UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
2100 RENAISSANCE BLVD., SUITE 100
KING OF PRUSSIA, PA 19406-2713

May 10, 2017

EA-17-023

Mr. John Dent
Site Vice President
Entergy Nuclear Operations, Inc.
Pilgrim Nuclear Power Station
600 Rocky Hill Road
Plymouth, MA 02360-5508

SUBJECT: PILGRIM NUCLEAR POWER STATION – SUPPLEMENTAL INSPECTION REPORT (INSPECTION PROCEDURE 95003 PHASE 'C') 05000293/2016011 AND PRELIMINARY GREATER-THAN-GREEN FINDING

Dear Mr. Dent:

On January 13, 2017, the U.S. Nuclear Regulatory Commission (NRC) completed the on-site portion of a supplemental inspection at Pilgrim Nuclear Power Station (PNPS) using Inspection Procedure (IP) 95003, "Supplemental Inspection for Repetitive Degraded Cornerstones, Multiple Degraded Cornerstones, Multiple Yellow Inputs, or One Red Input." On March 21, 2017, the NRC inspection team discussed the results of this inspection with you and other members of your staff at a public exit meeting. The results of this inspection are documented in the enclosed report.

The NRC performed this inspection to review your station's actions in response to PNPS's transition into the Repetitive Degraded Cornerstone Column (Column 4), as discussed in the 2015 mid-cycle assessment letter, dated September 1, 2015 (ML15243A259[1]). The NRC completed the Phase 'A' portion of this supplemental inspection on January 15, 2016 (ML16060A018). The Phase 'A' inspection was performed to review aspects of PNPS's corrective action program to determine whether continued operation of PNPS was acceptable and whether additional regulatory actions were necessary to arrest declining plant performance. The NRC completed the Phase 'B' portion of this supplemental inspection on April 8, 2016 (ML16144A027). The Phase 'B' inspection was performed to review Entergy's overall corrective action program performance since the last biennial problem identification and resolution inspection in August 2015. On September 2, 2016, you informed the NRC that your station was ready for Phase 'C' of the supplemental inspection.

The NRC determined that programs and processes at PNPS adequately support nuclear safety and that PNPS should remain in Column 4. Inspection Manual Chapter (IMC) 0305, "Reactor Oversight Assessment Process," Section 10.02e (ML16257A522), provides examples of

[1] Designation in parentheses refers to an Agencywide Documents Access and Management System (ADAMS) accession number. Documents referenced in this report are publicly available using the accession number in ADAMS.

unacceptable performance which represent situations in which the NRC lacks reasonable assurance that the licensee can or will conduct its activities to ensure protection of the public health and safety. With respect to these examples, the NRC has not identified: 1) multiple escalated violations of PNPS's license, technical specifications, regulations, or orders; 2) multiple safety-significant examples where the facility was determined to be outside of its design basis; or 3) a pattern of failure by Entergy management to effectively address previous significant concerns to prevent recurrence. While gaps in performance were identified during this inspection, the NRC determined that the above examples of unacceptable performance were not met. In particular, the NRC noted that licensed operators demonstrated, both in the control room and the simulator, the ability to effectively respond to events to place the reactor in a safe condition, consistent with their licensed responsibilities. The NRC also observed some improvement in corrective action program performance and a reduction in the number of operational events that resulted in a reactor scram.

Because the NRC had not completed the supplemental inspection for the White finding related to the 'A' safety/relief valve (SRV) prior to this inspection, the scope of this inspection also included a review of that issue using IP 95001, "Supplemental Inspection Response to Action Matrix Column 2 Inputs." As described in Section 4 of this inspection report, the NRC determined that the collective issues associated with the methodologies in the associated root cause evaluation (CR-PNP-2016-01621) represented a significant weakness, such that the objectives of IP 95001 could not be satisfied. Most notably, incorrect conclusions and assumptions related to the adequacy of information in the condition report originally written for the 'A' SRV operation in 2013 ultimately resulted in Entergy inappropriately assessing the impact of lack of rigor in shift manager operability determination review of an operability determination and any associated causal factors, in the root cause evaluation. Accordingly, Entergy will need to take action to address the deficiencies identified above, and the NRC will verify, through inspection follow-up activities, that the objectives of IP 95001 for this issue are met.

Based on the results of this inspection, as well as consideration of recent events at the station, the NRC identified deficiencies that warrant Entergy's immediate attention. Primarily, revisions are needed to your Comprehensive Recovery Plan for PNPS to ensure that performance improvements will be achieved and sustained. Specifically:

- Adjustments to corrective actions or compensatory measures to assure that the corrective actions to preclude repetition documented in the Comprehensive Recovery Plan will drive sustainable performance improvement;

- Inclusion of corrective actions to address the significant weaknesses identified during review of the root cause evaluation for the White SRV finding;

- A description of how Entergy is planning to address gaps identified by Phase 'C' of the IP 95003 inspection associated with the rigor with which senior licensed operators assure the plant is operated within its design bases (including operability determinations, technical specification knowledge, and questioning attitude);

- A review and analysis of the effectiveness of Entergy's implementation of subject matter experts and mentors, including any potential expanded scope needed to drive sustained performance improvement; and

- A description of how Entergy is addressing gaps in procedure use and adherence, which have resulted in recent events[2] at PNPS.

Additionally, Entergy needs to implement current Comprehensive Recovery Plan actions in a more rigorous and thoughtful manner to achieve substantial and sustainable performance improvement.

Once Entergy submits PNPS's revised Comprehensive Recovery Plan to the NRC, the NRC will review your plan and issue a Confirmatory Action Letter to confirm Entergy's key actions. These actions, if effectively implemented and independently verified by the NRC through inspection follow-up activities, will be considered by the NRC in determining whether PNPS should transition out of Column 4 of the NRC's Action Matrix, in accordance with IMC 0305, "Operating Reactor Assessment Program."

The enclosed report documents a finding that the NRC has preliminarily determined to be of greater than very low safety significance (i.e., greater than Green). As described in Section 6.7.4, the finding is associated with an apparent violation of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix B, Criterion III, "Design Control," in that Entergy did not account for potential new failure mechanisms on a new component, a relief valve, on the right angle drive for the 'A' emergency diesel generator radiator blower fan. As a result, Entergy did not consider the need to periodically monitor or maintain the valve, which subsequently failed, resulting in the inoperability of the 'A' emergency diesel generator for a period greater than its technical specification allowed outage time of 14 days. The finding was assessed based on the best available information, using IMC 0609.04, "Initial Characterization of Findings," and Exhibit 2 of IMC 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," issued June 19, 2012. The basis for the NRC's preliminary significance determination is described in the enclosed report.

The apparent violation of NRC requirements associated with this finding is being considered for escalated enforcement action in accordance with the Enforcement Policy, which appears on the NRC's Web site at http://www.nrc.gov/about-nrc/regulatory/enforcement/enforce-pol.html. Because the NRC has not made a final determination in this matter, no notice of violation is being issued for this inspection finding at this time. In addition, please be advised that the number and characterization of the apparent violation may change based on further NRC review. The NRC will inform you, in writing, when the final significance has been determined. We intend to complete and issue our final safety significance determination within 90 days from the date of this letter. The NRC's Significance Determination Process is designed to encourage an open dialogue between your staff and the NRC; however, the dialogue should not affect the timeliness of our final determination.

Before we make a final decision, we are providing you an opportunity to provide your perspective on this matter, including the significance, causes, and corrective actions, as well as any other information that you believe the NRC should take into consideration. Accordingly, you may notify us of your decision within 10 days to: (1) request a regulatory conference to meet with the NRC and provide your views in person; (2) submit your position on the finding in writing; or (3) accept the finding as characterized in the enclosed inspection report.

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[2] Event notification reports 52643 (March 27, 2017) and 52655 (March 31, 2017), available at https://www.nrc.gov/reading-rm/doc-collections/event-status/event/2017

If you choose to request a regulatory conference, the meeting should be held in the NRC Region I office within 40 days of the date of this letter, and will be open for public observation. The NRC will issue a public meeting notice and a press release to announce the date and time of the conference. We encourage you to submit supporting documentation at least one week prior to the conference in an effort to make the conference more efficient and effective. If you choose to provide a written response, it should be sent to the NRC within 30 days of the date of this letter. You should clearly mark the response as "Response to Preliminary "Greater-than-Green" Finding in Inspection Report No. 05000293/2016011; EA-17-023," and send it to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with a copy to the Regional Administrator, Region I, and a copy to the NRC Senior Resident Inspector at PNPS. You may also elect to accept the finding as characterized in this letter and the inspection report, in which case the NRC will proceed with its regulatory decision. However, if you choose not to request a regulatory conference, or to submit a written response, you will not be allowed to appeal the NRC's final significance determination.

Please contact Arthur Burritt at (610) 337-5069 within 10 days from the issue date of this letter to notify the NRC of your intentions. If we have not heard from you within 10 days, we will continue with our significance determination and enforcement decision.

The NRC team also documented nine findings of very low safety significance (Green), seven of which are violations of NRC requirements, and one Severity Level IV non-cited violation with no associated finding. The NRC is treating these violations as non-cited violations, consistent with Section 2.3.2.a of the Enforcement Policy. If you contest the violations or significance of these non-cited violations, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement; and the NRC Resident Inspectors at PNPS. If you disagree with a cross-cutting aspect assignment or a finding not associated with a regulatory requirement in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; and the NRC Resident Inspectors at PNPS.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at http://www.nrc.gov/reading-rm/adams.html and at the NRC Public Document Room, in accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/RA/

Daniel H. Dorman
Regional Administrator

Docket No. 50-293
License No. DPR-35

Enclosure:
Inspection Report 05000293/2016011
w/Attachments 1 and 2

cc w/encl: Distribution via ListServ

SUBJECT: PILGRIM NUCLEAR POWER STATION – SUPPLEMENTAL INSPECTION REPORT (INSPECTION PROCEDURE 95003 PHASE 'C') 05000293/2016011 AND PRELIMINARY GREATER-THAN-GREEN FINDING DATED MAY 10, 2017

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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket No.	50-293
License No.	DPR-35
Report No.	05000293/2016011
Licensee:	Entergy Nuclear Operations, Inc. (Entergy)
Facility:	Pilgrim Nuclear Power Station (PNPS)
Location:	600 Rocky Hill Road Plymouth, MA 02360
Dates:	November 28, 2016 – January 13, 2017
Inspectors:	D. Jackson, Team Leader, Branch Chief, Region I C. Bickett, Assistant Team Leader, Senior Reactor Inspector, Region I Senior Reactor Analyst F. Arner, Region I Problem Identification and Resolution Group R. Clagg (Lead), Senior Resident Inspector, Calvert Cliffs, Region I J. Bream, Physical Security Inspector, Region I D. Dodson, Senior Resident Inspector, Wolf Creek, Region IV A. Nguyen, Senior Resident Inspector, Palisades, Region III Leadership, Operations, and Oversight Group E. Duncan (Lead), Branch Chief, Region III G. Pick, Senior Reactor Inspector, Region IV R. Ruiz, Senior Resident Inspector, LaSalle, Region III A. Sanchez, Senior Resident Inspector, South Texas Project, Region IV D. Silk, Senior Operations Engineer, Region I *(part-time)* Engineering, Maintenance, and Programs Group J. Josey (Lead), Senior Resident Inspector, Comanche Peak, Region IV J. Brand, Reactor Inspector, Region I G. Eatmon, Resident Inspector, North Anna, Region II K. Miller, Resident Inspector, Farley, Region II

S. Elkhiamy, Project Engineer, Region I *(training)*
J. Schoppy, Senior Reactor Inspector, Region I *(part-time)*

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Approved by: Raymond K. Lorson
Team Manager
Director, Division of Reactor Safety

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EXECUTIVE SUMMARY

Background

Pilgrim Nuclear Power Station (PNPS) transitioned into the Repetitive Degraded Cornerstone Column (Column 4) of the Reactor Oversight Process Action Matrix as of the first quarter of 2015. This resulted from issuance of a White finding under the Mitigating Systems cornerstone while PNPS was already in the Degraded Cornerstone Column (Column 3) for more than five consecutive quarters due to two open White inputs under the Initiating Events cornerstone. In Inspection Procedure (IP) 95002 Supplemental Inspection Report 05000293/2014008 (ML15026A069[1]), dated January 26, 2015, the NRC noted that Entergy did not adequately evaluate the causes and take or plan timely corrective actions to address the issues associated with a high number of unplanned scrams which occurred in 2013. As a result, the two White inputs under the Initiating Events cornerstone remained open for greater than five consecutive quarters, and were in effect when the new White finding was identified during an inspection exit on March 20, 2015. The NRC subsequently closed the White inputs under the Initiating Events cornerstone on June 30, 2015, due to successful completion of the IP 95002 follow-up inspection.

The intent of the IP 95003 inspection was to provide the NRC a comprehensive understanding of the depth and breadth of safety, organizational, and performance issues at PNPS, and, if present, the potential for a more serious performance decline. The NRC structured IP 95003 inspection activities at PNPS in a phased approach to ensure that continued operation of the facility was acceptable until the final phase of the inspection could be completed. The NRC completed Phase 'A' of IP 95003 in January 2016, which focused on review of longstanding open corrective actions, Entergy's program for classification of adverse versus non-adverse condition reports (CRs), and Entergy's corrective actions to address past NRC violations. The results of the Phase 'A' inspection are documented in NRC Inspection Report 05000293/2016008, issued February 29, 2016 (ML16060A018). The NRC completed Phase 'B' of IP 95003 in April 2016, which focused on PNPS's corrective action program performance since the last biennial problem identification and resolution inspection in August 2015. The results of the Phase 'B' inspection are documented in NRC Inspection Report 05000293/2016009, issued May 20, 2016 (ML16144A027).

This inspection report documents the results of Phase 'C' of IP 95003, which satisfies the remaining IP 95003 inspection requirements, as well as review of the White finding in the Mitigating Systems cornerstone related to safety/relief valve (SRV) performance at the station. The NRC used the results of this inspection to determine whether continued operation of the facility was acceptable and whether additional regulatory actions were necessary to arrest declining plant performance. The NRC first defined the specific scope for this inspection in the 2015 PNPS mid-cycle assessment letter, dated September 1, 2015 (ML15243A259). Based on persistent corrective action program weaknesses that resulted in PNPS's entry into Column 4, this IP 95003 inspection focused on the corrective action program (IP 95003 Section 02.02) and safety culture assessment (IP 95003 Sections 02.07 – 02.09). Based on evaluation of the inputs into the Action Matrix, the reactor safety strategic performance area of the inspection focused on the key attributes of human performance (IP 95003 Section 02.03c), procedure quality (IP 95003 Section 02.03d), and equipment performance (IP 95003 Section 02.03e).

[1] Designation in parentheses refers to an Agencywide Documents Access and Management System (ADAMS) accession number. Documents referenced in this report are publicly available using the accession number in ADAMS.

Overall Assessment and Conclusions

The NRC determined that programs and processes at PNPS adequately support nuclear safety and that PNPS should remain in Column 4. Inspection Manual Chapter 0305, "Reactor Oversight Assessment Process," Section 10.02e, provides examples of unacceptable performance which represent situations in which the NRC lacks reasonable assurance that the licensee can or will conduct its activities to ensure protection of the public health and safety. With respect to these examples, the NRC has not identified: 1) multiple escalated violations of PNPS's license, technical specifications, regulations, or orders; 2) multiple safety-significant examples where the facility was determined to be outside of its design basis; or 3) a pattern of failure by Entergy management to effectively address previous significant concerns to prevent recurrence. While gaps in performance were identified during this inspection, the NRC determined that the above examples of unacceptable performance were not met. In particular, the NRC noted that licensed operators demonstrated, both in the control room and in the simulator, the ability to effectively respond to events to place the reactor in a safe condition, consistent with their licensed responsibilities. The NRC also observed some improvement in corrective action program performance and a reduction in the number of operational events that resulted in a reactor scram. However, based on the results of this inspection, as well as consideration of recent events at the station, the NRC team identified areas that warrant Entergy's immediate attention. Primarily, revisions are needed to the PNPS Comprehensive Recovery Plan to ensure that performance improvements will be achieved and sustained. Specifically:

- Adjustments to corrective actions or compensatory measures to assure that the corrective actions to preclude repetition (CAPRs) documented in the Comprehensive Recovery Plan will drive sustainable performance improvement;

- Inclusion of corrective actions to address the significant weaknesses identified during review of the root cause evaluation for the White SRV finding;

- A description of how Entergy is planning to address gaps identified by Phase 'C' of the IP 95003 inspection associated with the rigor with which senior licensed operators assure the plant is operated within its design bases (including operability determinations, technical specification knowledge, and questioning attitude);

- A review and analysis of the effectiveness of Entergy's implementation of subject matter experts and mentors, including any potential expanded scope needed to drive sustained management performance improvement; and

- A description of how Entergy is addressing gaps in procedure use and adherence, which have resulted in recent events[2] at PNPS.

Additionally, Entergy needs to implement current Comprehensive Recovery Plan actions in a more rigorous and thoughtful manner to achieve substantial and sustainable performance improvement.

[2] Event notification reports 52643 (March 27, 2017) and 52655 (March 31, 2017), available at https://www.nrc.gov/reading-rm/doc-collections/event-status/event/2017

This report documents one finding that the NRC team has preliminarily determined to be greater than very low safety significance (i.e., greater than Green). The NRC team determined that Entergy did not account for potential new failure mechanisms on a new component, a relief valve, on the right angle drive for the 'A' emergency diesel generator radiator blower fan. As a result, Entergy did not consider the need to periodically monitor or maintain the valve, which subsequently failed, resulting in inoperability of the 'A' emergency diesel generator (Section 6.7.4). The NRC team also identified nine findings of very low safety significance (Green), seven of which are violations of NRC requirements, and one Severity Level IV non-cited violation with no associated finding. Additionally, two licensee-identified violations of very low safety significance are documented in this report.

PNPS Site Recovery Process (Section 2)

Entergy conducted multiple assessments as part of their diagnostic recovery process. The results of these assessments were binned into broader categories, and ultimately analyzed to identify the major problem areas driving the performance issues at PNPS. The problems that caused other problems (i.e., "drivers") were designated as "fundamental problems." Problems that were caused by the fundamental problems (i.e., "driven") were designated as "problem areas." Entergy performed either a root or apparent cause evaluation for each of these areas.

IP 95001: SRV White Finding (Section 4)

The NRC team determined that the collective issues associated with the root cause methodologies in root cause evaluation CR-PNP-2016-01621 represented a significant weakness, such that the objectives of IP 95001 could not be satisfied for this issue. Most notably, the incorrect conclusions and assumptions related to the adequacy of information in CR-PNP-2013-00825, originally written for 'A' SRV operation in 2013, adversely impacted four of the cause evaluation methodologies used in root cause evaluation CR-PNP-2016-01621. Specifically, the details that were provided were adequate for an appropriately rigorous operability determination review to identify that SRV 'A' did not open. This ultimately resulted in Entergy inappropriately assessing the impact of shift manager review rigor, and any associated causal factors, in the root cause evaluation. Entergy documented this issue and specific issues identified during this portion of the inspection in CR-PNP-2017-00363 and CR-PNP-2017-00828. The NRC team documented a finding associated with this issue for failure to identify all root causes of a significant condition adverse to quality. Specifically, Entergy did not establish adequate measures to assure that the cause of a significant condition adverse to quality, inadequate shift manager operability determination rigor and its associated causes, were determined and corrective action taken to preclude repetition (Section 4.7).

Corrective Action Program Fundamental Problem (Section 5)

The NRC team concluded that Entergy's identification of the corrective action program as a fundamental problem was appropriate. The team determined that the identified direct cause, root cause, and contributing causes in CR-PNP-2016-00716 were generally reasonable and supportable. However, the NRC team noted that the root cause focused on the station senior leadership and failed to adequately address the role that lower-level leaders had in the implementation of the day-to-day prioritization and resolution of corrective action program items. The team determined that the definition of 'leaders' associated with the root cause was too narrow and failed to recognize that department performance improvement coordinators had a significant leadership role in the implementation and assessment of the corrective action program. The team concluded that CAPR-1 and CAPR-2, as they were written and

implemented, were not adequate to correct the root cause and preclude repetition of the fundamental problem because the CAPRs did not include a systematic or structured approach to coaching/mentoring to reach all station personnel with leadership responsibilities in the implementation of the corrective action program. The NRC team documented a finding related to this issue in Section 5.1.4.

Decision-Making/Risk-Recognition Fundamental Problem (Section 6.1)

The NRC team concluded that Entergy's identification of decision making/risk recognition as a fundamental problem was appropriate. The team further concluded that the root and contributing causes were appropriately identified by Entergy and that the corrective actions developed by the station to address the root and contributing causes were appropriate. Of those corrective actions sampled, all reviewed were being adequately implemented, though in some cases, would have benefitted from more rigorous and consistent implementation. The NRC team's observations suggested that the new standards and the 1.3.142, "PNPS Risk Review and Disposition," process, as delineated by CAPR-1, were not yet consistently being demonstrated by all levels of station leaders. Additionally, one of the key actions in CAPR-1 involved the use of Targeted Performance Improvement Plans to change and shape behaviors, reinforce expectations and standards, and achieve the desired results. The NRC team determined that the Targeted Performance Improvement Plans were inadequate and documented a finding related to this issue in Section 7.1.4.

With regards to augmentation of staff with subject matter experts, the NRC team concluded that the subject matter experts appeared to have a positive impact on the improvement and recovery efforts of the station. The nature of the subject matter experts' interactions with PNPS leaders was observed to be one of a consultation/recommendation based relationship, so the subject matter experts had no direct decision-making or line management authority, other than the ability to generate CRs. In the interactions observed by the NRC team, the PNPS senior leaders were generally receptive to the feedback from the subject matter experts and took actions to address items identified by the subject matter experts. However, based on interviews and a review of current open corrective action program items generated by the subject matter experts, the NRC team noted resistance to the improvement recommendations of the subject matter experts by some station managers. Additionally, the NRC team noted that the subject matter experts had recently shifted their approach to a more direct method of writing CRs for identified issues, versus their previous method of attempting to first influence the station staff to self-identify the issue, as a more effective way of impacting changes in station behavior. The NRC team also reviewed a sample of the reports that documented the results of the observations performed by the subject matter experts. The NRC team concluded that these reports effectively presented the results of the subject matter experts' observations in a frank and open manner, such that lessons could be learned and improvements realized. The NRC team also noted that, as of the end of this inspection, the decision making/risk recognition subject matter experts were instructed by the Site Vice President to focus more attention directly on mentoring and coaching the operations shift managers as an additional means of improving operations department decisions and behaviors.

Nuclear Safety Culture Fundamental Problem (Section 7.1)

The NRC team concluded that Entergy's identification of nuclear safety culture as a fundamental problem was appropriate. The NRC team determined that the multi-year gradual performance decline occurred, in part, due to declines in nuclear safety culture that went unrecognized and unaddressed. Performance monitoring tools and management responses

were ineffective in recognizing and addressing the decline until they began to impact performance. While nuclear safety remained a priority, actions to balance competing priorities, manage problems, and prioritize workload resulted in reduced safety margins.

Overall, the team noted significant weaknesses in development and implementation of the Targeted Performance Improvement Plans (CAPR-1A/B), including unclear alignment between the causal factors and items contained in the plans, inappropriate parallel implementation of the plans, insufficient duration of corrective actions for improvement of behaviors, generic versus specific counseling to address adverse behaviors, success criteria that would not be expected to result in substantial performance improvement at the station, and numerous administrative issues that impacted usefulness or credibility of the process. The NRC team concluded that these significant implementation weaknesses severely limited the overall effectiveness of the CAPR.

Entergy implemented a nuclear safety culture observation process using an external Nuclear Safety Culture Advocate. The NRC team concluded that the scope and format of the external nuclear safety culture observation process was an appropriate improvement and accountability tool and that the Nuclear Safety Culture Advocate role was being effectively implemented.

The NRC team did note examples of corrective actions in the Comprehensive Recovery Plan had been changed by the station such that the action would match what Entergy actually accomplished, versus what was intended by the original action. For example, one action required that Entergy implement a communications plan for all full-time site personnel and supplemental personnel that will allow PNPS to more fully understand the traits of a healthy nuclear safety culture and how nuclear safety culture influences nuclear safety performance. This was originally a one-time interim action that could be closed when 90 percent of the target population received the communication. The NRC team reviewed the closure of this action and identified that no objective evidence was included that demonstrated that 90 percent of the target population had received the communication. Subsequently, the NRC team determined that the Action Closure Review Board had previously identified that PNPS failed to provide documented evidence that 90 percent of the targeted population had received the communications. To address this issue, Entergy revised the corrective action to align with what had been accomplished, with a basis that the action as it was originally written was not realistic or necessary. Following this change, the Action Closure Review Board approved the closure of the corrective action. The NRC team reviewed this action and concluded that the relatively small number of employees that received the training (estimated at less than 50 percent) adversely impacted the effectiveness of the corrective actions. However, the NRC team recognized that redundancy and defense-in-depth provided by other more substantive corrective actions, such as the gap refresher training, mitigated the significance of this issue.

The NRC team noted that the nuclear safety culture root cause evaluation determined plant performance issues were exacerbated by the cumulative impact of staffing reduction initiatives. Resource issues were identified in other cause evaluations conducted as part of Entergy's recovery evaluations, including those related to the problem areas of work management, engineering programs, and equipment reliability. To address this issue, corrective actions were created to establish and implement procedural guidance for an Integrated Strategic Workforce Plan to ensure the appropriate level of staffing was maintained to support station goals and objectives. The team reviewed this plan and determined that, if properly implemented, it had the potential to be an effective tool for workforce planning.

NRC's Graded Safety Culture Assessment (Section 7.2)

The NRC team assessed PNPS's safety culture by conducting focus groups, interviews, behavioral observations, and document reviews. The NRC team conducted a total of 20 focus groups and 29 individual interviews which included questions related to all 10 traits that comprise a safety culture. In all, the NRC team interviewed 188 staff, supervisors, and managers, representing about 30 percent of the workforce at PNPS. In general, the NRC team's independent safety culture assessment confirmed the results of PNPS's Third Party Nuclear Safety Culture Assessment, which noted weaknesses in most areas. The general consensus among the focus group and interview participants was that safety culture at PNPS was much improved. Most participants perceived that there had been a marked change in leadership's focus on safety over production over the past year or so. Participants noted that there had been a new emphasis on procedure use and adherence and procedure quality, as well as improvements in conservative decision-making. Additionally, personnel felt that they were able to trust management up through the Site Vice President.

Despite the improved safety culture, PNPS was still challenged with translating the safety culture beliefs into repeatable, sustainable safety culture behaviors. The NRC team determined that some station personnel, including operators, technicians, supervisors, and management, were challenged to routinely exhibit site standards and expectations when performing normal duties and responsibilities in areas such as conservative decision-making, work practices, and procedure use and adherence. The NRC team concluded that this may be due to a number of factors, including the planned permanent shutdown of PNPS in 2019, the lack of effective benchmarking to understand what current industry standards consist of relative to issues in the organization, as well as the time it typically takes to change the safety culture of an organization.

Station personnel did note some challenges during the focus groups and individual interviews. Most personnel at all levels indicated that resource challenges continued to impact their ability to accomplish work. Though most staff indicated that the corrective action program had improved, some expressed concern that when contractor support was no longer at the station, PNPS would revert to past behaviors. Some staff also perceived that with regards to accountability, supervisors and managers were not held to the same standard as non-supervisory employees. Some personnel noted weaknesses in the work planning and scheduling processes, especially related to emergent work.

Nearly all personnel interviewed and in focus groups stated that they felt free to raise nuclear safety concerns through many avenues, including their supervisors, the corrective action program, the Employee Concerns Program, and the NRC. However, the team noted that concerns related to one event could be precursors to a potential chilled work environment in the radiation protection department (Section 7.8). Additionally, the NRC team noted some general frustration in the security department related to areas such as use of the corrective action program, resources, respectful work environment, and consideration during work planning. Despite these issues, the NRC team determined that employees of the security department would still raise nuclear safety concerns through the available avenues.

Finally, the NRC team noted some weaknesses in implementation of the Executive Review Board, Employee Concerns Program, and the Nuclear Safety Culture Monitoring Panel. Examples include an issue that was not evaluated by the Executive Review Board even though

it was required by Entergy procedure, issues with Employee Concerns Program Coordinator qualifications, and rigor associated with review of items at the Nuclear Safety Culture Monitoring Panel.

Performance Deficiency Cause Analysis (Section 8)

In general, the NRC team agreed with the fundamental problems and problem areas identified during Entergy's recovery evaluations. However, the NRC team noted the following areas of concern during the inspection, which will need to be addressed by Entergy:

- *Weaknesses in Adequacy and/or Implementation of CAPRs*. In general, the NRC team noted that Entergy exhibited weaknesses in the adequacy and/or implementation of the CAPRs for the root causes reviewed during this inspection. This included the CAPRs for the corrective action program root cause evaluation, the feedwater regulating valve failure root cause evaluation, and the nuclear safety culture root cause evaluation.

- *Operations Department Standards*. The NRC team concluded that in general, the operations staff at PNPS operated the plant safely, within design basis limits, and in a manner granted to them in their license. However, numerous examples observed by both the NRC team and the resident inspector staff indicated a lack of formality, appropriate technical specification usage, and attention to detail for implementation of administrative programs, which could represent precursors to a further decline in performance. The NRC team also determined that the operations department had not consistently demonstrated strong site ownership, leadership, and high standards of performance. The NRC team determined that additional action will be needed by Entergy to fully define the extent of the weaknesses related to operator standards at PNPS, as well as develop appropriate corrective actions to address those weaknesses.

- *Implementation of Subject Matter Experts at PNPS*. Based on a review of the root causes for the fundamental problems, the NRC team concluded that weaknesses in PNPS leadership standards and behaviors were drivers for Column 4 performance at the station. This is also supported by the results of the PNPS Third Party Nuclear Safety Culture Assessment, which indicated that the senior leadership team had not been consistently engaged in demonstrating and demanding higher levels and standards of performance from the site. Given the weaknesses identified related to the CAPRs for the fundamental problems, the NRC team concluded that the subject matter experts and mentors currently embedded in the PNPS organization are playing and will need to continue to play a key role in improving and sustaining positive changes in safety culture and performance at the station. This is especially true since it is commonly accepted that safety culture takes on the order of years to change, and it is evident, based on the observations and findings documented by the team, as well as the NRC independent safety culture assessment, that improved standards have not yet taken hold across the entire organization.

  Overall, the NRC team concluded that the subject matter experts and mentors were generally having a positive impact on recovery efforts at PNPS. However, the NRC team noted that with the exception of the lead corrective action program subject matter expert and the Nuclear Safety Culture Advocate, positions to which PNPS is committed to the current end of plant operations, the station has the flexibility to remove the subject matter experts and mentors following a successful effectiveness review of the related

area. Also of note, the lead corrective action program subject matter expert is only required to provide a minimum of one weekly on-site visit per month.

Given this situation, the NRC team determined that more robust and comprehensive action is prudent related to implementation of the subject matter experts and mentors at PNPS. At a minimum, this would include more significant time spent at the site, objective evidence showing positive, timely action taken in response to items identified in the subject matter expert status reports, and addition of subject matter experts and/or mentors at strategic levels in the operations department organization. Implementation of subject matter experts and mentors should continue until a positive change in safety culture is sustained and verified by NRC inspection. Additionally, more robust and comprehensive action is needed related to implementation of the Targeted Performance Improvement Plans (Section 7.1.4), as this action, in concert with the subject matter experts and mentors, would be the foundation for improving the safety culture at PNPS.

SUMMARY

Inspection Report 05000293/2016011; 11/28/2016 – 01/13/2017; Pilgrim Nuclear Power Station; Supplemental Inspection – IP 95003.

The inspection activities described in this report were performed by a team of 23 inspectors representing all of the NRC's regional offices, as well as the headquarters office. The NRC team identified one finding and apparent violation that has been determined to be preliminarily greater than very low safety significance (i.e., preliminary greater than Green). The team also identified nine findings of very low safety significance (Green), seven of which are violations of NRC requirements, and one Severity Level IV non-cited violation. Additionally, two licensee-identified violations of very low safety significance are documented in this report.

The significance of inspection findings is indicated by their color (i.e., greater than Green, or Green, White, Yellow, Red), and determined using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," dated April 29, 2015. Cross-cutting aspects are determined using IMC 0310, "Aspects Within the Cross-Cutting Areas," dated December 4, 2014. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy, dated November 1, 2016. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 6.

Cornerstone: Initiating Events

- Green. The NRC team identified a Green finding because Entergy did not issue appropriate CAPRs in accordance with Entergy procedure EN-LI-102, "Corrective Action Process," Revision 28. Specifically, Entergy did not issue adequate CAPRs associated with Root Cause 1 of the feedwater regulating valve failure in September 2016 that resulted in a manual scram. As a result of the NRC team's questions, Entergy issued procedure 1.13.2, "Vendor and Technical Information Reviews," Revision 0, as "continuous use" to ensure that planners will always have the checklist in-hand when planning work to ensure that appropriate vendor technical information is always included in applicable work instructions. Entergy entered the NRC team's concerns in the corrective action program as CR-PNP-2017-00687 and CR-PNP-2017-00936.

  The performance deficiency was more than minor because it is associated with the equipment performance attribute of the Initiating Events cornerstone and if left uncorrected, the performance deficiency would have the potential to lead to a more significant safety concern. Specifically, if left uncorrected, the performance deficiency could have the potential to result in repetition of a significant condition adverse to quality, loss of control of feedwater regulating valve 642A and a manual scram. The NRC team evaluated the finding using Exhibit 1, "Initiating Events Screening Questions," of IMC 0609, Appendix A, "Significance Determination Process for Findings At-Power," and determined this finding did not cause a reactor trip or the loss of mitigation equipment relied upon to transition the plant from the onset of a trip to a stable shutdown condition. Therefore, the NRC team determined the finding was of very low safety significance (Green). The NRC team determined that the finding had a cross-cutting aspect in the area of Human Performance, Procedure Adherence, because individuals did not follow processes, procedures, and work instructions. Specifically, Entergy did not follow procedure EN-LI-102, which provides the station standards for crafting a corrective action and states, in part, that the corrective action

descriptions must be worded to ensure that the adverse condition or cause/factor is addressed [H.8]. (Section 5.3.3)

Cornerstone: Mitigating Systems

- Green. The NRC team identified a Green non-cited violation of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix B, Criterion XVI, "Corrective Action," because Entergy did not adequately determine all root causes associated with a significant condition adverse to quality related to the failure to identify, evaluate, and correct the 'A' SRV's failure to open upon manual actuation during a plant cooldown on February 9, 2013. Specifically, Entergy did not establish adequate measures to assure that the cause of a significant condition adverse to quality, inadequate shift manager operability determination rigor and its associated causes, were adequately determined and corrective action taken to preclude repetition. Entergy's immediate corrective actions included planning to conduct operations management face-to-face conversations with shift manager qualified individuals to reinforce the shift manager's responsibility for operability and functionality determination accuracy and rigor. Entergy entered this issue into the corrective action program as CR-PNP-2017-00363 and CR-PNP-2017-00828.

  The performance deficiency was more than minor because it is associated with the equipment performance attribute of the Mitigating Systems cornerstone and if left uncorrected, the performance deficiency would have the potential to lead to a more significant safety concern. Specifically, if left uncorrected, the performance deficiency could have the potential to result in repetition of a failure to identify, evaluate, and correct an SRV's failure to open or a similar significant condition adverse to quality. The NRC team evaluated the finding using Exhibit 2, "Mitigating Systems Screening Questions," of IMC 0609, Appendix A, "Significance Determination Process for Findings At-Power," and determined this finding did not affect the design or qualification of a mitigating structure, system, or component; represent a loss of system and/or function; involve an actual loss of function of at least a single train or two separate safety systems for greater than its technical specification-allowed outage time; or represent an actual loss of function of one or more non-technical specification trains of equipment designated as high safety-significant. Therefore, the NRC team determined the finding was of very low safety significance (Green). The NRC team determined that the finding had a cross-cutting aspect in the area of Human Performance, Avoid Complacency, because individuals did not recognize and plan for the possibility of mistakes, latent issues, and inherent risk, even while expecting successful outcomes. Specifically, Entergy incorrectly assumed that CR-PNP-2013-00825 contained inadequate information to determine that the 'A' SRV had not opened, and this assumption ultimately impacted the root cause results documented in CR-PNP-2016-01621 [H.12]. (Section 4.7)

- Green. The NRC team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," because Entergy did not implement CAPRs for a significant condition adverse to quality identified in root cause evaluation CR-PNP-2016-00716, "Implementation of the Corrective Action Program," Revision 2. Specifically, the team identified that CAPRs for Entergy's continued weaknesses in the implementation of the corrective action program were inadequate. Entergy entered this issue into their corrective action program for further evaluation as CR-PNP-2017-00053, CR-PNP-2017-00410, and CR-PNP-2017-01134.

The performance deficiency was more than minor because if left uncorrected, it had the potential to lead to a more significant safety concern. Specifically, the failure to preclude repetition of this significant condition adverse to quality could result in continuing weaknesses in implementation of the corrective action program, which was designated as a fundamental problem, and thus a contributing factor for PNPS Column 4 performance. Additionally, weaknesses with corrective action program implementation could result in equipment issues where operability is not maintained. The NRC team evaluated the finding using Exhibit 2, "Mitigating Systems Screening Questions," of IMC 0609, Appendix A, "Significance Determination Process for Findings At-Power," and determined this finding did not affect the design or qualification of a mitigating structure, system, or component; represent a loss of system and/or function; involve an actual loss of function of at least a single train or two separate safety systems for greater than its technical specification-allowed outage time; or represent an actual loss of function of one or more non-technical specification trains of equipment designated as high safety-significant. Therefore, the NRC team determined the finding was of very low safety significance (Green). The NRC team determined that the finding had a cross-cutting aspect in the area of Human Performance, Procedure Adherence, because individuals did not follow processes, procedures, and work instructions. Specifically, Entergy did not follow procedure EN-LI-102, which provides the station standards for crafting a corrective action and states, in part, that the corrective action descriptions must be worded to ensure that the adverse condition or cause/factor is addressed [H.8]. (Section 5.1.4)

- Green. The NRC team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings." Specifically, the NRC team identified a programmatic issue because in some cases, Entergy did not enter the operability determination process when appropriate, and, when the process was entered, did not adequately document the basis for operability, in accordance with Procedure EN-OP-104, "Operability Determination Process," Revision 11. In each of the examples discussed, though the basis for operability was not adequate, all components were determined to be operable upon further evaluation. Entergy entered this issue into their corrective action program as CR-PNP-2017-00626.

  The performance deficiency was more than minor because if left uncorrected, could lead to a more significant safety issue. Specifically, the failure to enter and document a basis for operability could lead to not recognizing inoperable safety-related equipment, and place the reactor at a higher risk of core damage in a design basis accident. The NRC team evaluated the finding using Exhibit 2, "Mitigating Systems Screening Questions," of IMC 0609, Appendix A, "Significance Determination Process for Findings At-Power," and determined this finding did not affect the design or qualification of a mitigating structure, system, or component; represent a loss of system and/or function; involve an actual loss of function of at least a single train or two separate safety systems for greater than its technical specification-allowed outage time; or represent an actual loss of function of one or more non-technical specification trains of equipment designated as high safety-significant. Therefore, the NRC team determined the finding was of very low safety significance (Green). This finding had a cross-cutting aspect in the area of Human Performance, Teamwork. Specifically, the operations and engineering departments did not demonstrate a strong sense of collaboration and cooperation with respect to holding each other accountable when performing operability determinations to ensure nuclear safety is maintained [H.4]. (Section 6.3.4)

- Green. The NRC team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," because Entergy implemented inadequate corrective actions to address the procedure quality issues identified in CR-PNP-2016-02058. Specifically, Entergy inappropriately limited their corrective actions to those procedures that increased integrated risk above normal, and did not include other types of safety-related procedures that did not meet their procedure quality standards and resulted in procedure quality being a problem area. Entergy entered this issue into their corrective action program for further evaluation as CR-PNP-2017-00400.

  The performance deficiency was more than minor because it affected the procedure quality attribute of the Mitigating Systems cornerstone, and affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Entergy limited corrective actions to procedures that increased integrated risk above normal or trip sensitive and failed to include other procedures associated with safety-related components that reflected the broader population reviewed during the collective evaluation. The NRC team evaluated the finding using Exhibit 2, "Mitigating Systems Screening Questions," of IMC 0609, Appendix A, "Significance Determination Process for Findings At-Power," and determined this finding did not affect the design or qualification of a mitigating structure, system, or component; represent a loss of system and/or function; involve an actual loss of function of at least a single train or two separate safety systems for greater than its technical specification-allowed outage time; or represent an actual loss of function of one or more non-technical specification trains of equipment designated as high safety-significant. Therefore, the NRC team determined the finding was of very low safety significance (Green). The NRC team determined that this finding had a cross-cutting aspect related to Human Performance, Resources, because the leaders failed to ensure that personnel, equipment, procedures, and other resources are available and adequate to support nuclear safety. Specifically, based on available resources, Entergy chose to limit the scope of safety-related procedures being revised to only those that resulted in high integrated risk or were trip sensitive [H.1]. (Section 6.5.4)

- Preliminary Greater than Green. The NRC team identified a preliminary greater than Green finding and apparent violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," associated with Entergy's failure to ensure that design changes were subject to design control measures commensurate with those applied to the original design and were approved by the designated responsible organization. Specifically, Entergy received a new style right angle drive for the 'A' emergency diesel generator radiator blower fan from a vendor but failed to adequately review the differences in the design of the drives to identify potential new failure mechanisms for the part or the need for related preventive measures. Entergy entered this issue into the corrective action program as CR-PNP-2016-07443.

  The performance deficiency was more than minor because it was associated with the design control attribute of the Mitigating Systems cornerstone, and affected the associated cornerstone objective to ensure availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. In accordance with IMC 0609.04, "Initial Characterization of Findings," and Exhibit 2 of IMC 0609, Appendix A, "The Significance Determination Process for Findings At-Power," the team screened the finding for safety significance and determined that a detailed risk evaluation was required based on the 'A' emergency diesel generator being inoperable for greater than the technical specification allowed outage time.

Region I senior reactor analysts performed a detailed risk evaluation. The finding was preliminarily determined to be of greater than very low safety significance (greater than Green). The risk important sequences were dominated by external fire risk. Specifically, a postulated fire in the 'B' 4 kilovolt (KV) switchgear room with a consequential loss of the unit auxiliary generator power supply, non-recoverable loss of off-site power (LOOP) to both safety buses A5 and A6, loss of the 'B' emergency diesel generator with the conditional failure of the 'A' emergency diesel generator, along with the loss of bus A8 feed (from the shutdown transformer or station blackout (SBO) diesel generator) to safety buses A5 and A6. The internal event risk was dominated by weather related LOOPs, failure of the 'A' emergency diesel generator, with failure of the 'B' emergency diesel generator and SBO diesel generator to run, along with failure to recover offsite power or the emergency diesel generators. See Attachment 1, "'A' Emergency Diesel Generator Cooling Water System Degradation Detailed Risk Evaluation," for a detailed review of the quantitative criteria considered in the preliminary risk determination.

The NRC team did not assign a cross-cutting aspect to this finding because the performance deficiency occurred in May 2000. Entergy's program has undergone changes since May 2000, and the NRC team did not identify any recent examples of this performance deficiency. Other aspects of Entergy's performance related to this issue are further discussed in Sections 5.10.3 and 6.3.4. (Section 6.7.4.1)

- Green. The NRC team identified a Green non-cited violation of 10 CFR 50.65(a)(2), "Requirements for monitoring the effectiveness of maintenance at nuclear power plants." Specifically, Entergy did not demonstrate that the performance of 18 maintenance rule scoped components was effectively controlled through the performance of appropriate preventive maintenance, and did not establish goals and monitoring in accordance with 10 CFR 50.65(a)(1). Entergy's immediate corrective action was to initiate a CR to evaluate moving the affected systems to 10 CFR 50.65(a)(1) monitoring requirements. Entergy entered this issue in the corrective action program as CR-PNP-2017-00401.

  The performance deficiency was more than minor because it was associated with the equipment performance attribute of the Mitigating Systems cornerstone and affected the cornerstone objective to ensure availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, Entergy failed to demonstrate that the performance of the 18 maintenance rule scoped components was being effectively controlled through the performance of appropriate preventive maintenance which adversely impacts the reliability of those systems. The NRC team evaluated the finding using Exhibit 2, "Mitigating Systems Screening Questions," of IMC 0609, Appendix A, "Significance Determination Process for Findings At-Power," and determined this finding did not affect the design or qualification of a mitigating structure, system, or component; represent a loss of system and/or function; involve an actual loss of function of at least a single train or two separate safety systems for greater than its technical specification-allowed outage time; or represent an actual loss of function of one or more non-technical specification trains of equipment designated as high safety-significant. Therefore, the NRC team determined the finding was of very low safety significance (Green). The finding had a cross-cutting aspect in the area of Problem Identification and Resolution, Evaluation, in that Entergy failed to thoroughly evaluate and ensure that resolution of the identified issue, maintenance not being performed on maintenance rule scoped components, included reclassifying the components as necessary. Specifically, Entergy failed to demonstrate that the performance of 18 maintenance rule scoped components was effectively controlled

through the performance of appropriate preventive maintenance, or through performance goals and monitoring. [P.2]. (Section 6.9.4.1)

- Green. The NRC team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," because Entergy did not take timely corrective action for a previously identified condition adverse to quality. Specifically, Entergy failed to adequately resolve, through repair or adequate evaluation, gasket leakage on the 'B' residual heat removal heat exchanger, which resulted in continued degradation and leakage for the heat exchanger gasket. Entergy did not consider this leakage as a degraded condition, with the potential to impact both the operability of the residual heat removal system, and PNPS's licensing basis with regards to leakage of a closed loop system outside of containment. After the NRC team raised the issue, Entergy performed an operability determination that established a reasonable expectation of operability pending implementation of corrective actions. Entergy entered this issue into their corrective action program as CR-PNP-2016-09725.

  The performance deficiency was more than minor because it is associated with the equipment performance attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective to ensure availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to correct identified gasket leakage resulted in continued degradation and leakage of the heat exchanger gasket. The NRC team evaluated the finding using Exhibit 2, "Mitigating Systems Screening Questions," of IMC 0609, Appendix A, "Significance Determination Process for Findings At-Power," and determined this finding did not affect the design or qualification of a mitigating structure, system, or component; represent a loss of system and/or function; involve an actual loss of function of at least a single train or two separate safety systems for greater than its technical specification-allowed outage time; or represent an actual loss of function of one or more non-technical specification trains of equipment designated as high safety-significant. Therefore, the NRC team determined the finding was of very low safety significance (Green). The finding had a cross-cutting aspect in Human Performance, Conservative Bias, because Entergy failed to use decision making practices that emphasize prudent choices over those that are simply allowable [H.14]. (Section 6.9.4.3)

- Green. The NRC team identified a Green finding because Entergy did not adequately develop and implement a CAPR of a root cause related to a Category 'A' CR, as required by Entergy Procedure EN-LI-102, "Corrective Action Program." Specifically, Entergy did not adequately develop and implement the Targeted Performance Improvement Plans, which were designated as a CAPR for the root cause for the Nuclear Safety Culture Fundamental Problem. Entergy documented this issue in the corrective action program for further evaluation as CR-PNP-2017-00406.

  The performance deficiency was more than minor because if left uncorrected, it could lead to a more significant safety concern. Specifically, inadequate implementation of the Targeted Performance Improvement Plans could result in recurrence of a culture in which leaders are not holding themselves and their subordinates accountable to high standards of performance, resulting in continuing performance issues at the station. The NRC team evaluated the finding using Exhibit 2, "Mitigating Systems Screening Questions," of IMC 0609, Appendix A, "Significance Determination Process for Findings At-Power," and determined this finding did not affect the design or qualification of a mitigating structure, system, or component; represent a loss of system and/or function; involve an actual loss of

function of at least a single train or two separate safety systems for greater than its technical specification-allowed outage time; or represent an actual loss of function of one or more non-technical specification trains of equipment designated as high safety-significant. Therefore, the NRC team determined the finding was of very low safety significance (Green). This finding had a cross-cutting aspect in the area of Human Resources, Change Management, because leaders did not use a systematic process for evaluating and implementing change so that nuclear safety remains the overriding priority. In this case, PNPS leaders did not apply sufficient rigor in development and implementation of the Targeted Performance Improvement Plans such that they would be an adequate method to drive and sustain positive changes in the station's safety culture [H.3]. (Section 7.1.4)

Cornerstone: Barrier Integrity

- Green. The NRC team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," associated with Entergy's failure to correct a condition adverse to quality affecting safety-related equipment. Specifically, during a previous NRC inspection in August 2016, inspectors identified numerous locations in the drywell where non-seismic equipment was either in contact, or close proximity, with the drywell liner and had caused damage. Entergy initiated CRs and performed an operability evaluation for the identified issues. However, following a review of these CRs, the NRC team determined that Entergy failed to take corrective actions to address the condition adverse to quality. Entergy entered this issue into the corrective action program as CR-PNP-2016-09346 and CR-PNP-2016-09377 to perform an extent of condition review, secure the loose grating that had caused damage to the liner, and evaluate the need for a clearance criteria between components such as floor grating and support structures and the containment liner.

  The performance deficiency was more than minor because it was associated with the configuration control attribute of the Barrier Integrity cornerstone and affected the cornerstone objective to provide reasonable assurance that physical design barriers (fuel cladding, reactor coolant system, and containment) protect the public from radionuclide releases caused by accidents or events. Using IMC 0609, Appendix A, "The Significance Determination Process for Findings At-Power," Exhibit 3, "Barrier Integrity Screening Questions," the NRC team determined that this finding was of very low safety significance (Green) because the finding did not represent an actual open pathway in the physical integrity of reactor containment (valves, airlocks, etc.), containment isolation system (logic and instrumentation), and heat removal components. This finding had a cross-cutting aspect in the area of Problem Identification and Resolution, Evaluation, because the engineering evaluation of the degraded condition identified by the inspectors did not thoroughly evaluate the containment liner issues to ensure that resolutions address causes and extents of condition commensurate with their safety significance [P.2]. (Section 6.9.4.2)

Other Findings

- Severity Level IV. The NRC team identified a Severity Level IV non-cited violation of 10 CFR 50.73, "Licensee Event Report System," associated with Entergy's failure to submit a licensee event report within 60 days following discovery of an event meeting the reportability criteria. Specifically, on September 28, 2016, Entergy identified the 'A' emergency diesel generator was inoperable. The NRC team determined that the condition was prohibited by technical specifications and the inoperability of the 'A' emergency diesel generator existed for a period of time longer than allowed by Technical Specification 3.5.F, "Core and

Containment Cooling Systems." This was also reportable as a safety system functional failure. Entergy entered this issue into the corrective action program as CR-PNP-2016-09552.

Because this performance deficiency had the potential to impact the NRC's ability to perform its regulatory function, the NRC team evaluated the performance deficiency using traditional enforcement. The violation was evaluated using Section 2.3.11 of the NRC Enforcement Policy, because the failure to submit a required licensee event report may impact the ability of the NRC to perform its regulatory oversight function. In accordance with Section 6.9.d, Example 9, of the NRC Enforcement Policy, this violation was determined to be a Severity Level IV non-cited violation. Because this violation involves the traditional enforcement process and does not have an underlying technical violation, the NRC team did not assign a cross-cutting aspect to this violation, in accordance with IMC 0612, Appendix B. (Section 6.7.4.2)

Licensee-Identified Violations

Violations of very low safety significance that were identified by Entergy have been reviewed by the NRC. Corrective actions taken or planned by Entergy have been entered into the station's corrective action program. These violations and corrective action tracking numbers are listed in Section 9 of this report.

REPORT DETAILS

1. Performance History

PNPS transitioned into the Repetitive Degraded Cornerstone Column (Column 4) of the Reactor Oversight Process Action Matrix as of the first quarter of 2015. This resulted from issuance of a White finding under the Mitigating Systems cornerstone while PNPS was already in the Degraded Cornerstone Column (Column 3) for more than five consecutive quarters due to two open White inputs (unplanned scrams and unplanned scrams with complications) under the Initiating Events cornerstone. In IP 95002 Supplemental Inspection Report 05000293/2014008 (ML15026A069), dated January 26, 2015, the NRC noted that PNPS did not adequately evaluate the causes and take or plan timely corrective actions to address the issues associated with a high number of unplanned scrams, some of which were complicated, which occurred in 2013. As a result, the two White inputs under the Initiating Events cornerstone remained open for greater than five consecutive quarters, and were in effect when the new White finding was identified during a special inspection team exit on March 20, 2015.

