opening the FHB trackway roll-up door. The site does have manual actions within the spent fuel pool building to setup pool make-up temporary hoses and the 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.

(Add this paragraph)

A Spent Fuel Pool vent path will be provided by opening the Fuel Handling building trackway roll-up door. The site has manual actions within the Fuel Handling building to align the alternate SFP make-up flow path. The site plans to perform these manual actions prior to the onset of SFP boiling. The actions will be directed by 0BFSG-5, Initial Assessment and FLEX Equipment Strategy.

Change 12

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

Reason for Change: Site strategy can be successfully implemented without the FLEX hoses stored in the fuel handling building (FHB).

Change: Delete this sentence.

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.

Change 13

Section: Safety Function Support – PWR Portable Equipment Phase 1

Reason for Change: Calculation BYR14-060/BRW-14-0080-E results

Change: (replace section with the following):

DC power is required to maintain control of ESF equipment and vital instrumentation. Battery chargers are de-energized during a BDBEE leading to loss of DC and associated functions.

The 125VDC battery coping time is approximately 8 hours with load shedding. The load shedding needs to occur within 65 minutes of the event. Load shedding guidance is provided in 1/2BFSG-4, ELAP DC Bus Load Shed/Management.

Change 14

Section: Safety Function Support – PWR Portable Equipment Phase 2

Reason for Change: Calculation results and elimination of the need to route the alternate high pressure injection path hose within the FHB.

Change: Update this 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, MCC's 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 has manual actions within the Fuel Handling Building, which include aligning the alternate SFP make-up flow path. The site plans to perform these manual actions prior to the onset of SFP boiling. The actions will be directed by 0BFSG-5, Initial Assessment and FLEX Equipment Strategy.

Room temperatures for component with a direct FLEX function are being evaluated to ensure critical component survivability. The following calculations summarize the results:

- Calculation BYR13-234/BRW-13-0216-M, Auxiliary FW Pump Room Temperature Analysis during and ELAP Event (Ref. 13), shows room temperature is maintained within acceptable limits and supplemental room cooling is not required. Procedure guidance for setup of alternate cooling was developed to provide additional options to the operators and is controlled by 0BFSG-5, Initial Assessment of FLEX Equipment.
- Calculation BYR13-237/BRW-13-0219-M, MEER and Battery Room Conditions Flowing ELAP (Ref. 14), shows room doors must be opened when the battery charge is started and forced ventilation is required within 8 hours. 0BFSG-5, Initial Assessment of FLEX Equipment, provides operators with the necessary guidance to establish alternate ventilation.
- Calculation BYR13-236/BRW-13-0218-M, Control Room and Auxiliary Electric Equipment Room heat up and Ventilation during an ELAP (Ref. 15), shows the Unit 2 auxiliary electric room portion of the MRC boundary reaching temperature limits first within approximately 5.15 hours. 0BFSG-51, Alternate Control Room Ventilation, provides operators with the necessary guidance to establish alternate ventilation.

Additionally, a backup water source for core cooling and inventory make-up will be established with a portable FLEX DG feeding one of two SX Tower 480v substations and the local powering of a station deep well pump. The discharge of the deep well pump can be directed into the SX basin or be fed through temporary hoses from the UHS north valve house to the suction of the FLEX pumps.

Change 15

Section: Modification Safety Function Support – PWR Portable Equipment Phase 2 – Identify Modifications.

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

Change: The following modifications will be installed to support the FLEX generator for repowering Division II of station DC batteries:

The primary FLEX connection uses a Bus Connection Device, BCD, installed in a cubicle of BUS 132X and 232X.
The BCD will have the line side connections extending through the breaker frame to standard TPC FLEX electrical connections. Temporary cables will be routed from the TPC connections to the associated units FLEX generator at the 401' turbine building trackway entrance. The BCD and cables will be stored within the associated 4Kv switchgear room to improve operator response time. Once the BUS is energized, appropriate breakers will be closed to provide power to the safety related batteries.

The alternate strategy utilizes the existing site DC crosstie. In the event either unit primary FLEX strategy is unable to be implemented, DC busses 112 and 212 will be crosstied to provide power to the site B train safety related batteries. Critical 480v electrical loads will be powered from the AB TPU to the affected MCCs as called out in 1/2BFSG-5 attachment D. The power will be via deployable extension cords from the TPU to predesigned MCC buckets modified with a new feed breaker and fitted with a short pigtail type connector allowing back feeding of the MCC.

Change 16

Section: PWR Portable Equipment Phase 3

Reason for Change: The phase 3 equipment being supplied by the National SAFER Response Center as part of the site response plan has been refined.

Change: Phase 3 equipment is listed in Attachment B of this document.

Change 17

Section: Phase 3 Response Equipment/Commodities

Reason for Change: The phase 3 equipment/commodities being supplied by the National SAFER Response Center as part of the site response plan has been refined.

Change: The National SAFER Response Center will not be providing radiation protection equipment or commodities. These will be requested from other sites or utilities. Additionally, the heavy equipment section has been deleted.

Change 18

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

Reason for Change: Site calculations are being refined as part of the FLEX strategy development.

Change:

1. Change RCS cool down setpoint to 260 psig based on calculation BYR99-010/BRW-99-0017-I, Documentation of the Basis of the Emergency Operating Procedures (EOP) Setpoints (Ref. 7).
2. Adjusted the timeline limit for DC load shed completion to 65 minutes based on calculation BYR14-060/BRW-14-0080-E, Unit 1(2) 125 VDC Battery FLEX Coping Calculation – Common Calc – Beyond Design Basis (Ref. 8).
3. Adjusted the timeline limit for restoration of division 2 125 volt DC charger AC power to be completed within 6 hours to ensure the 8-hour requirement is met based on calculation BYR14-060/BRW-14-0080-E, Unit 1(2) 125 VDC Battery FLEX Coping Calculation – Common Calc – Beyond Design Basis (Ref. 8).
4. Adjusted the timeline and timeline limit for deploying hoses in the fuel handling building to 6 - 10 hours and 10.94 hours respectively, based on BYR13-240/BRW-13-0222-M, Spent Fuel Pool Boil Off Analysis during an ELAP Event (Ref. 9).
5. Added an additional action to setup high pressure FLEX pump and hoses at 12 to 16 hours to ensure they are available to supply borated make-up to the RCS and inject prior to entering Reflux Cooling. Injection must take please within 17 hours of the event based on calculation BYR13-239/BRW-13-0221-M, RCS Boration Analysis during an ELAP Event (Ref. 10) and Dave Flahive letter, (Ref. 24).
6. Changed the B DDAF pump overheating time due to SX cooling from 1 hour to 2 hours based on calculation BYR13-026/BRW-13-0031-M, Transient Analysis of SX System Following Loss of A-C Power (Ref. 16).

