

August 15, 2012

The Honorable Debbie Stabenow  
United States Senate  
Washington, DC 20510

Dear Senator Stabenow:

On behalf of the U.S. Nuclear Regulatory Commission, (NRC), I am responding to your letter of May 17, 2012, regarding the Palisades Nuclear Plant. You requested an explanation of the issues at the plant that resulted in it being downgraded in the NRC Reactor Oversight Process Action Matrix as well as information regarding actions the NRC has taken to address those issues.

In the fourth quarter of 2011, Palisades was moved to the Degraded Cornerstone Column of the NRC Action Matrix as a result of several incidents that occurred in the preceding months. The Action Matrix translates individual plant performance into corresponding NRC oversight action based on licensee performance in seven cornerstones of safety and security. The decline in licensee performance at Palisades included two inspection findings of low to moderate safety significance (White) and one finding of substantial safety significance (Yellow). The NRC will be conducting additional oversight that will include inspections to evaluate the licensee's progress in resolving these findings. The NRC will also review the results of an independent assessment of the safety culture at Palisades and corrective actions that are underway.

The first incident at Palisades involved its safety-related auxiliary feedwater (AFW) system. At Palisades, the AFW system is used to supply water to the secondary side of the steam generators for reactor cooling when normal feedwater sources are unavailable. It can be used during normal plant operations and accident scenarios. The AFW system consists of three pumps; two are electric motor-driven and one is steam-turbine-driven. The system will shut down a pump if the turbine exceeds an operating limit. On May 10, 2011, the turbine-driven AFW pump tripped during routine testing. Subsequent examination of the pump revealed the presence of grease on a component called a "knife-edge." This grease caused the lever to slip which shut down the pump.

Further investigation by the NRC and licensee revealed that, during maintenance on October 29, 2010, a worker incorrectly greased the knife-edge on the pump trip mechanism. The procedure used during this process required greasing some components, but not this specific component. The worker who performed the work did annotate the procedure to include the words "knife-edge" in the text after he lubricated the knife-edge. The annotation was not reviewed and assessed by the supervisor as required by site procedures to determine if a

change to procedure was necessary. Based on the information provided by the licensee and the NRC inspector's examination of the trip mechanism following the pump trip, the NRC concluded that the grease played a significant role in the turbine-driven AFW pump trip. After removal of the grease, the licensee tested the pump, which performed satisfactorily, and returned the pump to service.

The licensee's failure to follow procedures for greasing of components on the turbine-driven auxiliary feedwater pump constituted a failure to follow NRC requirements, resulting in a finding of low to medium safety significance (White). The NRC resident inspectors observed troubleshooting activities and testing of the pump, and verified that the licensee had taken appropriate measures to ensure proper operation of the turbine-driven AFW pump.

The second incident at Palisades involved the service water system. The plant's service water system includes three motor driven pumps, which are used to provide cooling water for safety-related equipment, such as component cooling water, containment air coolers, diesel generators, and control room coolers, during both normal operations and accident conditions. Under normal operating conditions, two pumps are in service at all times; however, the plant's technical specifications require all three pumps to be operable.

On August 9, 2011, one of the three service water pumps failed. The other two pumps continued to operate and provide the required service water flow needed for then-current plant conditions. Subsequent investigation of the failed pump determined that a shaft coupling had failed. Within a pump, a coupling is used to connect two shaft ends together, which allows the two shafts to rotate together.

As part of its post-incident restoration of the system, the licensee used spare couplings that had been purchased earlier, following a September 2009 failure of the same pump. On August 12, 2011, the licensee replaced all the pump couplings and two portions of the pump shaft and, after a successful test of the pump, returned the pump to service. The NRC resident inspectors observed portions of the work performed to restore the pump to service.