On January 27, 2015, PNPS experienced a partial LOOP during a winter storm. This resulted in an automatic reactor scram that was complicated by several equipment problems. The NRC dispatched a six-person special inspection team to the station on February 2, 2015, to review Entergy's organizational and operator response to the event, equipment response, and causes of the event. On March 20, 2015, the special inspection team conducted an exit meeting with Entergy management to discuss the results of the inspection, including a preliminary White finding related to SRV performance. The results of this special inspection are documented in NRC inspection report 05000293/2015007, issued on May 27, 2015 (ML15147A412).

On September 1, 2015, the NRC issued the final significance determination for the White finding (ML15230A217). The White finding was associated with a violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," in that Entergy did not identify, evaluate, and correct a significant condition adverse to quality associated with the 'A' SRV. Entergy did not identify, evaluate, and correct the 'A' SRV's failure to open upon manual actuation during a plant cool-down on February 9, 2013, following a LOOP event caused by a winter storm. The failure to take actions to preclude repetition resulted in the 'C' SRV failing to open due to a similar cause following a January 27, 2015, LOOP event also caused by a winter storm. The NRC determined that the 'A' SRV had been inoperable for a period greater than the technical specification allowed outage time of 14 days.

The NRC closed the two White inputs under the Initiating Events cornerstone on June 30, 2015, due to successful completion of the IP 95002 follow-up inspection (ML15169A946). The NRC reviewed the White SRV finding as part of the IP 95003 Phase 'C' inspection. The results of that review are documented in Section 4 of this inspection report.

2. Licensee Site Recovery and Comprehensive Recovery Plan

In response to the station's transition to Column 4 of the Action Matrix, Entergy implemented a diagnostic recovery process to determine what corrective actions would be needed to improve performance at the station. This recovery process was similar to that implemented at another Entergy site, Arkansas Nuclear One (ANO). Entergy's recovery process consisted of four phases: assessment phase, analysis phase, action plan development, and implementation phase.

Assessment Phase

This phase resulted in development of assessment reports and problem descriptions to be analyzed. Activities performed during the assessment phase included:

- A comparative assessment review to determine whether weaknesses similar to the fundamental problems and problem areas identified during the ANO NRC IP 95003 Recovery Process were also present at PNPS during the investigation period and may have contributed to the station's performance decline.

- A review of the station's identification, assessment, and resolution of performance deficiencies, which included assessment of previous root cause evaluations and associated corrective actions; the process for allocating resources with respect to safety and compliance, backlog management, and the reduction of workarounds; and the corrective action program.

- A review of the adequacy of programs and processes associated with human performance, procedure quality, and equipment performance.

- Third-Party Nuclear Safety Culture Assessments conducted in 2015 and March 2016. Entergy considered the results of the 2015 assessment for PNPS during the collective evaluation process. The results of the 2016 assessment were analyzed for potential additional problem descriptions.

- Review of the root cause evaluation for the White finding related to the 'A' SRV. This root cause was undergoing further evaluation during the collective evaluation process. The outcomes and corrective actions associated with the most recent revision to this root cause evaluation are included in Entergy's Comprehensive Recovery Plan.

Each assessment resulted in problems that were categorized as "negative observations" and/or "standards performance deficiencies." These assessment results were then binned into broader "standards performance deficiency rollups," and ultimately into "problem descriptions."

Analysis Phase

The analysis phase involved two steps – collective evaluation and cause analysis. The collective evaluation analyzed the Assessment Phase results for patterns, trends, or groupings to identify the major problem areas driving performance issues at PNPS. Once the major problems were identified, an analysis was performed to determine the relationship between the problems. The problems that caused other problems (i.e., "drivers") were designated as "fundamental problems." Problems that were caused by the fundamental problems (i.e., "driven") were designated as "problem areas."

PNPS's Collective Evaluation Report documented three fundamental problems, and six problem areas:

Fundamental Problems	Problem Areas
• Corrective Action Program • Nuclear Safety Culture • Risk Mitigation and Decision-Making	• Equipment Reliability • Engineering Programs • Procedure Quality • Procedure Use and Adherence • Work Management • Industrial Safety

The station performed root cause evaluations on all of the fundamental problems, as well as the equipment reliability problem area. The remaining problem areas received apparent cause evaluations. Though classified as a problem area, the station performed a root cause analysis for equipment reliability since this area was a major factor in the issues that resulted in the station's entry into Column 4. Based on the results of these cause evaluations, Entergy developed corrective actions to preclude repetition and/or other actions to address each area.

During the collective evaluation process, two problem descriptions did not roll-up into any of the fundamental problems or problem areas: "operability determinations and functionality assessments," and "design engineering and licensing basis." Entergy conducted an apparent cause evaluation on a problem description related to operability determinations and functionality assessments. Issues related to the design and licensing basis problem description are captured in the station's corrective action program under CR-PNP-2016-01476, CR-PNP-2016-01477, CR-PNP-2016-02483, and CR-PNP-2016-02484.

Action Plan Development

Entergy reviewed all the corrective and improvement actions developed during their recovery process, and then screened and organized the actions into the Comprehensive Recovery Plan. The Comprehensive Recovery Plan is divided into six improvement areas, and their associated area action plans, as described in the table below:

Improvement Area	Area Action Plan
Corrective Action Program	Corrective Action Program
	SRV White Finding
Human Performance	Industrial Safety
	Procedure Use and Adherence
Equipment Performance	Engineering Programs
	Equipment Reliability
	Work Management
Leadership	Risk and Decision-Making
Procedure Quality	Procedure Quality
	Operability Determinations and Functionality Assessments
Nuclear Safety Culture	Nuclear Safety Culture, including the Independent Nuclear Safety Culture Assessment Report Actions

Each area action plan included corrective actions, as well as effectiveness measures that Entergy established to ensure that the Comprehensive Recovery Plan was achieving desired outcomes in each area. Entergy was tracking and implementing Comprehensive Recovery Plan actions through the station's corrective action program.

3. NRC Methodology and Diagnostic Assessment

3.1 Inspection Objectives

The intent of this inspection was to provide the NRC a comprehensive understanding of the depth and breadth of safety, organizational, and performance issues at PNPS, and, where data indicated, the potential for a more serious performance decline. The objectives of this inspection were to:

- Provide timely additional information to be used by the NRC in deciding whether continued operation of the facility is acceptable and whether additional regulatory actions are necessary to arrest declining plant performance.
- Provide an independent assessment of risk significant issues to aid in the determination of whether an unacceptable margin of safety exists.
- Independently assess the adequacy of programs and processes used by Entergy to identify, evaluate, and correct performance issues.
- Independently evaluate and assess the adequacy of programs and processes in the affected strategic performance areas.
- Provide insight into the overall root and contributing causes of identified performance deficiencies.
- Evaluate Entergy's third-party safety culture assessment and conduct a graded assessment of PNPS's safety culture based on the results of the evaluation.

3.2 Inspection Scope

The NRC outlined the scope for this inspection in the 2015 PNPS mid-cycle assessment letter, dated September 1, 2015 (ML15243A259). Based on the persistent corrective action program weaknesses that resulted in PNPS's entry into the Repetitive Degraded Cornerstone (Column 4), this IP 95003 supplemental inspection focused on PNPS's corrective action program (IP 95003 Section 02.02) and safety culture assessment (IP 95003 Sections 02.07 – 02.09). Based on evaluation of inputs into the Action Matrix, the reactor safety strategic performance area portion of the inspection focused on the key attributes of human performance (IP 95003 Section 02.03c), procedure quality (IP 95003 Section 02.03d), and equipment performance (IP 95003 Section 02.03e).

Additionally, because the NRC had not completed the supplemental inspection for the White finding related to the SRVs prior to the Phase 'C' inspection, the scope of this inspection included a review of that issue, using IP 95001, "Supplemental Inspection Response to Action Matrix Column 2 Inputs." The results of that review are documented in Section 4 of this inspection report.

3.3 Inspection Approach

The NRC implemented a phased approach to complete the IP 95003 inspection requirements at PNPS. The NRC chose a phased approach, in combination with

informed baseline inspection samples, to allow the Agency to monitor Entergy's recovery efforts, and to determine whether there was any further degradation in plant performance that would require additional regulatory action to mitigate. A description of NRC follow-up activities completed since PNPS's transition into Column 4 of the Action Matrix are included in Section 4OA5 of each of the PNPS quarterly resident integrated inspection reports[3].

The NRC completed the Phase 'A' portion of this supplemental inspection on January 15, 2016. The purpose of this phase was to review aspects of PNPS's corrective action program and to determine whether continued operation of PNPS was acceptable and if additional regulatory actions were necessary to arrest declining plant performance. The results of the Phase 'A' inspection are documented in NRC Inspection Report 05000293/2016008 (ML16060A018). The Phase 'B' inspection reviewed PNPS's overall corrective action program performance since the last biennial problem identification and resolution inspection in August 2015. The results of the Phase 'B' inspection are documented in NRC Inspection Report 05000293/2016009 (ML16144A027). This inspection was the Phase 'C' portion of the inspection, and satisfied the remaining inspection requirements in IP 95003 for PNPS.

4. Review of White Safety/Relief Valve (SRV) Finding

4.1 Background

On January 27, 2015, PNPS was reducing reactor power, in accordance with station procedures, due to loss of one of the two 345KV offsite distribution lines during a winter storm. While at 52 percent power, operators observed a generator load reject and automatic reactor scram when the remaining 345KV offsite distribution line deenergized. Operator response to the scram was challenged by multiple equipment issues, including failure of the 'C' SRV to operate at low pressure. The NRC dispatched a special inspection team to review the event.

The special inspection team identified a White violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," in that Entergy did not identify, evaluate, and correct a significant condition adverse to quality associated with the 'A' SRV. Specifically, Entergy did not identify, evaluate, and correct the 'A' SRV's failure to open upon manual actuation during a plant cooldown on February 9, 2013, following a LOOP event caused by a winter storm. The failure to take actions to preclude repetition resulted in the 'C' SRV failing to open during the January 27, 2015, event described above. More information on this event and the White violation can be found in NRC Inspection Reports 05000293/2015007 and 05000293/2015011 (ML15147A412 and ML15230A217, respectively).

4.2 NRC Inspection Scope

IP 95003 directs that the scope of the inspection shall include inspection of Entergy's root cause, extent of cause, and extent of condition evaluations and associated corrective actions associated with the White SRV inspection finding if the associated supplemental inspection procedure has not yet been completed. During the Phase 'C'

[3] ADAMS Accession Numbers: 2015003 (ML15317A030), 2015004 (ML16042A327), 2016001 (ML16133A433), 2016002 (ML16223A529), 2016003 (ML16319A206), 2016004 (ML17045A524)

inspection, the NRC team reviewed this issue in accordance with IP 95001, "Supplemental Inspection Response to Action Matrix Column 2 Inputs." The objectives of this inspection were to:

- Assure that the root causes and contributing causes of the significant performance issues are understood
- Independently assess and assure that the extent of condition and extent of cause of significant performance issues are identified
- Assure that corrective actions taken to address and preclude repetition of significant performance issues are prompt and effective
- Assure that corrective action plans direct prompt actions to effectively address and preclude repetition of significant performance issues

The NRC team reviewed causal evaluations, procedures, and other documents which supported Entergy's evaluation of and actions to address the White finding, including:

- CR-PNP-2013-00825: CR documenting SRV 'A' performance information from the February 2013 event
- CR-PNP-2015-00561: Equipment apparent cause evaluation associated with the failure of SRV 'C' to fully open during manual operation
- CR-PNP-2015-01520: CR associated with testing and disassembly of SRV 'A'
- CR-PNP-2015-01983: Apparent cause evaluation associated with failure of SRV 'A' to fully open at low pressure
- CR-PNP-2015-05533: Root cause evaluation associated with the failure to identify, evaluate, and correct the 'A' SRV failure to fully open during manual operation at low pressure
- CR-PNP-2015-05827: Root cause evaluation associated with the failure of SRV 'C' to fully open during manual operation
- CR-PNP-2016-01621: Root cause evaluation associated with the failure to classify the 'A' SRV as inoperable

The NRC team reviewed corrective actions, both completed and planned, to address the identified causes, extent of condition, and extent of cause. The NRC team interviewed Entergy personnel to ensure that the root and contributing causes and the contribution of safety culture components were understood, and corrective actions taken or planned were appropriate to address the causes and preclude repetition. These interviews included the reactor operators and senior reactor operators involved in the 2013 and 2015 events where the 'A' and 'C' SRVs did not operate as required. The NRC team also conducted in-plant walkdowns, including independent inspections of the control room and simulator control room.

At the time of the inspection, root cause evaluation CR-PNP-2016-01621, Revision 2, was the most recent evaluation addressing Entergy's failure to identify, evaluate, and correct the 'A' SRV's failure to open upon manual actuation during a plant cooldown on February 9, 2013. Unless otherwise noted, this is the revision discussed in this section.

4.3 Problem Identification (IP 95001, Section 02.01)

a. *IP 95001, Section 02.01a, requires that the inspection staff determine that Entergy's evaluation of the issue documents who identified the issue (i.e., licensee-identified, self-revealing, or NRC-identified) and under what conditions the issue was identified.*

The following was excerpted from root cause evaluation CR-PNP-2016-01621:

> This was a self-revealing event. In 2015, Winter Storm JUNO led to a load reject and reactor scram. In support of the plant shutdown and cool down, safety relief valve 'C' failed to open with manual actuation at low reactor pressure. A later 2015 inspection of the 'C' valve revealed fretting in the main piston guide causing friction on the main valve piston. The extent of condition review concluded that safety relief valve 'A' did not open on demand during the 2013 NEMO storm and it was concluded that the valve was inoperable since that time.

The NRC team determined that Entergy's root cause evaluation adequately documented that this was a self-revealing issue, and outlined the conditions under which the issue was identified.

b. *IP 95001, Section 02.01b, requires that the inspection staff determine that Entergy's evaluation of the issue documents how long the issue existed and prior opportunities for identification.*

Entergy's root cause evaluation CR-PNP-2016-01621 stated, "On March 12, 2015, as the result of an extent of condition from SRV 'C' failure to open, it was identified that SRV 'A' had also failed to open on February 9, 2013, going undetected for 25 months." The root cause evaluation also documented prior opportunities for the station to identify the issue, including:

- On February 9, 2013, the issue with SRV 'A' was not logged, a CR was not initially documented, and additional operations expectations for shift turnover, communication, and control room presence were not met.

- On February 11, 2013, a work request was prepared that included the incorrect conclusion, "Tail pipe temperature indicated valve was open," which resulted in the creation of a work order to resolve SRV 'A' acoustic monitor issues, rather than a work order to evaluate SRV 'A' performance.

- On February 11, 2013, the senior reactor operator that prepared the immediate operability determination for CR-PNP-2013-00825 did not adequately utilize steam tables to verify that SRV 'A' did not open on demand.

- On February 11, 2013, the shift manager did not perform a rigorous review of the immediate operability determination for CR-PNP-2013-00825 prior to approval.

- On February 13, 2013, the Condition Review Group did not create an additional action to evaluate performance of SRV 'A'.

- On February 13, 2013, the responsible manager assigned to CR-PNP-2013-00825 did not create an additional action to evaluate performance of SRV 'A'.

- On February 13, 2013, the engineer assigned to CR-PNP-2013-00825 did not determine and document whether the acoustic monitor had worked prior to closing the corrective action concluding the issue was resolved.

- On February 13, 2013, the post-trip review team did not identify that SRV 'A' failed to open, and additional subsequent post-trip review package reviews did not identify the SRV 'A' deficiency.

Overall, the NRC team determined that Entergy's root cause evaluation adequately documented how long the issue existed and the multiple missed opportunities to identify that the 'A' SRV had not opened on February 9, 2013.

c. *IP 95001, Section 02.01c, requires that the inspection staff determine that Entergy's evaluation documented significant plant-specific consequences, as applicable, and compliance concerns associated with the issue(s).*

The following is excerpted from root cause evaluation CR-PNP-2016-01621:

> The actual consequences as stated in the problem statement were SRV 'A' was inoperable for an extended period of time and a similar failure of SRV 'C' in January 2015 was not prevented. There were no actual consequences to general safety of the public, nuclear safety, industrial safety and radiological safety of this event… Based on the risk analysis by the NRC and Entergy the risk was identified as moderate (White) as documented in the final significance determination.

The root cause evaluation also summarized causal factors and compliance concerns associated with the issues. These causal factors included: (1) non-compliance with procedures; (2) insufficient knowledge and skill; (3) inadequate oversight by the operability determination approver and post-trip review approvers; (4) inadequate information path; (5) lack of individual rigor; (6) lack of individual accountability; (7) lack of managerial accountability; (8) inadequate maintenance practices; and (9) lack of operations and control room oversight.

Overall, the NRC team determined that Entergy's evaluation adequately documented significant plant-specific consequences, as applicable, and compliance concerns associated with the issues.

4.4 Root Cause, Extent of Condition, and Extent of Cause Evaluation (IP 95001, Section 02.02)

a. *IP 95001, Section 02.02a, requires that the inspection staff determine that the problem was evaluated using a systematic methodology to identify the root and contributing causes.*

The NRC team noted that Entergy's evaluation of this issue required multiple cause evaluations. Root cause evaluation CR-PNP-2015-05533, Revision 1, completed on November 12, 2015, initially determined that the root cause was a lack of leadership intrusiveness, due to valuing results over behaviors, which led to the PNPS engineering, maintenance, and operations departments failing to use systematic processes to evaluate the anomalous operation of the 'A' SRV. Because significant flaws were found in this root cause evaluation during the recovery process, Entergy initiated CR-PNP-2016-01621 on March 4, 2016, and conducted another root cause evaluation of the issue.

Entergy used the following systematic methods to determine the causes and corrective actions for root cause evaluation CR-PNP-2016-01621: Event & Causal Factor Charting, Barrier Analysis, Why Staircase, Comparative Timeline, Organizational & Programmatic Evaluation, and Management Oversight and Risk Tree analysis. Entergy also performed document reviews, interviews, observations, internal reviews, and external reviews. Entergy identified the direct cause, two root causes, and three contributing causes in CR-PNP-2016-01621:

- Direct Cause: Maintenance, engineering, operations, and Condition Review Group personnel focused evaluation and correction activities on the acoustic monitor for SRV 'A' instead of the valve because information in CR-PNP-2013-00825 was incomplete.

- Root Cause 1: Operations managers did not provide effective reinforcement to the operations department of the standards and expectations for the conduct of operations that apply during plant transient conditions.

- Root Cause 2: PNPS personnel practiced insufficient accountability and rigor during performance of the Post-Trip Review Preliminary Safety Assessment for the station scram in February 2013.

- Contributing Cause 1: Licensed operator fundamental training was ineffective in providing the necessary knowledge to properly interpret steam tables.

- Contributing Cause 2: PNPS management oversight failed to ensure corrective action and operability determination processes were implemented as required.

- Contributing Cause 3: Instrumentation & Control maintenance personnel failed to conduct work on SRV 'A' acoustic monitor in accordance with the approved work document.

The NRC team determined that Entergy generally used a systematic methodology to identify the root and contributing causes. However, during this review, the NRC team

determined that root cause evaluation CR-PNP-2016-01621 did not have stand-alone quality, as specified in Entergy procedure EN-LI-118-PNP-RC, "95003 Root Cause Evaluation Process," Section 5.2, which stated that "cause evaluation reports will have stand-alone quality by presenting facts and other data to clearly support the causes determined and that specified corrective actions will address the causes." Specifically, root cause evaluation CR-PNP-2016-01621 did not include a review of the mechanical failure mechanism of SRV 'A'. Entergy noted that an apparent cause evaluation on the mechanical aspects of the SRV 'A' issues, CR-PNP-2015-01983, and a root cause evaluation on the mechanical aspects of the SRV 'A' issues, CR-PNP-2015-05827, had already been performed to adequately resolve these aspects of SRV performance. The NRC team reviewed these cause evaluations and determined that neither of the cause evaluations, nor any other cause evaluation, was specifically completed at the root cause level to address the hardware issues associated with SRV 'A'. Rather, Entergy discussed the mechanical aspects of the SRV 'A' failure in an extent of condition review in CR-PNP-2015-05827. CR-PNP-2015-05827 stated that both SRV 'A' and SRV 'C' exhibited rolled threads (indicative of an excessive impact force being applied) and shortened main stage spring lengths. Though not performing a root cause evaluation on the SRV 'A' hardware aspects could represent a missed opportunity to identify other issues with SRV performance, the NRC team determined that this would likely have had minimal impact on the results of root cause evaluation CR-PNP-2016-01621, which focused on why the station failed to identify that the 'A' SRV did not open in 2013. Additionally, all of these three-stage SRVs were removed and replaced with two-stage valves in May 2015 that are not considered susceptible to the failure mechanism associated with the 'A' and 'C' SRV failures in 2013 and 2015. Entergy documented this issue in CR-PNP-2017-00828.

b. *IP 95001, Section 02.02b, requires that the inspection staff determine that the root cause evaluation was conducted to a level of detail commensurate with the significance of the problem.*

The NRC team noted multiple issues in root cause evaluation CR-PNP-2016-01621. The following examples associated with the root cause methodologies utilized by Entergy illustrate incorrect conclusions, incorrect assumptions, inadequate rationale for ruling out alternative possible root causes, and the extent to which the incorrect conclusions and assumptions impacted the root cause evaluation, and its overall conclusions:

<u>"Why Staircase" Methodology</u>

In root cause evaluation CR-PNP-2016-01621, Entergy's "Staircase 2: Operability Determination Process" analysis began with the question: "Why did the operability determination performed by control room supervisor #2 (and approved by shift manager #2) conclude that SRV 'A' opened?" Entergy's response to this "Why Staircase" question included, "Because the licensed operators believed SRV 'A' opened based on tailpipe temperature rise from 130 to 220 and believed the acoustic monitor did not function properly."

This conclusion was not consistent with the station's interviews nor the NRC team's interviews. Specifically, Entergy's interview records (documented in CR-PNP-2016-01621) indicated that the reactor operator involved in the event knew that SRV-3A did

not open. Additionally, the interview records indicate that the control room supervisor suspected that there was an issue with SRV-3A and had notified the shift manager.

The control room supervisor indicated to the NRC team that a CR had not been initially written on February 9, 2013, following the event. Subsequently, the control room supervisor submitted CR-PNP-2013-00825 on February 11, 2013. The following was excerpted from the condition description of CR-PNP-2013-00825:

> During plant cooldown, when reactor pressure was about 100 psig, SRV 'A' did not register on the acoustic monitor when its switch was taken to OPEN. Cooldown was accomplished using HPCI in pressure control. Tailpipe temperature did show an increase to about 220 [degrees] F.

The immediate action description of the CR stated, "SRV 'C' & 'D' were used since they did show a change on the acoustic monitor," and the suggested action description of the CR stated, "Evaluate performance of the SRV 'A'." Based on the information available in CR-PNP-2013-00825 and the interview results discussed above, the NRC team did not agree with Entergy's conclusion that the licensed operators believed that 'A' SRV had opened based on the tailpipe temperature and that the acoustic monitor had functioned improperly.

The NRC team also assessed whether Entergy's root cause evaluation incorrectly ruled out alternative possible root causes due to the error in "Staircase 2: Operability Determination Process." The following was excerpted from CR-PNP-2016-01621:

> The why staircase determined that the cause of the incorrect Operability Determination related to SRV 'A' was due to Training organization deficiencies in existence at the time and the operator performance relative to Operability Determinations reflected these Training weaknesses and resulted in a weakness in Operator [Fundamentals].

The NRC team determined that this conclusion was not supported by the station's interviews or the NRC team's interviews. The immediate operability determination for CR-PNP-2013-00825, performed by a different control room supervisor than was involved in the February 9, 2013, event, stated, "No Degraded or Nonconforming Condition exists…The tailpipe thermocouple indicated the SRV was open based on vessel saturation temperatures. SRV surveillance instrumentation for RV-203-3A are operable." The NRC team reviewed Entergy's interview records with the operations personnel involved in the February 2013 event, and recognized that the control room supervisor that drafted the immediate operability determination demonstrated training weaknesses that resulted in a weakness in operator fundamentals. Specifically, the control room supervisor used the steam tables for the operability determination and incorrectly concluded that SRV 'A' had opened.

However, the NRC team determined that the shift manager that approved the immediate operability evaluation did not exhibit the same training weaknesses as the control room supervisor. The shift manager indicated to the NRC team in interviews that he/she had reviewed the operability determination, but had not specifically explored the statement, "The tailpipe thermocouple indicated the SRV was open based on vessel saturation temperatures." The shift manager also indicated that there was "extensive…training on the 3-stage safety relief valves." Both Entergy's interviews and the NRC team's

interviews with the shift manager that approved the operability determination support the NRC team's conclusion that the shift manager possessed adequate training and knowledge to ensure an adequate operability determination was completed. The cause of the incorrect and inadequate operability determination related to SRV 'A' was associated with inadequate shift manager review rigor and any causal factors that impact the shift manager's ability to complete rigorous reviews of operability determinations.

Barrier Analysis Methodology

The barrier analysis for root cause evaluation CR-PNP-2016-01621 attempted to identify causal factors that allowed the events to occur because barriers were ineffective, weak, or missing. The causal factors were then combined into contributing and root causes or used as supporting examples. Entergy identified the following as ineffective barriers, as excerpted from CR-PNP-2016-01621:

- Operator Fundamentals (Log Keeping)
- Operability Determination Process
- Corrective Action Program (CR Initiation Level of Detail)
- Corrective Action Program (Timeliness of CR Initiation)
- Post-Trip Review
- Conduct of Operations (Control Room and Operations and Operations Administrative Policies and Processes)
- Maintenance Fundamentals

Entergy concluded that the operability determination process barrier was ineffective because of a knowledge gap. However, though a portion of the barrier analysis stated that the shift manager trusted the control room supervisor's operability evaluation, Entergy did not cite shift manager operability determination review rigor as one of the reasons for the ineffective operability determination process barrier. As previously described, the NRC team concluded that the shift manager possessed adequate training and knowledge to ensure an adequate operability determination was completed, and inadequate shift manager review rigor (and any associated causal factors) contributed to this barrier being ineffective.

Entergy stated that the corrective action program barrier was ineffective because the details in CR-PNP-2013-00825 were inadequate to clearly define the condition. The following information was excerpted from Entergy CR-PNP-2013-00825:

> During plant cooldown, when reactor pressure was about 100 psig, SRV A did not register on the acoustic monitor when its switch was taken to OPEN. Cooldown was accomplished using HPCI in pressure control. Tailpipe temperature did show an increase to about 220 [degrees] F.

The NRC team agreed that the timeliness for issuing CR-PNP-2013-00825 did not meet Entergy's corrective action program expectations. The NRC team also agreed that additional information could have been included when CR-PNP-2013-00825 was written. However, given the values included for reactor pressure and tailpipe temperature, a knowledgeable senior reactor operator, like the shift manager, would be expected to effectively utilize steam tables or sufficiently challenge an inadequate operability

determination and determine that the tailpipe thermocouple indicated SRV 'A' had not opened based on vessel saturation temperatures. Additionally, the "Suggested Action Description" section of CR-PNP-2013-00825 stated, "Evaluate performance of SRV A." Hence, the NRC team concluded that though the timeliness of CR-PNP-2013-00825 did not meet corrective action program expectations, the details that were provided were adequate to initiate an appropriately rigorous operability determination review to identify the condition. As a result, the NRC team disagreed with Entergy's conclusion that the barrier associated with the CR-PNP-2013-00825 "Barrier Analysis Worksheet 3 Corrective Action Process" was ineffective.

With respect to the maintenance fundamentals and work management barrier, Entergy stated:

> The barrier worked as designed. The [work request] was written based on the condition report that was written on the condition of the acoustic monitor not functioning. The CR contained wording that indicated that the SRV 'A' valve had opened and this was transferred to the [work request] which resulted in the [work request/work order] being written only to address the acoustic monitor.

Based on review of the information in CR-PNP-2013-00825, the NRC team determined that there was no wording in the CR that indicated SRV 'A' had opened. The NRC team therefore concluded that the work request was written based on an interpretation or incorrect assumption associated with CR-PNP-2013-00825, versus being written on the actual condition and indications described in the CR. Hence, the NRC team disagreed that the work management and planning process barrier worked as designed, and that the work request was written based on the CR description.

Comparative Timeline Methodology

The NRC team reviewed details of the comparative timeline worksheets, and noted that Entergy's conclusion that CR-PNP-2013-00825 was inadequate adversely impacted how the causes of this event were determined. The following was excerpted from this portion of Entergy's analysis:

> How maintenance, engineering, operations and corrective action personnel reacted to the description in the CR is the direct cause (trigger) for this event. Maintenance, engineering, operations and [Condition Review Group] personnel decided to focus on the acoustic monitor, not the SRV 'A' failure to open on demand. The incomplete [CR] description is not causal because it included enough information to identify the SRV deficiency.

The NRC team agreed with the first sentence of this quotation and agreed that the CR description is not causal. However, this statement does not support the direct cause of the event, as listed in Section 4.4a. The NRC team could not reconcile how Entergy concluded that the CR description was not causal, but determined the direct cause was because information in CR-PNP-2013-00825 was incomplete.

This portion of Entergy's analysis also stated, "The suggested action was to evaluate performance of the SRV 'A'. That was not done. If the post-CR generation barriers

were effective, then the SRV deficiency would have been identified." This statement supported the NRC team's conclusions that the post-CR generation barriers, like the operability determination process, which included an inadequate shift manager review of CR-PNP-2013-00825, should have identified the SRV deficiency. Therefore, ineffective barriers prior to the initiation of CR-PNP-2013-00825 appear to have contributed to the event, and ineffective barriers post-initiation of CR-PNP-2013-00825 appear to be more significant causal factors.

The NRC team also reviewed work request 298475 for the SRV 'A' acoustic monitor not working during cooldown. The work request included information stating SRV 'A' was open based on tail pipe temperature. The following was excerpted from Entergy's comparative timeline worksheet:

> The inclusion of the incorrect information related to SRV 'A' opening in the additional information in the [work request] based on tail pipe temperature is not significant to the event to more clearly identify and document the condition with the SRV 'A' valve. The condition report CR-PNP 201[3]-00825 was written and included information stating that the valve had opened based on tailpipe temperature readings. Using the available CR information when generating a [work request] to make repairs is an expected behavior. If the work management or planning department would have further investigated or questioned the issue, it is very likely that the [work request] originator would have verified the additional information related to SRV 'A' opening. This would have resulted in the planning efforts to be focused on the acoustic monitor only. It is possible that questions could have been asked concerning the operation of the valve and the recommended actions to evaluate the valve could have been more pursued with the operator. This could have resulted in an opportunity to further clearly identify and document the issue with the SRV 'A' valve.

The NRC team disagreed with these conclusions and assumptions. Specifically, CR-PNP-2013-00825 did not include information stating that the valve had opened based on tailpipe temperature readings. If the work management or planning department would have further investigated or questioned the issue, the work request originator would have verified that SRV 'A' did not open. Hence, the planning efforts would not be expected to be focused on the acoustic monitor only. The NRC team determined that the work request being written to troubleshoot the acoustic monitor for SRV 'A,' as opposed to evaluating the performance of the valve, appears to be a more significant causal factor.

Management Oversight Risk Tree (MORT)

The NRC team noted that the same conclusions and assumptions regarding the adequacy of CR-PNP-2013-00825 impacted the MORT analysis as well. The following was excerpted from the "Management System Factors – Implementation" section of Entergy's MORT analysis:

> The CR generated two days later did not contain sufficient information for subsequent reviews to determine that the valve did not open. Procedure EN-LI-201, Corrective Action Process, step 5.2.2.e, at the time of the

> event stated the condition description and any supporting documentation should be in sufficient detail to provide a clear understanding of the condition. Contrary to this requirement, the CR description did not provide a clear understanding of the condition.

This contradicted another section of the MORT analysis (a4) which stated, "The CR did contain reactor pressure and tailpipe temperature information that, if reviewed with a conservative bias, would have led reviewers to conclude that the valve may not have opened."

As previously established, although the NRC team agreed that additional information could have been included when CR-PNP-2013-00825 was written, the NRC team determined that the reactor pressure and tailpipe temperature information available in CR-PNP-2013-00825 was sufficient for a knowledgeable senior reactor operator to effectively utilize steam tables and determine that SRV 'A' had not opened based on vessel saturation temperatures. Thus, the NRC team disagreed with Entergy's MORT analysis conclusion which stated, "Incomplete information in CR-PNP-2013-00825 led plant personnel and processes to focus on the acoustic monitor for SRV 'A' instead of the valve itself, and this is the Direct Cause of the event."

Entergy procedure EN-LI-118-PNP-RC, "95003 Root Cause Evaluation Process," defined the direct cause as, "The immediate human action or equipment failure mechanism that triggered an event or condition. This is not the apparent or root cause of the event." The NRC team determined that the direct cause did not appear to be fully comprehensive, and that the equipment failure mechanism associated with the 'A' SRV triggered the chain of events that resulted in the failure to identify, evaluate, and correct the significant condition adverse to quality associated with the 'A' SRV.

Based on review of the MORT analysis, the NRC team was unable to follow the rationale for ruling out the inadequate shift manager review as a possible root cause. The following was excerpted from the "Task Performance Errors" section of Entergy's MORT analysis:

> The Shift Manager that approved the operability determination performed on SRV 'A' did so without giving it an adequate review…Although the Shift Manager did provide his approval of the operability determination by signing it at the end of his shift, he stated in interviews that he did not review the operability determination in any detail…The Shift Manager did not demonstrate sufficient accountability to review the operability determination adequately, and this was a missed opportunity to determine the operability determination was flawed.

This was further supported by the "Management System Factors – Implementation" section, which indicated that the "lack of management oversight" associated with the operability determination contributed to the incorrect operability conclusion. It stated:

> The operability description included that 'The tailpipe thermocouple indicated the SRV was open based on vessel saturation temperatures.' This conclusion was incorrect based on the reactor pressure and the

> tailpipe temperature stated in the CR. Contributing to this was a lack of management oversight, which is discussed in the Services Branch of the MORT.

The NRC team reviewed the "Services" section of Entergy's MORT analysis related to the lack of management oversight. The following was excerpted from this section:

> The Shift Manager is responsible to review and approve operability determinations dispositioned on their shift. This review and approval was inadequate, as the fundamental flaws in the operability determination were not discovered. The review and approval lacked the intrusive management oversight required to ensure standards of the operability determination process were being maintained…Inadequate oversight was determined to be causal to this event, and the following Root cause is a result: Contributing Cause 2: PNPS Management oversight failed to ensure corrective action and operability determination processes were implemented as required.

The NRC team agreed that the shift manager is ultimately responsible for the conclusions of operability determinations dispositioned on his or her shift. CR-PNP-2013-00825 was placed in the corrective action program and contained sufficient information for the operability determination to conclude that SRV 'A' did not open. Though the flawed draft of the operability determination appears to have contributed to the shift manager's inadequate performance of his or her ultimate responsibility of ensuring correct operability determinations in transient and non-transient situations, the rigorous operability review was the responsibility of the shift manager.

Entergy identified failure of PNPS management oversight of the corrective action and operability determination processes as Contributing Cause 2. However, the NRC team determined that Entergy did not adequately focus on the shift manager's role as part of that oversight despite the fact that multiple cause evaluation methodologies, including the MORT analysis, identify this as an issue. As a result, the NRC team concluded that Entergy inappropriately assessed the impact of shift manager review rigor and any associated causal factors in root cause evaluation CR-PNP-2016-01621. This was further illustrated by the corrective actions developed to address this cause, which broadly address station management and ongoing operability determination issues, and do not specifically address shift manager rigor concerns.

Finally, the NRC team determined that Root Cause 1 narrowly focused on operations management actions during plant transients, even though the inadequate operability determination and inadequate review were completed two days after the plant transient condition during which SRV 'A' failed to operate.

Overall Summary

The NRC team identified the collective issues associated with the root cause methodologies as a significant weakness, such that the objectives of IP 95001 could not be satisfied. Most notably, the incorrect conclusions and assumptions related to the adequacy of information in CR-PNP-2013-00825 adversely impacted four of the cause evaluation methodologies used in root cause evaluation CR-PNP-2016-01621. Specifically, though documentation in CR-PNP-2013-00825 could have been enhanced,

the details that were provided were adequate for an appropriately rigorous operability determination review to identify that SRV 'A' did not open. This ultimately resulted in Entergy inappropriately assessing the impact of shift manager review rigor, and any associated causal factors, in root cause evaluation CR-PNP-2016-01261. This inappropriate assessment, coupled with other incorrect conclusions and assumptions in the Why Staircase, Barrier Analysis, Comparative Timeline, and MORT analyses of root cause evaluation CR-PNP-2016-01261 impacted the adequacy of the overall conclusions documented in Entergy's root cause evaluation. Entergy documented this issue, and the specific issues discussed in this section, in CR-PNP-2017-00363 and CR-PNP-2017-00828. The NRC team documented a finding associated with this issue in Section 4.7 of this report.

c. *IP 95001, Section 02.02c, requires that the inspection staff determine that the root cause evaluation included a consideration of prior occurrences of the problem and knowledge of prior operating experience.*

The CR-PNP-2016-01621 root cause evaluation documented a review of internal and external operating experience. The operating experience review ultimately identified 12 internal and 23 external operating experiences with "applicable lessons regarding inadequate evaluation and correction of issues which in some cases led to repeat issues." Additionally, CR-PNP-2016-01621 documented relevant events from February 8, 2013, through March 25, 2013.

The NRC team noted that the operating experience reviews in CR-PNP-2016-01621 did not appear to consider potentially relevant operating experience that was documented in root cause evaluation CR-PNP-2015-05827, which evaluated the event, "SRV-3C Did Not Fully Open during Manual Operation." Among the operating experience that was not considered were CR-PNP-2013-00011, CR-PNP-2013-05651, a General Electric Services Information Letter, and an NRC Information Notice.

CR-PNP-2013-00011, initiated on January 2, 2013, discusses a new SRV that failed initial steam testing at a vendor facility. The valve was disassembled and "small albrite scratches and unacceptable blemishes were found on the internal body of the valve." CR-PNP-2013-05651, initiated on August 6, 2013, discussed off-site testing of a Target Rock 3-stage SRV that resulted in the main stage failing to reclose fully after the first lift on the test stand. The valve was disassembled and "internal damage was identified to the main disc stem threads, main guide, main piston threads, and main piston rings." CR-PNP-2013-05651 also noted that similar damage to a Target Rock main stage has been reported in General Electric Services Information Letter No. 646, "Target Rock Safety Relief Valve Failure to Fully Open," dated December 20, 2002, and NRC Information Notice 2003-01, "Failure of a Boiling Water Reactor Target Rock Main Steam Safety/Relief Valve," dated January 15, 2003.

The NRC team noted that the absence of this operating experience appears to be contrary to Entergy procedure EN-LI-118-PNP-RC, "95003 Root Cause Evaluation Process." The NRC team determined this issue was minor, as failure to consider this operating experience would not have affected the conclusions of the cause evaluation. Entergy documented this issue in CR-PNP-2017-00828 in response to the NRC team's questions.

d. *IP 95001, Section 02.02d, requires that the inspection staff determine that the root cause evaluation addressed the extent of condition and the extent of cause of the problem.*

Extent of Condition

Root cause evaluation CR-PNP-2016-01621 defined the extent of condition as the extent to which other instances of failure to identify, evaluate, and correct for a same or similar significant condition adverse to quality had occurred and resulted in or could result in a repeat event. The NRC team noted that Entergy limited their extent of condition review to PNPS. Entergy's basis for this bounding condition was: "Although other stations…in the Entergy fleet have SRVs/[power operated relief valves], they are excluded from the extent review because other stations do not operate at [PNPS]." Thus, the evaluation did not include Entergy personnel at other stations or the corporate offices and consider if these personnel failed to identify, evaluate, and correct a significant condition adverse to quality associated with an SRV. During review of ANO NRC Supplemental Inspection Report 05000313/2016007 and 05000368/2016007 (ML16161B279), the NRC team noted that Entergy identified that a significant contributor to the performance problems at the station was ineffective implementation and oversight of the corrective action program. Similarly, NRC Yellow findings associated with a stator drop and flooding event at ANO identified problems with corrective action program implementation and quality, in that staff at ANO did not identify a significant condition adverse to quality. As such, the NRC team disagreed with Entergy's bases for bounding their extent of condition review to PNPS. Considering recent fleet operating experience, the NRC team did not view the work place location as a bases for assuming that Entergy personnel at other stations had not failed to identify, evaluate, and correct a significant condition adverse to quality associated with an SRV, or some other significant condition adverse to quality.

Additionally, for the review, Entergy expanded the condition beyond just SRVs to failure to identify, evaluate, and correct a significant condition adverse to quality associated with other "safety-related equipment, including important to safety equipment, and Maintenance Rule (high critical equipment)," and "plant programs/processes (Corrective Action Program, Security, Emergency Preparedness, Training, Human Performance, Industrial Safety, Operability Determinations, Operator Rounds, Work Management, Equipment Reliability, Maintenance Program, and Fire Protection)." The extent of condition review noted that the corrective action program root cause evaluation (CR-PNP-2016-00716) adequately bounded and evaluated the corrective action program extent of condition; CR-PNP-2015-05827 adequately resolved mechanical operation aspects of the SRVs; and failures to identify, evaluate, and correct significant conditions adverse to quality associated with other important to safety plant programs and processes, were known to exist.

The NRC team observed that Entergy did not document an extent of condition review related to the mechanical aspects of the 'A' SRV issue. However, the NRC team noted that the CR-PNP-2016-01621 root cause evaluation stated that all four SRVs were replaced with different style valves in spring 2015. CR-PNP-2015-05827 documented that SRV-3A and SRV-3C were replaced during a forced outage under work orders 52372900 and 00403856 on February 2, 2015, and during Refueling Outage 20, on May 15, 2015, temporary modification engineering change (EC) 44839 was implemented to replace all model 0867F 3-stage SRVs with model 7567F 2-stage valves.

In summary, the NRC team determined that there were weaknesses in Entergy's extent of condition review. Specifically, Entergy narrowly focused the extent of condition review only on PNPS personnel, and did not document an extent of condition review associated with the condition of the 'A' SRV. Entergy documented CR-PNP-2017-00828 in response to the NRC team's questions.

Extent of Cause

Root cause evaluation CR-PNP-2016-01621 evaluated the extent of cause for each of the identified root and contributing causes. This extent of cause review identified a number of additional extent of cause related corrective actions, and assessed the applicability of the root causes across disciplines and departments for different programmatic activities, human performance, and different types of equipment.

The NRC team determined that Entergy followed the EN-LI-118-PNP-RC process requirements for extent of cause evaluations. The bounding conditions for the analyses were appropriate, and the results of the extent of cause evaluation sufficiently considered other programs and processes at PNPS. As such, the NRC team determined that root cause evaluation CR-PNP-2016-01621 adequately addressed the extent of the identified causes of the problem. However, more evaluation may be needed once Entergy assesses the impacts of inadequate shift manager review rigor, and any associated causal factors, on root cause evaluation CR-PNP-2016-01621.

e. *IP 95001, Section 02.02e, requires that the inspection staff determine that the root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture traits in NUREG-2165, "Safety Culture Common Language," referenced in IMC 0310, "Aspects Within Cross-Cutting Areas."*

Revision 2 of root cause evaluation CR-PNP-2016-01621 discussed a safety culture review that was performed to determine if safety culture aspects were a root or contributing cause of the SRV White finding. Specifically, the "Safety Culture" section of Entergy's root cause evaluation identified 12 aspects that were determined to be weak and related to the root and contributing causes. Entergy's review stated, "The nuclear safety culture assessment identified weaknesses which were significant contributors to the identified direct cause, two root causes, and three contributing causes." The aspects that were identified as contributing to the root causes included: H.2, Field Presence; H.4, Teamwork; H.11, Challenge the Unknown; H.14, Conservative Bias; X.5, Leader Behaviors; and X.6, Standards. The additional aspects that were identified as contributing to the contributing and direct causes included: H.5, Work Management; H.8, Procedure Adherence; H.9, Training; P.1, Identification; P.2, Evaluation; and P.3, Resolution. Entergy determined that the identified aspects were being addressed by the corrective actions for all of the root and contributing causes.

The NRC team noted that H.10, Bases for Decisions, was not identified as an applicable aspect for Contributing Cause 2, associated with PNPS's management oversight failure to ensure corrective action and operability determination processes were implemented as required. NRC IMC 0310 describes H.10 as, "Bases for Decisions: Leaders ensure that the bases for operational and organizational decisions are communicated in a timely manner." NUREG-2165, "Safety Culture Common Language," further describes this aspect: "Leaders encourage individuals to ask questions if they do not understand the basis for operational and management decisions." The NRC team noted that the shift

manager that approved the operability determination associated with CR-PNP-2013-00825 did not adequately ask questions to understand the basis of an operational decision – the declaration of SRV 'A' as operable.

The NRC team also noted that H.13, Consistent Process, was also not identified as an applicable aspect for Contributing Cause 2. NRC IMC 0310 describes H.13 as, "Consistent Process: Individuals use a consistent systematic approach to make decisions. Risk insights are incorporated as appropriate." NUREG-2165 further describes this aspect: "Leaders take a conservative approach to decision making, particularly when information is incomplete or conditions are unusual" and "Individuals do not rationalize assumptions for the sake of completing a task." The NRC team noted that the shift manager that approved the operability determination associated with CR-PNP-2013-00825 did not take a conservative approach to decision-making when information was incomplete or conditions were unusual, and rationalized assumptions (i.e., that the operability determination that was provided for approval was sufficiently rigorous), for the sake of completing a task.

The NRC team determined that there were weaknesses in the CR-PNP-2016-01621 root cause, extent of condition, and extent of cause evaluations consideration of the safety culture traits in NUREG-2165, because the NRC team noted at least two aspects that did not appear to be properly considered to determine whether weaknesses in these safety culture components was a root cause or significant contributing cause of the performance issue. Entergy documented CR-PNP-2017-00828 in response to the NRC team's questions.

f. *IP 95001, Section 02.02f, requires that the inspection staff examine the common cause analyses for potential programmatic weaknesses in performance when a licensee has a second White input in the same cornerstone."*

The NRC team was not required to examine a common cause analyses for potential programmatic weaknesses in performance because the SRV White finding is the only White input in the Mitigating Systems cornerstone.

4.5 Corrective Actions Taken and Planned (IP 95001, Sections 02.03 and 02.04)

a. IP 95001, Sections 02.03a and 02.04a, require that the inspection staff determine that appropriate corrective actions are taken and/or planned for each root and contributing cause or that Entergy has an adequate evaluation for why no corrective actions are necessary. Section 02.04a also requires that the inspection staff determine that corrective action plans have been prioritized with consideration of significance and regulatory compliance.

The NRC team reviewed root cause evaluations CR-PNP-2015-05827 and CR-PNP-2016-01621 to assess corrective actions taken to address the causes. The following discussion is not meant to be exhaustive, but it outlines all completed CAPRs and some other notable actions taken.

CR-PNP-2015-05827 Root Cause Evaluation

Entergy determined the direct cause of SRV-3C not fully opening was, "fretting wear between the main stage piston rings and guide liner causing increased opening stroke

friction." To address this direct cause, SRV-3A and SRV-3C were replaced during a forced outage under work orders 52372900 and 00403856 on February 2, 2015, and a Standing Order was established to direct operators to continue to utilize SRVs exhibiting higher-than-normal opening friction to improve the popping action of the main disc by burnishing off observed ridges on the piston rings in the main stage.

Entergy determined the root cause of SRV-3C not fully opening was, "A Target Rock valve design defect which causes excessive opening velocity; resulting in a high impact load to the main disc stem and piston when the valve is actuated on the limited steam flow test stand." To address this root cause, PNPS implemented temporary modification EC 44839 during Refueling Outage 20, on May 15, 2015, to replace all model 0867F 3-stage SRVs with model 7567F 2-stage valves. During Refueling Outage 21 in spring 2017, Entergy indicated that they intend to replace the control assembly in the four existing 2-stage SRVs with new pilot assemblies with coated discs under work orders 00435308 ('A' SRV), 00435311 ('B' SRV), 00435314 ('C' SRV), and 00435316 ('D' SRV).

CR-PNP-2016-01621 Root Cause Evaluation

This root cause evaluation stated that actions for Root Cause 1 and Root Cause 2 will address the direct cause. To address Root Cause 1, Entergy implemented a CAPR (CR-PNP-2016-01621 CA-11) to revise the licensed operator requalification long-range training plan to include delivery of a case study and simulator-based exercise in operations continuing training for the continual reinforcement of standards and expectations for the conduct of operations during plant transient conditions – this material is to be presented on a 2-year frequency. The NRC team observed simulator training and presentation of the case study that were part of the CAPR and determined that the root cause discussed in the case study was not consistent with Root Cause 1 in CR-PNP-2016-01621. Entergy noted the NRC team's concern immediately and entered this corrective action weakness into the corrective action program as CR-PNP-2016-09647. The NRC team determined that this issue would not have significantly impacted the training provided by the case study presentation.

Entergy also implemented two additional non-CAPR actions to address Root Cause 1:

- Present a case study on the root cause to all operations management and licensed operators to reinforce the standards and expectations for the conduct of operations during transient conditions (CR-PNP-2016-01621 CA-9)

- Present a simulator-based exercise to all licensed operators that reinforces the responsibilities from EN-OP-115, "Conduct of Operations," and Procedure 1.3.34, "Operations Administrative Policies and Processes" (CR-PNP-2016-01621 CA-10)

To address Root Cause 2, Entergy implemented a CAPR (CR-PNP-2016-01621 CA-13) to revise Procedure 1.3.37, "Post-Trip Review," to add additional requirements and information like a challenge meeting, a "devil's advocate," a technical pre-job briefing, and operating experience on root cause evaluation CR-PNP-2016-01621.

This root cause evaluation also identified three contributing causes. Of note, some of the actions Entergy took to address Contributing Cause 2 included establishing an

operability determination/functionality assessment improvement action plan and establishing an industry subject matter expert operability determination/functionality assessment mentor to provide daily oversight and coaching to senior reactor operators. Other actions to address operability determination quality were recently completed in response to apparent cause evaluation CR-PNP-2016-01340. The NRC team's review and assessment of CR-PNP-2016-01340 is discussed in Section 6.3 of this report.

With respect to the identified causes, the NRC team found that Entergy generally completed or planned to complete appropriate corrective actions, including CAPRs for root causes. However, the NRC team noted that although substantial actions have been taken to address the operability determination process overall, there were not originally any corrective actions that appeared to specifically address shift manager operability determination rigor. The NRC team viewed this as a weakness considering the NRC team's conclusions regarding the importance of this cause. Entergy documented CR-PNP-2017-00828 to address these concerns. Additionally, during the inspection and as a result of the NRC team's observations, Entergy planned to take additional action to conduct operations management face-to-face conversations with shift manager-qualified individuals to reinforce the shift manager's responsibility for operability and functionality determination accuracy and rigor.

b. *IP 95001, Sections 02.03b and 02.04a, require that the inspection staff determine that corrective actions taken and/or planned have been prioritized with consideration of significance and regulatory compliance.*

With respect to the identified causes, the NRC team found that Entergy generally prioritized corrective actions taken and planned with consideration of significance and regulatory compliance.

