

Attachment 3

Letter to Governor Baker re: Pilgrim Nuclear Power Station, February 2015

Summary and Excerpts from:

"NRC 9002 Supplemental Inspection Report 05000293/2014008 and Assignment of Two Parallel White Performance Indicator Findings," 1/26/15

Summary and Background:

The U.S. NRC's "Supplemental Inspection Report" (Report, cited herein as "R." with page number) dated January 26, 2014, came on the heels of the NRC's third quarter 2013 finding that Pilgrim had crossed the threshold for allowable unplanned scrams (emergency shutdowns). Pilgrim had four scrams in 2013. In late November 2013, NRC Chair MacFarlane, her staff, and NRC inspectors visited Pilgrim to meet with management to discuss the scrams and "equipment reliability problems."

<http://www.capecodtimes.com/article/20131109/News/311090328>

In March 4, 2014, the NRC officially transitioned Pilgrim to the "Degraded Cornerstone" under the NRC matrix due to the 2013 scrams. NRC Adams Accession ML14063A316. The NRC informed Entergy of its intent to perform a supplemental inspection to determine whether Entergy had followed NRC procedures for addressing the problems that led to the problems.

In September, 2014 Entergy informed the NRC that it was ready for the inspection and had done what was required by NRC rules to address the scrams and equipment reliability problems. NRC rules required Entergy to perform a Root Cause Evaluation (RCE)¹ for each of the four scrams, and one for the overall transition to the degraded cornerstone "to identify weaknesses that existed in site organization..[and] a CCA [common cause analysis] to perform a review of the site safety culture and determine if any aspects of safety culture contributed to the four scram events." R.8.

The NRC inspection occurred between November 3, 2014 and December 12, 2014. The NRC found that Entergy had not adequately addressed the problems that resulted in the four scrams and documented this in its Inspection Report. The Report characterizes the four scrams as "risk significant performance issues, both individually and collectively." R. 28. The Report states,

"Specifically, although the eight-member team determined that, in general, the company's problem identification, root cause evaluation and corrective action plans were adequate, it has identified deficiencies in the implementation of corrective action plans, as well as in understanding of the issues' causes. In its report, the team cites

¹ A list of acronyms is at the end of the NRC Report.

several examples where fixes were not completed as intended or were closed prematurely.” NRC Blog, www.nrc.gov, 1/28/15.

In addition to addressing the four scrams individually, Entergy was required to determine whether the scrams were linked by “common causes” and what role the “safety culture” at Pilgrim played in the failures. The NRC said Entergy also failed to assess this adequately.

The Report Cover Letter states,

“Although inspectors determined that, in general, Entergy’s problem identification, cause evaluation, and corrective action for the White PIs, [Performance Indicators] **they identified deficiencies regarding Entergy’s execution of corrective actions documented in the corrective action plans, as well as Entergy’s understanding of some of the causes of the issues.** Specifically, inspectors identified several examples where corrective actions were not completed as intended or were closed prematurely. **Additionally, for one of the root cause evaluations, inspectors determined that Entergy failed to investigate a deficient condition in accordance with corrective action (CAP) program requirements to ensure they fully understood all of the causes of one of the scram events.”** Report Letter, p. 2.

As to the safety culture review, “Inspectors determined that the specific deficiencies in execution of corrective actions and cause analysis were indicative of the **CAP implementation weakness identified in the safety culture review.....inspectors determined that your actions in total did not provide assurance level required to meet inspection objectives and represent a significant weakness.”** Report Letter p. 2.

A. Excerpts from NRC report describing Entergy’s failure to “provide the assurance level to fully meet all of the inspection objectives.” Report Letter p. 1.

