Exelon Generation.

Order No. EA-12-049

RS-13-018

February 28, 2013

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: 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)

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

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 requires submission of an Overall Integrated Plan by February 28, 2013. The NRC Interim Staff Guidance (ISG) (Reference 2) was issued August 29, 2012 which endorses industry guidance document NEI 12-06, Revision 0 (Reference 3) with clarifications and exceptions identified in Reference 2. Reference 3 provides direction regarding the content of this Overall Integrated Plan.

Reference 4 provided the EGC initial status report regarding mitigation strategies, as required by Reference 1.

The purpose of this letter is to provide the Overall Integrated Plan pursuant to Section IV, Condition C.1, of Reference 1. This letter confirms EGC has received Reference 2 and has an Overall Integrated Plan developed in accordance with the guidance for defining and deploying strategies that will enhance the ability to cope with conditions resulting from beyond-design-basis external events.

The information in the enclosure provides the Byron Station, Units 1 and 2 Overall Integrated Plan for mitigation strategies pursuant to Reference 3. The enclosed Integrated Plan is based on conceptual design information. Final design details and associated procedure guidance, as well as any revisions to the information contained in the Enclosure, will be provided in the 6-month Integrated Plan updates required by Reference 1.

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 2013.

Respectfully submitted,

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

Enclosure:

1. Byron Station, Units 1 and 2 Mitigation Strategies (MS) Overall Integrated Plan

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
Mr. Robert J. Fretz, Jr, NRRIJLD/PMB, NRC
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Illinois Emergency Management Agency - Division of Nuclear Safety

Enclosure 1

Byron Station, Units 1 and 2

Mitigation Strategies (MS)

Overall Integrated Plan

(67 pages)

General Integrated Plan Elements PWR	
Site: Byron	
Determine Applicable Extreme External Hazard **Ref: NEI 12-06 section 4.0 -9.0** **JLD-ISG-2012-01 section 1.0**	Seismic events, except soil liquefaction; flooding from local intense precipitation; severe storms with high winds; snow, ice and extreme cold; and high temperatures were determined to be applicable Extreme External Hazards for Byron Station per the guidance of NEI 12-06 and are as follows: Seismic Hazard Assessment: Byron will address the Beyond Design Basis (BDB) Seismic considerations in the implementation of FLEX strategies consistent NEI 12-06, (Ref. 1). Through test borings performed it was concluded that the soils are not susceptible to liquefaction. (Ref. 2 UFSAR) External Flood Hazard Assessment: Byron UFSAR, (Ref. 3), addresses additional flooding mechanisms that are either not critical or not bounding for Byron. Not applicable per NEI 12-06, (Ref. 4), since Byron is considered a Dry site per Byron UFSAR, (Ref 5), the plant grade elevation is at 869.0 feet and the grade floors of the safety related building are at elevation 870.0 feet. The Probable Maximum Flood (PMF) along the Rock River does not affect the site, since the maximum water surface elevation is 708.3 feet, a minimum of 160.7 feet below the plant grade. The probable maximum precipitation (PMP) falling on the plant area was considered in the analysis of local intense precipitation on the plant site. The maximum water level is elevation 870.90 feet at the plant site due to PMP. To prevent water due to PMP from entering areas where essential equipment/systems are located, reinforced concrete curbs or steel barriers are provided. High Wind Hazard Assessment: NEI 12-06, (Ref. 6), identifies Byron Station in a region, (89° 16' W x 42° 4' N.) in which it would not experience severe winds from Hurricanes. However, NEI 12-06, (Ref. 7), identified Byron in Region 1 and is susceptible to tornado winds of 200 mph.

	Temperature information from Byron's UFSAR, (Ref 8), The annual average temperature in the Byron area as represented by Rockford data is 48.1°F, with extreme temperatures having ranged from a maximum of 103°F to a minimum of -22°F. Maximum temperatures equal or exceed 90°F about 13 times per year while minimum temperatures are less than or equal to 0°F about 16 times per year. Byron Station location is 89°16' W x 42°4' N. Extreme Cold Hazard Assessment: NEI 12-06, (Ref. 9), identifies Byron Station in an area in which it could receive 25 inches of snow over 3 days. NEI 12-06, (Ref. 10), identifies Byron Station as Ice Severity Level 5, Catastrophic destruction to power lines and/or existence of extreme amount of ice. High Temperature Hazard Assessment: Byron Station will address high temperatures considerations in the implementation of FLEX strategies consistent with NEI 12-06, (Ref. 11). References: 1. NEI 12-06 Rev. 0, Diverse and Flexible Coping Strategies (FLEX) implementation Guide, Section 5.2 dated August 2012. 2. Byron/Braidwood Nuclear Stations Updated Final Safety Analysis Report (UFSAR) Revision 14, Byron Section 2.5 3. Byron/Braidwood Nuclear Stations Updated Final Safety Analysis Report (UFSAR) Revision 14, Byron Section 2.4.4 through 2.4.7 dated December 2012. 4. NEI 12-06 Rev. 0, Diverse and Flexible Coping Strategies (FLEX) implementation Guide, Section 6.2.1 dated August 2012. 5. Byron/Braidwood Nuclear Stations Updated Final Safety Analysis Report (UFSAR) Revision 14, Byron Section 2.4.2.3 dated December 2012. 6. NEI 12-06 Rev. 0, Diverse and Flexible Coping Strategies (FLEX) implementation Guide, Figure 7-1 dated August 2012. 7. NEI 12-06 Rev. 0, Diverse and Flexible Coping Strategies (FLEX) implementation Guide, Figure 7-2 dated August 2012. 8. Byron/Braidwood Nuclear Stations Updated Final Safety Analysis Report (UFSAR) Revision 14, Byron Section 2.3.1.1 dated December 2012.

	9. NEI 12-06 Rev. 0, Diverse and Flexible Coping Strategies (FLEX) implementation Guide, Figure 8-1 dated August 2012. 10. NEI 12-06 Rev. 0, Diverse and Flexible Coping Strategies (FLEX) implementation Guide, Figure 8-2 dated August 2012. 11. NEI 12-06 Rev. 0, Diverse and Flexible Coping Strategies (FLEX) implementation Guide, Section 9.2 dated August 2012.
Key Site assumptions to implement NEI 12-06 strategies. **Ref: NEI 12-06 section 3.2.1**	*Provide key assumptions associated with implementation of FLEX Strategies:* • Flood and seismic re-evaluations pursuant to the 10 CFR 50.54(f) letter of March 12, 2012 are not completed and therefore not assumed in this submittal. As the re-evaluations are completed, appropriate issues will be tracked and addressed on a schedule commensurate with other licensing bases changes. • The following conditions exist for the baseline case: o DC battery banks are available. o AC and DC electrical distribution is available. o Diesel Driven Auxiliary Feedwater Pump, (DDAFW Pp) is available and will start in auto or manual as needed. o Local manual control of Steam Generator Power Operated Relief Valves, (S/G PORVs) o Plant initial response is the same as Station Black Out, (SBO), WCAP-17601-P (Ref.1). o No additional single failures of any SSC are assumed (beyond the initial failures that define the ELAP/LUHS scenario in NEI 12-06). • Additional staff resources are expected to arrive beginning at 6 hours, Ref: NEI 12-01 (Ref. 2) • Primary and secondary storage locations have not been selected yet. Storage locations will be chosen in order to support the event timeline. Once locations are finalized implementation strategies and routes will be assessed for hazard impact, and will be communicated in a future 6 month update following identification. • This plan defines strategies capable of mitigating a simultaneous loss of all alternating current (ac) power and loss of normal access to the ultimate heat sink resulting from a beyond-design-basis event by providing adequate capability to maintain or restore core cooling, containment, and SFP cooling capabilities

	at all units on a site. Though specific strategies are being developed, due to the inability to anticipate all possible scenarios, the strategies are also diverse and flexible to encompass a wide range of possible conditions. These pre-planned strategies developed to protect the public health and safety will be incorporated into the unit emergency operating procedures in accordance with established EOP change processes, and their impact to the design basis capabilities of the unit evaluated under 10 CFR 50.59. The plant Technical Specifications contain the limiting conditions for normal unit operations to ensure that design safety features are available to respond to a design basis accident and direct the required actions to be taken when the limiting conditions are not met. The result of the beyond-design-basis event may place the plant in a condition where it cannot comply with certain Technical Specifications, and, as such, may warrant invocation of 10 CFR 50.54(x) and/or 10 CFR 73.55(p). References: Ref 1 – WCAP-17601-P, Reactor Coolant System Response to the Extended Loss of AC Power Event for Westinghouse, Combustion Engineering, & Babcock & Wilcox NSSS Designs, dated August 2012. Ref 2 - NEI 12-01 Rev. 0, Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities, dated May 2012
Extent to which the guidance, JLD-ISG-2012-01 and NEI 12-06, are being followed. Identify any deviations to JLD-ISG-2012-01 and NEI 12-06. **Ref: JLD-ISG-2012-01 NEI 12-06 13.1**	*Include a description of any alternatives to the guidance, and provide a milestone schedule of planned action.* Full conformance with JLD-ISG-2012-01, Rev 0 and NEI 12-06 Rev 0 is expected with no deviations.
Provide a sequence of events and identify any time constraint required for success including the technical basis for the time constraint. **Ref: NEI 12-06 section 3.2.1.7 JLD-ISG-2012-01 section 2.1**	*Strategies that have a time constraint to be successful should be identified with a technical basis and a justification provided that the time can reasonably be met (for example, a walk through of deployment).* *Describe in detail in this section the technical basis for the time constraint identified on the sequence of events timeline Attachment 1A.*