However, the NRC team noted that none of the substantial actions that have been taken to address the operability determination process overall were CAPRs, and any re-evaluation of causes based on significant weaknesses associated with the level of detail of the CR-PNP-2016-01621 root cause evaluation could impact corrective action plan prioritization. Procedure EN-LI-118-PNP-RC, "95003 Root Cause Evaluation Process," defined a CAPR as, "An action designed to eliminate or mitigate the root cause to preclude repetition of the event." Section 5.12, "Corrective Action Plan," stated that root cause evaluations for significant conditions adverse to quality require a CAPR. Hence, any applicable corrective actions or additional corrective actions to specifically address shift manager operability determination rigor will need to be prioritized appropriately, and corrective actions planned to address any root cause revisions will also need to be prioritized appropriately. Entergy documented CR-PNP-2017-00828 in response to the NRC team's questions.

c. *IP 95001, Sections 02.03c and 02.04b, requires that the inspection staff determine that corrective actions taken and/or planned to address and preclude repetition of significant performance issues are prompt and effective.*

The CR-PNP-2015-05827 root cause evaluation identified the root cause of SRV-3C not fully opening as, "A Target Rock valve design defect which causes excessive opening velocity; resulting in a high impact load to the main disc stem and piston when the valve is actuated on the limited steam flow test stand." To address this root cause, temporary modification EC 44839 was implemented during Refueling Outage 20, on May 15, 2015,

to replace all model 0867F 3-stage SRVs with model 7567F 2-stage valves. During Refueling Outage 21 in spring 2017, Entergy indicated that they plan to replace the control assembly in the four existing 2-stage SRVs with new pilot assemblies with coated discs under work orders 00435308 (‘A’ SRV), 00435311 (‘B’ SRV), 00435314 (‘C’ SRV), and 00435316 (‘D’ SRV). The NRC team determined that these actions were timely and adequate to correct the specific hardware issues that led to the failure of the ‘A’ and ‘C’ SRVs.

With respect to the causes identified in CR-PNP-2016-01621, the NRC team determined that these actions were generally timely to correct the identified issues, and the planned actions to preclude repetition appeared effective and timely if implemented in accordance with scheduled dates. The NRC team did note, however, that new planned corrective actions to conduct operations management face-to-face conversations with shift manager qualified individuals to reinforce the shift manager’s responsibility for operability and functionality determination accuracy and rigor need to be completed promptly, commensurate with their significance. Entergy documented this observation in CR-PNP-2017-00828. The NRC team also noted that any re-evaluation of causes based on significant weaknesses associated with the level of detail of the CR-PNP-2016-01621 root cause evaluation, could necessitate additional actions, which would need to be completed promptly, to effectively address and preclude repetition of any new identified performance issues.

d. *IP 95001, Section 02.04c, requires that the inspection staff determine that the appropriate quantitative or qualitative measures of success have been developed for determining the effectiveness of planned and completed corrective actions.*

Entergy scheduled an effectiveness review (EFR) to be completed by October 26, 2017, for the CAPRs associated with Root Cause 1. This plan included performing a document review of the licensed operator long-range training plan and a formal simulator evaluation of each operating crew on the standards and expectations for the conduct of operations that apply during plant transient conditions. The NRC team determined that this plan adequately measured success for determining the effectiveness of the CAPRs to address Root Cause 1.

Entergy also scheduled an EFR for the CAPRs associated with Root Cause 2. The EFR plan included performing a post-trip review after completing a training simulator scenario. The NRC team determined that this plan adequately measured success for determining the effectiveness of the CAPRs to address Root Cause 2. At the time of this inspection, this EFR had not been completed.

As previously discussed, the NRC team identified multiple points in root cause evaluation CR-PNP-2016-01621 that demonstrate incorrect conclusions, incorrect assumptions, and an inadequate rationale for ruling out alternative possible root causes. The NRC team determined that this was a significant weakness because it ultimately resulted in Entergy’s failure to properly assess the impact of the inadequate shift manager review rigor, as well as any associated causal factors, in root cause evaluation CR-PNP-2016-01621. Therefore, any root cause revisions will also need to include quantitative and/or qualitative measures of success for determining the effectiveness of any CAPRs associated with new or revised root causes. Entergy documented CR-PNP-2017-00828 in response to the NRC team’s conclusions.

e. *IP 95001, Sections 02.03d and 02.04d, requires that the inspection staff determine that each Notice of Violation related to the supplemental inspection is adequately addressed, either in corrective actions taken or planned.*

As required by the NRC Reactor Oversight Process Action Matrix, this supplemental inspection was conducted because a finding of low to moderate safety significance (White) was identified in the first quarter of 2015. This issue was documented in NRC Special Inspection Report 05000293/2015007, dated May 27, 2015 (ML15147A412), and involved Entergy's failure to identify, evaluate, and correct the condition of the 'A' SRV's failure to open upon manual actuation during a plant cooldown on February 9, 2013, which resulted in a similar occurrence when the 'C' SRV did not open upon manual actuation during a subsequent LOOP event on January 27, 2015. The NRC also determined that the 'A' SRV had been inoperable for a period greater than the technical specification allowed outage time of 14 days. At Entergy's request, a regulatory conference was held on July 8, 2015. After considering the information presented by Entergy at the conference, the NRC maintained that the finding was appropriately characterized as White, and the results were conveyed to Entergy in a letter dated September 1, 2015, "Final Significance Determination for a White Finding and Notice of Violation – Inspection Report No. 05000293/2015011 – PNPS" (ML15230A217).

The letter concluded that information regarding: (1) the reason for the violations; (2) the corrective actions taken and planned to correct the violation and preclude repetition; and, (3) the date when full compliance was achieved, is already adequately addressed on the docket in NRC Inspection Report 05000293/2015007, in Entergy's presentation at the July 8, 2015, regulatory conference, and in the letter transmitting the Notice of Violation.

The NRC team noted that NRC Inspection Report 05000293/2015011, which transmitted the Notice of Violation, described corrective actions that had been taken in response to the issue, which included performing an ongoing root cause analysis, continuing improvements to the site corrective action program, actions to replace the 'A' and 'C' SRVs in February 2015 (prior to restarting from the January 27, 2015, event), and replacing all four SRVs with a different model during the Spring 2015 refueling outage.

The NRC team determined that Entergy's planned and completed corrective actions restored compliance with the Notice of Violation of Technical Specification 3.5.E, the automatic depressurization system was restored to operable when the 'A' and 'C' SRVs were replaced in February 2015, and replacement of all four SRVs with a different model during the Spring 2015 refueling outage reasonably addressed the extent of condition and cause concerns associated with the root cause identified in the evaluation associated with CR-PNP-2015-05827.

4.6 Evaluation of IMC 0305 Criteria for Treatment of Old Design Issues

Entergy did not request credit for self-identification of an old design issue; therefore, the issues were not evaluated against the IMC 0305 criteria for treatment of an old design issue.

4.7 NRC Inspection Findings

Failure to Identify All Root Causes of a Significant Condition Adverse to Quality

Introduction. The NRC team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," because Entergy did not adequately determine all root causes associated with a significant condition adverse to quality related to the failure to identify, evaluate, and correct the 'A' SRV's failure to open upon manual actuation during a plant cooldown on February 9, 2013.

Description. Entergy conducted root cause evaluation CR-PNP-2016-01621 to determine the causes of the station's failure to identify, evaluate, and correct the 'A' SRV's failure to open in February 2013. The NRC team determined that the CR-PNP-2016-01621 root cause evaluation was not conducted to a level of detail commensurate with the significance of the problem, and identified this as a significant weakness, as discussed in Section 4.4b of this report. Namely, conclusions and assumptions throughout the root cause evaluation were incorrect and inconsistent, and the rationale for ruling out alternative possible root causes was not clear or adequate.

One conclusion that impacted the results of the CR-PNP-2016-01621 root cause evaluation involved the direct cause and the adequacy of documentation in CR-PNP-2013-00825. Entergy concluded that the direct cause of the significant performance issues was, "Maintenance, Engineering, Operations, and Condition Review Group personnel focused evaluation and correction activities on the acoustic monitor for SRV 'A' instead of the valve because of incomplete information in CR-PNP-2013-00825." The NRC team reviewed CR-PNP-2013-00825, which was written following the failure of the 'A' SRV in February 2013. The NRC team determined that the information available in this CR was sufficient for Entergy to appropriately identify and evaluate 'A' SRV performance issues and take appropriate corrective actions.

The NRC team noted that the CR-PNP-2016-01621 root cause evaluation identified contributing causes associated with inadequate operator fundamental training, as it relates to the operability determination writer's use of the steam tables, and management oversight of the corrective action program and operability determination process. However, based on interviews conducted by both Entergy and the NRC with the involved personnel, the NRC team disagreed that the cause of the incorrect operability determination related to SRV 'A' was training deficiencies that resulted in poor operator performance while making an operability determination. Rather, the NRC team concluded that the shift manager, who had the ultimate responsibility to ensure the operability call was correct, possessed adequate training and knowledge to ensure an adequate operability determination was completed. The cause of the incorrect and inadequate operability determination related to SRV 'A' was associated with inadequate rigor in the shift manager review of an operability determination and any causal factors that may have impacted the shift manager's ability to complete a rigorous review of the operability determination.

The root cause(s) do not appear to be fully understood because the root cause(s) do not adequately address inadequate rigor in shift manager review of an operability determination, which appeared to be the basic causal factor that, if corrected or eliminated, would preclude repetition of the condition. Additionally, corrective actions related to Contributing Cause 2 and ongoing operability determination issues addressed

operability determination process issues, but did not specifically target shift manager rigor or any related causal factors that led to the inadequate shift manager rigor. As a result, Entergy remained susceptible to a repeat occurrence of inadequate shift manager operability review rigor for any significant condition adverse to quality that was entered into the corrective action program.

As a result of the NRC team's observations, Entergy planned to take additional action to conduct operations management face-to-face conversations with shift manager qualified individuals to reinforce the shift manager's responsibility for operability and functionality determination accuracy and rigor. Entergy documented the NRC team's concerns in the corrective action program as CR-PNP-2017-00363 and CR-PNP-2017-00828. More details related to this issue are discussed in Section 4.4b of this report.

Analysis. The NRC team determined that Entergy's failure to adequately identify all root causes associated with a significant condition adverse to quality, the failure to identify, evaluate, and correct the 'A' SRV's failure to open upon manual actuation during a plant cooldown on February 9, 2013, was a performance deficiency. The performance deficiency was more than minor because it was associated with the equipment performance attribute of the Mitigating Systems cornerstone and if left uncorrected, the performance deficiency could have the potential to lead to a more significant safety concern. Specifically, if left uncorrected, the performance deficiency could have the potential to result in repetition of a failure to identify, evaluate, and correct an SRV's failure to open or a similar significant condition adverse to quality. The NRC team evaluated the finding using Exhibit 2, "Mitigating Systems Screening Questions," of IMC 0609, Appendix A, "Significance Determination Process for Findings At-Power," and determined this finding did not affect the design or qualification of a mitigating structure, system, or component; represent a loss of system and/or function; involve an actual loss of function of at least a single train or two separate safety systems for greater than its technical specification-allowed outage time; or represent an actual loss of function of one or more non-technical specification trains of equipment designated as high safety-significant. Therefore, the NRC team determined the finding was of very low safety significance (Green). The NRC team determined that the finding had a cross-cutting aspect in the area of Human Performance, Avoid Complacency, because individuals did not recognize and plan for the possibility of mistakes, latent issues, and inherent risk, even while expecting successful outcomes. Specifically, Entergy incorrectly assumed that CR-PNP-2013-00825 contained inadequate information to determine that the 'A' SRV had not opened, and this assumption ultimately impacted the root cause results documented in CR-PNP-2016-01621 [H.12].

Enforcement. 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requires, in part, that in the case of significant conditions adverse to quality, measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition. Contrary to the above, since February 9, 2013, in the case of a significant condition adverse to quality, measures did not assure that the cause of the condition is determined and corrective action taken to preclude repetition. Specifically, Entergy did not establish adequate measures to assure that the cause of a significant condition adverse to quality, inadequate rigor in shift manager review of operability determination and its associated causes were adequately determined and corrective action taken to preclude repetition. As a result, Entergy remained susceptible to a repeat occurrence of the same significant condition adverse to quality. Entergy's immediate corrective actions included planning to conduct operations management face-

to-face conversations with shift manager qualified individuals to reinforce the shift manager's responsibility for operability and functionality determination accuracy and rigor. Because this violation was of very low safety significance (Green), and Entergy entered this issue into its corrective action program as CR-PNP-2017-00363 and CR-PNP-2017-00828, this violation is being treated as a non-cited violation, consistent with Section 2.3.2.a of the Enforcement Policy. **(NCV 05000293/2016011-01, Failure to Identify All Root Causes of a Significant Condition Adverse to Quality)**

5. Controls for Identifying, Assessing, and Correcting Performance Deficiencies *(IP 95003, Section 02.02)*

5.1 Corrective Action Program Fundamental Problem

5.1.1 PNPS Evaluation Results and Key Corrective Actions

Entergy identified that a significant contributor to the performance problems at the station was continued demonstration of weaknesses in the implementation of the corrective action program, which resulted in the station experiencing conditions adverse to quality and significant conditions adverse to quality that are recurring and long-standing.

In root cause evaluation CR-PNP-2016-00716, "Implementation of Corrective Action Program," Entergy stated:

> Leaders were not exhibiting the corrective action program leadership behaviors described in the Entergy Nuclear Excellence Model (Policy EN-PL-100) that was published July 31, 2014…Leaders with corrective action program oversight responsibilities (i.e., [Condition Review Group, Department Performance Review Meeting/Corrective Action Review Board and Aggregate Performance Review Meeting/Self-Assessment Review Board] members) were overly tolerant of the long-standing and repetitive corrective action program weaknesses being continuously identified by external departments and agencies…As a result, leadership did not establish a sense of urgency and accountability to correct these inappropriate behaviors that led to a significant decline in corrective action program performance.

Entergy identified the following causes in root cause evaluation CR-PNP-2016-00716:

- Direct Cause 1: PNPS personnel have not effectively applied the guidance contained in the corrective action program procedures and policies. This resulted in the PNPS corrective action program decline to an unacceptable level of performance.

- Root Cause 1: PNPS leaders have not fostered a sufficient change to the organizational culture that is needed to improve and sustain corrective action program performance. As a result, the station continues to experience longstanding corrective action program shortfalls.

- Contributing Cause 1: PNPS personnel (Corrective Action Review Group, Corrective Action Review Board, and Self-Assessment Review Board members) responsible for performance monitoring and oversight failed to provide adequate assessment of corrective action program performance. This contributed to leadership not recognizing the need for additional action to mitigate the corrective action program performance decline.

- Contributing Cause 2: PNPS personnel who initiate, disposition, and approve corrective action program products have not received adequate training commensurate with their corrective action program roles and responsibilities. This has resulted in unacceptable quality of some corrective action program products.

- Contributing Cause 3: PNPS leadership has not effectively managed the resources to implement and sustain the corrective action program. This resulted in declining corrective action program performance for the identification, evaluation and resolution of station issues.

Entergy implemented a number of actions to improve corrective action program performance including training personnel, improving program oversight, and hiring external corrective action program subject matter experts and mentors to bridge the performance gaps until station personnel could perform at appropriate levels. Key corrective actions developed by Entergy included:

- CR-PNP-2016-00716 CA-74: (CAPR-1) Augment the station staff with a subject matter expert; who has at a minimum, working experience as a Site Vice President direct report at an operating nuclear power plant or equivalent experience, to mentor the individual behaviors and station culture supporting the corrective action programs. This subject matter expert must have the organizational authority and independence to report on corrective action program performance to the station directors, vice president, and fleet executives; therefore, the subject matter expert will organizationally report to the Station Vice President and will provide a minimum of one on-site visit per month. The position will monitor, coach, and report the behaviors of station individuals responsible for the corrective action program product review and approval functions. Corrective action program quality performance indicator results will be monitored and tracked by the subject matter expert. This function will remain in place until the end of plant operating life.

- CR-PNP-2016-00716 CA-78: (CAPR-2) Develop and implement monthly corrective action program performance indicators including station and department level indicators to monitor performance including a monthly required review by the Corrective Action Review Board.

- CR-PNP-2016-00716 CA-80: Assign a part time (two weeks per month) subject matter expert to coach and mentor department performance improvement coordinators and corrective action program performance and independently review root cause evaluations and apparent cause evaluations to acquire the data for populating the Corrective Action Program Performance Indicators.

- CR-PNP-2016-00716 CA-81: Assign a part time (two weeks per month) subject matter expert to coach and mentor personnel who implement the operating experience, trending, and self-assessment and benchmarking processes.

- CR-PNP-2016-00716 CA-96: Generate the corrective action program subject matter expert monthly status report. These monthly status reports must continue until end of plant operating life.

5.1.2 NRC Inspection Scope

The NRC team reviewed and assessed the Corrective Action Program Fundamental Problem, as documented in root cause evaluation report CR-PNP-2016-00716, "Implementation of Corrective Action Program," and supporting documents. The NRC team reviewed documentation, interviewed station staff, attended station corrective action program meetings, and, as applicable, conducted walkdowns of plant structures, systems, and components to assess the station's performance in the following specific areas:

- Review root cause evaluation CR-PNP-2016-00716 and assess whether identified direct cause(s), root cause(s), and contributing cause(s) were appropriate

- Review and assess the implementation of root cause evaluation CR-PNP-2016-00716 interim actions, CAPR-1, and CAPR-2

- Review and assess the adequacy and implementation of EFRs for CAPR-1 and CAPR-2 (including interim reviews)

- Review and assess implementation of the cause evaluation process

- Review and assess the work order backlog for any significant conditions adverse to quality or conditions adverse to quality that may have been closed to a work order

- Review and assess implementation of the trending and performance review process

- On a sampling basis, conduct walkdowns of plant equipment referenced in reviewed corrective action program documents to evaluate problem identification, assessment, and corrective action completion

- Review and assess the use of the corrective action program during recovery evaluations

- Review and assess corrective action program staffing and training adequacy

- Review and assess corrective action program accountability and setting/enforcing expectations

The NRC team also reviewed and assessed the effectiveness of audits and assessments performed by the Nuclear Independent Oversight (NIOS) group, line organizations, and external organizations. The NRC team reviewed documentation, interviewed station staff, and attended station corrective action program meetings to assess the station's performance in the following specific areas:

- The use of the 'Learning Organization' process to track and document completion of recommendations, as compared to use of the condition reporting process
- The relative rigor of assessments performed at PNPS by the Entergy fleet
- The use of benchmarking outside the fleet to assess station performance
- The timeliness and specific responses to audits and assessments performed at PNPS by external organizations

5.1.3 NRC Inspection Observations and Assessment

The NRC team reviewed the causes Entergy identified in root cause evaluation CR-PNP-2016-00716 and the analysis methodologies that Entergy utilized to arrive at those conclusions. The NRC team determined that the identified direct cause, root cause, and contributing causes were reasonable and supportable. However, the NRC team noted that the root cause focused on the station senior leadership and failed to adequately address the role that lower-level leaders had in the implementation of the day-to-day prioritization and resolution of corrective action program items. The NRC team determined that Entergy's definition of 'leaders' associated with the root cause was too narrow, and failed to recognize that department performance improvement coordinators had a significant leadership role in the implementation and assessment of the corrective action program.

The NRC team reviewed the corrective actions associated with the Corrective Action Program Fundamental Problem root cause evaluation; specifically focusing on interim actions Entergy implemented to address short term vulnerabilities and CAPRs, which were designed to eliminate or mitigate the root cause to preclude repetition of the event.

Entergy's interim corrective actions included:

- Coaching of station leaders assigned as Condition Review Group members and the department improvement coordinators on conservative decision-making behaviors related to the corrective action program. This coaching was performed by the Director of Regulatory and Performance Improvement.
- Instituting a cause evaluation subject matter expert who mentored and independently reviewed all cause evaluation products
- Instituting a corrective action program subject matter expert who coached and mentored the department performance improvement coordinators and Condition Review Group members

- Instituting support corrective action program subject matter experts to perform closure reviews of corrective actions

- Instituting a subject matter expert who coached and mentored personnel who implement the operating experience, trending, and self-assessment and benchmarking programs.

The NRC team determined that these interim actions were appropriate for addressing the short term vulnerabilities that the site identified as major weaknesses in the implementation of the corrective action program. Based on the observations and interviews with site personnel, the NRC team found that individuals still relied heavily on the subject matter experts as "backstops" to ensure quality implementation of the corrective action program process to prevent issues from recurring. As such, the NRC team concluded that plant personnel behavioral improvements were still warranted in the fundamental areas of problem identification, evaluation, and resolution while these subject matter experts fulfilled their assigned (interim) functions. The interim actions were still in place at the conclusion of the on-site inspection.

From the root cause evaluation report, CAPR-1 was to augment the station staff with a subject matter expert who is responsible for monitoring, coaching, and reporting behaviors of station individuals responsible for the corrective action program product review and approval functions. CAPR-2 was to develop monthly corrective action program performance indicators, including station and department level indicators, to monitor performance. These indicators would be reviewed by the members of the Corrective Action Review Board and the subject matter experts to identify trends in station performance in the corrective action program.

Subsequent to the arrival of the 95003 NRC team, Entergy issued a revision to EN-LI-102, "Corrective Action Program." The revised process combined the functions of the Corrective Action Review Board and Condition Review Group into a new Performance Improvement Review Group. The NRC team determined that this change in process did not affect the CAPRs, as the subject matter expert and subject matter expert support personnel have continued to perform their assigned corrective action program oversight functions, including those related to the new Performance Improvement Review Group.

The NRC team conducted document reviews, observations, and interviews with station personnel to determine if the CAPRs, as written, would address the root cause of station leaders not fostering sufficient change to the organizational culture to improve and sustain corrective action program performance. As described in Entergy procedure EN-LI-118, "Cause Evaluation Process," corrective actions should be specific, measurable, achievable, realistic, and timely. Also, EN-LI-118 noted that effective corrective actions will eliminate the causes of problems, strengthen or refine existing processes or barriers (if deemed acceptable), significantly reduce the probability of occurrence of the same/similar events, and are clearly sustainable for long-term correction of the issue. After in-depth reviews and conversations with Entergy, the NRC team concluded that, as designed, CAPR-1 and CAPR-2 did not appear adequate to fully correct the root cause and preclude repetition of the fundamental problem, as described below.

CAPR-1, as it was initially implemented, provided for the corrective action program subject matter expert to mentor/coach director-level PNPS personnel, and use the performance indicators (CAPR-2) as a tool to measure effectiveness. The mentoring/coaching was intended to then “trickle down” to the manager and supervisor positions through one-on-one coaching between the PNPS directors and their subordinates. The corrective action program support subject matter experts, as described in the interim actions, provided independent reviews and focused feedback of corrective action program products during corrective action program meetings. However, while the support subject matter expert role was integral to the implementation of CAPR-1, Entergy did not include the support subject matter experts in CAPR-1, but rather as a separate non-CAPR corrective action that could be closed following a successful EFR.

The NRC team noted that the department performance improvement coordinators, as individuals on-site who were responsible for implementing significant parts of the corrective action program, were not addressed in the CAPR to receive the corrective action mentoring/coaching function. Also absent from receiving systematic direct mentoring/coaching were the Performance Improvement Review Group members (department managers and supervisors), who also have responsibilities to implement the corrective action program. Instead, Entergy believed that the performance of these members could improve through internal mentoring/coaching from their respective department directors.

Through interviews with various Entergy personnel, the NRC team determined that Entergy did not implement a systematic or structured coaching/mentoring process to reach all station personnel with leadership responsibilities in the implementation of the corrective action program. Additionally, the feedback that was provided to the department performance improvement coordinators and the Performance Improvement Review Group members from the support subject matter experts was solely focused on whether corrective action program products and meetings met the process, and did not involve coaching or mentoring on how performance could be improved. Additional discussion with Entergy staff indicated that there was an expectation that corrective action program staff receiving focused feedback would, as desired, seek coaching/mentoring to address the feedback provided. Considering the weaknesses identified in most areas of both the Third Party Nuclear Safety Culture Assessment and the NRC’s independent safety culture assessment (Section 7.2), and interviews conducted with Entergy personnel, the NRC team determined that there was not a basis or any evidence to support a conclusion that corrective action program staff would independently seek coaching or mentoring to address this feedback. Therefore, because of the apparent weaknesses in safety culture at PNPS and because Entergy did not develop any formal planned and systematic actions to ensure that performance would be improved for all key individuals who implement the corrective action program, the team determined that CAPR-1 and CAPR-2 did not provide reasonable assurance that improvements in the station’s execution of the corrective action program would be continued and sustained.

During the NRC team inspection, Entergy revised the CAPRs and other corrective actions for the Corrective Action Program Fundamental Problem root cause evaluation. In summary, Entergy changed CAPR-1 to encompass the support subject matter expert functions and to more clearly define how the subject matter experts would accomplish the objectives of monitoring, coaching, and reporting.

CAPR-1 and CAPR-2 are intended to remain in place through the end of plant life. Also, Entergy initiated an interim corrective action to coach and mentor the department performance improvement coordinators. Additional detail was added to this action to ensure the department performance improvement coordinators received appropriate mentoring and coaching on a one-on-one and group basis to aid in the changing of behaviors. Though this corrective action was appropriate, the NRC team noted that it was not part of the CAPR-1 actions, but rather, was designated as an interim action.

The NRC team reviewed the changes and conducted additional interviews with Entergy on the revisions. The NRC team noted that the new CAPR-1, as written, provided extensive guidance on the execution of the monitor and report functions for the subject matter experts. However, the NRC team noted that the coaching function still lacked specific execution guidance and it was unclear to the NRC team how sustainable that piece of the CAPR would be to continue to foster improvements. The root cause evaluation specifically listed attributes that Entergy determined were contributory to the root cause of station leaders not exhibiting the appropriate behaviors for corrective action program excellence. These attributes ranged from insufficient knowledge to resource management to accountability and were all items that would be addressed with the coaching/mentoring function provided by the subject matter experts. It was not evident, based on interviews and document reviews, that the coaching/mentoring would be robust enough to ensure comprehensive and sustainable improvements in those areas.

The NRC team also noted that the changes to the interim corrective actions for the department performance improvement coordinators did not provide an adequate means of communicating learnings between the manager-level positions (Performance Improvement Review Group members) and the department performance improvement coordinators; both of which have responsibilities for different, but integrated pieces of the corrective action program. A work task, WT-PNP-2016-435, was created to track cross-communication and observations for these groups through the beginning of the next refueling outage in spring 2017. The NRC team noted that this work task was of short duration and was not tied to successful completion of an EFR to ensure the proper behaviors and learnings were gained as desired.

Overall, the NRC team determined that while the station had noted improvement in corrective action program performance, CAPR-1 and CAPR-2, as they were written and implemented, did not provide reasonable assurance that any improvement could be continued and sustained. Specifically, the lack of a systematic approach for coaching/mentoring of Performance Improvement Review Group and department performance improvement coordinators would likely inhibit effective continuation of any performance improvements. Additionally, though Entergy implemented interim corrective actions to coach and mentor the department performance improvement coordinators, the NRC team noted that this action was not designated as a CAPR. The NRC team documented a finding related to this issue in Section 5.1.4 of this report.

The NRC team reviewed Entergy's completed interim EFRs for CAPR-1, CAPR-2, and the EFR for non-CAPR corrective actions associated with the Corrective Action Program Fundamental Problem root cause evaluation. For EFR-1 related to

CAPR-1, Entergy performed a focused self-assessment with a goal of determining if station personnel behaviors supported corrective action program product quality and illustrated nuclear safety culture and excellence model attributes. This was accomplished by interviewing personnel, reviewing corrective action program performance indicators, and looking for improving trends in corrective action program product quality for the months of July and August 2016. The EFR-1 interim review was combined with the focused self-assessment, EFR-2, performed for CAPR-2. EFR-2 specifically reviewed the corrective action program performance indicators to ensure the results were reflective of current corrective action program behaviors and practices and that they are being used to improve corrective action program performance.

Overall, Entergy concluded that the implementation of CAPR-1 and CAPR-2 was in accordance with the corrective actions as described in the root cause evaluation and the CAPRs were determined to be effective at the interim review. Improvements in corrective action program performance were recognized in several areas such as cause evaluation quality, corrective action program meeting quality, and the overall quality of corrective action closures. Improvements were determined to still be needed in the areas of self-identification of problems, benchmarking and self-assessments, and initial screening of CRs. Also, a “check and adjust” of the performance indicators occurred in August 2016 based on recommendations from the subject matter experts. Additional run time was determined to be needed to ensure the indicators were providing the appropriate data. However, CAPR-2 was still deemed to be effective by Entergy at the interim review.

The NRC team determined that these interim EFRs were narrow in scope and conducted too soon after the corrective actions were implemented, in that there was not sufficient data to support Entergy conclusions. Specifically, Entergy implemented the CAPR actions in June 2016 and the EFRs looked at data from July and August 2016. The initial plan for the EFRs stated they would be performed approximately five months after implementation of the corrective actions. This did not occur. Also, after collecting the first round of data for the CAPR-2 performance indicators in July 2016, Entergy changed the indicators in August 2016.

In addition, as part of the EFRs, Entergy reviewed 30 CRs written in July and August for timeliness and closure quality, two root cause evaluations, and four apparent cause evaluations. The NRC team observed that this review was a limited sample of CRs generated over the two-month time period; PNPS generates approximately that number of CRs daily. Also, the NRC team identified CRs that were written after this EFR was completed that indicated many deficiencies still existed in the timeliness and quality of CR closures. The NRC team and resident inspectors performed independent reviews of the root and apparent cause evaluations listed in the EFR and found multiple deficiencies associated with those evaluations.

For example, the inadequacies of one of the cause evaluations conducted for an equipment issue was documented as a subsequent NRC-identified non-cited violation in the fourth quarter 2016 NRC integrated inspection report. The resident inspectors documented a Green non-cited violation (NCV 2016004-03) of 10 CFR 50.65(a)(4) because Entergy did not properly assess and manage the increase in risk due to performing protective relay calibration and functional testing associated with the shutdown transformer on seven occasions from December 9, 2005, through

August 27, 2014. Specifically, Entergy did not identify that the performance of calibration and functional testing of protective relays associated with the shutdown transformer would prevent the 4160V safety buses from being automatically powered by other required sources, and consequently, did not properly assess and manage the increase in risk. The resident inspectors reviewed the associated root cause evaluation (CR-PNP-2016-02735) and determined that the evaluation did not address the issue with risk assessment or application of technical specification limiting conditions for operation. Additionally, the resident inspectors noted a timeliness issue with the root cause evaluation, potentially due to issues with classification of the CR. Though the testing issue was identified in April 2016, Entergy did not start the cause evaluation until June 2016. This issue is discussed in more detail in NRC Inspection Report 05000293/2016004 (ML17045A524).

The NRC team also noted another example that was missed by the individuals conducting the EFR. On May 5, 2016, the unit commenced a rapid power reduction due to heavy traveling screen fouling and rising screen differential pressures. Entergy documented this issue in CR-PNP-2016-03204, which was originally classified as a 'B' significance level, and would have required an apparent cause evaluation to assess the issue. NRC team interviews with the corrective action program subject matter experts indicated that the subject matter experts determined that the issue should have been classified as an 'A' significance level, which would have required a root cause evaluation. The station decided to leave the significance as a 'B' and completed an equipment apparent cause evaluation for the issue. Though the individuals conducting the EFR determined that there were no issues with this apparent cause evaluation, the Corrective Action Review Board later determined that the cause analysis was incorrect.

Based on the interim effectiveness reviews being narrow in scope, and the results of the NRC's independent reviews of the cause evaluations listed in the EFR, the NRC team determined that the interim EFRs conducted for CAPR-1 and CAPR-2 were not conducted with the appropriate breadth and depth to illustrate interim effectiveness of those corrective actions related to the Corrective Action Program Fundamental Problem. Entergy documented these observations in CR-PNP-2017-00339, and is expected to re-evaluate the future planned final EFRs, EFR-4 and EFR-5, based on those reviews being structured similar to EFR-1 and EFR-2.

5.1.4 NRC Inspection Findings

Failure to Establish Corrective Actions to Preclude Repetition of a Significant Condition Adverse to Quality

Introduction. The NRC team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," because Entergy did not take corrective action to preclude repetition for a significant condition adverse to quality identified in root cause evaluation CR-PNP-2016-00716, "Implementation of the Corrective Action Program," Revision 2. Specifically, the NRC team identified that corrective actions to prevent repetition of Entergy's continued weaknesses in the implementation of the corrective action program were inadequate.

Description. During performance of the collective evaluation process, Entergy identified the corrective action program as a fundamental problem. As a result,

Entergy completed a root cause evaluation and documented the results in CR-PNP-2016-00716, “Implementation of the Corrective Action Program,” Revision 2. Entergy documented the following in CR-PNP-2016-00716:

- Problem Statement: PNPS continues to demonstrate weaknesses in the implementation of the corrective action program. The station is experiencing conditions adverse to quality and significant conditions adverse to quality which are recurring and longstanding.

- Root Cause: PNPS leaders have not fostered a sufficient change to the organizational culture that is needed to improve and sustain corrective action program performance. As a result, the station continues to experience longstanding corrective action program shortfalls. PNPS leaders are not exhibiting the corrective action program leadership behaviors described in the Entergy Nuclear Excellence Model (Policy EN-PL-100) that was published July 31, 2014. Leaders with corrective action program oversight responsibilities (Condition Review Group, Department Performance Review Meeting/Corrective Action Review Board, and Aggregate Performance Review Meeting/Self-Assessment Review Board members) have been overly tolerant of the long-standing and repetitive corrective action program weaknesses. PNPS leadership did not have the requisite knowledge and skills for the corrective action program performance standards.

- CAPR-1: (summary) Augment the station staff with a subject matter expert. The position will monitor, coach, and report behaviors of station individuals responsible for the corrective action program product review and approval functions. Corrective action program quality performance indicator results will be monitored and tracked by the subject matter expert. The intent of this action is to provide the station with a subject matter expert to mentor the corrective action program.

- CAPR-2: (summary) Develop monthly corrective action program performance indicators including station and department level indicators to monitor performance including a monthly required review by the Corrective Action Review Board. The intent of this action is to provide a monitoring tool for detection of corrective action program performance trends at the department level.

- CA-80: (summary) Assign a part-time (two weeks per month) subject matter expert to coach and mentor department performance improvement coordinator and corrective action program performance and independently review root and apparent cause evaluations to acquire the data for populating the corrective action program performance indicators.

The NRC team identified that implementation of CAPR-1 and the associated supporting corrective actions resulted in a system where director-level and some select manager-level positions received corrective action program-focused coaching from the corrective action program subject matter expert, with the expectation that this focused coaching would “trickle down” to the subordinate manager and supervisor levels. Through interviews with station staff, the NRC team identified that

focused coaching at the manager and supervisor level was mainly from the corrective action program support subject matter experts providing independent review and focused feedback on corrective action program products and the conduct of corrective action program meetings. However, while this support subject matter expert role was integral to the implementation of CAPR-1, Entergy did not include the support subject matter experts in CAPR-1, but rather as a separate non-CAPR corrective action (CA-80) that could be closed following a successful EFR.

While subject matter expert coaching should improve performance of senior leadership, the NRC team did not identify any systematic process to coach all station individuals responsible for corrective action program product review and approval functions, such as the department performance improvement coordinators and the Performance Improvement Review Group members. Subsequent interviews with Entergy staff responsible for the root cause evaluation indicated that there was an expectation that corrective action program staff receiving focused feedback (CA-80) would, as required, seek coaching to correct the deficiencies identified. Considering the weaknesses identified in most areas of both the Third Party Nuclear Safety Culture Assessment and the NRC's independent safety culture assessment (Section 7.2), and interviews conducted with Entergy personnel, the NRC team determined that there was no evidence to support that this expectation would be satisfied. The NRC team concluded that absent a systematic or structured coaching/mentoring process to reach all personnel with leadership responsibilities in the implementation of the corrective action program, CAPR-1 would not adequately address the deficiencies identified in the root cause and would not provide reasonable assurance that improvements seen in implementation of the corrective action program would be continued and sustained.

Analysis. The NRC team determined that Entergy's failure to establish measures to preclude repetition of a significant condition adverse to quality in accordance with 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," was a performance deficiency. Specifically, in development of CAPR-1, Entergy did not include a systematic or structured process to coach/mentor all personnel with leadership responsibilities in implementation of the corrective action program. The performance deficiency was more than minor because if left uncorrected, it had the potential to lead to a more significant safety concern. Specifically, the failure to preclude repetition of this significant condition adverse to quality could result in continuing weaknesses in implementation of the corrective action program, which was designated as a fundamental problem, and thus a contributing factor for PNPS Column 4 performance. Additionally, weaknesses with corrective action program implementation could result in equipment issues where operability is not maintained (e.g., see Section 5.3.3). The NRC team evaluated the finding using Exhibit 2, "Mitigating Systems Screening Questions," of IMC 0609, Appendix A, "Significance Determination Process for Findings At-Power," and determined this finding did not affect the design or qualification of a mitigating structure, system, or component; represent a loss of system and/or function; involve an actual loss of function of at least a single train or two separate safety systems for greater than its technical specification-allowed outage time; or represent an actual loss of function of one or more non-technical specification trains of equipment designated as high safety-significant. Therefore, the NRC team determined the finding was of very low safety significance (Green). The NRC team determined that the finding had a cross-cutting aspect in the area of Human Performance, Procedure Adherence, because

individuals did not follow processes, procedures, and work instructions. Specifically, Entergy did not follow procedure EN-LI-102, which provides the station standards for crafting a corrective action and states, in part, that the corrective action descriptions must be worded to ensure that the adverse condition or cause/factor is addressed [H.8].

Enforcement. 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requires, in part, that in the case of significant conditions adverse to quality, measures shall be established to ensure that corrective action is taken to preclude repetition. Contrary to the above, beginning in November 2016, in the case of a significant condition adverse to quality, Entergy failed to establish measures to ensure that corrective action was taken to preclude repetition. Specifically, in the case of the corrective action program fundamental problem, a significant condition adverse to quality, Entergy failed to establish adequate CAPRs. Because this finding is of very low safety significance (Green) and has been documented in the corrective action program as CR-PNP-2017-00053, CR-PNP-2017-00410, and CR-PNP-2017-01134, this violation is being treated as a non-cited violation, consistent with Section 2.3.2.a of the Enforcement Policy. **(NCV 05000293/2016011-02, Failure to Establish Corrective Actions to Preclude Repetition of a Significant Condition Adverse to Quality)**

5.2 Corrective Action Program Accountability and Expectations

5.2.1 NRC Inspection Scope

The NRC team performed direct observation of Entergy meetings that were associated with the implementation of the corrective action program to assess the establishment and reinforcement of site standards and expectations related to the corrective action program, and accountability of site personnel who have responsibility for implementation of the corrective action program. The NRC team observed the Work Request Screening Committee meetings, the Condition Report Prescreening meetings conducted by the department performance improvement coordinators, and the Performance Improvement Review Group meetings.

5.2.2 NRC Inspection Observations and Assessment

The Work Request Screening Committee meeting performed reviews of CRs assigned to work requests for appropriate prioritization and scheduling. Entergy assigned work request priority based on whether the work request was associated with a condition adverse to quality or a non-adverse condition. Additionally, Entergy assessed the level of degradation or non-conformance of the equipment problem to be repaired and considered the safety significance of the issue.

During an observation of the Work Request Screening Committee meeting, the NRC team noted an interaction between members of the screening committee related to a concern that multiple open historic deficient conditions adverse to quality had been misclassified in the work request process. This resulted in the failure to appropriately schedule the items for maintenance. The NRC team identified that this concern was not entered into the corrective action program, so that the concern could be fully assessed. Some members of the screening committee felt that it was not necessary to enter the concern into the corrective action program since the screening

committee was capable of assessing the priority independently. It was noted that one of the subject matter experts, who was also observing the meeting, provided immediate feedback that the concern needed to be entered into the corrective action program in accordance with Entergy procedures. In this instance, the subject matter expert needed to reinforce the appropriate corrective action program behavior for site personnel.

The Condition Report Prescreening meetings conducted by the department performance improvement coordinators reviewed CRs entered into the corrective action program. Each department performance improvement coordinator pre-populated this information in the CRs for their respective departments based on their knowledge of the corrective action program and input received from their manager. The pre-populated information was then discussed and concurred on by all the department performance improvement coordinators at the prescreening meeting. This information was used to assign priority, classification, and trending codes for each CR reviewed.

The NRC team noted, during observation of these meetings, that some CRs were assigned as “bring-back” items due to insufficient understanding of the issue or not having consensus among the department performance improvement coordinators. The NRC team noted that in some cases, this is a good practice. However, excessive use of “bring-backs” could delay review and approval of a CR by the Performance Improvement Review Group and could unnecessarily delay corrective actions. The NRC team did not identify any specific concerns of untimely corrective actions as a result of excessive “bring-backs.” However, this practice was not in accordance with station expectations on the timeliness of classification and review of CRs. This expectation was unwritten and the NRC team noted that it could be emphasized more, or written as a standard, to ensure issues are reviewed in a timely manner.

The Performance Improvement Review Group meeting performed screening of CRs subsequent to the department performance improvement coordinator prescreening meeting. The Performance Improvement Review Group provided final review and approval of the recommendations given at the prescreening meeting. Additionally, the Performance Improvement Review Group provided oversight of operability determinations and review and approval of select cause evaluations. The Performance Improvement Review Group meeting was typically chaired by the General Manager for Plant Operations and attended by the Performance Improvement Director, Operations Manager, Engineering Director, and other department managers as necessary based on the meeting agenda.

The NRC team noted during observation of these meetings, and through interviews with Performance Improvement Review Group members, that attendance by department managers was inconsistent for those departments that were not required for quorum purposes. Additionally, active participation by department managers in the meeting was limited to only those items that directly related to their work groups. Collegial discussion and consensus of CRs was not observed by the NRC team to the level that was observed during the department performance improvement coordinator prescreening meetings. Alternately, the Performance Improvement Review Group was structured more as a meeting between the Performance

Improvement Review Group chairperson and the Performance Improvement department with others providing input when directly questioned.

The NRC team discussed with Entergy their observations of inconsistent attendance and lack of engagement by non-quorum department managers. Due to the lack of structured coaching/mentoring of Performance Improvement Review Group members and department managers (discussed in Section 5.1.3), not all Performance Improvement Review Group members were receiving the same level of feedback and learning opportunities. Additionally, coaching/mentoring opportunities disseminated during one Performance Improvement Review Group meeting were not formally captured or disseminated to members that were not in attendance. As such, these potentially represent lost learning opportunities that could be discussed when managers and department performance improvement coordinators meet before their prescreening meetings. The NRC team determined that this further illustrated the need for Entergy to develop a structured, systematic approach to coaching/mentoring all corrective action program leaders to ensure improvements are sustainable.

The NRC team noted, through discussions with the PNPS Performance Improvement Manager and the 95003 Recovery Director, that Entergy acknowledged that many of the corrective actions to improve station personnel accountability and standards are still in progress. During interviews with the department performance improvement coordinators, and those that routinely attend the Performance Improvement Review Group meetings, the NRC team heard that there has been more constructive engagement of personnel in the meetings. However, as evidenced by the observations above, personal accountability and adherence to station and fleet standards should continue to remain a recovery focus area.

5.2.3 NRC Inspection Findings

No findings were identified.

5.3 Implementation of the Cause Evaluation Process

5.3.1 NRC Inspection Scope

The NRC team performed a review of a sample of root cause evaluations and apparent cause evaluations that were completed after the implementation of the Corrective Action Program Fundamental Problem root cause evaluation CAPRs and interim corrective actions. The NRC team focused the review on cause evaluation process and quality in accordance with Entergy procedure EN-LI-118, “Cause Evaluation Process,” and EN-LI-102, “Corrective Action Program.” This review facilitated an assessment of the effectiveness of the interim corrective actions to improve cause evaluation quality. These actions included hiring contract personnel to perform root and apparent cause analyses, with supplemental help from site personnel as needed, and assignment of a subject matter expert to review the causal evaluation products for quality once completed. Root and apparent cause evaluations directly associated with the fundamental problems and problem areas for the 95003 and 95001 inspections were included in this review.

5.3.2 NRC Inspection Observations and Assessment

Based on a sampling of root and apparent cause evaluations conducted between July and December 2016, the NRC team determined that overall, the interim corrective actions from the corrective action program root cause evaluation appeared to have generally improved the quality of root cause and apparent cause evaluations. However, the NRC team identified deficiencies and gaps in several of the cause evaluations that were reviewed. Common deficiencies and areas for continued improvement were identified in the following parts of the cause evaluation process: adequacy and timeliness of corrective actions/CAPRs; the scope and timeliness of EFRs; rigor of completing and assigning corrective actions to extent of condition reviews; and the use of industry operating experience and missed opportunity reviews (for root cause evaluations). Specific examples of these deficiencies were cited in the violations identified during this inspection or are discussed below. Those observations that did not rise to the level of findings were discussed with PNPS and CRs were generated to address the gaps.

The NRC team identified two issues associated with implementation of the cause evaluation process. Specifically, as previously discussed, the NRC team noted multiple points in the CR-PNP-2016-01621 root cause evaluation, Revision 2, that demonstrate incorrect conclusions, incorrect assumptions, that the rationale for ruling out alternative possible root causes was not clear or adequate, and why the evaluation did not appropriately consider other possible root causes. This was identified as a significant weakness. The NRC team also identified other weaknesses associated with the CR-PNP-2016-01621 root cause evaluation in the use of systematic methodologies, operating experience reviews, extent of condition, safety culture aspects reviews, and corrective actions planned and taken. (See Section 4 for additional details).

The NRC team also identified a Green finding because Entergy failed to issue adequate CAPRs associated with a root cause of the feedwater regulating valve failure in September 2016 that resulted in a manual scram. Additional details concerning this finding are discussed below.

5.3.3 NRC Inspection Findings

Failure to Issue Appropriate Corrective Actions to Preclude Repetition for the Causes of the September 2016 Scram

Introduction. The NRC team identified a Green finding because Entergy did not issue appropriate CAPRs in accordance with EN-LI-102, “Corrective Action Process,” Revision 28. Specifically, Entergy did not issue adequate CAPRs associated with Root Cause 1 of the feedwater regulating valve failure in September 2016 that resulted in a manual scram.

Description. On September 6, 2016, with reactor power at 91 percent, control room operators noticed unexpected instantaneous core thermal power changes and then feedwater flow oscillations. Operations determined that a problem existed with feedwater regulating valve ‘A’ and entered Procedure 2.4.49, “Feedwater Malfunctions.” Operators placed feedwater regulating valve ‘A’ in remote manual to attempt to stabilize the feed flow oscillations, but no effect was noted. Power

changes of up to 5 percent were seen on core neutron monitors, and operators were dispatched to the condenser bay and attempted a manual lockup of feedwater regulating valve 'A' (FRV-642A). The manual locking device was degraded due to significant corrosion, so feedwater regulating valve 'A' could not be manually locked. Control room operators scrammed the reactor when reactor water level benchmarks were reached, and the main steam isolation valves closed on a Group 1 isolation signal. Entergy ultimately determined that a loose wire connection affected the digital control system, which resulted in loss of feedwater regulating valve control in both automatic and remote-manual modes of operation. (See NRC Inspection Report 05000293/2016004 (ML17045A524)) for additional discussion on the technical aspects of this issue.)

Entergy conducted a root cause evaluation for this event in CR-PNP-2016-06635. Entergy identified two root causes:

- Root Cause 1: Some planning personnel do not always know or understand work order planning standards documented in EN-FAP-WM-011, "Work Planning Standard," when including vendor or technical manual information in work orders.

- Root Cause 2: The site air operated valve test procedure for FV-642A/B was less than adequate in identifying degradation in the valve stem and packing performance.

The root cause evaluation also discussed the station's review of planning procedures that are used when generating work orders. The root cause evaluation stated, "This review identified that requirements of Section 3.7 of procedure [EN-]FAP-WM-011 as it relates to use of vendor manuals was not specifically followed as information from the vendor manual was not added to the work instructions in the [work order]."

Entergy documented two causal factors in the root cause evaluation that were combined to develop Root Cause 1:

- Maintenance planning procedure EN-FAP-WM-011 was not followed when developing detailed work instructions for wire assembly and installation which used vendor manual information.

- Critical maintenance work order planning standards when including vendor or technical manual information were not always known or understood by some planning personnel.

To address Root Cause 1, CR-PNP-2016-06635 identified CAPR-1, with two options. The following was excerpted from Entergy's root cause evaluation:

- Create and issue a site-specific procedure to implement a checklist to be used for critical maintenance work orders to verify the correct use of vendor and technical information as per the requirements of EN-FAP-WM-011 and expectations of maintenance and planning departments

- Revise existing fleet procedure EN-FAP-WM-011, documenting within the procedure that Section 3.7 is the CAPR together with revising Attachment 7.2, “Work Package Quality Checklist,” and requiring the planners to use the checklist on all critical maintenance work packages.

Additional non-CAPR corrective actions to address Root Cause 1 included implementing CAPR-1, applying the CAPR-1 checklist to all critical maintenance work orders that are currently planned and not implemented, communications to reinforce procedure use and adherence expectations, and a one-time training to qualified planners and project planners on EN-FAP-WM-011.

The NRC team noted that Section 5.8[2](a)(1) of EN-LI-102, “Corrective Action Process,” Revision 28, stated that the responsible manager must, “Ensure that a Root Cause Analysis is performed for Category ‘A’ CRs utilizing NMM EN-LI-118, Root Cause Analysis Process, and that appropriate CAPRs are issued.” The NRC team reviewed the root cause evaluation and interviewed Entergy personnel involved in drafting the root cause evaluation. The NRC team questioned how the corrective action plan, as written, would preclude repetition of Root Cause 1 and how CAPR-1 was sustainable. During interviews, Entergy personnel made clear that their view was that EN-FAP-WM-011, an “informational use” procedure, was adequate and provided sufficient detail to draft an appropriate work order. Per Entergy procedure EN-HU-106, “Procedure and Work Instruction Use and Adherence,” Revision 3, “informational use” procedures are not required to be in-hand during the performance of a task. The NRC team noted that one of the CAPR-1 options revised EN-FAP-WM-011 and the other created a site specific procedure that mirrors the subject requirements of EN-FAP-WM-011.

The NRC team could not reconcile how revising an already adequate “informational use” procedure, which was not understood, or creating a new site-specific procedure that mirrors the requirements of EN-FAP-WM-011, which was also going to be “informational use,” based on interviews, would ensure that planning personnel would always know and understand work order planning standards. Additionally, the NRC team noted that Entergy’s planned corrective actions did not ensure that new planners would be aware of the operating experience associated with this event and did not revise any initial or create any planner refresher training requirements, which could reasonably result in repetition of the issue.

As a result of the NRC team’s questions, Entergy stated that they planned to make the planning standard checklist of CAPR-1 “continuous use,” to ensure that planners will always have the checklist in hand when planning work to ensure that appropriate vendor technical information is always included in applicable work instructions. On January 26, 2017, “continuous use” procedure 1.13.2, “Vendor and Technical Information Reviews,” Revision 0, became effective to address CAPR-1 of the CR-PNP-2016-06635 root cause evaluation. Entergy entered the NRC team’s concerns in the corrective action program as CR-PNP-2017-00687 and CR-PNP-2017-00936.

Analysis. The NRC team determined that Entergy’s failure to develop appropriate CAPRs in accordance with procedure EN-LI-102, was a performance deficiency. The performance deficiency was more than minor because it was associated with the equipment performance attribute of the Initiating Events cornerstone and if left uncorrected, the performance deficiency would have the potential to lead to a more

significant safety concern. Specifically, if left uncorrected, the performance deficiency could have the potential to result in repetition of a significant condition adverse to quality, loss of control of feedwater regulating valve 642A and a manual scram, or a similar significant condition adverse to quality. The NRC team evaluated the finding using Exhibit 1, "Initiating Events Screening Questions," of IMC 0609, Appendix A, "Significance Determination Process for Findings At-Power," and determined this finding did not cause a reactor trip or the loss of mitigation equipment relied upon to transition the plant from the onset of a trip to a stable shutdown condition. Therefore, the NRC team determined the finding was of very low safety significance (Green). The NRC team determined that the finding had a cross-cutting aspect in the area of Human Performance, Procedure Adherence, because individuals did not follow processes, procedures, and work instructions. Specifically, Entergy did not follow procedure EN-LI-102, which provides the station standards for crafting a corrective action and states, in part, that the corrective action descriptions must be worded to ensure that the adverse condition or cause/factor is addressed [H.8].