7. Adjusted the timeline for the activity of staging and connecting the med head flex pump to allow for hose deployment time.
8. Added an additional activity in the time line to set up and establish ventilation in the AEER and the MCR within 5.15 hours, based on calculation BYR13-236/BRW-13-218-M, Control Room and Auxiliary Electric Equipment Room heat up and Ventilation during an ELAP (Ref.15).
9. Added additional information to timeline for the Phase 2 high head pump to establish makeup prior to entering reflux cooling, based on WCAP 17601-P and Westinghouse Letter LTR-FSE-14-61 (Ref.24).
10. Adjusted the timeline for setting up the medium pressure FLEX pump to 16 – 20 hours based on operator judgment.
11. Adjusted the timeline for initiation of SFP Make up via 0A FC Purification pump to 24 hours based on calculation BYR13-240/BRW-13-0222-M, Spent Fuel Pool Boil Off Analysis during an ELAP Event (Ref. 9).
12. Added an additional activity in the time line to repower a UHS 480v Substation to establish make up before 17 hours to the UHS, based on the calculation BYR14-119 UHS Volume Analysis during an ELAP Event (Ref. 23).

Updated timeline is in Attachment 1A of this document

Change 19

Section: Attachment 3 Conceptual Sketches

Reason for Change: Updated sketches as a result of refining the site strategy.

Change: Updated sketches are in Attachment 3 of this document.

Change 20

Section: Maintain Core Cooling and 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 Function Support – PWR Portable Equipment Phase 3.

Reason for Change: Updated phase 3 equipment use as a result of refining the site strategy.

Change: (replace section with the following):

Phase 3 equipment for this site includes a water purification skid, a boration skid, portable pumps, generators, diesel fuel handling equipment, cables, hoses and lighting equipment. The portable pumps will be capable of providing the necessary flow and pressure as outlines 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. The water purification skid will treat the site make up water used in core cooling. The boration skid will provide long term boration source for additional RCS inventory. The Phase 3 equipment will also provide operations and the ERO flexibility in addressing other issues created by the BDBEE.

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.4)	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 - The FLEX storage buildings will consist of one robust building housing "N" FLEX equipment and one commercial building housing the "+1" FLEX equipment. The robust and commercial buildings will be located adjacent to each other outside the protected area, north of the main parking lot. Primary and alternate deployment routes for FLEX equipment have been identified and are being recorded within the site program document Snow removal will be addressed as part of the site snow removal plan. Post event snow removal will be accomplished with a snowplow equipped FLEX truck. The site maximum flood water level is at elevation 870.9 feet resulting from a probable maximum precipitation (PMP) event. Byron plant grade elevation is at 869.0 feet and does not vary significantly

		across the site. The FLEX storage building floor will be constructed above the flood level to an elevation of 872 feet. A majority of the travel path elevations are between elevation 869 feet and 870 feet (Ref. 11). Some travel path locations may be covered by a small amount of water. Since the FLEX pumps and generators are trailer mounted, they should be maintained available when being deployed to different locations at the site. Debris removal impacts of the travel routes have been evaluated. The primary or alternate travel route will be utilized in the event one path becomes unavailable due to debris. In addition, the site has purchased an F-750 with a snow plow to assist in debris removal. Extreme hot and cold temperatures should have little impact on the site travel paths. Liquefaction evaluation of the travel routes has been drafted. Conditions do not exist at Byron for soil liquefaction during a severe seismic event and equipment deployment will not be impeded.
Sequence of events (p.5)	The final timeline will be time validated once detailed designs are completed and procedures are developed.	Started
Identify how strategies will be deployed (p.7)	Identification of storage area and creation of the administrative program.	Started - The robust and commercial buildings will be located adjacent to each other

		outside the protected area, north of the main parking lot. Site program document draft has been developed.
Programmatic controls (p.8)	Develop an administrative program for FLEX responsibilities, and testing & maintenance.	Started - Site program document draft has been developed. Testing and maintenance procedures will be developed based on the EPRI FLEX equipment templates.
National SAFER Response Center plan (p.9)	Development of Byron Station's response plan.	Started - Byron Station draft site response plan (playbook) has been developed.
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.	Complete - All key parameters have been identified and placed in attachment A.
Deployment Conceptual Design (p. multiple)	Develop the storage structure conceptual design.	Complete - The FLEX storage buildings will consist of one robust building housing "N" FLEX equipment and one commercial building housing the "+1" FLEX equipment. The robust building will be a 140 feet x 60 feet. The commercial building will be a 60 feet x 60 feet. Detailed building designs have been issued and construction is in progress.
Maintain RCS Inventory Control, Phase 2 (p.23)	A calculation will be required for the timing of the boration and quantity required.	Started - Calculation BYR13-239/BRW-13-0221-M (Ref. 10) identifies the timing and quantity of boration required. Specifically, boration will need to start prior to 17.6 hours into the event and require 15,240 gallons of water injected at 40 gallons per minute.
Maintain Containment,	Additional calculations will be	Started - Calculation BYR13-

Phase 1 (p.31)	performed to evaluate containment response.	235/BRW-13-0217-M (Ref. 12) and BYR14-046/BRW-14-0058 (Ref. 17) evaluate containment response in all modes. Containment pressure and temperature will reach the FSG set point limits in >30 days and 13.7 days respectively. In addition, containment pressure and temperature will reach design basis pressure and temperature limits in > 30 days.
Maintain Spent Fuel Pool Cooling, Phase 1 (p.39)	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 of Reference 1. 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. This method is outlined in 0BFSG-11, Alternate SFP Makeup and Cooling.
Maintain Spent Fuel Pool Cooling, Phase 1 (p.39)	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 - Calculation BYR13-240/BRW-13-0222-M (Ref. 9) determined the spent fuel pool timeline. With both units at power, time to boil = 10.94 hours and time to TAF = 90.98 hours. EP procedure set point for requiring makeup is SFP

		elevation of 420 foot, which should be reached in approximately 24 hours. With one unit in a refueling outage, time to boil = 2.72 hours and time to TAF = 43.96 hours.
Maintain Spent Fuel Pool Cooling, Phase 1, (p.39 and p.42)	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 (SFP) vent path will be provided by opening the Fuel Handling (FH) building trackway roll-up door per 0BFSG-11, Alternate SFP Makeup and Cooling. The site plans to perform required manual actions within the FH building prior to the onset of SFP boiling determined by calculation BYR13-240/BRW-13-0222-M (Ref. 9). A formal evaluation of the spent fuel pool area for steam and condensation will not be performed.
Safety Functions Support, Phase 2 (p.51)	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. 0BFSG-51, Alternate MCR Ventilation, provides the necessary guidance to establish alternate ventilation within the main control room.
Safety Functions Support, Phase 2 (p.51)	Critical ventilation assets may be required to support DDAF pumps, station battery rooms, miscellaneous electric equipment rooms, and fuel	Started - Habitability conditions within the Plant will be maintained with a tool box approach limiting the impact of

	handling building personnel habitability and/or component survivability. Specific analyses of these rooms will be performed.	high temperatures with methods such as supplemental cooling, personnel rotation and/or availability of fluids. Component survivability is being evaluated with the following calculations: • Calculation BYR13-234/BRW-13-0216-M, Auxiliary FW Pump Room Temperature Analysis during and ELAP Event, (Ref. 13), shows room temperature is maintained within acceptable limits and supplemental room cooling is not required. Procedure guidance for setup of alternate cooling was developed to provide additional options to the operators and is controlled by 0BFSG-5, Initial Assessment of FLEX Equipment. • Calculation BYR13-237/BRW-13-0219-M, MEER and Battery Room Conditions Flowing ELAP, (Ref. 14) shows room doors must be opened when the battery charge is started and forced ventilation is required within 8 hours. 1/2BFSG-5 / 0BFSG-5, Initial Assessment of FLEX Equipment, provides operators with the necessary guidance to establish alternate ventilation. • Calculation BYR13-236/BRW-13-0218-M,

		Control Room and Auxiliary Electric Equipment Room heat up and Ventilation during an ELAP (Ref. 15), shows the Unit 2 auxiliary electric room portion of the MCR boundary reaching temperature limits first within approximately 5.15 hours. 0BFSG-51, Alternate Control Room Ventilation, provides operators with the necessary guidance to establish alternate ventilation.

