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Anthony J. Vitale
Site Vice President

PNP 2013-010

February 28, 2013

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

SUBJECT: Overall Integrated Plan in Response to March 12, 2012 Commission Order to Modify Licenses With Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)

Palisades Nuclear Plant
Docket No. 50-255
License No. DPR-20

REFERENCES:

1. NRC Order Number EA-12-049, *Order To Modify Licenses With Regard To Requirements For Mitigation Strategies For Beyond-Design-Basis External Events*, dated March 12, 2012 (ADAMS Accession No. ML12054A736)
2. NRC Interim Staff Guidance JLD-ISG-2012-01, *Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events*, Revision 0, dated August 29, 2012 (ADAMS Accession No. ML12229A174)
3. NEI 12-06, Revision 0, *Diverse and Flexible Coping Strategies (FLEX) Implementation Guide*, Revision 0, dated August 2012 (ADAMS Accession No. ML12242A378)
4. Entergy letter to NRC (PNP 2012-091), *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 (ADAMS Accession No. ML12300A065)

**This is a public version of the submittal,
with information redacted in accordance with 10 CFR 2.390.**

Dear Sir or Madam:

On March 12, 2012, the NRC issued an order (Reference 1) to Entergy Nuclear Operations, Inc. (ENO). Reference 1 was immediately effective and requires provisions for mitigating strategies for beyond-design-basis external events. Specific requirements are outlined in the Enclosure of Reference 1.

Reference 1 requires submission of an overall integrated plan by February 28, 2013. The NRC Interim Staff Guidance (Reference 2) was issued August 29, 2012, and 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. The purpose of this letter is to provide the overall integrated plan pursuant to Section IV, Condition C.1.a, of Reference 1.

Reference 3, Section 13, contains submittal guidance for the overall integrated plan. The attachment to this letter provides the Palisades Nuclear Plant (PNP) Overall Integrated Plan pursuant to Reference 3.

Reference 4 provided the PNP initial status report regarding Mitigation Strategies for Beyond-Design-Basis External Events, as required by Reference 1. ENO has not yet identified any impediments to compliance with the Order, i.e., within two refueling cycles after submittal of the integrated plan, or December 31, 2016, whichever comes first. Future status reports will be provided as required by Section IV, Condition C.2, of Reference 1.

This letter contains no new regulatory commitments.

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

Sincerely,

ajv/jse

Enclosure: Palisades Nuclear Plant FLEX Integrated Plan

cc: Office Director, NRR, USNRC
Administrator, Region III, USNRC
Project Manager, Palisades, USNRC
Resident Inspector, Palisades, USNRC

PNP 2013-010

ENCLOSURE

PALISADES NUCLEAR PLANT FLEX INTEGRATED PLAN

FEBRUARY 2013

95 Pages Follow

General Integrated Plan Elements	
Determine Applicable Extreme External Hazard **References: NEI 12-06 Section 4.0 - 9.0, JLD-ISG-2012-01 Section 1.0**	*Input the hazards applicable to the site; seismic, external flood, high winds, snow, ice, cold, high temps.* *Describe how NEI 12-06 Sections 5 through 9 (Reference G1) were applied and the basis for why the plant screened out for certain hazards.* The hazards considered applicable to Palisades Power Plant are 1) seismic events, 2) external flooding, 3) severe storms with high winds, 4) snow, ice and extreme cold, and 5) high temperatures. **All items are discussed in more detail in Reference G8, Section 3.** ***<u>Seismic:</u>*** Per the UFSAR (Reference G2) seismic input, the seismic criteria for Palisades includes two (2) design basis earthquake spectra: OBE and SSE. A conservative SSE having peak horizontal ground acceleration at the surface of 0.05 g is the recommended value. However, to be conservative a hypothetical SSE of 0.2 g has been selected for designs and analyses, per UFSAR Section 2.4.4. The design basis values from the UFSAR will be used for Palisades' FLEX strategies. Thus the Palisades site screens in for the seismic hazard. The Palisades UFSAR does not explicitly address soil liquefaction. Flood and seismic re-evaluations pursuant to the 10 CFR 50.54(f) letter of March 12, 2012 (Reference G3) are currently in progress and will consider soil liquefaction. This is an open item tracked by OI1. In summary, per the FLEX guidance, seismic impact must be considered for all nuclear plant sites. As a result, the credited FLEX equipment needs to be assessed based on the current PLP seismic licensing basis to ensure that equipment remains accessible and available after a BDBEE, and that the FLEX equipment does not become a target or source of a seismic interaction from other SSCs. This assessment needs to include documentation ensuring that any storage location and deployment routes meet the FLEX criteria.

External Flood:

The flood assessment for the Palisades site provided in the UFSAR (Reference G2) considered flooding due to high levels in Lake Michigan, high rainfall, seismically-induced floods, wind-generated waves concurrent with flooding, and significant flooding in rushes called seiches. High tides, hurricane surges, and tsunamis were determined to not affect the site due to the inland location.

Ground level elevation for Palisades is 590 ft MSL. The PMF for Palisades including a sieche event is 594.1 ft. All plant equipment that will be used for FLEX is protected against a flood to a level of 594.4 ft per UFSAR Section 2.2. A sieche event is short in duration and is predicted to be less than 30 minutes in duration. Thus the Palisades site screens in for the external flooding hazard.

In summary, while the safety-related equipment is protected from the PMF, all safety-related structures are not located above this elevation and all structures are susceptible to the seiche levels. Therefore, the Palisades site is not considered a "dry" site and is susceptible to external flood. Accordingly, FLEX strategies will be developed for consideration of external flooding hazards. In addition, Palisades is also developing procedures and strategies for delivery of offsite FLEX equipment during Phase 3, which considers regional impacts from flooding.

High Winds:

Per the UFSAR (Reference G2) Figure 1-1, Sheet 1, the Palisades site is contained within a box with corner coordinates 42˚18' N, -086˚18' W and 42˚20' N, -086˚19' W. Based on these coordinates, Palisades will consider a maximum wind speed of 200 mph for FLEX per NEI 12-06 (Reference G1) Figure 7-1 and 7-2. Thus the Palisades site screens in for the high winds hazard.

The design basis tornado for Palisades uses a tangential wind speed of 300 mph per UFSAR Section 2.5.1.4.

In summary, based on the available locale data and Figures 7-1 and 7-2 of NEI 12-06, Palisades is susceptible to severe storms with high winds.

Extreme Cold:

Per the FLEX guidance all sites should consider the temperature ranges and weather conditions for their site in storing and deploying their FLEX equipment. That is, the equipment procured should be suitable for use in the anticipated range of conditions with normal design practices.

	The guidance provided in NEI 12-06 (Reference G1), Section 8.2.1 state that plants above the 35th parallel must consider extreme cold and snowfall. Per the UFSAR (Reference G2) Figure 1-1, Sheet 1 Palisades' is located between 42˚18' N and 42˚20' N, which is above the 35th parallel. Thus the Palisades site screens in for the extreme cold hazard. Per the UFSAR Figure 1-1, Sheet 1, the Palisades is contained within a box with corner coordinates 42˚18' N, -086˚18' W and 42˚20' N, -086˚19' W. Based on these coordinates, Palisades is a Level 5 region as defined by Figure 8-2 of NEI 12-06. Thus the Palisades site screens in for the extreme ice storm hazard. Equipment will need to be maintained at a temperature that will ensure its function. Extreme Heat: Due to Palisades' proximity to Lake Michigan, the site experiences cooler temperatures than most locations in their region, the 10 year maximum temperature is 95°F per UFSAR Section 2.5 (Reference G2). However, the guidance in NEI 12-06 (Reference G1) Section 9.2 states that all sites within the continental United States will address the high temperature scenarios. Thus the Palisades site screens in for the extreme heat hazard.
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 (Reference G3) are not completed and therefore not assumed in this submittal. As the re-evaluations are completed, appropriate issues will be entered into the corrective action system and addressed on a schedule commensurate with other licensing bases changes.* *Exceptions for the site security plan or other (license/site specific) requirements of 10CFR (Reference G3) may be required.* *Deployment resources are assumed to begin arriving at hour 6 and fully staffed by 24 hours.* *Certain Technical Specifications cannot be complied with during FLEX implementation.* **All items are discussed in more detail in Reference G8, Section 2.3.** Assumptions are consistent with those detailed in NEI 12-06 (Reference G1), Section 3.2.1 and the Executive Summary of the PWROG Core Cooling Position Paper, OG-12-482 (Reference G14). Key industry guidance and

site-specific assumptions are presented here:

NEI 12-06 (Reference G1) Assumptions

Initial Plant Conditions

The initial plant conditions are assumed to be the following:

A1. Prior to the event the reactor has been operating at 100 percent rated thermal power for at least 100 days or has just been shut down from such a power history as required by plant procedures in advance of the impending event.

A2. At the time of the postulated event, the reactor and supporting systems are within normal operating ranges for pressure, temperature, and water level for the appropriate plant condition. All plant equipment is either normally operating or available from the standby state as described in the plant design and licensing basis.

Initial Conditions

The following initial conditions are to be applied:

A3. No specific initiating event is used. The initial condition is assumed to be a LOOP at a plant site resulting from an external event that affects the off-site power system either throughout the grid or at the plant with no prospect for recovery of off-site power for an extended period. The LOOP is assumed to affect all units at a plant site.

A4. All installed sources of emergency on-site ac power and SBO Alternate ac power sources are assumed to be not available and not imminently recoverable.

A5. Cooling and makeup water inventories contained in systems or structures with designs that are robust with respect to seismic events, floods, and high winds, and associated missiles are available.

A6. Normal access to the ultimate heat sink is lost, but the water inventory in the UHS remains available and robust piping connecting the UHS to plant systems remains intact. The motive force for UHS flow, i.e., pumps, is assumed to be lost with no prospect for recovery.

A7. Fuel for FLEX equipment stored in structures with designs which are robust with respect to seismic events, floods and high winds and associated missiles, remains available.

A8. Permanent plant equipment that is contained in structures with designs that are robust with respect

	to seismic events, floods, and high winds, and associated missiles, are available. A9. Other equipment, such as portable ac power sources, portable back up dc power supplies, spare batteries, and equipment for 50.54(hh)(2), may be used provided it is reasonably protected from the applicable external hazards per Sections 5 through 9 and Section 11.3 of NEI 12-06 (Reference G1) and has predetermined hookup strategies with appropriate procedures/guidance and the equipment is stored in a relative close vicinity of the site. A10. Installed electrical distribution system, including inverters and battery chargers, remain available provided they are protected consistent with current station design. A11. No additional events or failures are assumed to occur immediately prior to or during the event, including security events. A12. Reliance on the fire protection system ring header as a water source is acceptable only if the header meets the criteria to be considered robust with respect to seismic events, floods, and high winds, and associated missiles. **Reactor Transient** The following additional boundary conditions are applied for the reactor transient: A13. Following the loss of all ac power, the reactor automatically trips and all rods are inserted. A14. The main steam system valves (such as main steam isolation valves, turbine stops, atmospheric dumps, etc.), necessary to maintain decay heat removal functions operate as designed. A15. S/RVs or PORVs initially operate in a normal manner if conditions in the PCS so require. Normal valve reseating is also assumed. A16. No independent failures, other than those causing the ELAP/LUHS event, are assumed to occur in the course of the transient. **Primary Coolant Inventory Loss** Sources of expected PWR reactor coolant inventory loss include: A17. Normal system leakage A18. Losses from letdown unless automatically isolated or until isolation is procedurally directed

	A19. Losses due to primary coolant pump seal leakage (rate is dependent on the PCP seal design) **SFP Conditions** The initial SFP conditions are: A20. All boundaries of the SFP are intact, including the liner, gates, transfer canals, etc. A21. Although sloshing may occur during a seismic event, the initial loss of SFP inventory does not preclude access to the refueling deck around the pool. A22. SFP cooling system is intact, including attached piping. **Containment Isolation Valves** It is assumed that the containment isolation actions delineated in current station blackout coping capabilities is sufficient. **PWROG PSC - ELAP CORE TEAM Core Cooling Management Interim Position Paper Assumptions** The key assumptions associated with secondary cooling: A23. The installed (design) ac independent AFW/EFW system will function for the mission time required to stage the portable pump following initiation of ELAP event. A24. The portable SG feed system is capable of maintaining SG level at the PCS pressure required to prevent nitrogen injection from the NSSS applicable passive injection system - CLA, SIT, or CFT – generic capability of 300 gpm at 300 psig at SG injection point. A25. The portable SG feed system is capable of maintaining SG level at the PCS temperature required to maintain the reactor subcritical prior to PCS boration. A26. The steam relief capability will support the PCS cooldown rate as defined in the NSSS generic ELAP analysis. A27. The steam relief capability will maintain the final PCS temperature defined in the NSSS generic ELAP analysis. The following assumptions are specific to the Palisades site: A28. Palisades will be able to declare ELAP within 1 hour in order to enable actions that place the plant outside of the current design and licensing basis.

	A29. Flood and seismic re-evaluations pursuant to the 10 CFR 50.54(f) letter of March 12, 2012 (Reference G3) are not completed and therefore not assumed in this submittal. As the re-evaluations are completed, appropriate issues will be entered into the corrective action system and addressed on a schedule commensurate with other licensing bases changes. A30. Exceptions to the site security plan or other (license/site specific) requirements of a nature requiring NRC approval will be communicated in a future six-month update following identification. A31. Required staffing levels will be determined consistent with guidance contained in NEI 12-06 for each of the site specific FLEX strategies. Assumed available staffing levels will be determined consistent with NEI 12-01, as described below. The event impedes site access as follows: a. Post event time: 6 hours – No site access. This duration reflects the time necessary to clear roadway obstructions, use different travel routes, mobilize alternate transportation capabilities (e.g., private resource providers or public sector support), etc. b. Post event time: 6 to 24 hours – Limited site access. Individuals may access the site by walking, personal vehicle or via alternate transportation capabilities (e.g., private resource providers or public sector support). c. Post event time: 24+ hours – Improved site access. Site access is restored to a near-normal status and/or augmented transportation resources are available to deliver equipment, supplies and large numbers of personnel. These results will be compared to confirm this assumption, or adjustments will be made to plant staffing or FLEX design to meet this requirement. A32. The designed hardened connections are protected against external events or are established at multiple and diverse locations. A33. Margin will be added to design FLEX components and hard connection points to address future requirements as re-evaluation warrants (margin will be determined during the detailed design or evaluation process). Portable FLEX components will be procured commercially. A34. No additional events or single failures of SSCs beyond those described in NEI 12-06 (Reference G1) are assumed to occur immediately prior to or

	during the event, including security events. A35. 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/or with its Security Plan, and, as such, may warrant invocation of 10 CFR 50.54(x) and/or 10 CFR 73.55(p).
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.* Palisades has no known deviations to the guidelines in JLD-ISG-2012-01 (Reference G5). Palisades is taking a deviation from Section 3.2.2(13) of NEI 12-06 (Reference G1) in order to use installed charging pumps versus a portable pump for PCS makeup; this is in line with NEI 12-06 Table D-1 (Reference G1). This deviation is discussed in more detail in the PCS inventory control section. If any additional deviations are identified, then the deviations will be communicated in a future six-month update following identification. A milestone schedule can be found in Attachment 2.