Enforcement. Entergy failed to develop appropriate CAPRs for a significant condition adverse to quality in accordance with EN-LI-102, "Corrective Action Process," Revision 20. The NRC team did not identify a violation of regulatory requirements associated with this finding since the feedwater system is not a safety-related system. The issue was entered into Entergy's corrective action program as CR-PNP-2017-00687 and CR-PNP-2017-00936. Because this finding does not involve a violation and is of very low safety or security significance (Green), it is identified as a finding. **(FIN 05000293/2016011-03, Failure to Issue Appropriate Corrective Actions to Preclude Repetition for the Causes of the September 2016 Scram)**

5.4 Work Order Backlog Review for Significant Conditions Adverse to Quality and Conditions Adverse to Quality

5.4.1 NRC Inspection Scope

The NRC team performed a sample review of items contained in the work order system to verify that items were properly prioritized and conditions adverse to quality were corrected appropriately. PNPS had implemented corrective actions associated with the 95003 Recovery Plan to specifically address the work order backlog. These actions included trending historical open work orders against a threshold for acceptability and reassigning resources to other departments, as needed, to perform the necessary work.

5.4.2 NRC Inspection Observations and Assessment

PNPS's work order process was assessed against Entergy procedure EN-WM-100, "Work Request Generation, Screening, and Classification." The NRC team reviewed CRs that identified incorrect prioritization of work orders identified as a result of the 95003 recovery actions and observed the conduct of work order prioritization meetings. Through the review of documentation, the NRC team did not identify any work orders that were incorrectly prioritized or characterized for significant conditions adverse to quality or conditions adverse to quality. Overall, the NRC team

determined that the station was taking appropriate actions, in accordance with the IP 95003 Recovery Plan, to reduce the work order backlog.

5.4.3 NRC Inspection Findings

No findings were identified.

5.5 Implementation of the Trending and Performance Review Process

5.5.1 PNPS Evaluation Results and Key Corrective Actions

In the Corrective Action Program Fundamental Problem root cause evaluation, the trending program for adverse conditions was identified through the extent of condition review as an area that required improvement. Entergy's planned actions to address this area included use of a subject matter expert, on an interim and, to a lesser extent, long-term basis to provide training, coaching/mentoring, and oversight of the trending program. In addition, training was provided on various topics to the department improvement coordinators and department managers and supervisors who participated on the Performance Improvement Review Group. The Entergy trending and performance review process procedure was revised to enhance staff guidance.

5.5.2 NRC Inspection Scope

The NRC team reviewed Entergy's process for trending within the corrective action program to ensure that potential negative changes in performance were identified, evaluated, and corrected to prevent future problems. The NRC team reviewed documents, attended meetings, and conducted interviews with personnel who implement the program.

5.5.3 NRC Inspection Observations and Assessment

Overall, the NRC team noted that the station had shown improvement at identifying trends, including use of trend codes for CRs, and following the Entergy fleet procedure to evaluate and resolve those trends. The additional training and support from the subject matter expert had enhanced the department performance improvement coordinators' understanding of the process, how to collate data, and how to assess that data.

The NRC team identified performance gaps in the resolution of adverse trends or planned improvement actions. During review of the station's Aggregate Performance Review Meeting and Departmental Performance Review Meeting documentation, multiple examples were identified where improvement items were considered closed or resolved before all applicable actions had been completed. Per the fleet procedure, an item cannot be considered resolved until the CR is closed and clearly defined effectiveness measures, which focus on the underlying behaviors that led to a negative trend, were satisfactorily completed. However, Entergy was not implementing the effectiveness measures as described, and focused on the absence of events rather than the underlying behaviors. The NRC team also found examples of trends identified outside of an Aggregate Performance Review Meeting or Departmental Performance Review Meeting (i.e., documented in a CR) that were not

included in these review meetings so that the trend could be tracked to resolution. In these cases, corrective actions for the adverse trends or improvement items were not necessarily implemented to fix the problem. Entergy documented these observations in the corrective action program as CR-PNP-2017-00303, CR-PNP-2017-00307, and CR-PNP-2017-00330. The NRC team did not identify any examples where items for improvement were inappropriately considered closed that resulted in an adverse impact. In addition, the NRC team did not identify any examples where identified trends that were not subsequently reviewed in an Aggregate Performance Review Meeting or Departmental Performance Review Meeting resulted in an adverse impact. Therefore, the NRC team determined that these program implementation deficiencies were minor.

5.5.4 NRC Inspection Findings

No findings were identified

5.6 Corrective Action Program Implementation: Problem Identification

5.6.1 NRC Inspection Scope

The NRC team performed walkdowns of various plant systems to verify that Entergy was conducting appropriate system walkdowns, identifying issues with a low threshold, and completing appropriate corrective actions.

5.6.2 NRC Inspection Findings and Observations

During the walkdowns, the NRC team identified multiple minor equipment issues that were subsequently captured in the corrective action program. The NRC team assessed the identified issues and determined, for the most part, that they did not affect system performance or reliability. When issues were identified that could have the potential to adversely affect a system, the NRC team noted that those CRs were not always classified appropriately (for example, considered non-adverse conditions when they were adverse), were not initiated in a timely manner, or were not assigned operability/functionality assessments as required. As each specific example arose, those issues were discussed with Entergy and appropriate actions were taken. Specific concerns related to operability/functionality assessments are described in Section 6.3 of this report. These walkdowns illustrated the continued need for station improvement at identifying and entering items into the corrective action program and ensuring that issues are classified appropriately to support timely and effective decision-making and action.

5.6.3 NRC Inspection Findings

No findings were identified

5.7 Implementation of the Corrective Action Program during Recovery Evaluations

5.7.1 NRC Inspection Scope

The NRC team reviewed documents and reports generated for the IP 95003 recovery plan development and implementation. Through PNPS's recovery

evaluations, the station identified 773 negative observations and 177 standards performance deficiencies. The NRC team reviewed a sample of these negative observations and standards performance deficiencies to verify that they were included in the corrective action program appropriately and that identified issues were corrected in accordance with their safety significance.

The negative observations and standards performance deficiencies were then systematically evaluated by the PNPS Recovery Team to identify the overall fundamental problems and problem areas. Most of the negative observations and standards performance deficiencies were closed to corrective actions contained within the respective root and apparent cause evaluations for the different areas. In these cases, the NRC team verified whether the corrective actions adequately addressed the conditions described in the negative observations and standards performance deficiencies.

5.7.2 NRC Inspection Observations and Assessment

Overall, the NRC team determined that Entergy, using appropriate fleet procedures and guidance, systematically assessed conditions identified in the corrective action program to evaluate larger station performance issues in the formation of their fundamental problems and problem areas and corrective actions to address those performance issues.

Each section within this report discusses the individual fundamental problem and problem area evaluations conducted after the collective evaluation report was constructed. Issues identified during those specific reviews are discussed in their respective sections.

5.7.3 NRC Inspection Findings

No findings were identified.

5.8 Corrective Action Program Staffing and Training Adequacy

5.8.1 NRC Inspection Scope

The NRC team reviewed the station's staffing and training adequacy as they related to the implementation of the corrective action program. Entergy identified in the Corrective Action Program Fundamental Problem root cause evaluation report that inadequate training and a lack of resources were both contributing causes to the decline in standards and performance of the station in the area of corrective action program. Specifically, Contributing Cause 2 states, "PNPS personnel who initiate, disposition, and approve corrective action program products have not received adequate training commensurate with their corrective action program roles and responsibilities. This has resulted in unacceptable quality of some products." Contributing Cause 3 states, "PNPS leadership has not effectively managed the resources to implement and sustain the corrective action program. This resulted in declining corrective action program performance for the identification, evaluation and resolution of station issues."

Corrective actions from the corrective action program root cause evaluation were generated to address these areas. Training corrective actions focused on the initiation and closure of CRs for all site personnel; trending, CR classification, and closure requirements for the department improvement coordinators; and CR initiation and closure requirements for supervisors and above. In the area of resources, the site hired contractors to perform all cause evaluations (site personnel had their qualifications removed because of the insufficient products that were being generated based on inadequate training); brought in subject matter experts to provide oversight of corrective action program meetings, focusing on leadership behaviors, and reviews of all corrective action program products; and hired mentors to work with the station staff on improving the trending, operating experience, and self-assessment programs. Entergy also split the Performance Improvement group into one set of people specifically focused on core corrective action program responsibilities and one set of people focused on the other areas such as trending and operating experience. New qualification cards were generated for the department performance improvement coordinators to better define their roles and to adequately train them on their duties within the corrective action program.

5.8.2 NRC Inspection Observations and Assessment

Through interviews and document reviews, the NRC team reviewed Entergy's corrective actions and assessed if they were adequate to address the issues identified in the root cause evaluation report. Interviews with plant personnel who implement the corrective action program illustrated that training and resources were definitely lacking and sometimes inhibited proper performance of corrective action program responsibilities prior to the recovery efforts. The interviews also revealed that the new training and the department performance improvement coordinator qualification standard were helpful in realigning the station on the standards and expectations of the corrective action program and what each individual was responsible for within that program. The department performance improvement coordinators especially seemed to gain knowledge, clarification, and detail that was previously lacking. The NRC team noted this training was effective in the higher quality products generated and discussions held during the various corrective action program-related meetings.

The NRC team noted that most of the corrective actions associated with resources focused on hiring external personnel to fill in the gaps where the site's performance was inadequate. The NRC team noted that without all of the supplemental personnel, PNPS did not appear to have adequate resources to handle the work load in the corrective action program. For example, related to the performance of causal evaluations, PNPS would not have trained or qualified personnel to perform those duties if the supplemental resources left the station. In other cases, such as with the department performance improvement coordinators, some personnel with corrective action program responsibilities also have other duties to fulfill within the station's organization. While these actions were determined to be appropriate for interim measures, the NRC team discussed with PNPS the need to emphasize behavioral changes to ensure sustainability of improvements in areas where the site personnel were relying on subject matter experts or mentors to prevent errors from occurring. The NRC team also noted that corrective action program activities will continue to require strong support by Entergy to sustain improvements in this area.

5.8.3 NRC Inspection Findings

No findings were identified.

5.9 Self-Assessment and Benchmarking Activities

5.9.1 PNPS Evaluation Results and Key Corrective Actions

Through the Collective Evaluation process, Entergy identified that while no single event or action appears to have triggered their performance decline, a gradual decline of performance began at least five years ago but was not recognized in its early stages due to inadequate self-assessments.

Ineffective Performance Improvement Activities

Entergy performed a Comparative Assessment Review to determine whether weaknesses, similar to those identified during the ANO IP 95003 Recovery process, were present at PNPS. Similar to the ANO Corrective Action Program Fundamental Problem, and Performance Tools Problem Area, PNPS identified that implementation of performance improvement activities had not been effective. As a result, problems were left uncorrected until identified by external groups or self-revealing events occurred. Entergy identified that the performance improvement tools that were not used effectively included:

- Corrective Action Program
- Self-Assessments
- Benchmarking
- Performance Assessment
- Operating Experience
- Observations

The PNPS Recovery Team concluded during the Collective Evaluation process that the ineffective use of performance improvement tools was one of the problems indicative of a fundamental problem in the corrective action program, and that it would be further evaluated and addressed in CR-PNP-2016-00716, “Implementation of the Corrective Action Program 95003 Root Cause Evaluation.”

Entergy documented the following in the corrective action program root cause evaluation report:

- Contributing Cause 1 stated, in part, that “PNPS personnel…responsible for performance monitoring and oversight failed to provide adequate assessment of corrective action program performance. This contributed to leadership not recognizing the need for additional action to mitigate the corrective action program performance decline. The lack of self-critical assessments contributed to multiple problems that were either self-revealing or identified by external departments and agencies. The assessment process was not used by station leadership to self-identify the corrective action program implementation weaknesses in the early stages of decline.”

As a result of Entergy's extent of condition review, the object of the corrective action program root cause evaluation was expanded to include "Trending, Operating Experience, Self-Assessments and Benchmarking."

Entergy identified the following key corrective actions to address ineffective performance improvement activities:

- Require department performance improvement coordinators to review closed corrective actions for quality for priority level 1 and level 2 corrective actions and 50 percent of level 3 corrective actions. The intent of this action is to ensure station CR corrective action priorities 1 thru 3 actions are closed in accordance with corrective action program procedures and to provide feedback to individuals to improve closure quality.

- Develop and implement a performance scorecard for Condition Review Group, Corrective Action Review Board, and Self-Assessment Review Board meetings. This scorecard is to include ratings for leadership accountability, behaviors, and results expected during these meetings. The intent of this action is to improve Condition Review Group, Corrective Action Review Board, and Self-Assessment Review Board effectiveness by rating and trending performance results.

- The Entergy Corrective Action Program/Operating Experience Corporate Functional Area Manager is to evaluate the "Entergy Corrective Action Program Excellence Plan" (LO-HQNLO-2015-00073) and revise as necessary to ensure the plan incorporates the CR-PNP-2016-00716 root cause evaluation conditions and appropriate fleet corrective actions to address the identified corrective action program and problem identification and resolution program weaknesses (i.e. Identify, Evaluate, and Correct; Operational Experience; Trending; and Self-Assessments and Benchmarking).

- Assign a subject matter expert to coach and mentor personnel who implement the operating experience, trending, self-assessment, and benchmarking processes. The intent of this action is to provide data that supports the oversight provided by CAPR-1 for sustained improved performance.

<u>Ineffective Corporate Oversight</u>

The PNPS Recovery Team also concluded, during the Comparative Assessment Review, that similar to the ANO Corporate and Independent Oversight Fundamental Problem (i.e., NIOS), corporate organizations have not consistently monitored and evaluated PNPS performance to ensure performance gaps are identified and corrected in a timely manner. Corporate oversight did not routinely monitor station performance information through diverse means, such as personal observations and independent and line management oversight. As a result, the station had not always been effective in conducting timely and effective independent self-assessments, assuring that performance gaps are resolved, and that line management takes timely action to correct issues. Additionally, the corporate NIOS organization did not

consistently provide senior leaders with objective assessments of how site performance compares to the industry. This resulted in inadequate communication of issues to line management, lack of independence between NIOS personnel and the line organizations, and inconsistency with identifying substantial performance shortfalls.

The PNPS Recovery Team subsequently concluded that the issue of inconsistent corporate oversight was one of the problems indicative of a Nuclear Safety Culture (Leadership, Resources, and Oversight) Fundamental Problem, and that it would be further evaluated and addressed in CR-PNP-2016-02052, "Nuclear Safety Culture 95003 Root Cause Evaluation."

Entergy's nuclear safety culture root cause evaluation report documented the following:

- Contributing Cause 1: Corporate leaders and independent oversight organizations did not provide sufficient oversight of station performance to ensure timely resolution of emerging, repetitive and long-standing performance problems. This contributed to performance gaps not being resolved by the station.

Entergy identified the following key corrective actions in CR-PNP-2016-02052 to address ineffective corporate oversight:

- Perform benchmarking (by a current Management Review Meeting member) at an industry leading station on Operational Excellence Management Review Meeting content, leadership behaviors exhibited and execution of an Operational Excellence Management Review Meeting. The results will be contained in a benchmark report and documented along with action items in the corrective action program. The lessons-learned will be communicated to the members of the PNPS Operational Excellence Management Review Meeting. The intent of this corrective action is to determine what good looks like when it comes to Operational Excellence Management Review Meeting content, behaviors and execution and allow for needed improvements.

- Ensure the "Entergy Nuclear Sustainability Plan" addresses the issues documented in the root cause evaluation relating to corporate oversight and NIOS.

- Revise EN-FAP-OM-011, "Corporate Oversight Model," to include:

    - Station nuclear safety culture output from the Nuclear Safety Culture Monitoring Panel and the associated performance indicators as inputs to the Oversight Analysis Meeting and Oversight Review Board.

    - Once per trimester (approximately three times per year), leaders from the Operations Support, Engineering, Nuclear Oversight, and Licensing departments will hold an Oversight Analysis Meeting to evaluate plant performance and discuss any changes in plant categorization that should

be recommended to the corporate senior leadership team. The meeting will be chaired by a Vice President of Operations Support.

- Revise EN-FAP-OM-002, "Management Review Meetings," to prioritize review of nuclear safety culture status and regulatory performance to the Operational Excellence Management Review Meeting agenda.

5.9.2 NRC Inspection Scope

The NRC team reviewed a sample of, and processes for, audits and assessments conducted by the PNPS line organization, Entergy corporate, and both onsite and corporate NIOS organizations to evaluate program effectiveness and assess the appropriateness of station response. Specifically, the NRC team reviewed Entergy procedures EN-LI-104, "Assessments and Benchmarking," EN-FAP-OM-011, "Corporate Oversight Model," EN-LI-128, "Mid-Cycle Assessment Process," and EN-QV-109, "Audit Process," and reviewed a sample of historical and recent focused self-assessments, snapshot assessments, corporate mid-cycle assessments, onsite NIOS audits, and a corporate NIOS self-assessment of the Entergy Northern Fleet. The NRC team also interviewed station management, staff, and subject matter experts/mentors responsible for coaching and mentoring personnel who implement the self-assessment process. The NRC team reviewed a sampling of CRs, learning organization documents, NIOS findings, and Elevation/Escalation letters generated as a result of internal self-assessment/audit reports to assess the appropriateness and timeliness of the station management's support and response.

The NRC team also evaluated PNPS's recovery efforts to address the weaknesses identified in the areas of internal self-assessments, as documented in fundamental problem root cause evaluations CR-PNP-2016-00716, "Implementation of the Corrective Action Program," and CR-PNP-2016-02052, "Nuclear Safety Culture." See Sections 5.1 and 7.1 of this report, respectively, for a more detailed assessment of these fundamental problems.

Finally, the NRC team reviewed external assessments of PNPS to ensure that NRC perspectives of Entergy performance were consistent with any issues identified during these assessments. The NRC team also reviewed these reports to determine whether any significant safety issues were identified that required further NRC follow-up.

5.9.3 NRC Inspection Observations and Assessment

Internal Self-Assessments

The NRC inspection team evaluated the progress of Entergy's efforts to address the weaknesses identified in the area of internal self-assessments and concluded that Entergy's evaluation and characterization of the performance issues in the area of internal self-assessments were appropriate. The NRC team found that the population of internal self-assessments/audits reviewed were performed in accordance with the appropriate Entergy procedures, were generally self-critical, and appeared to be an effective means for PNPS to identify and assess performance issues. Particularly, the NRC team noted that the quality of the more recently-conducted assessments was generally higher, indicating ongoing

improvement in this area. The population of CR and learning organization documents reviewed were also appropriately resolved in a manner commensurate with their safety-significance, or had due dates that were reasonable.

Station Responsiveness to NIOS-Identified Issues

Regarding the NRC team's assessment of the responsiveness of station management to issues identified by the onsite NIOS group, through interviews, the NRC team concluded that, overall, the station's responsiveness/priority given to NIOS-identified issues has improved in the last couple of years and was generally viewed as adequate and on an improving trend. This recent improving trend was viewed to be largely driven by the reported improved relations between the NIOS manager and the Site Vice President and General Manager of Plant Operations.

Although the level of responsiveness received from the station on NIOS-identified issues was considered to be improving, interview results and NRC team observations reflected that the pace at which those issues were being resolved was not always consistent with the significance of the identified issue. For example, in May 2016, NIOS issued an elevation letter (CR-PNP-2016-03090) to the General Manager of Plant Operations regarding poor performance in Work Management due to the fact that important station work had continued to incur delays and was frequently unable to start as scheduled, or work groups encountered problems that delayed completion of work. Although short term improvements were noted following the issuance of that elevation letter, performance in Work Management proceeded to degrade once more, necessitating the issuance of an NIOS Escalation Letter (CR-PNP-2016-08099) to the Site Vice President in October 2016. The NRC team concluded that the persistence of this NIOS issue and the untimeliness of its overall resolution, illustrated that responsiveness given to NIOS-identified issues by station management required improvement. As of the time of this inspection, corrective actions to resolve this issue were still in progress.

External Assessments

The NRC team did not identify any additional safety-significant issues in PNPS's external assessments that required additional inspection follow-up.

5.9.4 NRC Inspection Findings

No findings were identified.

5.10 Use of Industry Information

5.10.1 PNPS Evaluation Results and Key Corrective Actions

Entergy did not identify that a significant contributor to performance problems at PNPS were deficiencies in the evaluation and use of operating experience. However, root cause evaluation CR-PNP-2016-00716 (Corrective Action Program Fundamental Problem) evaluated weaknesses in the implementation of the corrective action program, as well as conditions adverse to quality and significant conditions adverse to quality that are recurring and longstanding. As a part of the

CR-PNP-2016-00716 extent of cause evaluation, the station reviewed performance improvement programs including operating experience, trending, self-assessments, and benchmarking.

The CR-PNP-2016-00716 root cause evaluation described examples of weaknesses with the station's use of operating experience, including:

- A Standards Performance Deficiency (CR-PNP-2015-05829) regarding significant quality issues with identification and use of internal and external operating experience in Corrective Action Review Board-approved apparent cause evaluations at PNPS

- Corrective Action Audit, QA-3-2015-PNP-1 (CR-PNP-2015-04731), which concluded, "The Operating Experience Program is unsatisfactory due to backlog of untimely reviews and acknowledgements of [category "B1" operating experience]. This is a systemic problem across the site."

- Insights from the Standards Performance Deficiency assessment, which noted that some root and apparent cause evaluations did not use operating experience to help identify the causes which could leave PNPS more vulnerable to repeat events of the same or similar nature.

- CR-PNP-2016-01314, "Operating experience review was not used to aid in developing the specific root and contributing causes." PNPS closed this CR to CR-PNP-2016-00716 and considered this condition during performance of this root cause evaluation.

5.10.2 NRC Inspection Scope

The NRC team reviewed Entergy procedure EN-OE-100, "Operating Experience Program," Revision 26, interviewed PNPS operating experience staff members, and conducted plant walkdowns. The NRC team reviewed a sample of operating experience evaluations, as well as PNPS's use and consideration of applicable operating experience in recent cause evaluations.

5.10.3 NRC Inspection Observations and Assessment

Based on the samples selected for review, the NRC team determined Entergy generally implemented procedure EN-OE-100 adequately as it relates to sharing, screening, evaluating, implementing actions, and oversight for fleet and industry operating experience. However, the NRC team identified examples of issues with the implementation of the operating experience program. Specifically:

- The NRC team identified four operating experience records that were not screened as "B1" in accordance with Section 5.4 of EN-OE-100, Revision 26. The NRC team determined these issues to be of minor significance since the failure to adequately screen these operating experience records had no consequence, and the NRC team's concerns were entered into the corrective action program by Entergy as CR-HQN-2017-00049.

- The NRC team identified that although the condition analysis for the recent 'A' emergency diesel generator radiator cooling fan gearbox event (CR-PNP-2016-07743) included a review of internal and external operating experience, the review did not identify an external operating experience item related to a similar North Anna emergency diesel generator issue that occurred in September 2013. The NRC team later determined that Revision 23 of EN-LI-118, "Cause Evaluation Process," effective October 11, 2016, no longer requires an operating experience review for this level of cause evaluation. PNPS entered the NRC team's observation into the corrective action program as CR-PNP-2017-00935.

5.10.4 NRC Inspection Findings

No findings were identified.

5.11 Comprehensive Recovery Plan Metrics

5.11.1 NRC Inspection Scope

The NRC team developed an understanding of each individual metric and reviewed the performance of each metric since it was implemented and considered a recovery plan metric. The NRC team reviewed procedures related to the metric parameters being monitored, interviewed the metric and action plan owners, and assessed whether the metric could monitor for improved performance.

5.11.2 NRC Inspection Observations and Assessment

The NRC team identified no concerns with the metrics being monitored by Entergy. The NRC team determined that Entergy had effectively identified existing metrics that would enable them to monitor for improving performance. The NRC team determined that Entergy had established some leading indicators in an attempt to flag declining performance earlier, particularly related to a safety conscious work environment. The NRC team challenged Entergy as to why they believed using existing metrics would demonstrate improved performance. Entergy replied that the increased cooperation among managers and challenges among managers resulted in increased focus on monitoring the direction of the metrics being monitored. The NRC team determined that Entergy initiated corrective documents monthly for any metric identified as red. Entergy implemented this to ensure that they captured poor performance in their corrective action program. The NRC team determined that the level of detail being included with the metrics and the associated graphs continued to improve and provide for better assessment and planned corrective actions. Many of these improvements resulted from assessment comments provided by the quality assurance organization.

The NRC team determined that the increased focus on improving the items being assessed, the revised attitude towards improved performance, and the increased challenges among the managers created an atmosphere that should improve site performance. The NRC team identified no issues with the metrics being used to measure improved performance.

5.11.3 NRC Inspection Findings

No findings were identified.

6. Reactor Safety Strategic Performance Area

Human Performance Key Attribute *(IP 95003, Section 02.03c)*

6.1. Decision-Making and Risk-Recognition Fundamental Problem Area

6.1.1 PNPS Evaluation Results and Key Corrective Actions

PNPS determined that a fundamental problem existed in the area of decision-making and risk-recognition. Specifically, Entergy performed evaluations as part of the NRC IP 95003 preparation and identified that in some cases, risk-significant decisions were made by station leaders without recognizing and managing risk. Flawed risk-significant decisions had negatively impacted work processes, equipment reliability, and resulted in station events.

Entergy's decision-making and risk-recognition root cause evaluation (CR-PNP-2016-02054) documented that station procedures were inadequate to address planned maintenance on offsite transmission equipment, which led to a plant event; the station was found to not always apply a conservative bias when making decisions; longstanding weaknesses in the station's implementation of the preventive maintenance program indicated a lack of recognition of the risk; and, decision-making had been adversely impacted by flawed assumptions that resulted in risk being inappropriately accepted by individuals or the organization.

Entergy documented the following in the root cause evaluation report:

- Root Cause 1: Station leadership has not consistently exhibited behaviors that set the requisite standards and expectations for consequence-biased decision-making and effective operational risk management, consistent with a strong nuclear safety culture.

- Contributing Cause 1: Station leadership skills and knowledge are inadequate regarding the performance of operational risk assessments and associated decision-making.

- Contributing Cause 2: An effective risk assessment process has not been fully established for identifying and managing operational risks in a systematic, rigorous, and thorough manner, commensurate with a strong nuclear safety culture.

- Contributing Cause 3: Station leadership lacks a strong commitment to the corrective action and operating experience programs for the prevention of risk-significant station events.

- Contributing Cause 4: Station leadership has demonstrated insensitivity to regulatory risk.

- Contributing Cause 5: Entergy nuclear independent oversight organizations (i.e., NIOS and the Safety Review Committee) have not consistently performed timely and effective assessments, monitoring, and evaluation of station performance relative to risk-significant decision-making.

Entergy documented the following key corrective actions in the decision-making and risk-recognition root cause evaluation:

- CR-PNP-2016-02054 CA-24: (CAPR-1) Establish and institutionalize expectations and accompanying accountability for station leadership (i.e., supervisors and above) regarding consequence-biased decision-making and effective risk management. Incorporate these expectations formally into the continuous performance monitoring and feedback process in accordance with EN-FAP-OM-016, "Performance Management Processes and Practices", for station leadership (i.e., supervisors and above), with attendant accountability to change and shape behaviors, reinforce expectations and standards, and achieve the desired results.

- CR-PNP-2016-02054 CA-26: Augment the station staff with an external subject matter expert in the area of risk assessment as a full-time position to mentor and assess individual leadership behaviors and performance against the established leadership expectations. Perform observations of leadership performance against the established leadership expectations and provide feedback to that leader's Manager or Director.

- CR-PNP-2016-02054 CAs-36, 37: Conduct leadership training to reinforce the established station leadership expectations, specific principles related to Teamwork and for Integrated Risk Management and Decision-Making.

- CR-PNP-2016-02054 CA-38: Revise governing risk assessment procedures to include guidance in line with current industry standards.

6.1.2 NRC Inspection Scope

The NRC team reviewed the decision-making and risk-recognition root cause evaluation, CR-PNP-2016-02054, and supporting documents to assess: 1) whether the identification of risk-recognition and decision-making as a fundamental problem was appropriate; 2) whether the identified root and contributing causes were appropriate; 3) whether the corrective actions identified to address the root and contributing causes were appropriate; 4) whether the corrective actions that have been implemented were adequately implemented; 5) whether identified EFRs adequately assess the effectiveness of the corrective actions; 6) whether the implemented EFRs were adequately performed; and 7) through independent performance-based inspection, whether the overall problem was effectively addressed. Specific decision-making meetings observed by the NRC team during this review included:

- Critical Evolution Meetings;
- Plant Health Committee/Critical Decision Meeting;
- Leadership & Alignment Meetings;

- Critical Decision Meetings; and
- T-2 Technical Rigor Risk Review Meetings.

The NRC team also performed detailed assessments of the key corrective actions to evaluate whether they were developed appropriately to achieve their stated objectives. Through interviews, independent observations of station leaders in decision-making meetings, and document reviews, the NRC team evaluated if the corrective actions were being implemented as intended.

Establish and Institutionalize Expectations/Accountability (CAPR-1)

The NRC team reviewed and assessed implementation of CR-PNP-2016-02054 CA-24 (CAPR-1). Specifically, the NRC team:

- Assessed whether the new concepts were being demonstrated by station leaders

- Assessed whether risk assessment tools used to support decision-making were clear, understandable, and adequate

- Reviewed implementation of PNPS procedure 1.3.142, "PNPS Risk Review and Disposition," through a sampling of completed or in-progress risk reviews

Augmentation of Station Staff with Subject Matter Experts

The NRC team reviewed and assessed implementation of CR-PNP-2016-02054 CA-26. Specifically, the NRC team:

- Evaluated qualifications of subject matter experts through review of biographical information, resumes, work history, and interviews

- Observed subject matter experts in action, such as during decision-making meetings, to observe typical interactions with station management and personnel

- Reviewed assessment reports, CRs, and other pertinent written products generated by the subject matter experts to assess their effectiveness in improving plant performance

In addition to the decision-making/risk-recognition root cause evaluation, the NRC team also reviewed the following areas:

Long-Standing Equipment Issues

The NRC team reviewed and assessed decision-making regarding long-standing equipment issues. Particularly, for any unresolved long-term equipment issues (with a focus on degraded or non-conforming conditions of safety-related structures, systems, or components greater than one year old), the NRC team determined whether inadequate resources were a cause, or contributed to any inappropriate delay in resolving those issues.

In preparation for the IP 95003 inspection, PNPS performed an Allocation of Resources Performance Area Report, which was reviewed by the NRC team to assess whether Entergy corporate and PNPS had appropriately allocated resources for modifications and other important work activities to ensure consideration was given to safety (risk) and compliance with regulatory requirements. Further, the NRC team assessed whether Entergy had appropriately identified issues within this causal area and planned or implemented appropriate corrective actions.

Within this assessment, backlogs associated with modifications and other important work were assessed to determine whether resources were provided to ensure manageable workloads and prevent the need for workarounds (including operator workarounds) that could increase the likelihood of an initiating event or complicate accident mitigation.

The NRC team's conclusions were in line with PNPS's Allocation of Resources Performance Area Report. The following is excerpted from this report:

> Significant weaknesses were identified in all four objective areas [Operations, Engineering, Maintenance, and the Site-wide miscellaneous objective area, which includes such areas as Corrective Action Program, post-maintenance testing, unplanned limiting condition for operation entries, etc.]. Site backlog issues were seen in areas such as the level of capital spending, low staffing levels and issues with the corrective action program. Operations backlog issues were seen in operators' acceptance of longstanding issues. Engineering issues were seen in backlogs, [preventive maintenance] and acceptance of longstanding issues. Maintenance backlog issues were seen with the high backlog levels associated with maintenance items such as [preventive maintenance], work orders and leak repairs. In all areas, acceptance of risk and in some cases a lack of awareness of risk were identified.

The following excerpts from the Allocation of Resources Performance Area Report illustrate some of the specific observations Entergy identified during their assessment:

- The staffing level at PNPS was significantly below the average of other small boiling water reactors. The manning levels appear to be leading to an increase in backlogs.

- The staffing at PNPS from 2006 to 2014 had lowered by over 115 full-time equivalents as compared to the average small [boiling water reactor] staffing. The deviation is over 50 [full-time equivalents] when comparing to the median. (This data is based on Electric Utility Cost Group information.) As a consequence, the staffing levels appear to be leading to an increase in backlogs.

- [Fix-it-Now] team resources were inadequate to meet their objective to control the maintenance backlog. As a consequence, maintenance backlogs were growing larger and older.

- Work week manager staffing was at two [employees]. The normal staffing for this position is four.

- The magnitude of some backlogs in Maintenance, Work Planning, Engineering, Corrective Action and Operations are inconsistent with industry or fleet standard performance levels. The high backlogs pose increased risk to the site and reduce the ability to effectively understand and manage risk.

- Several safety and reliability-related plant or program upgrades had been deferred through several operating cycles. This deferral of work had increased the risk to the site.

- Risk reviews were not found or were weakly documented for some important backlogs and work deferrals. This led to a lack of understanding of the risk and potentially to the improper prioritization of work.

- In some cases, the PNPS team does not understand the funding process fully or for other reasons does not take the appropriate action to obtain funding for plant issues in a timely manner. As a consequence, resolution of issues have been delayed.

- CR-PNP-2014-01990 was written by NIOS due to multiple electrical calculations that exceeded the procedural direction for updating. Discussions with engineering personnel indicate that this backlog was due in part to the [Human Capital Management process].

- The performance improvement department was unable to provide the needed oversight of corrective action management, causal analysis quality, and trending.

Additionally, in preparation for the IP 95003 inspection, Entergy performed an assessment to compare the recent IP 95003 issues of ANO for possible applicability to PNPS. This third-party Comparative Assessment Review concluded that ANO's Organizational Capacity Problem Area (i.e., "resources") was applicable to PNPS, as documented in CR-PNP-2016-01465. Specifically, the Comparative Assessment Review stated:

> Review of historical data at [PNPS] suggests staffing and resources for each department or functional area needed to support their assigned responsibilities as well as to facilitate cross-functional responsibilities has not been consistently provided. Consideration and mitigation of the potential effects of organizational changes and staff reductions has not always been performed before these are initiated. As a result, the station has not always been effective with providing consistent support of the Work Management Process, effective resolution and mitigation of problems that could challenge safe plant operation, and managing collective dose (as examples).

The NRC team noted that Entergy did not classify "resources" as a stand-alone problem area in the Comprehensive Recovery Plan, but instead chose to address

the issue of "resources" by incorporation into the overarching Safety Culture Fundamental Problem, and addressed this area through the corrective actions associated with root cause evaluation CR-PNP-2016-02052. See Section 7.1 of this inspection report for the NRC team's assessment of this causal factor and associated corrective actions.

Comparison to ANO IP 95003 Issues

The NRC team reviewed the ANO IP 95003 inspection report and Comparative Assessment Review to determine whether the issues that were identified at ANO regarding decision-making/risk-management existed at PNPS, if they had been identified by Entergy, and whether appropriate corrective actions had been developed and implemented. Additionally, the NRC team determined whether the corrective actions implemented at ANO were also identified for implementation at PNPS, and if not, whether a reasonable basis existed for not implementing similar actions.

6.1.3 NRC Inspection Observations and Assessment

The NRC team concluded that Entergy's identification of decision-making/ risk-recognition as a fundamental problem was appropriate. The NRC team further concluded that the root and contributing causes were appropriately identified by Entergy and that the corrective actions developed by the station appeared to be appropriate to address the root and contributing causes.

The NRC team's evaluation of the adequacy of corrective actions that had been implemented included (at the time of inspection) 56 of the 63 corrective actions from the root cause evaluation that were complete. Of those corrective actions sampled, the NRC team determined that in some cases, more rigorous and consistent implementation was required. Examples are discussed below.

Establish and Institutionalize Expectations/Accountability (CAPR-1)

Through the review of Entergy's implementation of CAPR-1, the NRC team concluded that the new expectations regarding consequence-biased decision-making and effective risk management, created as a result of CAPR-1, were appropriately developed based on widely-accepted industry standards. Entergy's actions thus far in the area of CAPR-1 generally have had a positive impact in the decision-making onsite, however the NRC team had the following observations:

- The NRC team observed that, for the most part, station senior leadership appeared to be practicing and demonstrating the new expectations and concepts developed through CAPR-1. However, some station leaders (managers and first-line supervisors) from across multiple departments appeared to be lagging in their demonstration of the new decision-making principles and implementation of procedure 1.3.142, "PNPS Risk Review and Disposition," as described in the examples below:

    - An engineering manager directed the extension of 57 outage preventive maintenance activities on 4KV and 480V breakers (some of which were

critical, safety-related functions) without sufficient technical justification and did not utilize procedure 1.3.142, as intended by CAPR-1 (Reference CR-PNP-2016-07486). This issue was identified by the PNPS subject matter experts.

- An engineering manager stated, during an interview with the NRC team, that there was reluctance to remove an emergency diesel generator from service to perform extent of condition inspections for fear of incurring undesired system unavailability time from a maintenance rule metric standpoint.

- A control room supervisor failed to identify and challenge an emergency diesel generator relay testing workgroup on December 7, 2016, when they incorrectly presented their activities as low-risk, instead of high-risk due to the associated 24-hour technical specification limiting condition for operation. Following questions by a member of the NRC team observing the activity, the station realized the appropriate risk categorization and deferred the job until the appropriate, procedurally required actions (e.g., Critical Evolution Meeting, etc.) could take place. The NRC team determined this issue was minor because it only affected integrated risk, an administrative process, and did not impact the risk assessment required by 10 CFR 50.65(a)(4). Entergy documented this issue in the corrective action program as CR-PNP-2016-09739 and CR-PNP-2016-09740.

- An in-field instrumentation and controls supervisor failed to identify and take issue with multiple procedure non-compliances performed in his presence.

- An in-field instrumentation and controls supervisor disregarded a technician's comment regarding the apparent need for a procedure enhancement when difficulties were encountered during the execution of that procedure.

The NRC team's observations above suggested that the new standards and the 1.3.142 process as delineated by CAPR-1 were not consistently demonstrated by all levels of station leaders.

- One of the key actions in CAPR-1 was to formally incorporate the newly-developed expectations into the continuous performance monitoring and feedback process in accordance with EN-FAP-OM-016, "Performance Management Processes and Practices," for station leadership, with attendant accountability. One of the ways in which Entergy planned to do so was by utilizing the progressive Performance Management Model, including the use of Targeted Performance Improvement Plans and Performance Improvement Plans as appropriate, to change and shape behaviors, reinforce expectations and standards, and achieve the desired results. The NRC team determined that the Targeted Performance Improvement Plans were inadequate. (See Section 7.1 of this inspection report for a detailed discussion of this issue.)

- Regarding the NRC team's evaluation of whether the risk-assessment tools used to support decision-making are clear, understandable, and adequate, the NRC team concluded, through a review of procedure 1.3.142, "PNPS Risk Review and Disposition," Revisions 5, 6, and a draft of Revision 7, that the procedure appeared sufficient to achieve its intended objective, provided it is initiated when entry criteria are met and implemented with sufficient rigor. With each subsequent revision reviewed, procedure 1.3.142 included more clarification and explanation in sections where practice had revealed a need for clarity to make the procedure more easily understood. The NRC team concluded that the reviews completed in accordance with the 1.3.142 procedure are adequate to increase station sensitivity to integrated risk and conservative decision-making, as outlined in CAPR-1, provided it is used appropriately.

- Through a sampling of completed or in-progress reviews conducted by Entergy in accordance with procedure 1.3.142, "PNPS Risk Review and Disposition," the NRC team noted that the station's implementation of the procedure was generally adequate. The risk decisions/deferrals that the station chose as a result of this process appeared to be prudent, though with varying levels of rigor demonstrated in the technical justifications.

  The NRC team noted that from October to December 2016, subject matter expert observations/reports identified that Entergy was not initiating a risk review per procedure 1.3.142 as intended, nor sufficiently implementing all of the procedure requirements when used for important risk decisions. As an example, the subject matter experts identified various inconsistencies in the implementation of procedure 1.3.142, such as the station's decision to use a less restrictive corporate outage deferral process for a number of outage planning decisions. Additionally, at the time, staff interviews revealed the belief that entry into/use of the procedure was largely voluntary and subject to management discretion, which led to inconsistent use of the process. At that time, however, procedure 1.3.142 had just undergone a major revision, and staff/management training was still underway. The subject matter experts assisted in the development of the training materials and job aids. Those revisions were intended to assist the performers to better understand and execute the various criteria located throughout the procedure. Following the training and roll-out of the procedure revision, some improvements were noted in the level of initiation, thoroughness, and overall quality of completion of the reviews conducted in accordance with procedure 1.3.142; however, continued failures to utilize this process and additional cases of insufficient detail/basis in the packages prompted the need for another major procedure revision, which at the time of this inspection had not been completed.

- Entergy developed three EFRs in CR-PNP-2016-02054: EFR-1, an interim review to ensure improving trends towards the success goals established in EFR-2, which is the final EFR; and EFR-3, which was developed for the non-CAPR corrective actions in the root cause evaluation. In accordance with EFR-1, the first assessment was to be completed in October 2016. Subsequent assessments were to be completed in the month following the end of each subsequent quarter, until the final EFR was completed and determined whether the corrective actions had been effective. However, the

NRC team identified that Entergy failed to perform the first assessment in October 2016. Entergy entered the issue into their corrective action program as CR-PNP-2016-09717 and retroactively performed the October EFR in January 2017. This EFR noted that CAPR-1 (CR-PNP-2016-02054 CA-24) was closed on October 13, 2016, which was two weeks after the EFR assessment period. Therefore, because CAPR-1 was not yet fully implemented, Entergy could not evaluate the effectiveness of the action, and concluded that the EFR was "indeterminate."

Augmentation of Station Staff with Subject Matter Experts

Through the review of Entergy's implementation of CA-26, the NRC team concluded that the decision-making/risk-recognition subject matter experts were technically qualified to act in the capacity of subject matter experts in their areas. A sample of CRs generated by the subject matter experts in this area were reviewed. Additionally, a sampling of recent bi-weekly/monthly subject matter expert roll-up reports were reviewed. The bi-weekly/monthly reports were of high quality and contained critical and constructive critiques of PNPS leadership and staff behaviors along with recommendations for improvement in the area of decision-making and risk-recognition. The NRC team concluded that the subject matter experts appeared to have a positive impact on the improvement/recovery efforts of the station.

The nature of the subject matter expert's interactions with PNPS leaders was observed to be one of a consultation/recommendation-based relationship, so the subject matter experts had no direct decision-making or line management authority, other than the ability to generate CRs. In the interactions observed by the NRC team, the PNPS senior leaders were generally receptive to the feedback and took actions to address those items. However, based on interviews and a review of current open corrective action program items generated by the subject matter experts, the NRC team noted resistance to the improvement recommendations of the subject matter experts by some station managers. For example, in reference to CR-PNP-2016-07486, subject matter experts identified that numerous outage preventive maintenance activities were extended without sufficient technical justification and without conducting a risk review in accordance with procedure 1.3.142, "PNPS Risk Review and Disposition." After challenging the engineering department on the lack of sufficient justification, another corrective action program action item was created for engineering to review and enhance the original justifications. This follow-up action, however, was still not completed to the level of rigor or standards that the subject matter expert believed to be necessary to be in alignment with station procedures and CAPR-1, so the subject matter expert elevated the issue to senior management to drive a satisfactory resolution. At the conclusion of the onsite weeks of this inspection, the resolution of this issue was still in progress.

The NRC team noted that the subject matter experts had recently shifted their approach to directly writing CRs for identified issues instead of their previous approach of attempting to first influence the station staff to self-identify the issue, as a more effective way of impacting changes in station behavior. Additionally, the NRC team noted that, as of the end of this inspection, the decision-making/risk-recognition subject matter experts were instructed by the Site Vice President to focus more attention directly on mentoring and coaching the operations shift managers as an additional means of improving operations department decisions and behaviors.

Long-Standing Equipment Issues

Regarding the NRC team's assessment of Entergy's decision-making regarding long-standing equipment issues, the station provided the NRC team with a list of all degraded or non-conforming conditions greater than one year old, with the oldest current open degraded or non-conforming condition identified in 2011. Through a review of CRs, work order backlogs, and interviews, the NRC team determined that none of the identified long-standing degraded or non-conforming conditions were attributed to a lack of resources (funding or staffing) or an inappropriate decision impacting resources. The topic of Entergy's allocation of resources, in general, is evaluated in Section 7.1 of this inspection report.

Comparison to ANO IP 95003 Issues

The NRC team concluded that Entergy's Comparative Assessment Review adequately identified the ANO IP 95003 issues that were applicable to PNPS. Particularly, in the area of decision-making/risk-recognition, the station identified that decision-making/risk-recognition was also a fundamental problem at PNPS. The following excerpt from the ANO IP 95003 inspection report documents ANO's deficiencies regarding the identification of appropriate causal factors associated with risk-recognition problem that was also identified at PNPS:

> The Decision Making and Risk Management root cause evaluation focused on decision-making as the problem and risk management issues as a consequence, resulting in having inadequate corrective actions to address risk management and recognition. The NRC team identified examples that indicated ANO failed to manage risk because they failed to recognize conditions that required a risk assessment. In response, ANO developed a series of corrective actions that appear to address the symptoms, but no cause analysis was performed.

This operating experience from ANO's IP 95003 inspection was appropriately incorporated at PNPS. Additionally, the NRC team concluded that Entergy provided sufficient justification to explain why some of the ANO issues did not apply or differed from PNPS, and that the corrective actions developed by Entergy in this area were appropriate.

6.1.4 NRC Inspection Findings

No findings were identified.

6.2 Procedure Use and Adherence Problem Area

6.2.1 PNPS Evaluation Results and Key Corrective Actions

Entergy determined that procedure use and adherence was a problem area and initiated CR-PNP-2016-02059 to determine an apparent cause and establish corrective actions to resolve those causes. Entergy classified the CR as a Category 'B' and performed an apparent cause evaluation. The following is excerpted from Entergy's apparent cause evaluation:

- Direct Cause: Station personnel do not consistently ensure that all applicable requirements of “Informational Use” procedures are identified and followed.

- Apparent Cause: Senior management had not effectively set the expectation that guidance contained in “Informational Use” procedures will be identified and implemented.

- Contributing Cause 1: Supervisors do not reinforce the standard that guidance contained in “Informational Use” procedures is identified and implemented.

- Contributing Cause 2: Performance monitoring and trending were not being effectively used to identify behaviors of not following “Informational Use” procedures.

- Contributing Cause 3: The work culture at PNPS values timely work completion over compliance with “Informational Use” procedure guidance.

Entergy developed the following key corrective actions in the apparent cause evaluation:

- CR-PNP-2016-02059 CA-16, 17, 18: Senior site leadership issued and communicated, via an all-hands meeting, a “Procedure Use and Adherence Expectations” document. This document covered procedure use and adherence expectations for “Informational Use,” as well as “Reference Use” and “Continuous Use” procedures.

- CR-PNP-2016-02059 CA-19: Senior site leadership required a signed acknowledgement of the expectations by all staff at a supervisor and above level that stated they had not only received, but understood those expectations as well.

- CR-PNP-2016-02059 CAs-31– 40, 42, 43: Site department managers communicate senior management’s procedure use and adherence expectations once per quarter for a year.

- CR-PNP-2016-02059 CA-21: Maintenance Manager initiate weekly meetings with scheduled “most error-likely task” observers to provide expectations for human performance observations, including observation of procedure use and adherence with “informational use” procedures.

- CR-PNP-2016-02059 CA-28: Create a new 95003 human performance “What it Looks Like (WILL)” sheet to include procedure use and adherence observation attributes.

- CR-PNP-2016-02059 CA-29: Perform observations using the 95003 human performance WILL sheet concurrently with the performance of human performance observations for the assessment period of one year (until June 1, 2017), or until closure of EFR PNPLO-2016-0002 CA-13.

- CR-PNP-2016-02059 CAs-22–27: Develop trend codes for procedure use and adherence associated with “informational use,” “reference use,” and “continuous use” procedures; train all department performance improvement coordinators on how to use the trend codes; and incorporate procedure use and adherence issues into the Aggregate Performance Review Meeting.

In addition, Entergy established an EFR that was scheduled to be completed by June 2017. The EFR was expected to review a monthly snapshot of IP 95003 Human Performance WILL sheets specific to procedure use and adherence over the period specified. The identified success criteria was an improving trend over the assessment period.

6.2.2 NRC Inspection Scope

The NRC team reviewed Entergy’s procedure use and adherence apparent cause evaluation (CR-PNP-2016-02059) as well as completed and planned corrective actions. The NRC team also interviewed PNPS personnel (maintenance, operations, and management), observed pre-job briefs for maintenance and surveillance activities, and observed the performance of those maintenance and surveillance activities. Furthermore, the NRC team observed the use of the IP 95003 Human Performance WILL sheets and interviewed those supervisors who had completed “most error-likely task” observations and used those WILL sheets.

6.2.3 NRC Inspection Observations and Assessment

Overall Assessment for the Procedure Use and Adherence Problem Area

The NRC team concluded that identification of procedure use and adherence as a problem area was appropriate, and continued to be appropriate as the NRC team identified that PNPS continued to experience problems with procedure use and adherence, especially with “informational use” procedures. These problems were continuing despite most of the corrective actions developed for the apparent and contributing causes having been implemented by Entergy. The NRC team identified that Entergy was not monitoring the monthly snapshot IP 95003 Human Performance assessments, as discussed in Section 6.2.1. The NRC team also identified that corrective actions for Contributing Cause 3 were not adequate. Each of these issues is discussed in more detail below.

Examples of Continued Procedural Adherence Issues

The following were instances reviewed or identified by the NRC that demonstrate a continued issue with the station’s performance related to procedure use and adherence.

- While observing a paired observation on November 28, 2016, using “continuous use” Procedure 8.E.29.1, “Salt Service Water Instrumentation Calibration and Functional Test,” Revision 19, the NRC team found several instances where the technician did not follow and worked around procedure weaknesses. For example, a step in the procedure was not completed, as tygon tubing was left in place instead of being removed. This was rationalized by the technician because the following step directed the

technician reinstall the tube. The paired observer and the supervisor were interviewed and Entergy wrote CR-PNP-2016-09303 to address these items.

- While preparing for a paired observation, the NRC team identified that the risk for a degraded voltage test was improperly assessed as low, instead of high, as required by Entergy procedure EN-WM-104, "On-Line Risk Assessment," Attachment 9.3, due to the associated 24-hour technical specification limiting condition for operation. Following questions by a member of the NRC team observing the activity, the station realized the appropriate risk categorization and deferred the job until the appropriate, procedurally required actions (e.g., Critical Evolution Meeting, etc.) could take place. The NRC team determined this issue was minor because it only affected integrated risk, a process that dictates requirements for items such as work oversight, preparation meetings, review/approval, etc., and did not impact the reactor safety risk assessment required by 10 CFR 50.65(a)(4). Entergy documented this issue in the corrective action program as CR-PNP-2016-09739.

- The NRC team identified that "informational use" procedure EN-WM-104, "On Line Risk Assessment," Revision 15, was recently revised and approved on December 1, 2016, but as of December 6, 2016, the site continued to use Revision 14 of the procedure. Entergy documented this issue in CR-PNP-2016-09666. The issue was corrected the same day.

- On January 4, 2017, while discussing trend reviews and EN-LI-121, "Trending Performance and Review Process," one of the Entergy team members used the wrong revision. This is an "informational use" procedure.

- On January 11, 2017, the NRC team identified an inadequate shift manager turnover where the on-coming shift manager failed to sign into the logbook prior to the off-going shift manager leaving the site. The shift managers did perform a face-to-face turnover and did walk down the control room panels, and at no time was the control room without a shift manager. The NRC team determined that this turnover was not in accordance with "informational use" procedure EN-OP-115-03, "Shift Turnover and Relief," Revision 2. Entergy entered this issue into the corrective action program as CR-PNP-2017-00445. This issue is discussed further in Section 6.4.