	See attached sequence of events timeline (Attachment 1A). *Technical Basis Support information, see attached NSSS Significant Reference Analysis Deviation Table (Attachment 1B)* Byron Station timeline is outlined in Attachment 1A. 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 and procedures are developed. The results will be provided in a future 6-month update. • 5 to 15 minutes - Based on the plant response and the direction from the Emergency Operating Procedure BCA 0.0, Loss of All AC Power, an operator is dispatched to the B AFW Pump and will ensure that it is properly aligned and low suction pressure is reset if needed. The operators will then verify that the pump is started and running properly. The one (1) hour time constraint is based on the results of MAAP analysis BW-MISC-009 (Ref. 1). The MAAP calculation shows SG dryout will occur within 61 minutes without AF flow as referenced in the WCAP-17601-P (Ref. 2). • 30 minutes to 3.6 hours – After the Station DGs have been verified to be not available, an operator is dispatched to the Div 2 ESF Switchgear Bus _32X and verifies all breakers are open then will proceed to the FLEX Building and prep and align the FLEX DG to the station connections. Once aligned the FLEX DG will be started and a controlled loading will occur to restore power to the required Div 125 volt DC Battery charger and to the Div 2 125 Volt instrument busses. The 3.6 hour time constraint is based on the results of EC Evaluation 391872 (Ref. 3). The EC calculation shows the DC bus 112 voltage will be below acceptable values after 3.6 hours without operator action. • 1.5 hours – The control room will begin and direct a cooldown of the RCS by local operation of the S/G PORVs and local control of the AF flow control valves to reduce S/G pressure down to at least 300 psia at a minimum of 75°F/hr, MAAP Analysis (Ref.1)

	References: 1. MAAP Analysis Document NO. BW-MISC-009 Rev 0, approved 10/20/11 2. WCAP-17601-P approved August 2012 3. EC Evaluation 391872, Battery Coping Time For The 125V DC ESF Battery Banks, dated February 8, 2013
Identify how strategies will be deployed in all modes. **Ref: NEI 12-06 section 13.1.6**	*Describe how the strategies will be deployed in all modes.* Deployment of FLEX is expected for all modes of operation. Transportation routes will be developed from the equipment storage area to the FLEX staging areas. An administrative program will be developed to ensure pathways remain clear or compensatory actions will be implemented to ensure all strategies can be deployed during all modes of operation. This administrative program will also ensure the strategies can be implemented in all modes by maintaining the portable FLEX equipment available to be deployed during all modes. Identification of storage and creation of the administrative program are open items. Closure of these items will be documented in a future 6-month update.
Provide a milestone schedule. This schedule should include: • **Modifications timeline** o **Phase 1 Modifications** o **Phase 2 Modifications** o **Phase 3 Modifications** • **Procedure guidance development complete** o **Strategies** o **Maintenance** • **Storage plan (reasonable protection)** • **Staffing analysis completion** • **FLEX equipment acquisition timeline** • **Training completion for the strategies**	*The dates specifically required by the order are obligated or committed dates. Other dates are planned dates subject to change. Updates will be provided in the periodic (six month) status reports.* *See attached milestone schedule (Attachment 2)* Exelon Generation Company, LLC (Exelon) fully expects to meet the site implementation/compliance dates provided in Order EA-12-049, with no exceptions. Any changes or additions to the planned interim milestone dates will be provided in a future 6-month update

• **Regional Response Centers operational** **Ref: NEI 12-06 section 13.1**	
Identify how the programmatic controls will be met. **Ref: NEI 12-06 section 11** **JLD-ISG-2012-01 section 6.0**	*Provide a description of the programmatic controls equipment protection, storage and deployment and equipment quality. See section 11 in NEI 12-06. Storage of equipment, 11.3, will be documented in later sections of this template and need not be included in this section.* *See section 6.0 of JLD-ISG-2012-01.* Byron Station will implement an administrative program for FLEX to establish responsibilities, and testing and maintenance requirements. A plant system designation will be assigned to FLEX which will require configuration controls associated with systems. This will establish responsibilities, maintenance and testing requirements for all components associated with FLEX. Unique identification numbers will be assigned to all FLEX components included in the system. (This will be an open item) Equipment associated with these strategies will be procured as commercial equipment with design, storage, maintenance, testing, and configuration control as outlined in JLD-ISG-2012-01section 6 and NEI 12-06 section 11. Installed structures, systems and components pursuant to 10CFR50.63(a) will continue to meet the augmented quality guidelines of Regulatory Guide 1.155, Station Blackout. Standard industry preventive maintenance (PM) will be developed to establish maintenance and testing frequencies based on type of equipment and will be within EPRI guidelines. Testing procedures will be developed based on the industry PM Templates and Exelon Standards. Byron's administrative program for FLEX responsibilities, and testing & maintenance are open items. Closure of these items will be documented in a future 6-month update.
Describe training plan	*List training plans for affected organizations or describe the plan for training development* Training materials for FLEX will be developed for all station staff involved in implementing FLEX strategies. For accredited training programs, the Systematic Approach to Training, SAT, will be used to determine training needs. For other station staff, a training overview will be developed and communicated. Closure of this item will be communicated in a future 6-month update.

Describe Regional Response Center plan	Byron Station has contractual agreements in place with the Strategic Alliance for FLEX Emergency Response (SAFER). The industry will establish two (2) Regional Response Centers, (RRC), located in Tennessee and Arizona to support utilities during beyond design basis events. Each RRC will hold five (5) sets of equipment, four (4) of which will be able to be fully deployed when requested, the fifth set will have equipment in a maintenance cycle. Equipment will be moved from an RRC to a local Assembly Area, established by the Strategic Alliance For Flex Emergency Response (SAFER) team and the utility. Communications will be established between the affected nuclear site and the SAFER team and required equipment moved to the site as needed. First arriving equipment, as established during development of the nuclear site's playbook will be delivered to the site within 24 hours from the initial request Ref. NEI 12-06 (Ref. 1). Reference Nuclear RRC Contract RFP-20480 (Ref.2). Development of Byron Station's playbook is an open item. Closure of this item will be documented in a future 6-month update. <u>References:</u> Ref 1 - NEI 12-06 Rev. 0 Diverse and Flexible Coping Strategies (FLEX) implementation Guide, Section 12 Ref 2 –Nuclear contract with SAFER for the RRC, dated June 8, 2012.
Notes: Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Once these have been fully developed, Exelon will update the integrated plan for Byron during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.	

Maintain Core Cooling & Heat Removal

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

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

Ref: JLD-ISG-2012-01 section 2 and 3

PWR Installed Equipment Phase 1

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

At the initiation of the event operators will enter Station Blackout (SBO) – Emergency Operating Procedure (EOP), _BCA 0.0 Loss of All AC. The Extended Loss of AC Power (ELAP), Attachment B, will be entered when the emergency diesel generators are confirmed unavailable and off-site power cannot be restored and it is confirmed by dispatcher or visual verification of physical damage to infrastructure at site.

Within 90 minutes Operators will cool down the plant at approximately 75°F/hr to 420°F (Tcold). Steam generator (SG) pressure will be approximately 300 psia at this temperature. Steam generator pressure of 300 psia corresponds to RCS pressure necessary to inject SI accumulators. This will ensure RCS pressure is above the minimum pressure to preclude injection of accumulator nitrogen into the RCS. MAAP Analysis(Ref 1), WCAP-17601-P (Ref. 2).

During cool down, the Diesel Driven Auxiliary Feedwater (DDAFW) pump will deliver water from the Ultimate Heat Sink (UHS) via Essential Service Water (SX) system to the SGs.

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 begin immediately. 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. This time will be used to determine the time required to complete transition to Phase 2.
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 implementing 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

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

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.

References:
Ref 1 - MAAP analysis BB-MISC-020 Rev. 0, Approved 2/01/13
Ref 2 - WCAP-17601-P Rev 0, Reactor Coolant System Response to the Extended Loss of AC Power Event for Westinghouse, Combustion Engineering, & Babcock & Wilcox NSSS Designs, dated August 2012, Section 4 & 5
Ref 3 - OP-AA-108-117-1001 Rev 0, Spent Fuel Storage Pools Heat-up Rate With Loss of Normal Cooling, dated July 22, 2011

Details:

Provide a brief description of Procedures / Strategies / Guidelines	Byron Station will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.
Identify modifications	The following gaps have been identified that prevent extended operation of the DDAFW Pump. Byron Station will utilize modifications to close these gaps prior to FLEX implementation. These will be an Open item that will be closed and documented in a future 6-month update. 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 1 hour.
Key Reactor 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 Pressure: WR - PI-403	RCS pressure boundary and

	pressure control
Containment Pressure: PI-PC005	Containment Integrity
SFP Level: (component # TBD)	SFP Inventory

Byron's evaluation of the FLEX strategy may 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 (NEI 12-06 Rev. 0 Section 3.2.1.10) and any difference will be communicated within a future 6-month update following identification.

In addition to the parameters listed in NEI 12-06 Rev. 0 Section 3.2.1.10, the following additional parameters will be evaluated for use as the detailed strategy is developed. Closure of this item will be communicated in a future 6-month update.

