Entergy

Entergy Nuclear Operations, Inc.
Palisades Nuclear Plant
27780 Blue Star Memorial Highway
Covert, MI 49043-9530
Tel 269 764 2000

Anthony J. Vitale
Site Vice President

PNP 2014-011

February 28, 2014

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

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

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

REFERENCES:

1. NRC Order Number EA-12-049, *Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events*, dated March 12, 2012 (ADAMS Accession No. 12054A736)
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, *Diverse and Flexible Coping Strategies (FLEX) Implementation Guide*, Revision 0, dated August 2012 (ADAMS Accession No. ML12242A378)
4. Entergy Nuclear Operations, Inc. (ENO) 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
5. Entergy Nuclear Operations, Inc. (ENO) letter to NRC, PNP 2013-010, *Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)*, dated February 28, 2013

6. Entergy Nuclear Operation, Inc. (ENO) letter to NRC, PNP 2013-064, *Palisades Nuclear Plant First Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049),* dated August 28, 2013

Dear Sir or Madam:

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued an order (Reference 1) to Entergy Nuclear Operations, Inc. (ENO). Reference 1 was immediately effective and directs ENO to develop, implement, and maintain guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities in the event of a beyond-design-basis external event.

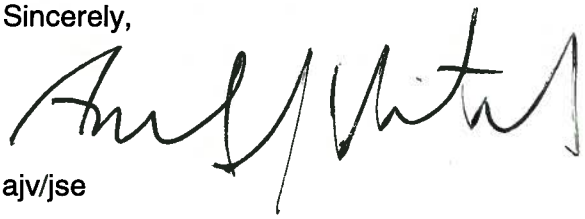
Reference 1 required submission of an initial status report 60 days following issuance of the final interim staff guidance (Reference 2) and an overall integrated plan pursuant to Section IV, Condition C. Reference 2 endorses industry guidance document NEI 12-06, Revision 1 (Reference 3) with clarifications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

Reference 1 requires submission of a status report at six-month intervals following submittal of the overall integrated plan. Reference 3 provides direction regarding the content of the status reports. Reference 6 provided the first six-month status report. The purpose of this letter is to provide the second six-month status report pursuant to Section IV, Condition C.2, of Reference 1, that delineates progress made in implementing the requirements of Reference 1. The attachment provides an update of milestone accomplishments, including any changes to the compliance method, schedule, or need for relief and the basis, if any.

This letter contains no new commitments and no revised commitments.

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

Sincerely,



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

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

ATTACHMENT

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

1 Introduction

Entergy Nuclear Operations, Inc. (ENO) developed for Palisades Nuclear Plant (PNP) an overall integrated plan (Reference 1), which documented the diverse and flexible strategies (FLEX), in response to Reference 2. This attachment provides an update of milestone accomplishments since submittal of the last status report (Reference 3), including any changes to the compliance method, schedule, or need for relief/relaxation and the basis, if any.

2 Milestone Accomplishments

The following milestone(s) have been completed since July 31, 2013, and are current as of January 31, 2014.

- First Six-Month Status Report — August 2013
- Second Six-Month Status Report — Complete with submission of this document in February 2014
- FLEX Strategy Evaluation — January 2014

3 Milestone Schedule Status

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

- Perform Staffing Analysis

The Perform Staffing Analysis milestone completion date has been changed to April 2014. This new milestone target completion date does not impact the Order implementation date.

- Modifications Evaluation

The Modifications Evaluation milestone target completion date has been changed to April 2014. This new milestone target completion date does not impact the Order implementation date.