Assessment of Apparent Cause Evaluation, Identified Causes, and Corrective Actions

The NRC team reviewed the apparent cause and determined that in general, the identified causes and corrective actions appeared adequate, and, if properly implemented and enforced, should result in improved performance in procedure use and adherence. However, the NRC team noted weaknesses in Entergy's corrective actions to address Contributing Cause 3. Entergy stated that Contributing Cause 3 was, "The work culture at [PNPS] continues to value timely completion of work over compliance with "informational use" procedural guidance." Entergy has taken, or plans to take, the following corrective actions to address this issue:

- Distribute senior site leadership's procedure use and adherence expectations document

- Present senior site leadership expectations at one "all-hands" meeting

- Perform (and continue to perform) 95003 Human Performance WILL sheet observations to observe and coach procedure use and adherence activities during "most error-likely task" activities

- Discuss the procedure use and adherence expectations during pre-job briefs

The NRC team determined that although the corrective actions detailed above had been implemented, and the work staff was aware of management's expectation, Entergy continued to struggle to demonstrate consistent performance in procedure use and adherence area. The NRC team determined that in some cases, station management did not always schedule and plan work to provide high assurance that station staff could succeed. For example, the performance of a degraded voltage surveillance activity was scheduled on the due date (November 30, 2016) and the staff knew that if the surveillance activity was not performed by midnight, the station would be in a 24-hour shutdown technical specification limiting condition for operation. The surveillance test included the completion of four similar attachments for four channels of equipment. The NRC team observed the performance of the first attachment, which required about2 hours to complete. The maintenance crew continued with the other three attachments after the NRC team completed their in-field observation. The NRC team reviewed the test records the next day and discovered that the remaining three attachments cumulatively required only about 2.5 hours to complete. The NRC team attributed the difference in time required to perform the attachments on the remaining channels to time pressure, due to the impending 24-hour technical specification action statement; the fact that the last three channels were not being observed by the NRC team; and work scheduling, which placed the workers in a position where they felt that they needed to complete the activity as soon as possible. The NRC team reviewed the scheduling of this surveillance and found that the activity was originally scheduled a couple of days prior, though still very close to the deadline for completion. However, the surveillance test had to be rescheduled due to an emergent issue requiring movement of a control rod drive unit. Sometimes, the scheduling of work items had such little margin that any perturbation placed the site in a "must" complete situation and potentially pressured the workers to complete these tasks with minimal time.

The NRC team observed a pre-job brief for a logic system functional test on December 1, 2016, which was to be performed by the same group of workers that worked the evening before and performed the degraded voltage surveillance test. Due to a needed procedure change stemming from an EC, and limited time to complete the task due to fatigue rule requirements, the logic system functional test was postponed. The NRC team interviewed the workers and determined that not only was there a lack of qualified technicians to perform these type of surveillances, the station was not likely to staff more fully-qualified technicians in the future due to the planned permanent plant shutdown in 2019. The NRC team also determined that the logic system functional test would normally be completed in about 4 hours, although the work week schedule had the activity scheduled for 8 hours. The

supervisor, when asked directly, stated that the activity would take the better part of 8 hours. It was apparent to the NRC team that the workers were completing the surveillance in much less time than the scheduled duration or what was expected by supervision for the activity. Based on interviews with the maintenance manager, the NRC team learned that additional resources appeared necessary in some maintenance departments, including instrumentation and control, and the electrical lab group. Entergy documented this observation in CR-PNP-2017-00365. The NRC team observed that there were apparent limitations in the number of well-qualified personnel in some areas of maintenance.

The NRC team also explored the needed procedure change that delayed the logic system functional test surveillance activity. The NRC team determined that there were numerous maintenance procedures that were planned for enhancement. The NRC team did not identify any procedures that could not be performed as written; however, nearly all of the maintenance procedures reviewed required some identified enhancement to remove human error performance traps or to better represent how the activity was to be implemented. The NRC team further discovered that there are multiple processes available to change procedures, but none appear to be very effective, and the backlog of procedure changes are not effectively tracked or managed to completion. Entergy documented this observation in CR-PNP-2017-00295.

These examples, coupled with the information discussed in Section 6.13 (Work Management Problem Area) related to scheduling of work at the station, led the NRC team to conclude that while station management was communicating the importance of procedure use and adherence over the timely completion of work, in actual practice, station management had not yet aligned the programs, processes, and resources to ensure that the workers were positioned for success to value procedure use and adherence, especially “informational use” procedures, over timely completion of work activities. Entergy initiated CR-PNP-2017-00296 and CR-PNP-2017-00399 to evaluate this NRC-identified concern.

Assessment of the Planned EFR

The NRC team identified that the monthly snapshot 95003 Human Performance Assessments indicated that performance in procedure use and adherence was stagnant, and had not improved since inception. Furthermore, with the exception of NIOS, Entergy had not been reviewing these assessments, and was not aware of this stagnant performance. Therefore, Entergy was not taking any corrective action to evaluate and improve performance. The NRC team informed Entergy of this observation at about the same time that NIOS informed the station of this issue as a part of the IP 95003 corrective action follow-up. Entergy acknowledged that the station was not reviewing the monthly snapshot 95003 Human Performance Assessments, did not recognize the stagnant trend, and did not evaluate corrective actions. Entergy wrote CR-PNP-2016-10326 and subsequently closed this CR to CR-PNP-2016-02059. Entergy added corrective actions to the CR-PNP-2016-02059 corrective action plan to review the monthly assessments and to incorporate CR trend reviews.

In addition to identifying that the trend for procedure use and adherence had not improved, the NRC team identified, from the review of the monthly snapshot 95003

Human Performance Assessments, that the number one “at-risk” observation in the assessments was the failure of supervisors and workers to stay in their roles and responsibilities. Entergy had not identified this issue. The NRC team communicated to Entergy that the failure to identify that staff were not maintaining their roles and responsibilities represented an opportunity to, on a real-time basis, impart expectations for procedure use and adherence as well as get the immediate feedback as to why the staff felt the need to step out of their roles. Maintaining roles and responsibilities was key in improving plant performance, but had gone unrecognized because the snapshot assessments were not being reviewed. Entergy initiated CR-PNP-2017-00366 to evaluate the NRC-identified concern.

6.2.4 NRC Findings

No findings were identified.

6.3 Operability Determinations and Functionality Assessments

6.3.1 PNPS Evaluation Results and Key Corrective Actions

During the station’s 95003 recovery evaluations, Entergy determined a standards performance deficiency existed in the area of operability determinations. The Collective Evaluation Team determined that there was insufficient data to support an elevation of this deficiency to a fundamental problem or a problem area. Specifically, the issue identified was that operability determinations and functionality assessments did not always meet the requirements of Entergy procedure EN-OP-104, “Operability Determination Process.” Entergy issued CR-PNP-2016-01340 for this issue, classified the CR as a Category ‘B,’ and performed an apparent cause evaluation. Entergy’s final apparent cause evaluation documented the following causes:

- Apparent Cause: Licensed senior reactor operators had less than adequate task knowledge for performance of operability determinations and functionality assessments. The site management had failed to ensure that the licensed senior reactor operators at PNPS had sufficient knowledge, skills, and abilities to perform the safety significant task of operability determinations and functionality assessments accurately and consistently.

- Contributing Cause 1: The workload for performing operability determinations and functionality assessments exceeds the capacity of the normal senior reactor operator shift complement to perform high quality determinations during periods of peak activity.

- Contributing Cause 2: PNPS management has not been sufficiently intrusive in the operability determination and functionality assessment process and have allowed incomplete and inadequate operability determinations and functionality assessments to go unidentified and unchallenged.

Entergy developed the following key corrective actions:

- CR-PNP-2016-01340 CAs-70-73: Subject matter expert to construct a training course that included training on the operability determination process

and very task-specific training on the station's operability determination procedure, EN-OP-104, "Operability Determination Process." The initial and continuing senior reactor operator training programs were revised to incorporate the new training on the operability determination and functionality assessment process. Once revised, all senior reactor operators, including those in initial licensing class, were trained.

- CR-PNP-2016-01340 CA-10: Establish an industry subject matter expert operability determination/functionality assessment mentor to provide daily oversight and one-on-one coaching on operability determinations and functionality assessments for shift senior reactor operators.

- CR-PNP-2016-01340 CA-35: Establish an Operability Determination Challenge Review Board. This board will review all CRs and all operability determinations and functionality assessments every business day, grade the quality of the operability determination/functionality assessment, and communicate results to each of the operating crews on a weekly basis. The intent of this board is to provide consistent, sustainable oversight to the operability determination and functionality assessment process.

- CR-PNP-2016-01340 CAs-78, 79: Develop and implement a plan to supplement the control room staff during normal business hours with a licensed senior reactor operator once the next class of senior reactor operators receive their NRC licenses in March 2017. PNPS implemented an interim corrective action to supplement the control room staff by assigning a contracted subject matter expert to assist in developing operability determinations and functionality assessments on a daily basis.

Entergy established an EFR that consisted of quarterly snapshot assessments of the monthly roll-ups of the weekly Operability Determination Challenge Review Board observations. The EFR was to review only the third and fourth quarter 2016 snapshots for improved performance.

6.3.2 NRC Inspection Scope

The NRC team performed a thorough review of Entergy's operability determination/functionality assessment apparent cause evaluation, as well as the completed and planned corrective actions as stated in CR-PNP-2016-01340. The NRC team interviewed senior reactor operators, shift managers, operations and assistant operations managers, other staff who are familiar with the operability determination and functionality assessment process, and the subject matter expert hired to be the mentor for this process. The NRC team also observed numerous Operability Determination Challenge Review Board daily meetings.

Additionally, the NRC team reviewed and assessed the adequacy of Entergy procedure EN-OP-104, "Operability Determination Process," the CRs closed to CR-PNP-2016-01340, the current operability determination and functionality assessment program, and longstanding operability decision-making issues.

6.3.3 NRC Inspection Observations and Assessment

Overall Assessment of Operability Determinations and Functionality Assessments

The NRC team concluded that the identification of a standards performance deficiency in the area of operability determinations and functionality assessments during the station's recovery evaluations was appropriate. Entergy has implemented a significant number of corrective actions to improve the technical competence of the licensed senior reactor operators who perform and approve operability determinations and functionality assessments; to improve management oversight of the operability determination and functionality assessment program and associated products; and to supplement the normal dayshift operating crew with additional resources to assist with the workload. The NRC team determined that PNPS had made significant improvements in the application and implementation of the operability determination and functionality assessment program. However, the NRC team also concluded that Entergy continued to have some issues with the operability determination and functionality assessment process related to the technical rigor and quality of engineering support. This was evident in the NRC-identified issues that are discussed in Section 6.3.4 of this inspection report.

The NRC team determined that Entergy had established a well-defined and prescriptive procedure that provided appropriate guidance for conducting operability evaluations. The NRC team selected portions of the operability procedure to verify that it appropriately incorporated guidance available in the industry including the information contained in NRC IMC 0326, "Operability Determinations & Functionality Assessments for Conditions Adverse to Quality or Safety," dated December 3, 2015.

Assessment of the Apparent Cause Evaluation, Identified Causes, and Corrective Actions

The NRC team reviewed the apparent cause evaluation and determined that the identified causes and corrective actions appeared to be adequate. The corrective actions planned and taken have resulted, and should continue to result, in improved performance in implementation of the operability determination program. Entergy developed an operability determination and functionality assessment improvement action plan to address the lack of technical competency for the licensed senior reactor operators and to address operations management oversight of the program. The last contributing cause related to workload exceeding the capacity of the normal senior reactor operator shift compliment to perform high quality operability determinations and functionality assessments was being addressed by a staffing plan that, as of the date of this inspection, had not been developed in writing. However, the NRC team discussed the concept of the plan in an interview with the manager of operations.

Assessment of Actions to Address the Apparent Cause: Task Knowledge

Entergy hired a subject matter expert with substantial experience in developing and implementing operability determination programs and processes. The subject matter expert had previous experience with sites that had undergone NRC IP 95003 recovery efforts. The subject matter expert assisted in the apparent cause evaluation, and in developing and implementing interim and final corrective actions.

As an immediate, interim corrective action, the contractor served as a mentor for the senior reactor operators on shift. This individual spent most of his time in the control room advising and coaching the senior reactor operator staff. The subject matter expert also developed training to improve the skills of senior reactor operators to perform quality operability determinations and functionality assessments. The NRC team reviewed the training materials and determined them to be adequate for the stated purpose.

Entergy also developed several other "operator aids" to assist the senior reactor operators in developing quality operability determinations and functionality assessments and to ensure the correct determination on operability was made. These "operator aids" included:

- Development of a template to be used in the corrective action program to ensure that all applicable operability determination and functionality assessment items were properly addressed for compliance with EN-OP-104, "Operability Determination Process," and NRC IMC 0326, "Operability Determinations & Functionality Assessments for Conditions Adverse to Quality or Safety"

- Development of a list of Maintenance Rule systems and components (safety-related and non-safety-related) that were classified as high risk

- Development of a list of mission times for safety-related structures, systems, and components

Based on interviews, the NRC team determined that all licensed senior reactor operators demonstrated that these job aides were not the final word on operability input, and that they alone were responsible for making accurate and timely operability determinations.

The NRC team determined that the corrective actions described above had enhanced the ability of the licensed senior reactor operators to properly implement the operability determination and functionality assessment program, and their ability to produce accurate operability determinations and functionality assessments. However, the NRC team determined that more improvement was needed in implementing the operability determination and functionality assessment process. Specifically, the NRC team identified some examples where operations had failed to enter the operability determination process, and/or engineering failed to provide adequate operability input, in that the input lacked technical rigor and proper review of the current licensing basis (see Section 6.3.4). It is important to note that the NRC team determined the cross-cutting aspect, the cause that contributed most to the performance deficiency, was in the area Human Performance, associated with Teamwork. Although not the only possible cause, the NRC team determined that the operations and engineering departments did not demonstrate a strong sense of collaboration and cooperation with respect to holding each other accountable to ensure nuclear safety was maintained.

Assessment of Actions to Address Contributing Cause 1: Workload

Entergy implemented interim compensatory measures to address this contributing cause. There were two final corrective actions planned that were not yet completed at the time of this inspection: develop a staffing plan, and implement that staffing plan. The operations manager verbally stated that his plan would be to assign a dayshift position to be filled, on a rotational basis, by a licensed senior reactor operator to assist the operations crew with operability determination and functionality assessment workload issues. This action would take place after the current initial licensed operator class is completed in March 2017, because PNPS did not have the resources available to support this action. As an interim compensatory measure, the subject matter expert, initially assigned to act as a mentor to the on-shift senior reactor operators to implement the operability determination and functionality assessment process, was reassigned in November 2016, to assist in developing operability determinations and functionality assessments to alleviate some of the workload.

The NRC team did not directly assess the workload on operations. However, based on review of the data in the cause evaluation and interviews with station staff, the NRC team determined that some of the CRs that were written on a daily basis are representative of a normal, expected workload. The NRC team also determined that other departments doing work, inspections, and walkdowns of the plant could take some action to not inundate the control room with CRs at the end of the work day (week, month, or quarter) by writing CRs as the conditions are identified, and by better planning engineering and maintenance walkdowns so that they were distributed throughout the week, month, or quarter instead of being conducted at the end of the period.

Assessment of Actions to Address Contributing Cause 2: Management Oversight

As part of the Operability Determination Process/Functionality Assessment Improvement Action Plan, PNPS established an Operability Determination Challenge Review Board. The Operability Determination Challenge Review Board description, purpose, function, and responsibilities were added to station procedure 1.3.34, “Operations Administrative Policies and Processes,” Revision 141, and approved on April 16, 2016. The board’s main goal was to provide oversight of the operability determination and functionality assessment process to maintain and enhance the quality of the process and to ensure compliance with EN-OP-104 and NRC IMC 0326. The Operability Determination Challenge Board required attendance was operations management (manager of operations and/or assistant operations managers), and optional attendance by the operations department performance improvement coordinator, reactor engineering, and the control room shift manager. The board usually met daily on normal workdays, reviewed all CRs and operability determinations/functionality assessments performed, and looked for complete, accurate, and thorough documentation. These operability determinations/functionality assessments were graded (if deficient) according to the grading sheet developed and attached to the 1.3.34 procedure. The grading was on a scale of 1 through 5, with 1 being acceptable as written and 5 being a significant noncompliance. If the operability determination/functionality assessment was graded as a 5, it was immediately amended and a CR was initiated to document the performance. PNPS tracked the results and provided feedback to the specific

operations crews on a weekly basis. These weekly reports were then rolled-up monthly and were used in a monthly operations crew metric. These metrics were used to evaluate operations crew's performance and also provided an input into the Operations Department Performance Review Meeting report.

Because this was a significant corrective action, the NRC team observed most meetings while on site and interviewed a number of individuals on the Operability Determination Challenge Review Board, as well as other knowledgeable individuals. Overall, the NRC team determined that the establishment of the Operability Determination Challenge Review Board was an appropriate corrective action. The NRC team also observed challenging and critical reviews of the operability determinations/functionality assessments. However, there were some items that passed through the Operability Determination Challenge Review Board (see Section 6.3.4) and, if left uncorrected, would have resulted in an inadequate operability determination or functionality assessment.

From a review of these corrective actions, the NRC team has two concerns in this area: the required composition of the Operability Determination Challenge Review Board, and the sustainability of the board and metric tracking since this corrective action was not a CAPR. The required composition of the Operability Determination Challenge Review Board consisted of two operations personnel. The NRC team concluded that the narrow staffing of the board created a missed opportunity to gain a variety of perspectives from other departments with a vested interest in the quality of operability determinations. The advantages of this would be that those departments could see how their input was incorporated into the operability determination/functionality assessment process; better determine what type and the quality of input was required and expected by operations to ensure that an appropriate and accurate operability determination is made; and to increase accountability. Given that engineering was often tasked with providing input to operability determinations, engineering should be considered to participate on this board. Because operability and reportability are similar and related, the NRC team determined that licensing department participation would also add value. The NRC team noted that licensing made an effort to attend and participate on the board, although their presence was not required.

The NRC team also had a concern with the sustainability of the Operability Determination Challenge Review Board and metric tracking. The board had been incorporated into station procedures, but could be easily eliminated or modified to curtail its effectiveness. The manager of operations verbally committed to conduct the board until the planned cessation of operations in 2019. The NRC team also had concerns related to metric tracking. The NRC team inquired about the fact that the subject matter expert was performing all the tracking for the Operability Determination Challenge Review Board, even though the subject matter expert was only contracted until May 2017. The operations manager stated that the operations department performance improvement coordinator will perform that duty, although this was not documented as such. The operations manager also stated that he intended to suspend these metrics in the future. The NRC team considered the above corrective actions as a positive, but would need added assurance from Entergy that these actions would remain in place.

Assessment of the Planned EFR

Entergy developed and implemented an Operability Determination/Functionality Assessment Improvement Plan on April 20, 2016. Part of that plan included the development of a metric in order to begin to assess the effectiveness of the corrective actions. Two quarterly snapshots were performed and reviewed. Based on the review of those snapshot assessments, it appeared that operations had improved the quality and consistency of the operability determinations and functionality assessments. However, there continued to be a need for improvement as discussed in Section 6.3.4. Furthermore, operations management communicated the intent to suspend assessing this metric in the future. The NRC team was unable to determine how performance in this area will continue to be improved without measurement.

6.3.4 NRC Inspection Findings

Programmatic Issue with Implementation of the Operability Determination Process

Introduction. The NRC team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings." Specifically, the NRC team identified a programmatic issue because in some cases, Entergy did not enter the operability determination process when appropriate, and, when the process was entered, did not adequately document the basis for operability, in accordance with Procedure EN-OP-104, "Operability Determination Process," Revision 11.

Description. Entergy Procedure EN-OP-104, "Operability Determination Process," Revision 11, provided the process to assess operability and functionality when degraded or non-conforming conditions affecting structures, systems, and components were identified. EN-OP-104, Section 1.0[4] noted that the operability determination process was used to assess the operability of structures, systems, and components described in technical specifications. Additionally, EN-OP-104, Section 5.5[7] provided requirements for evaluating the capability of the component, system, and integrated plant response during applicable analyzed design basis events. This included, in part, evaluating conformance with applicable requirements of the combined licensing basis; the magnitude of the degraded or non-conforming condition; applicable codes and standards requirements for operability; loss of functional capability; the effect on other structures, systems, and components; and the capability of the structure, system, or component to meet the required mission time. During this inspection, the NRC team identified four examples where Entergy did not properly follow EN-OP-104 in order to appropriately determine the operability of safety-related structures, systems, and components. Specifically, the NRC team identified instances where Entergy did not enter the operability determination process and/or did not document operability determinations with sufficient detail and technical rigor to reach an operability conclusion. In each of the examples discussed below, though the basis for operability was not adequate, all components were subsequently determined to be operable following further evaluation.

- On November 30, 2016, the NRC team questioned the operability of the 'A' emergency diesel generator following the loss of oil from the fan bearings and gear oil pump, as documented in CR-PNP-2016-07443. Under work order

457101, Entergy repaired the relief valve, added oil to the system, collected an oil sample, and completed a visual inspection, which included an inspection of the magnetic drain plug. The visual inspection determined that there was no damage identified from running the emergency diesel generator without adequate oil in the radiator fan gearbox. Following a post-maintenance surveillance run, Entergy declared the 'A' emergency diesel generator operable. Given that a visual inspection without any component disassembly would not allow complete measurement and inspection of all the vital components, the NRC team questioned the condition of the fan bearings and gear oil pump, and thus, the capability of the diesel to perform its safety function for the 30-day mission time. The NRC team noted that the gears were made of stainless steel and thus, any particulate would not be found on a magnetic plug visual examination. Additionally, Entergy did not analyze the oil sample taken as part of the initial repair work order prior to declaring the emergency diesel generator operable. Entergy wrote CR-PNP-2016-09546 and CR-PNP-2016-09648 to address the NRC team's concern. Entergy subsequently analyzed the oil sample and determined that there was no particulate in the oil and therefore no internal damage to the oil pump or the fan gearbox. This was an example where Entergy failed to assess the operability of the 'A' emergency diesel generator with adequate technical rigor to support the operability conclusion.

- On December 2, 2016, while reviewing the 'A' emergency diesel generator radiator fan gearbox issue documented in CR-PNP-2016-07443 (dated September 28, 2016), the NRC team identified an immediate operability concern with the 'B' emergency diesel generator. On September 29, 2016, following repair of the 'A' emergency diesel generator, Entergy visually inspected the 'B' emergency diesel generator and determined it to be operable, thus completing a common cause evaluation. Subsequently, the apparent cause evaluation related to the 'A' emergency diesel generator gearbox, completed on October 27, 2016, identified vibration and inadequate thread engagement on the gearbox relief valve cap as a probable cause of failure. Entergy had written a work order to inspect, and verify thread engagement and stake the relief valve on the 'B' emergency diesel generator as a corrective measure, and had planned to execute this work order in the spring 2017 refueling outage. Based on the new information provided by the apparent cause evaluation, as well as a field walkdown, the NRC team questioned the operability of the 'B' emergency diesel generator. The NRC team determined that Entergy did not verify or provide reasonable assurance that 'B' emergency diesel generator was operable following the completion of the 'A' emergency diesel generator causal evaluation, and thus, waiting until the 2017 refueling outage to take corrective action was unacceptable. As a result of the NRC team's concerns, Entergy immediately executed the work order to ensure operability of the 'B' emergency diesel generator, and wrote CR-PNP-2016-09546 to address the operability concerns for the 'B' emergency diesel generator. This is an example where Entergy failed to enter the operability determination process or properly assess the operability of the 'B' emergency diesel generator following the completion of the cause evaluation on the 'A' emergency diesel generator.

- On December 7, 2016, the NRC team questioned the operability of the 'B' residual heat removal heat exchanger stemming from a leak from the upper flange. The initial flange leak was documented in the corrective action program as CR-PNP-2016-05785. Entergy performed an operability determination and determined that the issue did not pose an operability concern because the limit for leakage from emergency core cooling systems was 0.5 gallons per minute, and the actual leak was 90 drops per minute. PNPS only evaluated the operability for the residual heat removal system, and did not consider other aspects of plant operation that could be impacted by this leakage. The resident inspectors and the NRC team continued to express concern that categorization of the system as "operable" was incorrect because a degraded condition existed in the system. Entergy documented the NRC team's operability concern in the corrective action program as CR-PNP-2016-09725, and coded the immediate determination of operability as "Operable-Op Eval" in accordance with EN-OP-104. Engineering completed their evaluation and recommended that the condition was "Operable-DNC" (operable, degraded non-conforming). According to the evaluation, a more thorough review of the current licensing basis concluded that this condition represented leakage of a closed loop system outside containment, contrary to ANSI 56.2-1984, "Containment Isolation Provisions for Fluid Systems." Furthermore, Technical Specification 5.5.2 "Primary Coolant Sources Outside Containment," also prescribed a required program to minimize leakage outside containment, and station procedure 8.A.16, "RHR System Integrity Surveillance," Revision 17, whose purpose was to identify leakage, stated that the objective was zero leakage. This was an example where Entergy failed to adequately document the basis for operability in that it was not classified correctly, and engineering did not demonstrate knowledge of current licensing basis in order to provide an adequate operability input for leakage of closed loop systems outside containment, in addition to the operability of the 'B' residual heat removal system.

- On January 12, 2017, the NRC team questioned the operability of both trains of the emergency diesel generators documented in CR-PNP-2016-09945. This CR describes an NRC concern with regards to a Seismic Class two-over-one (II/I) classification of chain-falls and trolleys located in each emergency diesel generator room. The initial operability determination incorporated "engineering judgement" to declare the emergency diesel generators operable because it would "not pose a credible seismic II/I concern." This initial operability determination was incorrect, as Seismic Class II components are assumed to fail in a safe shutdown earthquake or in an operating basis earthquake without an evaluation. Engineering then provided operations another operability input that again used "engineering judgement" in assuming that the chain-falls and the trolleys are well-supported and that the chains would see very limited energy from seismic motion of the monorail. The NRC team communicated to Entergy that the PNPS Updated Final Safety Analysis Report (UFSAR), Section 12.2.3.5.1, states that Class II structures and equipment were designed such that interfaces with Class I structures would not result in a functional failure of that Class I structure. This cannot be proven through "engineering judgement." In this example, operations made an inadequate operability determination initially, then, after NRC questions, engineering failed to provide an adequate

input to operability. Entergy issued CR-PNP-2017-00357 and included a proper engineering evaluation to be used as an input to operability of both trains of emergency diesel generators. This was an example of Entergy's failure to adequately develop an initial basis for operability until further challenged by the NRC team.

The NRC team reviewed these four issues in detail, interviewed involved parties, and reviewed PNPS input and concluded that there was an issue associated with effective communication between the operations and engineering departments that had led to the failure to identify and properly document the basis for operability. Operations' apparent lack of questioning attitude and acceptance of engineering input, and engineering's lack of rigor and consideration of licensing basis documents supported this conclusion. Given the current state of the station's operability determination process (degraded, but improving) and engineering's lack of technical rigor, senior reactor operators did not demonstrate a challenging and questioning attitude towards the engineering product input provided, which was used as a basis for operability of important plant systems to ensure safety. For their part, engineering did not fully demonstrate effective interaction with operations to obtain a complete understanding of some issues in order to ensure that operations had sufficient information to make a fully informed decision on operability.

Analysis. The failure to identify when to enter the operability determination process and the failure to adequately document the basis for operability, in accordance with EN-OP-104, "Operability Determination Process," Revision 11, was a performance deficiency. The performance deficiency was more than minor because if left uncorrected, could lead to a more significant safety issue. Specifically, the failure to enter and document a basis for operability could lead to not recognizing inoperable safety-related equipment, and place the reactor at a higher risk of core damage in a design basis accident. The NRC team evaluated the finding using Exhibit 2, "Mitigating Systems Screening Questions," of IMC 0609, Appendix A, "Significance Determination Process for Findings At-Power," and determined this finding did not affect the design or qualification of a mitigating structure, system, or component; represent a loss of system and/or function; involve an actual loss of function of at least a single train or two separate safety systems for greater than its technical specification-allowed outage time; or represent an actual loss of function of one or more non-technical specification trains of equipment designated as high safety-significant. Therefore, the NRC team determined the finding was of very low safety significance (Green). This finding had a cross-cutting aspect in the area of Human Performance, Teamwork. Specifically, the operations and engineering departments did not demonstrate a strong sense of collaboration and cooperation with respect to holding each other accountable when performing operability determinations to ensure nuclear safety is maintained [H.4].

Enforcement. 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," states, in part, that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. EN-OP-104, "Operability Determination Process," Revision 11, states, in part, that the operability process is used to assess operability of structures, systems, and components described in technical specifications. The scope considered within the operability determination process is as follows:

structures, systems, and components required to be operable by technical specifications; structures, systems and components not explicitly required by technical specifications; and structures, systems, and components that provide support functions required for the operability. Contrary to the above, from November 30, 2016, through January 12, 2017, PNPS did not accomplish activities in accordance with Entergy Procedure EN-OP-104 in that the station did not appropriately use the operability process to assess the operability of the emergency diesel generators and the 'B' residual heat removal heat exchanger. Because this finding is of very low safety significance (Green) and has been entered into the corrective action program as CR-PNP-2017-00626, this violation is being treated as a non-cited violation, consistent with Section 2.3.2.a of the NRC Enforcement Policy. **(NCV 05000293/2016011-04, Programmatic Issue with Implementation of the Operability Determination Process)**

6.3.5 Other NRC Inspection Results

The NRC team reviewed other recent NRC inspection reports and noted findings related to PNPS's implementation of EN-OP-104, "Operability Determination Process":

- In NRC Inspection Report 05000293/2016003 (ML16319A206), the inspectors identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," because Entergy did not adequately assess operability as required by EN-OP-104, "Operability Determination Process." Specifically, the station did not evaluate the operability of emergency diesel generator 'B' when opening a cabinet door containing relays that serve a safety function.

- In NRC Inspection Report 05000293/2016003 (ML16319A206), the inspectors identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," because Entergy did not perform an immediate operability determination and adequately evaluate the operability of primary containment isolation valves in accordance with procedure EN-OP-104.

- In NRC Inspection Report 05000293/2016004 (ML17045A524), the inspectors identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," because Entergy did not perform a prompt operability determination and adequately evaluate the operability of a recirculation flow converter in a timely manner in accordance with procedure EN-OP-104. As a result, Entergy allowed this flow converter to remain in service, without reasonable assurance of its capability to perform its required safety function, from October 3, 2016, until the component was declared inoperable and replaced on October 21, 2016.

6.4 Operations Department Standards, Site Ownership, and Leadership

6.4.1 NRC Inspection Scope

The NRC team observed control room operations, surveillances, shift turnover, reactivity briefs, pre-job briefs with maintenance, the control room response to a medical emergency, reactivity changes, and plant monitoring. The NRC team performed interviews with auxiliary plant operators, reactor operators, senior reactor operators, operations management, and maintenance and licensing personnel. In addition, the NRC team observed operator requalification simulator and classroom training, attended morning plan-of-the-day meetings, daily Operability Determination Challenge Review Boards, Performance Improvement Review Group meetings, T-2 work meetings, and Critical Evolution Meetings.

6.4.2 NRC Inspection Observations and Assessment

Overall, the NRC team determined that the operations staff at PNPS operated the plant safely, within design basis limits, and in a manner granted to them in their license. However, numerous examples observed by the NRC team and the resident staff indicated a lack of formality, appropriate technical specification usage, and attention to detail for implementation of administrative programs. Some of the examples observed by the NRC team and the resident inspection staff included:

- Operations staff failed to make a 10 CFR 50.72 notification to the NRC for a technical specification required shutdown, as required by Technical Specifications 3.7.A.5 and 3.7.A.2.b, for two main steam outboard isolation valves inoperable (2D and 2C). PNPS's position was that they were able to close 1C, but chose not to do so. Therefore, they could meet Technical Specification 3.7.A.2.b and were shutting down to repair the two main steam isolation valves. PNPS documented this concern in CR-PNP-2017-00288 and CR-PNP-2017-01767. This issue will be dispositioned in the first quarter 2017 resident inspector report.

- In some cases, operations management and staff exhibited a general lack of formality in the main control room, including announcing of alarms, leaning on the balance of plant control board during startup, and disruptive behavior at the back panels that interrupted a shift reactivity briefing. In one of these cases, the training manager commented that the same behavior was observed during training as well. These behaviors were contrary to Entergy procedure EN-OP-115, "Conduct of Operations," which required that operations activities be performed in a professional manner that contributes to safe and reliable plant operations, and that personnel maintain a focused business-like approach to assigned duties. In each of these cases, the behaviors were not addressed by station or operations management until questioned by the NRC. These examples demonstrated that low expectations for formality and professionalism were being endorsed and not corrected by the organization. Entergy documented these issues in CR-PNP-2017-00297, CR-PNP-2017-02003, and CR-PNP-2017-04475.

- The NRC team observed a face-to-face shift manager turnover and board walkdown, and noted that the on-coming shift manager went to a meeting and did not sign into the electronic logbook until 25 minutes after the off-going shift manager left the control room. The on-coming shift manager signed in as of 7:00 am without annotating it was a late entry. This was contrary to Entergy procedure EN-OP-115-03, "Shift Turnover and Relief," Revision 2, which states that the off-going shift manager will not leave the work area until their relief has successfully assumed the watch by annotating it in the station logs. The NRC team communicated this to the operations manager, who stated that this was not an unusual occurrence. Entergy entered this issue into the corrective action program as CR-PNP-2017-00445. The NRC team determined that this issue was minor because there was not any time where an operations shift did not have a shift manager assigned. However, this issue highlighted the acceptance of informal behaviors and non-adherence to operating procedures by shift and operations management.

- The NRC team observed a pre-job brief for an emergency diesel generator surveillance and commented that, although the brief was adequate, it appeared to only cover enough to meet the minimum requirements of the associated checklist. The NRC team noted that operating experience discussed at the briefing was not site-specific or actionable to protect against having an issue with the surveillance. The NRC team further noted that the worst case scenario, which discussed an inoperable emergency diesel generator and technical specification entry, was not the worst case. The worst case scenario would be a catastrophic failure and personnel injury. The briefing did not communicate that there was an ongoing issue with procedure use and adherence and what actions or tools the participants were going to use to ensure performance that met expectations for this problem area. The NRC team's observations were communicated and well-received by the shift manager. By contrast, the NRC team had the opportunity to observe a similar brief the following day and noted a clear improvement in the quality and intensity of the brief.

- The NRC team also identified an issue with keeping current, up-to-date information in the control room for operational decision-making issues and some long standing night orders. The NRC team identified an operational decision-making issue for switchyard line 355 that had been resolved several weeks prior, yet the operations staff was carrying the operational decision-making issue on the shift turnover sheet. The NRC team also reviewed the age of standing orders, as one was written in 2015, and requested Entergy to review them to ensure that they were all still valid. Entergy documented this issue in CR-PNP-2017-04476.

- The NRC team noted, during the first onsite inspection week (November 28 – December 2, 2016), that Entergy had not yet completed their winter readiness preparations at PNPS in accordance with procedure 8.C.40, "Seasonal Weather Surveillance," Revision 40, which stated that Attachment 1 (cold weather preparations) should be performed in the fall of each year (September to November). Entergy completed their winter readiness preparations on December 6, 2016. The NRC team determined that this

> issue was minor because the items that were not completed did not impact the operability of any safety-related equipment.

Based on these examples, the NRC team determined that the lack of formality was likely a result of inadequate management standards and expectations, as well as the operations staff having become complacent with respect to the conduct of plant operations over a number of years. The NRC team also concluded that the operations department had not demonstrated strong and consistent site ownership and leadership, and had not reinforced high standards of performance, as required by station procedures. In addition to the examples listed above, the NRC noted the following:

- The programmatic violation concerning the incomplete operability determinations (Section 6.3.4), as well as the recent operability determination violations identified by the resident staff (Section 6.3.5) demonstrated a lack of ownership for some complex issues in which engineering was requested to provide supportive information. In these examples, operations did not hold engineering accountable to provide high quality engineering products.

- The NRC team reviewed the role of operations department staff in meetings and observed that individuals were not challenged during meetings. The station explained to the NRC team that individuals were challenged one-on-one outside of the meetings. The NRC team communicated that challenging teammates in meetings was viewed as healthy and, if conducted in a professional manner, significant gains and productivity could be realized from other participants' input. The response was, "That is not how business is conducted here."

- Related to shift manager operability determination review rigor for the 'A' SRV issue (Section 4.7), the NRC team concluded that there was enough information in the associated CR such that a knowledgeable senior reactor operator could reasonably conclude that the 'A' SRV did not open in 2013. Further, the NRC team determined that the shift manager possessed adequate training and knowledge to ensure an adequate operability evaluation was completed, but did not review the operability determination with enough rigor to identify the performance issues with the SRV.

The NRC team also reviewed the November 2016 PNPS 95003 Mentor Team Report and interviewed the team leader. The mentor team identified an issue with shift manager leadership in the plan-of-the-day meetings. The following is excerpted from CR-PNP-2016-10130, which Entergy wrote in response to this monthly mentor report:

> Shift managers mostly act as meeting facilitators and do not take on a strong leadership role in the plan-of-the-day meetings. Based on our experience and knowledge of industry standards, we would expect to see the shift managers leading the meeting, and the station, by demonstrating and reinforcing high standards of performance. Performance in this area is inconsistent. Currently,

this role is filled by the Senior Operations Manager, who usually summarizes the meeting and provides overall direction to the team.

The planned corrective actions were to develop and implement coaching to individual shift managers to increase leadership at plan-of-the-day meetings. The NRC team determined that this CR and planned corrective action were appropriate in developing leadership among shift managers. These corrective actions were scheduled to be implemented in the spring 2017 and, as such, were not evaluated as part of this inspection.

Entergy initiated CR-PNP-2017-01248 related to the NRC team's concerns regarding gaps in licensed operator ownership and accountability.

6.4.3 NRC Inspection Findings

No findings were identified.

Procedure Quality Key Attribute *(IP 95003, Section 02.03d)*

6.5 Procedure Quality Problem Area

6.5.1 PNPS Evaluation Results and Key Corrective Actions

Entergy identified procedure quality (i.e., eliminate human error traps and administrative errors) as a problem area as a result of their collective evaluation process. In response, Entergy performed an apparent cause evaluation and documented the evaluation results and corrective actions to address the procedure quality problem area in CR-PNP-2016-02058. Entergy's apparent cause evaluation documented the following:

- Direct Cause: Some procedures do not comply with station procedures 1.3.4-1, "Procedure Writers Guide," 1.3.4-10, "Writers' Guide for Emergency Operating Procedures," 1.3.4-13, "EOP/SAG Verification Program," or 1.3.4-14, "EOP/SAG Validation Program."

- Apparent Cause: Managers, superintendents, and personnel who are assigned to review new procedures and procedure changes are unaware of PNPS procedure standards and expectations.

- Contributing Cause 1: 1.3.4-1, "Procedure Writers Guide," does not include key industry standard elements from the guidance prescribed in industry standard PPA AP-907-005, "Procedure Writer's Manual."

- Contributing Cause 2: The resolution requirements of the PNPS Corrective Action Program when applied to procedure quality issues were ineffective.

Entergy established interim corrective actions to ensure that their event response procedures did not have any technical and/or procedure quality issues that

prevented effectively implementing the procedures. Entergy implemented the following corrective actions to address their issues in the procedure quality problem area:

- CR-PNP-2016-02058 CA-30: Revise NOP98A1, "Procedure Process," to require new station procedures and station procedure changes be reviewed by qualified personnel. The intent is to ensure new procedures and procedure changes are reviewed by personnel who are qualified via training.

- CR-PNP-2016-02058 CA-31: Develop and implement procedure reviewer qualification training. The intent of this action is to institutionalize a method to maintain procedure reviewer's knowledge of PNPS procedure standards.

- CR-PNP-2016-02058 CA-33: Develop and implement gap training related to procedure quality for managers, superintendents, and procedure reviewers in Operations, Maintenance, Chemistry, and Radiation Protection departments

- CR-PNP-2016-02058 CA-32: Revise PNPS 1.3.4-1, "Procedure Writers Guide," to incorporate key industry standard elements from the guidance prescribed in PPA AP-907-005, "Procedure Writer's Manual."

- CR-PNP-2016-02058 CAs-34 – 37: Personnel who are assigned to review new station procedures or station procedure changes scoped under PNPS 1.3.4-1, "Procedure Writers Guide," shall be qualified to perform reviews. At least two workers from each responsible department will be trained and qualified. The intent of this action is to ensure personnel who review new procedures and procedure changes are trained and qualified to perform those duties in accordance with PNPS procedure standards and expectations. Also, the intent is to ensure new procedures or procedure changes submitted by any worker at the station or contractors will be reviewed by a qualified individual for compliance to PNPS procedure standards and expectations.

- CR-PNP-2016-02058 CAs-40 – 45: Assign qualified personnel to review procedures used for activities that place the station in an integrated risk above normal. The intent is to ensure these procedures are workable as written and in compliance with PNPS 1.3.4-1, "Procedure Writers Guide."

6.5.2 NRC Inspection Scope

The NRC team evaluated the procedure quality problem area to determine whether PNPS: (1) correctly identified procedure quality as a problem area, (2) appropriately identified apparent and contributing causes, (3) established appropriate corrective actions identified to address the apparent and contributing causes, (4) adequately implemented corrective actions, (5) identified EFR(s) that adequately assessed the effectiveness of the corrective actions, (6) adequately performed any EFRs, and (7) effectively addressed the overall problem.

In addition, the NRC team reviewed, evaluated, and assessed the following specific areas:

- The process used to develop and revise procedures, and the process used to incorporate procedure feedback, including changes classified as “non-intent” changes.
- Emergency operating procedures for procedure quality and adequacy.
- Other procedures for quality and accuracy, with specific samples from the residual heat removal and on-site emergency alternating current power systems.
- The process used to develop and control temporary procedures and temporary procedure changes, including whether Entergy established limits on how long a temporary procedure can be in effect and whether this compares with observed practices.
- Internal assessments and external assessments associated with the vendor manual program and whether Entergy had corrected any identified deficiencies.
- Whether Entergy maintained vendor manuals up to date and appropriately incorporated vendor manual requirements into procedures/work orders.
- Recently completed work orders and open work orders to determine whether these work orders incorporated vendor manual requirements, as appropriate.
- Use of the corrective action program when processing procedure changes.
- Adequacy of the procedure implementing the operability process.
- Adequacy of the comprehensive recovery plan metrics to provide meaningful information to track recovery.

The NRC team conducted this inspection through a review of records, procedures, procedure changes, corrective action documents, vendor manual changes, process evaluations, and interviews. The NRC team evaluated whether each corrective action had been effectively implemented.

6.5.3 NRC Inspection Observations and Assessment

Procedure Quality Process

The NRC team determined that Entergy correctly assessed procedure quality as a problem area. Entergy considered this a problem area since procedures that did not meet current industry standards contained human error traps that could lead to mistakes when personnel performed the procedures. These written procedures included human error traps such as action steps in ‘Notes’ and ‘Caution’ statements or multiple actions in a single step. Entergy performed a thorough review of

procedure issues during their collective evaluation process by evaluating a broad range of procedures that affected both safety-related and important to safety components. The NRC team listed the procedures reviewed by Entergy during the collective evaluation process in Table 1, “Procedures with Quality Issues,” located in the Attachment to this report. The NRC team verified that Entergy properly assigned the negative observations into standards performance deficiencies and into standards performance deficiency roll-ups. The apparent cause analysis identified appropriate direct, apparent, and contributing causes.

The NRC team determined that Entergy had reviewed approximately 207 of their 602 maintenance procedures in response to a different deficiency documented in CR-PNP-2013-01566. The 207 procedures included procedures for equipment that Entergy identified as trip-sensitive or would increase integrated risk above normal. The NRC team determined that the procedures upgraded during these reviews included revisions to correct technical as well as procedure quality issues. Also, operations had reviewed 61 out of 125 procedures as part of an extent of condition evaluation related to declining performance, as described in a mid-cycle assessment letter. As part of the recovery plan, Entergy performed interim corrective actions that included reviewing and revising any of the remaining 64 operations procedures that had procedure quality or technical deficiencies.

The NRC team determined that, generally, Entergy established appropriate corrective actions to address the apparent cause. Entergy revised their procedure process to add a procedure quality review intended to ensure procedures met the procedure writer’s guide, which they had upgraded to current industry standards. Entergy identified six work groups (operations, mechanical, electrical and instrumentation and control, maintenance, chemistry, and radiation protection) that had procedures that required review. Entergy developed a standard set of technical and procedure quality questions, in the form of a WILL sheet, to assess their procedures against rating criteria. Entergy had established that procedures associated with maintenance activities scheduled at the work management T-10 milestone (i.e., 10 weeks prior to the work implementation week) would be assessed and evaluated by each of the work groups to determine if they required revision. Entergy selected this milestone to assure that any procedures that required revision in order to be technically feasible for implementation had sufficient time to be corrected. The NRC team identified one performance deficiency because Entergy had not selected a sufficiently broad range of procedures that required upgrading to meet their writer’s guide requirements. The NRC team documented the details related to this performance deficiency in Section 6.5.4 of this report.

Entergy had not established any specific time limits for revising the procedures to meet their plant writer’s guide for procedures that were technically adequate but had one or more concerns related to usage quality. The NRC team expressed a concern that the process had not established a time limit to make the changes and Entergy initiated LO-PNPLO-2017-00002 to require monthly assessments of changes to procedures to assess timeliness in improving procedure quality. Entergy indicated that the procedure changes would be implemented commensurate with their safety significance.

The NRC team determined that, with a few exceptions, Entergy had effectively implemented their planned corrective actions as of the date of the inspection.

Though Entergy identified the need to reperform the EFR required by CR-PNP-2015-07853 CA-23, due to not sampling 20 percent of the correct population of revised operations procedures, the NRC team determined that Entergy did not actually implement the reperformance of the EFR. Entergy initiated CR-PNP-2016-09843 to document the NRC team's observation, and performed the appropriate EFR in accordance with PNPLO-2015-00208, CA-4. The NRC team determined this issue was minor because the EFR concluded that operations procedures revised because of technical concerns also met the procedure quality standards in the procedure writer's guide.

The NRC team evaluated the planned EFR to assess the corrective actions related to performing procedure quality reviews. The NRC team determined that one of the four planned actions in the EFR required enhancement. Entergy had not established a large enough sample population for interviewing personnel as part of the procedure quality review process. Specifically, Entergy planned to conduct eight interviews to include users, supervisors, and managers. The NRC team considered this number too small a sample since the procedure revisions affected six work groups. Entergy documented this observation in CR-PNP-2017-00419 and indicated that they would at least triple the sample population.

The NRC team verified that Entergy provided appropriate training to managers and supervisors, selected a minimum of two individuals from the work groups to perform procedure quality reviews, and provided appropriate training to the identified procedure quality reviewers. Since Entergy initiated their procedure quality review process at the T-10 work management milestone in mid-November, the NRC team determined that the process had insufficient time to demonstrate that it would be effective. Specifically, Entergy had reviewed upcoming procedures and identified some that required revision to meet their writer's guide; however, the identified procedures had not been revised. In addition, the NRC team determined that Entergy had established a review scope that would revise the most safety and risk significant procedures, but did not address the broad range of procedures that resulted in identifying procedure quality as problem area. The NRC team identified a performance deficiency since Entergy had established an inadequate procedure quality review scope, as described in Section 6.5.4 of this inspection report.

The NRC team concluded that Entergy had appropriately identified procedure quality as a problem area and had established corrective actions that should address the deficiencies related to this problem area. The NRC team could not determine whether the corrective actions effectively addressed this problem area since the majority of the actions had not been in place for a sufficient amount of time. The NRC team concluded that the corrective actions, if implemented properly, could correct the deficiencies that resulted in procedure quality being a problem area.

Specific Activities Reviewed

The NRC team determined that Entergy used Procedure NOP98A1, "Procedure Process," Revision 39, to control their procedure process including revisions. The NRC team verified that this procedure: (1) prescribed the process and established controls for developing and revising procedures; (2) provided clear guidelines for determining whether planned procedure changes were intent or non-intent changes;

(3) established controls and conditions for developing temporary procedures, which included a 2-year limit for temporary procedures to remain active; and (4) required that vendor manual instructions be incorporated as procedure steps rather than referencing a section of a vendor manual.

To assess Entergy's procedure review process, the NRC team selected: (1) procedures associated with the residual heat removal and on-site emergency alternating current power systems; (2) procedures identified as temporary procedures; (3) procedure changes listed as non-intent changes; (4) procedures that had associated vendor manual changes; and (5) work orders that implemented preventive maintenance requirements. The NRC team determined from the review of procedures that PNPS had established appropriate controls that ensured personnel could identify the difference between an intent change and a non-intent change. The NRC team determined that Entergy placed effective dates on temporary procedure cover pages that clearly defined the expiration date of the temporary procedures. The NRC team verified that Entergy used temporary procedures for special tests or infrequently performed activities as prescribed in Procedure NOP98A1.

The NRC team determined that the apparent cause evaluation for procedure quality identified that none of the 15 negative observations impacted the ability of operators to effectively implement their emergency operating procedures. The NRC team reviewed the negative observations, interviewed personnel who had identified the negative observations, and discussed the planned resolution of the negative observations with the responsible operations personnel. The NRC team evaluated the emergency operating procedures against the emergency operating procedure writer's guide. CR-PNP-2016-05834, CA-2 described the need to develop corrective actions to resolve the emergency operating procedure negative observations. During discussions with Entergy, the NRC team determined that the deficiencies affected the writer's guide, emergency operating procedures, and the procedure design bases documents. Entergy developed specific corrective actions as part of CR-PNP-2016-05834 to address the specific deficiencies and initiated changes to the documents. The NRC team observed that Entergy had appropriately concluded that the negative observations had no impact on the ability of operators to effectively implement the emergency operating procedures.

The NRC team determined that Entergy had performed effective internal snapshot assessments of their interim procedure quality reviews. The assessments described the quality of procedure changes that had been developed and the progress of procedure updates.

The NRC team reviewed the vendor manual update process. As an extent of condition review specified in CR-PNP-2016-02061, CA-42 and CA-43, Entergy completed a snapshot self-assessment of their vendor manual program and vendor re-contact process (LO-PNPLO-2016-00033). The NRC team determined that Entergy had performed a critical self-assessment that identified several standards performance deficiencies including: (1) failure to have a significant component list, (2) failure to have a key vendor list, (3) failure to generate a record to demonstrate vendor re-contact had occurred, and (4) failure to establish preventive maintenance tasks to re-contact 55 vendors. Entergy self-identified that they failed to contact 13 vendors of safety-related components within 3 years as specified in Entergy

procedure EN-DC-148, “Vendor Manuals and Vendor Re-Contact Process,” Revision 6. The NRC team confirmed that Entergy had made the re-contacts during this inspection and no significant changes to the vendor manuals resulted. The NRC team determined this was a licensee-identified violation and documented this issue in Section 9 of this inspection report.

The NRC team determined that Entergy had credited the corrective actions being implemented for the corrective action fundamental problem area to address the contributing cause identified in this apparent cause evaluation. During the review of this area, the NRC team determined that Entergy consistently initiated corrective action documents for procedure changes that affected technical information contained within procedures since Entergy considered these changes as adverse. Entergy did not consider changes that affected procedure quality as adverse since the changes would not prevent effective implementation of the procedure. The NRC team verified that Entergy appropriately closed non-adverse CRs to procedure change forms. The NRC team identified no concerns with the disposition of intent and non-intent procedure changes.

6.5.4 NRC Inspection Findings

Inadequate Procedure Quality Review Scope

Introduction. The NRC team identified a Green non-cited violation because Entergy implemented inadequate corrective actions to address the procedure quality issues identified in CR-PNP-2016-02058. Specifically, the apparent cause identified this as a problem area based upon a broad range of plant procedures with procedure quality issues; however, Entergy limited the corrective actions to only those procedures that would result in an integrated risk increase above normal.

Description. Entergy’s apparent cause evaluation related to procedure quality, documented in CR-PNP-2016-02058, identified the following problem statement: “Some station procedures have technical errors and/or lack an appropriate level of detail and human factoring. Inadequate procedure quality increases the probability of procedure non-compliance, human performance errors and station events.” The apparent cause evaluation also stated that the direct cause of the procedure quality problem area was that some procedures do not comply with the procedure writer’s guides. Further, the extent of condition documented in the cause evaluation recognizes that all types of plant procedures contain some level of detail, human factoring, or administrative errors. To address the direct cause of the procedure quality problem area, Entergy specified corrective actions only to address procedures used for emergent work, and procedures used for activities that place the station in an integrated risk above normal (i.e., procedures considered trip sensitive or could result in a consequential event). Entergy did not specify corrective actions for a number of procedures, including maintenance and/or operating procedures for safety-related equipment.