Core Exit Thermocouple (CET) Temperature: TI-IT002
RCS Accumulator Level: LI-951, LI-953, LI-955, and LI -957
Reactor Vessel Level Indicating System (RVLIS): LI-RC020
AFW Flow: FI-AF012A, FI-AF014A, FI-AF016A and FI-AF018A
Battery Capacity / DC Bus Voltage: EI-DC002
Neutron Flux: NI-NR006A/B, NI-36B IR

Reference:
PWROG Generic FLEX Support Guidelines and Interfaces (Controlling Procedure Interface and Recommendation Instruments) Rev. 0, Supplement 14, dated December 2012 PA-PSC-0965.

Notes:
Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Once these have been fully developed, Exelon will update the integrated plan for Byron during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.

Maintain Core Cooling & Heat Removal	
PWR Portable Equipment Phase 2	
Provide a general description of the coping strategies using on-site portable equipment including station modifications that are proposed to maintain core cooling. Identify methods and strategy(ies) utilized to achieve this coping time. Phase 2 Core cooling will be achieved with a portable FLEX diesel pump and S/G PORVs. The pump suction will come from the RWST and/or the UHS fed from the well water pumps powered from a portable Flex DG. The discharge will be into the AFW lines downstream of the containment isolation valves into the S/Gs. The PORVs will be used to control the S/G pressure. In the event the unit is in a refueling outage, another portable FLEX diesel pump will also be able to supply the RCS boil off using the modifications outlined in Phase 2 of Inventory Control. Electrical power required to support the Flex Strategy is described in the Safety Function Support Section of the document.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	Byron Station will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.
Identify modifications	The following modifications will be installed to support FLEX pump water injection into the SGs. **FLEX pump discharge:** Install Pipe flange connections on the A, D, B and C Auxiliary feed water (AF) SG injection lines at the test flanges within the Main Steam Isolation Valve (MSIV) rooms. Connect the pipe flanges with a header routed through the steam tunnel. One end of the header will be routed to the B/C Main Steam Safety Valve (MSSV) room and terminated with a standard FLEX connection (Primary connection) and the other end will be routed to the A/D MSSV room and terminated with a standard FLEX connection (Alternate connection). **FLEX pump suction:** A tee will be installed on the B SI pump suction line. A header will be routed from the tee through the RWST tunnel to the RWST tunnel access hatch or alternate path and terminated with a standard FLEX connection. Additionally, hoses could be run from the UHS as suction backup source.

Maintain Core Cooling & Heat Removal

PWR Portable Equipment Phase 2

Key Reactor 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 Pressure: WR - PI-403	RCS pressure boundary and pressure control
Containment Pressure: PI-PC005	Containment Integrity
SFP Level: (component # TBD)	SFP Inventory

Byron's evaluation of the FLEX strategy may 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 (NEI 12-06 Rev. 0 Section 3.2.1.10) and any difference will be communicated within a future 6-month update following identification.

In addition to the parameters listed in NEI 12-06 Rev. 0 Section 3.2.1.10, the following additional parameters will be evaluated for use as the detailed strategy is developed. Closure of this item will be communicated in a future 6-month update.

Core Exit Thermocouple (CET) Temperature: TI-IT002
RCS Accumulator Level: LI-951, LI-953, LI-955, and LI -957
Reactor Vessel Level Indicating System (RVLIS): LI-RC020
AFW Flow: FI-AF012A, FI-AF014A, FI-AF016A and FI-AF018A
Battery Capacity / DC Bus Voltage: EI-DC002
Neutron Flux: NI-NR006A/B, NI-36B IR

Reference:
PWROG Generic FLEX Support Guidelines and Interfaces (Controlling Procedure Interface and Recommendation Instruments) Rev. 0, Supplement 14, dated December 2012 PA-PSC-0965.

Maintain Core Cooling & Heat Removal	
PWR Portable Equipment Phase 2	
Storage / Protection of Equipment : **Describe storage / protection plan or schedule to determine storage requirements**	
Seismic	Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Rev. 0, Section 11. Schedule to construct permanent building is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to Byron Station.
Flooding Note: if stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level.	Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Rev. 0, Section 11. Schedule to construct permanent building is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to Byron Station.
Severe Storms with High Winds	Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Rev. 0, Section 11. Schedule to construct permanent building is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to Byron Station.
Snow, Ice, and Extreme Cold	Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Rev. 0, Section 11. Schedule to construct permanent building is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to Byron Station.
High Temperatures	Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Rev. 0, Section

Maintain Core Cooling & Heat Removal	
PWR Portable Equipment Phase 2	
	11. Schedule to construct permanent building is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to Byron Station.

Deployment Conceptual Design
(Attachment 3 contains Conceptual Sketches)

Strategy	**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
The required Flex Equipment needed for core cooling will be installed in a Robust Flex building ready for quick hook up and use. Hoses and Electrical connections that will be completed as needed to support the coping strategy will be stored within the Flex building.	The storage structure conceptual design has not been completed and will be an Open Item. The closure of this item will be documented in a future 6- month update.	FLEX piping, valves, and connections (electrical & fluid) will meet NEI 12-06 Rev.0 protection requirements. There will be an administrative program created to protect the connections from blockage during outages and non outage times.

Notes:
Secondary cooling capabilities recommend 300 gpm at 300 psia. (WCAP-17601-P Ref 1)

The RWST inventory is maintained at a minimum of 423,000 gal during normal operation. With a conservative sustained flow rate of 300 gpm, the total inventory would be depleted in 23 hours. Prior to depletion of the RWST inventory a transition will be made to the UHS.

Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Once these have been fully developed, Exelon will update the integrated plan for Byron during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.

Reference:
Ref 1 - WCAP-17601-P Rev 0, Reactor Coolant System Response to the Extended Loss of AC Power Event for Westinghouse, Combustion Engineering, & Babcock & Wilcox NSSS Designs,

Maintain Core Cooling & Heat Removal
PWR Portable Equipment Phase 2
dated August 2012.

Maintain Core Cooling & Heat Removal

PWR Portable Equipment Phase 3

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

Phases 1 and 2 strategy will provide sufficient capability such that no additional Phase 3 strategies are required.

Phase 3 equipment for Byron includes backup portable FLEX pumps and generators. The portable FLEX 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 FLEX 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 support component would be a portable refuel vehicle with a large diesel oil bladder to support refilling the FLEX diesel tanks.

Details:

Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation with a description of the procedure / strategy / guideline.* Byron Station will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.
Identify modifications	*List modifications necessary for phase 3* There are no Phase 3 modifications required.
Key Reactor Parameters	*List instrumentation credited or recovered for this coping evaluation.*

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

Maintain Core Cooling & Heat Removal

PWR Portable Equipment Phase 3

RCS Pressure: WR - PI-403	RCS pressure boundary and pressure control
Containment Pressure: PI-PC005	Containment Integrity
SFP Level: (component # TBD)	SFP Inventory

Byron's evaluation of the FLEX strategy may 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 (NEI 12-06 Rev. 0 Section 3.2.1.10) and any difference will be communicated within a future 6-month update following identification.

In addition to the parameters listed in NEI 12-06 Rev. 0 Section 3.2.1.10, the following additional parameters will be evaluated for use as the detailed strategy is developed. Closure of this item will be communicated in a future 6-month update.

Core Exit Thermocouple (CET) Temperature: TI-IT002
RCS Accumulator Level: LI-951, LI-953, LI-955, and LI -957
Reactor Vessel Level Indicating System (RVLIS): LI-RC020
AFW Flow: FI-AF012A, FI-AF014A, FI-AF016A and FI-AF018A
Battery Capacity / DC Bus Voltage: EI-DC002
Neutron Flux: NI-NR006A/B, NI-36B IR

Reference:
PWROG Generic FLEX Support Guidelines and Interfaces (Controlling Procedure Interface and Recommendation Instruments) Rev. 0, Supplement 14, dated December 2012 PA-PSC-0965.

Deployment Conceptual Design
(Attachment 3 contains Conceptual Sketches)

Strategy	**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
Equipment will be delivered from the RRC to the staging area. From there the equipment will be transported to the site	No modifications are required other than those outlined in Phase 2 of this plan.	Byron will utilize Phase 2 connection points.

Maintain Core Cooling & Heat Removal		
PWR Portable Equipment Phase 3		
and hooked up by both RRC personnel and plant personnel per the playbook. Equipment will then be operated per plant procedures.		

Notes: Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Once these have been fully developed, Exelon will update the integrated plan for Byron during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.

Maintain RCS Inventory Control

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

- **Low Leak RCP Seals or RCS makeup required**
- **All Plants Provide Means to Provide Borated RCS Makeup**

PWR Installed Equipment Phase 1:

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

At the initiation of the event operators will enter Emergency Operating Procedure (EOP) BCA 0.0, Loss of All AC. The Extended Loss of AC Power (ELAP), BCA 0.0 Attachment B, will be entered when the emergency diesel generators are confirmed unavailable and off-site power cannot be restored and it is confirmed by dispatcher or visual verification of physical damage to infrastructure at site.

Within 90 minutes operators will cool down the plant at approximately 75°F/hr to 420°F (Tcold). Steam generator (SG) pressure will be approximately 300 psia. Steam generator pressure of 300 psia corresponds to RCS pressure necessary to inject SI accumulators. This will ensure RCS pressure is above the minimum pressure to preclude injection of accumulator nitrogen into the RCS. WCAP-17601-P (Ref. 2).

During cool down, the initial RCS inventory make-up and boration source will be the SI accumulators.

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 begin immediately. All efforts will be made to control reactor temperature below 212°F to prevent an unplanned mode change. Exelon has a program in place (Ref. 3) to determine the time to boil for all conditions during shutdown periods. This time will be used to determine the time required to complete transition to Phase 2.
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 implementing 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

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

Maintain RCS Inventory Control

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.