Milestone	Target Completion Date*	Activity Status	Revised Target Completion Date
Submit Overall Integrated Implementation Plan	Feb 2013	Complete	
Six-Month Status Updates			
Update 1	Aug 2013	Complete	
Update 2	Feb 2014	Complete	
Update 3	Aug 2014	Not Started	
Update 4	Feb 2015	Not Started	
Update 5	Aug 2015	Not Started	
FLEX Strategy Evaluation	Jan 2014	Complete	
Perform Staffing Analysis	Dec 2013	Started	Apr 2014
Modifications			
Modifications Evaluation	Jan 2014	Started	Apr 2014
Engineering and Implementation			
N-1 Walkdown	Feb 2014	Started	
Design Engineering	May 2014	Started	
Implementation Outage	Oct 2015	Not Started	
On-site FLEX Equipment			
Purchase and Procure	Jun 2014	Started	
Off-site FLEX Equipment			
Develop Strategies with RRC	Jan 2015	Started	
Install Off-Site Delivery Station (If Necessary)	Oct 2015	Not Started	
Procedures			
Pressurized Water Reactor Owners Group (PWROG) issues Nuclear Steam Supply System (NSSS)-Specific Guidelines	Jun 2013	Complete	
Create PNP FLEX FSG	Mar 2015	Not Started	
Create Maintenance Procedures	Mar 2015	Not Started	
Training			
Develop Training Plan	Jun 2015	Not Started	
Training Complete	Sept 2015	Not Started	
Validation / Demonstration	Oct 2015	Not Started	
Submit Completion Report	Oct 2015	Not Started	

*Target Completion Date is the last submitted date from either the overall integrated plan or previous six-month status reports

4 Changes to Compliance Method

The following changes are being incorporated to the FLEX strategy for PNP.

1. Overall Integrated Plan (OIP) page 9, item 3 (and other locations of OIP) states the battery life will be four hours. The four hour battery capacity was determined to provide insufficient margin for transition to Phase 2. Based on analysis and planning for a deeper load shed, the installed battery capacity will be extended to eight hours (see Open Item OI6). Therefore, the time at which a portable FLEX generator is required to be deployed and operational has been extended from hour 4 to hour 8 based on battery capacity.

2. OIP page 10, item 9 (and other locations of OIP) stated that LC-19 will be repowered from the portable FLEX generator. This remains the primary strategy to provide power to battery chargers. However, Load Center 20 will also be modified similar to Load Center 19 to provide diverse connection locations to the battery chargers.

3. OIP page 11, item 10 (and other locations of OIP) stated that a FLEX portable transfer pump will be used to refill the CST. The Phase 2 core cooling strategy has changed such that the CST refill will not be used. Instead inventory for feeding the steam generators will be provided by the FLEX portable transfer pump directly to the main feed water (MFW) system piping or the auxiliary feed water (AFW) system piping via hose connections, thereby bypassing the CST.

4. OIP page 11, item 10 (and other locations of OIP) requires commencement of deployment of a portable FLEX pump two hours after the event such that it can be operational four hours after the event. This was based on the limited protected inventory of the condensate storage tank (CST) and the primary system makeup storage tank (T-81). Additional inventory in the CST and T-81 will now be protected (see Open Item OI3) which increases the volume available for Phase 1 of the beyond-design-basis external event (BDBEE). Therefore, the time at which the FLEX pump is required to be deployed and operational has been delayed from hour 4 to hour 8 based on CST and T-81 protected inventory. Additionally, the strategy of refilling the CST has changed such that the CST refill will not be used. Instead inventory for feeding the steam generators will be provided directly to the main feed water (MFW) system piping or the auxiliary feed water (AFW) system piping via hose connections, thereby bypassing the CST (see Open Item OI7).

5. OIP page 11, item 14 (and other locations of OIP) credits the battery room exhaust fans for removal of hydrogen from the battery rooms. It has been determined that the battery room exhaust fans are not robust and cannot be credited. Therefore a new strategy developed for control of hydrogen will employ the use of portable fans for ventilation in battery rooms. Also see Open Item OI8.

6. OIP page 11, item 15 (and other locations of OIP) credits the volume control tank (VCT) and safety injection refueling water tank (SIRWT) as borated sources of water for primary coolant system (PCS) inventory and reactivity control. However, it has been determined that the VCT and SIRWT are not robust for all applicable external hazards. Therefore the VCT and SIRWT are no longer the credited sources of borated water. Concentrated boric acid storage tanks (T-53A and T-53B) will now be credited as the borated water sources for these functions early in Phase 2. Later in

Phase 2 (> 24 hours), the boric acid batching tank (T-77) will be used to batch required borated water inventory. Also see Open Item OI16.

7. OIP page 12, item 16 states that spent fuel pool (SFP) equipment (hoses and monitor nozzles) will be deployed at hour 18 to prevent SFP level from dropping below the level of 15 feet above the fuel at hour 20.93. Under worst case conditions it is estimated that boiling could occur beginning at approximately 5.6 hours. Therefore operators would be required to enter the SFP area under potentially onerous conditions. It was determined that in order to protect personnel from the need to enter the SFP area after it is already boiling that actions should be taken for deployment of SFP cooling equipment (hoses and monitor nozzles) prior to the start of boiling. The action will now be taken at approximately five hours after event initiation and prior to SFP boiling in order to mitigate potential habitability concerns after boiling.