1. General Comments by the NRC (emphasis supplied)

- The NRC assigned two “White” findings “involving a significant weakness identified in Entergy’s causal evaluation and corrective actions” for the four scrams. R. 5.
- “Ultimately, inspectors determined that specific deficiencies in execution of corrective actions identified by inspectors **were symptomatic of the identified challenges** in CAP implementation, and correspondingly determined that corrective actions specified in the **common cause and safety culture evaluations were not effective at ensuring that performance issues identified by the numerous RCEs were corrected...[this] was a performance deficiency.”** R. 39.
- Inspectors **“identified multiple examples of failure to implement the corrective actions....”** R.6. The failure to implement proper procedures for corrective actions was a **“significant programmatic deficiency** that could lead to worse errors if uncorrected.”

- “Specifically, if uncorrected this issue would have the potential to **lead to a more significant safety concerns....**” **“Specifically a severe weather procedure did not prescribe sufficient actions that would limit the likelihood of ice bridging or place the plant in a condition that it could responds to a loss of offsite power (LOOP) without potentially upsetting plant stability and the failure to conduct insulator testing prevented the station from assessing its replacement strategy.”**
R. 6. “....Entergy did not take effective corrective actions to address issues in a timely manner commensurate with their safety significance.” R. 7.

2.Examples of failures to take corrective actions for the problems that caused the four scrams.

A. For the February 8, 2013 complicated reactor scram due to loss of offsite power during winter storm Nemo:

- “...Entergy did not complete an action to send a faulted component for failure analysis...This prevented the inspectors from verifying that Entergy understood the material condition of the main switchyard transformer insulators and that the material condition and supporting preventive maintenance tasks were sufficient. The intent of this testing is to assist in determining a replacement strategy for insulators and is used to determine the condition of the insulator exterior glazing which is effective against contamination from coastal salt, fog and/or mist conditions.” R. 4, 39.
- “...corrective action to conduct an engineering study to determine feasibility of switchyard upgrades to remove the resistance to flashovers due to ice-bridging on insulators was extended eleven times. At the time of the inspection (21 months since the event) Entergy still had not made a decision as to whether the modification would be funded and implemented...did not prioritize this corrective action in manner commensurate with its safety significance... a weakness....” The NRC did not require follow up because Entergy finally did the study. R. 34.
- NRC will do another inspection to “verify that Entergy has (1) assessed the independent failure analysis of the faulted insulator for potential impact to the RCE; [and] (2) revised the RCE for the winter storm scram to include additional action for the incomplete effectiveness review....” R. 5.
- The NRC inspectors “determined that the actions taken by Entergy were not in accordance with their CAP because the corrective action [failure analysis on the insulator] was closed improperly.” R. 29.
- "This was a self-revealing event caused by external faults on the 345 kilovolt (kV) system which resulted in the loss of both 345kV transmission lines connected to the Pilgrim switchyard ring bus. The loss of transmission lines resulted in a LOOP and a main generator load reject followed by an automatic reactor scram...and two subsequent LOOP events” on Feb. 8 and 10. There were “two flashovers (phase to ground fault)...caused by ice-bridging on the insulator. The

subsequent LOOP events were caused by faults internal to the Pilgrim switchyard, which is operated and maintained by Entergy.” R. 10, 21.

- A similar event occurred in 2008. There was a “weather related build up of snow and ice on a bushing...” which caused a “flashover resulting in a main generator load reject and reactor scram.” R. 11.
- Entergy self-identified two root causes and three contributing causes of the event. R. 16, 19, 21.
- The NRC said, “Despite corrective actions to upgrade severe weather procedures to address deficiencies during a winter storm on February 8, 2013, inspectors identified that the procedure changes did not fully meet the intent of the corrective actions because there were no substantive changes to the procedure for pre-storm actions. Additionally, inspectors determined that the inadequate guidance for pre-storm actions represented a condition adverse to quality that was reasonably within Entergy’s ability to identify and correct by execution of corrective actions identified in the RCE;” R. 39; See also R. 28, 29.