On August 15, 2011, the NRC sent a team of experts to review the circumstances surrounding the pump's failure and its relation to the 2009 failure of the same pump. The NRC inspection team reviewed the results of an independent metallurgical analysis on the failed coupling. The analysis showed that the reason for the failure of the coupling was inter-granular stress corrosion cracking (IGSCC). IGSCC is a type of metallurgical failure that can cause metal to develop a crack under certain conditions. This crack can propagate until the material fails. The failure of the coupling in 2011 was determined to be a repeat of the failure that occurred in September 2009, when another coupling in the same pump failed due to IGSCC.

The NRC inspection team determined during its review of the 2011 event that the licensee's 2009 root cause evaluation only focused on one material property and did not consider the susceptibility of the couplings to IGSCC. In addition, this root cause evaluation did not address the adequacy of the coupling's material for the environment to which it was subjected. Since not all critical factors were investigated, the corrective actions taken in 2009 were inadequate to prevent IGSCC from recurring.

The NRC conducted an evaluation of the licensee's performance and determined that the failure to prevent recurrence of significant conditions adverse to quality and the failure to completely consider the properties of the coupling material, a material susceptible to IGSCC, constituted a failure to follow NRC requirements. This finding was determined to be of low to moderate safety significance (White). The service water pump couplings have been replaced with new couplings made from a different type of steel, which is not as susceptible to this type of corrosion, and the NRC has verified that the new couplings are in compliance with our requirements.

The third incident at Palisades involved maintenance work on a safety-related direct current electrical bus. The plant experienced an automatic reactor shutdown on September 25, 2011, when a worker was performing maintenance activities on an electrical panel. A small metal piece located inside the electrical panel came into contact with another metal piece resulting in a series of electrical problems that caused the loss of half of the control room indicators and activation of certain safety systems not warranted by actual plant conditions. This made the automatic shutdown more challenging for the operators to handle and increased the risk of a more significant event occurring. However, a second electrical bus remained available and operators maintained the plant in a safe shutdown condition.

In response to this incident, the NRC sent a Special Inspection Team (SIT) to further investigate the circumstances surrounding the maintenance work activities that led to the reactor shutdown, and the plant's response to the shutdown. During its review of the event, the SIT found several procedural deficiencies related to the work instructions. The SIT concluded that the work packages used by the licensee were not appropriate for the circumstances and were not written in accordance with plant procedures. This is contrary to NRC regulations, which require that activities affecting quality be prescribed by documented instructions or procedures of a type appropriate to the circumstances, and that the activities be accomplished in accordance with the procedures. This inspection finding has been determined to be of substantial safety significance (Yellow).

As part of the corrective actions for this event, the licensee replaced the damaged bus connectors and breakers. Compensatory measures are in place that raise the trip set point for the shunt trip breaker to improve coordination between the breaker and the downstream fuses, one of the deficiencies found by the SIT. The NRC resident inspectors and the SIT reviewed the compensatory measures and found them adequate. In addition to the previously discussed Yellow finding, the SIT also identified several performance deficiencies that were determined to be of very low safety significance (Green).

Going forward, the NRC will perform two supplemental inspections, in addition to routine baseline inspections, to review the long-term corrective actions the licensee has taken, and determine the effectiveness of those actions to fix the issues that led to the two White findings and one Yellow finding in 2011. In addition, the NRC will evaluate the site's safety culture, which the NRC defines as the core values and behaviors resulting from a collective commitment by leaders and individuals to emphasize safety over competing goals to ensure protection of people and the environment. We expect the licensee to address these issues and we will carefully review their actions. The first supplemental inspection of the AFW pump was conducted in June 2012. We will schedule an inspection of the service water pump coupling failure and the electrical breaker issues after the licensee completes work to address these issues.

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Please be assured that the NRC is closely overseeing the Palisades Nuclear Plant and ensuring that the plant continues to operate safely. The NRC expects the licensee to fully address the identified shortcomings and we will take whatever actions are necessary to assure continued safe operation of the facility. If you need additional information, please contact me or Rebecca Schmidt, Director of the Office of Congressional Affairs, at (301) 415-1776.

Sincerely,

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Allison M. Macfarlane