8. OIP page 12, item 21 (and other locations of OIP) credit a mobile water purification unit (and/or other large regional response center (RRC) equipment) 24 hours after the event. This timing was determined to be unlikely and unsupported by the RRC for large equipment such as purification units, 4160 V diesel generators, and boration units. Therefore the purification units will not be credited until 72 hours after the event.

9. OIP page 18, in the section for PWR Installed Equipment Phase 1, it is stated that the turbine driven auxiliary feedwater (TDAFW) pump is not credited for seismic events because the turbine driver is not seismically qualified. The TDAFW system (including the turbine driver) has now been qualified as seismically robust and is credited for all external events. See Open Item OI5 in this report for additional information.

10. OIP page 19, under Steam Generators Available for Cooling (Modes 1-4), states that a modification will be required to provide for remote manual operation of the ADVs to begin cooling down the plant at hour 2. The modification selected, and which will allow for the remote manual operation of the ADVs, is the installation of backup nitrogen bottles to last through Phase 1 and connection point for an air compressor to be connected for Phase 2.

11. OIP page 19, under Key Reactor parameters (and other locations of OIP) the level indications for tank T-81 and SIRWT are credited. Because the CST and T-81 are cross-tied, it has been determined that the level indication for the CST is sufficient to indicate the available inventory in both tanks. Therefore level indication for T-81 is redundant and is not required. SIRWT level indication is not required because the tank is no longer credited.

12. OIP page 62 (and other locations of OIP) states use of multiple FLEX generators. PNP has determined that it is preferable to use only one FLEX generator in the PNP strategy. This FLEX generator will be sufficiently sized to carry all the loads that are planned for use in the FLEX strategy.

13. During analysis of site seismic capabilities it was determined that PNP is susceptible to soil liquefaction. Therefore new storage locations are being developed and Attachment 3 of OIP will be updated for storage, staging and routing. Also see Open Item OI1.

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

ENO expects to comply with the order implementation date and no relief/relaxation is required at this time.

6 Open Items from Overall Integrated Plan and Interim Staff Evaluation

The following tables provide a summary and status of any open items documented in the overall integrated plan and any open items or confirmatory items documented in Interim Staff Evaluation (ISE). A fourth table includes a listing of audit questions and the status of each item.

Overall Integrated Plan Open Item	Status
OI1. Perform analysis on Palisades' susceptibility to soil liquefaction and potential consequences on the FLEX implementation plan.	Started Preliminary borings were performed on site and soil liquefaction susceptibility was identified. Based on this information a set of FLEX equipment will be stored inside the protected area (PA) for the seismic event. The other set of FLEX equipment will be stored outside of the PA and be protected against the tornado event. Both locations will be protected from all other BDBEEs. Additional planning is under way to address other impacts to equipment storage and deployment. See also Change to Compliance Method Item 13.
OI2. Develop Phase 3 deployment strategy with correspondence with the RRC.	Started
OI3. Evaluate the need to missile protect primary system makeup storage tank (T-81) and other external tanks.	Started The CST volume alone is insufficient to provide the required inventory, when considering available on site resources for SG makeup during Phase 1. Additional inventory is required and can be provided by tank T-81. T-81 will be verified/credited as robust for all applicable external events. As required, modifications will be implemented to protect both the CST and primary system makeup tank for all applicable external events. See also Change to Compliance Method Item 4.
OI4. Select the location of FLEX equipment storage facility.	Started Refer to OI1. One set of equipment will be stored in Sea-Land containers inside the PA for the Seismic event. An additional set(s) of equipment will be stored outside the PA in a structure(s) providing an appropriate level of protection for the tornado event. Both sets will be protected against the other applicable (screened-in) BDBEE external hazards.