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 walkthrough of deployment).* *A milestone schedule is outlined in Attachment 2.* *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)* **All items are discussed in more detail in Reference G8, Section 5.** The sequence of events and any associated time constraints are identified below for Palisades' Modes 1-4 strategies for FLEX Phase 1 through Phase 3. These actions are more bounding when compared to the Modes 5 and 6 and full core offload scenarios as they require the most personnel, actions, and time constraints. See attached sequence of events timeline (Attachment 1A) for a summary of this information. The times identified to initiate each action in this section and in Attachment 1A are based on resource loading to allow completion of all actions prior to their individual time constraints. Time critical completion times are included. Palisades' timeline is outlined in Attachment 1A. A timeline walkthrough will be completed when detailed design and site strategy is finalized. 1. At the beginning of the event (hour 0.25), several automatic actions will have taken place (i.e. insert all rods, shut MSIVs, trip turbine, commence feeding with the Turbine Driven Auxiliary Feedwater Pump [TDAFWP] etc.). Operators need to verify that all automatic actions have been completed as expected. 2. At hour 0.50, dispatch available personnel to prepare vehicles and start moving debris to ensure access is available for FLEX equipment. Though this is done prior to declaring the ELAP, this action will need to be done pre-emptively to ensure sufficient time is available for subsequent steps. 3. At hour .50, when it is clear that the site diesel generators will not start, dc load shed will commence to extend the battery life to 4 hours. This load shed must be completed by 2 hours. **Commencing and completing the dc load shed are time critical actions.**

	4. At hour 0.50, initiate monitoring of Control Room temperature. SOP-24 (Reference G13) directs operators to open the Control Room doors and establish alternate Control Room ventilation. 5. At hour 0.95, operators should begin the process to declare an ELAP. This declaration allows actions to be taken that place plant components outside of the current licensing basis. The RRC should be notified as time permits to request delivery of off-site equipment be initiated. **Declaration of an ELAP is time critical.** 6. At hour 1.0, once the ELAP has been declared, site personnel will be dispersed to conduct a damage assessment. This action provides information on which components, structures, and water sources are available to support FLEX strategies, and debris removal concerns that must be alleviated to deploy FLEX equipment. Beginning this action as soon as an ELAP is declared allows maximum time to determine which FLEX strategies will be used. 7. At hour 2.0, the Control Room operators will need to open the ADVs to allow for PCS cooldown. The plant should cooldown to no less than 350˚F at approximately 75˚F/hour. This will decrease pressure sufficiently enough to minimize leakage from the PCP seals and allow for the SITs to inject to the PCS and provide the initial necessary makeup. **Decreasing pressure to allow the SITs to inject to the PCS is a time critical action**. 8. At hour 2.0, operators should cross-connect Tank T-81 and the CST. The CST alone is rated for less than 4 hours of inventory when using the TDAFWP, with a cool down. The tanks must be cross-connected such that the T-81 inventory can be gravity drained into the CST prior to depleting the CST inventory. **Cross-connecting T-81 and the CST to provide additional inventory for the TDAFWP is a time critical action**. 9. At hour 2.0, operators will need to deploy the first 100 kW FLEX generator to restore power to LC-19. This action will allow Palisades to power the battery chargers to maintain vital dc loads and instrumentation during the ELAP. This action must be completed prior to full battery depletion at approximately 4 hours as discussed in the IER 11-4 Response (Reference G7). Once LC-19 is being powered by the 100 kW FLEX generator, MCC-1 can be fed which allows the battery chargers to be started using the normal installed breakers. **Restoring power to the battery chargers is a time critical action to ensure continuity of power to the vital dc loads and instrumentation.**

	10. At hour 2.0, the operators will need to deploy the FLEX transfer pump to the Lake Michigan access area. Once the pump is staged, hoses will be routed to refill the CST with the FLEX transfer pump. The FLEX transfer pump must be established prior to using the entire inventory in the CST and T-81. Deploying the FLEX transfer pump includes routing 900 feet of flexible hose. **Deploying the FLEX transfer pump is a time critical strategy that must be completed by the 4.0 hour mark to ensure continuous flow to the SGs.** 11. Prior to this time, emergency lighting is being provided by Appendix R lighting, emergency dc lighting, and emergency lighting from the 100 kW FLEX generators. Once time critical steps are completed additional temporary lighting can be strategically placed in several vital areas (e.g. Control Room, Auxiliary Building, Cable Spreading room, etc.). This lighting will be powered by smaller cart FLEX generators, similar to those used for B.5.b strategies. 12. At hour 3.0, ventilation for the Refueling Building will be required. At 5.63 hours (most conservatively), the Spent Fuel Pool (SFP) will begin to boil off. To ensure condensate build-up from the SFP is limited, ventilation will be established early, prior to the onset of boiling, to ensure the action is completed while the building is still habitable and accessible. 13. At hour 5.0, the second 100 kW FLEX generator will be deployed to power either Bus 11 or Bus 12. This action must be taken to re-power one of the installed positive-displacement charging pumps and provide a method of injecting makeup water into the PCS. Initially, the charging pumps will be taking suction from the VCT. **Providing makeup water to the PCS is a time critical step that must be completed by hour 9.** 14. Once the battery chargers have been placed in service, battery ventilation must be established to remove hydrogen created during the battery charge. This will be accomplished by repowering the installed battery room exhaust fans, which are powered from Bus 11 and Bus 12. 15. 1.5 hours after PCS injection is established, the volume in the VCT will near depletion. The suction source must be swapped to the SIRWT or other borated source. To maintain an acceptable margin to criticality, boration is required by hour 13 to counter the effects of cooldown and xenon decay. **Injecting borated water to the PCS is a time critical step that must be completed within 13 hours of shutdown to ensure sufficient negative**

	reactivity exists to maintain shutdown conditions. 16. At hour 18, the site will need to deploy the SFP makeup FLEX pump to ensure that the spent fuel in the pool remains covered. At time 5.63 the pool will conservatively begin to boil and will reach 15 feet above the fuel within 20.93 hours. **Providing makeup to the SFP is a time critical step that must be completed by hour 20.93.** 17. As needed, temporary ventilation will be set up in vital locations. This temporary ventilation will be powered by smaller cart FLEX generators, similar to those used for B.5.b strategies. 18. As decay heat reduces, the pressure in the SGs may be reduced beyond the cooldown target pressure depending on steam demand from the TDAFWP. The reduction in steam pressure reduces the driving force for the TDAFWP. As a precaution, the operators will need to stage the diesel-driven Core Cooling FLEX pump and associated hoses. When the TDAFW pump is insufficient to maintain core cooling, the Core Cooling FLEX pump can be employed to re-establish core cooling. 19. Each of the diesel-driven equipment items need to be refueled. At 10 hours following starting the first diesel driven 100 kW FLEX Generator, a diesel tank, loaded in a pickup truck, will be filled with diesel fuel from an on-site source. This diesel fuel will then be transported to the various diesel-driven FLEX equipment as necessary. 20. Initiation of large debris removal equipment routing from the RRC receipt location into the protected area will occur at hour 24.0. This equipment will be used to clear a path for the transport of other large RRC equipment into the protected area, and as such, should be the first piece of equipment received from off-site. 21. Initiated at hour 24.0, the mobile water purification unit should be received from the RRC, and deployment into the site. This equipment will support the effective heat removal from the PCS by providing pure, demineralized water to makeup to the CST. Although the quality of the water in Lake Michigan may be acceptable to feed the SGs, higher quality water is preferred. The Lake Michigan water evaluation is an open item, tracked by OI19. 22. The large fuel truck and a supply of diesel fuel from off-site should be received and deployed beginning at 25.0 hours (once large debris is clear). Given the amount of diesel-driven FLEX equipment, additional fuel supplies will need to be available for Phase 3 activities.

	23. The large, Phase 3 ultimate heat sink pump should begin on-site deployment from the delivery location at hour 32.0. This pump will be required to be aligned prior to the point at which the SGs can no longer provide effective heat removal from the PCS. 24. The large 2 MW FLEX diesel generator should be deployed on-site at hour 44.0. The need time for this equipment is based on the need to align the long term core cooling strategy prior to the point when the SGs cannot provide core cooling. 25. A diesel-driven air compressor should be received on-site and deployed to the units at hour 52.0. This equipment will be used to support the re-alignment of any air-operated valves to support long term strategies for core cooling, containment cooling, and spent fuel pool cooling. 26. A mobile boration unit should be received on site and deployed to Lake Michigan to use in conjunction with the mobile purification unit to provide borated makeup to the SIRW tank.
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.* **All items are discussed in more detail in Reference G8, Section 6.** Deployment of FLEX equipment is described in the subsequent sections below for each strategy and all modes. The broad-spectrum deployment strategies are unchanged for the different operating modes. The deployment strategies from the FLEX storage building to each staging area are identified, as well as the debris removal concerns, security barriers, and lighting needs as they apply to each deployment path. Palisades will use deployment paths, which refer to the route from a storage location to the staging location (for the pumps and generators), and routing paths, which refer to the route from a staging location to the point of connection to existing plant equipment (for hoses and cables). Deployment paths and routing paths are shown in Attachment 3 of this document for all strategies. To ensure the strategies can be implemented in all modes, areas adjacent to the equipment storage facilities and staging areas, as well as the deployment and hose routing paths will be kept normally accessible. These requirements will be included in an administrative program. Debris removal equipment will be procured to ensure that onsite roadways are passable following a BDBEE. Offsite travel paths from the offsite response center will be

<table>
<tr><td></td><td>assessed as part of the RRC response dependent on post-event conditions.</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td>Provide a milestone schedule. This schedule should include:
• Modifications timeline
  ○ Phase 1 Modifications
  ○ Phase 2 Modifications
  ○ Phase 3 Modifications
• Procedure guidance development complete
  ○ Strategies
  ○ Maintenance
• Storage plan (reasonable protection)
• Staffing analysis completion
• FLEX equipment acquisition timeline
• Training completion for the strategies
• RRCs operational
Ref: NEI 12-06 Section 13.1</td><td>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. Milestone updates will be communicated in future six-month updates following identification.</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td>Identify how the programmatic controls will be met.
Refs: NEI 12-06 Section 11; JLD-ISG-2012-01 Section 6.0</td><td>Provide a description of the programmatic controls equipment protection, storage and deployment and equipment quality. See Section 11 in NEI 12-06 (Reference G1). 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 (Reference G5).
All items are discussed in more detail in Reference G8, Section 7.
Equipment associated with these strategies will be procured as commercial equipment with design, storage, maintenance, testing, and configuration control as outlined in JLD-ISG-2012-01 (Reference G5) Section 6 and NEI 12-06 Rev. 0 (Reference G1), Section 11.</td></tr>
</table>

	Procedure Guidance Procedures and guidance to support deployment and FLEX strategy implementation, including interfaces with EOPs, special event procedures, AOPs, and SOPs, will be coordinated within the site procedural framework. The procedural documentation will be auditable, consistent with generally accepted engineering principles and practices, and controlled within the Palisades document control system. Palisades is a participant in the PWROG project PA-PSC-0965 (Reference G14) and will develop the FSGs in a timeline to support the implementation of FLEX by spring of 2015. The PWROG has generated these guidelines in order to assist utilities with the development of site-specific procedures to cope with an ELAP in a manner that is compliant with the requirements of NEI 12-06. Actions that maneuver the plant will remain contained within the typical controlling procedures, and the FSGs will be implemented as necessary to maintain the key safety functions of core cooling, containment, and spent fuel pool cooling in parallel with the controlling procedure actions. The overall approach will be symptom-based, meaning that the controlling procedure actions and FSGs are initiated based on actual plant conditions. Palisades will continue participation in PA-PSC-0965 (Reference G14) and will update plant procedures upon completion of the PWROG program. Maintenance and Testing The FLEX equipment will be initially tested, or other reasonable method used, to verify that performance conforms to the limiting FLEX requirements. It is expected that the testing will include the equipment and the assembled sub-systems to meet the planned FLEX performance. Additionally, Palisades will implement the maintenance and testing template upon issuance by EPRI. Staffing The timing and deployment for the FLEX strategies were developed assuming: - On-site staff are at administrative staffing levels - No independent, concurrent events - All personnel on-site are available to support the site response, only operations personnel were considered in current staffing estimates. The complete staffing

	evaluations will be performed as required per the NRC order. Palisades will need to address staffing considerations in accordance with NEI 12-06 (Reference G1) to fully implement FLEX at the site. <u>Configuration Control</u> The unavailability of equipment and applicable connections that directly perform a FLEX mitigation strategy will be managed using plant equipment control guidelines developed in accordance with NEI 12-06 (Reference G1) Section 11.5. Programs and controls will be established to assure personnel proficiency in the mitigation of beyond-design-basis events is developed and maintained in accordance with NEI 12-06 Section 11.6. The FLEX strategies and basis will be maintained in an overall program document. Existing plant configuration control procedures will be modified to ensure that changes to the plant design, physical plant layout, road, buildings, and miscellaneous structures will not adversely impact the approved FLEX strategies in accordance with NEI 12-06, Section 11.8.
Describe training plan	*List training plans for affected organizations or describe the plan for training development* Training materials for FLEX will be developed for all station staff involved in implementing FLEX strategies. For accredited training programs, the Systematic Approach to Training will be used to determine training needs. For other station staff, a training overview will be developed and communicated. Training for FLEX implementation will be done in accordance with NEI 12-06, Rev. 0 (Reference G1), Section 11.6 and will be conducted prior to design implementation.
Describe Regional Response Center plan	The industry will establish two (2) RRCs 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 assemble area, established by the 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. Entergy, for the Palisades site, will negotiate and execute a contract with SAFER that will meet the requirements of NEI 12-06, Section 12. For Palisades this will include provisions to connect the sites 2400V distribution system. This is an open item tracked by OI17.
Notes: This section contains Open Items: OI1: Soil liquefaction evaluation OI17: Entergy-SAFER contract for NEI 12-06 OI19: Evaluate the use of Lake Michigan water to cool the SGs.	

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 (Reference G1): • **AFW/EFW** • **Depressurize SG for Makeup with Portable Injection Source** • **Sustained Source of Water** Ref: JLD-ISG-2012-01 (Reference G5) 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. **All items are discussed in more detail in Reference G8, Section 8.1.1.** Steam Generators Available for Cooling (Modes 1-4) At the initiation of the event, operators will enter Station Blackout procedure EOP-3.0 (Reference G6). The Extended Loss of ac Power procedure will be entered when the SBO generators are confirmed unavailable, off-site power cannot be restored, as confirmation of physical damage to infrastructure at the site by dispatcher or visual verification. The initial means of core cooling and heat removal will be achieved with the use of the TDAFWP. The plant will cool down using the TDAFWP to a target temperature of 350°F in the PCS. The TDAFWP is available for all events except the seismic event because the turbine driver for the pump is not seismically qualified. Palisades will evaluate seismically-qualify the turbine driver for the TDAFW. This is an open item tracked by OI5. The TDAFWP speed is controlled by an air-operated, dc-controlled regulator valve. This is powered by the on-site batteries, which are limited in power. This valve can also be manually controlled to conserve battery power, which is much more intensive and requires a dedicated operator. Palisades intends to evaluate any actions that can be taken to determine if additional loads, such as the TDAFWP control valve, can be removed as a dc load. This is an open item tracked by OI6. As determined in the IER 11-4 Response (Reference G7), ventilation for the TDAFWP room will not be required for several days into the event. During cool down, the Turbine Driven Auxiliary Feed Water Pump will deliver water from the CST to the SGs. As discussed in the Palisades IER 11-4 Response, once the CST is depleted it can be gravity fed from Tank T-81 by opening a cross-tie valve. The CST and T-81 combined contain 4 hours of SG cooling water. The CST is seismically qualified but vulnerable to wind missiles for the majority of the tank. A modification will be installed to ensure the CST is protected from wind missiles. T-81 is not seismically qualified and is also susceptible to missile hazards. Palisades has open items to determine if T-81 will also be missile protected as well as evaluate additional sources of non-borated water, these are tracked under OI3 and OI7 respectively.

[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.

The ADVs will remain closed at the beginning of Phase 1. These valves will be opened when the plant is ready to commence cooldown at approximately 2 hours into the event. The ADVs are air operated, and must be remotely operated. A modification will be required to provide manual operation of the ADVs.

Operators will cool down (75°F/hr) the plant to approximately 350°F (T_{cold}). SG pressure will be approximately 190 psig at this temperature.

All items are discussed in more detail in Reference G8, Section 8.3.1.

Steam Generators Unavailable for Cooling (Modes 5 and 6)

During outage conditions, the SGs would not be available. In Modes 5 and 6 the time before PCS inventory make-up is required has not been determined; this is being tracked under OI20. At this time there are no initial Phase 1 actions for this scenario; all responses involve the use of portable equipment.

Details:	
Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* Palisades will utilize the industry-developed guidance from the PWROG to develop site specific procedures or guidelines to address the criteria in NEI 12-06 (Reference G1). These procedures and/or guidelines will support the existing symptom-based command and control strategies in the current EOPs.
Identify modifications	Increase the wind missile shield around the CST.
Key Reactor Parameters	*List instrumentation credited for this coping evaluation phase.* To support this function, the following instrumentation will be needed: • SG Level • SG Pressure • CST Level • T-81 Level • PCS Pressure • PCS Temperature • Pressurizer Level • Reactor Vessel Level Indication • SIRW Tank Level Additional parameters may require monitoring. Palisades will conduct an evaluation to determine if any other parameters should be monitored. This is an open item that tracked by OI14.

	The station batteries are capable of powering this instrumentation during Phase 1.

Notes:

The following Open items from this section are being tracked:

OI3: Palisades' evaluation for missile protection of T-81 and other external tanks is an open item.

OI5: Palisades will ensure that the TDAFWP turbine will be seismically qualified.

OI6: Palisades will evaluate the current dc load shed strategy.

OI7: Evaluate additional non-borated water sources.

OI14: Palisades' evaluation of the FLEX strategy may identify additional instrumentation parameters to be monitored

OI20: Evaluate time until PCS makeup is necessary in Modes 5 & 6.

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.

All items are discussed in more detail in Reference G8, Section 8.1.2.

Steam Generators Available (Modes 1-4)

Phase 2 strategies for core cooling and heat removal will commence when the volume in the CST has depleted. Phase 2 strategies will involve the use of an onsite portable pump, either to refill the CST for use with the TDAFWP or to provide an alternate method of SG makeup.