References:

Ref 1 - MAAP analysis BB-MISC-020 Rev. 0 Approved 2/01/13
Ref 2 – WCAP-17601-P Rev 0, Reactor Coolant System Response to the Extended Loss of AC Power Event for Westinghouse, Combustion Engineering, & Babcock & Wilcox NSSS Designs, dated August 2012
Ref 3 - OP-AA-108-117-1001 Rev 0, Spent Fuel Storage Pools Heat-up Rate With Loss of Normal Cooling, date July 22, 2011.

Details:

Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation* Byron Station will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.
Identify modifications	*List modifications* There are no Phase 1 modifications required at this time.
Key Reactor Parameters	*List instrumentation credited for this coping evaluation.*

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 Pressure: WR - PI-403	RCS pressure boundary and pressure control
Containment Pressure: PI-PC005	Containment Integrity
SFP Level: (component # TBD)	SFP Inventory

Maintain RCS Inventory Control	
	Byron's evaluation of the FLEX strategy may 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 (NEI 12-06 Rev. 0 Section 3.2.1.10) and any difference will be communicated within a future 6-month update following identification. In addition to the parameters listed in NEI 12-06 Rev. 0 Section 3.2.1.10, the following additional parameters will be evaluated for use as the detailed strategy is developed. Closure of this item will be communicated in a future 6-month update. Core Exit Thermocouple (CET) Temperature: TI-IT002 RCS Accumulator Level: LI-951, LI-953, LI-955, and LI -957 Reactor Vessel Level Indicating System (RVLIS): LI-RC020 AFW Flow: FI-AF012A, FI-AF014A, FI-AF016A and FI-AF018A Battery Capacity / DC Bus Voltage: EI-DC002 Neutron Flux: NI-NR006A/B, NI-36B IR Reference: PWROG Generic FLEX Support Guidelines and Interfaces (Controlling Procedure Interface and Recommendation Instruments) Rev. 0, Supplement 14, dated December 2012 PA-PSC-0965.
Notes: Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Once these have been fully developed, Exelon will update the integrated plan for Byron during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.	

Maintain RCS Inventory Control	
PWR Portable Equipment Phase 2:	
Provide a general description of the coping strategies using on-site portable equipment including modifications that are proposed to maintain Inventory Control. Identify methods (Low Leak RCP Seals and/or borated high pressure RCS makeup)and strategy(ies) utilized to achieve this coping time. Phase 2 RCS inventory control and boration will be achieved within 8 hrs via a portable FLEX pump WCAP-17601-P (Ref 1). The FLEX pump suction will come from the RWST. The discharge will be into the CV/SI pump discharge line downstream of the CV/SI pump. The shortened time of 8 hrs for inventory satisfies the borated water makeup at the expected Xenon peak of 8-10 hrs, from WCAP-17601-P (Ref 1). A calculation will be required and tracked as an Open item for the timing of the boration and quantity required. The closure of this item will be documented in a future 6-month update. Electrical power to support the FLEX strategy is described in the Safety Function Support section. References: Ref 1 - WCAP-17601-P Rev 0, Reactor Coolant System Response to the Extended Loss of AC Power Event for Westinghouse, Combustion Engineering, & Babcock & Wilcox NSSS Designs, Section 5.8.1 dated August 2012. page 5-206.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation* Byron Station will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.
Identify modifications	*List modifications* The following FLEX modifications will be installed to support RCS inventory and boration. FLEX pump discharge: The B CV pump discharge header, downstream of check valve _CV8481B, will be modified with a tee. A header will be routed from the tee to the RWST tunnel hatch or alternate path and terminated with 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 can be electrically opened after the FLEX DG powers up the Div 2 ESF Bus. The B SI pump discharge header, downstream of _SI8921B, will be modified with a tee. A header will be routed from the tee to the RWST tunnel hatch or alternate path and terminated with standard FLEX connection (Primary). Deployment of the secondary flow path will be

<table>
<tr><th colspan="2">Maintain RCS Inventory Control</th></tr>
<tr><th colspan="2">PWR Portable Equipment Phase 2:</th></tr>
<tr><td></td><td>contingent on primary pressure conditions less than 1750 psig due to the SI discharge header relief valves. This flow path goes through normally opened MOVs that if closed can be manually realigned to establish flow

FLEX pump suction: The SI pump suction line from RWST will be modified with a tee. A header will be routed from the tee to the RWST tunnel hatch or alternate path and terminated with a standard FLEX connection.</td></tr>
<tr><td>Key Reactor Parameters</td><td>List instrumentation credited or recovered for this coping evaluation.

<table>
<tr><th>Essential Instrumentation</th><th>Safety Function</th></tr>
<tr><td>SG Pressure:
PI-515, PI-516, PI-525, PI-535, PI-545 and PI-546</td><td>RCS pressure boundary and pressure control</td></tr>
<tr><td>SG Level:
NR - LI-517, LI-519, LI-527, LI-537, LI-547 and LI-549
WR - LI-502 and LI-503</td><td>RCS pressure boundary and pressure control</td></tr>
<tr><td>RCS Temperature:
Cold Leg - TI-413B, TI-423B, TI-433B and TI-443B</td><td>RCS Heat Removal</td></tr>
<tr><td>RCS Pressure: WR - PI-403</td><td>RCS pressure boundary and pressure control</td></tr>
<tr><td>Containment Pressure: PI-PC005</td><td>Containment Integrity</td></tr>
<tr><td>SFP Level: (component # TBD)</td><td>SFP Inventory</td></tr>
</table>

Byron's evaluation of the FLEX strategy may 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 (NEI 12-06 Rev. 0 Section 3.2.1.10) and any difference will be communicated within a future 6-month update following identification.

In addition to the parameters listed in NEI 12-06 Rev. 0 Section 3.2.1.10, the following additional parameters will be evaluated for use as the detailed strategy is developed. Closure of this item will be communicated in a future 6-month update.</td></tr>
</table>

Maintain RCS Inventory Control	
PWR Portable Equipment Phase 2:	
	Core Exit Thermocouple (CET) Temperature: TI-IT002 RCS Accumulator Level: LI-951, LI-953, LI-955, and LI -957 Reactor Vessel Level Indicating System (RVLIS): LI-RC020 AFW Flow: FI-AF012A, FI-AF014A, FI-AF016A and FI-AF018A Battery Capacity / DC Bus Voltage: EI-DC002 Neutron Flux: NI-NR006A/B, NI-36B IR Reference: PWROG Generic FLEX Support Guidelines and Interfaces (Controlling Procedure Interface and Recommendation Instruments) Rev. 0, Supplement 14, dated December 2012 PA-PSC-0965.
Storage / Protection of Equipment: **Describe storage / protection plan or schedule to determine storage requirements**	
Seismic	*List Protection or schedule to protect* Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Rev. 0, Section 11. Schedule to construct permanent building is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to Byron Station.
Flooding Note: if stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level.	*List Protection or schedule to protect* Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Rev. 0, Section 11. Schedule to construct permanent building is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to Byron Station.
Severe Storms with High Winds	*List Protection or schedule to protect* Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Rev. 0, Section 11. Schedule to construct permanent building is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. Procedures and programs will be developed to address storage

Maintain RCS Inventory Control		
PWR Portable Equipment Phase 2:		
	structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to Byron Station.	
Snow, Ice, and Extreme Cold	*List Protection or schedule to protect* Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Rev. 0, Section 11. Schedule to construct permanent building is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to Byron Station.	
High Temperatures	*List Protection or schedule to protect* Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Rev. 0, Section 11. Schedule to construct permanent building is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to Byron Station.	
Deployment Conceptual Modification **(Attachment 3 contains Conceptual Sketches)**		
Strategy	**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
The required Flex Equipment needed for RCS Inventory will be installed in a Robust Flex building ready for quick hook up and use. Hoses and Electrical connections that will be completed as needed to support the coping strategy will be stored within the Flex building.	The storage structure conceptual design has not been completed and will be an Open Item. The closure of this item will be documented in a future 6-month update.	FLEX piping, valves, and connections (electrical & fluid) will meet NEI 12-06 Rev.0 protection requirements. There will be an administrative program created to protect the connections from blockage during outages and non-outage times.

Maintain RCS Inventory Control
PWR Portable Equipment Phase 2:
Notes: Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Once these have been fully developed, Exelon will update the integrated plan for Byron during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.

Maintain RCS Inventory Control

PWR Portable Equipment Phase 3:

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

Phases 1 and 2 strategy will provide sufficient capability such that no additional Phase 3 strategies are required.

Phase 3 equipment for Byron includes backup portable FLEX pumps and generators. The portable FLEX 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 FLEX 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 support component would be a portable refuel vehicle with a large diesel oil bladder to support refilling the FLEX diesel tanks.

Details:

Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation* Byron Station will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.
Identify modifications	*List modifications* There are no Phase 3 modifications required.
Key Reactor Parameters	*List instrumentation credited or recovered for this coping evaluation.*

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 Pressure: WR - PI-403	RCS pressure boundary and pressure control

Maintain RCS Inventory Control

PWR Portable Equipment Phase 3:

Containment Pressure: PI-PC005	Containment Integrity
SFP Level: (component # TBD)	SFP Inventory

Byron's evaluation of the FLEX strategy may 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 (NEI 12-06 Rev. 0 Section 3.2.1.10) and any difference will be communicated within a future 6-month update following identification.

In addition to the parameters listed in NEI 12-06 Rev. 0 Section 3.2.1.10, the following additional parameters will be evaluated for use as the detailed strategy is developed. Closure of this item will be communicated in a future 6-month update.