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. Reference 10 demonstrates that the Flexible and Diverse Coping Strategies (FLEX) RCS make-up

			pump will be deployed and capable of injecting into the RCS prior to the time when injection is required including the appropriate time margin to ensure adequate sub-criticality for both the maximum seal leakage and no seal leakage scenarios. The analyses and evaluations supporting the OIP demonstrate that the FLEX RCS make-up pump will be aligned 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. Therefore, the boron mixing criteria are met. The current site timeline shows the High pressure FLEX pump will be available for RCS boration within 12 – 16 hours of the event initiation which meets the timing requirements outlined in Reference 22.
	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.	Complete - The site FLEX equipment storage structure design is complete and complies with the requirements of 12-06, Sections 5.3.1, 7.3.1, and 8.3.1 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	Started - 1/2 BFSG-7, Loss of Vital

		(Seismic) –Confirm procedure for measuring key instruments at containment penetrations using portable instrument.	Instrumentation or Control Power draft has been developed. It provides guidance for alternate methods to measure key instruments at appropriate locations within the plant.
4	3.1.1.4.A	Off-Site Resources – Confirm National SAFER Response Center local staging area and method of transportation to the site in future 6-month update	Complete - Site primary staging area (Area C) location is the Whiteside County Airport. The Alternate staging area (Area D) location is DeKalb Sycamore Airport. Primary and alternate transportation routes have been identified between these locations and Byron Station. These routes are detailed within the sites National SAFER Response Center response plan (playbook). The main transportation method will be by a heavy haul vehicle utilizing any available transportation route. If an accessible transportation route cannot be identified, helicopter transportation will be utilized.
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 maximum building temperature will be controlled by forced ventilation. Temperature information from Byron's UFSAR indicates the site extreme high temperature is a maximum of 102°F. The FLEX low pressure pump was designed to be able to operate with an outside air temperature of 176°F. The FLEX medium head and high head pump purchase specification requires a maximum operating air temperature of 110°F. The FLEX Generator purchase

			specification requires a maximum operating air temperature of 122°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 - FLEX equipment is being purchased with appropriate temperature specifications to ensure it will function in the extreme temperature conditions applicable to the site. Temperature information from Byron's UFSAR indicates the site extreme high temperature is a maximum of 102°F. The FLEX low pressure pump was designed to be able to operate with an outside air temperature of 176°F. The FLEX medium head and high head pump purchase specification requires a maximum operating air temperature of 110°F. The FLEX Generator purchase specification requires a maximum operating air temperature of 122°F. FLEX equipment primary staging locations are located outside of buildings and therefore require no additional cooling.
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 primary conditions considered are based on the Westinghouse reference coping cases described in section 5.2.1 of WCAP-17601-P (Ref. 18). The extended loss of alternating current (AC) power (ELAP) simulation parameters matrix provided in Westinghouse correspondence LTR-FSE-14-43 (Ref. 22) outlines the comparison of items for Byron Station.
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	Started – Exelon has used generic ELAP analysis performed in WCAP 17601-P (Ref. 18) with the NOTRUMP computer code to

		includes specifying an acceptable definition for reflux condensation cooling.	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. The analyses and evaluations supporting the OIP demonstrate that the Flexible and Diverse Coping Strategies (FLEX) reactor coolant system (RCS) make-up pump will be aligned prior to the loop flow rate decreasing below the loop flow rate corresponding to the definition of the onset of reflux cooling. Calculation BYR13-239/BRW-13-0221-M (Ref. 10) demonstrates that the RCS FLEX pump will be deployed and capable of injecting into the RCS prior to the time when injection is required including the appropriate time margin to ensure adequate sub-criticality for both the maximum seal leakage and no seal leakage scenarios. Site timeline shows that the high pressure FLEX pumps are available between 12 and 16 hours following the beyond-design-basis external event (BDBEE) which meets the timing requirements to allow for the necessary Boron mixing.
9	3.2.1.1.B	ELAP Analysis - Confirm calculations to verify no nitrogen injection into RCS during depressurization.	Started - Calculation BYR99-010/BRW-99-0017-I (Ref. 7) determined the minimum steam generator (SG) pressure to preclude a significant amount of nitrogen from being injected into the RCS from the accumulator is 160 psig. This value was increased to 260 psig by adding an additional 100 psi margin, as recommended by the Westinghouse Owners Group Emergent Procedure

			background document. 1/2BCA 0.0 provides direction to stop the RCS depressurization at a SG pressure of 260 psig and isolate the safety injection accumulators.
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)	Started - Procedural guidance has been developed which follows the industry approach of prioritizing the cleanest to dirtiest water sources. The first choice of secondary makeup with the DD AF Pp is the Condensate Storage Tank (CST). If the CST is not available, then by design, the suction will be swapped to the UHS. At about the 10 the hour mark post event UHS makeup from Well Water, (WW), powered by a FLEX DG will be used. The National SAFER Response Center will deliver a water purification skid within 24 hours. This skid will be installed upon arrival and used to condition the S/G cooling water indefinitely. A quantitative analysis, to ensure this strategy is successful, is planned.
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 Site water source for RCS boration and inventory is the two (2) robust RWST's. The usable volume of 315,000 gallons per RWST should last greater than 7 days with both units in mode 1-4. An RWST usage calculation is in progress to determine the need and timing of additional Phase 3 boration equipment.
12	3.2.1.2.B	Reactor Coolant Pump (RCP) Seal Leakage - In some plant designs, the cold legs could experience	Complete – (1) The Westinghouse letter LTR-

		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.	RES-13-153, Documentation of 7228C O-Rings at ELAP Conditions, concludes, with a high level of confidence, that the integrity of the associated O-Rings will be maintained at the temperature conditions experienced during the ELAP event. (2) In June 2014, Westinghouse issued PWROG-14015-P, "No.1 Seal Flow Rate for Westinghouse Reactor Coolant Pumps Following Loss of All AC Power." The purpose of this report was to calculate a new number 1 seal leakage rate based on the actual leak-off line layout at Byron station versus the representative leak-off line layout assumed in WCAP-10541. The new, lower leakage rates are being utilized in calculation revisions for Containment Pressure, Containment Temperature, and Boration.
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 WCAP17601-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 - The Westinghouse nuclear steam supply system (NSSS) calculations documented in WCAP17601-P using the NOTRUMP code were performed with the ANS 5.1 1979 + 2 sigma decay heat model and assumed the reactor is initially operating at 100% power (NOTRUMP reference case core power is 3723 MWt). Implementation of this model