B. For the January 10, 2013 reactor scram due to inadvertent trip of both RRP.

- This is similar to the 8/22/13 event (“Complicated reactor scram due to trip of all three RFPs, related to failed cable splice, see Part 3, below).
- This caused a “loss of reactor recirculation flow which resulted in a reactor scram.” R. 4. This was linked to an “inadvertent seal-in of a relay during cover replacement....” R. 15.
- The event was **“caused by the failure of I&C [instrumentation and control] department personnel to ensure adequate barriers were in place...”** relating to the relay cover. R. 9. In other words, by human error.
- “Difficulties with relay cover installation were a long-standing problem at Pilgrim.” R. 11. The department “was accustomed to overcoming difficulties and working around them. Entergy had prior opportunities to identify the issue....”
- **“Overconfidence and complacency was demonstrated in the I&C department personnel who were tolerant to the difficulty in relay cover installation. Personnel were aware that replacing the relay covers was difficult but it became a normal practice to make multiple attempts because no consequences had previously occurred at Pilgrim.”** R. 15-16.
- “Despite additional actions being specified to correct the licensee-identified deficiencies the inspectors identified that **many of the human performance related actions were either cancelled or closed.**” R. 4. “...many of these actions either had not been completed as intended or lacked sufficient evidence to support closure...” **“...the maintenance standing order [to get problem fixed] was not being implemented”** at the time of the NRC inspection. R.4. “A maintenance standing order was created and signed by maintenance supervisors in September 2014 which directed interim actions for enhanced supervisor oversight and procedure review in preparation for maintenance to be

implemented. Despite this, inspectors identified that the maintenance standing order was not being implemented..." R. 26.

- "...the numerous procedure deficiencies and human performance issues identified by inspectors represented conditions adverse to quality that were reasonably within Entergy's ability to identify and correct by execution of corrective actions identified in the RCE." R. 39.
- The NRC inspectors identified **"multiple examples where corrective actions were not completed as specified in the RCE..."** R. 34.
- "Additionally, inadequate application of human performance tools and **overconfidence and complacency among members of the I&C department contributed to this event.**" R. 9, 20-21.
- Inspectors **"observed similar behaviors" to those exhibited in connection with the relay cover:**
 - (1) On 11/4/14, the inspectors saw **workers knowingly proceed with a risky installation of a piece of equipment that in fact broke.** "...Inspectors observed primary containment isolation logic testing that included installing a switched jumper to set up the correct logic for the testing. The technicians were sensitive to the risk of the jumper coming loose, but they proceeded on with the test even after struggling to install the jumper. Later during the surveillance, the jumper detached from plant equipment." R. 27.

(2) On 11/3/14, **an operator's finger slipped off a button causing a premature half scram.** "...during reactor protection system testing on November 3, 2014, a half scram occurred earlier than expected when a technician's finger slipped off the "INOP/INHIBIT" pushbutton. A precaution in the procedure warned that not engaging the pushbutton would bring a half scram and Entergy staff stated that the challenge of continuously holding the button down had been recognized historically. **Despite this known challenge, Entergy proceeded with the planned work.**" R. 27.

C. For the August 22, 2013 complicated reactor scram due to trip of all three RFPs.

- **The direct cause of this event: "An undocumented splice** associated with LV-3067 failed and damaged the cable section resulting in a short to ground and the tripping of breaker Y1-24, which removed power from the RFP [Reactor Feed Pump] seal cooling coil flow instruments and generated trip signals for all three RFPs..." R. 16.
- The electrical transient was "directly caused by a failed cable splice; however **Entergy did not investigate the failure mechanism sufficiently to determine the specific cause....**" R. 4. "Entergy did not investigate the cause of the electrical transient in accordance with station CAP requirements sufficiently to ensure that all causes were understood." This failure led to a Green finding. R. 5.