Core Exit Thermocouple (CET) Temperature: TI-IT002
RCS Accumulator Level: LI-951, LI-953, LI-955, and LI -957
Reactor Vessel Level Indicating System (RVLIS): LI-RC020
AFW Flow: FI-AF012A, FI-AF014A, FI-AF016A and FI-AF018A
Battery Capacity / DC Bus Voltage: EI-DC002
Neutron Flux: NI-NR006A/B, NI-36B IR

Reference:
PWROG Generic FLEX Support Guidelines and Interfaces (Controlling Procedure Interface and Recommendation Instruments) Rev. 0, Supplement 14, dated December 2012 PA-PSC-0965.

Deployment Conceptual Modification
(Attachment 3 contains Conceptual Sketches)

Strategy	**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
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 personnel and	No modifications are required other than those outlined in Phase 2 of this plan.	Byron will utilize Phase 2 connection points.

Maintain RCS Inventory Control		
PWR Portable Equipment Phase 3:		
plant personnel per the playbook. Equipment will then be operated per plant procedures.		
Notes: Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Once these have been fully developed, Exelon will update the integrated plan for Byron during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.		

Maintain Containment

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

- Containment Spray
- Hydrogen igniters (ice condenser containments only)

PWR Installed Equipment Phase 1:

Provide a general description of the coping strategies using installed equipment including modifications that are proposed to maintain containment. Identify methods (containment spray/Hydrogen igniter) and strategy(ies) utilized to achieve this coping time.

There are no Phase 1 actions required.

The limiting case for containment occurs when Auxiliary Feed flow is not established and the TAF is 2.6 hours results in the maximum calculated containment pressure is 27 psia. (Ref 1) This is below the Containment Design pressure of 50 psig. (Ref 2) The Containment maximum temperature is 218 °F. This is below the maximum calculated Containment temperature of 280 °F for a LBLOCA and 333 °F for a MSLB. UFSAR (Ref 2)
Additional calculations will be performed to evaluate containment response. This will be an open item. The closure of this item will be documented in a future 6-month update.

References:
Ref 1 - MAAP Analysis BW-MISC-009, dated November 1, 2011
Ref 2 - Byron/Braidwood Nuclear Stations Updated Final Safety Analysis Report (UFSAR) Revision 14, Section 6.2 dated December 2012

Details:

Provide a brief description of Procedures / Strategies / Guidelines	Byron Station will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.
Identify modifications	There are no phase 1 modifications required.
Key Containment Parameters	*List instrumentation credited or recovered for this coping evaluation.*

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	RCS pressure boundary and pressure control

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

Maintain Containment

WR - LI-502 and LI-503	
RCS Temperature: Cold Leg - TI-413B, TI-423B, TI-433B and TI-443B	RCS Heat Removal
RCS Pressure: WR - PI-403	RCS pressure boundary and pressure control
Containment Pressure: PI-PC005	Containment Integrity
SFP Level: (component # TBD)	SFP Inventory

Byron's evaluation of the FLEX strategy may 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 (NEI 12-06 Rev. 0 Section 3.2.1.10) and any difference will be communicated within a future 6-month update following identification.

In addition to the parameters listed in NEI 12-06 Rev. 0 Section 3.2.1.10, the following additional parameters will be evaluated for use as the detailed strategy is developed. Closure of this item will be communicated in a future 6-month update.

Core Exit Thermocouple (CET) Temperature: TI-IT002
RCS Accumulator Level: LI-951, LI-953, LI-955, and LI -957
Reactor Vessel Level Indicating System (RVLIS): LI-RC020
AFW Flow: FI-AF012A, FI-AF014A, FI-AF016A and FI-AF018A
Battery Capacity / DC Bus Voltage: EI-DC002
Neutron Flux: NI-NR006A/B, NI-36B IR

Reference:
PWROG Generic FLEX Support Guidelines and Interfaces (Controlling Procedure Interface and Recommendation Instruments) Rev. 0, Supplement 14, dated December 2012 PA-PSC-0965.

Notes: Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Once these have been fully developed, Exelon will update the integrated plan for Byron during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.

Maintain Containment

PWR Portable Equipment Phase 2:

Provide a general description of the coping strategies using on-site portable equipment including modifications that are proposed to maintain core cooling. Identify methods (containment spray/hydrogen igniters) and strategy(ies) utilized to achieve this coping time.

There are no Phase 2 actions required.

Details:

Provide a brief description of Procedures / Strategies / Guidelines

Confirm that procedure/guidance exists or will be developed to support implementation

Byron Station will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.

Identify modifications

List modifications

There are no Phase 2 modifications required.

Key Containment Parameters

List instrumentation credited or recovered for this coping evaluation.

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 Pressure: WR - PI-403	RCS pressure boundary and pressure control
Containment Pressure: PI-PC005	Containment Integrity
SFP Level: (component # TBD)	SFP Inventory

Byron's evaluation of the FLEX strategy may 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 (NEI 12-06 Rev. 0 Section 3.2.1.10) and any difference will be communicated within a future 6-month update following identification.

Maintain Containment	
	In addition to the parameters listed in NEI 12-06 Rev. 0 Section 3.2.1.10, the following additional parameters will be evaluated for use as the detailed strategy is developed. Closure of this item will be communicated in a future 6-month update. Core Exit Thermocouple (CET) Temperature: TI-IT002 RCS Accumulator Level: LI-951, LI-953, LI-955, and LI -957 Reactor Vessel Level Indicating System (RVLIS): LI-RC020 AFW Flow: FI-AF012A, FI-AF014A, FI-AF016A and FI-AF018A Battery Capacity / DC Bus Voltage: EI-DC002 Neutron Flux: NI-NR006A/B, NI-36B IR Reference: PWROG Generic FLEX Support Guidelines and Interfaces (Controlling Procedure Interface and Recommendation Instruments) Rev. 0, Supplement 14, dated December 2012 PA-PSC-0965.

Storage / Protection of Equipment: **Describe storage / protection plan or schedule to determine storage requirements**	
Seismic	*List Protection or schedule to protect* NA
Flooding	*List Protection or schedule to protect* NA
Severe Storms with High Winds	*List Protection or schedule to protect* NA
Snow, Ice, and Extreme Cold	*List Protection or schedule to protect* NA
High Temperatures	*List Protection or schedule to protect* NA

Deployment Conceptual Modification **(Attachment 3 contains Conceptual Sketches)**		
Strategy	**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
No deployment strategy is required.	No modifications are required.	No new connection points are required.

Maintain Containment
Notes: Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Once these have been fully developed, Exelon will update the integrated plan for Byron during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.

Maintain Containment

PWR Portable Equipment Phase 3:

Provide a general description of the coping strategies using phase 3 equipment including modifications that are proposed to maintain core cooling. Identify methods (containment spray/hydrogen igniters) and strategy(ies) utilized to achieve this coping time.

There are no Phase 3 actions required.

Details:

Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation* There are no Phase 3 actions required.
Identify modifications	*List modifications* There are no Phase 3 modifications required.
Key Containment Parameters	*List instrumentation credited or recovered for this coping evaluation.*

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 Pressure: WR - PI-403	RCS pressure boundary and pressure control
Containment Pressure: PI-PC005	Containment Integrity
SFP Level: (component # TBD)	SFP Inventory

Byron's evaluation of the FLEX strategy may 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 (NEI 12-06 Rev. 0 Section 3.2.1.10) and any difference will be communicated within a future 6-month update following identification.

In addition to the parameters listed in NEI 12-06 Rev. 0 Section 3.2.1.10, the following additional parameters will be evaluated for use as the detailed strategy is developed. Closure of this item will be communicated in a future 6-month update.

Maintain Containment	
	Core Exit Thermocouple (CET) Temperature: TI-IT002 RCS Accumulator Level: LI-951, LI-953, LI-955, and LI -957 Reactor Vessel Level Indicating System (RVLIS): LI-RC020 AFW Flow: FI-AF012A, FI-AF014A, FI-AF016A and FI-AF018A Battery Capacity / DC Bus Voltage: EI-DC002 Neutron Flux: NI-NR006A/B, NI-36B IR Reference: PWROG Generic FLEX Support Guidelines and Interfaces (Controlling Procedure Interface and Recommendation Instruments) Rev. 0, Supplement 14, dated December 2012 PA-PSC-0965.

Deployment Conceptual Modification **(Attachment 3 contains Conceptual Sketches)**		
Strategy	**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
No deployment strategy is required.	No modifications are required.	No new connection points are required.

Notes: Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Once these have been fully developed, Exelon will update the integrated plan for Byron during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.

Maintain Spent Fuel Pool Cooling	
Determine Baseline coping capability with installed coping[4] modifications not including FLEX modifications, utilizing methods described in Table 3-2 of NEI 12-06: • **Makeup with Portable Injection Source**	
PWR Installed Equipment Phase 1:	
Initial Spent Fuel Pool makeup will be accomplished with gravity drain from RWST. Procedure development will be tracked as an open item. The closure of this item will be documented in a future 6-month update. Spent Fuel Pool (SFP) makeup is not a time constraint with the initial condition of both units in Mode 1 at 100% power, since the worst case fuel pool heat load conditions only exist during a refueling outage. Under non-outage conditions, the maximum SFP heat load is 38.5 Mbtu/hr. Loss of SFP cooling with this heat load and an initial SFP temperature of 141 degrees F results in a time to boil of 7 hours, and 81.96 hours to the top of active fuel. Therefore, completing the equipment line-up for initiating SFP makeup within 12 hours into the event ensures adequate cooling of the spent fuel is maintained. The worst case SFP heat load during an outage is 61.4 Mbtu/hr. Loss of SFP cooling with this heat load and an initial SFP temperature of 163 degrees F results in a time to boil of 3.1 hours, and 50.16 hours to the top of active fuel. Therefore, completing the equipment line-up for initiating SFP make-up within 8 hours into the event ensures adequate cooling of the spent fuel is maintained. Operator judgment was 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, and will be provided in a future 6-month update. 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 6-month update References: 1. Byron/Braidwood Nuclear Stations Updated Final Safety Analysis Report (UFSAR) Revision 14, Table 9.1-1, dated December 2012.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	Byron Station will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.