The primary strategy for core cooling uses a portable FLEX transfer pump to refill the CST to prolong the use of the TDAFWP. Potentially available suction sources for refilling the CST are T-90, T-91, and Lake Michigan. The pump will be placed near the suction source and hose will be routed to the CST. This action must be completed before the inventory in the CST and T-81 deplete, which occurs in approximately 4 hours. As discussed in Phase 1, Palisades is evaluating the protection of other tanks to extend this time. This is tracked under OI3

The portable pump is required to deliver 300 gpm to the tank vented to atmospheric conditions to maintain the CST inventory required for the TDAFWP to maintain SG inventory.

Ventilation for the TDAFWP spaces will still not be required during Phase 2; however, if time is available, temporary fans can be staged ahead of time to prepare for high temperatures. At this time, a 100 kW FLEX generator will be powering the battery loads via the battery chargers on MCC-1, this is not a loading concern as it was in Phase 1; thus remote dc control will remain available to the TDAFWP control valve.

The secondary core cooling method will be employed if the SGs no longer have sufficient steam to drive the TDAFWP, the TDAFWP is unavailable for any other reason, or the CST and T-81 are drained. A larger portable Core Cooling FLEX pump can be used to provide cooling water directly to the SGs. In order to provide a diverse means of coping, connection points in both the AFW and MFW systems will be provided. The portable pump using the same suction sources as previously discussed can connect to a tee that will be installed in the MFW piping. Following some valve manipulation, this connection will allow water to be fed to one or both SGs. The AFW connection will also involve the installation of the tee connection and will enable Palisades to feed one or both SGs. Again, these actions will need to be completed within 4 hours before the CST inventory has been depleted.

The portable pump will be able to deliver 300 gpm at 300 psi per the Core Cooling Position Paper (Reference G14) to maintain the steam generator inventory required for the reactor core cooling and heat removal functions.

Even if the TDAFWP remains available, the Core Cooling FLEX pump will be staged when time is available because at some point the TDAFWP will become unavailable.

Maintain Core Cooling & Heat Removal	
PWR Portable Equipment Phase 2	
All items are discussed in more detail in Reference G8, Section 8.3.2. Steam Generators Unavailable for Cooling (Modes 5 and 6) In the event that Palisades is in an outage, the Core Cooling FLEX Diesel Engine Driven Pumps will be used to supply water directly to the reactor. This will be done by using the portable Core Cooling FLEX Pump taking suction from the SIRW Tank or Lake Michigan and providing water through hose connections to either the LPSI or HPSI headers. The SIRW Tank is not missile protected. Palisades is evaluating alternate borated water tanks internal to the Containment Building to supplement the water volume that may be added from Lake Michigan. This is an open item tracked under OI16. The portable pump is required to deliver 100 gpm at 100 psi to perform the reactor core cooling and heat removal functions when the steam generators are not available.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* Palisades will utilize the industry developed guidance from the PWROG to develop site specific procedures or guidelines to address the criteria in NEI 12-06 (Reference G1). 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: • The preferred connection requires the installation of a pipe tee in the Feedwater System piping. A hose connection will be installed onto the end of the pipe tee. The pipe tee will also be extended to an accessible height. The location of the new pipe tee is shown in Attachment 3. • The alternate connection point requires modification of the AFW P-8C discharge piping. This includes installing a new tee in the discharge pipe that a hose can be connected to. The location of this connection is shown in Attachment 3. In addition, 175 feet of piping must be installed in the Tendon Tunnel so that a pump staged outside may establish a discharge flow path to the West Safeguards Room from which hose will be routed to the secondary connection point

Maintain Core Cooling & Heat Removal	
PWR Portable Equipment Phase 2	
	in the AFW system. • The alternate connection point to the AFW system for core cooling requires installation of a hose connection onto a flange in the East Safeguards Room. The flange will also need to be extended closer to floor level for accessibility. In addition, 175 feet of piping must be installed in the Tendon Tunnel so that a pump staged outside may establish the suction flow path to the East Safeguards Room where the suction connection is located. The Tendon Tunnel is below the flood elevation; therefore, hose cannot be used in place of piping unless the Tendon Tunnel is sealed against flooding. The location of the new connection is shown in Attachment 3. This same section of piping will be used for Modes 5 and 6 cooling. The following modifications will be installed to support Core Cooling FLEX Pump water injection into the reactor vessel if the unit is in an outage: • To allow for connection of the portable pump, the existing cap on line DC-1-4 off the HPSI pump discharge header must be removed and a hose connection must be installed in its place. The location of the new connection point is shown in Attachment 3. In addition, 175 feet of piping must be installed in the Tendon Tunnel so that a pump staged outside may establish a discharge flow path to the West Safeguards Room where the primary connection is located. The Tendon Tunnel is below the flood elevation; therefore, hose cannot be used in place of piping unless the Tendon Tunnel is sealed against flooding. This Tendon Tunnel routing is the same as above. • There is an existing spool piece in the LPSI system that can be modified so a hose can be connected to it. In addition, 175 feet of piping must be installed in the Tendon Tunnel so that a pump staged outside may establish a discharge flow path to the East Safeguards Room from which hose will be routed to the secondary connection point in the West Safeguards Room. This is the same discharge piping that is required for the primary connection. The Tendon Tunnel is below the flood elevation; therefore, hose cannot be used in place of piping unless the Tendon Tunnel is sealed against flooding. • Modes 5 and 6 core cooling requires installation of a hose connection onto a flange in the East Safeguards Room. The

<table>
<tr><th colspan="2">Maintain Core Cooling & Heat Removal</th></tr>
<tr><th colspan="2">PWR Portable Equipment Phase 2</th></tr>
<tr><td></td><td>flange will also need to be extended closer to floor level for accessibility. In addition, 175 feet of piping must be installed in the Tendon Tunnel so that a pump staged outside may establish the suction flow path to the East Safeguards Room where the suction connection is located. The Tendon Tunnel is below the flood elevation; therefore, hose cannot be used in place of piping unless the Tendon Tunnel is sealed against flooding. The location of the new connection is shown in Attachment 3. Alignment of this suction flow path requires valve 3418 to be opened.</td></tr>
<tr><td>Key Reactor Parameters</td><td>List instrumentation credited or recovered for this coping evaluation.

To support this function the following instrumentation will be required:
• SG Level
• SG Pressure
• CST Level
• T-81 Level
• PCS Pressure
• PCS Temperature
• Pressurizer Level
• Reactor Vessel Level Indication
• SIRW Tank Level

These instruments will be available throughout Phase 2 due to repowering of the battery chargers which is discussed in the safety functions section.

Additionally, the Phase 2 FLEX equipment will have installed local instrumentation needed to operate the equipment. The use of these instruments will be described in the associated procedures for use of the equipment. These procedures will be based on inputs from the equipment suppliers, operator experience, and expected equipment function during an ELAP.</td></tr>
<tr><td colspan="2">Storage / Protection of Equipment :
Describe storage / protection plan or schedule to determine storage requirements
Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Rev. 0 (Reference G1), Section 11. The schedule to construct a 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 Palisades.</td></tr>
</table>

Maintain Core Cooling & Heat Removal	
PWR Portable Equipment Phase 2	
Seismic	The FLEX storage facility will be designed to withstand seismic events to the magnitude discussed in the "General Integrated Plan Elements" section of this document.
Flooding Note: if stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level.	The FLEX storage facility will be designed to withstand flooding events to the PMF discussed in the "General Integrated Plan Elements" section of this document. The equipment will be protected during a short duration seiche event and available for any standing flood event.
Severe Storms with High Winds	The FLEX storage facility will be designed to withstand severe storms with high wind events to the magnitude discussed in the "General Integrated Plan Elements" section of this document.
Snow, Ice, and Extreme Cold	The FLEX storage facility will be designed to withstand snow, ice, and extreme cold events to the magnitude discussed in the "General Integrated Plan Elements" section of this document.
High Temperatures	The FLEX storage facility will be designed to withstand high temperature events to the magnitude discussed in the "General Integrated Plan Elements" section of this document.

Deployment Conceptual Design

(Attachment 3 contains Conceptual Sketches)

The pumps, hoses, and transport vehicles will all be stored in the FLEX storage facility. The staging area for Modes 1-4 will be either at the Lake Michigan suction area or near Tanks T-90 and T-91 (Staging Areas 2 and 3 in Attachment 3); dependent on which suction source will be used. The maximum deployment path will be 1,900 feet from Storage Area 1 and 850 feet from Storage Area 2.

The staging area for Modes 5 and 6 will be either at the Lake Michigan suction area or near the Tendon Tunnel (Staging Areas 3 and 4 in Attachment 3); dependent on which suction source will be used. The maximum deployment path will be approximately 1,500 feet from Storage Area 1 and 1,200 feet from Storage Area 2.

Two storage areas have been identified. Palisades will determine where the storage facility will be located. This is an open item tracked by OI4.

The pumps and hoses will be deployed to the staging locations following the paths shown in Attachment 3. The deployment paths to the staging areas for both units are kept clear during normal and outage conditions. Debris from various overhead hazards may need to be cleared; however, the expected debris can be cleared with moderately sized equipment. There are no security barriers in the deployment paths for the pumps, and the entirety of the deployment path is within the protected area.

From each staging area, the hose will be routed to the suction source and the connection point by following the routing paths shown in Attachment 3. There are no debris concerns in the hose

Maintain Core Cooling & Heat Removal		
PWR Portable Equipment Phase 2		
routing paths. There are security barriers in the hose routing paths; a key will be needed to access certain routing areas. The Palisades security procedure will need to be modified to support these FLEX strategies. Area lighting will be required for outside deployment during the night. It is recommended that this need be met by the lights on the truck used to haul the pump and area lighting at each staging area. It is recommended that plant personnel be provided with flashlights or helmet lamps to augment the emergency lighting when they are inside the plant making connections.		
Steam Generators Available (Modes 1-4)		
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*
Strategy 1 (FLEX transfer pump to refill CST) is to stage the pump at the Lake Michigan access point, with the suction hose draped into the lake access. The discharge of the pump will be connected to a hose, routed to the CST where the manway or the overflow line would be modified to have a hose connection. If it is not possible to use the connection, the hose can be dropped through the manway on the top of the CST. For Strategy 2 (SG makeup FLEX Pump), the primary connection point for reactor core cooling is to install a pipe tee in the Feedwater System. This strategy does not rely upon the availability of the CST and the operability of the TDAFWP. The hose will be routed from Staging Area 3 (Lake Michigan access) around the Turbine Building, and into the south entrance of the Turbine Building. From there the hose remains on the 590'	The CST will need to be modified to provide a hose connection in the overfill line of in the manway cover. Modifications to both the MFW and AFW systems will be required to allow for a quick hose connection. The preferred connection requires the installation of a pipe tee in the Feedwater System piping. A hose connection will be installed onto the end of the pipe tee. The pipe tee will also be extended to an accessible height. The location of the new pipe tee is shown in Attachment 3. Installation of a tee in the AFW system piping and installation of pipe in the Tendon Tunnel to carry water into the Safeguards Room and supply the AFW connection are required. The location of this connection is shown in Attachment 3. In addition, 175 feet of piping must be installed in the tendon tunnel so that a pump staged	The Connection from both T-90 and T-91 is not guaranteed to survive every event simultaneously but is the preferred source if available. Suction from Lake Michigan will survive all the events and will use a rigid suction hose to draft out of the lake to ensure its availability. The new connection to the CST will be protected by the CST missile barrier. The discharge connection for the AFW system is location inside the Auxiliary Building and will survive all events. The connection for the MFW system is in the Turbine Building and at such an elevation is protected from a flood. The CST connection is the manway on the tank and is expected to survive the same events as the tank; all but a wind missile event. A modification to missile-protect the CST will allow this connection to survive all

Maintain Core Cooling & Heat Removal		
PWR Portable Equipment Phase 2		
level (grade level) and is routed to the feedwater piping. If the Turbine Building is inaccessible, and this connection point is unavailable following a BDBEE, a second connection point utilizes a modified AFW system drain downstream of the motor-driven AFW pump P-8C. The hose would be routed at grade level around the Turbine Building, and into an access hatch for the tendon tunnel. The hose would be connected to a hard pipe routed to the 570' level, where a second hose will be routed to the AFW piping for the secondary connection.	outside may establish a discharge flow path to the East Safeguards Room from which hose will be routed to the secondary connection point in the AFW system. The alternate connection point to the AFW system for core cooling requires installation of a hose connection onto a flange in the East Safeguards Room. The flange will also need to be extended closer to floor level for accessibility. In addition, 175 feet of piping must be installed in the tendon tunnel so that a pump staged outside may establish the suction flow path from East Safeguards Room where the suction connection is located. The Tendon Tunnel is below the flood elevation; therefore, hose cannot be used in place of piping unless the Tendon Tunnel is sealed against flooding. The location of the new connection is show in Attachment 3. This same section of piping will be used for Modes 5 and 6 cooling.	events.
Steam Generators Not Available (Modes 5 & 6)		
Strategy	**Modifications**	**Protection of connections**
The hose would be routed at grade level around the Turbine Building, and into an access hatch for Tendon Tunnel. The hose would be connected to a hard pipe routed to the 570' level, where a second hose will be routed to the HPSI piping for the primary connection or LPSI piping for the secondary	To allow for connection of the portable pump, the existing cap on line DC-1-4 off the HPSI pump discharge header must be removed and a hose connection must be installed in its place. The location of the new connection point is shown in Attachment 3. In addition, 175 feet of piping must be	The Connection from both T-90 and T-91 is not guaranteed to survive every event simultaneously but is the preferred source if available. Suction from Lake Michigan will survive all the events and will use a rigid suction hose to draft out of the lake to ensure its availability.

Maintain Core Cooling & Heat Removal		
PWR Portable Equipment Phase 2		
connection.	installed in the Tendon Tunnel so that a pump staged outside may establish a discharge flow path to the West Safeguards Room where the primary connection is located. The Tendon Tunnel is below the flood elevation; therefore, hose cannot be used in place of piping unless the Tendon Tunnel is sealed against flooding. This Tendon Tunnel routing is the same as above. A new tee will need to be installed in an existing spool piece in the LPSI system with a hose connection on the end of it. In addition, 175 feet of piping must be installed in the Tendon Tunnel so that a pump staged outside may establish a discharge flow path to the East Safeguards Room from which hose will be routed to the secondary connection point in the West Safeguards Room. This is the same discharge piping that is required for the primary connection. The Tendon Tunnel is below the flood elevation; therefore, hose cannot be used in place of piping unless the Tendon Tunnel is sealed against flooding. Modes 5 and 6 core cooling requires installation of a hose connection onto a flange in the East Safeguards Room. The flange will also need to be extended closer to floor level for accessibility. In addition, 175 feet of piping must be installed in the Tendon Tunnel so that a pump staged outside	The discharge connection for the AFW system is a location inside the Auxiliary Building that will survive all events. The connection for the MFW system is in the Turbine Building and at such an elevation that it is protected from a flood. The CST connection is the manway on the tank and is expected to survive the same events as the tank; all but a wind missile event. A modification will allow this connection to survive all events.

Maintain Core Cooling & Heat Removal		
PWR Portable Equipment Phase 2		
	may establish the suction flow path to the East Safeguards Room where the suction connection is located. The Tendon Tunnel is below the flood elevation; therefore, hose cannot be used in place of piping unless the Tendon Tunnel is sealed against flooding. The location of the new connection is shown in Attachment 3. Alignment of this suction flow path requires valve MV-ES3418 to be opened.	

Notes:

The following open items are identified in this section:

OI3: Palisades' evaluation for missile protection of T-81 and other external tanks is an open item.

OI4: Select the location of FLEX equipment storage facility.

OI16: Evaluate borated water sources in addition to SIRW Tank.

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.

All items are discussed in more detail in Reference G8, Section 8.1.3.

<u>Steam Generators Available (Modes 1-4)</u>

At the beginning of Phase 3, Palisades will continue with the strategies from Phase 2: refilling the SGs with the SG makeup FLEX pump, and removing heat using the ADVs. As equipment from the RRC arrives, it will be implemented for the long term coping strategy.

By Phase 3, Palisades will be using Lake Michigan water to maintain core cooling; however clean water is desirable to bring the plant to cold shutdown. A water purification unit will be provided by the RRC, which will be used to purify the Lake Michigan water and dilute undesirable constituents in the SGs.

As Phase 3 continues, the RRC will provide a large 2 MW medium voltage generator, which will supply power to installed equipment used to bring the plant to cold shutdown. The RRC will additionally provide a large, diesel-driven UHS FLEX pump. This pump will provide Service Water flow, as it is assumed the Service Water Pumps or intake structure are unrecoverable. Palisades still needs to determine the connection point for the UHS FLEX Pump to the Service Water System. This is an open item, tracked by OI18.

Once the UHS FLEX pump has established cooling flow, and the large 2 MW FLEX generator is connected to the 1C or 1D 2400 V bus [OI17], Palisades can re-power a CCW pump and a SDC pump to establish shutdown cooling. The SDC pumps will take suction from whichever tank is still available and can be borated.

Additional boration beyond that which is stored on-site will likely be needed. The RRC will provide a mobile boration unit which, in conjunction with the water purification unit, can provide acceptable water to make-up to the PCS and facilitate transition to a shutdown cooling configuration.