			includes fission product decay heat resulting from the fission of U-235, U-238, and Pu-239 and actinide decay heat from U-239 and Np-239. The power fractions are typical values expected for each of the three fissile isotopes through a three region burn-up with an enrichment based on typical fuel cycle feeds that approach 5%. With that, a conversion ratio of 0.65 was used to derive the decay power of the two actinides U-239 and Np-239. Fission product neutron capture is treated per the ANS standard. The decay heat calculation utilizes a power history of three 540 day cycles separated by two 20 day outages that bounds initial condition 3.2.1.2 (1) of the Nuclear Energy Institute (NEI) document NEI 12-06, Section 3.2.1.2 (with a minimum assumption from NEI 12-06 that the reactor has been operated at 100% power for at least 100 days prior to event initiation). Therefore, the decay heat curve assumed in the Westinghouse calculations in WCAP 17601-P is representative of Byron and Byron Units 1 and 2. The primary-side transient profile assumed in the reactor coolant system (RCS) inventory control and long-term sub-criticality calculations for Modes 1 through 4 with steam generators available is based on the Westinghouse reference coping case of WCAP-17601-P and plant specific parameters such as reactor coolant system nominal temperature(s), pressures(s), and volumes, and accumulator cover gas pressures. These calculations do not, however, include any decay heat model and rely on the case

			runs cited from WCAP-17601-P regarding decay heat related phenomenon.
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 limits.	Started - The primary system conditions considered are based on the Westinghouse reference coping cases described in Section 5.2.1 of WCAP-17601-P (Ref. 18). The extended loss of alternating current (AC) power (ELAP) simulation parameters matrix provided in Westinghouse Correspondence LTR-FSE-14-43 (Ref. 22) outlines the comparison of items for Byron Station.
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 – Calculation BYR13-238/BRW-13-220-E (Ref. 19) confirms the pump batteries can operate for > 8 hour following ELAP event. Calculation BYR13-234/BRW-13-0216-M (Ref. 13) shows room temperature limit for equipment survivability is not challenged. Habitability conditions 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. 0BFSG-5, Initial Assessment and FLEX Equipment Staging, provides the necessary actions to install temporary fans to provide cooling to the DDAF pump room. The Phase 2 staffing study was completed in April 2014. Results were submitted to the NRC by letter RS-14-129 dated May 29, 2014.
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.	Complete - All key parameters have been identified and placed in Attachment A.
18	3.2.1.6.A	Sequence of Events - Confirm that	Started - The final time line will be

		the final timeline has been time validated after detailed designs are completed and procedures are developed. The results may be provided in a future 6-month update.	validated as the time sensitive actions, listed in Attachment 1A, go through the validation process. Results will be provided in a future update.
19	3.2.1.6.B	Sequence of Events - Confirm analysis to validate Phase 2 pump capacities.	Started - Hydraulic calculation BYR13-144/BRW-13-0160-M (Ref. 20), FLEX Pump Sizing and Hydraulic Analysis, evaluates the FLEX high pressure, medium pressure and low pressure pump capacities. The calculations validate the capability of the Phase 2 pumps for their intended FLEX purpose.
20	3.2.1.9.A	Use of portable pumps - Confirm final design of strategies meets "use of portable pumps" guideline in NEI 12-06 Section 3.2.2 Guideline 13.	Started – Station FLEX strategies utilize 1/2BCA 0.0, loss of all AC, as the controlling document to identify and implement the supporting BFSG Series procedures. The low pressure FLEX pump connection and line-up is controlled by 0BFSG-5, Initial Plant Assessment and FLEX Equipment Staging. The medium pressure pump connection and line-up is controlled by 1/2BFSG-3, Alternate Low Pressure Feedwater. The high pressure pump connection and line-up is controlled by 1/2BFSG-1, Long Term RCS Inventory Control, and 1/2BFSG-8, Alternate RCS Boration.
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 procedure guidance is not being developed due to its limited make-up flow. The primary means for SFP make-up utilizes the installed 0A Refueling Water Purification Pump with FLEX AC power.

			0BFSG-11, Alternate SFP Make-up and Cooling, provides operators with the necessary guidance to execute the task. 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 165°F. Due to this damper arrangement and lack of motive force, minimal FHB atmosphere should be dispersed in to the AB. 0BFSG-5, Initial Assessment and FLEX Equipment Staging, or 0BFSG-11, Alternate SFP make-up and Cooling, establish a Spent Fuel Pool Vent path by opening the SFP trackway roll-up door. The site does have manual actions within the spent fuel pool building to setup temporary hose for pool make-up. The site plans to perform these manual actions prior to the onset of SFP boiling. 0BFSG-5, Initial Assessment and FLEX Equipment Staging and 0BFSG-11, Alternate SFP make-up and Cooling, provide the necessary guidance to execute the task. The final time line will be validated after the detailed design is completed and will be provided in a future update. All operator actions are completed prior to SFP boiling. The FHB trackway rollup doors are opened to provide a vent path. The only equipment in the FHB post event

			that are required are the newly installed SFPI instruments which are designed to operate in this environment.
22	3.2.3.A	Containment - Confirm containment reanalysis supports no Phase 1, 2, and 3 mitigation strategies are required because containment pressure and temperature are maintained within acceptable limits.	Started – Calculation BYR13-235/BRW-13-0217-M (Ref. 12) Containment Pressure and Temperature Response during an ELAP Event, confirms the response supports Phase 1, 2, and 3 mitigation strategies. Containment pressure and temperature will reach the FSG set point limits in >30 days and 13.7 days respectively. In addition, containment pressure and temperature will reach design basis pressure and temperature limits in > 30 days.
23	3.2.3.B	Containment - Confirm evaluation performed for the need to monitor containment temperature.	Started – Calculation BYR13-235/BRW-13-0217-M (Ref. 18) shows Containment pressure and temperature will reach the FSG set point limits in >30 days and 13.7 days respectively. In addition, containment pressure and temperature will reach design basis pressure and temperature limits in > 30 days. Even with these long timeframes, containment temperature has been added to the key parameter list to provide operators with additional tools. Monitoring of containment temperature can be performed on an Intermittent bases and will be controlled by emergency procedures and 1/2BFSG-7, Loss of Vital Instrument or Control Power.
24	3.2.4.1.A	Equipment cooling - Confirm modification has been performed to prevent DDAF pump from overheating due to cooling water	Started – EC 394153, Alternate SX Supply to 1/2SX04P Pump Suction FLEX Mod 3, resolves DDAF pump over heating due to SX water

		recirculation flow paths within the SX system cycling and overheating the pump within 1 hour.	recirculation within the SX system by providing an alternate SX supply. 1/2BFSG-2, Alternate AFW/EFW Suction Source provides operators with the necessary guidance to align the alternate SX supply.
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)	Calculation BYR13-234/BRW-13-0216-M, Auxiliary FW Pump Room Temperature Analysis during and ELAP Event, (Ref. 13), shows room temperature is maintained within acceptable limits and supplemental room cooling is not required. Procedure guidance for the setup of alternate cooling was developed to provide additional options to the operators and is controlled by 0BFSG-5, Initial Assessment of FLEX Equipment Calculation BYR13-237/BRW-13-0219-M, MEER and Battery Room Conditions Following ELAP (Ref. 14), shows battery room can reach 2% hydrogen concentration within 2.52 hours of re-energizing the battery changer. Hydrogen generation begins when the battery chargers are re-energized. When power is re-established to the battery charger, power is also returned to the battery room vent fan. Operation of the battery room vent fan will prevent hydrogen generation from becoming a concern. 1/2BFSG-5, Initial Assessment and FLEX Equipment Staging, provides operators with the necessary guidance to establish forced ventilation within the battery room. Additionally, this calculation shows the MEER room will require forced ventilation to preserve component availability within 8 hours of re-energizing the