Overall Integrated Plan Open Item	Status
OI5. Perform seismic evaluation of turbine-driven auxiliary feedwater pump (TDAFWP) driver K-8.	Started Seismic evaluation documents the seismic qualification of the pump and associated components. The TDAFW pump is qualified with the exception of an outlier related to a check for bolt tightness. Bolt tightness on the pump is being performed under WO# 372138 and documented under EC 46465. See also Change to Compliance Method Item 9.
OI6. Evaluate strategies to extend battery coping time.	Started The battery load shedding strategy is currently being revised to extend the battery coping time through shedding loads in addition to those identified in the station blackout procedure. Preliminary results indicate a coping time of at least 8 hours for the installed batteries accompanying the expected deep load shed list. See also Change to Compliance Method Item 1.
OI7. Evaluate sources of non-borated water in addition to condensate storage tank (T-2) and T-81.	Complete/Closed After depletion of T-2 and T-81, makeup to the SGs will be from a portable pump with the credited suction source being Lake Michigan. Modifications to credit sources of non-borated water for sources other than T-2 and T-81 were determined to not be required.
OI8. Palisades Probabilistic Risk Assessment (PRA) to provide justification why battery room ventilation is not required until 24 hours.	Complete/Closed Palisades PRA provided multiple evaluations for battery room hydrogen generation. It was determined that supplemental ventilation is required approximately 1.5 hours after charging begins for removal of hydrogen. Ventilation is not required for Phase 2 temperature control. This supplemental ventilation has been included in the Palisades strategy. See also Change to Compliance Method Item 5.
OI9. Evaluate the effects of FLEX on security procedures.	Started The security plan/program will be updated to correspond to FLEX procedures.
OI10. Evaluate requirements of mobile purification unit from RRC.	Complete/Closed It was determined that the 250 gpm RRC demineralized water treatment unit is preferred over the 100 gpm RRC reverse osmosis unit in order to support SG makeup and provide makeup to the RRC mobile

Overall Integrated Plan Open Item	Status
	boration unit.
OI11. Evaluate requirements of mobile boration unit from RRC.	Complete/Closed The required flow rate of borated water for PNP is a maximum of 58.3 gpm.
OI12. Evaluate methods of venting the fuel handling building.	Complete/Closed The strategy for venting the fuel handling building will be to open an existing double leaf door/hatch on the roof of the building.
OI13. Evaluate the use of high-efficiency LED lighting.	Complete/Closed The use of high-efficiency LED lighting has been evaluated for its impact to battery coping time and control room heat loads. LED lighting would have minimal impact and is not required or recommended.
OI14. Perform evaluation to determine if additional parameters will need to be monitored during FLEX activities.	Complete/Closed In addition to NEI 12-06, PWROG FLEX guidance was reviewed for key parameter monitoring. The NEI 12-06 and PWROG guidance regarding recommended instrumentation has been incorporated into the FLEX strategy and the power supply for these instruments evaluated. All the credited instruments are powered by battery/DC buses and available throughout the event.
OI15. Perform analysis to ensure survivability of containment.	Started Containment analysis has been completed using the Modular Accident Analysis Program (MAAP) and is being reviewed for owner's acceptance. Preliminary results of this analysis show containment design parameters will not be exceeded for the at-power scenario (i.e., event initiating in Mode 1). For the most conservative shutdown scenario (i.e., Mode 5 reduced inventory), preliminary results of the analysis show that actions will be required to prevent exceeding the design limits of containment.
OI16. Evaluate borated water sources in addition to safety injection refueling water tank (SIRWT).	Complete/Closed All additional sources of borated water were evaluated for use following a BDBEE. The concentrated boric acid storage tanks (T-53A and T-53B) are the credited source of borated water. These tanks are analyzed to provide sufficient borated water for greater than 24 hours. After 24 hours, borated water will be batched as necessary for inventory control using the boric acid batching tank T-77. See also Change to Compliance