The NRC team independently reviewed the negative observations related to procedure quality (level of detail, human factoring, or administrative errors) and determined that procedure quality issues affected a wide range of procedures, not just procedures that increased integrated risk above normal. For example, 31 of the procedures included routine system operating procedures, ventilation system

calibration procedures, and maintenance procedures (refer to Table 1 in the Attachment to this report). Entergy procedure EN-LI-118, "Cause Evaluation Process," Revision 22, Step 5.2[8] specified that there should be a direct logical tie between the problem statement, cause, and corrective actions. Step 5.4[1](d) and (e) specified, in part, to ensure the problem statement contains only one problem and use the problem statement to maintain focus. Step 5.12[5] specified that corrective actions should be established for each identified root and apparent cause. The NRC team determined that the corrective actions related to limiting the scope of procedures to those that resulted in integrated risk above normal was too narrowly focused, did not accurately reflect the conclusions of the apparent cause evaluation, and did not completely address the identified problem and apparent cause. Specifically, Entergy failed to establish actions that addressed the broad range of procedures that affected safety-related equipment, and inappropriately focused the corrective actions to only those procedures that increased plant risk above normal.

Analysis. The failure to establish corrective actions to address a condition adverse to quality in accordance with 10 CFR Part 50, Appendix B, Criterion XVI, was a performance deficiency. Specifically, PNPS inappropriately limited their corrective actions to those procedures that increased integrated risk above normal, and did not include other types of safety-related procedures that did not meet their procedure quality standards and resulted in procedure quality being a problem area. The performance deficiency was more than minor because it affected the procedure quality attribute of the Mitigating Systems cornerstone, and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). The decision to limit corrective actions to procedures that increased integrated risk above normal or trip sensitive failed to include other procedures associated with safety-related components that reflected the broader population reviewed during the collective evaluation.

The NRC team evaluated the finding using Exhibit 2, "Mitigating Systems Screening Questions," of IMC 0609, Appendix A, "Significance Determination Process for Findings At-Power," and determined this finding did not affect the design or qualification of a mitigating structure, system, or component; represent a loss of system and/or function; involve an actual loss of function of at least a single train or two separate safety systems for greater than its technical specification-allowed outage time; or represent an actual loss of function of one or more non-technical specification trains of equipment designated as high safety-significant. Therefore, the NRC team determined the finding was of very low safety significance (Green). The NRC team determined that this finding had a cross cutting aspect related to Human Performance, Resources, because the leaders failed to ensure that personnel, equipment, procedures, and other resources are available and adequate to support nuclear safety. Specifically, based on available resources, Entergy chose to limit the scope of safety-related procedures being revised to their procedure quality standard to only those that resulted in high integrated risk or were trip sensitive [H.1].

Enforcement. 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," states, in part, that measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and non-conformances are promptly identified and corrected.

Contrary to the above, from June 15, 2016, through January 12, 2017, Entergy did not establish adequate measures to correct an identified condition adverse to quality. Specifically, the corrective actions established in the apparent cause evaluation in CR-PNP-2016-02058 were limited to those that increased integrated risk above normal rather than a wider range of procedures affecting safety-related components, as identified in their collective evaluation process. Because this finding was of very low safety significance (Green), and Entergy entered this issue into their corrective action program as CR-PNP-2017-00400, this violation is being treated as a non-cited violation, consistent with Section 2.3.2.a of the Enforcement Policy. **(NCV 05000293/2016011-05, Failure to Establish Corrective Actions to Address Scope of Procedure Quality Issues)**

6.6 Emergency Preparedness Procedures

6.6.1 NRC Inspection Scope

The NRC team reviewed a sample of Emergency Plan (Plan) and implementing procedure changes to assess the change process and to ensure that no decrease in the effectiveness of the Plan had occurred.

6.6.2 NRC Inspection Observations and Assessment

The document changes were mostly administrative or editorial in nature based upon user input. Other document changes were process enhancements. The effectiveness and commitments of the Plan were maintained. Implementing procedures were determined to be capable to support the emergency response organization's ability to protect public health and safety.

6.6.3 NRC Inspection Findings

No findings were identified.

Equipment Performance Key Attribute *(IP 95003, Section 02.03e)*

6.7 Equipment Reliability Problem Area

6.7.1 PNPS Evaluation Results and Key Corrective Actions

During the 95003 Collective Evaluation process, Entergy identified that "station equipment performance and material condition do not meet fleet and industry standards. These weaknesses have resulted in long-standing equipment problems and less than adequate equipment reliability which have led to station challenges and events." As a result, Entergy identified equipment reliability as a problem area and conducted a root cause evaluation under CR-PNP-2016-02056 to assess the issue. Entergy's root cause evaluation documented the following causes:

- Root Cause 1: Station leadership is not consistently exhibiting and reinforcing behaviors that support the fundamental concepts of a zero tolerance for unanticipated equipment failure.

- Root Cause 2: Station leadership has failed to take action to mitigate the plant reliability impact of reducing resources.

- Contributing Cause 1: Station leadership has failed to foster and reinforce strong teamwork and accountabilities between and within key organizations that implement major elements of the equipment reliability processes, specifically system engineering, maintenance, and production.

- Contributing Cause 2: Station leadership did not effectively implement change management for organizational-capacity-related changes and for corporate procedural changes associated with the restructuring activities of alignment (2007/8), the proposed company spin-off (2008/9), and Human Capital Management (2013).

- Contributing Cause 3: Station personnel have not effectively applied the guidance contained in the corrective action program procedures (initiation, evaluation, resolution) to maintain station equipment performance within industry standards.

- Contributing Cause 4: Station leadership does not consistently ensure all applicable requirements of "informational use" procedures are identified and followed.

- Contributing Cause 5: Station personnel do not rigorously implement the preparation, control, and execution of work activities such that equipment reliability is the overriding priority.

The evaluation also determined there had been opportunities to recognize and address the decline in equipment reliability through quality assurance audits, cause evaluations, and external findings. However, the response efforts had not been effective or sustainable and therefore had not adequately addressed the underlying issues identified. Secondly, staffing had been reduced by 8 percent since 2007, while during this same time period, the average full-time-equivalent staffing at other small boiling water reactors had increased. Over 40 percent of the staff reduction at PNPS was in the engineering department (i.e., greater than 20 engineering full-time-equivalent) with additional impacts to production staffing.

Entergy identified the following significant corrective actions in the corrective action plan:

- CR-PNP-2016-02056 CA-26: (CAPR-1) Develop, approve, and issue a PNPS specific recovery procedure to describe required actions to be implemented by the equipment reliability mentor team put in place by corrective action CA-RCE-2-A.

- CR-PNP-2016-02056 CA-29: (CAPR-2A) Track action CR-PNP-2016-2057 CA-41 to completion. This action requires the maintenance manpower resources be increased in order to reduce work order backlogs to meet fleet goals.

- CR-PNP-2016-02056 CA-30: (CAPR-2B) Track action CR-PNP-2016-2057 CA-42 to completion. This action requires the reassessment of action CR-PNP-2016-2057 CA-41 to increase maintenance man-power resources to ensure an adequate resource-loading plan for maintenance is based on the workload expectations for the remaining 3 years of plant life.

- CR-PNP-2016-02056 CA-31: (CAPR-2C) Provide supplemental support for the systems, components, and engineering supervision functions.

6.7.2 NRC Inspection Scope

The NRC team performed a review of the equipment reliability root cause evaluation documented in CR-PNP-2016-02056, and associated corrective actions planned and already implemented. The NRC team conducted interviews with key personnel, including design and system engineers; performed field walkdowns to visually inspect several safety-related systems and components to verify the material condition of structures, systems, components, and support systems; attended meetings associated with the plant health program; and performed a review of key system health reports. The NRC team assessed the maintenance, calibration, and testing of risk-significant plant structures, systems, and components. The NRC team assessed PNPS's implementation of on-line and outage maintenance, including backlogs; preventive maintenance scope, frequency, deferrals, technical bases, and use of vendor recommendations and industry experience; and longstanding equipment issues. Additionally, the NRC team assessed the effectiveness of corrective actions for deficiencies involving equipment performance and assessed the operational performance of selected safety systems to verify the capability of performing their intended safety functions. The review included the following systems and components:

- Emergency Diesel Generators
- Start-up Transformer
- Air Operated Valves
- Auxiliary Building Tours with Focus on Penetration Areas and Motors
- High Pressure Cooling Injection
- Decay Heat Removal System and 'B' Heat Exchanger Flange Leakage
- Safety-Related Check Valves
- Safety-Related Station Batteries
- 480V and 4KV Power Cables: Cable Reliability Program

6.7.3 NRC Inspection Observations and Assessment

The NRC team concluded that PNPS's evaluation of the equipment reliability issues documented in CR-PNP-2016-02056 was comprehensive. The evaluation provided a critical look at the plant health program, including long term equipment reliability and obsolescence, and identified key issues that the program had previously failed to identify or correct. The NRC team verified an adequate extent of condition review was also performed. In the area of equipment performance and reliability, the NRC team acknowledged that PNPS had completed numerous efforts to improve equipment performance and reliability. In addition, improved engineering support and management oversight of the plant material condition and equipment

performance were noted including the implementation of a new mentoring program with industry subject-matter experts to provide an ongoing diagnostic assessment of plant performance. The NRC team also noted that five contract staff members were added to engineering and six maintenance staff were added to reduce the maintenance backlog. In addition, the NRC team verified that EFRs have been established for identified CAPRs.

However, the NRC team identified several examples which indicated that the resolution of degraded equipment problems and implementation of the corrective action program continued to challenge PNPS. The NRC team determined that at this time it is too early to assess the effectiveness of all the applicable corrective actions because the effectiveness reviews are not all complete and the corrective actions have only been in place for a short period of time. The need for further NRC reviews at a later time will be evaluated to ensure the response efforts have been effective and sustainable and have adequately addressed the underlying issues identified. The following specific issues related to the area of equipment performance were identified during the inspection:

- The NRC team identified a finding and apparent violation associated with the failure to adequately review a design change implemented on the 'A' emergency diesel generator, documented in Section 6.7.4. This issue resulted in inoperability of the 'A' emergency diesel generator.

- During this inspection, the NRC team identified a performance deficiency involving untimely corrective actions to address the degraded 'C' phase cable which supplies power to several 480V safety-related components, including reactor building closed cooling water pumps, salt service water pumps, emergency diesel generator oil transfer pump, reactor feed pump lubricating oil, and the battery room exhaust fan. Specifically, since 2007, Entergy identified a failure to meet the cable reliability (insulation resistance) Megger testing acceptance criteria of 100 megaohms (MΩ). In addition, triennial Megger test results showed a degrading trend with the last reading taken in 2015 at 5.8MΩ. The 3-phase non-shielded cable is approximately 1010 feet long, and involves three separate manholes that are challenged with water submergence. Additionally, each manhole contains a cable splice. Engineering reduced the acceptance criteria to a minimum calculated value of 1.48MΩ and determined the cable would remain operable until its replacement during the upcoming refueling outage (1R21) scheduled for early 2017. The NRC team did a detailed review of this issue to verify Entergy is properly monitoring and pumping out water from the manholes as required by Entergy procedure EN-DC-246, "Cable Reliability Program." The NRC team reviewed applicable CRs and operability determinations, interviewed the cable reliability engineer, engaged NRC electrical experts from the headquarters office, and held several telephone conferences with Entergy. An Electric Power Research Institute (EPRI) representative was also present during one of the telephone calls. The NRC team determined that Entergy's actions to address this degraded trend were untimely and were not commensurate with the safety significance of the cable. Entergy issued CR-PNP-2017-00755 to document the NRC team's concerns. The NRC team concluded that this performance deficiency was minor, in accordance with IMC 0612, Appendix B, because it did not affect the Mitigating System

cornerstone objective of availability, reliability, or capability of the system. Based on the available data, and the absence of a cable failure, the NRC team did not have reason to question operability of the cable or its associated safety-related systems. In addition, the NRC team confirmed that actions to perform detailed trouble shooting and cable replacement as necessary are approved and scheduled for the upcoming refueling outage (1R21) as documented in CR-PNP-2015-03909.

- During this inspection, the NRC team identified a performance deficiency involving a deficient evaluation of an operating experience review for an emergency diesel generator jacket cooling water hose failure. On January 4, 2016, at Oyster Creek Nuclear Generating Station, an emergency diesel generator cooling water flexible coupling hose ruptured during a biweekly surveillance test, which resulted in low coolant pressure and subsequent inoperability of the emergency diesel generator (See NRC Inspection Report 05000219/2016001 (ML16132A436)). On June 20, 2016, Entergy completed an evaluation of this operating experience issue under OE-NOE-2016-00103, CA00015 and determined that their ALCO emergency diesel generators have many non-metallic hoses (approximately 38) associated with lubricating oil, jacket water, and air (starting/turbo assist) systems that were susceptible to the same type of failure. The NRC team noted that Entergy credited their preventive maintenance program, which requires replacement of all the emergency diesel generator hoses at an 8-year frequency, without doing any verification that the 8-year frequency was being properly implemented. The NRC team interviewed the emergency diesel generator system engineer, reviewed applicable hose replacement work orders, and performed walkdowns of both emergency diesel generators to visually inspect the condition of all the hoses. The NRC team noted that Entergy had replaced most of the non-metallic hoses on both emergency diesel generators between 2010 and 2011, but could not find documentation to confirm that several air hoses (starting air/turbo assist) had been replaced. The NRC team was concerned that these flexible hoses may have been in service for approximately 42 years and subjected to thermal degradation and aging that could eventually lead to failure and potentially impact emergency diesel generator operability. Entergy performed an immediate operability evaluation under CR-PNP-2017-00341 and CR-PNP-2017-00370 (‘A’ and ‘B’ emergency diesel generators, respectively) and determined that a failure of any of the affected hoses would not severely impact the operability of the emergency diesel generators and that this condition is considered non-conforming but operable. The NRC team reviewed this information and determined that Entergy’s conclusions were acceptable. Additionally, the NRC team performed a walkdown of the emergency diesel generators and observed that the hoses appeared to be in good condition. Entergy initiated actions to replace the applicable hoses during the upcoming refueling outage (1R21). The NRC team determined that failure to ensure the vendor recommended 8-year replacement frequency of the emergency diesel generator non-metallic hoses was a performance deficiency. Based on the observed good condition of the hoses, the results of Entergy’s operability evaluation, and adequate monthly surveillance test results of both emergency diesel generators, the NRC team determined this performance deficiency was minor, in accordance

with IMC 0612, Appendix B, because it did not affect the Mitigating Systems cornerstone objective of availability, reliability, or capability of the system.

6.7.4 NRC Inspection Findings

.1 Design Change Not Appropriately Reviewed by Entergy

Introduction. The NRC team identified a preliminary greater than Green finding and apparent violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," associated with Entergy's failure to ensure that design changes were subject to design control measures commensurate with those applied to the original design and were approved by the designated responsible organization. Specifically, Entergy received a new style right angle drive for the 'A' emergency diesel generator radiator blower fan from a vendor but failed to adequately review the differences between the design of the original and replacement drive to identify potential new failure mechanisms for the part or the need for related preventive measures.

Description. On September 28, 2016, while performing prestart checks on emergency diesel generator X-107A, operations department personnel noted oil on the deck and the oil level in the radiator fan gearbox below the vendor's minimum recommended level (11 pints). Additional checks identified that the pressure setscrew on the oil relief valve for the gearbox had backed out which created a path for oil to be lost. Emergency diesel generator X-107A was likely in this condition since the completion of its last run on August 31, 2016, resulting in 28 days of inoperability. Entergy initiated CR-PNP-2016-07443 to capture this issue in the station's corrective action program. Entergy also documented an adverse condition analysis in CR-PNP-2016-07443.

The NRC team reviewed the adverse condition analysis documented in CR-PNP-2016-07443, and noted that Entergy had determined that this gearbox had been installed in May 2000 as a like-for-like replacement for the original gearbox, and the original gearbox did not have a relief valve in the oil circuit. Following the September 28, 2016, discovery of this condition, Entergy determined that approximately 2 pints of oil remained in the gearbox and 9 pints of oil had been lost (minimum oil capacity specified by the vendor is 11 pints). Entergy attributed this low oil condition to three causal factors: 1) a design limitation associated with minimal thread engagement (1 – 2 threads) of the setscrew for the relief valve set pressure; 2) a potential for inadvertent operation of the setscrew; and 3) engine vibration caused the setscrew to back out. However, Entergy was unable to determine which of the identified causal factors was the most likely, therefore, they determined the cause to be indeterminate. The NRC team questioned Entergy's causal analysis, and the adequacy of the May 2000 engineering evaluation performed for the replacement gearbox.

With respect to the causal analysis, during discussions with Entergy, the NRC team was informed that since every operator that may have gone into the room at some point prior to this event could not be interviewed (all operators who entered the room over the last sixteen years were not available), the station could not rule out inadvertent manipulation of the setscrew and that was why Entergy determined that the cause was indeterminate. The NRC team determined that this was not a valid reason for classifying the cause as indeterminate. Specifically, the NRC team and

the resident staff had interviewed multiple operators about what is manipulated during prestart checks of the emergency diesel generator and every operator who was interviewed identified that the setscrew was not a component that is manipulated. Based on the clear interview results, the NRC team determined that the most likely cause of the setscrew backing out was vibration, and that the minimal thread engagement was a contributing factor. This determination has been further reinforced since following the NRC team's interviews, Entergy subsequently interviewed all individuals who may have recently entered this space prior to the event, and no one reported manipulating this component.

With respect to evaluations performed for the replacement gearbox, the NRC team determined that in May 2000, while performing planned maintenance activities on the 'A' emergency diesel generator fan drive gearbox (right angle drive), Entergy identified unsatisfactory backlash readings. This prompted Entergy to replace the fan drive gearbox. While attempting to procure a replacement gearbox, it was discovered that the vendor had upgraded the design and the model currently installed was no longer available. Entergy determined that the major difference between the models was that the new model incorporated a relief valve in the oil circuit. Based on these discussions, Entergy determined that the new model gearbox could be classified as a "like-for-like" replacement for the existing gearbox. Entergy performed PDC/FRN 02-113, "X-107A Emergency Diesel Generator Radiator Fan Drive, Right Angle Gear Box Replacement," to document the "like-for-like" evaluation for replacing the fan drive gearbox.

The NRC team also reviewed Station Procedure 3.02, "Preparation, Review, Verification, Approval, And Revision of Design Documents For Plant Design Changes," Revision 38, and noted that Appendix A and B directed that for plant design changes, design change packages were to be generated and these packages were to be reviewed against the original design criteria by all groups responsible for the original design.

The NRC team determined that Entergy's characterization of the change as "like-for-like" even though the new model incorporated a relief valve in the oil circuit was not appropriate, and the replacement gearbox was, in fact, a design change. This design change should have been subject to a review to determine the differences between the new gearbox design and the old one to determine the suitability of application of the part, and the failure to perform this review resulted in Entergy's failure to consider potential new failure mechanisms for the part or the need for related preventive measures.

Analysis. Entergy selected a replacement gearbox for the 'A' emergency diesel generator in May 2000 without fully reviewing the differences between the new gearbox design and the existing gearbox to determine the suitability of application of the new part. Entergy characterized the change as "like-for-like" even though the new model incorporated a relief valve in the oil circuit. As a result, Entergy did not consider potential new failure mechanisms for the part, or the need for related preventive maintenance activities, which was a performance deficiency. The performance deficiency was more than minor because it was associated with the design control attribute of Mitigating Systems cornerstone, and affected the associated cornerstone objective to ensure availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. In

accordance with IMC 0609.04, “Initial Characterization of Findings,” and Exhibit 2 of IMC 0609, Appendix A, “The Significance Determination Process for Findings At-Power,” the team screened the finding for safety significance and determined that a detailed risk evaluation was required based on the ‘A’ emergency diesel generator being inoperable for greater than the technical specification allowed outage time.

Region I senior reactor analysts performed a detailed risk evaluation. The finding was preliminarily determined to be of greater than very low safety significance (greater than Green). The risk important sequences were dominated by external fire risk. Specifically, a postulated fire in the ‘B’ 4KV switchgear room with a consequential loss of the unit auxiliary generator power supply, non-recoverable LOOP to both safety buses A5 and A6, loss of the ‘B’ emergency diesel generator with the conditional failure of the ‘A’ emergency diesel generator, along with the loss of bus A8 feed (from the shutdown transformer or SBO diesel generator) to safety buses A5 and A6. The internal event risk was dominated by weather related LOOPs, failure of the ‘A’ emergency diesel generator, with failure of the ‘B’ emergency diesel generator and SBO diesel generator to run, along with failure to recover offsite power or the emergency diesel generators. See Attachment 1, “‘A’ Emergency Diesel Generator Cooling Water System Degradation Detailed Risk Evaluation,” for a detailed review of the quantitative criteria considered in the preliminary risk determination.

The NRC team did not assign a cross-cutting aspect to this finding because the performance deficiency occurred in May 2000. Entergy’s program has undergone changes since May 2000, and the NRC team did not identify any recent examples of this performance deficiency. Other aspects of Entergy’s performance related to this issue are further discussed in Sections 5.10.3 and 6.3.4.

Enforcement. 10 CFR Part 50, Appendix B, Criterion III, “Design Control,” requires that measures shall be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of structures, systems, and components to which Appendix B applies (i.e., that prevent or mitigate the consequences of postulated accidents that could cause undue risk to the health and safety of the public).

Technical Specification 3.5.F.1 requires that during any period when one emergency diesel generator is inoperable, continued reactor operation is permissible only during the succeeding 72 hours unless such emergency diesel generator is sooner made operable, provided that all of the low pressure core and containment cooling systems shall be operable, and the remaining emergency diesel generator shall be operable. If this requirement cannot be met, an orderly shutdown shall be initiated and the reactor shall be placed in the cold shutdown condition within 24 hours. The 72-hour limiting condition for operation can be extended to 14 days provided, in addition to the above requirements, the SBO diesel generator is verified operable.

Contrary to the above, in May 2000, Entergy selected a part that was essential to the safety-related function of a component to which Appendix B applies, and did not review the part for suitability of application. Specifically, when Entergy replaced the ‘A’ emergency diesel generator radiator blower fan gearbox and discovered that the installed model was no longer available, Entergy concluded that the new model could be classified as a “like-for-like” replacement for the old one. However, the new

model incorporated a relief valve in the oil circuit that was not part of the installed model and Entergy did not review this configuration for potential failure mechanisms. Therefore, Entergy did not consider the need to periodically monitor or maintain the part in this application. Consequently, Entergy also did not identify that the relief valve had a design limitation associated with minimal thread engagement (1-2 threads) of the setscrew for the relief valve set pressure. The technical assumption is that as a result of gearbox pressurization and resultant forces applied within the oil system and to the relief valve, over time, the setscrew backed out, and Entergy, on September 28, 2016, identified that the gearbox had lost most of its oil, and contained an amount that was below the minimum recommended level. This resulted in the 'A' emergency diesel generator being inoperable for a period greater than the technical specification allowed outage time. This violation is being treated as an apparent violation pending a final significance (enforcement) determination. **(AV 05000293/2016011-06, Design Change Not Appropriately Reviewed by Entergy)**

.2 Failure to Report Condition Prohibited by Technical Specifications and a Safety System Functional Failure

Introduction. The NRC team identified a Severity Level IV non-cited violation of 10 CFR 50.73, "Licensee Event Report System," associated with Entergy's failure to submit a licensee event report within 60 days following discovery of an event meeting the reportability criteria. Specifically, on September 28, 2016, Entergy identified the 'A' emergency diesel generator was inoperable. The NRC team determined this condition was prohibited by technical specifications and the inoperability of the 'A' emergency diesel generator existed for a period of time longer than allowed by Technical Specification 3.5.F, "Core and Containment Cooling Systems." This was also reportable as a safety system functional failure.

Description. On September 28, 2016, operations declared the 'A' emergency diesel generator inoperable and entered Technical Specification 3.5.F, "Core and Containment Cooling Systems," in order to perform prestart checks on the diesel. While performing the prestart checks prior to running the 'A' emergency diesel generator technical specification monthly surveillance, operators found oil on the deck and the oil level in the radiator fan gearbox below the manufacturer's minimum recommended level (2 pints vice 11 pints). Additional checks identified that the set screw on the oil relief valve for the gearbox had backed out which allowed oil to leak out at some point during the prior operation of the emergency diesel generator on August 30, 2016. Based on the 'as-found' condition, operations determined that the 'A' emergency diesel generator would not be capable of running for its required mission time (30 days). Entergy initiated CR-PNP-2016-07443 to capture the issue in the station's corrective action program, and work order 457101 to correct the identified condition.

Entergy subsequently performed a reportability evaluation and documented it in CR-PNP-2016-07443. Entergy determined that the issue was not reportable because the 'A' emergency diesel generator was inoperable at the time of discovery, and the low oil level had been corrected and the diesel returned to operable status within the technical specification allowed outage time. Subsequently, on October 13, 2016, Entergy initiated CR-PNP-2016-07899 to identify that the low oil condition documented in CR-PNP-2016-07443 was a maintenance rule functional failure.

Entergy determined that the condition represented a maintenance rule functional failure because the diesel could not perform its maintenance rule function for the required mission time. This CR was not coded for further operability or reportability review and was subsequently closed to CR-PNP-2016-07443.

While reviewing the adverse condition analysis documented in CR-PNP-2016-07443, the NRC team determined that the 'A' emergency diesel generator had been inoperable since its prior surveillance run on August 30, 2016. Specifically, the NRC team determined that due to the system configuration, with the relief valve above the sump oil level, oil would only leak from the relief valve when the diesel was running. This meant that the fan gearbox had been in a low oil level condition since the prior surveillance run in August (29 days), and that the diesel had been inoperable for that period of time as well. The NRC team noted that Technical Specification 3.5.F, "Core and Containment Cooling Systems," allows one emergency diesel generator to be inoperable for 72 hours, extendable to 14 days if the SBO diesel generator is verified to be operable. Based on this, the NRC team determined that the 'A' emergency diesel generator had been inoperable for longer than its technical specification allowed outage time, and should have been reported under the requirements of 10 CFR 50.73(a)(2)(i)(B).

On September 15, 2016, the 'B' emergency diesel generator was inoperable for the planned monthly operability run. During this time, both the 'A' and 'B' emergency diesel generators were inoperable at the same time which is a condition that could have prevented the fulfillment of the safety function of a system needed to shut down the reactor and maintain it in a safe condition, remove residual heat, and mitigate the consequences of an accident which is reportable in accordance with 10 CFR 50.73(a)(2)(v)(A), 50.73(a)(2)(v)(B), and 50.73(a)(2)(v)(D). The 'B' emergency diesel generator remained available.

The NRC team explained their conclusion to Entergy and Entergy agreed that the issue should have been reported, and that the report was late. Entergy initiated CR-PNP-2016-09552 to capture this issue in the station's corrective action program, and on December 9, 2016, submitted Licensee Event Report PNPS-LER-2016-008.

Analysis. Entergy's failure to submit a licensee event report within 60 days following discovery of an event meeting the reportability criteria was a performance deficiency. Because this performance deficiency had the potential to impact the NRC's ability to perform its regulatory function, the NRC team evaluated the performance deficiency using traditional enforcement. The violation was evaluated using Section 2.3.11 of the NRC Enforcement Policy, because the failure to submit a required licensee event report may impact the ability of the NRC to perform its regulatory oversight function. In accordance with Section 6.9.d, Example 9, of the NRC Enforcement Policy, this violation was determined to be a Severity Level IV non-cited violation. Because this violation involves the traditional enforcement process and does not have an underlying technical violation, the NRC team did not assign a cross-cutting aspect to this violation, in accordance with IMC 0612, Appendix B.

Enforcement. 10 CFR 50.73(a)(1) requires, in part, that the licensee shall submit a licensee event report for any event of the type described in this paragraph within 60 days after the discovery of the event. 10 CFR 50.73(a)(2)(i)(B) requires, in part, that licensees shall report any operation or condition prohibited by the plant's technical

specifications. 10 CFR 50. 73(a)(2)(v)(A), 50. 73(a)(2)(v)(B), and 50.73(a)(2)(v)(D) requires, in part, that licensees shall report any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to shut down the reactor and maintain it in a safe shutdown condition; remove residual heat; or mitigate the consequences of an accident. Contrary to the above, Entergy failed to submit a licensee event report for an event of the type described in this paragraph within 60 days following discovery of the event. Specifically, from September 28, 2016, until December 9, 2016, Entergy failed to make a required report when it was discovered that the 'A' emergency diesel generator was not operable, as required by station Technical Specification 3.5.F, and on September 15, 2016, when both emergency diesel were inoperable resulting in a safety system functional failure. Because this violation has been entered into the corrective action program as CR-PNP-2016-09552, compliance was restored in a reasonable amount of time, and the violation was not repetitive or willful, this Severity Level IV violation is being treated as a non-cited violation, consistent with Section 2.3.2.a of the Enforcement Policy. **(NCV 05000293/2016011-07, Failure to Report Condition Prohibited by Technical Specifications and a Safety System Functional Failure)**

6.8 Emergency Preparedness Equipment and Facilities

6.8.1 NRC Inspection Scope

The NRC team assessed emergency preparedness related equipment and facilities against Emergency Plan commitments and reviewed the adequacy of the surveillance program to maintain equipment and facilities. Specifically, through interviews, tours, and sampling equipment lockers, the NRC team verified that onsite and offsite emergency facilities were adequately maintained and supplied to be in a state of readiness to implement the emergency plan. Surveillances of facilities, communications systems, and notification equipment were checked for completion and for the identification and correction of any identified problems.

6.8.2 NRC Inspection Observations and Assessment

The NRC team found the facilities and equipment to be in a state of readiness to implement the Emergency Plan.

Prior to this inspection, Entergy had identified several instances in 2012 and 2015 when the H_2O_2 monitors and post-accident sampling system had been out of service for extended periods of time thereby impacting the ability to implement emergency action levels (EALs) for assessment of gas concentrations inside of containment. Due to the other EALs, Entergy was able to make the appropriate emergency declarations in an accurate and timely manner. Entergy determined that ineffective troubleshooting, inadequate causal analysis, and inappropriate prioritization of corrective measures resulted in these long-standing equipment issues and the failure to maintain equipment reliability. Corrective actions included returning the H_2O_2 and the post-accident sampling systems to Maintenance Rule 10 CFR 50.65 (a)(2) status in May 2016 and updating EP-AD-270, "Equipment Important to Emergency Response," to identify necessary equipment and the associated compensatory measures or equipment. A list of equipment important to emergency response was added to the agenda to be reviewed by Entergy during the plan-of-the-day meetings.

Entergy's corrective actions were effective in ensuring the capability to monitor and assess containment gases.

6.8.3 NRC Inspection Findings

The NRC team determined that this was a licensee-identified violation and documented this issue in Section 9 of this report.

6.9 Engineering Programs Problem Area

6.9.1 PNPS Evaluation Results and Key Corrective Actions

During the IP 95003 Collective Evaluation process, a number of negative observations were made regarding engineering programs in general. Specifically, the evaluation determined that some engineering programs such as maintenance rule, flow-accelerated corrosion, and preventive maintenance were not being adequately implemented, and this resulted in long-standing equipment problems and unacceptable material condition deficiencies, equipment failures, system unavailability, and regulatory non-compliance. As a result, Entergy identified engineering programs as a problem area and performed an apparent cause evaluation in CR-PNP-2016-02061. The apparent cause evaluation documented the following causes:

- Apparent Cause: PNPS site engineering leadership did not provide adequate oversight of engineering programs and programmatic processes.
- Contributing Cause 1: PNPS organizational structure and capacity were not adequate to ensure long term successful performance of engineering programs and processes.
- Contributing Cause 2: Implementation of corrective actions was insufficient to return the programs to health.
- Contributing Cause 3: Turnover of personnel has occurred with no change management or succession planning.
- Contributing Cause 4: PNPS has exhibited weaknesses in technical conscience with inadequate recognition of risk.

Entergy identified the following key corrective actions in the corrective action plan:

- CR-PNP-2016-02061 CA-14: Utilize a fleet subject matter expert who is an industry expert in the areas of Maintenance Rule to provide mentorship and coaching to station maintenance rule coordinator.
- CR-PNP-2016-02061 CA-22: Add an annual training requirement (read and sign) for conduct of engineers.
- CR-PNP-2016-02061 CA-18: Roll out a new NRC Safety Culture Trait talk as a weekly discussion at the engineering morning meeting.

- CR-PNP-2016-02061 CA-20: Engineering director to issue a directive requiring corrective actions be assigned to the supervisor with the sub-response to the individual contributor and not directly to the individual contributor.

- CR-PNP-2016-02061 CA-21: Add an element to the yearly performance review to require that supervisors, managers, and directors are accountable for the health of the programs under their cognizance.

Entergy's EFR for actions included in CR-PNP-2016-02061 was to perform assessments of the PNPS engineering department in areas such as:

- Equipment failures as a result of inadequate implementation of preventive maintenance work orders on critical plant components and systems

- Component failures of critical components included in the flow-accelerated corrosion monitoring program

- Incorrect maintenance rule functional failure determinations or incorrect unavailability hour determinations by maintenance rule program personnel.

6.9.2 NRC Inspection Scope

The NRC team performed a review of the engineering programs apparent cause evaluation documented in CR-PNP-2016-02061, and associated corrective actions planned and already implemented. The NRC team conducted interviews with key personnel, including design and system engineers; performed field walkdowns to visually inspect several safety-related systems and components to verify the material condition of structures, systems, components, and support systems; attended meetings associated with the plant health program; and performed a review of key system health reports. In addition, the NRC team assessed preventive maintenance scope, frequency, deferrals, technical bases, and use of vendor recommendations and industry experience; and longstanding equipment issues. The NRC team also assessed the extent of condition for design and licensing basis performance issues and reviewed completed self-assessments in the preventive maintenance, flow accelerated corrosion, and maintenance rule programs. Additionally, the NRC team assessed the effectiveness of corrective actions for deficiencies identified by Entergy involving engineering programs and assessed the operational performance of selected safety systems to verify the capability of performing their intended safety functions. The NRC team completed an assessment of a sample of PNPS's engineering programs including:

- Flow Accelerated Corrosion Monitoring Program
- Maintenance Rule Program
- Preventive Maintenance Program
- Large Motor Program
- Aging Management Programs
- Single Point Vulnerability Review Program
- Modification Program

6.9.3 NRC Inspection Observations and Assessment

The NRC team concluded that Entergy's evaluation of the engineering program issues documented in CR-PNP-2016-02061 was comprehensive. The evaluation provided a critical look at engineering management oversight and mentoring, work force resources, and outage schedule. The NRC team verified additional engineering staffing has been added to maintain the appropriate level of program engineering staffing to ensure safe and reliable operation of the plant until planned permanent shutdown in 2019. In addition, adequate monitoring tools for detection of corrective action program performance have been implemented. The NRC team verified an adequate extent of condition review was also performed. In addition, improved engineering support and management oversight of the plant material condition and equipment performance were noted, including the implementation of the new mentoring program with industry subject-matter experts to provide an ongoing diagnostic assessment of plant performance and also that the EFRs have been established for the CAPRs.

However, the NRC team identified several examples which indicated that deficiencies in engineering programs and implementation of the corrective action program continue to challenge the organization. The following specific issues related to the area of engineering and engineering programs were identified during the inspection, and are documented in Section 6.9.4 of this report:

- The NRC team identified a finding associated with the failure to effectively control and monitor the performance of maintenance rule scoped equipment.

- The NRC team identified a finding associated with the failure to correct a condition adverse to quality associated with non-safety-related floor grating in contact with or in close proximity to the safety-related containment drywell liner.

- The NRC team identified a finding associated with the failure to take timely corrective actions for a condition adverse to quality associated with gasket leaks on the 'B' residual heat removal heat exchanger.

6.9.4 NRC Inspection Findings

.1 Failure to Adequately Monitor the Performance of Maintenance Rule Scoped Components

Introduction. The NRC team identified a Green non-cited violation of 10 CFR 50.65(a)(2), "Requirements for monitoring the effectiveness of maintenance at nuclear power plants." Specifically, Entergy did not demonstrate that the performance of 18 maintenance rule scoped components was effectively controlled through the performance of appropriate preventive maintenance, and did not establish goals and monitoring in accordance with 10 CFR 50.65(a)(1).

Description. In 2007, Entergy transitioned programs used to track and manage preventive maintenance. During this transition, the 10 CFR 50.65(a)(2) performance requirements for 18 components were inadvertently removed, and the components

were listed as run-to-failure. These components were required to be scoped into the maintenance rule, as defined by 10 CFR 50.65(b), and be monitored either through 10 CFR 50.65(a)(1) goals or 10 CFR 50.65(a)(2) performance monitoring.

In CR-PNP-2016-07115, Entergy recognized these 18 components were incorrectly listed as run-to-failure, and had been for the last nine years. However, Entergy did not place these components into 10 CFR 50.65(a)(1) and establish goals and monitoring when they identified the inability to demonstrate that the performance and condition of the components was effectively controlled through preventive maintenance. Instead, Entergy maintained the components in 10 CFR 50.65(a)(2) status. Entergy determined that without component failures that resulted in maintenance rule functional failures that caused the system or function to exceed the established performance criteria, the components were correctly placed in 10 CFR 50.65(a)(2) status.

In accordance with the NRC Enforcement Manual, the 10 CFR 50.65 (a)(2) performance demonstration must be technically justifiable and reasonable. When a component is designated as run-to-failure, a technical evaluation should be done to confirm that no maintenance or monitoring is required for that component under 10 CFR 50.65 (a)(2). Typically, this is to ensure the failure of the component would not impact the system's ability to meet criteria found in 10 CFR 50.65 (b)(1) and (b)(2). The determination that the run-to-failure designation is invalid makes the (a)(2) performance demonstration for that system no longer technically justifiable. Therefore the demonstration ceases to be valid and the structure, system, or component is required to be moved to (a)(1). Upon identification of the concern, Entergy had to develop a new performance demonstration for the 18 affected components as documented in CR-PNP-2017-00401.

The NRC team determined that Entergy was not appropriately monitoring the 18 affected components to ensure that their performance or condition had been demonstrated to be effectively controlled. The NRC team investigated the status of the 18 components listed in CR-PNP-2016-07115 through a CR search and found apparent examples of component failures that were treated as broke-fix and were not captured and evaluated in the maintenance rule program to affirm the (a)(2) performance demonstration remained valid.

Analysis. Entergy's failure to effectively control and monitor the performance of maintenance rule scoped equipment in accordance with 10 CFR 50.65(a)(2) was a performance deficiency. The performance deficiency was more than minor because it was associated with the equipment performance attribute of the Mitigating Systems cornerstone and affected the cornerstone objective to ensure availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, Entergy failed to demonstrate that the performance of the 18 maintenance rule scoped components was being effectively controlled through the performance of appropriate preventive maintenance, which adversely impacts the reliability of those systems. The NRC team evaluated the finding using Exhibit 2, "Mitigating Systems Screening Questions," of IMC 0609, Appendix A, "Significance Determination Process for Findings At-Power," and determined this finding did not affect the design or qualification of a mitigating structure, system, or component; represent a loss of system and/or function; involve an actual loss of function of at least a single train or two separate safety systems for greater than its

technical specification-allowed outage time; or represent an actual loss of function of one or more non-technical specification trains of equipment designated as high safety-significant. Therefore, the NRC team determined the finding was of very low safety significance (Green). The finding had a cross-cutting aspect in the area of Problem Identification and Resolution, Evaluation, in that Entergy failed to thoroughly evaluate and ensure that resolution of the identified issue, maintenance not being performed on maintenance rule scoped components, included reclassifying the components as necessary. Specifically, Entergy's failure to demonstrate that the performance of 18 maintenance rule scoped components was effectively controlled through the performance of appropriate preventive maintenance, necessitated the need for a technically justifiable performance demonstration. [P.2].

Enforcement. 10 CFR 50.65(a)(1), requires, in part, that the licensee shall monitor the performance or condition of structures, systems, or components within the scope of the rule as defined by 10 CFR 50.65(b), against licensee-established goals in a manner sufficient to provide reasonable assurance that these structures, systems, or components are capable of fulfilling their intended functions. 10 CFR 50.65(a)(2) states, in part, that monitoring as specified in 10 CFR 50.65(a)(1) is not required where it has been demonstrated that the performance or condition of structures, systems, or components is being effectively controlled through the performance of appropriate preventive maintenance, such that the structures, systems, or components remain capable of performing their intended function. Contrary to the above, between 2007 and 2016, Entergy failed to demonstrate that the performance of 18 maintenance rule scoped components was effectively controlled through the performance of appropriate preventive maintenance, and did not establish goals and monitoring in accordance with 10 CFR 50.65(a)(1). Entergy's immediate corrective action was to initiate a CR to evaluate moving the affected systems to 10 CFR 50.65(a)(1) monitoring requirements. Since this violation was of very low safety significance (Green) and has been entered into the corrective action program as CR-PNP-2017-00401, this violation is being treated as a non-cited violation consistent with Section 2.3.2.a of the Enforcement Policy. **(NCV 05000293/2016011-08, Failure to Adequately Monitor the Performance of Maintenance Rule Scoped Components)**

.2 Ineffective Corrective Actions to Address Conditions Adverse to Quality Regarding Components in Contact with or Close Proximity to the Drywell Liner

Introduction. The NRC team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," associated with Entergy's failure to correct a condition adverse to quality affecting safety-related equipment. Specifically, during a previous NRC inspection in August 2016, inspectors identified numerous locations in the drywell where non-seismic equipment was either in contact, or close proximity, with the drywell liner and had caused damage. Entergy initiated CRs for the identified issues, and performed an operability evaluation for the specific items identified by the inspectors, but failed to take corrective actions to address the condition adverse to quality.

Description. Prior to the IP 95003 inspection, on August 22, 2016, during a walkdown of the containment drywell while the plant was shutdown, the inspectors performed visual inspections of the structural integrity of the reactor containment drywell metal liner to verify the liner surface was free of defects, and to assess the

condition of the safety-related coatings inside containment. The inspectors also reviewed controls of permanently installed equipment, structural supports, and non-safety-related floor grating to protect the liner and the liner coatings from damage. The inspectors identified that numerous sections of floor grating came in direct contact or were in close proximity with the containment liner. In some cases, contact by the floor grating had resulted in removal of the liner coating and/or minor scratches. The inspectors also questioned several large structural safety-related supports that were in close proximity to the liner. These issues created a potential for liner damage during a design basis seismic event. Additionally, the inspectors were concerned with the extent of this condition, since due to normal radiation-related shine, several areas in containment were not accessible for the inspectors to do a complete inspection of the liner. The inspectors also reviewed the last two completed periodic coating inspections performed per procedure CEP-CII-003 during the last two refueling outages per American Society of Mechanical Engineers (ASME) Section XI and noted that the minor damage to the containment liner and coating caused by the floor grating had not been identified or documented. To address the inspectors' concerns, PNPS initiated CR-PNP-2016-06188, CR-PNP-2016-06315, CR-PNP-2016-06242, and CR-PNP-2016-06316.

During the on-site inspection week of November 28, the NRC team performed a follow-up review of Entergy's operability evaluation and applicable corrective actions documented in the four CRs and interviewed the system engineer and engineering management personnel. The NRC team noted that Entergy engineers determined there was no acceptance criteria established in any design drawings or procedures to prevent interaction between structures, systems, and components and the containment liner. The evaluation also determined the gouge caused to the liner by the loose floor grating was only 0.008 inches deep and did not challenge operability of the liner. Additionally, Entergy determined that the liner damage potential was low due to the limited energy that could result in impact to the liner during a design basis seismic event, the relative robust liner (1-1/16" thick carbon steel plate) at the applicable elevations, and the thickness of the concrete behind it. The NRC team noted that Entergy had implemented adequate corrective actions to address only one of the conditions identified by the inspectors. Specifically, per CR-PNP-2016-06242, actions were implemented to cut the floor grating that was rubbing against a 1-inch stainless steel pipe associated with the core spray loop break detection instrumentation. However, the NRC team noted that Entergy had closed all four CRs without corrective actions to address the condition adverse to quality identified by the inspectors regarding components in contact with or close proximity to the drywell liner. Specifically, the NRC team determined no actions had been implemented or planned to perform an extent of condition review, to secure the loose grating that had caused the minor damage to the liner, and to evaluate the need for a clearance criteria between components such as floor grating and support structures and the containment liner to prevent damage to the liner during normal plant operation and a postulated seismic event.

Although Entergy had determined there were no clearance requirements established between the liner and components inside containment, the NRC team concluded the seismic II/I classification delineated in PNPS's UFSAR was clear and the station failed to consider this standard when making the decision to not implement any actions to correct the condition adverse to quality identified by the inspectors. Specifically, the NRC team noted that PNPS UFSAR Structural Design Section

12.2.1.1.2 states, in part, that Class II designated structures and/or equipment shall not degrade the integrity of any structures and/or equipment designated Class I. Per UFSAR Section 12.2.1.2, the PNPS drywell is a Class I structure. To accomplish the objective above, UFSAR Section 12.2.3.5.1 continues to state that Class I to Class II interfaces are designed so that there will be no functional failure in the Class I structure. Entergy entered this issue into the corrective action program as CR-PNP-2016-09346 and CR-PNP-2016-09377 to perform an extent of condition review, to secure the loose grating, and to evaluate the need for a clearance criteria between components such as floor grating and support structures and the containment liner.

Entergy also performed an operability determination that established a reasonable expectation of operability pending implementation of corrective actions. The NRC team reviewed the operability determination and agreed with the conclusion.

Analysis. Failure to implement adequate corrective actions to address conditions adverse to quality regarding components in contact with or close proximity to the drywell liner constitutes a performance deficiency. The performance deficiency was more than minor because it was associated with the configuration control attribute of the Barrier Integrity cornerstone and affected the cornerstone objective to provide reasonable assurance that physical design barriers (fuel cladding, reactor coolant system, and containment) protect the public from radionuclide releases caused by accidents or events. Using IMC 0609, Appendix A, "The Significance Determination Process for Findings At-Power," Exhibit 3, "Barrier Integrity Screening Questions," the NRC team determined that this finding was of very low safety significance (Green) because the finding did not represent an actual open pathway in the physical integrity of reactor containment (valves, airlocks, etc.), containment isolation system (logic and instrumentation), and heat removal components. This finding had a cross-cutting aspect in the area of Problem Identification and Resolution, Evaluation, because engineering evaluation of the degraded condition identified by the inspectors did not thoroughly evaluate the containment liner issues to ensure that resolutions address causes and extent of conditions commensurate with their safety significance [P.2].

Enforcement. 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requires in part, that conditions adverse to quality such as deficiencies, deviations, and non-conformances are properly identified and corrected. Contrary to the above, from August 22 through November 28, 2016, PNPS failed to assure that conditions adverse to quality were promptly identified and corrected. Specifically, PNPS failed to address identified conditions adverse to quality regarding components in contact with or close proximity to the drywell liner. As a result, no actions had been implemented or planned to perform an extent of condition review, to secure the loose grating that had caused minor damage to the liner, and to evaluate the need for a clearance criteria between components such as floor grating and support structures and the containment liner to prevent damage to the liner during normal plant operation or a postulated seismic event. Entergy implemented immediate corrective actions to enter this issue into the corrective action program for resolution. Entergy also performed an operability determination that established a reasonable expectation of operability pending implementation of corrective actions. Because this violation was of very low safety significance (Green) and PNPS entered this issue into its corrective

action program as CR-PNP-2016-09346 and CR-PNP-2016-09377, this violation is being treated as a non-cited violation, consistent with Section 2.3.2.a of the Enforcement Policy. **(NCV 05000293/2016011-09, Ineffective Corrective Actions to Address Conditions Adverse to Quality Regarding Components in Contact with or Close Proximity to the Drywell Liner)**

.3 Failure to Promptly Correct a Condition Adverse to Quality for the Residual Heat Removal System

Introduction. The NRC team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," because Entergy did not take timely corrective action for a previously identified condition adverse to quality. Specifically, Entergy failed to adequately resolve gasket leakage on the 'B' residual heat removal heat exchanger, which resulted in continued degradation and leakage for the heat exchanger gasket. Entergy did not consider this leakage or degraded condition with the potential to impact the operability of the residual heat removal system, or PNPS' licensing basis with regards to leakage or a closed loop system outside containment.

Description. On August 10, 2016, station personnel performed a visual inspection of the 'B' loop residual heat removal system suction and discharge piping. During this inspection, a 90 drop per minute leak was identified on the 'B' heat exchanger upper flange with the system at test pressure. Entergy initiated CR-PNP-2016-05785 to capture this issue in the station's corrective action program for resolution.

The NRC team reviewed Entergy's response to CR-PNP-2016-05785 as part of the inspection scope. During this review, the NRC team noted that Entergy had classified the system as fully operable (no degraded condition exists) and closed the CR to work order 51533968. The NRC team reviewed work order 51533968 and noted that on August 16, 2016, the work order had been coded as returned with no repair date scheduled. The NRC team questioned why Entergy had not classified the leak as a degraded condition and did not appear to be planning a repair.

During subsequent discussions with plant staff, the NRC team learned that leakage on the 'B' residual heat removal heat exchanger was a long standing issue, and both flanged joints (upper and lower) of the heat exchanger were identified as leaking. The NRC team reviewed the history of this heat exchanger and determined that in 1979, the upper flange had been identified as leaking and Entergy had done leak injection to stop the leak. In 1987, the upper flange was again found leaking and the lower flange was also identified as leaking. Entergy again performed leak injection to address the leaking joints. In 2007, the lower flange was again identified as leaking (3 gallons per minute), and again, Entergy performed leak injection to address the leakage. In May 2015, during piping inspections, station personnel identified a 30 drop per minute leak on the lower flange. CR-PNP-2015-05378 was written and closed to work order 00415067, which was subsequently closed on April 12, 2016, with no work performed.

The NRC team determined that Entergy was not considering the leakage as a degraded condition, and that Entergy was treating the leak injection activity as a permanent repair. The NRC team noted that this was contrary to the NRC staff's position documented in Part 9900 Technical Guidance Document, "Online Leak

Sealing Guidelines for ASME Code Class 1 and 2 Components," dated July 15, 1997. Specifically, the staff identified the use of leak sealant as a temporary repair option for leaking gaskets, and the leaking gaskets should be replaced at the next refueling outage, or have a risk-informed deferral assessment.

The NRC team determined that Entergy had failed to take timely and adequate corrective actions to correct the heat exchanger flange leakage issues on the 'B' residual heat removal heat exchanger or to perform a risk-informed deferral assessment. The NRC team informed Entergy of their observations and Entergy initiated CR-PNP-2016-09725 to capture this issue in the station's corrective action program. Entergy also performed an operability determination that established a reasonable expectation of operability pending implementation of corrective actions. The NRC team reviewed the operability evaluation and agreed with the conclusions.

Analysis. Entergy's failure to take timely and adequate corrective actions to correct a condition adverse to quality, or to perform a risk-informed deferral assessment, was a performance deficiency. The performance deficiency was more than minor because it is associated with the equipment performance attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective to ensure availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to correct identified gasket leakage or to perform an appropriate evaluation of the condition resulted in continued degradation and leakage of the heat exchanger gasket, and called into question the operability of the heat exchanger. The NRC team evaluated the finding using Exhibit 2, "Mitigating Systems Screening Questions," of IMC 0609, Appendix A, "Significance Determination Process for Findings At-Power," and determined this finding did not affect the design or qualification of a mitigating structure, system, or component; represent a loss of system and/or function; involve an actual loss of function of at least a single train or two separate safety systems for greater than its technical specification-allowed outage time; or represent an actual loss of function of one or more non-technical specification trains of equipment designated as high safety-significant. Therefore, the NRC team determined the finding was of very low safety significance (Green). The finding had a cross-cutting aspect in Human Performance, Conservative Bias, because Entergy failed to use decision making practices that emphasize prudent choices over those that are simply allowable [H.14].