All items are discussed in more detail in Reference G8, Section 8.3.3.

<u>Steam Generators Unavailable for Cooling (Modes 5 and 6)</u>

At the beginning of Phase 3, Palisades will continue with the strategies from Phase 2: refilling the PCS with the SG makeup FLEX pump, with excess flow spilling out into the refueling cavity. As equipment from the RRC arrives it will be implemented for the long term coping strategy.

By Phase 3, Palisades will be using Lake Michigan water to maintain core cooling; however, clean borated water is desirable to bring the plant to cold shutdown. A water purification unit will be provided by the RRC, which will be used to purify the Lake Michigan water. The RRC will provide a mobile boration unit which, in conjunction with the water purification unit, can provide acceptable water for continued make-up to the SIRWT and supply the PCS.

As Phase 3 continues, the RRC will provide a large 2 MW medium voltage generator, which will

Maintain Core Cooling & Heat Removal	
PWR Portable Equipment Phase 3	
supply power to installed equipment used to bring the plant to cold shutdown. The RRC will additionally provide a large, diesel-driven UHS FLEX Pump. This pump will provide Service Water flow, as it is assumed the Service Water Pumps or intake structure are unrecoverable. Palisades still needs to determine the connection point for the UHS FLEX Pump to the Service Water System. This is an open item, tracked by OI18. Once the UHS FLEX pump has established cooling flow, and the large 2 MW FLEX generator is connected to the 1E 2400 V bus [OI17[, Palisades can re-power a CCW pump and SDC pump to re-establish shutdown cooling. The SDC pumps will take suction from whichever tank is still available and can be borated. Additional boration beyond that which is stored on-site will likely be needed. The RRC will provide a mobile boration unit which, in conjunction with the water purification unit, can provide acceptable water to make-up to the SIRWT and supply the PCS.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* Palisades will utilize the industry developed guidance from the PWROG to develop site specific procedures or guidelines to address the criteria in NEI 12-06 (Reference G1). These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.
Identify modifications	A modification will be made to the Service Water System to accept water from Lake Michigan via the UHS FLEX pump. A piping tee will be inserted into the Service Water piping. The water will flow and provide cooling to the CCW heat exchanger and reject the heat back to the lake as the system normally operates. The location of the Service Water connection has not yet been determined. This is an open item tracked by OI18. Electrical modifications to accept the medium voltage 2 MW FLEX generator will be discussed in the Safety Function Support section of this document.
Key Reactor Parameters	*List instrumentation credited or recovered for this coping evaluation.* To support this function, the following instrumentation will be required: • SG Level • SG Pressure • PCS Pressure • PCS Temperature • Pressurizer Level • Reactor Vessel Level Indication

Maintain Core Cooling & Heat Removal		
PWR Portable Equipment Phase 3		
	These instruments will be available throughout Phase 3 due to repowering of the battery chargers, which is discussed in the safety functions section. Additionally, the Phase 3 FLEX equipment will have installed local instrumentation needed to operate the equipment. The use of these instruments will be described in the associated procedures for use of the equipment. These procedures will be based on inputs from the equipment suppliers, operator experience, and expected equipment function during an ELAP.	
Deployment Conceptual Design **(Attachment 3 contains Conceptual Sketches)** Phase 3 equipment from the RRC will be delivered to Palisades using a means that the RRC determines to be the best based on the event. The deployment paths to the staging areas are to be normally kept clear. Large debris from various overhead hazards may need to be cleared; however, the expected debris can be cleared with moderately sized equipment. There are security barriers in the hose routing paths; a key will be needed to access certain routing areas. The Palisades security procedure will need to be modified to support these FLEX strategies. From each staging area the hose will be routed to the suction source and the connection point. Debris removal will have been completed, thus there are no debris concerns in the hose routing paths. There are security barriers in the hose routing paths; a key will be needed to access certain routing areas. The Palisades security procedure will need to be modified to support these FLEX strategies. This is an open item tracked by OI9 Area lighting will be required for outside deployment during the night. It is recommended that this need be met by the lights on the trucks used to haul the pump and area lighting at each staging area. It is recommended that plant personnel be provided flashlights or helmet lamps to augment the emergency lighting when they are inside the plant making connections. Electrical strategies to accept the medium voltage 2 MW FLEX generator will be discussed in the Safety Function Support section of this document.		
Strategy *Identify Strategy including how the equipment will be deployed to the point of use.*	**Modifications** *Identify modifications*	**Protection of connections** *Identify how the connection is protected*
Core Cooling Equipment (All Modes)		
The UHS FLEX pump will be staged along Lake Michigan. The suction hose will simply be draped into the open lake with a strainer to filter flotsam. The discharge hose will be run	A modification will be made to the Service Water System to accept water from Lake Michigan via the UHS FLEX Pump. A piping tee will be inserted into the Service Water	FLEX connections will be enclosed within a structure or on piping that meets NEI 12-06 Rev. 0. The location of the Service Water connection has not yet been determined. This

Maintain Core Cooling & Heat Removal		
PWR Portable Equipment Phase 3		
along grade level to the Service Water Pump House, the Service Water piping adjacent to the pump house, or near the CCW heat exchanger in the Auxiliary Building where the discharge of the hose will be connected to the Service Water System. The location of the Service Water connection has not yet been determined. This is an open item tracked by OI18.	piping. The water will flow and provide cooling to the CCW heat exchanger and reject the heat back to the lake as the system normally operates. The location of the Service Water connection has not yet been determined. This is an open item tracked by OI18. Electrical modifications to accept the medium voltage 2 MW FLEX generator will be discussed in the Safety Function Support section of this document.	is an open item tracked by OI18
Water Purification Unit (All Modes)		
The Water Purification Unit will be staged along Lake Michigan. The suction hose will simply be draped into the open lake with a strainer to filter flotsam. The discharge would run to the CST, SIRW Tank, or any other tank that survived the event. The requirements for this equipment must still be developed. This is an open item tracked by OI10	Modifications to allow makeup to be added to the SIRW Tank or the CST are described in the Phase 2 portion of the Core Cooling and Heat Removal section of this document.	This equipment will use the tank connections from the Phase 2 portion of the Core Cooling and Heat Removal section of this document. The connections are protected from all external hazards.
Mobile Boration Unit (All Modes)		
The Mobile Boration Unit will be staged along Lake Michigan with the Water Purification Unit. The Mobile Boration Unit will have a tank where the purified water can be routed, mixed with boron, and then delivered to the desired tank. The requirements for this equipment must still be developed. This is an open	No modifications to plant equipment will be necessary for this equipment.	There are no direct connections to plant equipment for this equipment.

Maintain Core Cooling & Heat Removal		
PWR Portable Equipment Phase 3		
item tracked by OI11		

Notes:

OI9: Evaluate changes to security procedures for FLEX.

OI10: The requirements of the Water Purification Unit must still be developed.

OI11: The requirements of the Mobile Boration Unit must still be developed.

OI17: Entergy, for the Palisades site, will negotiate and execute a contract with SAFER that will meet the requirements of NEI 12-06, Section 12.

OI18: Evaluate a location to install a tee in the Service Water System to allow the UHS FLEX Pump to provide cooling.

Maintain PCS 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 (Reference G1): • **Low Leak PCP Seals or PCS makeup required** • **All Plants Provide Means to Provide Borated PCS 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 PCP Seals and/or borated high pressure PCS makeup) and strategy(ies) utilized to achieve this coping time. **All items are discussed in more detail in Reference G8, Section 8.2.1.** *This section addresses PCS inventory control and subcriticality issues for conditions where steam generators are available. PCS inventory control and subcriticality issues for conditions where steam generators are not available are addressed in the core cooling section of this report.* PCS inventory control during Phase 1 is controlled by isolation of the letdown and the performance of installed PCP seals. With the successful use of these two items, the leakage from the PCS will be minimized. In the event of an ELAP, valves in the PCS letdown path automatically fail closed as a part of the containment isolation actions. In the event the valves do not automatically close, operators can manually isolate the system. Palisades' strategy for coping with an ELAP includes an early cooldown to low pressure to further minimize leakage from the PCP seals. As the plant cools down and the PCS volume begins to shrink, some makeup will be required; however this will be accomplished by lowering PCS pressure below 300 psig. This action will allow the SITs to discharge to the PCS for makeup. Given the expected start time for cooldown and limiting cooldown rate, this will happen at approximately 5 hours. Additionally, boron addition will not be required to maintain adequate shutdown margin to criticality until 13 hours into the event.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* Palisades will utilize the industry developed guidance from the PWROG to develop site specific procedures or guidelines to address the criteria in NEI 12-06 (Reference G1). These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.

[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 PCS Inventory Control	
Identify modifications	No modifications are required for Phase 1.
Key Reactor Parameters	*List instrumentation credited for this coping evaluation.* To support this function the following instrumentation will be required: • SG Level • SG Pressure • PCS Pressure • PCS Temperature • Neutron Flux Level • Pressurizer Level • Pressurizer Pressure • Core Exit Thermocouple Temperature • Reactor Vessel Level • SIT Level The station batteries are capable of powering this instrumentation during Phase 1
Notes: None.	

Maintain PCS Inventory Control	
PWR Portable Equipment Phase 2:	
Provide a general description of the coping strategies using on-site portable equipment including modifications that are proposed to maintain core cooling. Identify methods (Low Leak PCP Seals and/or borated high pressure PCS makeup) and strategy(ies) utilized to achieve this coping time. **All items are discussed in more detail in Reference G8, Section 8.2.2.** *This section addresses PCS inventory control and subcriticality issues for conditions where steam generators are available. PCS inventory control and subcriticality issues for conditions where steam generators are not available are addressed in the core cooling section of this report.* The transition to Phase 2 strategies is driven by the need to maintain effective natural circulation heat transfer and the need to borate the PCS to provide continued subcritical margin as the plant cools and xenon decays. In Modes 1-4, it has been determined that PCS makeup will most conservatively be required by 8 hours and boration will be required by 13 hours after the event starts. This requirement ensures continued single phase natural circulation which ensures effective heat transfer. Additional modes of heat transfer are available including two phase natural circulation and reflux cooling, but these modes are not credited as part of the Palisades FLEX strategy and are reserved as a means to provide defense in depth relative to ELAP coping. In order to provide makeup to the PCS, Palisades will utilize two of its three installed positive displacement charging pumps. The strategy of repowering installed equipment is allowed per table D-1 of NEI 12-06 (Reference G1). However, this conflicts with the guidance provided in NEI 12-06 Section 3.2.2(13) (Reference G1) therefore a deviation from Section 3.2.2(13) is being taken. In order to utilize the installed charging pumps an evaluation of the charging system robustness must be performed, this is being tracked under OI21. Either P-55B or P-55C will be used as the motive force to provide makeup to the PCS. Each pump requires approximately 56 kW of power. The selected pump will be powered from FLEX Generator 2 through either Bus 11 or Bus 12. The electrical connections are detailed in the safety functions section of this document. Once power is established, the proper valve lineup will be made and the pump will be started to provide makeup to the PCS. The pump must be able to provide makeup for a 30 gpm leak rate. Both pumps will start by taking suction from the VCT; however, the VCT is limited in volume. Additionally, as the plant cools down, a higher concentration of boron will be required. The suction is then swapped to the SIRW Tank, which is not missile protected. Palisades is evaluating alternate protected borated water tanks internal to supplement the water volume that may be added when Lake Michigan is the suction source. This is an open item tracked under OI16 The SIRW Tank contains a minimum of 250,000 gallons of borated inventory. The makeup rate will be no more than 40 gpm. This combined with the SFP requirement of 33 gpm flow, allows for 57 hours of makeup; thus refilling the SIRW Tank will not be required until equipment arrive from the RRC in Phase 3.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.*

Maintain PCS Inventory Control	
PWR Portable Equipment Phase 2:	
	Palisades will utilize the industry developed guidance from the PWROG to develop site specific procedures or guidelines to address the criteria in NEI 12-06 (Reference G1). These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.
Identify modifications	All modifications for PCS inventory control are discussed in the Safety Support Function section of this document.
Key Reactor Parameters	*List instrumentation credited or recovered for this coping evaluation.* To support this function the following instrumentation will be required: • SG Level • SG Pressure • PCS Pressure • PCS Temperature • Neutron Flux Level • Pressurizer Level • Pressurizer Pressure • Core Exit Thermocouple Temperature • Reactor Vessel Level Instrumentation These instruments will be available throughout Phase 2 due to repowering of the battery chargers, which is discussed in the safety functions section. Additionally, the Phase 2 FLEX equipment will have installed local instrumentation needed to operate the equipment. The use of these instruments will be described in the associated procedures for use of the equipment. These procedures will be based on inputs from the equipment suppliers, operator experience, and expected equipment function during an ELAP.

Storage / Protection of Equipment:

Describe storage / protection plan or schedule to determine storage requirements

Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06, Rev. 0 (Reference G1), 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 Palisades.

Maintain PCS Inventory Control	
PWR Portable Equipment Phase 2:	
Seismic	The FLEX storage facility will be designed to withstand seismic events to the magnitude discussed in the "General Integrated Plan Elements" section of this document.
Flooding Note: if stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level.	The FLEX storage facility will be designed to withstand flooding events to the PMF discussed in the "General Integrated Plan Elements" section of this document. The equipment will be protected during a short duration seiche event and available for any standing flood event.
Severe Storms with High Winds	The FLEX storage facility will be designed to withstand severe storms with high wind events to the magnitude discussed in the "General Integrated Plan Elements" section of this document.
Snow, Ice, and Extreme Cold	The FLEX storage facility will be designed to withstand snow, ice, and extreme cold events to the magnitude discussed in the "General Integrated Plan Elements" section of this document.
High Temperatures	The FLEX storage facility will be designed to withstand high temperature events to the magnitude discussed in the "General Integrated Plan Elements" section of this document.

Deployment Conceptual Modification

(Attachment 3 contains Conceptual Sketches)

The generators, cables, and transport vehicles will all be stored in the FLEX storage facility. The staging area for Modes 1-4 will be either at the north side of the Turbine Building near the Auxiliary Building or the on the east side of the Turbine Building (Staging Areas 1 and 5 in Attachment 3), dependent on which suction source will be used. The maximum deployment path will be 2,100 feet from Storage Area 1 and 1,100 feet from Storage Area 2. Two storage areas have been identified. Palisades will determine where the storage facility will be located. This is an open item tracked by OI4.

The generators and cables will be deployed to the staging locations following the paths shown in Attachment 3. The deployment paths to the staging areas for both units are normally kept clear. Debris from various overhead hazards may need to be cleared; however, the expected debris can be cleared with moderately sized equipment. There are no security barriers in the deployment paths for the pumps, and the entirety of the deployment path is within the protected area.

From each staging area, the cable will be routed to the existing buswork. There are no debris concerns in the cable routing paths. There are no security barriers in the hose routing paths.

Area lighting will be required for outside deployment during the night. It is recommended that this need be met by the lights on the truck used to haul the generator and area lighting at each staging area. It is recommended that plant personnel be provided flashlights or helmet lamps to augment the emergency lighting when they are inside the plant making connections.

Strategy	Modifications	Protection of connections

Maintain PCS Inventory Control		
PWR Portable Equipment Phase 2:		
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
The generator will re-power either Bus 11 or Bus 12, which will power the installed positive displacement charging pumps using existing mechanical connections and electrical cabling. Electrical cable routing and connections will be discussed in the Safety Function Support section of this document.	Bus 11 and 12 will need a modification to a spare breaker to accept leads from the generator. Electrical modifications to accept the 100 kW FLEX generator will be discussed in the Safety Function Support section of this document.	All connection points are located within the Auxiliary Building and protected from all external events.
Notes: The following open items are identified in this section: OI4: Select the location of FLEX equipment storage facility OI16: Evaluate borated water sources in addition to SIRW Tank. OI21: Evaluate the robustness of the Charging System.		

<table>
<tr><th colspan="2">Maintain PCS Inventory Control</th></tr>
<tr><th colspan="2">PWR Portable Equipment Phase 3:</th></tr>
<tr><td colspan="2">Provide a general description of the coping strategies using Phase 3 equipment including modifications that are proposed to maintain core cooling. Identify methods (Low Leak PCP Seals and/or borated high pressure PCS makeup) and strategy(ies) utilized to achieve this coping time. All items are discussed in more detail in Reference G8, Section 8.2.3.

This section addresses PCS inventory control and subcriticality issues for conditions where steam generators are available. PCS inventory control and subcriticality issues for conditions where steam generators are not available are addressed in the core cooling section of this report.

At the beginning of Phase 3, Palisades will continue with the strategies for providing PCS inventory control and boration using the FLEX strategies described in Phase 2. The inventory in the SIRW Tank is shown to provide PCS makeup inventory for 57 hours. This is sufficient to survive until the RRC can provide a water purification unit and mobile boration unit.

