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MEMORADUM TO: Anne T. Boland, Director  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

FROM: Richard P. Correia, Director */RA/*  
Division of Risk Analysis  
Office of Nuclear Regulatory Research

SUBJECT: TRANSMITTAL OF FINAL PILGRIM NUCLEAR POWER  
STATION ACCIDENT SEQUENCE PRECURSOR ANALYSIS

This memorandum transmits the final results of an accident sequence precursor (ASP) analysis of an operational event that occurred at Pilgrim Nuclear Power Station on January 27, 2015. The Office of Nuclear Regulatory Research (RES) did not request a formal analysis review from the licensee in accordance with U.S. Nuclear Regulatory Commission Regulatory Issue Summary 2006-24, "Revised Review and Transmittal Process for Accident Sequence Precursor Analyses," because the analysis had a preliminary conditional core damage probability (CCDP) of less than  $1 \times 10^{-4}$ . The final results determined that the operational event had a best estimate CCDP of  $4 \times 10^{-5}$ ; and therefore, is not considered a *significant* precursor. A copy of the preliminary analysis was provided to the Office of Nuclear Reactor Regulation (NRR) and Region I staff as a courtesy; no feedback was provided.

The ASP Program continues to systematically review licensee event reports (LERs) and all other event reporting information [e.g., inspection reports (IRs)] for potential precursors, and to analyze those events which have the potential to be precursors. Precursor analyses will be provided to the Office of Nuclear Reactor Regulation (NRR) periodically upon completion.

**Transmittal to Licensee Requested.** We are requesting NRR to send the enclosed final ASP analysis to the licensee for their information. The ASP analysis should be made publicly available after the analysis has been transmitted to the licensee. Please inform us when the ASP analysis has been transmitted to the licensee and when it is made publicly available.

CONTACT: Christopher Hunter, RES/DRA/PRB  
301-415-1394

**Final ASP Analysis Summary.** A brief summary of the final ASP analysis, including the results, is provided below.

*Loss of Offsite Power Due to Winter Storm Juno (January 2015) at Pilgrim Nuclear Power Station.* This event is documented in LER 293/15-001, LER 293/2015-002, IR 05000293/2015007, IR 05000293/2015002, and IR 05000293/2015011.

*Executive Summary.* On January 27, 2015, at 4:02 a.m., with the reactor at 52% power and both safety buses being powered from emergency diesel generators (EDGs) and 345kV offsite power line 355 out-of-service due to weather related failures in the switchyard, a loss of offsite power (LOOP) occurred due to the loss of the second 345kV line 342. This resulted in a generator load reject and a reactor scram. All control rods fully inserted and main steam isolation valves were directed closed. A plant cool down commenced with reactor water level being maintained by the reactor core isolation cooling system and pressure controlled by high pressure coolant injection system. Due to complications in level control because of letdown isolation (caused by loss of instrument air), the operators cycled safety relief valves (SRVs) B and D to control reactor coolant system pressure. Offsite power was not restored until January 29th, when line 342 was energized and aligned to the safety buses.

According to the risk analysis modeling assumptions used in this ASP analysis, the most likely core damage scenario is a non-recoverable LOOP and subsequent station blackout (SBO) due to the failure of the feeder breakers from the startup and/or auxiliary transformers to the safety buses to open. The failure of these breakers prevents the EDGs from being able to supply power to the safety buses. If operators fail to open these breakers, then core damage is assumed to occur given the failure to reach a safe and stable state (non-recoverable SBO) within 24 hours. This accident sequence accounts for approximately 47% of the conditional core damage probability (CCDP) for the event.

The Reactor Oversight Process identified one White finding (i.e., low to moderate safety significance) and seven Green findings (i.e., very low safety significance) associated with complications that occurred during response to this event. Six of the 8 inspection findings did not result in a loss in the safety function of mitigation equipment. The Significance Determination Process (SDP) evaluates each inspection finding (i.e., licensee performance deficiency) individually. Whereas, ASP analyses consider the occurrence of an initiating event, along with any failures, degraded conditions, or unavailabilities that were associated with initiating event and during the event response. Additional information on the similarities/differences between the ASP analysis modeling assumptions and the SDP evaluations are provided in the final analysis report.

*Summary of Analysis Results.* This operational event resulted in a best estimate CCDP of  $4 \times 10^{-5}$ . The detailed ASP analysis can be found in the enclosure.

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**Sensitive Information.** The detailed ASP analysis has been reviewed in accordance with current guidance for sensitive unclassified non-safeguards information, and it has been determined that it may be released to the public.

Enclosure:  
As stated

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OFFICE	RES/DRA/PRB	RES/DRA/PRB	RES/DRA
NAME	C. Hunter	J. Nakoski	R. Correia <i>(M.Thaggard for)</i>
DATE	06/01/16	06/15/16	06/20/16

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