Enforcement. 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requires, in part, that measures shall be established to assure that conditions adverse to quality are promptly identified and corrected. Contrary to the above, from 1979 through the present, Entergy failed to assure that conditions adverse to quality were promptly identified and corrected without an engineering assessment of the condition. Specifically, Entergy failed to adequately resolve gasket leakage issues associated with the 'B' residual heat removal system heat exchanger, which resulted in continued degradation and leakage. Entergy implemented immediate correction actions to enter this issue into the corrective action program for resolution. Entergy also performed an operability determination that established a reasonable expectation of operability pending implementation of corrective actions. Since this violation was of very low safety significance (Green) and has been entered into the corrective action program as CR-PNP-2016-09725, this violation is being treated as a non-cited violation consistent with Section 2.3.2.a of the Enforcement Policy. **(NCV**

05000293/2016011-10, Failure to Promptly Correct a Condition Adverse to Quality for the Residual Heat Removal System)

6.10 Preventive Maintenance Program

6.10.1 PNPS Evaluation Results and Key Corrective Actions

Entergy performed a review of components that are identified as the most risk significant in the station's probabilistic risk analysis to identify any preventive maintenance program deficiencies that could affect equipment reliability or potential component aging issues that could challenge plant operations before the end of operating plant life. In addition, on February 2, 2016, NIOS identified that the Preventive Maintenance Oversight Group had not been effective at improving the overall health of the preventive maintenance program to improve station equipment reliability, and as a result, equipment failures continued to impact station safety and reliability. Contributing to this was a Preventive Maintenance Oversight Group focus on approving preventive maintenance deferrals instead of improving the effectiveness of the preventive maintenance program and weak oversight by the Plant Health Committee. The ineffectiveness of Preventive Maintenance Oversight Group was determined as the apparent cause of not addressing preventive maintenance program deferrals (CR-PNP-2015-08030). Entergy performed an apparent cause evaluation under CR-PNP-2016-01273 to address these concerns.

The preventive maintenance evaluation documented that declining effectiveness of the preventive maintenance program was the result of insufficient engineering oversight to ensure longstanding program issues identified by external groups were properly addressed. In addition, contributing causes such as personnel not being knowledgeable about the preventive maintenance process and a lack of commitment to program implementation were identified. Specifically, the assessment identified poor engineering management oversight of issues that were identified in 2010, 2013, and again in 2015 (CR-PNP-2015-08030 Preventive Maintenance Program Deferrals) by external peer groups. Issues identified by Entergy included:

- Managers deferred several critical preventive maintenance tasks and removed them from the outage scope without full implementation of mitigation strategies and prior to Preventive Maintenance Change Request-Action Requests being approved.

- Lack of preventive maintenance oversight and consistent standards enforcement by the Preventive Maintenance Oversight Group has allowed inadequate preparations and procedural adherence issues to continue resulting in preventive maintenance deferrals.

- Gaps in management of priorities and resource capacity during outage periods led to preventive maintenance deferrals.

In addition, there were numerous instances where items were removed from outage scope with little evidence that the risk of equipment failure was considered, or that the risk was considered and tolerated. This decline in the preventive maintenance program performance appears related to initiatives to reduce staffing. Specifically,

since 2006, PNPS has been a leader in workforce reduction efforts and has lowered staffing by over 115 full-time equivalents.

The following corrective actions were identified under the preventive maintenance assessment:

- Assess the extent of condition in the preventive maintenance program.
- Increase engineering resources to regain effectiveness in the equipment reliability process.
- Perform a preventive maintenance program self-assessment. This assessment was started in August 2016 and identified the following key issues:
  - CR-PNP-2016-05871: A total of 653 components do not have criticality classification documented
  - CR-PNP-2016-07115: Eighteen high risk components are classified "Run-to-Failure" and 11 components are classified as "Non-Critical"
  - CR-PNP-2016-07243: Frequencies of preventive maintenance deviate from preventive maintenance basis documents and Entergy preventive maintenance templates
  - CR-PNP-2016-07486: Preventive maintenance change request AR-245704 technical justification to extend the frequency of 57 outage items does not meet current industry or fleet standards
  - CR-PNP-2016-07555: Risk significant components within the direct current distribution system have no documented preventive maintenance strategy within the basis documents
  - CR-PNP-2016-07720: 4KV breakers and protective relays have duplicate equipment numbers in the equipment database. The duplicate equipment identifiers have contradictory criticality information
  - CR-PNP-2016-08708: Risk-significant components, such as turbine auxiliary oil pumps P-130A and P-130B, have preventive maintenance actions scheduled years beyond the late date, and some preventive maintenance actions have been closed without doing preventive maintenance, due to motors considered "not running" although the motors run monthly

6.10.2 NRC Inspection Scope

The NRC team reviewed the preventive maintenance programs for the selected systems to assess program adequacy and to determine whether design, vendor, and generic information were appropriately incorporated into the maintenance program. The NRC team did a sample review of operability evaluations for components whose preventive maintenance strategy has either been deferred or had a frequency

change to beyond vendor recommended life of the components. Observations of in-progress maintenance and testing on some systems were also conducted. The NRC team reviewed Entergy procedure EN-DC-324, "Preventive Maintenance Program," and conducted interviews with PNPS personnel, including engineering personnel who had an input into maintenance-related activities, to determine how the system was operated, whether that operation conflicted with the intended safety function, and whether engineering input was at an appropriate level to ensure safe and reliable plant operation. The NRC team also assessed the application of the preventive maintenance program to mitigate single point vulnerabilities, which identified components whose failure can result in having to operate at reduced power or a unit scram.

The NRC team also reviewed the following engineering program "snap-shot" self-assessments performed by PNPS:

- Check Valve Program (LO-PNPLO-2016-00054)
- Air Operated Valve Program (LO-PNPLO-2016-00055)
- Motor Operated Valve Program (LO-PNPLO-2016-00057)
- Station Batteries Program (LO-PNPLO-2016-00061)
- Large Motor Program (CR-PNPS-2016-2061, CA-99)

6.10.3 NRC Inspection Observations and Assessment

The NRC team assessed Entergy's preventive maintenance program performance to determine whether it was sufficient to support safe operation and whether planned corrective actions would promote sustained performance improvement for the remaining operating life of the plant. The NRC determined that Entergy's evaluations related to the preventive maintenance program were comprehensive. The evaluations identified multiple conditions that contributed to the failure of the preventive maintenance program to sustain reliable equipment performance. Additionally, the station's evaluations identified multiple conditions that contributed to the failure to identify and resolve declining performance. The NRC team concluded Entergy's evaluation was adequate and did not identify any significant additional consequences from preventive maintenance scope reductions or those preventive maintenance actions that had either been deferred or had a frequency change to beyond vendor recommended life of the components.

6.10.4 NRC Inspection Findings

No findings were identified.

6.11 Large Motor Program

6.11.1 PNPS Evaluation Results and Key Corrective Actions

The large motor program at PNPS is a long-term program to manage motors with more than 200 horsepower. The intent is to identify, schedule, and track motor rewinding and refurbishment. By procedure, this program is managed at the corporate level with the PNPS program engineer responsible for monitoring and maintaining the long range plan for motors onsite. From 2005 to 2006, the Entergy

fleet experienced several large motor failures as documented in CR-HQN-2007-0972. In 2008, a fleet motor subject matter expert meeting determined that continuous duty motors should have a time-based refurbishment and time-based rewind tasks on a 16- and 30-year interval, respectively. It was recognized at that time that some stations had motors beyond the 30-year time frame and that availability of critical spares could further impede implementation. Based on Entergy fleet operating experience, priority was given to continuous duty motors. In 2010, actions were initiated to add preventive maintenance actions for refurbishments and rewinds for continuous duty large motors. Any motors that were non-continuous duty were not included as requiring time-based refurbishments. PNPS then experienced several motor failures including:

- In January 2012, the 'A' residual heat removal pump motor failed (CR-PNP-2012-00190). The fleet was consulted to add time-based preventive maintenance for this non-continuous operating motor. The motor is in-service when the train is selected for shutdown cooling during outages. The preventive maintenance template was not changed.

- In May 2013, the 'A' turbine auxiliary oil motor failed (CR-PNP-2013-04190). PNPS performed a root cause evaluation and implemented a time-based strategy on non-continuous duty motors.

As corrective actions for these failures, PNPS initiated actions in December 2013 to add a refurbishment task for five non-continuous duty safety-related motors: 'B', 'C', and 'D' residual heat removal pump motors and the 'A' and 'B' core spray pump motors. Specifically, refurbishment of the 'B', 'C', and 'D' residual heat removal pump motors was set for 2017, 2019, and 2021, respectively. The core spray pump motors were set for 2019 for 'A' and 2021 for 'B'. PNPS also determined that continuous removal of large motors from the outage scope from 2011 to 2015 had created a large backlog and put equipment reliability at an increased risk.

6.11.2 NRC Inspection Scope

The NRC team performed a sample review of the large motor program and associated corrective actions planned and already implemented. The NRC team reviewed the list of large motor deferrals and associated risk reviews performed per station procedure 1.3.142, "PNPS Risk Review and Disposition." The NRC team also conducted interviews with key personnel, including the motor program owner and design and system engineers, performed field walkdowns to visually inspect several safety-related motors and associated components to verify their material condition, and reviewed applicable system health reports. The NRC team assessed the maintenance, surveillance testing, and diagnostic activities of selected risk-significant motors, including vibration, lubricating oil analysis, thermography readings, Megger testing, and boroscopic inspections. The NRC team assessed PNPS's implementation of online and outage maintenance, including backlogs; preventive maintenance scope, frequency, deferrals, technical bases, and use of vendor recommendations and industry experience; and longstanding equipment issues. Additionally, the NRC team assessed the effectiveness of corrective actions for deficiencies involving the selected motor performance and assessed the operational performance of the motors and associated components to verify the capability of performing their intended safety functions.

The NRC team also sampled the following mitigating strategies implemented by PNPS to assess and evaluate applicable corrective actions regarding safety-related or critical motors through the remaining operating life of the plant:

- 'A' reactor feedwater motor rewind (P-103A): This motor was refurbished in August 20, 2013, but never rewound, and is not planned to be rewound for the remaining operating life of the plant.

- 'B' reactor feedwater pump motor rewind (P-103B): Replacement with a refurbished and rewound motor is scheduled for 1R21.

- Circulating water pump motor rewind (P-105A): Rewind of this pump is not planned to be completed for remaining operating life of the plant.

- 'B', 'C', and 'D' residual heat removal pump motor rewinds: Rewinds of these pumps are not planned for the remaining operating life of the plant. An available spare motor, which has been refurbished and rewound, is kept as a ready spare for any of the motors, if needed.

6.11.3 NRC Inspection Observations and Assessment

The NRC team noted that deficiencies with the large motor program had been properly captured by PNPS and that evaluations and some corrective actions had been implemented or planned. Specifically, motor refurbishments and rewinds were not being performed on some large motors.

The NRC team noted that PNPS had performed a risk evaluation per procedure 1.3.142 to remove the 'B' residual heat removal pump motor from the scope of the upcoming refueling outage (1R21) and keep the refurbished motor as a ready spare for any of the motors, if needed. Additionally, as noted above, PNPS does not plan on refurbishing or rewinding the 'C' or 'D' residual heat removal pump motors for the remaining operating life of the plant. The NRC team questioned this decision since these were the original motors that have been operating for almost 42 years without a motor refurbishment or rewind. The NRC team reviewed PNPS's evaluation of the 'A' residual heat removal pump motor failure that occurred in 2012 (CR-PNP-2012-00190); the motor was 40 years old when it failed. The NRC team noted that the station's evaluation had determined the 'A' motor winding failure was attributed to the large number of motor starts. The number of starts on the 'A' residual heat removal pump motor was much larger when it failed than the number of starts for the other three residual heat removal pump motors. This is because at PNPS, the 'A' pump has historically been the preferred pump for supporting shutdown cooling or other activities. A review of the number of pump starts for a six-year period prior to 2012 identified the 'A' pump had 302 starts, while the 'B' pump only had 11 starts, the 'C' pump had 158 starts, and the 'D' pump had 72 starts. The NRC team verified that diagnostic test results for all four residual heat removal pump motors including vibration, lubricating oil analysis, thermography readings, Megger testing, and boroscopic inspections, are satisfactory and do not show any degrading trend. In addition, yearly high voltage "Baker" testing performed on all four residual heat removal pump motors since 2014 show satisfactory results. The NRC team noted

that PNPS's failure to properly implement the expected continuous duty and non-continuous duty motors refurbishment and motor rewinds is a concern. However, given the acceptable results in the predictive maintenance activities being performed, the likelihood of failure of any of the safety-related motors that have not been refurbished and/or rewound for the remaining three years of operating life of the plant is low. Therefore, based on currently available data, and despite the deficiencies identified by PNPS regarding their large motor program, the NRC team found no significant issues or operability concerns.

6.11.4 NRC Inspection Findings

No findings were identified.

6.12 Single Point Vulnerabilities

6.12.1 NRC Inspection Scope

The NRC team assessed the application of the Preventive Maintenance Program to mitigate single point vulnerabilities, which identified components whose failure can result in having to operate at reduced power or a unit scram. PNPS's evaluation documented a total of 342 components as single point vulnerabilities, and included mitigation strategies in Single Point Vulnerability Unit Reliability Team 6-17-2013.

The NRC team interviewed the single point vulnerability program owner, reviewed the current list of unmitigated single point vulnerabilities, and performed a sample inspection of the safety review and operability evaluations for five currently unmitigated single point vulnerabilities including PNPS's decision to not mitigate (rewind) the 'A' circulating water pump motor (P-105A) for the remaining operating life of the plant. The NRC team also reviewed applicable large motor performance monitoring data for these motors such as Megger test results, vibration data, lubricating oil samples, and thermography readings. In addition, because industry operating experience has identified age-related degradation of electrolytic capacitors, the NRC team reviewed PNPS's assessments and applicable corrective actions for several electrolytic capacitors with a 10- to 12-year recommended replacement cycle that have never been replaced (i.e., greater than 41 years of operation). PNPS determined these capacitors have a very high probability of failure due to aging and obsolescence.

Capacitors are energy storage devices that are widely used in electronic and electrical power circuits. Operating experience has shown that capacitors have finite lifetimes. Placing these capacitors in a periodic preventive maintenance program that accounts for both time in storage and time in service can address the adverse effects of aging capacitors in equipment circuitry and prevent equipment failures. EPRI TR-112175, "Capacitor Application and Maintenance Guide," dated August 1999, states that capacitor change-outs are performed between 7 and 15 years depending on vendor recommendations and plant operating experience. Another EPRI document, "Power Supply Maintenance and Application Guide (1003096)," dated December 2001, states that many of the power supplies that failed had been in service greater than 15 years on average. The NRC team also reviewed PNPS's shelf life program to ensure components that have a limited material life and

components containing limited shelf life materials that can suffer degradation of their physical properties while in storage environment are properly addressed.

The NRC team sampled the following high critical single point vulnerability assessments:

- EC 5000071780, which modified the main turbine stator cooling runback logic during 1R17 to eliminate an existing high critical single point vulnerability
- Reactor feedwater pump motor rewind (P-103B), scheduled for 1R21
- Circulating water pump motor rewind (P-105A), which will not be done for the remainder of plant operating life
- Start-up transformer X-4 rewind, scheduled for 1R21
- Replace electrolytic capacitor for FIC-640-19A, feedwater regulating valve FV-642A manual/auto control station, which was completed in 1R20
- Replace electrolytic capacitor for FIC-640-19B, feedwater regulating valve FV-642A manual/auto control station, scheduled for 1R21
- Replace electrolytic capacitor for feedwater regulating valve FV-642A loss of milliamp lock-up (UA-640-16A), scheduled for 1R21
- Replace electrolytic capacitor for feedwater regulating valve FV-642B loss of milliamp lock-up (UA-640-16B), scheduled for 1R21
- Replace electrolytic capacitor for rod worth minimizer rod block (FA-640-17A), scheduled for 1R21
- Replace electrolytic capacitor for rod worth minimizer rod block (FA-640-17B), scheduled for 1R21
- Replace electrolytic capacitor for recirculation ‘A’ & ‘B’ run-back limiters (LAHL-640-44A), scheduled for 1R21
- Replace electrolytic capacitor for high water level feed pump trip, 2-out-of-2 logic (ALRM-640-44A), scheduled for 1R21
- Replace electrolytic capacitor for high water level feed pump trip, 2-out-of-2 logic (ALRM-640-44B), scheduled for 1R21
- Replace electrolytic capacitor for feedwater 1-element and 3-element control computation module (640-51), scheduled for 1R21
- Replace electrolytic capacitor for start-up feedwater regulating valve (640-51), scheduled for 1R21

6.12.2 NRC Inspection Observations and Assessment

The NRC team verified that Entergy properly developed a list to identify and establish mitigating strategies to reduce and resolve single point vulnerabilities. In addition, the NRC team verified that the strategy and risk related to single point vulnerabilities is communicated to management through several methods such as the Preventive Maintenance Oversight Group, system health reports, and the Plant Health Committee per Entergy procedure EN-DC-336. The NRC team noted that Entergy has scheduled mitigation actions for most of the unmitigated single point vulnerabilities for the upcoming refueling outage, 1R21. For the large motors, based on current satisfactory equipment reliability trend data (Megger test results, vibration data, lubricating oil samples, and thermography readings) and satisfactory surveillance test results, the NRC team determined that Entergy’s decision to not rewind the motors stated above was reasonable. The NRC team also noted that Entergy has an action to perform a new comprehensive review of all capacitors by

the end of first quarter of 2017. For the currently unmitigated electrolytic capacitors, the NRC team verified that visual inspections, cleaning, calibration, and test results were satisfactory during the last refueling outage, 1R20. Since Entergy has scheduled replacements for these capacitors during the next refueling outage, the NRC team did not have an immediate operability concern.

6.12.3 NRC Inspection Findings

No findings were identified.

6.13 Work Management Problem Area

6.13.1 PNPS Evaluation Results and Key Corrective Actions

Entergy identified that the preparation, control, and execution of work activities was not rigorously implemented such that equipment reliability was the overriding priority. Problems in the work management process resulted in high maintenance backlogs, long-standing equipment reliability issues and deferred corrective actions. As a result, Entergy identified work management as a problem area and conducted an apparent cause evaluation under CR-PNP-2016-02057 to assess the issue. The apparent cause evaluation documented the following causes:

- Direct Cause: PNPS personnel do not consistently ensure all applicable requirements of "informational use" procedures are identified and followed when using "informational use" procedures.

- Apparent Cause 1: Management did not always ensure that roles, responsibilities, and expectations within the work management process/program were clearly communicated, understood, and executed.

- Contributing Cause 1: Some work management personnel do not always use and adhere to the work management process procedures, specifically EN-WM-100, "Work Request Generation, Screening, and Classification," EN-WM-101, "On-Line Work Management Process," EN-WM-105, "Planning," and EN-WM-109, "Scheduling."

- Contributing Cause 2: Some work management coordinators lack in-depth knowledge of the work management process.

- Contributing Cause 3: Current staffing levels will not support reducing backlog corrective/deficient and corrective action work orders and maintain them within fleet and industry goals.

Though Entergy's IP 95003 assessment teams did not specifically evaluate the work management process, they did identify examples that point to process inefficiencies, varying work group support of T-week requirements and resource issues that hinder schedule execution.

Entergy implemented the following interim corrective actions:

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- CR-PNP-2016-02057 CAs-19 – 21, 25 – 28: Increase management oversight and coaching for preparation activities such as work package or work task walk downs and resource scheduling.

- CR-PNP-2016-02057 CAs-29 – 35: Use an established burn down curve to monitor the backlog reduction monthly through December 2016.

Entergy completed the following corrective actions:

- CR-PNP-2016-02057 CA-36: Production Manager clearly outlines roles, responsibilities, and expectations for conducting the work management process.

- CR-PNP-2016-02057 CA-39: Design, develop, and implement training for work management coordinators to increase the process knowledge.

- CR-PNP-2016-02057 CA-40: Validate the work order backlog so that accurate planning and scheduling and backlog reduction can be accomplished.

- CR-PNP-2016-02057 CA-41: Increase fix-it-now team and maintenance shop staffing to support reducing the work order backlog.

Entergy's remaining corrective actions included:

- CR-PNP-2016-02057 CA-42: Reassessing the staffing requirements in fix-it-now team and the maintenance shops

- CR-PNP-2016-02057 CA-37 – 38: Annually revisiting the roles, responsibilities, and expectations for conducting the work management process as outlined by the Production Manager.

6.13.2 NRC Inspection Scope

The NRC team performed an assessment of the on-line work management process and associated on-line risk assessment process. The review of the on-line work management process encompassed the work planning and scheduling process for T-weeks that directly impacted the on-line risk management. The review of the work management process also covered the effectiveness of scheduling and implementing work orders. The review covered both fleet and site-specific procedures that defined roles, responsibilities, planning milestones, and expectations.

To perform the review and assessment of the work management program, the NRC team performed in-office document reviews, equipment walkdowns, attended planning and scheduling meetings, observed the station's management of emergent work, and interviewed work management personnel. Specifically, the NRC team attended on-line work week planning and scheduling meetings designed to align

meeting objectives as defined in the procedures with meeting outcomes, noting specifically preventive maintenance and surveillance due dates, allocation of work hours coupled with required personnel, and management of work holds which includes required materials and work order walkdowns. The NRC team also reviewed post-work week critiques for 2016, held every week to evaluate the station's adherence to the work week schedule, resource management, best practices, and lessons learned.

The NRC team also reviewed Entergy's actions to reduce high equipment backlogs, and preventive maintenance practices regarding scheduling and frequency changes. The NRC team noted that high equipment backlogs and emergent maintenance activities had been impacting station resource loading and necessitating rescheduling of some planned maintenance activities.

6.13.3 NRC Inspection Observations and Assessment

The NRC team noted that the work management program showed inconsistent performance, as demonstrated from a sample of 2016 post-work week critique reviews and CRs. From inspection activities and time onsite, the NRC team had the following observations regarding the work management program and associated implementation challenges:

- Emergent work challenged the organization beyond what the Fix-it-Now team was able to support, meaning that scheduled work was removed during the work week and the associated resources were allocated for emergent work.

- Procedurally identified work week milestones and completion criteria were not aligned with work week meeting activities. Entergy moved work after the schedule freeze, right up to the active work week, because the work was not ready to be implemented. The work was not ready to be implemented for a number of reasons, including: availability of workers, unavailable parts, underestimated required work hours, or changed station risk profiles due to the accommodation of emergent work.

- Work management performance indicators that track the preparation of work schedules were not consistent with the active work week scheduled and approved work orders.

- Work management meeting importance was inconsistently demonstrated when the work week meetings are cancelled for emergent work or forced outages and associated recovery efforts.

- NIOS issued an elevation letter to the General Manager of Plant Operations on May 2, 2016, regarding the ineffective work management program, and the station responded by implementing corrective actions. The corrective actions proved to be ineffective because NIOS proceeded to issue an escalation letter to the Site Vice President, on October 18, 2016, regarding the work management program, citing the same items as the elevation letter. The NRC team was aligned with the concerns identified by NIOS and

observed the same behaviors and trends regarding schedule stability and impact on equipment reliability.

The NRC team also determined that the work management program influenced preventive maintenance. The NRC team reviewed Entergy's practice of deferring maintenance or changing the preventive maintenance frequency by extending time between preventive maintenance activities. The NRC team determined that the documentation supporting preventive maintenance frequency changes lacked technical rigor and often credited the last 'as-found' equipment condition being satisfactory. Other preventive maintenance frequency change documents cite that the preventive maintenance was not critical-path for refueling outages, and the maintenance was removed from the outage scope, meaning production was influencing preventive maintenance frequency changes. Changes to the preventive maintenance program assessed by the NRC team have not been in place long enough for the impact to be evaluated. (See Section 6.10 for additional discussion on PNPS's preventive maintenance program.)

The NRC team concluded that the corrective actions implemented by Entergy were marginally effective. Specifically, the PNPS work management program was following procedural guidance, and was making progress to bundle related work, correctly prioritize work, as shown by the reduced number of preventive maintenance and surveillances in grace or deep grace, and relate required work hours to required workers in the context of a full work schedule. However, PNPS's work management program continued to struggle with emergent work, which is beyond the ability of Fix-it-Now team to protect the planned work schedule, and required additional resources to mitigate, as shown through post-work week critiques. Additionally, Entergy had made little progress regarding the NIOS elevation and escalation letters, because many of the concerns identified by NIOS continued to exist, as observed by the NRC team. Overall, Entergy continued to struggle to implement the work management process, and associated risk to effectively maintain the plant, as illustrated through consistent emergent work.

6.13.4 NRC Inspection Findings

No findings were identified. The NRC team determined that these work process deficiencies impacted the efficiency of equipment performance improvements, but did not result in any equipment inoperability or loss of function.

6.14 Industrial Safety Problem Area

6.14.1 PNPS Evaluation Results and Key Corrective Actions

Entergy identified that industrial safety behaviors at the station had been inadequate, resulting in the Industrial Safety Performance Indicator remaining in the lowest industry quartile for an extended period of time. Additionally, the Collective Evaluation Team determined that, "An increase in industrial safety events and station personnel injuries is a precursor to a more significant event such as a serious injury, fatality, catastrophic equipment failure, or degraded margin to nuclear safety. Past corrective actions have not been effective to improve trends in industrial safety." As such, Energy determined that industrial safety performance was a problem area and

performed an apparent cause evaluation to evaluate this area, as documented in CR-PNP-2016-02062. This apparent cause evaluation documented the following:

- Direct Cause: PNPS workers continue to have injuries that contribute to the Total Industrial Safety Accident Rating indicator.

- Apparent Cause 1: Station personnel at all levels have been ineffective in recognizing situations that have risks normally associated with safety behaviors, (i.e., poor situational awareness), for activities where they not are closely monitored, observed, or coached.

- Apparent Cause 2: Supervisors and managers have not enforced specific safety behaviors practiced during routine activities outside of the power block.

- Contributing Cause 1: Implementation of the corrective action program when applied to industrial safety issues was ineffective with a resultant negative impact on industrial safety.

- Contributing Cause 2: In the past, the Area Safety Committee has been ineffective due to limited participation and less than adequate procedural guidance.

Entergy documented the following key corrective actions in the apparent cause evaluation:

- CR-PNP-2016-02062 CA-7: Develop and deploy an interactive computer based training course that includes quizzes and has a pass/fail feature, to include risk recognition and mitigation related to individual situational awareness.

- CR-PNP-2016-02062 CA-9: Develop and implement a dynamic learning activity for risk recognition and mitigation to be presented to managers and supervisors.

6.14.2 NRC Inspection Scope

Though not specifically under the regulatory purview of the NRC, the NRC team reviewed this apparent cause evaluation for any additional insights into PNPS's recovery efforts and corrective action program implementation. The NRC team assessed PNPS performance related to industrial safety to determine whether it was sufficient to support safe operation and whether planned corrective actions would promote sustained performance improvement. The NRC team conducted multiple plant walkdowns and observed maintenance work in progress. The NRC team also toured areas of the plant to assess the physical conditions, identify possible safety hazards, and identify any deficiencies that had not been entered into the corrective action program. The NRC team reviewed the apparent cause evaluation documented in CR-PNP-2016-02062 to assess completion of corrective actions. The report noted that past corrective actions have not been effective to improve trends in industrial safety. The NRC team noted that all of the apparent cause

evaluation corrective actions were completed with the exception of CR-PNP-2016-02062 CA-9, which is expected to be completed in the spring of 2017.

6.14.3 NRC Inspection Observations and Assessment

The NRC team verified during plant tours that safe work practices were employed during observed maintenance work and no industrial safety hazards were identified.

The NRC team noted that there has been at least one significant industrial safety incident at PNPS since completion of the apparent cause evaluation. An individual was injured on October 26, 2016, while working at a location outside of the power block. The individual required medical attention greater than first aid at a medical provider, thus the injury was classified as an Occupational Safety and Health Administration recordable injury. Entergy evaluated the event by non-adverse analysis CR-PNP-2016-08273. All site personnel participated in a "safety stand down" on November 1, 2016, to review a description of the event, why it happened, immediate corrective actions, and lessons-learned. The NRC team reviewed the non-adverse analysis evaluation and planned/completed corrective actions. The NRC team also met with management from the affected department on December 5, 2016, to discuss the event and the effectiveness of the corrective actions to prevent the same or similar industrial safety incidents. There are currently four open corrective actions associated with this non-adverse analysis.

6.14.4 NRC Inspection Findings

No findings were identified.

7. Safety Culture Assessment

7.1 Nuclear Safety Culture Fundamental Problem

7.1.1 PNPS Evaluation Results and Key Corrective Actions

PNPS identified that a significant contributor to declining performance at the station was the failure of leaders to consistently demonstrate a commitment to emphasize nuclear safety over competing goals. As such, the station identified nuclear safety culture as a fundamental problem. PNPS completed an assessment of this fundamental problem in root cause evaluation report CR-PNP-2016-02052, which documented the following causes:

- Direct Cause: PNPS priorities to address performance problems, emergent equipment reliability issues, and change initiatives adversely impacted station leadership's capability to maintain a strong nuclear safety culture. As a result, the station experienced a decline in nuclear safety and regulatory performance.

- Root Cause: PNPS leaders have not held themselves and their subordinates accountable to high standards of performance. This reduced the effectiveness of the performance improvement/corrective action processes to recognize and stop the decline in nuclear safety culture. As a consequence,

the station has experienced long-standing problems and increased regulatory oversight.

- Contributing Cause 1: Corporate leaders and independent oversight organizations did not provide sufficient oversight of station performance to ensure timely resolution of emerging, repetitive, and longstanding performance problems. This contributed to performance gaps not being resolved by the station.

- Contributing Cause 2: Station leaders have not applied sufficient resource management to support station priorities. Resources include personnel, equipment and procedures. This contributed to increased station work backlogs, and workloads which adversely impacted nuclear safety performance.

PNPS implemented a number of key corrective actions to address the root and contributing causes described above. Specific corrective actions included the following:

- CR-PNP-2016-02052 CAs-36, 37, 71 – 78: (CAPR-1A/1B) Utilizing the guidance contained in EN-FAP-HR-006, "Fleet Approach to Leadership Development and Organizational Effectiveness," and EN-PL-100, "Nuclear Excellence Model," develop (CAPR-1A) and implement (CAPR-1B) individual Targeted Performance Improvement Plans for each supervisor and above (up to and including the Site Vice President), that includes actionable improvement items with date triggers to improve leadership behavior gaps identified.

- CR-PNP-2016-02052 CA-38: (CAPR-1C) Conduct a closure review board (per PNPS Recovery Procedure 1.3.145) to review all Targeted Performance Improvement Plans after they have been closed by the one-up leader. The closure review board will ensure that the Targeted Performance Improvement Plans are appropriately closed with sufficient evidence that all the objectives have been satisfied.

- CR-PNP-2016-02052 CA-41: Reinforce Entergy's Managerial Accountability Model as stated in EN-PL-100, Attachment 3.2, to improve consistent performance of managerial and individual accountability at all levels in the organization. This is a one-time action that can be closed when use of Entergy's Managerial Accountability Model has been reinforced with 90 percent of the target population.

- CR-PNP-2016-02052 CA-43: Develop a PNPS handbook (or equivalent) based on the EN-PL-100 Nuclear Excellence Model (PNPS's vision, mission, strategy, goals, core values, attributes of leader, and individual behaviors), and site specific recovery procedure.

- CR-PNP-2016-02052 CA-44: Conduct alignment sessions with station leadership on the content and implementation expectations of EN-PL-100, "Nuclear Excellence Model," and PNPS employee handbook or equivalent.

These sessions will be led by the Site Vice President and focus on establishing accountability for high standards of performance to align behaviors in support of a strong nuclear safety culture.

- CR-PNP-2016-02052 CA-45: Senior Managers to rollout the PNPS employee handbook or equivalent to site personnel.

- CR-PNP-2016-02052 CA-46: Revise the New Employee Onboarding Checklist to include employee receiving a PNPS handbook and a discussion by the manager on the PNPS handbook concepts and expectations for use.

- CR-PNP-2016-02052 CA-47: Procure two external subject matter expert resources as observation/coaching mentors for the station in establishing the proper observation standards to station coaches in the field. This action will remain in place until the end of first quarter 2017.

- CR-PNP-2016-02052 CA-56: Establish and implement procedural guidance for a workforce planning process to include development and implementation guidance for a PNPS Integrated Strategic Workforce Plan that extends to the end of plant operations and provides future staffing needs.

- CR-PNP-2016-02052 CA-57: Develop and implement a procedure to conduct a PNPS People Health Committee to place priority on staffing and retention issues that are impacting PNPS employees.

- CR-PNP-2016-02052 CA-60: Provide gap refresher "Nuclear Safety Culture" training to improve station personnel including supervisors/managers, knowledge and in-depth understanding of the attributes/traits of a healthy nuclear safety culture and how nuclear safety culture influences nuclear safety performance.

- CR-PNP-2016-02052 CA-61: Establish a Nuclear Safety Culture Advocate who will be an independent (external to Entergy) reviewer to monitor leadership and individual accountability, as well as safety culture on a real-time basis and report emergent concerns to the Site Vice President, Safety Culture Leadership Team, Nuclear Safety Culture Monitoring Panel, and specific departments to allow timely corrective actions. This position should remain in place for the remainder of plant operations.

PNPS identified interim corrective actions to monitor the PNPS nuclear safety culture until the corrective actions in CR-PNP-2016-02052 were accomplished and an EFR was performed to ensure that the desired outcomes were achieved. Interim corrective actions included:

- CR-PNP-2016-02052 CA-62: Convene the Nuclear Safety Culture Monitoring Panel on a frequency of no less than one meeting per month. When necessary, convene the Nuclear Safety Culture Monitoring Panel to address emergent issues or other matters of an imminent nature that, in the judgment of the Chair, warrant immediate attention/action and should not be deferred until the next monthly meeting.

- CR-PNP-2016-02052 CA-31: Implement an "emergent" nuclear safety culture issue process to allow the station to address safety culture issues that appear to be safety conscious work environment related in a very timely manner.

PNPS also identified the following EFRs to be performed:

- PNPLO-2016-0085/1: Perform a baseline Leadership/Organizational Effectiveness Survey and then perform the survey quarterly for one year to measure leadership behavior effectiveness. The results are to be presented relative to industry and/or plant norms. Success will be noted by a positive trend of survey results demonstrating notable improvement within the first six months and sustained performance the following six months would indicate meaningful positive results. A notable improvement would equate to approximately 50 percent of one standard deviation in the results.

- PNPLO-2016-0085/2: Complete a nuclear safety culture assessment by an independent external organization (similar to SYNERGY) that validates improvements have been made in leadership, resources, and oversight of the station. This review will be completed following completion of EFR-1 and will include an interim assessment one year after CAPR-1B (Targeted Performance Improvement Plans) is complete and another assessment one year after the interim assessment is completed. A notable improvement would equate to approximately 50 percent of one standard deviation in the results.

- PNPLO-2016-0085/3: Have a Leadership/Organizational Effectiveness Survey completed that will measure leadership behavior effectiveness. A notable improvement would equate to approximately 50 percent of one standard deviation in the results.

- PNPLO-2016-0085/4: Have a Leadership/Organizational Effectiveness Survey completed that will measure leadership behavior effectiveness. A notable improvement would equate to approximately 50 percent of one standard deviation in the results.

- PNPLO-2016-0086/1: Have a nuclear safety culture assessment completed by an independent external organization (similar to SYNERGY) that validates improvements have been made in leadership, resources, and oversight of the station.

- PNPLO-2016-0086/2: Have a nuclear safety culture assessment completed by an independent external organization (similar to SYNERGY) that validates improvements have been made in leadership, resources, and oversight of the station.

7.1.2 NRC Inspection Scope

The NRC team assessed nuclear safety culture to determine whether PNPS practices supported safe operation and whether planned corrective actions promoted sustained performance improvement.

In particular, the NRC team assessed actions to address nuclear safety culture through a review of root cause evaluation CR-PNP-2016-02052. Attributes considered in this review included the following: 1) whether the identification of nuclear safety culture as a fundamental problem was appropriate, 2) whether the identified direct, root, and contributing causes were appropriate, 3) whether the corrective actions identified to address the direct, root, and contributing causes were appropriate, 4) whether the corrective actions that have been implemented were adequately implemented, 5) whether identified EFRs adequately assess the effectiveness of the corrective actions, and 6) through independent performance-based inspection, whether the overall problem was effectively addressed.

As part of the NRC team's overall assessment of nuclear safety culture as a fundamental problem and the adequacy of PNPS's plans to address this fundamental problem, the NRC team focused on the station's actions to address the areas of standards and accountability and staffing adequacy. Additionally, because a significant number of corrective actions had been completed by the end of this inspection, the NRC team sampled these corrective actions to determine whether the actions had been adequately implemented with quality.

7.1.3 NRC Inspection Observations and Assessment

The NRC team determined that the multi-year gradual performance decline occurred, in part, due to declines in nuclear safety culture that went unrecognized and unaddressed. Performance monitoring tools and management responses were ineffective in recognizing and addressing the decline until they began to impact performance. While nuclear safety remained a priority, actions to balance competing priorities, manage problems, and prioritize workload resulted in reduced safety margins.

The NRC team concluded that PNPS's nuclear safety culture evaluations were comprehensive. The evaluation report documented multiple conditions that contributed to the failure at the site and corporate level to identify and arrest declining performance. The NRC team also concluded that the identified corrective actions, if properly implemented, could be effective in addressing nuclear safety cultures declines at PNPS. Specific observations related to PNPS's planned and/or completed corrective actions are noted below:

Targeted Performance Improvement Plans

PNPS developed Targeted Performance Improvement Plans for all supervisors and above, utilizing the guidance contained in EN-FAP-HR-006, "Fleet Approach to Leadership Development & Organizational Effectiveness," and EN-PL-100, "Nuclear Excellence Model." This action was designated as one of the CAPRs for this root cause evaluation, with the other two CAPRs being implementation of the plans and review of the completed plans by a closure review board.

The NRC team reviewed EN-FAP-OM-016, "Performance Management Processes and Practices," which included requirements for establishing Targeted Performance Improvement Plans, and Attachment 7.3, "Targeted Performance Improvement Plan." The NRC team reviewed a sample of Targeted Performance Improvement Plans that were generated for station leaders and determined that overall, these plans included behaviors to be addressed, expectations and goals, required actions to address the expectations and goals, and measurements that the expectations and goals had been attained as specified in Attachment 7.3. In the Targeted Performance Improvement Plans, Entergy identified three specific behavior problems for first line supervisors and six specific behavior problems for managers and directors, as summarized in the following table:

Gap	Managers and Directors	First-Line Supervisors
Leadership alignment and teamwork with peers	X	X
Effective communication, demonstration, and reinforcement of the Excellence Model behaviors and standards to achieve ownership and accountability for performance by their department personnel	X	X
Constructive coaching and mentoring to motivate and develop their employees	X	X
Effective monitoring and oversight of individual and team performance to adjust talent, direction, leadership and resources as necessary for success	X	
Strategic decision making practices that supports or affects nuclear safety	X	
Fostering a Learning Organization where employees use self-assessment, benchmarking, operating experience and the corrective action programs to recognize small signs of decline and aggressively resolve performance gaps.	X	

Overall, the NRC team concluded that although the Targeted Performance Improvement Plans satisfied the requirements in EN-FAP-OM-016, the generic one-size-fits-all approach, weak success criteria, and numerous administrative issues suggested to the NRC team that further improvements could be realized and that in the absence of these improvements, any performance improvement may not be sustainable.

The following specific issues were identified to support this assessment:

- *Generic Targeted Performance Improvement Plans*. The behavior problems identified in the Targeted Performance Improvement Plans were generic in nature and not intended to indicate that a particular supervisor specifically exhibited the particular behavioral problem, but rather to ensure that the specifically identified behavior problem was monitored through the Targeted Performance Improvement Plan. These plans generally did not include any other behaviors that could represent a specific nuclear safety culture weakness for an individual. Similarly, the NRC team identified that the actions to address the behaviors were frequently identical in nature, although a more-tailored approach for each individual would likely include issues more pertinent to improve the individuals' performance. For example, one of the

generic actions was the performance of activities in the corrective action program with quality and timeliness. The success measure for this action was that "All [corrective action program root and apparent causes] presented to [the Corrective Action Review Board] will achieve a grade 3 or better." During an observation of a monthly one-on-one meeting between the Regulatory Affairs Manager and the Administrative Services Supervisor, the NRC team identified that this generic Targeted Performance Improvement Plan action and measure of success were included, although Administrative Services were not typically involved with a root or apparent cause evaluation. The NRC team discussed this specific action with the Regulatory Assurance Manager, who subsequently revised the Targeted Performance Improvement Plan to include more appropriate criteria for the individual.

- *Parallel Implementation of the Targeted Performance Improvement Plans*. All supervisors and above, including those in the same chain of command, were placed on the same plans at the same time for the same behaviors. The NRC team concluded that this called into question the effectiveness of the coaching and implementation of the plans if all individuals were working on the same gaps at the same time, versus sequencing implementation of the plans such that a supervisor or manager would complete their requirements prior to having to coach their subordinates.

- *Insufficient Duration for Improvement of Behaviors*. Entergy procedure EN-FAP-OM-016, "Performance Management Processes and Practices," Section 3.2[6] notes that the timeline for a Targeted Performance Improvement Plan should be between 30 – 90 days. Each plan noted that the individual was supposed to meet with their manager every thirty days for a total of three meetings. The original due date for completion of implementation of these plans, and the associated closure review boards, was December 16, 2016. This limited timeframe did not appear to be of sufficient duration to ensure a sustainable change in the culture of management and leadership of the organization.

- *Unchallenging Success Criteria*. The NRC team identified that in some cases, the success measures were not challenging. For example, the measure of success in the behavior problem area of 'Coaching' only required that the supervisor coach one direct report or any person working at PNPS once in a month. Additionally, the NRC team identified that the measures of success frequently omitted any independent verification, but rather relied solely upon information provided during the interview. The NRC team concluded that an independent verification that actions had been accomplished would better ensure that the actions had been accomplished to the satisfaction of the individual's supervisor.

- *Administrative Issues*. The NRC team identified numerous administrative issues including incorrect names that suggested sections from other Targeted Performance Improvement Plans had been "cut and pasted" without an adequate review; future meetings "pre-credited" as having been performed that had not yet been performed; and plans that were identified to be satisfied and closed without all problems satisfactorily addressed. In addition, during

some interviews, supervisors were unaware that a Targeted Performance Improvement Plan had been implemented to address their individual performance. After discussing these issues with PNPS, the station completed an audit of the plans (CR-PNP-2016-09736) and identified a substantial number of issues, including cases in which required behaviors were not listed to be addressed, one-on-one meetings that were not held as required, numerous cases in which identified behavior gaps were not being addressed, legibility issues, the absence of written comments by the supervisor, and similar or identical comments from meeting to meeting.

- *Guidance Procedure for Targeted Performance Improvement Plans.* The NRC team reviewed Entergy procedure EN-FAP-HR-006, "Fleet Approach to Leadership Development & Organizational Effectiveness," which was referenced in CAPR-1B as the guidance to be used when implementing the Targeted Performance Improvement Plans. The NRC team determined that this procedure did not contain adequate information related to effective implementation of the plans. Additionally, PNPS did not involve the human resources department in development or implementation of the plans, even though EN-FAP-HR-006 stated that these actions should be coordinated with human resources. This could have created a missed opportunity for the station to self-identify the implementation issues described in the finding associated with this issue.

The finding associated with this issue is discussed in Section 7.1.4 of this inspection report.

Nuclear Safety Culture Advocate

PNPS implemented the nuclear safety culture observation process using an external Nuclear Safety Culture Advocate, and CA-61 was closed on August 26, 2016. The implementing memorandum associated with this action prescribed the creation of this position and the commitment to staff the position for the duration of PNPS operation. The NRC team concluded that the scope and format of the external nuclear safety culture observation process was an appropriate improvement and accountability tool.

The NRC team met with the Nuclear Safety Culture Advocate to discuss the implementation of the actions established in the position. The NRC team learned that a number of the responsibilities outlined in the charter were not being performed by the Nuclear Safety Culture Advocate, but instead were being performed by the subject matter experts. In particular, the Nuclear Safety Culture Advocate had delegated responsibilities for attending meetings and other activities to personally monitor nuclear safety culture performance to the subject matter experts. As a result, the Nuclear Safety Culture Advocate focused on monitoring nuclear safety culture performance through a review of documents, such as CRs, audits, evaluations, and inspections, and reviews and self-assessments, which were used to develop weekly and monthly reports for the Nuclear Safety Culture Monitoring Panel. The NRC team verified that between the subject matter experts and the Nuclear Safety Culture Advocate, all of the advocate's responsibilities were being performed. As such, the NRC team concluded that the use of subject matter experts to alleviate the Nuclear Safety

Culture Advocate of the duties and responsibilities identified in the Nuclear Safety Culture Advocate charter met the intent of the charter. PNPS documented this observation in CR-PNP-2016-09646.

The NRC team found that the Nuclear Safety Culture Advocate was working very closely with the Nuclear Safety Culture Monitoring Panel. In particular, the NRC team identified examples in which emergent issues identified by the Nuclear Safety Culture Advocate were discussed at a special Nuclear Safety Culture Monitoring Panel meeting, through which immediate actions were developed to address the advocate's concerns. The NRC team concluded that in general, based on the interviews conducted, as well as the reports reviewed and Nuclear Safety Culture Monitoring Panel meeting observed, that the Nuclear Safety Culture Advocate role was being effectively implemented.

Subject Matter Experts

CR-PNP-2016-02052, CA-47 required that PNPS procure two external subject matter expert resources as observation/coaching mentors to assist the station in establishing the proper observation standards and act as "Coach the Coaches." The NRC team determined that PNPS hired multiple subject matter experts as a portion of the overall station mentoring functions, as observation/coaching mentors. The NRC team reviewed the resumes of a number of these subject matter experts and determined that their background and experience supported their roles and responsibilities as subject matter experts.

The NRC team reviewed the Project Plan for the subject matter experts and noted that this plan included meetings, interviews, and field activities. The NRC team reviewed the evaluation form used by the subject matter experts (i.e., WILL sheet), and noted that it included nuclear safety culture standards to assess the activities. The NRC team concluded that the evaluation form appeared to be a good tool to ensure consistency and quality in the observation process.

The NRC team concluded that for the meetings observed, the subject matter experts were actively engaged in assessing the conduct of the meeting. In particular, the NRC team noted that at times, the subject matter experts generated CRs when their concerns were not addressed by PNPS to their satisfaction. For example, CR-PNP-2016-09147, dated November 18, 2016, documented that the station's response had not been timely and conservative to address potential latent equipment vulnerabilities that may exist due to inadequate maintenance strategies on aging plant components.

However, the NRC team also observed that the subject matter experts routinely exited the meeting without providing any direct feedback to those attending the meeting, including the meeting leader. When interviewed, the subject matter expert stated that feedback was typically provided to the meeting leader face-to-face after the meeting to avoid providing criticism in the presence of peers and subordinates. The NRC team considered this strategy and determined that some immediate feedback to those in attendance, particularly to emphasize constructive observations that reflected improvements, would be of benefit and should be considered.

Additionally, during a Critical Evolution Meeting held on December 2, 2016, to discuss performance of Procedure 8.M.2-2.10.8.5, “Diesel Generator ‘A’ Initiation by Loss of Offsite Power Logic – Critical Maintenance,” the NRC team observed that the subject matter expert asked questions of PNPS regarding the critical activity being discussed before the meeting had been concluded. The NRC team concluded that it would have been more appropriate for the subject matter expert to ask questions after the meeting was concluded to be able to better assess whether the questions asked by the subject matter expert would have otherwise been asked by PNPS. This observation also led the NRC team to conclude that the subject matter expert was not entirely external or independent of the process, as intended.

The NRC team also reviewed a sample of the reports that documented the results of the observations performed by the subject matter experts. The NRC team concluded that these reports effectively presented the results of the subject matter experts’ observations in a frank and open manner, such that lessons could be learned and improvements realized. The NRC team also identified that the subject matter experts had not yet begun to routinely perform in-field observations and concluded that these observations were an important aspect of the PNPS recovery.

“Emergent” Nuclear Safety Culture Issue Process

PNPS developed CR-PNP-2016-02052, CA-31 to implement an "emergent" nuclear safety culture issue process to allow the station to address safety culture issues that appeared to be safety conscious work environment-related in a very timely manner. To address this action, PNPS utilized Entergy procedure EN-QV-136, “Nuclear Safety Culture Monitoring.” The NRC team reviewed EN-QV-136 and confirmed that Step 5.3[6](b) stated, in part, that emergent Nuclear Safety Culture Monitoring Panel meetings may be called to take action on issues or concerns as necessary, and that the Nuclear Safety Culture Monitoring Panel ensures that emergent issues with the potential to impact the site nuclear safety culture health are brought to the attention of the Safety Culture Leadership Team. The NRC team identified one example in which an emergent issue with the potential to impact nuclear safety culture had been brought to the attention of the Safety Culture Leadership Team through the corrective action process, and dispositioned in an emergent Nuclear Safety Culture Monitoring Panel meeting. The NRC team concluded that this corrective action was appropriately closed.

Communications Plan Implementation

CR-PNP-2016-02052, CA-35 required that PNPS implement a communications plan for all full-time site personnel and supplemental personnel that will allow PNPS to more fully inform station personnel regarding the traits of a healthy nuclear safety culture and how nuclear safety culture influences nuclear safety performance. The intent of this action was to improve communications on nuclear safety culture and IP 95003 recovery issues and actions to improve safety performance. Additionally, CA-35 was documented as a one-time interim action that could be closed when 90 percent of the target population received the communication.

The NRC team reviewed the documentation for CA-35 that was closed on September 30, 2016. In their closure response, PNPS identified that on September 26, 2016, a PNPS all-hands meeting was conducted to address this corrective action and that all aspects of the corrective action were addressed at the meeting. The closure response also indicated that the presentation was video recorded to ensure any personnel who were unable to attend the meeting in person had the opportunity to watch it at a later date; and that the presentation was posted on the PNPS home page. The Recovery Manager reviewed the presentation and response, and determined they were adequate.
The NRC team reviewed the CA-35 closure and identified that no objective evidence was included in the closure documentation that demonstrated that 90 percent of the target population had received the communication and that the "target population" referenced in the corrective action was not defined. Subsequently, the NRC team determined that the Action Closure Review Board had previously identified that PNPS failed to provide documented evidence that 90 percent of the targeted population had received the communications. To address this issue, PNPS revised the corrective action to align with what had been accomplished. In particular, PNPS senior management recommended that the corrective action be revised to require that the presentation be made in person to the target population (Entergy – PNPS Employees) in an all-hands setting vice the original requirement of 90 percent of the target population, and that the large attendance for the September 26, 2016, all-hands meeting met the intent for a majority of the station population. This was considered a change to the intent of the corrective action by PNPS. The NRC team reviewed the basis for this change and identified that PNPS considered the action as it was originally written to not be realistic or necessary. Following this change, the Action Closure Review Board approved the closure of the corrective action.

The NRC team reviewed this action and concluded that the relatively small number of employees that received the training, estimated to be less than 50 percent of PNPS employees, adversely impacted the effectiveness of the corrective action. The NRC team was also concerned that the target population did not specifically include contractors and other supplemental workers involved in the day-to-day operation of PNPS. The NRC team also concluded that redundancy and defense-in-depth provided by other more substantive corrective actions, such as the gap refresher training accomplished in CR-PNP-2016-2052 CA-60, mitigated the significance of this issue.

PNPS Handbooks

CR-PNP-2016-02052 CA-43 through CA-45 required creation of a PNPS handbook (CA-43), conduct of alignment sessions with station leadership on the content and implementation expectations on the handbook (CA-44), and rollout of the handbook to site personnel (CA-45). Additionally, CA-45 specified that the action could be closed when signed acknowledgement was received from 90 percent of the target population.

The NRC team reviewed the PNPS handbook, "Building Our Legacy of Excellence," and verified that all required elements were included, and that an alignment session with station leadership was conducted. Receipt of the handbook by station management was confirmed by signature. In the review of CA-44, the NRC team identified that not all supervisors were required to receive the training since some

were assumed to have been unavailable at the time it was provided. The NRC team questioned this standard since there was nothing in place to preclude the training from being provided after the supervisor returned to the site. PNPS documented this issue in CR-PNP-2017-00449.

In addition, during the review of CR-PNP-2016-02052, CA-45, the NRC team identified that no objective evidence was identified that demonstrated that 90 percent of the target population had signed acknowledgement of the training, as required in CA-45. Subsequently, the NRC team determined that the Action Closure Review Board previously identified that PNPS failed to provide documented evidence that 90 percent of the target population had signed acknowledgement of the training. Similar to the discussion of CR-PNP-2016-2052, CA-35, the NRC team determined that the corrective action was subsequently revised. In this case, the corrective action was revised and closed to reference CA-43, with the September 20, 2016, presentation as objective evidence that the PNPS handbook was distributed.