Additional boration beyond that which is stored on-site will likely be needed. The RRC will provide a mobile boration unit which, in conjunction with a water purification unit, can provide acceptable water to make-up to the SIRWT and supply the PCS.

As Phase 3 continues, more equipment will be received from the RRC, and Palisades will gradually transition to the long term core cooling strategy, which involves cooling the core using a single train of shutdown cooling. An UHS FLEX pump supplied by the RRC will provide cooling to the Service Water System, which supplies cooling water to the CCW system and the SDC system. A CCW pump and SDC pump will be powered by a 2 MW FLEX generator supplied by the RRC. Restoring a train of shutdown cooling is discussed more thoroughly in the Core Cooling and Heat Removal section of this document. Palisades has a 2400V system as opposed to 4160V, a transformer will be required to ensure the RRC generator is compatible [OI17].</td></tr>
<tr><th colspan="2">Details:</th></tr>
<tr><td>Provide a brief description of Procedures / Strategies / Guidelines</td><td>Confirm that procedure/guidance exists or will be developed to support implementation.

Palisades will utilize the industry developed guidance from the PWROG to develop site specific procedures or guidelines to address the criteria in NEI 12-06 (Reference G1). These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.</td></tr>
<tr><td>Identify modifications</td><td>Electrical modifications to accept the medium voltage 2 MW FLEX generator will be discussed in the Safety Function Support section of this document.</td></tr>
<tr><td>Key Reactor Parameters</td><td>List instrumentation credited or recovered for this coping evaluation.

To support this function the following instrumentation will be required:

• SG Level
• SG Pressure</td></tr>
</table>

<table>
<tr><th colspan="2">Maintain PCS Inventory Control</th></tr>
<tr><th colspan="2">PWR Portable Equipment Phase 3:</th></tr>
<tr><td></td><td>• PCS Pressure
• PCS Temperature
• Neutron Flux Level
• Pressurizer Level
• Pressurizer Pressure
• Core Exit Thermocouple Temperature
• Reactor Vessel Level Instrumentation

These instruments will be available throughout Phase 3 due to repowering of the battery chargers, which is discussed in the safety functions section.

Additionally, the Phase 3 FLEX equipment will have installed local instrumentation needed to operate the equipment. The use of these instruments will be described in the associated procedures for use of the equipment. These procedures will be based on inputs from the equipment suppliers, operator experience, and expected equipment function during an ELAP.</td></tr>
</table>

Maintain PCS Inventory Control		
PWR Portable Equipment Phase 3:		
Deployment Conceptual Modification **(Attachment 3 contains Conceptual Sketches)** Phase 3 equipment from the RRC will be be delivered to Palisades using a means that the RRC determines to be the best based on the event. The deployment paths to the staging areas for both units are kept clear during normal and outage conditions. Large debris from various overhead hazards may need to be cleared; however, the expected debris can be cleared with moderately sized equipment. There are security barriers in the hose routing paths; a key will be needed to access certain routing areas. The Palisades security procedure will need to be modified to support these FLEX strategies. From each staging area the hose will be routed to the suction source and the connection point. Debris removal will have been completed, thus there are no debris concerns in the hose routing paths. There are security barriers in the hose routing paths; a key will be needed to access certain routing areas. The Palisades security procedure will need to be modified to support these FLEX strategies. This is an open item tracked by OI9. The FLEX generator will be staged on the east side of the Turbine Building near Staging Area 2 as shown in Attachment 3. From each staging area, the cable will be routed to the existing buswork. There are no debris concerns in the cable routing paths. There are no security barriers in the hose routing paths. Area lighting will be required for outside deployment during the night. It is recommended that this need be met by the lights on the trucks used to haul the pump and area lighting at each staging area. It is recommended that plant personnel be provided flashlights or helmet lamps to augment the emergency lighting when they are inside the plant making connections. Electrical strategies to accept the medium voltage 2 MW FLEX generator will be discussed in the Safety Function Support section of this document.		
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 UHS FLEX pump will be staged along Lake Michigan. The suction hose will simply be draped into the open lake with a strainer to filter flotsam. The discharge hose will be run along grade level to the Service Water Pump House, the Service Water piping adjacent to the pump house, or near the CCW heat exchanger in the Auxiliary	A modification will be made to the Service Water System to accept water from Lake Michigan via the UHS FLEX Pump. A piping tee will be inserted into the Service Water piping. The water will flow and provide cooling to the CCW Heat Exchanger and reject the heat back to the lake as the system normally operates. The location of the Service Water	FLEX Connections will be enclosed within a structure or on piping that meets NEI 12-06 Rev 0. The location of the Service Water connection has not yet been determined. This is an open item tracked by OI18.

Maintain PCS Inventory Control		
PWR Portable Equipment Phase 3:		
Building where the discharge of the hose will be connected to the Service Water System. The location of the Service Water connection has not yet been determined. This is an open item tracked by OI18.	connection has not yet been determined. This is an open item tracked by OI18. Electrical modifications to accept the medium voltage 2 MW FLEX generator will be discussed in the Safety Function Support section of this document.	

Notes:

The following open items are identified in this section:

OI9: Evaluate the effects of FLEX on security procedures.

OI17: Entergy, for the Palisades site, will negotiate and execute a contract with SAFER that will meet the requirements of NEI 12-06, Section 12.

OI18: Evaluate a location to install a tee in the Service Water System to allow the UHS FLEX Pump to provide cooling.

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 (Reference G1)**:** • Containment Spray	
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. **All items are discussed in more detail in Reference G8, Section 8.4.** Containment pressure and temperature are expected to increase during an ELAP due to loss of containment cooling and mass and energy transfer from the PCS to containment. The Palisades Containment design pressure is 55 psig and the design temperature is 283°F. The Containment Liner has been analyzed for temperatures up to 410°F for a design basis accident. A containment evaluation has been performed consistent with the boundary conditions described in Section 2 of NEI 12-06. Based on the performance of installed PCP seals, pressure and temperature of containment are not expected to rise significantly. Analysis done in support of the IER 11-4 response (Reference G7) demonstrated that as long as cooling water was restored to the SGs prior to fuel damage there would not be any structural concerns with containment for this event. Therefore there are no specific Phase 1 actions required at this time. However, the FSGs will include steps to monitor containment conditions. Additional strategies to maintain containment during conditions outside those described in Section 2 of NEI 12-06 have not been determined (OI15).	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* Palisades will utilize the industry developed guidance from the PWROG to develop site specific procedures or guidelines to address the criteria in NEI 12-06 (Reference G1). 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.

[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	
Key Containment Parameters	*List instrumentation credited for this coping evaluation.* To support this function the following instrumentation will be required: • Containment Pressure • Containment Temperature The station batteries are capable of powering this instrumentation during Phase 1.
Notes: The following open items are identified in this section: OI15: Perform analysis to ensure survivability of Containment.	

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. **All items are discussed in more detail in Reference G8, Section 8.4.** Containment evaluation will be performed based on the boundary conditions described in Section 2 of NEI 12-06. Based on the results of this evaluation, required actions to ensure maintenance of containment integrity and required instrument function will be developed, if needed (OI15)..	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* Palisades will utilize the industry developed guidance from the PWROG to develop site specific procedures or guidelines to address the criteria in NEI 12-06 (Reference G1). 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 2 modifications.
Key Containment Parameters	*List instrumentation credited or recovered for this coping evaluation.* To support this function the following instrumentation will be required: • Containment Pressure • Containment Temperature These instruments will be available throughout Phase 3 due to repowering of the battery chargers, which is discussed in the safety functions section.
Storage / Protection of Equipment: **Describe storage / protection plan or schedule to determine storage requirements**	
Seismic	There is no equipment to be stored for this function.
Flooding	There is no equipment to be stored for this function.
Severe Storms with High Winds	There is no equipment to be stored for this function.

Maintain Containment		
PWR Portable Equipment Phase 2:		
Snow, Ice, and Extreme Cold	There is no equipment to be stored for this function.	
High Temperatures	There is no equipment to be stored for this function.	
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: The following open items are identified in this section: OI15: Perform analysis to ensure survivability of containment.		

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. **All items are discussed in more detail in Reference G8, Section 8.4.** Containment evaluation will be performed based on the boundary conditions described in Section 2 of NEI 12-06. Based on the results of this evaluation, required actions to ensure maintenance of containment integrity and required instrument function will be developed [OI15]. To provide long term support of containment, Palisades will use the medium voltage 2 MW FLEX generator from the RRC to repower the installed containment air fans. Palisades has a 2400V system and the RRC generator will be 4160V, a transformer will be required to make the two compatible. The procurement of this transformer is being tracked under OI17. The method in which cooling will be provided to the containment air fans is being traced under OI21. .	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* Palisades will utilize the industry developed guidance from the PWROG to develop site specific procedures or guidelines to address the criteria in NEI 12-06 (Reference G1). These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.
Identify modifications	Electrical modifications to accept the medium voltage 2 MW FLEX generator will be discussed in the Safety Function Support section of this document.
Key Containment Parameters	*List instrumentation credited or recovered for this coping evaluation.* To support this function the following instrumentation will be required: • Containment Pressure • Containment Temperature These instruments will be available throughout Phase 3 due to repowering of the battery chargers, which is discussed in the safety functions section.
Deployment Conceptual Modification	

Maintain Containment		
(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.	Electrical modifications to accept the medium voltage 2 MW FLEX generator will be discussed in the Safety Function Support section of this document.	No new connection points are required.

Notes:

The following open items are identified in this section:

OI15: Perform analysis to ensure survivability of containment.

OI17: Entergy, for the Palisades site, will negotiate and execute a contract with SAFER that will meet the requirements of NEI 12-06, Section 12.

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 (Reference G1)**:** • **Makeup with Portable Injection Source**	
PWR Installed Equipment Phase 1:	
Provide a general description of the coping strategies using installed equipment including modifications that are proposed to maintain spent fuel pool cooling. Identify methods (makeup via portable injection source) and strategy(ies) utilized to achieve this coping time. **All items are discussed in more detail in Reference G8, Section 8.5.1.** Under non-outage conditions, the maximum SFP heat load is 4.405 MW. Loss of SFP cooling with this heat load and an initial SFP temperature of 140°F results in a time to boil of 5.63 hours. This does not include the amount of time it takes to reach the top of active fuel once the boiling initiates. Palisades' will use a safety margin of 15 feet above the top of the spent fuel, which will be reached after 20.93 hours; therefore, completing the equipment line-up for initiating SFP make-up at 18 hours is conservative. The worst case SFP heat load during an outage is 9.02 MW. Loss of SFP cooling with this heat load and an initial SFP temperature of 140°F results in a time to boil of 3.28 hours. With the entire core being located, in the SFP, manpower resources normally allocated to core cooling along with the operations outage shift manpower can be allocated to aligning SFP make-up which ensures the system alignment can be established prior to the point at which SFP conditions become challenged. Palisades' will use a safety margin of 15 feet above the top of the spent fuel, which will occur after 11.28 hours; therefore, completing the equipment line-up for initiating SFP make-up at 9 hours is conservative. Given the time available before makeup is necessary, there are no activities required to support SFP cooling during Phase 1; however, SFP area vent is established during inspection of SFP conditions by actions such as opening doors or wall louvers. Palisades will determine the optimal method of established ventilation. This is an open item tracked by OI12.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* Palisades will utilize the industry developed guidance from the PWROG to develop site specific procedures or guidelines to address the criteria in NEI 12-06 (Reference G1). These procedures and/or guidelines will support the existing symptom

[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.

	based command and control strategies in the current EOPs.
Identify modifications	The Spent Fuel Pool level instrumentation will be installed in accordance with NRC Order Number EA 12-051 (Reference G11) and NEI 12-02 (Reference G12). A vent modification will be required to allow for venting of the Fuel Handling Building. Palisades will determine how to implement this venting capability. This is an open item tracked by OI12
Key SFP Parameter	To support this function SFP Level instrumentation is required. The availability of SFP Level instrumentation will be addressed when the design for the SFP Level instrumentation is completed per EA 12-051 (Reference G11).
Notes: The following open items are identified in this section: OI12: Evaluate methods of venting the Fuel Handling Building	

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. **All items are discussed in more detail in Reference G8, Section 8.5.2.** The transition to Phase 2 strategies will be as the inventory in the SFP slowly declines due to boiling. It has been determined that the SFP makeup with an intact pool is not required until 20.93 hours for a normal decay heat load, and 11.28 hours for a maximum decay heat load. SFP cooling through makeup and spray will be provided by using the SFP makeup FLEX pump. For makeup, the primary method for maintaining Spent Fuel Pool makeup is to modify a flanged connection in the Spent Fuel Pool Cooling System so that it can be fed by a portable pump. The secondary method is a hose connection in the Spent Fuel Pool Cooling System fed by a portable pump. A method of providing Spent Fuel Pool spray must also be established in the event the Spent Fuel Pool area becomes uninhabitable. The method for this function will be to use the B.5.b monitor nozzle in the Spent Fuel Fool Room fed from a hose and pump. The portable pump is required to deliver 100 gpm at 28 psi to perform the Spent Fuel Pool Cooling function. These connections are both located in the SFP Heat Exchanger Room on the 590' Level. The primary connection is an existing flange that must be fitted with a hose connection. The secondary connection is an existing hose connection. If SFP spray is necessary, a monitor nozzle will be attached to the discharge hose of the SFP makeup FLEX pump. The hose will then be routed to the top of the SFP level on the 649' Level. The monitor nozzle will be staged in the Spent Fuel Pool Room early in the event, before the area becomes uninhabitable. Palisades will use their B.5.b pumps to fulfill this requirement. The B.5.b monitor nozzle discharges 100 gpm at a pressure of 30 – 50 psi. The available suction sources for all of the above options are the SIRWT and Lake Michigan. Two diesel engine driven pumps will be stored to support this requirement. The pump will be sized to provide the bounding hydraulic requirements for all spent fuel pool cooling alignments. Since the SFP makeup and CST refill both have relatively low pressure and flow requirements the same pump may be used to provide flow to both when they are using the same suction source.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation* Palisades will utilize the industry developed guidance from the PWROG to develop site specific procedures or guidelines to address

Maintain Spent Fuel Pool Cooling	
PWR Portable Equipment Phase 2:	
	the criteria in NEI 12-06 (Reference G1). These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.
Identify modifications	To allow for connection of the portable pump, a hose connection will be installed on the flange. The flange, located in the SFP Heat Exchanger Room, is on the discharge side of the B SFP Heat Exchanger and is isolated by MV-SFP133. SFP cooling requires installation of a hose connection onto a flange in the East Safeguards Room to get suction from the SIRW Tank. The flange will also need to be extended closer to floor level for accessibility. In addition, 175 feet of piping must be installed in the Tendon Tunnel so that a pump staged outside may establish the suction flow path to the East Safeguards Room where the suction connection is located. The Tendon Tunnel is below the flood elevation; therefore, hose cannot be used in place of piping unless the Tendon Tunnel is sealed against flooding. The location of the new connection is shown in Attachment 3. Alignment of this suction flow path requires valve MV-ES3418 to be opened.
Key SFP Parameter	SFP level instrumentation is required to support this function. The availability of SFP level instrumentation will be addressed when the design for the SFP level instrumentation is completed per NRC Order Number EA 12-051, “Order Modifying Licenses with regard to Reliable Spent Fuel Pool Instrumentation” (Reference G11) and NEI 12-02, “To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation” (Reference G12).
Storage / Protection of Equipment: **Describe storage / protection plan or schedule to determine storage requirements** Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06, Rev. 0 (Reference G1) Section 11. The schedule to construct a 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 Palisades.	
Seismic	The FLEX storage facility will be designed to withstand seismic events to the magnitude discussed in the "General Integrated Plan Elements" section of this document.

Maintain Spent Fuel Pool Cooling	
PWR Portable Equipment Phase 2:	
Flooding	The FLEX storage facility will be designed to withstand flooding events to the PMF discussed in the "General Integrated Plan Elements" section of this document. The equipment will be protected during a short duration seiche event and available for any standing flood event.
Severe Storms with High Winds	The FLEX storage facility will be designed to withstand severe storms with high wind events to the magnitude discussed in the "General Integrated Plan Elements" section of this document.
Snow, Ice, and Extreme Cold	The FLEX storage facility will be designed to withstand snow, ice, and extreme cold events to the magnitude discussed in the "General Integrated Plan Elements" section of this document.
High Temperatures	The FLEX storage facility will be designed to withstand high temperature events to the magnitude discussed in the "General Integrated Plan Elements" section of this document.