			battery changers. 1/2BFSG-5 / 0BFSG-5, Initial Assessment of FLEX Equipment, provides operators with the necessary guidance to establish alternate ventilation. Calculation BYR13-236/BRW-13-0218-M, Control Room and Auxiliary Electric Equipment Room heat up and Ventilation during an ELAP (Ref. 15) shows the Unit 2 Auxiliary Electric Equipment Room portion of the MCR boundary reaching temperature limits first within approximately 5.15 hours. 0BFSG-51, Alternate Control Room Ventilation, provides operators with the necessary guidance to establish alternate ventilation.
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 - Calculation BYR13-237/BRW-13-0219-M, MEER and Battery Room Conditions Following ELAP (Ref. 14), shows battery room can reach 2% hydrogen concentration within 2.52 hours of re-energizing the battery changer. Hydrogen generation begins when the battery chargers are re-energized. When power is re-established to the battery charger, power is also returned to the battery room vent fan. Operation of the battery room vent fan will prevent hydrogen generation from becoming a concern. 1/2BFSG-5, Initial Assessment and FLEX Equipment Staging, provides operators with the necessary guidance to establish forced ventilation within the battery room. Calculation BYR13-237/BRW-13-0219-M (Ref. 14) assumes a battery room maximum temperature of 138F and a

			minimum temperature of 60F during an ELAP event. The temperature effects on the battery capacity were incorporated into this calculation.
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, ice, and snow.	Started - The site FLEX strategy has been evaluated for potential freezing due to loss of heat trace or other heat sources. Susceptible equipment includes the RWST, temporary hoses and pumps deployed outside. A calculation, to show the effects of freezing on this equipment is in progress, BYR14-130/BRW-14-0211-M, Evaluation of Tank and Hose Freezing during an ELAP, (Ref.25). The FLEX temporary hoses, routed outside, will be protected from freezing by maintaining positive flow or by draining when not in use. Additional sections of FLEX hose are also available as a replacement in the event a section of the hose freezes.
28	3.2.4.4.A	Communications - Confirm that upgrades to the site's communications systems have been completed.	Started - Communications upgrade conceptual design is complete. For the 1st - 2nd refuel outage, (B2R18), The Site will have 3 Iridium Satellite phones available for the SM/SED in the MCR area. Additional handheld radios for use on talk-around with batteries staged in the robust FLEX building. The Site will have Sound Powered phones and cords in lockers in the plant with cables as well as Bull Horns for help with notifications. In Addition, for the 2nd – 2nd Refuel outage, (B1R20), the site will complete the NARS Upgrade satellite communications system. Detail design will be communicated

			in a future 6 month update.
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 – 1/2BFSG-5, Initial Assessment and FLEX Equipment Staging, provides electrical bus isolation and ensures multiple sources are not simultaneously connected to buses. The portable FLEX DG circuit breakers are sized to provide over-current protection downstream of the circuit breakers.
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 Units 1 and 2 "B" tanks contain 100,000 gallons of fuel. It is reasonable to assume the site fuel supply will last until roads can be re-opened 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 directly available to the Diesel fuel oil transfer pumps. The site also has 125,000 gallon and 50,000 gallons storage tanks that are not robust but would be used if available. An analysis is planned to show that the refueling capability of our F-750 truck is sufficient to ensure all of the FLEX diesel driven equipment can be kept re-fueled until additional capabilities can be brought to the site.
33	3.2.4.10.A	Load reduction to conserve DC power- Confirm sizing calculations for FLEX generators and details of	Started – EC393367, Electrical FLEX Connections to Unit 2 Safety Related Buses (Bus 232x),

		load shedding.	contains FLEX DG sizing calculations. DC load shedding will be performed in accordance with BFSG-4, ELAP DC Load Shed/Management. Load shedding should start at approximately 35 minutes after the start of an ELAP event and complete within 65 minutes. BYR14-060/BRW-14-0080-E (Ref. 8) demonstrates the Division 2 DC batteries will last at least 8 hours with the performance of appropriate load shedding.

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-13-017).
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 28th, 2013.
5. Byron Station's Second Six Month Status Report for the Implementation of FLEX, dated February 28th, 2014.
6. 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. MF0895 AND MF0896), dated December 17, 2013.

7. BYR99-010/BRW-99-0017-I Rev. 2, Documentation of the Basis of the Emergency Operating Procedures (EOP) Setpoints, dated June 2014. DRAFT

8. BYR14-060/BRW-14-0080-E Rev. 0, Unit 1(2) 125 VDC Battery FLEX Coping Calculation – Common Calc – Beyond Design Basis, dated May 2014. DRAFT

9. BYR13-240/BRW-13-0222-M Rev. 0, Spent Fuel Pool Boil Off Analysis during an ELAP Event, dated March 2014.

10. BYR13-239/BRW-13-0221-M Rev. 0, RCS Boration Analysis during an ELAP Event, dated June 2014. DRAFT

11. Exelon Structural Drawing S-183 Rev. AF, Roadway Plan Plant and Construction Laydown Area, dated 5/2014.

12. BYR13-235/BRW-13-0217-M Rev. 0, Containment Pressure and Temperature Response during an ELAP Event, dated June 2014. DRAFT

13. BYR13-234/BRW-13-0216-M Rev. 0, Auxiliary FW Pump Room Temperature Analysis during and ELAP Event, dated March 2014.

14. BYR13-237/BRW-13-0219-M Rev. 0, MEER and Battery Room Conditions Flowing ELAP, dated June 2014. DRAFT

15. BYR13-236/BRW-13-0218-M Rev. 0, Control Room and Auxiliary Electric Equipment Room heat up and Ventilation during an ELAP, dated June 2014. DRAFT

16. BYR13-026/BRW-13-0031-M Rev. 0, Transient Analysis of SX System Following Loss of A-C Power, dated August 2014.

17. BYR14-046/BRW-14-0058-M Rev. 0, Containment Environment Following an Extended Loss of AC Power During Shutdown, dated June 2014. DRAFT

18. WCAP 17601-P.Rev. 1, Reactor Coolant System Response to the Extended Loss of AC Power Event for Westinghouse, Combustion Engineering and Babcock & Wilcox NSSS Designs, dated January 2013.