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

<table>
<tr><td>Identify modifications</td><td>The Spent Fuel Pool level instrumentation will be installed in accordance with NRC Order Number EA 12-051 and NEI 12-02.</td></tr>
<tr><td>Key SFP Parameter</td><td>
<table>
<tr><th>Essential Instrumentation</th><th>Safety Function</th></tr>
<tr><td>SG Pressure:
PI-515, PI-516, PI-525, PI-535, PI-545 and PI-546</td><td>RCS pressure boundary and pressure control</td></tr>
<tr><td>SG Level:
NR - LI-517, LI-519, LI-527, LI-537, LI-547 and LI-549
WR - LI-502 and LI-503</td><td>RCS pressure boundary and pressure control</td></tr>
<tr><td>RCS Temperature:
Cold Leg - TI-413B, TI-423B, TI-433B and TI-443B</td><td>RCS Heat Removal</td></tr>
<tr><td>RCS Pressure: WR - PI-403</td><td>RCS pressure boundary and pressure control</td></tr>
<tr><td>Containment Pressure: PI-PC005</td><td>Containment Integrity</td></tr>
<tr><td>SFP Level: (component # TBD)</td><td>SFP Inventory</td></tr>
</table>

Byron's evaluation of the FLEX strategy may 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 (NEI 12-06 Rev. 0 Section 3.2.1.10) and any difference will be communicated within a future 6-month update following identification.

In addition to the parameters listed in NEI 12-06 Rev. 0 Section 3.2.1.10, the following additional parameters will be evaluated for use as the detailed strategy is developed. Closure of this item will be communicated in a future 6-month update.

Core Exit Thermocouple (CET) Temperature: TI-IT002
RCS Accumulator Level: LI-951, LI-953, LI-955, and LI -957
Reactor Vessel Level Indicating System (RVLIS): LI-RC020
AFW Flow: FI-AF012A, FI-AF014A, FI-AF016A and FI-AF018A
Battery Capacity / DC Bus Voltage: EI-DC002
Neutron Flux: NI-NR006A/B, NI-36B IR

Reference:
PWROG Generic FLEX Support Guidelines and Interfaces (Controlling Procedure Interface and Recommendation Instruments) Rev. 0, Supplement 14, dated December 2012 PA-PSC-0965.</td></tr>
</table>

Notes: Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Once these have been fully developed, Exelon will update the integrated plan for Byron during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.	

Maintain Spent Fuel Pool Cooling	
PWR Portable Equipment Phase 2:	
Provide a general description of the coping strategies using on-site portable equipment including modifications that are proposed to maintain spent fuel pool cooling. Identify methods (makeup via portable injection source) and strategy(ies) utilized to achieve this coping time. Spent Fuel Pool cooling will be achieved with a portable FLEX diesel pump. The FLEX pump suction will come from the RWST and/or UHS with make-up from Well Water. The discharge will be into the SFP. 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 6-month update. Electrical power required to support the Flex Strategy is described in Safety Function Support Section of the document.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation* Byron Station will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.
Identify modifications	*List modifications* Spent fuel pool cooling will be achieved with a portable FLEX diesel pump via a primary and secondary FLEX injection connections. The primary injection path will be through the SFP skimmer system. A tee connection will be installed on line 0FC29B upstream of 0FC8751. The pipe will be routed from this tee in the spent fuel pool skimmer room to the FHB north wall. The pipe will penetrate the north wall of the FHB and have a standard FLEX connection installed. The alternate injection path will be provided by installation of a standpipe adjacent to the SFP by the south wall with standard National Standard Tread (NST) connection. A pipe will be routed from the standpipe to the FHB south wall on the ground elevation. The pipe will penetrate the south wall of the FHB and have a standard FLEX connection installed. The NST connection will have a staged fire hose with a spray nozzle.

Maintain Spent Fuel Pool Cooling

Key SFP Parameter

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 Pressure: WR - PI-403	RCS pressure boundary and pressure control
Containment Pressure: PI-PC005	Containment Integrity
SFP Level: (component # TBD)	SFP Inventory

Byron's evaluation of the FLEX strategy may 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 (NEI 12-06 Rev. 0 Section 3.2.1.10) and any difference will be communicated within a future 6-month update following identification.

In addition to the parameters listed in NEI 12-06 Rev. 0 Section 3.2.1.10, the following additional parameters will be evaluated for use as the detailed strategy is developed. Closure of this item will be communicated in a future 6-month update.

Core Exit Thermocouple (CET) Temperature: TI-IT002
RCS Accumulator Level: LI-951, LI-953, LI-955, and LI -957
Reactor Vessel Level Indicating System (RVLIS): LI-RC020
AFW Flow: FI-AF012A, FI-AF014A, FI-AF016A and FI-AF018A
Battery Capacity / DC Bus Voltage: EI-DC002
Neutron Flux: NI-NR006A/B, NI-36B IR

Reference:
PWROG Generic FLEX Support Guidelines and Interfaces (Controlling Procedure Interface and Recommendation Instruments) Rev. 0, Supplement 14, dated December 2012 PA-PSC-0965.

Maintain Spent Fuel Pool Cooling	
Storage / Protection of Equipment: **Describe storage / protection plan or schedule to determine storage requirements**	
Seismic	*List Protection or schedule to protect* Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Rev. 0, Section 11. Schedule to construct permanent building is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to Byron Station.
Flooding	*List Protection or schedule to protect* Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Rev. 0, Section 11. Schedule to construct permanent building is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to Byron Station.
Severe Storms with High Winds	*List Protection or schedule to protect* Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Rev. 0, Section 11. Schedule to construct permanent building is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to Byron Station.
Snow, Ice, and Extreme Cold	*List Protection or schedule to protect* Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Rev. 0, Section 11. Schedule to construct permanent building is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion.

Maintain Spent Fuel Pool Cooling	
	Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to Byron Station.
High Temperatures	*List Protection or schedule to protect* Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Rev. 0, Section 11. Schedule to construct permanent building is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to Byron Station.

Deployment Conceptual Design **(Attachment 3 contains Conceptual Sketches)**		
Strategy	**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
The required Flex Equipment needed for SFP cooling will be installed in a Robust Flex building ready for quick hook up and use. Hoses and Electrical connections that will be completed as needed to support the coping strategy will be stored within the Flex building.	The storage structure conceptual design has not been completed and will be an Open Item. The closure of this item will be documented in a future 6-month update.	FLEX piping, valves, and connections (electrical & fluid) will meet NEI 12-06 Rev.0 protection requirements. There will be an administrative program created to protect the connections from blockage during outages and non-outage times.

Notes: Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Once these have been fully developed, Exelon will update the integrated plan for Byron during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.

Maintain Spent Fuel Pool Cooling

PWR Portable Equipment Phase 3:

Provide a general description of the coping strategies using phase 3 equipment including modifications that are proposed to maintain spent fuel pool cooling. Identify methods (makeup via portable injection source)and strategy(ies) utilized to achieve this coping time.

Phase 2 strategy will provide sufficient capability such that no additional Phase 3 strategies are required.

Phase 3 equipment for Byron includes backup portable FLEX pumps and generators. The portable FLEX 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 support component would be a portable refuel vehicle with a large diesel oil bladder to support refilling the FLEX diesel tanks.

Details:

Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation* Byron Station will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.
Identify modifications	There are no phase 3 modifications required.
Key SFP Parameter	

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 Pressure: WR - PI-403	RCS pressure boundary and pressure control
Containment Pressure: PI-PC005	Containment Integrity
SFP Level: (component # TBD)	SFP Inventory

Maintain Spent Fuel Pool Cooling	
	Byron's evaluation of the FLEX strategy may 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 (NEI 12-06 Rev. 0 Section 3.2.1.10) and any difference will be communicated within a future 6-month update following identification. In addition to the parameters listed in NEI 12-06 Rev. 0 Section 3.2.1.10, the following additional parameters will be evaluated for use as the detailed strategy is developed. Closure of this item will be communicated in a future 6-month update. Core Exit Thermocouple (CET) Temperature: TI-IT002 RCS Accumulator Level: LI-951, LI-953, LI-955, and LI -957 Reactor Vessel Level Indicating System (RVLIS): LI-RC020 AFW Flow: FI-AF012A, FI-AF014A, FI-AF016A and FI-AF018A Battery Capacity / DC Bus Voltage: EI-DC002 Neutron Flux: NI-NR006A/B, NI-36B IR Reference: PWROG Generic FLEX Support Guidelines and Interfaces (Controlling Procedure Interface and Recommendation Instruments) Rev. 0, Supplement 14, dated December 2012 PA-PSC-0965.

Deployment Conceptual Design (Attachment 3 contains Conceptual Sketches)		
Strategy	**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
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 personnel and plant personnel per the playbook. Equipment will then be operated per plant procedures.	No modifications are required other than those outlined in Phase 2 of this plan.	Byron will utilize Phase 2 connection points.