Maintain Spent Fuel Pool Cooling		
PWR Portable Equipment Phase 2:		
Deployment Conceptual Design **(Attachment 3 contains Conceptual Sketches)** The pumps, hoses, and transport vehicles will all be stored in the FLEX storage facility. The staging area for SFP makeup will be either at the Lake Michigan suction area or near the Tendon Tunnel for the SIRW Tank (Staging Areas 3 and 4 in Attachment 3), dependent on which suction source will be used. The maximum deployment path will be 1,500 feet from Storage Area 1 and 1,200 feet from Storage Area 2. Two storage areas have been identified. Palisades will determine where the storage facility will be located. This is an open item tracked by OI4. The pumps and hoses will be deployed to the staging locations following the paths shown in Attachment 3. The deployment paths to the staging areas for both units are normally kept clear. Debris from various overhead hazards may need to be cleared; however, the expected debris can be cleared with moderately sized equipment. There are no security barriers in the deployment paths for the pumps, and the entirety of the deployment path is within the protected area. From each staging area, the hose will be routed to the suction source and the connection point by following the routing paths shown in Attachment 3. There are no debris concerns in the hose routing paths. There are no security barriers in the hose routing paths. Area lighting will be required for outside deployment during the night. It is recommended that this need be met by the lights on the truck used to haul the pump and area lighting at each staging area. It is recommended that plant personnel be provided flashlights or helmet lamps to augment the emergency lighting when they are inside the plant making connections.		
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*
For both primary and secondary methods, the pump is staged at the SIRW Tank or the Lake Michigan access area. The SIRW Tank is preferred; however, if the site is in Mode 5 or 6, the SIRW Tank suction will need to be dedicated to maintaining core cooling, thus Lake Michigan will be used. The discharge of the pump will be connected to a hose, routed to the SFP Heat Exchanger Room and connected to the required	To allow for connection of the portable pump, a hose connection will be installed on the flange. The flange, located in the SFP Heat Exchanger Room, is on the discharge side of the B SFP Heat Exchanger and is isolated by MV-SFP133. SFP Cooling requires installation of a hose connection onto a flange in the East Safeguards Room to get suction from the SIRW Tank. The flange will also need to be	The suction pipe for the SIRWT will be constructed to withstand all the hazards. Lake Michigan will survive all the events and will use a hardened suction hose to draft out of the lake to ensure its availability. Both discharge connections are inside the Auxiliary Building, which will survive all events. Hose will be used to get from the pumps to the connection points; this hose will be stored in the FLEX building that will be

Maintain Spent Fuel Pool Cooling		
PWR Portable Equipment Phase 2:		
connection.	extended closer to floor level for accessibility. In addition, 175 feet of piping must be installed in the Tendon Tunnel so that a pump staged outside may establish the suction flow path to the East Safeguards Room where the suction connection is located. The Tendon Tunnel is below the flood elevation; therefore, hose cannot be used in place of piping unless the Tendon Tunnel is sealed against flooding. The location of the new connection is shown in Attachment 3. Alignment of this suction flow path requires valve MV-ES3418 to be opened.	designed to withstand all events.

Notes:

The following open items are identified in this section:

OI4: Select the location of FLEX equipment storage facility

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. **All items are discussed in more detail in Reference G8, Section 8.5.3.** The strategies to maintain SFP cooling from Phase 2 can continue as long as there is sufficient inventory available to feed the strategies. For long term cooling of the SFP, Palisades will repower one train of normal SFP cooling equipment. The Phase 3 medium voltage 2 MW FLEX Generator from the RRC will be used to repower the equipment for SFP cooling. To remove heat, the RRC will have supplied a UHS FLEX pump connected as described in the Phase 3 portion of the Core Cooling and Heat Removal section of this document.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* Palisades will utilize the industry developed guidance from the PWROG to develop site specific procedures or guidelines to address the criteria in NEI 12-06 (Reference G1). These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.
Identify modifications	Electrical modifications to accept the medium voltage 2 MW FLEX generator will be discussed in the Safety Function Support section of this document.
Key SFP Parameter	SFP level instrumentation is required to support this function. The availability of SFP level instrumentation will be addressed when the design for the SFP level instrumentation is completed per NRC Order Number EA 12-051, “Order Modifying Licenses with regard to Reliable Spent Fuel Pool Instrumentation” (Reference G11) and NEI 12-02, “To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation” (Reference G12).

Maintain Spent Fuel Pool Cooling		
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. The UHS FLEX pump will be staged along Lake Michigan. The suction hose will simply be draped into the open lake with a strainer to filter flotsam. The discharge hose will be run along grade level to the Service Water Pump House, the Service Water piping adjacent to the pump house, or near the CCW heat exchanger in the Auxiliary Building where the discharge of the hose will be connected to the Service Water System. The location of the Service Water connection has not yet been determined. This is an open item tracked by OI18.	*Identify modifications* Electrical modifications to accept the medium voltage 2 MW FLEX generator will be discussed in the Safety Function Support section of this document.	*Identify how the connection is protected* Electrical connections to accept the medium voltage 2 MW FLEX generator will be discussed in the Safety Function Support section of this document.
Notes: The following open items are identified in this section: OI18: Evaluate a location to install a tee in the Service Water System to allow the UHS FLEX Pump to provide cooling.		

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. **All items are discussed in more detail in Reference G8, Section 8.6.1.** Support for the safety functions is provided by continued observation of plant conditions by operators using specific instruments and coordinating activities from the Control Room. In addition, the Key Reactor Parameters can be determined from a local reading using standard I&C instruments and local indications. During Phase 1, the installed vital batteries are used to maintain the critical instrumentation, control systems, and lighting available to the operators. The time at which vital power will be available can be extended by performing a load shed of all loads that are not considered to be critical for monitoring the conditions of the plant during an ELAP. Instrumentation functionality and Control Room accessibility are supported by establishing Control Room ventilation per existing coping for a licensed SBO event. Per EOP-3.0, the SBO procedure (Reference G7), the operators are directed to open the Control Room doors to provide some natural ventilation. Portable fans are added to increase the air circulation if opening the door proves to be inefficient. The primary means to maintain critical instrumentation and control is via vital ac instrumentation buses and 125 V dc buses powered by the station batteries. The initial loading on the battery is large, such that the operators will enter the SBO EOP (Reference G7) to reduce loading and extend the battery life to four (4) hours. Vital loads that must remain include monitoring instrumentation for critical plant parameters; control of valves, such as the ADVs, containment valves, and the TDAFWP control valve; and lighting. Palisades has committed to increasing this time for an ELAP by investigating a deeper load shed for the FLEX procedures. This is an open item, tracked by OI6. Lighting will also be available using the Appendix R lighting, which is supported by individual battery packs. These lights are intended to last 8 hours. These lights, along with all lighting, can be made more efficient by replacing the incandescent bulbs with energy efficient fluorescent or LED bulbs. This will additionally reduce the heat load requiring less ventilation in the Control Room. Palisades will evaluate the use of high-efficiency fluorescent or LED lighting. This is an open item tracked by OI13. The present 125 V dc battery coping time is approximately 4 hours per the station SBO procedure, EOP-3.0 (Reference G6).
Details:

[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.

Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* Palisades will utilize the industry developed guidance from the PWROG to develop site specific procedures or guidelines to address the criteria in NEI 12-06 (Reference G1). 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.
Key Parameters	*List instrumentation credited for this coping evaluation phase.* • 125 dc Bus Voltage • 120 VAC Instrument Bus Voltage • Battery Discharge Rate (Current) • Battery Amp-Hour meters • Control Room temperature (local thermometer) All indication can be local or remote to the Control Room.

Notes:

The following open items are identified in this section:

OI6: Evaluate strategies to extend battery coping time.

OI13: Evaluate the use of high-efficiency LED lighting.

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.

All items are discussed in more detail in Reference G8, Section 8.6.2.

Support for the safety functions is provided by continued observation of plant conditions by operators using specific instruments and coordinating activities from the Control Room. In addition, the Key Reactor Parameters can be determined from a local reading using standard I&C instruments and local indications. During Phase 2, two portable 480 V, 100 kW FLEX diesel generators will be used to maintain power to critical instrumentation, as well as recharging the vital batteries and SBO battery loads. The generators will also be used to power existing battery room ventilation and emergency lighting. Where necessary, portable lighting and portable ventilation can be powered by smaller ac generators.

The 480 V generator will be connected to the installed electrical distribution system through modified spare breakers in the 1E class 480 V buswork. The generator should be connected to the electrical distribution system before battery power is fully depleted at the four (4) hour mark following the ELAP. While this is a very short time period, Palisades has an open item to investigate ways to extend this time using a deeper dc load shed strategy, as discussed above in Phase 1 and tracked by open item OI6.

The generator will be connected to LC-19 through the use of temporary cables and a modified spare breaker with quick connects. Once the generator is aligned to LC-19 power can be supplied to MCC-1 so the battery chargers can be powered using their normal breakers and cabling. MCC-1 provides the capability to charge both trains of batteries. MCC-1 also provides the ability to power lighting for the Cable Spreading Room, Control Room, and Auxiliary Building. Once battery charging begins ventilation will need to be established to vent hydrogen gas. This generator will also be used to power other loads as needed such as temporary lighting and temporary ventilation.

A second generator will be used to power Bus 11 or Bus 12; connection from the FLEX generator to Bus 11 or Bus 12 will be similar to that of LC-19 described above. Bus 11 and 12 are the power supplies to the installed 480 V positive-displacement charging pumps, which will be used to inject borated water into the PCS as described in the "Maintain PCS Inventory Control" section above. Either Bus 11 or Bus 12 can be used, dependent on which charging pump will be used for operation. Bus 11 and Bus 12 can be cross-tied to provide a diverse means of powering either pump. Bus 11 also provides the ability to power the battery room ventilation exhaust fans to remove hydrogen gas that is generated when the aggressive battery charging begins.

Load sequencing calculations and procedures were determined to be unnecessary to prevent overloading or tripping the FLEX generators. Loads will be applied one at a time and manually added by locally operating the breakers. Load sequencing would be difficult to predetermine because loads will be restored on an as-need basis, dependent on which function needed to be restored first (e.g. battery chargers, ventilation, electrically powered pumps used for FLEX strategies, etc.). Additionally, the generators will be sized such that there is sufficient load margin to support starting the largest load with all other loads running. If there is still a concern, FLEX procedures will be developed to provide the maximum amount of electrical loading on each FLEX

Safety Functions Support	
PWR Portable Equipment Phase 2	
generator prior to starting each load. Four 100 kW FLEX generators will be stored on site for this function to support the N+1 requirement for FLEX. Palisades requires two generators to support the Phase 2 strategy. Smaller diesel generators loaded on carts, similar to the ones used for B.5.b strategies will be used as necessary to power communications equipment, portable fans, and portable lighting. Because so many FLEX strategies rely on diesel-driven equipment, Palisades must have a strategy to refuel these components. Most components will be stored with a certain amount of fuel. Fuel tanks that have survived the BDBEE will still contain fuel, but not have a method of transferring said fuel to the diesel driven components. Palisades will have a fuel tank which can be mounted on many standard pickup trucks. The truck will be used to transport the fuel tank to the installed tanks, transport the fuel to the diesel driven components, and refuel the components. The diesel fuel can be gravity drained from the tank or drained using a fuel transfer FLEX pump, established with the truck.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* Palisades will utilize the industry developed guidance from the PWROG to develop site specific procedures or guidelines to address the criteria in NEI 12-06 (Reference G1). These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.
Identify modifications	Modify spare breakers on necessary buses. The breakers will need to be replaced with breakers large enough to support the load from the generator. Additionally, the face of the breaker will need to be modified to have external female connectors, capable of receiving power from the FLEX generators. Four (4) female connectors will be required for 480 V distribution centers, one for each phase (A, B, C) and one to ground the generator to the bus. The connectors will be quick-electrical connections that require little to no electrical training to marry the connection. Two (2) breakers on LC-19 will require this modification. A spare breaker on both Bus 11 and Bus 12 will also need this modification.
Key Parameters	*List instrumentation credited for this coping evaluation phase.* • 125 dc Bus Voltage • 120 VAC Instrument Bus Voltage • 480 VAC Bus Voltage (for required Buses) • Battery Discharge Rate (Current) • Battery Amp-Hour meters

Safety Functions Support	
PWR Portable Equipment Phase 2	
	• Battery Charger ac and dc Voltage • Control Room temperature (local thermometer) • FLEX Generator Voltage • FLEX Generator Current • FLEX Generator Power (kW) All indication can be local or remote to the Control Room.

Storage / Protection of Equipment :	
Describe storage / protection plan or schedule to determine storage requirements	
Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06, Rev. 0 (Reference G1) Section 11. Schedule to construct the 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 Palisades.	
Seismic	The FLEX storage facility will be designed to withstand seismic events to the magnitude discussed in the "General Integrated Plan Elements" section of this document.
Flooding Note: if stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level.	The FLEX storage facility will be designed to withstand flooding events to the PMF discussed in the "General Integrated Plan Elements" section of this document. The equipment will be protected during a short duration seiche event and available for any standing flood event.
Severe Storms with High Winds	The FLEX storage facility will be designed to withstand severe storms with high wind events to the magnitude discussed in the "General Integrated Plan Elements" section of this document.
Snow, Ice, and Extreme Cold	The FLEX storage facility will be designed to withstand snow, ice, and extreme cold events to the magnitude discussed in the "General Integrated Plan Elements" section of this document.
High Temperatures	The FLEX storage facility will be designed to withstand high temperature events to the magnitude discussed in the "General Integrated Plan Elements" section of this document.

Safety Functions Support		
PWR Portable Equipment Phase 2		
Deployment Conceptual Design **(Attachment 3 contains Conceptual Sketches)** The generators, cables, and transport vehicles will all be stored in the FLEX storage facility. The staging area for Modes 1-4 will be either at the north side of the Turbine Building near the Auxiliary Building or the on the north east side of the Containment Building (Staging Areas 1 and 5 in Attachment 3). The maximum deployment path will be 2,200 feet from Storage Area 1 and 900 feet from Storage Area 2. Two possible storage areas have been identified. Palisades will determine where the storage facility will be located. This is an open item tracked by OI4. The generators and cables will be deployed to the staging locations following the paths shown in Attachment 3. The deployment paths to the staging areas are kept clear during normal and outage conditions. Debris from various overhead hazards may need to be cleared; however, the expected debris can be cleared with moderately sized equipment. There are security gates in the deployment paths from each storage location, The entirety of the deployment path is within the owner controlled area. From each staging area, the cable will be routed to the existing buswork. There are no debris concerns in the cable routing paths. There are security doors in the cable routing paths that will need to be opened. Area lighting will be required for outside deployment during the night. This need will be met by the lights on the truck used to haul the generator and lights mounted on the generator trailer. Plant personnel will be provided flashlights or helmet lamps to augment the emergency lighting when they are inside the plant making connections.		
Strategy	**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use. Two possible staging locations are considered for the generators. The preferred location is northeast of the Containment Building. The secondary location is north of the Turbine Building. Cables will be routed from the staging location to the Cable Spreading Room and the Electrical Equipment Room on the 607'-6" Level where the connections will be made.	*Identify modifications* Modify spare breakers on necessary buses. The breakers will need to be replaced with breakers large enough to support the load from the generator. Additionally, the face of the breaker will need to be modified to have external female connectors, capable of receiving power from the FLEX generators. Four (4) female connectors will be required for 480 V distribution centers, one for each phase (A, B, C) and one to ground the generator to the bus. The connectors will	*Identify how the connection is protected* The portable generators will be stored in the FLEX building and will therefore be available for all events. The cables from the generators are routed through the turbine building and will survive all events. FLEX electrical connections will be enclosed within a structure that meets NEI 12-06 Rev. 0 on safety related electrical buses.

Safety Functions Support		
PWR Portable Equipment Phase 2		
	be quick-electrical connections that require little to no electrical training to marry the connection. Two (2) breakers on LC-19 will require this modification. A spare breaker on both Bus 11 and Bus 12 will also need this modification.	

Notes:

The following open items are identified in this section:

OI4: Select the location of FLEX equipment storage facility.

OI6: Evaluate strategies to extend battery coping time.

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.   **All items are discussed in more detail in Reference G8, Section 8.6.3.**   During Phase 3, Palisades will be aligned to shutdown cooling conditions to establish an indefinite coping capability. To support cold shutdown, one train of shutdown cooling equipment will be restored. This will require a large 2400 V source from the RRC to repower an SDC Pump and a CCW pump. The generator should also be capable of supporting all the loads from Phase 2.   Shortly after announcing the ELAP, Palisades will notify the RRC and request delivery of off-site equipment. The Phase 3 large FLEX generator is expected to arrive by 24 hours and be set up to power plant equipment by 72 hours after the event. When sufficient site personnel are available and the generator is ready for electrical loading, one train of Class 1E 2400 V switchgear will be energized. The standard medium voltage used in the US Nuclear Fleet is 4 kV generators to supply 2 MW of power. Since Palisades' medium voltage operates at 2400 V, they will need a transformer to step the voltage down to an acceptable level prior to being applied to the bus. It is unclear if Palisades or the RRC will procure the transformer; therefore, this remains an open item, tracked by OI17.   The RRC generator will connect to the 2400 V Switchgear 1C located on the 590' Level in the 1-C Switchgear Room, which in turn will operate the equipment essential to plant shutdown. The equipment expected to be powered for cold shutdown is LPSI pump P-67B, HPSI pump P-66B, and CCW pump P-52C. Vital lighting and ventilation loads can also restored using power from the RRC FLEX generator. The RRC FLEX generator will provide power to the 1-C switchgear using temporary cables connected to a modified breaker with quick connects. Unlike the 480 V buses, the 2400 V switchgear does not have any spare breaker cubicles, so a modified spare breaker must be stored nearby that can be racked into an existing cubicle that will not be used for FLEX strategies, such as the site diesel breaker.   Large load breakers in Phase 3 can either be locally operated using existing procedures or remotely controlled from the Control Room. Operating 2400 V breakers manually requires safety precautions such as arc suits and are extensive procedures. Operating the breakers remotely or locally will require the return of DC control power to the breakers.   Load sequencing will be required for Phase 3 strategies, but not to protect the RRC FLEX generator. The load sequencing will need to be performed such that a pump/system is not started until its cooling supply system is available. For example it would be best if the CCW pump and CCW system were operating prior to starting the LPSI pump since CCW supplies cooling to the LPSI system.   In order to line up systems for shutdown cooling, several valve manipulations will be required. For any large MOVs, smaller generators loaded on carts will be used to operate single MOVs, one at a time. Manual operation of these valves may be challenged due to size and accessibility.