19. BYR13-238/BRW-13-220-E Rev. 0, DDAF Pump Battery Duty Cycle and Sizing for a BDBEE, dated January 2014. DRAFT

20. BYR13-144/BRW-13-0160-M Rev. 0, FLEX Pump Sizing and Hydraulic Analysis, dated April 2014. DRAFT

21. Letter to Mr. Jack Stringfellow titled "Boron Mixing Endorsement Letter in Regards to Mitigation Strategies Order EA-12-049," January 8, 2014. (Agency wide Documents Access and Management System (ADAMS) Accession Number ML13276A183)

22. Westinghouse Correspondence LTR-FSE-14-43, Revision 0-A, "Exelon Generation Company, LLC Mitigation Strategies Order (EA-12-049) Design ELAP Simulation Parameters," July 16, 2014. DRAFT

23. BYR14-119 UHS Rev 0, Volume Analysis during an ELAP Event dated July 2014

24. Letter to David Flahive, of Westinghouse, titled "Exelon Generation Company, LLC Mitigation Strategies Order (EA-12-049) Open and Confirmatory Item Responses," Letter LTR-FSE-14-61 Rev.0-A dated July 17, 2014

25. BYR14-130/BRW-14-0211-M Rev. 0, Evaluation of Tank and Hose Freezing during an ELAP Dated Aug 2014 DRAFT

Attachment A
Key Parameters

Essential Instrumentation	Safety Function
SG Pressure: PI-515, PI-516, PI-525, PI-535, PI-545 and PI-546	RCS pressure boundary and pressure control
SG Level: NR - LI-517, LI-519, LI-527, LI-537, LI-547 and LI-549 WR - LI-502 and LI-503	RCS pressure boundary and pressure control
RCS Temperature: Cold Leg - TI-413B, TI-423B, TI-433B and TI-443B	RCS heat removal
RCS temperature: Hot leg - TI-413A, TI-423A, TI-433A and TI-443A	RCS heat removal
Core Exit Thermocouple (CET) Temperature TI-IT002	RCS heat removal
RCS Pressure: WR - PI-403	RCS pressure boundary and pressure control
Pressurizer level: LI-460	RCS inventory
Vessel Level Indicating System (RVLIS) LI-RC020	RCS inventory
Containment Pressure: PI-PC005	Containment integrity
Containment Temperature: TE-VP030, TE-VP031, TE-VP032, and TE-VP033.	Containment integrity
Spent Fuel Pool Level: 0LI-FC001B and 0LI-FC002B.	SFP inventory
RWST Level Channel LT-931	RCS inventory
Post Accident Neutron Monitor NI-NR006 A/B	Reactor core subcriticality
DC Bus Voltage _EI-DC002	Battery capacity
AFW Flow: FI-AF012A, FI-AF014A, FI-AF016A and FI-AF018A	RCS heat removal
AFW Suction Pressure PI-AF055	RCS heat removal
CST level: 1LI – CD051A	RCS heat removal
Accumulator Level: LI951, LI953, LI955, and LI 957	RCS inventory

Core Exit Thermocouple TI-IT002, Reactor Vessel Level Indicating System LI-RC020, Post Accident Neutron Monitor NI-NR006 A/B and Spent Fuel Pool Level 0LI-FC001B and 0LI-FC002B will be re-energized per the site strategy.

Attachment B
Phase 3 Equipment

PWR Portable Equipment Phase 3							
Use and (potential / flexibility) diverse uses						*Performance Criteria*	*Notes*
Note: The National SAFER Response Center NRC equipment is being procured at the time of this submittal. The equipment listed is a generic list provided by the National SAFER Response Center and even though we may not require this equipment in our plan it will be available and could be utilized in the phase 3 time period.							
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		
Medium Voltage Diesel Generator	X	X	X	X	X	1 MW output at 4160 Vac, three phase Note 1	Backup equipment
Low Voltage Diesel Generator	X	X	X	X	X	1100 kW output at 480 Vac, three phase Note 2	Backup equipment
High Pressure Injection Pumps	X					2000 psi shutoff head, 60 gpm capacity	Backup equipment
SG/RPV Makeup Pump	X					500 psi shutoff head, 500 gpm max flow	Backup equipment
Low Pressure / Medium Flow Pump	X	X	X			300 psi shutoff head, 2500 gpm max flow	Backup equipment
Low Pressure / High Flow	X		X			150 psi shutoff head, 5000 gpm max flow	Backup equipment

PWR Portable Equipment Phase 3							
Use and (potential / flexibility) diverse uses						*Performance Criteria*	*Notes*
Note: The National SAFER Response Center NRC equipment is being procured at the time of this submittal. The equipment listed is a generic list provided by the National SAFER Response Center and even though we may not require this equipment in our plan it will be available and could be utilized in the phase 3 time period.							
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		
Cable / Electrical	X	X	X			Various as determined by AREVA document # 51-9199717-005	Backup equipment
Hose / Mechanical Connections	X	X	X			Various as determined by AREVA document # 51-9199717-005	Backup equipment
Lighting Towers					X	40,000 lumens	Backup equipment
Diesel Fuel Transfer						500 gallon air-lift container	Backup equipment
Diesel Fuel Transfer Tank						264 gallon tank, with mounted AC/DC pumps	Backup equipment
Portable Fuel Transfer Pump						60 gpm after filtration	Backup equipment
Electrical Distribution System						4160 V, 250 MVA, 1200 A	Backup equipment

PWR Portable Equipment Phase 3							
Use and (potential / flexibility) diverse uses						*Performance Criteria*	*Notes*
Note: The National SAFER Response Center equipment is being procured at the time of this submittal. The equipment listed is a generic list provided by the National SAFER Response Center and even though we may not require this equipment in our plan it will be available and could be utilized in the phase 3 time period.							
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		
Mobile Boration	**X**		**X**			Each mobile boration unit consists of three (3) stand-alone trailers containing: • Main tank, mixers, pumps and control panel on one stand-alone trailer • Generator and heater on one stand-alone trailer • A main generator on one stand-alone trailer	Provide Borated Water Source
Water Purification	**X**		**X**			The water treatment equipment shall have an output flow capacity of 250 gpm (demineralized water)	Provide Quality Water Source
Note 1: 1 MW is the individual generator output, and 2 MW is the total standard output to be supplied by the Phase 3 MV generators to satisfy identified load demands. The total output is created by connection of several smaller generators in parallel. Note 2: The 1100 kW unit is derated to 1000 kW.							

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	Unit 1 and Unit 2 @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. Reference WCAP 17601-P reference.
4	5 - 15 mins	MCR closes C & D S/G PORVs to conserve inventory.	Y – 15 minutes	_BCA 0.0, Loss of All AC Power, action. Reference 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