- **“this performance deficiency...impacts the cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations....R. 5-6.**
- The splice “location was not marked on any drawings.” R. 11.
- **“Entergy had two prior opportunities to identify the SPV [Single Point Vulnerability] introduced by the low cooling coil flow instrument medication” since July 7, 2011 and Nov. 5, 2011, employees wrote reports on it, and questioned it, but Entergy did nothing.** R. 11, 12. Instead of fixing it, “system engineering recommended maintaining the automatic trip and removing the instruction to bypass it.” R. 12.
- “Entergy did not identify corrective actions to correct the cause of the failed splice and inspectors could not verify that actions taken to ensure other splices were not improperly installed were sufficient....” R. 24. **“Contrary to the standards...Entergy did not fully derive the causes of the manual scram...This performance deficiency affects the equipment performance attribute of the Initiating Events cornerstone because the failure to fully derive the causes of the failed splice prevented them from taking appropriate actions to evaluate and correct those actions. This impacts the cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions....R. 25.** NRC requirements set forth a procedure for such an investigation; Entergy failed to follow it.
- There is the potential for “other legacy cable splice failures” and there was a weakness in Entergy’s search method for finding other potential failures. R. 24.

D. For the October 14, 2013 complicated reactor scram due to loss of offsite power.

- This resulted from “failure of a defective pole at an offsite substation.” Page 17.
- Transmission “line 33 de-energized...”
- “Entergy failed to ensure that station procedures contained adequate pre-defined risk-based criteria for planned maintenance on offsite transmission equipment which places Pilgrim in an SPV to an automatic scram...” R. 17.
- NRC determined Entergy’s corrective actions were appropriate for this event. R. 30.

E. For the common cause and safety culture review.

- The NRC inspectors identified “specific deficiencies in execution of correction actions and causal analysis”...and the “evaluations were ineffective.” **“...these issues represent a significant weakness” because they did not provide assurance that you (1) understood the causes and (2) had taken or planned adequate correction actions to address the safety-significant PIs.” This is the reason for the two new “White PI inspection findings.”** R.5.

B. Failures identified in Inspection Report that relate to January 27, 2015 scram and mechanical failures.

1. Links between January 27, 2015 scram and NRC Inspection Report

As described above, Pilgrim's Degraded Cornerstone and the NRC's supplemental inspection arise from the four scrams in 2013, two of which were caused by loss of outside power (February 8, 2013 and October 14, 2013) and two by equipment failures (relay cover on January 10, 2013 and failed cable splice on 8/22/13).

About 14 months after the last 2013 scram that caused the Degraded Cornerstone, on January 27, 2015, Pilgrim had an "automatic reactor scram on turbine trip due to loss of offsite power" followed by two mechanical failures. NRC Event reports 50769, 50771, 50790. **The 2013 scram was caused by loss of off site power and "inadequate pre-defined, risk based criteria established to guide operator confronted with deteriorating switchyard conditions during and following a blizzard"** R. 21. On January 26, 2015, one day before the first 2015 scram, the NRC released the Report saying that **Entergy had not adequately "revised the RCE for the winter storm scram to include additional action for the incomplete effectiveness review...."** R. 5. Juno proved this.

The Report documents that although Entergy knew or should have known about problems that caused the scrams in 2013-- a failed cable splice that the company knew about, R. 11, the need for switchyard upgrades to avoid flashovers and scrams, R. 34, and ignoring problems with the relay cover, R. 9, -- Entergy did not fix them. **The over-arching finding of the Inspection Report is that Entergy deferred maintenance, ignored known problems and failed to take pro-active measures with regard to storm preparation.**

Examples are as follows:

- "Despite corrective actions to upgrade **severe weather procedures** to address deficiencies during a winter storm on February 8, 2013, inspectors identified that the **procedure changes did not fully meet the intent of the corrective actions because there were no substantive changes to the procedure for pre-storm actions.** Additionally, inspectors determined that the **inadequate guidance for pre-storm actions represented a condition adverse to quality that was reasonably within Entergy's ability to** identify and correct by execution of corrective actions identified in the RCE;" R. 39; See also R. 28, 29.
- **The February 8, 2013 scram was similar to what had happened in 2008.** ("...weather related build-up of snow and ice on a bushing associated with the 'A' phase of an air-circuit breaker in the switchyard caused a current path to ground, known as a flashover, resulting in a main generator load reject and reactor scram." R. 11.