Safety Functions Support	
PWR Portable Equipment Phase 3	
Refueling operations in Phase 3 will be similar to that of Phase 2, using a diesel fuel tank loaded on a truck. Additional fuel supplies can be brought by the RRC when on-site supplies are diminished.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* Palisades will utilize the industry developed guidance from the PWROG to develop site specific procedures or guidelines to address the criteria in NEI 12-06 (Reference G1). These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.
Identify modifications	Modify two spare 2400 V breakers, sufficiently large enough to support the load from the generator. Additionally, the face of the breaker will need to be modified to have external female connectors, capable of receiving power from the FLEX generators. Four (4) female connectors will be required for 2400 V distribution centers, one for each phase (A, B, C) and one to ground the generator to the bus. The connectors will be quick-electrical connections that require little to no electrical training to marry the connection. The breakers must able to be racked into the 1C Switchgear.
Key Parameters	*List instrumentation credited or recovered for this coping evaluation.* To support this function the following instrumentation will be required: • 125 dc Bus Voltage • 120 VAC Instrument Bus Voltage • 480 VAC Bus Voltage (for required Buses) • 2400 VAC Switchgear Voltage • 2400 VAC Switchgear Current • 2400 VAC Switchgear dc Control Power Voltage • Battery Discharge Rate (Current) • Battery Amp-Hour meters • Battery Charger ac and dc Voltage • FLEX Generator Voltage • FLEX Generator Current • FLEX Generator Power (kW) • RRC FLEX Generator Voltage • RRC FLEX Generator Current • RRC FLEX Generator Power (kW)

Safety Functions Support	
PWR Portable Equipment Phase 3	
	• Shutdown Cooling System Valve Indication All indication can be local or remote to the Control Room.

Deployment Conceptual Design

(Attachment 3 contains Conceptual Sketches)

Phase 3 equipment from the RRC will be delivered to Palisades using a means that the RRC determines to be the best based on the event. The deployment paths to the staging areas are normally kept clear. Large debris from various overhead hazards may need to be cleared; however, the expected debris can be cleared with moderately sized equipment. There are security barriers in the hose routing paths; a key will be needed to access certain routing areas. The Palisades security procedure will need to be modified to support these FLEX strategies.

From each staging area the hose will be routed to the suction source and the connection point. Debris removal will have been completed, thus there are no debris concerns in the hose routing paths. There are security barriers in the hose routing paths; a key will be needed to access certain routing areas. The Palisades security procedure will need to be modified to support these FLEX strategies. This is an open item tracked by OI9

Area lighting will be required for outside deployment during the night. It is recommended that this need be met by the lights on the trucks used to haul the pump and area lighting at each staging area. It is recommended that plant personnel be provided flashlights or helmet lamps to augment the emergency lighting when they are inside the plant making connections.

Electrical strategies to accept the medium voltage 2 MW FLEX generator is discussed in the Safety Function Support section of this document.

Strategy	**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use. The FLEX generator will be staged on the east side of the Turbine Building near staging area 4. The cables will then be routed into the Auxiliary Building and into the 1C Switchgear Room on the 590' Level.	*Identify modifications* Modify two spare 2400 V breakers, sufficiently large enough to support the load from the generator. Additionally, the face of the breaker will need to be modified to have external female connectors, capable of receiving power from the FLEX generators. Four (4) female connectors will be required for 2400 V distribution centers, one for each phase (A, B, C) and one to ground the	*Identify how the connection is protected* The portable generators will be stored in the FLEX building and will therefore be available for all events. The cables from the generators are routed through the turbine building and will survive all events. FLEX electrical connections will be enclosed within a structure that meets NEI 12-06 Rev. 0 on safety related electrical buses.

Safety Functions Support		
PWR Portable Equipment Phase 3		
	generator to the bus. The connectors will be quick-electrical connections that require little to no electrical training to marry the connection. The breakers must able to be racked into the 1C Switchgear.	

Notes:

The following open items are identified in this section:

OI9: Evaluate the effects of FLEX on security procedures.

OI17: Entergy, for the Palisades site, will negotiate and execute a contract with SAFER that will meet the requirements of NEI 12-06, Section 12.

PWR Portable Equipment Phase 2							
Use and (potential / flexibility) diverse uses						*Performance Criteria*	*Maintenance*
Portable Equipment	Core	Containment	SFP	Instrumentation	Accessibility		Maintenance / PM requirements
Portable SG Makeup Pump (3)	X					300 gpm, 780 ft	Will follow EPRI template requirements
Portable SFP Makeup Pump (3)			X			300 gpm, 164 ft	Will follow EPRI template requirements
100 kW PDG (4)	X			X		480 V, 150 A, 100 kW	Will follow EPRI template requirements
Pump Transport Truck (2)					X	-	Will follow EPRI template requirements
Fuel Transport Truck (2)					X	-	Will follow EPRI template requirements
Exhaust Fans					X	8 kW	Will follow EPRI template requirements
Cooling Ventilation					X	8 kW	Will follow EPRI template requirements
Cell Tower					X	3 kW	Will follow EPRI template requirements

PWR Portable Equipment Phase 2							
Use and (potential / flexibility) diverse uses						*Performance Criteria*	*Maintenance*
Portable Equipment	Core	Containment	SFP	Instrumentation	Accessibility		Maintenance / PM requirements
Radio Repeaters					**X**	3 kW	Will follow EPRI template requirements

PWR Portable Equipment Phase 3							
Use and (potential / flexibility) diverse uses						*Performance Criteria*	*Notes*
Portable Equipment	Core	Containment	SFP	Instrumentation	Accessibility		
Ultimate Heat Sink Pump	**X**	**X**				6000 gpm	
Containment Cooling Pump	**X**	**X**				-	
RRC Generator				**X**		2400 V, 2000 kW	
Large Fuel Truck					**X**	-	
Large Debris Removal Equipment					**X**	-	
Service Water Suction Hose	**X**	**X**				-	
Service Water Discharge Hose	**X**	**X**				-	
Mobile Boration Unit	**X**					-	
Mobile Water Purification System	**X**	**X**				-	
Mobile Chiller for Containment Cooling[1]		**X**				-	

PWR Portable Equipment Phase 3							
Use and (potential / flexibility) diverse uses						*Performance Criteria*	*Notes*
Portable Equipment	Core	Containment	SFP	Instrumentation	Accessibility		
Diesel Driven Air Compressor					**X**	-	
Alternate Air Cooled Ultimate Heat Sink[1]	**X**	**X**	**X**			-	
Mobile Heat Exchanger Unit[1]	**X**	**X**	**X**			-	

1these items are not credited but may be available through the RRC.

Phase 3 Response Equipment/Commodities	
Item	**Notes**
Radiation Protection Equipment • Survey instruments • Dosimetry • Off-site monitoring/sampling	
Commodities • Food • Potable water	
Fuel Requirements	
Heavy Equipment • Transportation equipment • Debris clearing equipment	

References

G1. NEI 12-06, Revision 0, “Diverse and Flexible Coping Strategies (FLEX) Implementation Guide,” August 2012.

G2. Palisades UFSAR, Rev. 30, “Palisades Final Safety Analysis Report,” September 2012.

G3. 10 CFR 50, "Domestic Licensing Of Production And Utilization Facilities," July 6, 2012.

G4. U.S. Nuclear Regulatory Commission Information Notice 2010-18, Generic Issue 199, “Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States on Existing Plants,” September 2, 2010 (ADAMS Accession No. ML100270582).

G5. NRC JLD-ISG-2012-01, Revision 0, “Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events,” August 2012.

G6. Palisades Nuclear Plant Emergency Operating Procedure EOP-3.0, Rev. 14, "Station Blackout Recovery Emergency Operating Procedure," November 15, 2006.

G7. Palisades’ response to INPO IER L1-11-4, "Near Term Actions to Address the Effects of an Extended Loss of All AC Power in Response to the Fukushima Daiichi Event," October 26, 2012.

G8. Nexus Document 12-4105-03-08, Rev. 0 "Palisades FLEX Implementation Plan," February 2013.

G9. NRC Regulatory Guide (RG) 1.155, Rev. 0, “Station Blackout,” August 1988.

G10. American Society of Civil Engineers Document ASCE 7-10, 2010 Edition, "Minimum Design Loads for Buildings and Other Structures," May 20, 2010.

G11. NRC Order EA-12-051, Revision 0, “Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation,” March 12, 2012.

G12. NEI 12-02, Revision 1, “Industry Guidance for Compliance with NRC Order EA-12-051, 'To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation,'" August 24, 2012.

G13. SOP-24, Rev. 58, "Ventilation and Air Conditioning System Operating Procedure," June 19, 2012.

G14. LTR-PCSA-12-78, “Transmittal of PA-PSC-0965 Core Team PWROG Core Cooling Management Interim Position Paper,” November 9, 2012

G15. WCAP-17601-P, Rev. 0, “Reactor Coolant System Response to the Extended Loss of AC Power Event for Westinghouse, Combustion Engineering and Babcock and Wilcox NSSS Designs.

Abbreviations

ac	Alternating Current
ADV	Atmospheric Dump Valve
AFW	Auxiliary Feedwater
AOP	Abnormal Operating Procedure
AOV	Air-Operated Valve
APM	Available Physical Margin
ARV	Automatic Relief Valve
ASCE	American Society of Civil Engineers
BDB	Beyond-Design-Basis
BDBEE	Beyond-Design-Basis External Events
CCW	Component Cooling Water
CET	Core Exit Temperature
CFR	Code of Federal Regulations
CFT	Core Flood Tanks
CLA	Cold Leg Accumulators
CLB	Current Licensing Basis
CSR	Cable Spreading Room
CST	Condensate Storage Tank
DBFL	Design Basis Flood Level
dc	Direct Current
DG	Diesel Generator
EDMG	Extreme Damage Mitigation Guideline
EFW	Emergency Feedwater
ELAP	Extended Loss of ac Power
EOP	Emergency Operating Procedure
EPRI	Electric Power Research Institute
ERO	Emergency response Organization
FCV	Flow Control Valve
FLEX	Flexible and Diverse Coping Mitigation Strategies
FP	Footprint
FSG	FLEX Support Guideline
HPSI	High Pressure Safety Injection

HVAC	Heating, Ventilation, and Air Conditioning
IER	Industry Event Report
INPO	Institute of Nuclear Power Operations
ISG	Interim Staff Guidance
LOOP	Loss of Offsite Power
LPSI	Low Pressure Safety Injection
LUHS	Loss of Normal Access to the Ultimate Heat Sink
MAAP	Modular Accident Analysis Program
MCC	Motor Control Center
MFW	Main Feed Water
MOV	Motor-Operated Valve
MSIV	Main Steam Isolation Valve
MSSV	Main Steam Safety Valve
NEI	Nuclear Energy Institute
NPO	Nuclear Plant Operator
NPSH	Net Positive Suction Head
NRC	Nuclear Regulatory Commission
NSSS	Nuclear Steam Supply System
NTTF	Near-Term Task Force
OBE	Operating Basis Earthquake
OI	Open Item
P&ID	Piping and Instrumentation Identification Diagram
PCP	Primary Coolant Pump
PCS	Primary Coolant System
PDG	Portable Diesel Generator
PORV	Power Operated Relief Valve
PMF	Probable Maximum Flood
PMP	Probable Maximum Precipitation
PRA	Probabilistic Risk Assessment
PWR	Pressurized Water Reactor
PWROG	Pressurized Water Reactor Owners Group
RCP	Reactor Coolant Pump
RO	Reactor Operator
RPV	Reactor Pressure Vessel
RRC	Regional Response Center

SAFER	Strategic Alliance for FLEX Emergency Response
SAMG	Severe Accident Management Guideline
SDC	Shutdown Cooling
SIRWT	Safety Injection and Refueling Water Storage Tank
SI	Safety Injection
SIT	Safety Injection Tank
SBO	Station Blackout
SFP	Spent Fuel Pool
SG	Steam Generator
SOCA	Site Owner Controlled Area
SRO	Senior Reactor Operator
S/RV	Safety/Relief Valve
SSC	Systems, Structures and Components
SSE	Safe Shutdown Earthquake
TDAFW	Turbine-Driven Auxiliary Feedwater
TDAFWP	Turbine-Driven Auxiliary Feedwater Pump
TDH	Thermal Driving Head
UFSAR	Updated Final Safety Analysis Report
UHS	Ultimate Heat Sink
VCT	Volume Control Tank
WEC	Westinghouse Electric Company

Attachment 1A
Sequence of Events Timeline

Action Item	Elapsed Time [hrs][6]	Action	New ELAP Time Constraint Y/N [7]	Time Constraint (hr)[8]	Remarks / Applicability
0	0	**Event Starts**	**N/A**		Plant @100% power
1	.25	Verify TDAFWP Operation and other automatic functions	Y	1	Required to ensure plant is operating as expected. While the TDAFWP area may be inaccessible, the pump will still be operable, and remote indication of flow can still be accomplished.
2	0.5	Debris Removal (Access)	Y	2	Must begin pre-emptively regardless of whether the event results in an ELAP or not to ensure sufficient time is available to deploy all FLEX equipment within the time restraints.
3	0.5	Initiate DC Load Shed	Y	.5	EOP-3.0, required to extend battery life. Additional load shed will be investigated to provide more time margin for the operators to deploy FLEX equipment.
4	0.5	Open Control Room door for ventilation	N		Can be accomplished at any time. This is not a time intensive step, and the heat load in the Control Room will be minimal based on the reduced amount of running equipment resulting from the ELAP.
5	0.95	Declare ELAP	Y	1	This declaration allows action to be

[6] Estimated timing is provided for start of ELAP strategies. Following completion of staffing studies (A31), updated operator action times will be provided for each time sensitive action. All actions will be completed prior to time constraint.

[7] Instructions: Provide justification if No or NA is selected in the remark column. If yes include technical basis discussion as requires by NEI 12-06 section 3.2.1.72

[8] Time constraints based on Reference G8, Section 5 analyses. Additional refinements may be provided in subsequent updates.

Action Item	Elapsed Time [hrs][6]	Action	New ELAP Time Constraint Y/N [7]	Time Constraint (hr)[8]	Remarks / Applicability
					taken which places the plant outside the current licensing basis.
6	1.0	Damage assessment	N		As required
7	2.0	Commence Cooldown	Y	2	Cooldown initiated, to be completed in 3 hours. This cooldown will support depressurizing the PCS such that the SITs can inject.
8	2.0	Cross-connect T-81 with the CST	Y	4	The CST is limited to 4 hours of inventory for core cooling. Deploying the FLEX equipment can be time consuming; however, the inventory can be extended by cross-connecting the CST with T-81 such that T-81 can gravity drain to the CST.
9	2.0	Deploy and Connect Generator No. 1 to establish battery chargers.	Y	4	Generator must be established within 4 hours of the event based on IER 11-4 Response (Reference G7) battery depletion discussion. This action will restore the battery chargers.
10	2.0	Deploy FLEX pump for CST Makeup	Y	4	Constraint based on IER 11-4 Response (Reference G7) discussion on CST depletion. Includes hose routing.
11	3.9	Establish temporary lighting	N		As required
12	5.0	Establish ventilation for Refueling Building	Y	5.5	Must be established before SFP boiling begins to ensure the action can be taken while the building is steam free and still accessible.
13	5.0	Deploy and Connect FLEX Generator No. 2 to establish PCS makeup via the installed charging pumps	Y	8	PCS makeup is required by 8 hours to ensure the core remains covered. Initial suction source will be from the VCT.