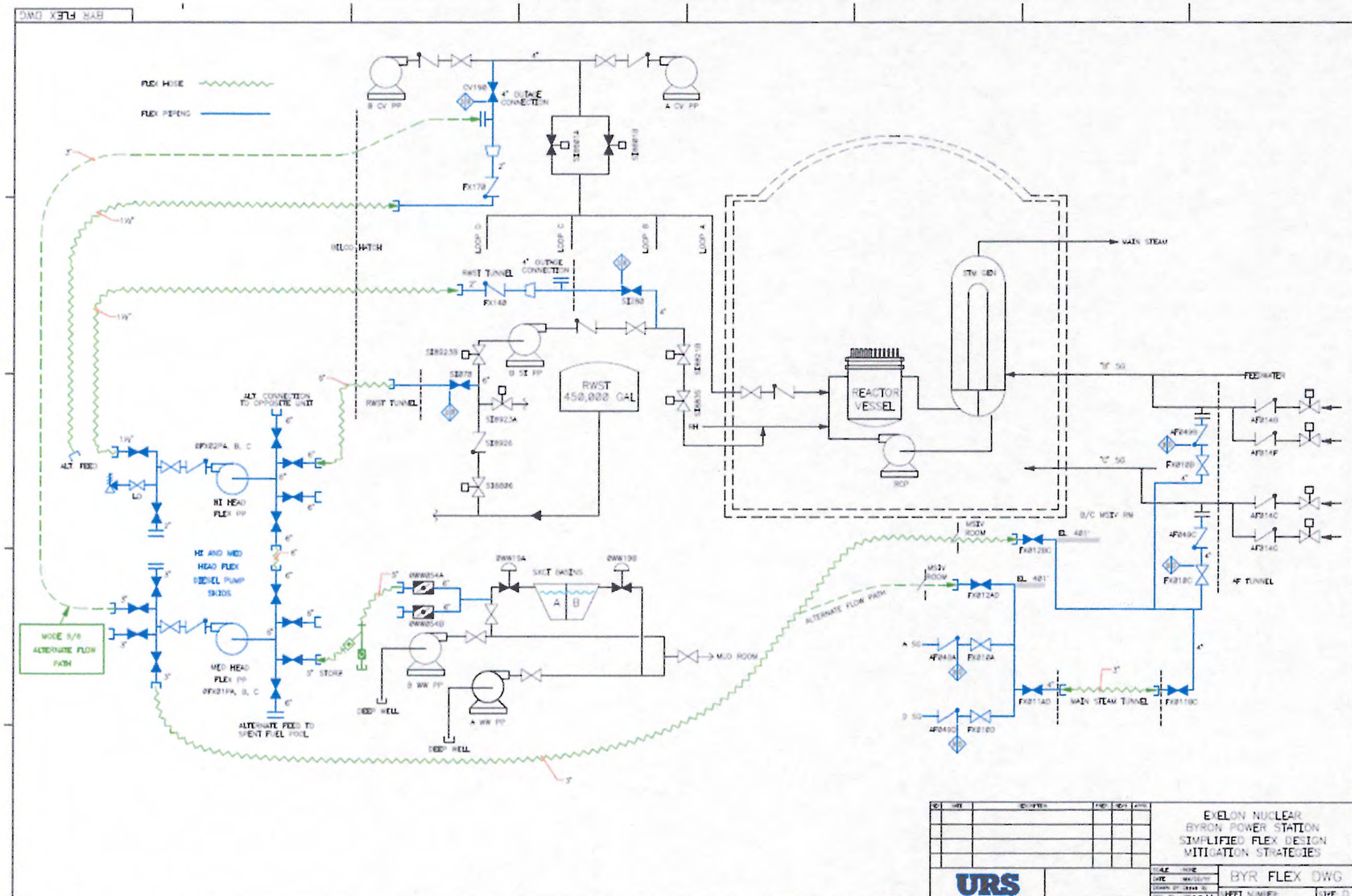
[1] Instructions: Provide justification if No or NA is selected in the remark column
If yes include technical basis discussion as requires by NEI 12-06 section 3.2.1.7

7	30 mins to 6 hrs	Connect FLEX 480V AC generators to ESF bus _32X and verify they are supplying power to Div 2 - 125V DC battery chargers	Y – 8 hours	Reference BRW-14-0080-E Rev 0, Unit 1(2) 125 VDC Battery FLEX Coping Calculation – Common Calc – Beyond Design Basis, dated May 2014.
8	35 mins to 65 mins	Operators dispatched to perform DC Bus Load Shed	Y - 65 minutes	Reference BRW-14-0080-E Rev 0, Unit 1(2) 125 VDC Battery FLEX Coping Calculation – Common Calc – Beyond Design Basis, dated May 2014.
9	55 mins to 90 mins	SX Short Cycle Cooling EC is aligned to cool the B AF Pp within 2 hour after pump start.	Y - 2 hours	_BCA 0.0, Loss of All AC Power, action. Reference BRW-13-0031-M Rev. 0, Transient Analysis of SX System Following Loss of A-C Power.
10	1.5 hrs	Start depressurization of S/Gs to 260 psig 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 hours	_BCA 0.0, Loss of All AC Power, action. Reference BRW-13-0221-M Rev 0, RCS Boration Analysis during an ELAP Event, dated June 2014.
11	2.25 hrs	SI Accumulator borated water begins to inject into the RCS	NA	Operator Judgment
12	3.5 hrs	Maintain SG pressure 260 psig and RCS temperature between 420F – 410F with SG PORV operation. Maintain SG level.	NA	Reference BRW-13-0221-M Rev 0, RCS Boration Analysis during an ELAP Event, dated June 2014
13	3 – 5 hrs	Set up and establish ventilation in AEER and MCR	Y – 5.15 hours	Directed from 0BFSG-51Alternate MCR Ventillation Reference calculation BYR13-236/BRW-13-0218-M, Control Room and Auxiliary Electric Equipment Room heat up and Ventilation during an ELAP

14	5 – 7 hrs	Isolate SI Accumulators	NA	1/2BFSG -10 action
15	6 – 9 hrs	Deploy FLEX DG to SX tower switchgear room and establish power to one of the ESF Busses 131Z/132Z for power to a Well Water, (WW), Pump and establish make up flow to the UHS.	Y –17 hours	Reference calculation BYR14-119 UHS Volume Analysis during an ELAP Event
16	6 - 10 hrs	Deploy all hoses and connections in FHB for alternate SFP Fill strategy before FHB becomes uninhabitable from SFP Boiling	Y - 10.94 hours	Directed from 0BFSG-5 and 0FSG-11. Reference BRW-13-0222-M Rev 0, Spent Fuel Pool Boil Off Analysis during an ELAP Event, dated April 2014.
17	12 – 16 hrs	Stage and connect Phase 2 high pressure FLEX Pumps and ensure they are available to supply borated make-up to the RCS and inject prior to entering Reflux Cooling.	Y - 17 hours	Reference WCAP 17601-P and Westinghouse Letter LTR-FSE-14-61, Rev. 0-A Dated July 2014
18	16 - 20 hrs	Stage and connect Phase 2 med head FLEX Pumps and ensure they are available to supply make-up to the SG's.	NA	1/2BFSG-5action
19	24 hrs	Initiate SFP Make up via 0A FC Purification pump as required for level and temperature control	NA	0BFSG-11action. Reference BRW-13-0222-M Rev 0, Spent Fuel Pool Boil Off Analysis during an ELAP Event, dated April 2014.
20	24 hrs	National SAFER Response Center resources begin arriving on site.	NA	National SAFER Response Center Guide
21	24 - 72 hrs	Continue to maintain critical functions of Core Cooling (via DDAF), RCS Inventory Control (via FLEX pump injection to RCS) and SFP Cooling (via FLEX pump injection to SFP). Utilize initial National SAFER Response Center equipment and resources.	NA	End of analytical simulation