Maintain Spent Fuel Pool Cooling
Notes: Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Once these have been fully developed, Exelon will update the integrated plan for Byron during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.

Safety Functions Support	
Determine Baseline coping capability with installed coping[5] modifications not including FLEX modifications.	
PWR Installed Equipment Phase 1	
Provide a general description of the coping strategies using installed equipment including station modifications that are proposed to maintain and/or support safety functions. Identify methods and strategy(ies) utilized to achieve coping times. 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 present 125VDC battery coping time is approximately 3 hours 36 minutes, without load shedding and can be extended to 5 hours 40 minutes with deep load shedding (Ref. 1) consistent with procedure _BCA 0.0. Loss of all AC Power. References: Ref 1 – Byron EC Evaluation 391872, Battery Coping Time For The 125v DC ESF Battery Banks, dated 2/8/13	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* Byron Station will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.
Identify modifications	There are no Phase 1 modifications required.
Key Parameters	No identified key parameters. Byron's evaluation of the FLEX strategy may identify parameters that are needed in order to support key actions identified in the plant procedures/guidance or to indicate imminent or actual core damage (NEI 12-06 Rev. 0 Section 3.2.1.10) and any difference will be communicated within a future 6-month update following identification.
Notes: Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Once these have been fully developed, Exelon will update the integrated plan for Byron during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.	

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

Safety Functions Support	
PWR Portable Equipment Phase 2	
Provide a general description of the coping strategies using on-site portable equipment including station modifications that are proposed to maintain and/or support safety functions. Identify methods and strategy(ies) utilized to achieve coping times. A portable diesel generator will provide power to one division of the 480V ESF busses. Repowering at this level will permit the recovery of one division of station battery chargers, DDAFP battery chargers, and MCC's powering critical equipment such as Diesel fuel oil transfer pumps, and other ESF equipment beneficial to mitigate the event. Exelon Generation Company, LLC (Exelon) intends on maintaining the Operational Command and Control function within the Main Control Room. Habitability conditions will be evaluated and a strategy will be developed to maintain Main Control Room habitability. The strategy and associated support analyses will be provided in a future 6-month update. 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 are open items and will be addressed as part of the detailed engineering design phase. The closure of these items will be documented in a future 6-month update. Additionally, a backup water source for core cooling, inventory, and SFP makeup will be established with a portable FLEX diesel pump and temporary hoses from the UHS. A Dry Hydrant will be installed at the UHS to support this strategy.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation with a description of the procedure / strategy / guideline.* Byron Station will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.
Identify modifications	*List modifications necessary for phase 2* The following modifications will be installed to support FLEX generator repowering station DC batteries: One 480V ESF bus on each unit will be re-powered with a portable FLEX generator. The primary FLEX connection will be at the FLEX building outside of the FHB outer wall. From the FLEX connection installed cables will be routed through the FHB and AUX building to the 480V ESF bus. At the bus, a spare breaker will be modified to function as a feed breaker. The alternate FLEX connection will consist of a patch panel mounted

Safety Functions Support	
PWR Portable Equipment Phase 2	
	directly to the 480 V ESF bus. Cables and a portable generator will be staged supporting timely re-powering of the bus consistent with the site's timeline. A dry hydrant will be installed in the UHS with a Flex Connection on it as a source of makeup water for use with a portable FLEX diesel pump. The well water pump will have a Flex Connection added to the discharge as a source of clean makeup water. Electrical connection via spare breaker for UHS 480v Substation for a FLEX DG to repower the UHS 480 Substation for a deep well pump.
Key Parameters	*List instrumentation credited or recovered for this coping evaluation.* No identified key parameters. Byron's evaluation of the FLEX strategy may identify parameters that are needed in order to support key actions identified in the plant procedures/guidance or to indicate imminent or actual core damage. Reference NEI 12-06 Rev. 0, Section 3.2.1.10 and any difference will be communicated within a future 6-month update following identification.
Storage / Protection of Equipment : **Describe storage / protection plan or schedule to determine storage requirements**	
Seismic	*List Protection or schedule to protect* Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Rev. 0, Section 11. Schedule to construct permanent building is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to Byron Station.
Flooding Note: if stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level.	*List Protection or schedule to protect* Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Rev. 0, Section 11. Schedule to construct permanent building is contained in Attachment 2, and will satisfy the site compliance date.

Safety Functions Support	
PWR Portable Equipment Phase 2	
	Temporary locations will be used until building construction completion. Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to Byron Station.
Severe Storms with High Winds	*List Protection or schedule to protect* Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Rev. 0, Section 11. Schedule to construct permanent building is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to Byron Station.
Snow, Ice, and Extreme Cold	*List Protection or schedule to protect* Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Rev. 0, Section 11. Schedule to construct permanent building is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to Byron Station.
High Temperatures	*List Protection or schedule to protect* Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Rev. 0, Section 11. Schedule to construct permanent building is contained in Attachment 2, and will satisfy the site compliance date. Temporary locations will be used until building construction completion. Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to Byron Station.

Safety Functions Support		
PWR Portable Equipment Phase 2		
Deployment Conceptual Design **(Attachment 3 contains Conceptual Sketches)**		
Strategy	**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
The required Support Equipment needed for AC Phase 2 implementation will be installed in a Robust Flex building ready for quick hook up and use. Hoses and Electrical connections that will be completed as needed to support the coping strategy will be stored within the Flex building. Equipment for the UHS FLEX support will be staged in a robust building and will be deployed to a pre-identified staging location with a debris removal tool like the F-750 with snowplow or equivalent machine. Hoses and electrical connections will be completed as needed to support the site coping strategy.	The storage structure conceptual design has not been completed and will be an Open Item. The closure of this item will be documented in a future 6-month update.	FLEX piping, valves, and connections (electrical & fluid) will meet NEI 12-06 Rev.0 protection requirements. There will be an administrative program created to protect the connections from blockage during outages and non-outage times.
Notes: Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Once these have been fully developed, Exelon will update the integrated plan for Byron during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.		

Safety Functions Support	
PWR Portable Equipment Phase 3	
Provide a general description of the coping strategies using phase 3 equipment including modifications that are proposed to maintain and/or support safety functions. Identify methods and strategy(ies) utilized to achieve coping times. Phase 2 strategy will provide sufficient capability such that no additional Phase 3 strategies are required. Phase 3 equipment for Byron includes backup portable FLEX pumps and generators. The portable FLEX 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 FLEX 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 support component would be a portable refuel vehicle with a large diesel oil bladder to support refilling the FLEX diesel tanks.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	Byron Station will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.
Identify modifications	There are no phase 3 modifications required.
Key Parameters	No identified key parameters. Byron's evaluation of the FLEX strategy may identify parameters that are needed in order to support key actions identified in the plant procedures/guidance or to indicate imminent or actual core damage. Reference NEI 12-06 Rev. 0 Section 3.2.1.10 and any difference will be communicated within a future 6-month update following identification.

Safety Functions Support		
PWR Portable Equipment Phase 3		
Deployment Conceptual Design **(Attachment 3 contains Conceptual Sketches)**		
Strategy	**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
Equipment and consumables 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 personnel and plant personnel per the playbook. Equipment will then be operated per plant procedures.	No modifications are required other than those outlined in Phase 2 of this plan.	Byron will utilize Phase 2 connection points.
Notes: Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Once these have been fully developed, Exelon will update the integrated plan for Byron during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.		

PWR Portable Equipment Phase 2							
Use and (potential / flexibility) diverse uses						*Performance Criteria*	*Maintenance*
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		Maintenance / PM requirements
Four (4) 480 VAC Generator				**X**	**X**	500kW Per conceptual design	Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11.
Three (3) High Head Flex Pump	**X**					40 gpm at 1500 psia At the injection point to the RCS per WCAP 17601-P	Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11.
Three (3) Medium Head FLEX pump	**X**					300 gpm at 300 psia At the injection point to the Steam Generators per WCAP 17601-P	Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11.

PWR Portable Equipment Phase 2							
Use and (potential / flexibility) diverse uses						*Performance Criteria*	*Maintenance*
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		Maintenance / PM requirements
Two (2) Portable diesel FLEX pumps	X		X			1100 gpm at 500 ft head General Usage	Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11.
Six (6) Portable 5500 watt DGs	X	X	X	X	X	5500 watt General Usage	Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11.
One (1) F-750 Ford Truck	X	X	X	X	X	Debris Removal and Refuel delivery capability General Usage	Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11.

PWR Portable Equipment Phase 2							
Use and (potential / flexibility) diverse uses						*Performance Criteria*	*Maintenance*
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		Maintenance / PM requirements
Three (3) Diesel Trash Pumps	X	X	X	X	X	General Usage	Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11.
Three (3) Satellite phones	X	X	X	X	X	Iridium 9555 General Usage	Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11.
Six (6) 42" Electric Box Fans			X	X	X	General Usage	Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11.

PWR Portable Equipment Phase 2							
Use and (potential / flexibility) diverse uses						*Performance Criteria*	*Maintenance*
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		Maintenance / PM requirements
Ten (10) 20" portable electric vent fans			**X**	**X**	**X**	General Usage	Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11.