Action Item	Elapsed Time [hrs][6]	Action	New ELAP Time Constraint Y/N [7]	Time Constraint (hr)[8]	Remarks / Applicability
14	8.5	Establish battery ventilation	N		As determined by Palisades, hydrogen buildup will not be sufficient for several hours after charging has commenced.
15	9.0	Transfer PCS suction makeup from the VCT to a borated source.	Y	9.5	The VCT suction is limited in volume, so a secondary source is required. To maintain an acceptable margin to criticality, boration is required by hour 13 to counter the effects of cooldown and xenon decay
16	9.0	Establish temporary ventilation	N		As required
17	10.0	Stage SG makeup FLEX Pump	N		The TDAFWP may not be sufficient depending upon the pressure in the SGs. The secondary strategy for SG makeup should be available to back up the TDAFW pump. If it is determined that refilling the CST is not possible, staging this pump will be required in the first 4 hours.
18	12.0	Commence refueling strategies	Y	15.5	The first diesel driven equipment should have started around hour 3.5. Refueling will require adding transferring diesel from on-site diesel storage tanks to a diesel tank loaded on a truck. The fuel is then transported to the various diesel driven FLEX equipment.
19	18.0	Deploy the SFP makeup FLEX pump	Y	20.5	Boiling occurs in the SFP at time 5.63. The pool will continue to boil off until the water level is 15 feet above the top of the spent fuel at time 20.93. Makeup must be provided prior to this time.

Action Item	Elapsed Time [hrs][6]	Action	New ELAP Time Constraint Y/N [7]	Time Constraint (hr)[8]	Remarks / Applicability
20	24.0	Large debris removal	Y	72	Time based on establishing clear paths for heavy equipment being deployed by RRC.
21	24.0	Align mobile water purification system	Y	72	Deploy system to provide purified water for all system make up.
22	25.0	Establish large fuel truck service	Y	72	Provide diesel fuel to the site for portable equipment operation to preserve the on-site supply.
23	32.0	Establish ultimate heat sink pump	Y	72	Action initiated to deploy a pump to provide river water to the CCW heat exchangers to support long term shutdown cooling.
24	44.0	Establish the 2 MW FLEX generator	Y	72	Generator deployed to power large electrical equipment required for long term shutdown cooling.
25	52.0	Setup diesel-driven air compressors	Y	72	Action done to support repositioning of AOVs necessary for long term shutdown cooling
26	62.0	Set up mobile boration unit.	Y	72	Action initiated to provide a borated source after all on-site sources have been used.

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
To be provided with Rev. 0					
	All	Supported by Reference G8 Table C-4, Entergy has evaluated WCAP-17601 (Reference G15) considering Palisades site-specific parameters and determined that the conclusions of that document are applicable to Palisades. Entergy has performed analysis consistent with the recommendations of the core cooling position paper (Reference G14). There are no deviations in the Palisades FLEX conceptual design with respect to the PWROG guidance.			

Attachment 2A
Milestone Schedule

Palisades Milestone Schedule		
Activity	**Original Target Completion Date**	**Status (Will be updated every 6 months)**
Submit Overall Integrated Implementation Plan	**February-2013**	
6 Month Status Updates		
Update 1	*August-2013*	
Update 2	*February-2014*	
Update 3	*August-2014*	
Update 4	*February-2015*	
Update 5	*August-2015*	
FLEX Strategy Evaluation	**April-2013**	
Perform Staffing Analysis	**December-2013**	
Modifications		
Modifications Evaluation	*June-2013*	
Engineering and Implementation		
N-1 Walkdown	*November-2013*	
Design Engineering	*May-2014*	
Implementation Outage	*1R24 March-2015*	
On-site FLEX Equipment		
Purchase	*June-2013*	
Procure	*December-2013*	
Off-site FLEX Equipment		
Develop Strategies with RRC	*November-2013*	
Install Off-site Delivery Station (if necessary)	*May-2015*	
Procedures		
PWROG issues NSSS-specific guidelines	*June-2013*	
Create Palisades FSG	*October-2014*	
Create Maintenance Procedures	*October-2014*	

Palisades Milestone Schedule		
Activity	**Original Target Completion Date**	**Status (Will be updated every 6 months)**
Training		
Develop Training Plan	*January-2015*	
Implement Training	*April-2015*	
Submit Completion Report	**May-2015**	

Attachment 2B
Open Item List

OI1. Perform analysis on Palisades' susceptibility to soil liquefaction and potential consequences on the FLEX implementation plan.

OI2. Develop Phase 3 deployment strategy with correspondence with the RRC.

OI3. Evaluate the need to missile protect T-81 and other external tanks.

OI4. Select the location of FLEX equipment storage facility.

OI5. Perform seismic Evaluation of TDAFWP driver K-8.

OI6. Evaluate strategies to extend battery coping time.

OI7. Evaluate sources of non-borated water in addition to T-2 and T-81.

OI8. Palisades PRA to provide justification why battery room ventilation is not required until 24 hours.

OI9. Evaluate the effects of FLEX on security procedures.

OI10. Evaluate requirements of mobile purification unit from RRC.

OI11. Evaluate requirements of mobile boration unit from RRC.

OI12. Evaluate methods of venting the Fuel Handling Building.

OI13. Evaluate the use of high-efficiency LED lighting.

OI14. Perform evaluation to determine if additional parameters will need to be monitored during FLEX activities.

OI15. Perform analysis to ensure survivability of containment.

OI16. Evaluate borated water sources in addition to SIRWT.

OI17. Entergy, for the Palisades site, will negotiate and execute a contract with SAFER that will meet the requirements of NEI 12-06, Section 12.

OI18. Evaluate a location to install a tee in the Service Water System to allow the UHS FLEX Pump to provide cooling.

OI19. Evaluate the use of Lake Water to cool the SGs during an ELAP.

OI20. Evaluate time until PCS makeup is necessary in Modes 5 & 6.

OI21. Evaluate connection to ensure cooling water can be provided for containment air fans.

OI22. Evaluate the robustness of the charging pumps.

Attachment 3
Conceptual Sketches

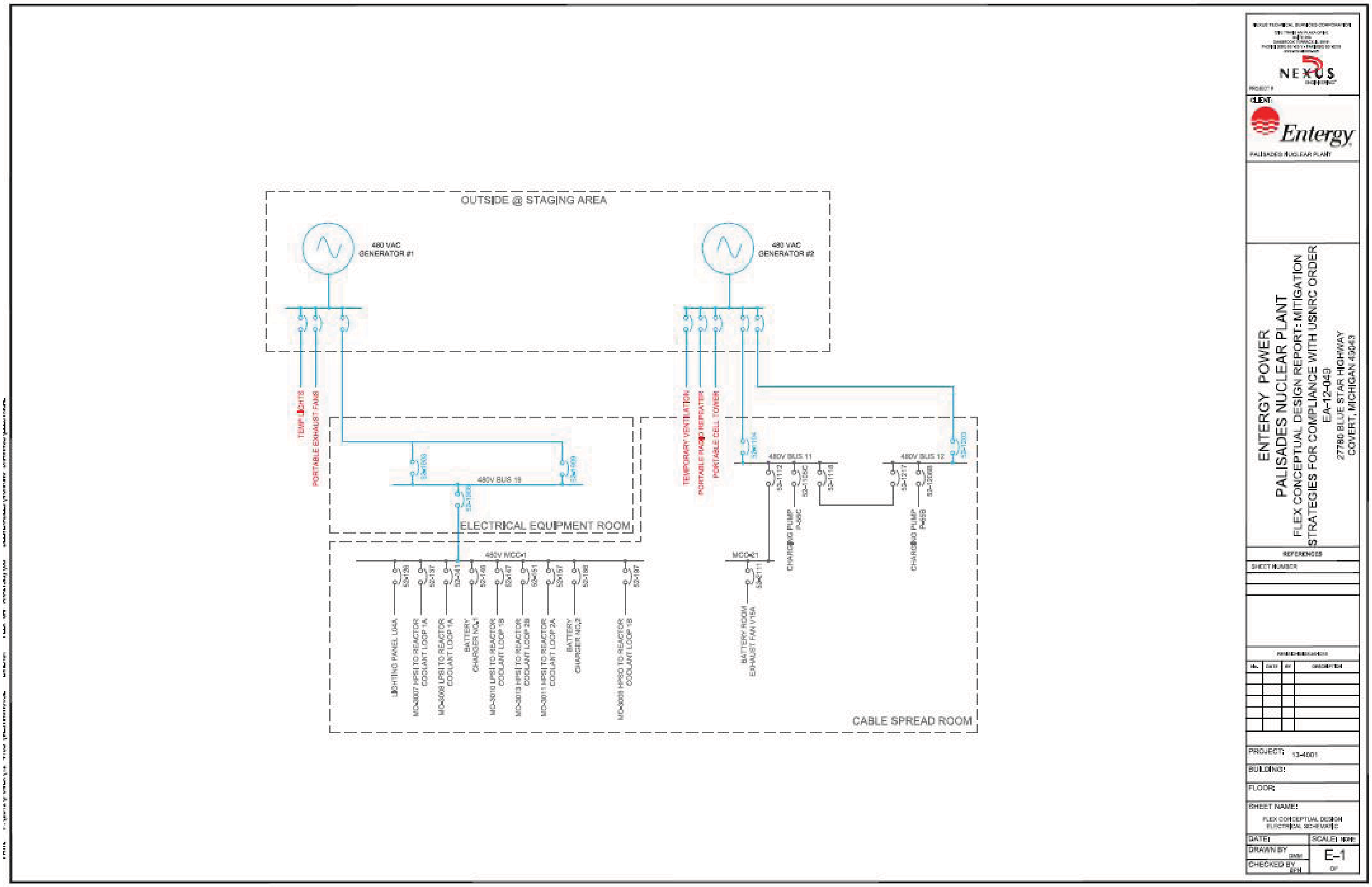

Figure 3-1: Simplified Electrical FLEX Strategy Diagram

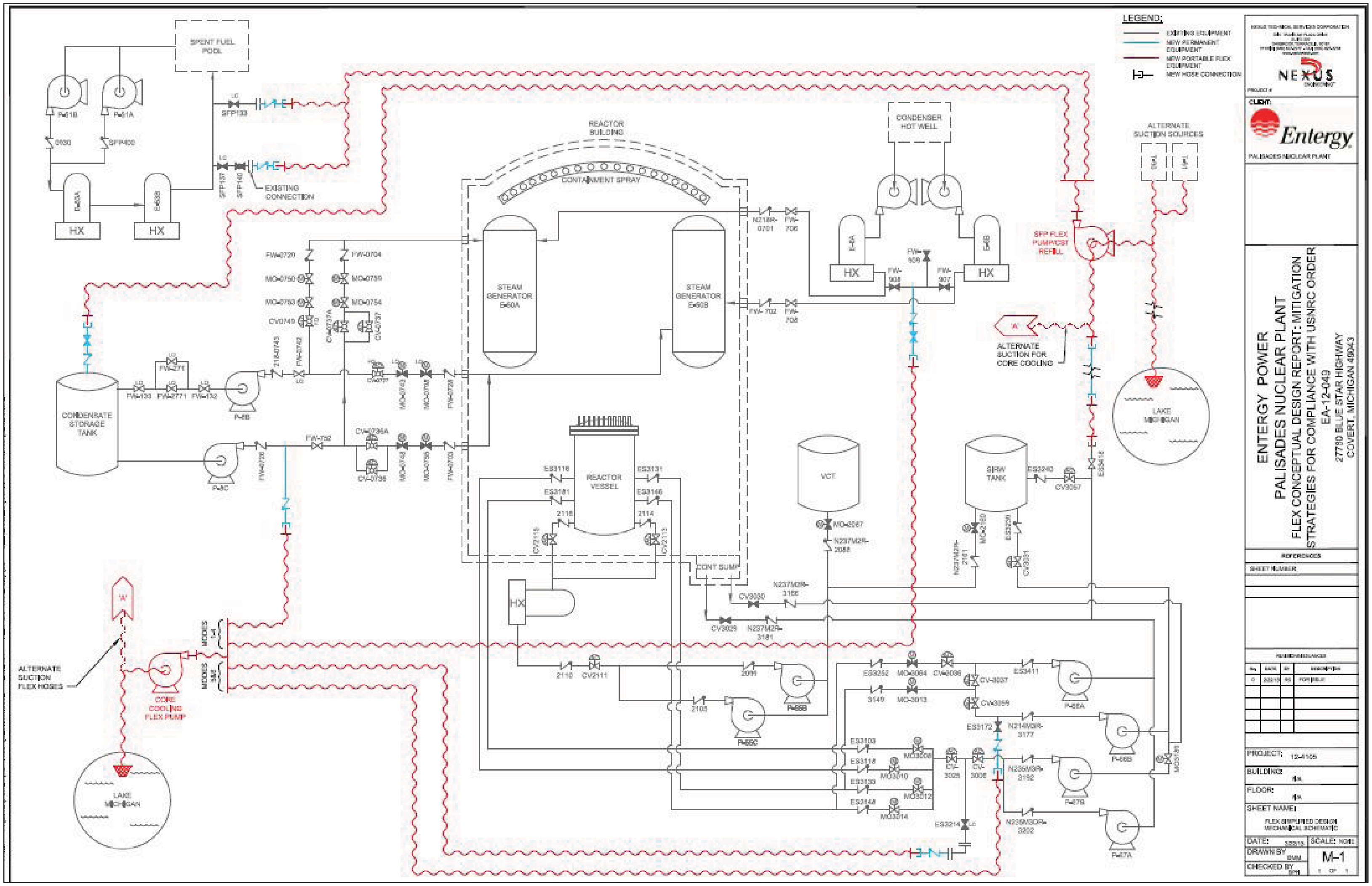

Figure 3-2: Simplified Mechanical FLEX Strategy Diagram

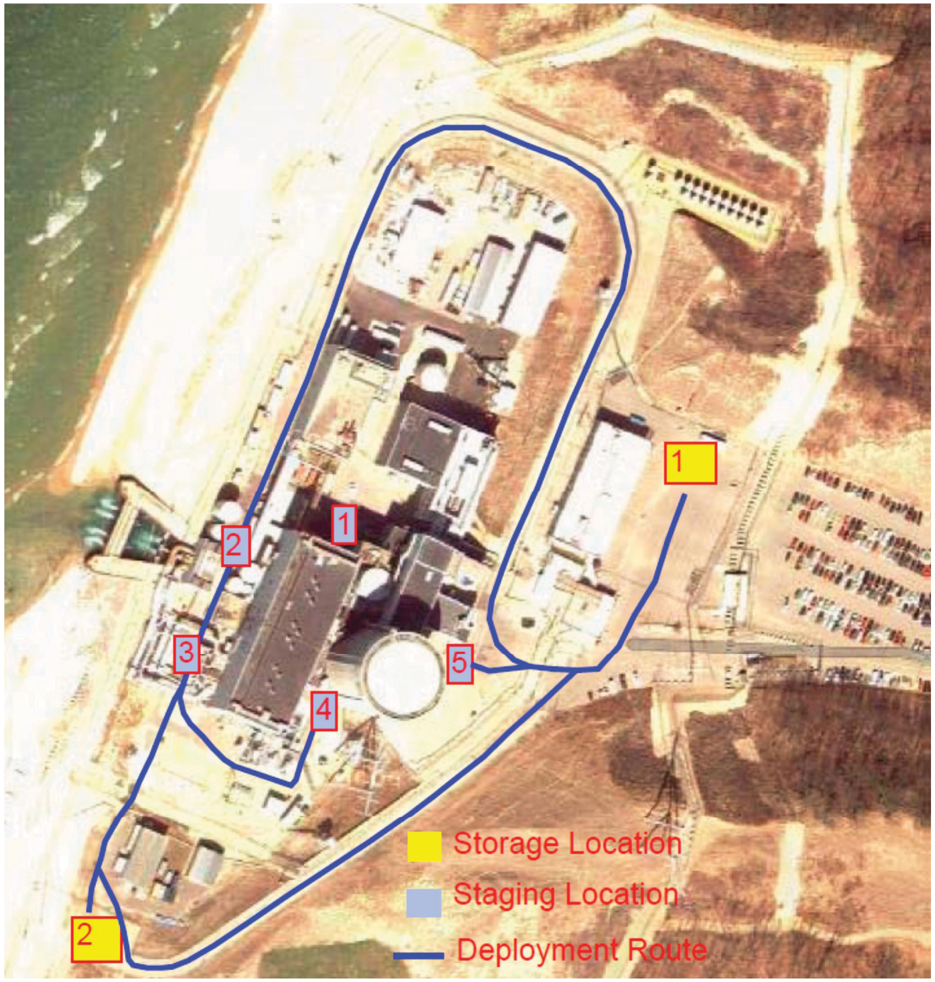

Figure 3-3: Palisades' Storage, Staging, and Deployment Diagram

[redacted]

Figure 3-4: Palisades' Consolidated Cable and Hose Routing Diagram - 590' Level

[redacted]

Figure 3-5: Palisades' Consolidated Cable and Hose Routing Diagram - 570' Level

[redacted]

Figure 3-6: Palisades' Consolidated Cable and Hose Routing Diagram - 609'-6" Level

[redacted]

Figure 3-7: Palisades' Consolidated Cable and Hose Routing Diagram – 625' Level