Overall Integrated Plan Open Item	Status
	Method Item 6.
OI17. Entergy, for the Palisades site, will negotiate and execute a contract with Strategic Alliance for FLEX Emergency Response (SAFER) that will meet the requirements of NEI 12-06, Section 12.	Complete
OI18. Evaluate a location to install a tee in the service water system to allow the ultimate heat sink (UHS) FLEX pump to provide cooling.	Complete/Closed Several locations in the service water system were evaluated. A pipe elbow downstream of service water system (SWS) pump P-7C was identified as the best location for connecting a pipe tee to allow flow from the RRC UHS pump.
OI19. Evaluate the use of lake water to cool the steam generators during an extended loss of ac power (ELAP).	Started An analysis has been completed and is being reviewed for owner's acceptance that determines the impacts on the steam generators when using lake water as the makeup source.
OI20. Evaluate time until primary coolant system (PCS) makeup is necessary in Modes 5 & 6.	Complete/Closed An evaluation was performed that documented the time until PCS makeup is required in shutdown modes. The time when makeup is required varies greatly depending on the status of the PCS when the event occurs (i.e., PCS level, pressure, and temperature). The most limiting scenario was found to be such that PCS makeup could be required as early as one hour after the event if the PCS is vented and at reduced inventory. High risk evolutions such as vented PCS and reduced inventory will be managed by outage risk planning and contingency actions such as pre-staging equipment as discussed in the NRC endorsed white paper on Shutdown / Refueling Modes.
OI21. Evaluate connection to ensure cooling water can be provided for containment air fans.	Complete/Closed Cooling water flow to the containment air fans is through the service water system addressed in the status update to OI 18. Connection of the RRC supplied FLEX UHS pump to the SWS will provide the necessary means/connection for cooling water flow to the containment air coolers.
OI22. Evaluate the robustness of the charging pumps.	Complete/Closed The charging pumps have been evaluated as robust for seismic events. The pumps are

Overall Integrated Plan Open Item	Status
	located inside the auxiliary building and protected against all other external hazards.

Interim Staff Evaluation Open Items	Status
The U.S. Nuclear Regulatory Commission (NRC) has not issued an Interim Staff Evaluation for Palisades; therefore, there are no open items for the Interim Staff Evaluation identified at this time	N/A

Interim Staff Evaluation Confirmatory Items	Status
The NRC has not issued an Interim Staff Evaluation for Palisades; therefore, there are no confirmatory items from the Interim Staff Evaluation identified at this time	N//A

Audit Question Open Items	Status	Completion or Target Date
PAL-002	Closed	
PAL-003	Closed	
PAL-004	Closed	
PAL-007	In progress	Aug 2014
PAL-008	In progress	Aug 2014
PAL-011	In progress	Aug 2014
PAL-012	In progress	Aug 2014
PAL-013	In progress	Aug 2014
PAL-014	In progress	Aug 2014
PAL-015	Closed	
PAL-016	In progress	Aug 2014
PAL-017	In progress	Oct 2015
PAL-018	In progress	Aug 2014
PAL-019	In progress	Aug 2014
PAL-020	Closed	
PAL-021	In progress	Aug 2014
PAL-022	Complete	e-Portal updated
PAL-023	In progress	Aug 2014
PAL-024	Closed	
PAL-025	In progress	Aug 2014
PAL-026	In progress	Aug 2014
PAL-027	In progress	Aug 2014
PAL-028	In progress	Aug 2014
PAL-030	In progress	Aug 2014
PAL-033	In progress	Aug 2014
PAL-035	In progress	Aug 2014
PAL-036	In progress	Oct 2015
PAL-037	In progress	Aug 2014
PAL-039	Closed	
PAL-040	In progress	Oct 2015
PAL-041	Closed	
PAL-043	In progress	Aug 2014

Audit Question Open Items	Status	Completion or Target Date
PAL-044	In progress	Aug 2014
PAL-045	In progress	Aug 2014
PAL-046	In progress	Aug 2014
PAL-047	In progress	Aug 2014
PAL-048	In progress	Aug 2014
PAL-049	In progress	Aug 2014
PAL-050	In progress	Aug 2014
PAL-051	In progress	Aug 2014
PAL-053	In progress	Aug 2014
PAL-054	In progress	Aug 2014
PAL-055	Closed	
PAL-057	In progress	Aug 2014
PAL-057	In progress	Aug 2014

7 Potential Interim Staff Evaluation Impacts

The NRC has not yet issued an interim staff evaluation for PNP; therefore, there are no potential impacts to the interim staff evaluation identified at this time.

8 References

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

1. Entergy Nuclear Operations, Inc. (ENO) letter to NRC, PNP 2013-010, *Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049),* dated February 28, 2013
2. NRC Order Number EA-12-049, *Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events*, dated March 12, 2012 (ADAMS Accession No. ML12054A736).
3. Entergy Nuclear Operation, Inc. (ENO) letter to NRC, PNP 2013-064, *Palisades Nuclear Plant First Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049),* dated August 28, 2013.