PWR Portable Equipment Phase 3							
Use and (potential / flexibility) diverse uses						*Performance Criteria*	*Notes*
Note: The RRC equipment has not been procured at the time of this submittal. The equipment listed is a generic list provided by the RRC and even though Byron may not require this equipment in its plan it will be available and could be utilized in the Phase 3 time period. Once the SAFER committee determines the equipment specifications for bid, updates will be made as necessary to this table. The Phase 3 portable equipment table will be updated once all of the equipment has been procured and placed in inventory.							
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		
Medium Voltage Diesel Generator	X	X	X	X	X	2 MW output at 4160 Vac, three phase	• Generator must be common commercially available. • Must run on diesel fuel.
Low Voltage Diesel Generator	X	X	X	X	X	500 kW output at 480 Vac, three phase	• Generator must be common commercially available. • Must run on diesel fuel.
Positive displacement High Pressure Pumps (PWR only)	X					1000-3000 psi shutoff head, 60 gpm capacity	Must run on diesel fuel
Low Pressure Pump	X	X	X			300 psi shutoff head, 2500 gpm max flow	
Low Pressure Pump	X		X			500 psi shutoff head, 500 gpm max flow	

Low Pressure Pump					X	110 psi shutoff head, 400 gpm max flow submersible	
Low Pressure Pump	X	X				150 psi shutoff head, 5000 gpm max flow	
Air Compressor		X				120 psi minimum pressure, 2000 scfm	
			Industry Standard RRC Order				

Phase 3 Response Equipment/Commodities	
Item	**Notes**
Radiation Protection Equipment • Survey instruments • Dosimetry • Off-site monitoring/sampling	The RRC will not stock this type of equipment but this equipment will be requested from site-to-site and utility-to-utility on an as required basis.
Commodities • Food • Potable water	The RRC will not stock these commodities but they will be requested from site-to-site and utility-to-utility on an as required basis.
Fuel Requirements	300 – 500 gallon bladders that can be delivered by air
Heavy Equipment 1. Transportation equipment 2. Debris clearing equipment	• TBD during site specific playbook development • Redundant Phase 2 equipment to be located at RRC

Attachment 1A
Sequence of Events Timeline

Action item	Elapsed Time	Action	Time Constraint Y/N [6]	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 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	5-15 mins	Verify DDAF Pp is operating properly.	Y – 1 hour	_BCA 0.0, Loss of All AC Power, action.
4	10-30 mins	Attempt starting Emergency D/Gs.	NA	_BCA 0.0, Loss of All AC Power, action.
5	30 mins	ELAP condition recognized and ELAP Procedures are entered.	NA	_BCA 0.0, Loss of All AC Power, attachment B for ELAP
6	30 mins to 3.6 hrs	Connect FLEX 480V AC generators to ESF bus _32X and verify they are supplying power to Div 2 - 125V DC battery chargers.	Y – 3.6 hrs	Reference: EC-EVAL # 391872 Battery Coping Time For The 125V DC ESF Battery Banks, dated February 8, 2013
7	1.5 hrs	Start depressurization of SGs to 300 psia at a minimum of 75°F/hr cooldown with SG PORV local/manual operation. SG feed is controlled with Local/Manual operation of AFW flow control valves.	Y - 1.5 hrs	_BCA 0.0, Loss of All AC Power, action.

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

8	2.25 hrs	SI Accumulator borated water begins to inject into the RCS	NA	Operator Judgment
9	3-6 hrs	Connect high pressure FLEX Pumps and ensure they are available to supplying borated make-up to the RCS.	N	
10	3 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
11	6 – 12 hrs	Connect FLEX Pump and ensure it is available to supplying makeup to the SFP.	NA	
12	12 hrs	Connect FLEX Pumps and ensure they are available to supplying makeup to the SGs.	NA	
13	24 hrs	Set up FLEX pump suction from UHS.	NA	
14	24 hrs	Regional Response Center (RRC) resources begin arriving on site.	NA	
15	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 1B
NSSS Significant Reference Analysis Deviation Table

Item	Parameter of interest	WCAP value (WCAP-17601-P August 2012 Revision 0)	WCAP page	Plant applied value	Gap and discussion
1	Time to begin the cooldown	WCAP has a delay of 2 hours	4-14	1.5 hours	From the MAAP Analysis BB-MISC-020 the cooldown begins early due to the secondary inventory available in the Original Steam Generators, (OSGs) on U-2

Attachment 2
Milestone Schedule

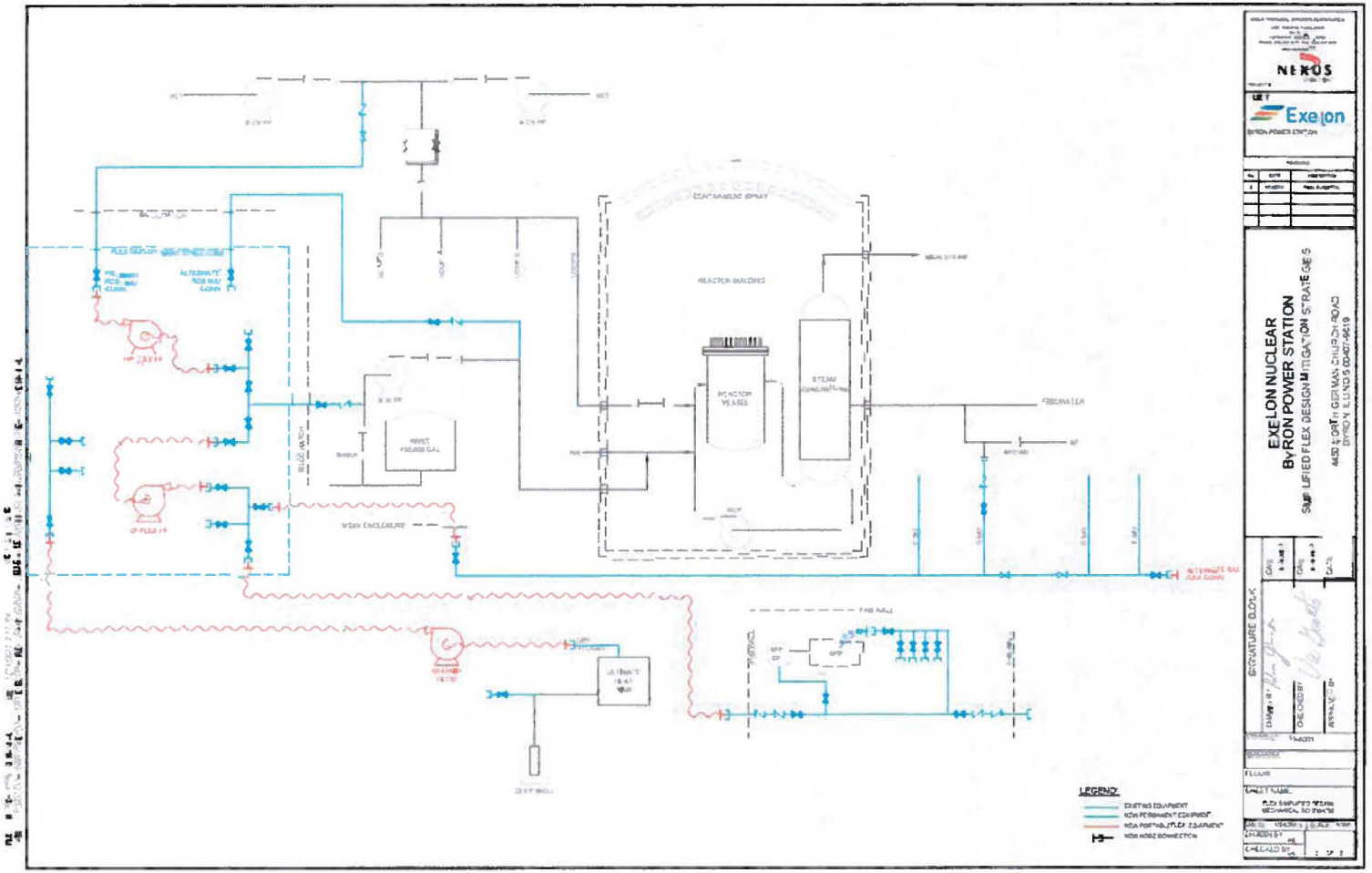
Site: Byron

Original Target Completion Date		Activity	Status {Include date changes in this column}
		Submit 60 Day Status Report	Complete
		Submit Overall Integrated Implementation Plan	Complete
		Contract with RRC	Complete
Recurring action, Aug and Feb		Submit 6 month updates	Ongoing
Unit 1	Unit 2	Modification Development	
Aug 2014	Dec 2013	• Phase 1 modifications	Conceptual Design I/P
Aug 2014	Dec 2013	• Phase 2 modifications	Conceptual Design I/P
Aug 2014	Dec 2013	• Phase 3 modifications	Note 1
Unit 1	Unit 2	Modification Implementation	
Sept 2015	Oct 2014	• Phase 1 modifications	Note 1
Sept 2015	Oct 2014	• Phase 2 modifications	Note 1
Sept 2015	Oct 2014	• Phase 3 modifications	Note 1
		Procedure development	
Oct 2014		• Strategy procedures	Note 1
Oct 2014		• Maintenance procedures	Note 1
Jun 2014		Staffing analysis	Note 1
Oct 2014		Storage Plan and construction	Note 1
Oct 2014		FLEX equipment acquisition	Note 1
Oct 2014		Training completion	Note 1
Aug 2014		Regional Response Center Operational	(will be a standard date from RRC)
Sept 2015		Unit 1 Implementation date	Note 1
Oct 2014		Unit 2 Implementation date	Note 1

Note(s):

1. Exelon will update the status of ongoing and future milestones in the Integrated Plan for Byron Station during a scheduled 6-month update. This update will include any changes to the milestone schedule as submitted in the February 28, 2013 Integrated Plan.

Attachment 3
Conceptual Sketches (Byron Mechanical)



Attachment 3
Conceptual Sketches (Byron Electrical)