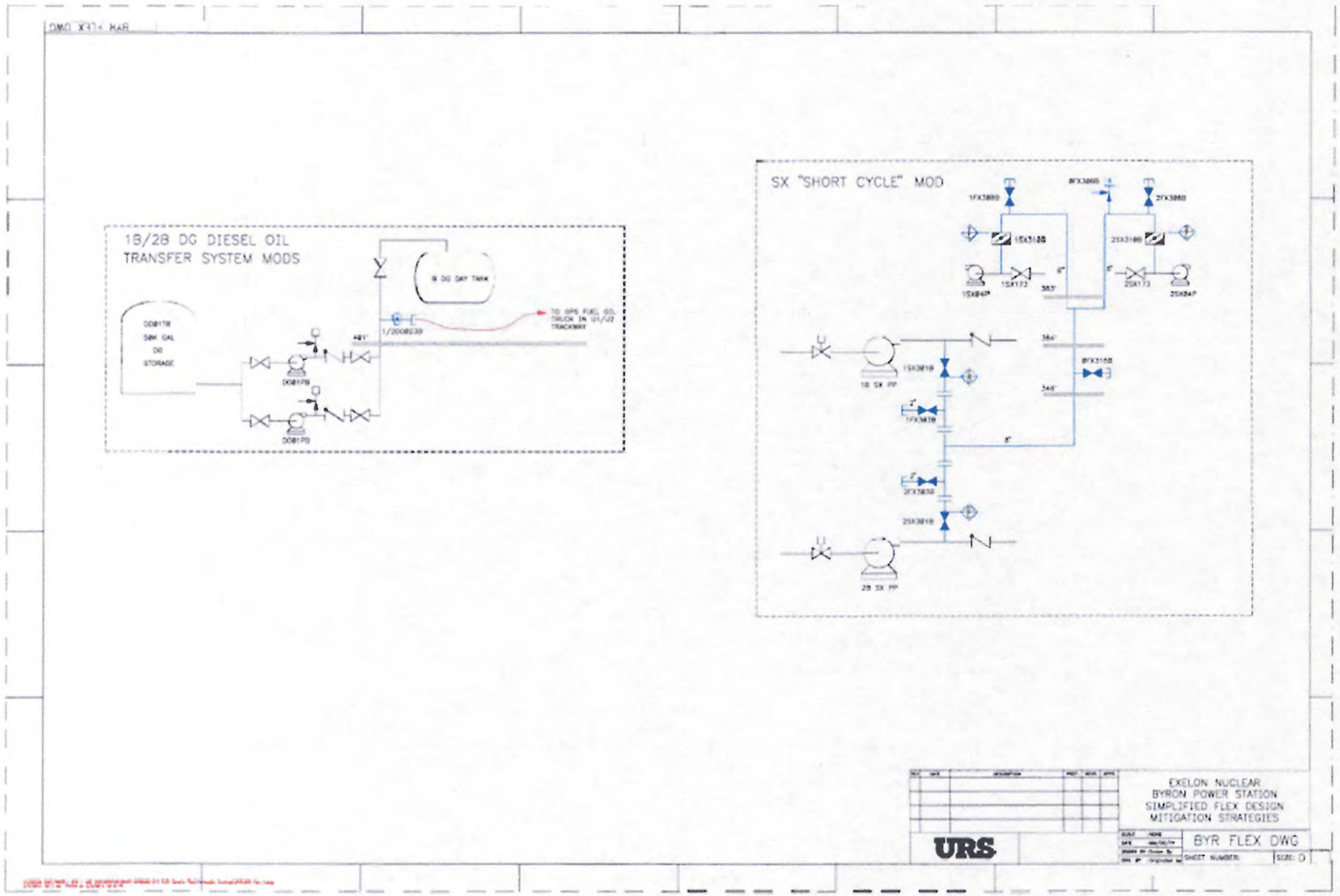
Attachment 3

Update Mechanical One Line Diagrams

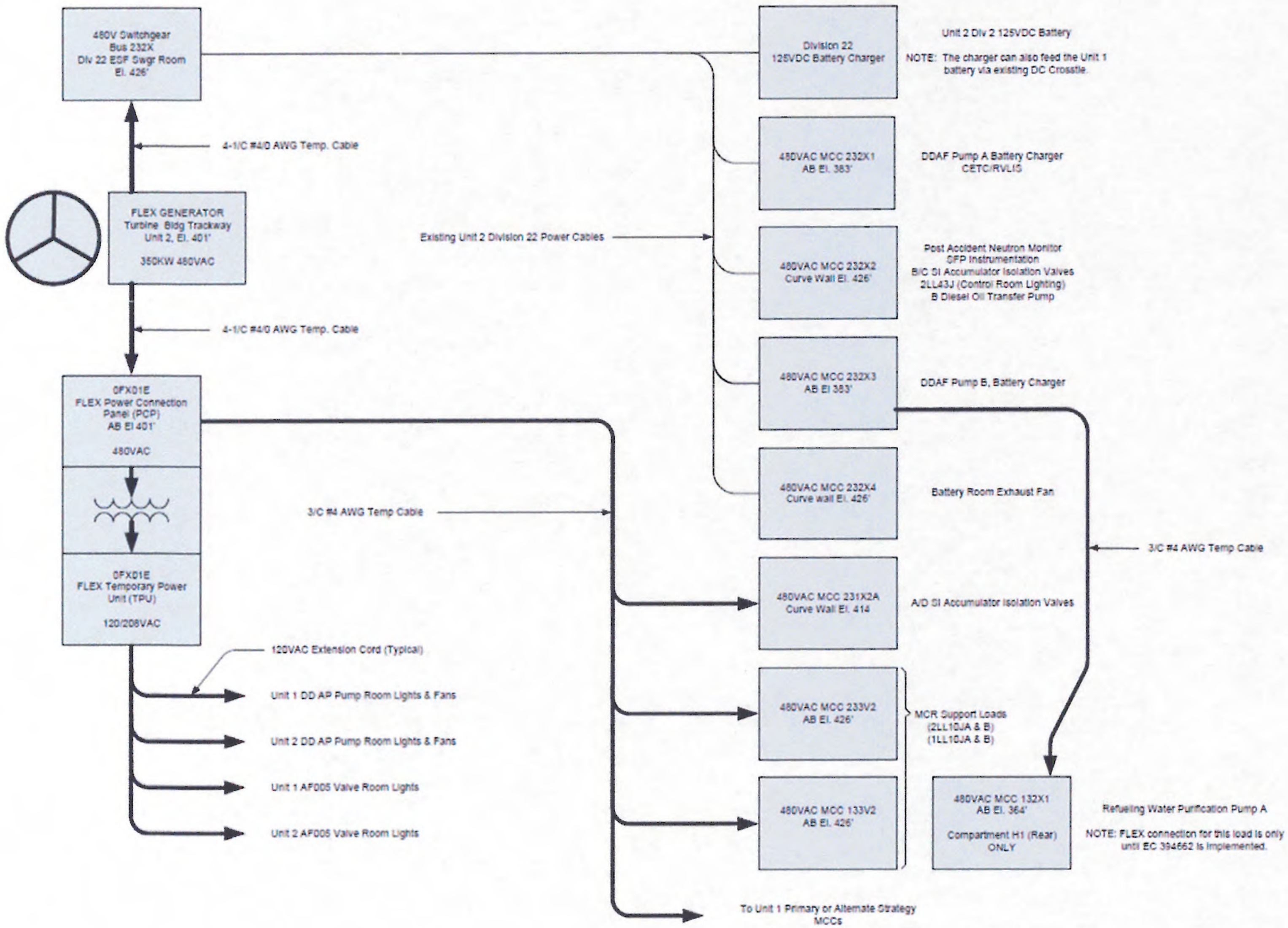


Attachment 3

Update Mechanical One Line Diagrams



Electrical Primary Strategy



Electrical Alternate Strategy