- “In performance of these reviews, Entergy identified challenges in corrective action program (CAP) implementation in that **Entergy has not taken corrective actions to address identified issues and causes in a timely manner. Entergy’s CCA documented that this was the leading driver behind challenges in nuclear safety culture behaviors at Pilgrim.** Additionally, Entergy identified that individuals did not always understand the importance of adhering to nuclear standards and that **station leaders have not consistently exhibited behaviors that set the appropriate standards.** Although, the inspectors determined that, in general, Entergy’s problem identification, cause evaluation, and corrective action plans for the two White Initiating Events PIs were adequate, they identified deficiencies regarding Entergy’s execution of corrective actions plans for the two White Initiating Events PIs were adequate, they identified deficiencies regarding Entergy’s execution of corrective actions documented in the corrective action plans, as well as Entergy’s understanding of some of the causes o of the issues documented in the corrective action plan, as well as Entergy’s understanding of some of the issues.” R. 3.

While the NRC inspection report for the January 27, 2015 scram and mechanical failures is not due until mid-March 2015, the events raises questions about whether Entergy’s failure to make adequate changes to procedures for “pre-storm actions” and failure to develop adequate “guidance for pre-storm actions”, R. 39; R. 28, 29 ,caused or contributed to the January 27 scram. Entergy’s failure to take appropriate corrective actions with regard to the (1) the transformer insulator (deferring maintenance and postponing budget approval for an engineering analysis eleven times) and (2) the defective cable splice, may have prevented the two scrams that resulted from these equipment failures. Similarly, there is a question as to whether the January 27, 2015 equipment failures could have been prevented.

C. Performance failures prior to 2013 that relate to 2013 and 2015 scrams

The January 27, 2015 scram involved **switchyard flashovers. This type of failure contributed to eight similar performance failures at Pilgrim since 1978.** Three of those have occurred since Entergy has owned Pilgrim. **They are:**

- Feb. 06, 1978 (Nor’easter/Blizzard - Blizzard of 78) - The reactor automatically scrambled when heavy snowfall caused electrical breakers in the 345 kilovolt switchyard to flashover and trip.
- Feb. 13, 1983 (Nor’easter/Blizzard) - With the reactor shut down, there was a loss of offsite power. High winds caused salt accumulation on electrical equipment that led to an electrical fault and a loss of offsite power lasting about 1 minute. (records not on NRC webpage: “salt accumulation and electrical fault” suggests flashover).

- Oct. 30, 1991 (Nor'easter/Hurricane - Perfect Storm) - The operators shut down the reactor when a severe storm blew seaweed into the intake structure, clogging the circulating water pumps, and causing a loss of condenser vacuum. Weather-related loss of offsite power lasting 120 minutes (switchyard flashover reported in LER #91-024-00).
- Dec. 13, 1992 (Nor'easter/Blizzard) - The reactor automatically scrammed on a generator load rejection caused by flashovers in the switchyard due to salt deposits during a severe storm.
- Mar 13, 1993 (Nor'easter/Superstorm/Blizzard - Storm of the Century) - The reactor automatically scrammed on a generator load rejection caused by flashovers in the switchyard due to wind-packed snow during blizzard conditions.
- Dec. 19, 2008 (Nor'easter/Blizzard) - The reactor automatically scrammed when a winter storm caused icing in the main switchyard.(switchyard flashover reported in 1/26/15 Supplemental Inspection Report)
- Feb 08, 2013 (Nor'easter/Blizzard - Nemo) - The reactor automatically scrammed at 9:17 pm when a blizzard caused offsite power to be lost. (switchyard flashover reported in 1/26/15 Supplemental Inspection Report and warehouse storage screw up)
- Jan 27, 2015 (Nor'easter/Blizzard - Juno)