The NRC team reviewed this action and concluded that the strength of the overall corrective action effectiveness was adversely impacted by the change and that it was not clear if all employees had received and were aware of the content of the PNPS Employee Handbook.

Quarterly Leadership/Organizational Effectiveness Survey

One of the performance monitoring tools included in PNPS's Comprehensive Recovery Plan to evaluate the effectiveness of safety culture improvement initiatives was to conduct periodic surveys (CR-PNP-2016-02052, CA-40). The original due date for this corrective action was August 31, 2016, and at the time of this inspection, had been extended five times with a revised current due date of January 29, 2017. The NRC team reviewed the first quarterly safety culture survey conducted by Midwest Organizational Services LLC, dated December 4, 2016. This survey was conducted with the intent of validating that improvements have been made in leadership, resources, and oversight of the station. The NRC team identified several inconsistencies between the survey, the Third Party Nuclear Safety Culture Assessment, and the observations from the focus group interviews. For example, the survey did not identify the security organization as needing additional improvement in the area of resources. However, security had been identified by Entergy as needing additional focus in this area, and the NRC team also identified resources, specifically in security, as a challenge area during interviews with site personnel. Members of the NRC team observed a meeting between the Nuclear Safety Culture Advocate, the Performance Area Owner for Nuclear Safety Culture, and the Assistant to the Site Vice President for the purpose of discussing the effectiveness of the survey tool. The champions identified many of the same issues with the survey that the NRC team did, and elected to discontinue use of this particular quarterly survey tool. At the end of this inspection, the station was evaluating an alternative method to assess the effectiveness of the corrective actions (CR-PNP-2017-00169).

Staffing Adequacy

Root cause evaluation CR-PNP-2016-02052 documented that plant performance declines, "were exacerbated in June 2013 by the cumulative impact of initiatives to

reduce station staffing that occurred without sufficient change management which placed additional demands on the workforce," and "station performance continued to decline in 2013 and was further impacted by the 2013 Human Capital Management initiative as noted by Contributing Cause 2 of this report." Root cause evaluation CR-PNP-2016-02052 also noted that the staffing at PNPS from 2006 to 2014 had decreased by more than 115 full-time equivalents as compared to the average small boiling water reactor staffing; and that the deviation was over 50 full-time equivalents when compared to the median. Additionally, this root cause evaluation documented that a Nuclear Human Capital Management Change Management Plan for Implementation activity was drafted in response to the 2013 Human Capital Management initiative, but was never implemented. The NRC team also noted that resource issues were identified in other cause evaluations conducted as part of PNPS's recovery evaluations, including those related to the work management (CR-PNP-2016-02057), engineering programs (CR-PNP-2016-02061), and equipment reliability (CR-PNP-2016-02056) problem areas.

To address this issue, root cause evaluation CR-PNP-2016-02052 identified that corrective actions had been created to establish and implement procedural guidance for an Integrated Strategic Workforce Plan to ensure the appropriate level of staffing was maintained to support station goals and objectives (CA-56). Although this corrective action remained open at the end of the on-site inspection weeks, the NRC team discussed the action with PNPS and identified that the overall intent of the action was to determine the appropriate level of staffing for safe and reliable operation of PNPS. The Integrated Strategic Workforce Plan was expected to be updated annually and reviewed at least twice per year by the PNPS People Health Committee, and expected to include performance metrics and reviews, as delineated in the process. Key departments, at a minimum, to develop and maintain the PNPS Integrated Strategic Workforce Plan include: Operations, Radiation Protection, Chemistry, Maintenance, Engineering, Training, Nuclear Independent Oversight, Security, Emergency Planning, Performance Improvement, and Regulatory Affairs/Licensing. The NRC team reviewed this plan and determined that, if properly implemented, it had the potential to be an effective tool for workforce planning.

In addition to the Integrated Strategic Workforce Plan, root cause evaluation CR-PNP-2016-02052 indicated that a separate procedure established a PNPS People Health Committee (CA-57) to manage staffing and retention of personnel at the department level. The NRC team reviewed the subject action, which was closed on October 13, 2016, and noted that this activity was included as part of Procedure 1.3.145, "PNPS Recovery Procedure," which was designed to capture specific high-priority actions associated with PNPS's recovery. This particular action was one of five actions in the nuclear safety culture area that were identified as high priority actions at PNPS.

During this inspection, PNPS began implementing the PNPS People Health Committee program. The resident inspectors observed the first PNPS People Health Committee meeting that was held on December 16, 2016. In addition, the NRC team reviewed the presentation and other materials used to introduce the committee strategy to the PNPS People Health Committee team members. Based on the NRC team's review of the materials presented at the meeting, including the strategies being pursued at PNPS, as well as the observations by the resident inspectors who attended the first committee meeting, the NRC team concluded that, if implemented

properly, the PNPS People Health Committee had the potential to provide an adequate means to manage and address staffing and retention issues at PNPS.

The NRC team also reviewed some staffing-related corrective actions developed from the results of the 2016 Third Party Nuclear Safety Culture Assessment, as documented in CR-PNP-2016-04261. For example, CAs-30/33/36 required that PNPS review mechanical maintenance staffing to ensure that the station maintains the desired staffing levels, and initiate enhancements as needed. The NRC team reviewed the subject actions, which documented that six to twelve months prior to this survey, mechanical maintenance staffing levels were below desired levels due to a variety of reasons. The corrective action also documented that as of August 1, 2016, mechanical maintenance staffing levels had fully recovered and that all positions were fully staffed. As of October 13, 2016, when the action was closed, all mechanical maintenance department positions remained filled. The NRC team reviewed the subject package and verified that when the corrective action was closed, all mechanical maintenance department positions were filled.

The NRC team also reviewed CR-PNP-2016-04261, CA-39, which required that the station develop an organizational capacity matrix meter to be able to determine impacts on staffing levels real-time to ensure staffing requirements were acceptable to support work at PNPS. The matrix was designed to be a predictor for the organization as a capacity measure using factors such as: 1) Backlogs, 2) Overtime, 3) Corrective Action Extensions, 4) Surveys, 5) Resignations, and 6) Attrition. Although this action remained open with a due date of February 28, 2017, at the end of the on-site inspection weeks, the NRC team determined that PNPS had planned to integrate this action with CR-PNP-2016-02052, CA-56 to develop a process to predict organizational capacity that could be used as an input into decisions made by the PNPS People Health Committee. The NRC team reviewed this plan and determined that, if properly implemented, it had the potential to be an effective tool for workforce planning.

Staffing Benchmarking Assessment

To assess the overall staffing levels at PNPS, a benchmarking assessment was performed which compared the nominal number of employees at sites similar in design and operation with those at PNPS. This study, which was completed by a contractor in the spring of 2016, documented that overall staffing levels at PNPS were 19.8 percent lower than those at the three similar sites that were benchmarked.

During a discussion with PNPS management concerning these results, the NRC team learned that this information had not been shared with plant management until the study results had been requested by the NRC team to support this IP 95003 inspection.

Nuclear Sustainability Plan

During discussions of future staffing plans, as well as a review of a number planned corrective actions [CR-PNP-2016-02052, CA-69; CR-PNP-2016-02054 (Decision-Making/Risk Recognition), CA-47; and CR-PNP-2016-02056 (Equipment Reliability) CA-61], the NRC team became aware of a future Entergy initiative referred to as the Nuclear Sustainability Plan.

The Nuclear Sustainability Plan, which has been reviewed and approved by the Entergy Board of Directors, focused on the following areas and initiatives:

- Be Professional (People)
  - Structure organization to support operational excellence
  - Cultivate excellence in Nuclear Professional Behavior and Safety Culture
  - Train and develop people
  - Support the company
- Fix the Plant (Plant)
  - Identify and eliminate equipment vulnerabilities
  - Strengthen Fleet Technical Conscience
  - Fortify Integrated Risk Management
- Operate as a Fleet (Process)
  - Align organization to a shared vision
  - Strengthen corporate structure and capacity
  - Create consistency through Peer Group improvements and ownership
  - Improve strategic planning

According to Entergy management, these initiatives, such as structure the organization to support operational excellence, were anticipated to result in a significant increase in staffing and address a number of behavior gaps, including the following:

- Ensure that corporate leaders are holding themselves and their subordinates accountable to high standards of performance and effectively use performance improvement/corrective action processes to recognize and stop the decline in nuclear safety culture, radiological, and industrial safety performance
- Ensure that corporate leaders, independent oversight organizations, and other fleet station senior leaders are providing sufficient oversight of PNPS and fleet performance
- Ensure that corporate leaders are applying sufficient resource management to support station and nuclear safety culture priorities
- Ensure that resources are routinely evaluated to ensure plant operation and equipment reliability are not adversely impacted
- Ensure that strong teamwork and accountability between Corporate and the station, and between station organizations is fostered and reinforced

At the end of the on-site weeks of this inspection, the Nuclear Sustainability Plan had not yet been implemented. As of April 20, 2017, the NRC team had been informed that the Nuclear Sustainability Plan had been renamed the Nuclear Strategic Plan.

PNPS has stated that several of the initiatives, such as Pilgrim People Health Committee and Integrated Strategic Workforce Planning, have been fully implemented. There were various other initiatives that PNPS planned to adopt such as Recruitment Support, Operator Fundamentals, Nuclear Safety Culture Training and Assistance, and a new Nuclear Excellence Model.

7.1.4 NRC Inspection Findings

Failure to Adequately Develop and Implement Targeted Performance Improvement Plans

Introduction. The NRC team identified a Green finding because Entergy did not adequately develop and implement a CAPR of a root cause related to a Category 'A' CR, as required by Entergy procedure EN-LI-102, "Corrective Action Program." Specifically, Entergy did not adequately develop and implement the Targeted Performance Improvement Plans, which were designated as a CAPR for the root cause for the Nuclear Safety Culture Fundamental Problem.

Description. During performance of the Collective Evaluation process, PNPS identified nuclear safety culture as a fundamental problem, and documented the issue in CR-PNP-2016-02052. The station screened this CR as Category 'A,' and performed a root cause evaluation to further assess the issue. Entergy procedure EN-LI-102, "Corrective Action Program," Attachment 9.1 states, in part, that all Category 'A' CRs are investigated with a root cause report, and CAPRs are developed. EN-LI-102, Section 3.0[9] also states that a CAPR is a type of corrective action intended to eliminate or mitigate the root cause(s) of a condition, and thereby preclude repetition. Additionally, Entergy procedure EN-LI-118, "Cause Evaluation Process," Section 5.6[11], states, in part, that CAPRs should eliminate the causes of the significant event so that the same or similar events are not repeated, and clearly result in long-term correction and be sustainable.
To address the identified root cause, the station developed three CAPRs, which included development and implementation of Targeted Performance Improvement Plans to address identified leadership behavior gaps, as well as conduct of a Closure Review Board to ensure that the Targeted Performance Improvement Plans were appropriately closed with sufficient evidence that the plan objectives were satisfied. (Refer to Section 7.1.1 of this report for a more detailed discussion of the root/contributing causes and CAPRs).

In some cases, the NRC team was not able to clearly link the causal factors identified in root cause evaluation CR-PNP-2016-02052 to the CAPRs. For example, in Attachment 8 of the root cause evaluation, PNPS determined that Causal Factor 2, "Insufficient Performance Monitoring," related to the root cause. Causal Factor 2 includes "Failure to recognize declining performance (insufficient use of self-assessment, benchmarking, operating experience, and performance indicators)." Per CR-PNP-2016-02052, a causal factor is an action or lack of action associated with a problem statement that, if corrected, could have prevented the inappropriate leadership behaviors from occurring or would have significantly mitigated their consequences. In this case, though PNPS determined that Causal Factor 2 was related to the root cause, the NRC team could not conclude that the CAPRs directly addressed this causal factor. Specifically, the behavior gaps in the Targeted Performance Improvement Plans that PNPS had developed to address this issue

were “Fostering a Learning Organization where employees use self-assessment, benchmarking, operating experience, and the corrective action programs to recognize small signs of decline and aggressively resolve performance gaps” and “Effective monitoring and oversight of individual and team performance to adjust talent, direction, leadership and resources as necessary for success.” The NRC team determined that these behaviors were too broad to ensure the specific causal factors were addressed to preclude repetition of similar problems.

The NRC team also reviewed a sample of Targeted Performance Improvement Plans across multiple departments, including the actions identified to address specific behavioral problems. The NRC team determined that there were multiple significant weaknesses associated with PNPS’s implementation of these plans. Examples of implementation weaknesses identified by the NRC team include parallel implementation of the plans, insufficient duration of corrective actions to improve behaviors, generic versus specific counseling to address adverse behaviors, success criteria that would not be expected to result in substantial performance improvement at the station, and a large number of administrative issues. (Refer to Section 7.1.3 of this report for a more detailed discussion of each of these weaknesses). The NRC team determined that these significant implementation weaknesses severely limited the overall effectiveness of the CAPR. Entergy documented this issue in the corrective action program as CR-PNP-2017-00406.

Analysis. The NRC team determined that Entergy’s failure to adequately develop and implement a CAPR to address a root cause in accordance with EN-LI-102 was a performance deficiency. Specifically, Entergy did not adequately develop and implement the Targeted Performance Improvement Plans, which were designated as a CAPR of the root cause for the Nuclear Safety Culture Fundamental Problem. The performance deficiency was more than minor because if left uncorrected, it could lead to a more significant safety concern. Specifically, inadequate implementation of the Targeted Performance Improvement Plans could result in recurrence of a culture where leaders are not holding themselves and their subordinates accountable to high standards of performance, resulting in continuing performance issues at the station. The NRC team evaluated the finding using Exhibit 2, “Mitigating Systems Screening Questions,” of IMC 0609, Appendix A, “Significance Determination Process for Findings At-Power,” and determined this finding did not affect the design or qualification of a mitigating structure, system, or component; represent a loss of system and/or function; involve an actual loss of function of at least a single train or two separate safety systems for greater than its technical specification-allowed outage time; or represent an actual loss of function of one or more non-technical specification trains of equipment designated as high safety-significant. Therefore, the NRC team determined the finding was of very low safety significance (Green). This finding had a cross-cutting aspect in the area of Human Resources, Change Management, because leaders did not use a systematic process for evaluating and implementing change so that nuclear safety remains the overriding priority. In this case, PNPS leaders did not apply sufficient rigor in the development and implementation of Targeted Performance Improvement Plans such that they would be an adequate method to drive and sustain positive changes in the station’s safety culture [H.3].

Enforcement. Entergy failed to adequately develop and implement a CAPR of a root cause related to a Category ‘A’ CR, as required by Entergy procedure EN-LI-102,

"Corrective Action Program." Specifically, Entergy did not adequately develop and implement the Targeted Performance Improvement Plans, which were designated as a CAPR for the root cause for the Nuclear Safety Culture Fundamental Problem. The NRC team did not identify a violation of regulatory requirements associated with this finding. The issue was entered into Entergy's corrective action program as CR-PNP-2017-00406. Because this finding does not involve a violation and is of very low safety or security significance (Green), it is identified as a finding. **(FIN 05000293/2016011-11, Failure to Adequately Develop and Implement Targeted Performance Improvement Plans)**

7.2 NRC Independent Safety Culture Assessment (IP 95003, Section 02.07)

7.2.1 NRC Inspection Scope

The NRC team assessed PNPS's safety culture by conducting focus groups, interviews, behavioral observations, and document reviews. The NRC team conducted a total of 20 focus groups and 29 individual interviews which included questions related to all 10 traits that comprise a safety culture. In all, the NRC team interviewed 188 staff, supervisors, and managers, representing about 30 percent of the workforce at PNPS. The NRC team also conducted behavioral observations to gain insights on how work is being performed in the field. The information from the focus groups, interviews, and behavioral observations was rolled-up into themes which are discussed in this report.

In addition to the focus groups and interviews, the NRC team conducted document reviews, which included CRs, root cause evaluations, the independent Third Party Nuclear Safety Culture Assessments for both 2015 and 2016, and the recent PNPS Baseline Survey Analysis Report completed in December 2016. The NRC team also completed a comprehensive review of PNPS's Employee Concerns Program, as well as the Executive Review Board process for screening disciplinary actions. Finally, the NRC team evaluated the Nuclear Safety Culture Monitoring Panel and Safety Culture Leadership Team meetings to verify whether they were effective methods for understanding safety culture at PNPS.

7.2.2 NRC Inspection Observations and Assessment

In general, the NRC team's independent safety culture assessment confirmed the results of PNPS's Third Party Nuclear Safety Culture Assessment, which noted weaknesses in most areas. The general consensus among the focus group and interview participants was that safety culture at PNPS was much improved. Most participants perceived that there had been a marked change in leadership's focus on safety over production over the past year or so. Participants noted that there was a new emphasis on procedure use and adherence and procedure quality, as well as improvements in conservative decision-making. Additionally, personnel felt that they were able to trust management up through the Site Vice President.

Despite the improved safety culture, PNPS was still challenged with translating the safety culture beliefs into repeatable, sustainable safety culture behaviors. The NRC team determined that some station personnel, including operators, technicians, supervisors, and management, were challenged to routinely exhibit site standards and expectations when performing normal duties and responsibilities in areas such

as conservative decision-making, work practices, and procedure use and adherence. The NRC team concluded that this may be due to a number of factors, including the planned permanent shutdown of PNPS in 2019, and the lack of effective benchmarking to understand what normal industry standards consist of relative to issues in the organization, as well as the time it typically takes to change the safety culture of an organization.

Station personnel did note some challenges during the focus groups and individual interviews. Most personnel at all levels indicated that resource challenges continued to impact their ability to accomplish work. Though most staff indicated that the corrective action program had improved, some expressed concern that when contractor support was no longer at the station, PNPS would revert to past behaviors. Some staff also perceived that with regards to accountability, supervisors and managers were not held to the same standard as non-supervisory employees. Some personnel noted weaknesses in the work planning and scheduling processes, especially related to emergent work.

Nearly all personnel interviewed and in focus groups stated that they felt free to raise nuclear safety concerns through many avenues, including their supervisors, the corrective action program, the Employee Concerns Program, and the NRC. However, the NRC team noted that concerns related to one event could be precursors to a potential chilled work environment in the radiation protection department (Section 7.8). Additionally, the NRC team noted some general frustration in the security department related to areas such as use of the corrective action program, resources, respectful work environment, and consideration during work planning. Despite these issues, the NRC team determined that the security department would still raise nuclear safety concerns through the available avenues.

Finally, the NRC team noted some weaknesses in implementation of the Executive Review Board, Employee Concerns Program, and the Nuclear Safety Culture Monitoring Panel. Examples included an issue that was not evaluated by the Executive Review Board even though it was required by Entergy procedure, issues with Employee Concerns Program Coordinator qualifications, and rigor associated with review of items at the Nuclear Safety Culture Monitoring Panel.

The NRC team assessed PNPS's behaviors and performance in each of the IMC 0310 safety culture traits. Traits, attributes, and examples are referenced within NUREG 2165, "Safety Culture Common Language." It is important to note that results of the focus groups and interviews represented the perceptions of those interviewed, unless otherwise noted.

.1 Assessment of the Leadership Safety Values and Actions Trait

The Leadership Safety Values and Actions trait states that leaders demonstrate a commitment to safety in their decisions and behaviors. The associated attributes include:

- Resources (H.1): Leaders ensure that personnel, equipment, procedures, and other resources are available and adequate to support nuclear safety.

- Field Presence (H.2): Leaders are commonly seen in working areas of the plant observing, coaching, and reinforcing standards and expectations. Deviations from standards and expectations are corrected promptly.

- Incentives, Sanctions and Rewards (X.1): Leaders ensure incentives, sanctions, and rewards are aligned with nuclear safety policies and reinforce behaviors and outcomes that reflect safety as the overriding priority.

- Strategic Commitment to Safety (X.2): Leaders ensure plant priorities are aligned to reflect nuclear safety as the overriding priority.

- Change Management (H.3): Leaders use a systematic process for evaluating and implementing change so that nuclear safety remains the overriding priority.

- Roles, Responsibilities, and Authorities (X.3): Leaders clearly define roles, responsibilities, and authorities to ensure nuclear safety.

- Leader Behaviors (X.5): Leaders exhibit behaviors that set the standard for safety.

Most personnel interviewed and in focus groups indicated that there had been a marked change in leadership's focus on safety over production over the past year or so, in that manager communications and actions emphasized nuclear safety as paramount. There had been more open dialogue on safety and better conversations when individuals have questions on which work should be prioritized based on nuclear safety. There was a new emphasis on procedure use and procedure quality as well as "stop when unsure." Conservative decision making was viewed as an area which had improved. Most personnel had positive input concerning PNPS's Site Vice President as well as Entergy's Chief Nuclear Officer with respect to their emphasis on safety and safety culture and doing the right thing even if it means stopping or shutting down the plant. Most personnel interviewed indicated that management was more visible in the field, but still seemed to spend the majority of their time in meetings.

Most personnel at all levels indicated that resource challenges continued to impact their ability to accomplish work. Most focus groups described examples of insufficient numbers of qualified personnel to perform specialized tasks; training being rescheduled due to workload or conflicts with availability of support organizations such as security; excessive overtime; and reliance on contractor support rather than hiring the staff needed. (For additional discussion on staffing adequacy, refer to Section 7.1.3 of this report).

All personnel agreed that leadership emphasized safety as the top priority. Everyone interviewed said that they would use the corrective action program and felt comfortable with leadership's expectation to stop work when unsure or when questions exist. The general consensus from the interviews was that safety culture at PNPS was much improved. However, as discussed throughout this report, the NRC team noted examples of actual behaviors that were contrary to the results of

the focus groups and interviews (see Sections 6.1.3 and 6.2.3 of this report for examples).

The NRC team's independent safety culture assessment confirmed the results of PNPS's nuclear safety culture assessments and cause evaluations within the Leadership Safety Values and Actions trait which indicated that the senior leadership team had not been consistently engaged in demonstrating and demanding higher levels and standards of performance from the site. Although interviews and focus groups indicated that leadership team behaviors have changed in a positive direction, actual behaviors observed by the NRC team provide conflicting information. The NRC team concluded that actions being taken by leadership, such as continued emphasis on safety and conservative decision making mentioned above, if continued, should have a positive effect on PNPS's safety culture.

.2 Assessment of the Problem Identification and Resolution Trait

The Problem Identification and Resolution trait states that issues potentially impacting safety are promptly identified, fully evaluated, and promptly addressed and corrected commensurate with their significance. The associated attributes include:

- Identification (P.1): The organization implements a corrective action program with a low threshold for identifying issues. Individuals identify issues completely, accurately, and in a timely manner in accordance with the program.

- Evaluation (P.2): The organization thoroughly evaluates problems to ensure that resolutions address causes and extent of conditions, commensurate with their safety significance.

- Resolution (P.3): The organization takes effective corrective actions to address issues in a timely manner, commensurate with their safety significance.
- Trending (P.4): The organization periodically analyzes information from the corrective action program and other assessments in the aggregate to identify programmatic and common cause issues.

All individuals interviewed or in focus groups indicated that more focus had been placed on how to identify issues and enter them into the corrective action program. Most staff felt that improvements via training and leadership have led to an improved corrective action program. There was widespread familiarity with how to initiate a CR, and personnel indicated that their supervisors desired for them to get the CR into the right hands so that identified conditions could be corrected. There was also general consensus that CR thresholds are now very low, which resulted in more CRs being written. However, some personnel expressed that the corrective action program became saturated with insignificant or repeat CRs in order to manage the ratio of an "internally to externally identified CR" metric. This resulted in additional stress on personnel to deal with extraneous CRs. Some staff expressed that many of the identified issues need multiple CRs in order for the condition to be resolved. Staff recognized the positive impact provided by the contractors who were hired to focus on apparent and root cause evaluations. However, some personnel did

express concern that when the contractor support was no longer at PNPS, old ways of doing business would begin again. While most personnel believed that issues are addressed in a timely manner, the site still needed improvement with disposition of issues as non-adverse or adverse. Staff felt that improvements to the Corrective Action Review Board process have led to CRs being conservatively categorized as adverse.

Across the corrective action program organization, a focused effort was implemented to define roles, responsibilities, and training for multiple positions. In addition, Entergy hired subject matter experts and contractors to ensure qualified staff was available and manpower matched workload for the corrective action program. The NRC team noted that Entergy had streamlined the job-specific responsibilities for the department performance improvement coordinators. PNPS personnel felt that these corrective actions have led to an overall reduction in the backlog of open CRs. Station-wide training focused on how to use the station's software to initiate a CR and the life cycle of a CR. Although all personnel reported receiving feedback when a CR they wrote was closed, the feedback was typically an automated email indicating the CR had been closed without providing details regarding what was done in response to the problem. Personnel were encouraged to write follow-up CRs if they disagreed with how the CR was closed.

During focus groups and interviews, some security personnel expressed frustration over the use of corrective action program. They did not feel encouraged to write CRs, however, they did not express any hesitancy to use the corrective action program. They also expressed frustration with status and resolution of CRs that were placed in the corrective action program. Examples were discussed that pointed to inconsistency in training and use of the corrective action program at the site.

The NRC team's independent safety culture assessment confirmed the results of PNPS's nuclear safety culture assessments and cause evaluations within the Problem Identification and Resolution trait. PNPS identified the corrective action program as a fundamental problem during their recovery evaluations. The NRC team's assessment of this area is discussed in more detail in Section 5.1 of this report.

.3 Assessment of the Personal Accountability Trait

The Personal Accountability trait states that all individuals take personal responsibility for safety. The associated attributes include:

- Standards (X.6): Individuals understand the importance of adherence to nuclear standards. All levels of the organization exercise accountability for shortfalls in meeting standards.

- Job Ownership (X.7): Individuals understand and demonstrate personal responsibility for the behaviors and work practices that support nuclear safety.

- Teamwork (H.4): Individuals and workgroups communicate and coordinate their activities within and across organizational boundaries to ensure nuclear safety is maintained.

All personnel interviewed and in focus groups communicated that they have a high commitment to nuclear safety and accountability. Most personnel expressed a desire to return PNPS to a high-performing site and sustain the performance until decommissioning. All expressed the need for individuals to be held accountable for their personal performance, and that they believe this has improved over the past few years. While most non-supervisory personnel believed that site leadership was now placing appropriate emphasis on personal accountability, some expressed uneasiness regarding whether all employees are held to the same standards.

One area where some non-supervisory personnel expressed concern was the perception that supervisors and managers were not held accountable to the same standards as non-supervisory employees. Some non-supervisory personnel expressed that at the worker level, a mistake would be punished, while a manager who makes a mistake is simply transferred to another department, or to another Entergy plant, with no perceived consequences. They also expressed frustration that senior leadership did not seem to be held accountable for making non-conservative decisions, such as the decision to continue operating the plant despite an impending winter storm (January 2015), resulting in high consequences for the site.

The NRC team's independent safety culture assessment confirmed the results of PNPS's nuclear safety culture assessments which identified personal accountability as an area of concern. The NRC team noted that two of the three personal accountability attributes (i.e., standards and ownership) are not used for determination of cross-cutting aspects during baseline NRC inspections, so there was limited data from NRC inspections. Focus group discussions, individual interviews, and field observations support the conclusion that personal accountability had been a nuclear safety culture problem at PNPS, although there had been notable improvement recently.

.4 Assessment of the Work Processes Trait

The Work Process trait states that the process of planning and controlling work activities is implemented so that safety is maintained. The associated attributes include:

- Work Management (H.5): The organization implements a process of planning, controlling, and executing work activities such that nuclear safety is the overriding priority. The work process includes the identification and management of risk commensurate to the work.

- Design Margins (H.6): The organization operates and maintains equipment within design margins. Margins are carefully guarded and changed only through a systematic and rigorous process. Special attention is placed on maintaining fission product barriers, defense-in-depth, and safety-related equipment.

- Documentation (H.7): The organization creates and maintains complete, accurate, and up-to-date documentation.

- Procedure Adherence (H.8): Individuals follow processes, procedures, and work instructions.

Most individuals interviewed or in focus groups indicated that resource issues negatively impacted the work management process. Individuals stated that as people left they were not replaced. Some stated that the "Fix-it-Now" team was understaffed and used for the wrong purposes such as installing modifications. Some stated maintenance resources were diverted from scheduled items to perform unscheduled corrective maintenance. Security officers stated that lack of resources had occasionally challenged time critical tasks.

Some personnel stated that they felt there were weaknesses in the planning and scheduling processes and that work was sometimes emergent and unscheduled. Some personnel indicated the T-week planning process needed the most improvement, and that the scheduling margin was such that emergent issues forced resources away from planned work. Most radiation protection technicians and security officers felt that no work planning or scheduling consideration was given to either of their groups. Security officers stated that delivery vehicles were often forced to wait hours for processing and at times turned away due to unavailability of security resources. Several stated that hiring contract planners had improved the work management process. Some noted that unplanned work was not "hitting them out of the blue" as it had in the past.

In addition, most personnel said that procedures were of high quality and easy to correct. Others stated that the fleet procedure program made it hard to reconcile local procedure issues, at times requiring weeks or months to implement a change. Maintenance personnel stated that "Fix-it-Now" team work packages were of high quality due to the skill of the "Fix-it-Now" team planners, whereas shop maintenance packages had many errors due to "cut and paste" of information between documents.
Individuals described coordination between groups as a struggle, but improving, and indicated that coordination became challenging when there was unscheduled work. Some workers stated that supervisors routinely put them under time pressure. Some engineers stated that they had to champion planning, scheduling, field work, and testing in order to complete critical work and preventive maintenance. Some individuals described long delays in fixing equipment and rework after repairs. Others described a loss of the big picture in that small things got fixed to the detriment of fixing major items. Operation supervisors, however, stated that they had station management support for priority issues and received support as needed from other departments.

The NRC team observed emergent corrective maintenance and calibration of an average power range monitor flow converter in the main control room. During the evolution, the NRC team observed technicians and operators appropriately use standard human performance tools, coordinate on expected alarms and indications, and practice formal three-way communication. Although maintenance continued during operations shift turnover, there was no loss of maintenance focus on the task and no degradation of operator awareness. This emergent maintenance was

successfully performed over multiple shifts during a half scram condition to meet technical specification limiting condition for operation requirements.

The NRC team's independent safety culture assessment confirmed the results of PNPS's nuclear safety culture assessments with respect to the work processes trait, which determined that the work planning and scheduling process was implemented poorly and was not adequately supporting the ability to accomplish work. Most focus groups indicated that availability of resources impacted the implementation of PNPS's work management process, and at times, the station responded to emergent safety and production issues at the expense of scheduled corrective and preventive maintenance. The NRC team did not identify any evidence or reason to believe that Entergy management would aggressively address self- and independently-identified work management process issues as long as minimum regulatory requirements to allow continued operation were satisfied. Entergy identified work management as a problem area during their recovery evaluations. The NRC team's assessment of this area can be found in Section 6.13 of this inspection report.

.5 Assessment of the Continuous Learning Trait

The Continuous Learning trait states that opportunities to learn about ways to ensure safety are sought out and implemented. The associated attributes include:

- Operating Experience (P.5): The organization systematically and effectively collects, evaluates, and implements relevant internal and external operating experience in a timely manner.

- Self-Assessment (P.6): The organization routinely conducts self-critical and objective assessments of its programs and practices.

- Benchmarking (X.8): The organization learns from other organizations to continuously improve knowledge, skills, and safety performance.

- Training (H.9): The organization provides training and ensures knowledge transfer to maintain a knowledgeable, technically competent workforce and instill nuclear safety values.

Many personnel interviewed and in focus groups indicated that they had concerns about the continuous learning environment at PNPS. Some personnel were concerned about a perceived lack of quality training, training that was computer-based, and training that focused on memorization rather than how to perform a task. Most personnel stated that there was little training available above the minimum requirements, which was a noticeable decrease in how training was implemented in the past.

When questioned about the recent safety culture assessments conducted at PNPS, most personnel indicated awareness of the outcomes, as well as the specific actions being taken by PNPS in response to the assessments.

Many management and non-supervisory personnel stated that benchmarking was not performed as frequently in recent times as it has been in the past. The NRC

team noted that only eleven formal benchmarking activities have occurred from 2013 to present. During interviews, a few people also described occurrences of what they considered to be benchmarking activities, however the NRC team noted these activities did not appear to be documented using benchmark report guidance from EN-LI-104 “Self-Assessment and Benchmark Process.”

Many individuals, excluding operators, indicated that training was a low priority at PNPS, training quality had declined, training did not effectively support the work process, and training attendance conflicted with work. One focus group indicated training had been cut back to the bare minimum, from four times a year for four days to once a year for three days. Others stated that training was needed for job fundamentals such ability to read prints/drawings. Others stated that there was a lack of qualified instructors.

The NRC team’s independent safety culture assessment confirmed the results of PNPS’s nuclear safety culture assessments, which noted that the organization is not placing sufficient emphasis on key elements of continuous improvement, such as self-assessment, industry benchmarking, operating experience, and self-criticalness.

.6 Assessment of the Environment for Raising Concerns Trait

The Environment for Raising Concerns trait states that a safety conscious work environment is maintained where personnel feel free to raise safety concerns without fear of retaliation, intimidation, harassment, or discrimination. The associated attributes include:

- Safety Conscious Work Environment Policy (S.1): The organization effectively implements a policy that supports individuals’ rights and responsibilities to raise safety concerns, and does not tolerate harassment, intimidation, retaliation, or discrimination for doing so.

- Alternate Process for Raising Concerns (S.2): The organization effectively implements a process for raising and resolving concerns that is independent of line-management influence. Safety issues may be raised in confidence and are resolved in a timely and effective manner.

Nearly all personnel interviewed and in focus groups stated they felt free to raise nuclear safety concerns through many avenues including: their supervisors, the Corrective Action Program, the Employee Concerns Program, and the NRC. However, the NRC team noted that the radiation protection workgroup expressed concerns related to one event that could be precursors to a potential chilled environment (see Section 7.8 of this report for more detail). Additionally, the security workgroup expressed some concerns with the use of the Employee Concerns Program. The PNPS Employee Concerns Program Coordinator was taking steps to address workgroups at the site that had lower scores in some questions in the 2016 Third Party Nuclear Safety Culture Assessment survey related to the use of the PNPS Employee Concerns Program. As of April 20, 2017, PNPS stated that the next Nuclear Safety Culture Assessment results are planned to be compared to the prior assessment to evaluate the effectiveness of the actions taken. The NRC team noted that an EFR of these actions should confirm whether these actions have been

successful in increasing confidence in the Employee Concerns Program, especially in the security workgroup.

The NRC team noted that there were no NRC inspection findings that were assigned cross-cutting aspects within the environment for raising concerns safety culture trait.

PNPS's safety culture evaluations identified the safety conscious work environment as a potential problem area. The station completed an apparent cause evaluation and did not substantiate any issues with the environment for raising concerns.

The NRC team's independent safety culture assessment confirmed the results of PNPS's nuclear safety culture assessments related to the environment for raising concerns trait. The NRC team noted that with the exception of the precursors in the radiation protection workgroup, as discussed in Section 7.8, there are no ongoing indications of potential issues with the environment for raising concerns.

.7 Assessment of the Effective Safety Communication Trait

The Effective Safety Communication trait states that communications maintain a focus on safety. The associated attributes include:

- Work Process Communications (X.9): Individuals incorporate safety communications in work activities.

- Bases for Decisions (H.10): Leaders ensure that the basis for operational and organizational decisions is communicated in a timely manner.

- Free Flow of Information (S.3): Individuals communicate openly and candidly, both up, down, and across the organization, and with oversight, audit, and regulatory organizations.

- Expectations (X.10): Leaders frequently communicate and reinforce the expectation that nuclear safety is the organization's overriding priority.

Most personnel interviewed and in focus groups felt that site management had improved in communicating their focus on improving safety, and identified the use of additional communication tools such as site daily newsletters, a SharePoint site (AirsWeb), videos, emails, signage, recordings, and quarterly all-hands meetings. Management has placed additional emphasis on procedural adherence. Senior Management has consistently communicated via a weekly safety message to follow the process and complete the task without regard to production. Most personnel interviewed stated that senior management is improving at informing plant personnel of safety-significant or risk-significant issues via plan-of-the-day communications. Managers are also more engaged in meeting with key personnel on a more frequent basis to understand issues and address questions. Station personnel also conveyed that management changed a practice from closed top-level meetings to conducting informed follow-up debriefs with employees to ensure more transparency and openness.

Employees felt empowered to stop work and actively participate in stand-down meetings. Individuals indicated that there had been more open dialogue on safety and better conversations when individuals had questions on which work should be prioritized based on nuclear safety. While communication methods and frequency had improved for most, security personnel did not feel as informed, felt that information was inconsistently shared from the top down, and felt communications were not pertinent to them. Security staff indicated that they did not have opportunities to interact with site senior leadership due to the inability to attend the all-hands meetings while standing watch.

The NRC team's independent safety culture assessment confirmed the results of PNPS's nuclear safety culture assessments and cause evaluations within the nuclear safety culture trait of effective safety communication. The NRC team concluded that PNPS developed appropriate corrective actions to improve performance in the effective safety communication trait.

.8 Assessment of the Respectful Work Environment Trait

The Respectful Work Environment trait states that trust and respect permeate the organization. The associated attributes include:

- Respect is Evident (no IMC 0310 code): Everyone is treated with dignity and respect.

- Opinions are Valued (no IMC 0310 code): Individuals are encouraged to voice concerns, provide suggestions, and raise questions. Differing opinions are respected.

- High Level of Trust (no IMC 0310 code): Trust is fostered among individuals and work groups throughout the organization.

- Conflict Resolution (no IMC 0310 code): Fair and objective methods are used to resolve conflicts.

Personnel felt that they were able to trust management up through the Site Vice President. They trusted that the new senior management team was moving the station in the right direction. The majority of personnel interviewed and in focus groups felt that they were respected for the work that they contributed to the station and that they worked in a respectful work environment. However, focus groups and interview participants stated that although site security has not been compromised, most members of the security organization felt disrespected by plant management due to a lack of a retention bonus contract before the impending plant closure. Security officers stated that changes in policy, procedures, and work hours occur randomly and without input from the security officers. Security officer dissatisfaction was documented in numerous anonymous CRs. The NRC team confirmed that in spite of the sometimes tense relationship between management and security officers, changes to security policy and procedures were accomplished in accordance with the corrective action program and communicated to security officers via daily roll call packets.

The focus groups also indicated that radiation protection personnel did not feel like they were respected. Some examples provided include plant personnel interrupting their work; plant personnel not understanding the scope and time associated with radiation protection work; and not accounting for radiation protection support during work planning, which results in resource strains to the department to provide unscheduled coverage.

Overall, the NRC team concluded that, with some exceptions as noted, there is a respectful work environment at the station.

.9 Assessment of the Questioning Attitude Trait

The Questioning Attitude trait states that individuals avoid complacency and continuously challenge existing conditions and activities in order to identify discrepancies that might result in error or inappropriate action. The associated attributes include:

- Nuclear is recognized as Special and Unique (no IMC 0310 code): Individuals understand that complex technologies can fail in unpredictable ways.

- Challenge the Unknown (H.11): Individuals stop when faced with uncertain conditions. Risks are evaluated and managed before proceeding.

- Challenge Assumptions (X.11): Individuals Challenge Assumptions and offer opposing views when they think something is not correct.

- Avoid Complacency (H.12): Individuals recognize and plan for the possibility of mistakes, latent problems and inherent risk, even while expecting successful outcomes.

Most individuals interviewed and in focus groups stated that they would feel comfortable challenging their immediate supervisor or manager if they felt they were not able to get an issue resolved. Individuals stated that they felt they had stop-work authority, would not hesitate to stop work or stop when unsure, and there would be no retaliatory action for doing so. Participants in the focus groups and interviews also stated that in many cases, people were acknowledged and sometimes rewarded for stopping work when conditions were challenging.

However, during field observations and document reviews, the NRC team identified several examples that demonstrated an inadequate questioning attitude by the station:

- PNPS did not adequately question or evaluate the adverse effects of running the ‘A’ emergency diesel generator cooling fan right-angle gear drive without pressurized lubrication (refer to Section 6.7.4 of this report for a detailed discussion of this issue).

- The NRC team observed PNPS’s preparations for a core spray system logic surveillance test, including multiple pre-job briefings and a control room brief.

The control room authorized and then subsequently decided to stop the test when the NRC team questioned the evaluation of risk for the evolution due to conflicting information that was presented regarding risk. The same information was available to multiple PNPS staff who participated in the briefings, yet none of them questioned the conflicting information.

The NRC team concluded that the general willingness of station personnel to stop work and raise concerns when they are in doubt is a positive cultural attribute. Additionally, in focus group interviews, most PNPS personnel stated that site performance has improved dramatically, especially over the past few years. However, the NRC team also noted that in order for an individual to raise a concern or challenge an assumption, they must first recognize that there is, or might be, an issue (i.e., "frame of reference" with current standards). PNPS's challenges with "frame of reference" may be partially due to placing insufficient priority on benchmarking of industry peers – as previously noted, the station has only completed 11 formal benchmarking activities since 2013, while other planned benchmarking activities had been cancelled. The NRC team concluded that on an individual and collective level, the station is not sufficiently self-critical, making comparisons only with their own past performance rather than that of their industry peers. This is in line with the 2016 Third Party Nuclear Safety Culture Assessment results, which noted that the PNPS organization (and the Entergy fleet) has become overly insular and disconnected from an accurate understanding of current industry best practices, which contributed to an organizational "frame of reference" deficiency.

.10 Assessment of the Decision-Making Trait

The Decision-Making trait states that healthy decision-making for activities that support or affect nuclear safety is systematic, rigorous, and thorough. Attributes associated with healthy decision making include:

- Consistent Process (H.13): Individuals use a consistent, systematic approach to make decisions. Risk insights are incorporated as appropriate.

- Conservative Bias (H.14): Individuals use decision-making practices that emphasize prudent choices over those that are simply allowable. A proposed action is determined to be safe to proceed, rather than unsafe in order to stop.

- Avoid Complacency (H.12): Individuals recognize and plan for the possibility of mistakes, latent issues, and inherent risk, even while expecting successful outcomes. Individuals implement appropriate error reduction tools.

- Accountability for Decisions (X.12): Single-point accountability is maintained for nuclear safety decisions.

Most individuals interviewed and in focus groups stated, with few exceptions, that PNPS management made conservative decisions. Examples discussed included:

- Many participants cited the plant shutdown during a recent winter storm.

- Some described the decision to delay unit startup to perform switchyard maintenance after an individual raised a safety concern over a breaker disconnect hotspot.

- Some referred to the plant shutdown in 2016 to repair an excessive feed water regulation valve packing leak.

However, focus group and interview participants did note some examples of non-conservative decision-making at the station, including:

- Some noted the decision to start up the plant in 2015 with a packing leak from a feedwater regulating valve.

- One individual described a 2016 decision related to a defective salt service water strainer pressure indicator as an example and stated, “If the work-around for broken equipment met minimum NRC safety requirements, the equipment was not repaired.”

- Some individuals provided examples of degraded security-related equipment that went unfixed with compensatory work arounds in place.

- Some individuals described an informal, non-conservative “backshift decision-making philosophy” that is perceived to prioritize production. Workers stated that work is delayed on dayshift because issues go through committees, groups, and meetings, but on backshift, “you do what you have to do to get the job done; you do the job now and do the paperwork later; results over process; some higher risk jobs are only done on backshift.” An individual cited an example of completing work in a high radiation area that would have never happened on dayshift.

The NRC team also reviewed the decision-making aspects related to an entry into an unplanned technical specification limiting condition for operation for inoperable main steam isolation valves. The technical specification requires that if a main steam isolation valve is inoperable, the steam line must be isolated or the plant shut down within specified time limits. When the station confirmed that two main steam isolation valves were inoperable, the shift manager immediately ordered the isolation of one of the main steam lines. The second steam line, however, could not be immediately isolated because there were no procedures for two steam line operation at the existing power level. The shift manager conservatively ordered operators to lower reactor power and reactor pressure to a level at which the plant was analyzed for two steam line operation. The shift manager then ordered the second main steam line isolated. The operators then completed the reactor shutdown to repair the main steam isolation valves.

Originally, the shift manager determined that when operators started to lower reactor power, a report to the NRC was required within four hours per 10 CFR 50.72(b)(2)(i), and the NRC Senior Resident Inspector was notified as such. After consultation with operations management, the shift manager determined that a four-hour report was not required and the report was not made. Though the station took appropriate actions with regards to operation of the plant, the NRC team questioned the

reasoning behind the reportability decision. This issue will be dispositioned in the first quarter 2017 integrated inspection report.

With the exception of site security officers, during formal interviews and focus groups, most stated that management involved the entire team in the decision-making process and adequately communicated decisions that affect nuclear safety and site security. Operators stated there was an open line of communication up and down the chain of command and that decisions and the bases behind decisions were communicated during pre-job briefs, turnovers, and equipment out-of-service briefs. Others stated that people were able to challenge managerial and supervisory decisions and empowered with the authority to stop work.

The NRC team confirmed the results of PNPS's safety culture assessments within the decision-making trait, which determined that there continues to be inconsistent performance in this area. Based on the examples provided above, the NRC team concluded that PNPS did not consistently exhibit alignment with nuclear safety culture attributes for conservative decision-making. When challenged by events or circumstances, PNPS operators prudently made decisions to place the plant in a safe condition. However, it appears, at times, that the station passively accepted and encouraged decision-making biased towards that which is expedient and allowable over that which is prudent. PNPS identified decision-making/risk-mitigation as a fundamental problem during their recovery evaluations. The NRC team's evaluation of this area is discussed in more detail in Section 6.1 of this inspection report.

7.2.3 NRC Inspection Findings

No findings were identified.

7.3 Safety Culture and Safety Conscious Work Environment Policies

7.3.1 NRC Inspection Scope

The NRC team reviewed the procedures and training governing safety culture and safety conscious work environment to determine whether they are adequate to support a robust nuclear safety culture and encourage personnel to report safety concerns without fear of retaliation. The NRC team reviewed Entergy procedures EN-PL-190, "Maintaining a Strong Safety Culture," and EN-PL-187, "Safety Conscious Work Environment." In addition, the NRC team reviewed training modules on safety culture and safety conscious work environment to support training for PNPS staff, as well as supervisors and above.

7.3.2 NRC Inspection Observations and Assessment

The PNPS 2016 Third Party Nuclear Safety Culture Assessment identified a nominal decline in nuclear safety culture and a nominal decline in safety conscious work environment since the 2015 assessment.

The NRC team concluded that the procedures for safety culture and safety conscious work environment were appropriate and were updated to include all safety culture traits from NUREG-2165, "Safety Culture Common Language." The NRC

team noted that EN-PL-187, “Safety Conscious Work Environment,” applies to all employees and contractors while EN-PL-190, “Maintaining a Strong Safety Culture” does not mention contractors.

The NRC team concluded that most PNPS personnel understood that safety culture is 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, and that safety conscious work environment is an atmosphere for raising concerns without fear of harassment, intimidation, retaliation, or discrimination. PNPS management provided all employees with the “Building Our Legacy of Excellence” booklet. This booklet referred to the traits of a healthy nuclear safety culture as well as expectations for behaviors to obtain excellence.

In addition, all PNPS employees received training related to safety culture in 2016. Entergy developed training module PGAT-ADM-NSCCAP, “Improving our Nuclear Safety Culture,” under CR-PNP-2016-02052, CA-60, to ensure a common understanding of the nuclear safety culture traits and how nuclear safety culture influences nuclear safety performance. In addition, PGAT-ADM-NSCCAP supported a secondary objective to provide safety conscious work environment training, to ensure that employees understood that they could raise safety concerns without fear of retaliation, under CR-PNP-2016-06113, CA-05. The majority of this classroom training was completed by November 22, 2016. The NRC team noted that new hires will not be included in this one-time training initiative. The NRC team observed this training on December 7, 2016, and noted that case studies from the NRC Safety Culture Policy Statement, as well as lessons learned from the nuclear safety culture root cause evaluation (CR-PNP-2016-02052), were utilized for small group discussions in this training session.

In addition to the above, the NRC team noted that other classroom and computer-based training was also conducted related to safety culture:

- FCBT-GET-PATSS, “Entergy Fleet Plant Access,” which all employees received, discusses both the Employee Concerns Program and safety culture.

- Entergy manual, EN-TQ-127, “Supervisor Training Program, included reference to FFAM-SUPV-00001, “Supervisor Training Program Familiarization Guide.” This familiarization guide included a meeting with the Site Employee Concerns Program Coordinator and a review of procedures EN-PL-187, “Safety Conscious Work Environment,” EN-PL-190, “Maintaining a Strong Safety Culture,” and EN-QV-136, “Nuclear Safety Culture Monitoring”.

- Initial training for first line supervisors includes classroom training module FSEM-SUPV-NSC, “Nuclear Safety Culture,” within one year from date of promotion or hire into a supervisory role. All supervisors will now receive computer-based training module FCBT-SUPV-NSC, “Nuclear Safety Culture,” Revision 0, as a prerequisite for FSEM-SUPV-NSC.

The NRC team concluded that training for supervisors and above in the area of safety culture and safety conscious work environment is adequate.

7.3.3 NRC Inspection Findings

No findings were identified.

7.4 Executive Review Board

7.4.1 NRC Inspection Scope

The NRC team evaluated Entergy's Executive Review Board process to determine whether PNPS employees were encouraged to report safety-related concerns without fear of retaliation, and that control measures or policies were being implemented. The NRC team reviewed procedure EN HR-138, "Executive Review Board Process for Employees," reviewed seven selected Executive Review Board files from the last year, interviewed the human resources representative from PNPS, and reviewed procedure EN-HR-138-1, "Executive Review Board Process for Supplemental Personnel." The purpose of the Executive Review Board process is to review certain personnel actions to ensure that the actions do not create a chilling effect in the affected work group and/or other workgroups on site.

7.4.2 NRC Inspection Observations and Assessment

The NRC team noted that the Executive Review Board documented actions in accordance with the process, including identifying if an individual had participated in a protected activity. In addition, the NRC team verified that in general, the Executive Review Board identified the potential for creating chilling effects when used appropriately.

The NRC team concluded that the process and procedures used to guide the Executive Review Board were appropriate. However, the NRC team identified one instance where PNPS did not ensure that all actions that warrant review by the Executive Review Board were identified. During focus groups, the NRC team learned of an Ethics Hotline incident perceived by workers as punitive. An individual had been removed from duty while Entergy investigated the hotline allegation. Although the hotline allegation was not substantiated and the individual returned to work without loss of pay or punishment, the removal of the individual was not evaluated by the Executive Review Board for a potential chilling effect on other employees. This is contrary to EN-HR-138, Section 5.4[1], which states, in part, that the Executive Review Board shall review the following proposed actions: disciplinary action resulting in a suspension or termination; involuntary removal from duties; denial or removal of unescorted access; and any actions or issues that the Executive Review Board, in its discretion, believes may have the potential to create a chilling effect. The NRC team determined this procedure non-compliance was minor in accordance with IMC 0612, Appendix B, because it was not a precursor to a significant event, would not lead to a more significant safety concern, did not cause a performance indicator to exceed a threshold, and did not affect one of the cornerstone objectives. This issue did not result in a chilled work environment in the affected department. Entergy documented this issue in the corrective action program under CR-PNP-2017-02684.

7.4.3 NRC Inspection Findings

No findings were identified.

7.5 Employee Concerns Program

7.5.1 NRC Inspection Scope

The NRC team completed a review of the PNPS Employee Concerns Program, including a review of governing procedures, documentation of concerns, documentation of corrective actions, feedback to employees, evaluation of concerns, and any hesitancy to raise safety concerns. In addition, the NRC team evaluated the self-assessment process and the expertise to determine whether weaknesses in the Employee Concerns Program existed that could adversely impact PNPS's ability to maintain a safety conscious work environment. The inspectors also reviewed training related to the Employee Concerns Program, and conducted interviews with the PNPS Employee Concerns Program Coordinator and the Entergy Corporate Employee Concerns Program Manager.

7.5.2 NRC Inspection Observations and Assessment

Based on a review of files from 2015 and 2016, the NRC team determined that documentation in the files was sufficiently detailed to demonstrate appropriate processing of the concern, including resolution and feedback to the employee. The NRC team also determined that PNPS appropriately maintained Employee Concerns Program records in a secure location accessible only to the Employee Concerns Program staff. The NRC team concluded that processes and procedures used to implement the Employee Concerns Program at PNPS were appropriate. However, the NRC team did note some weaknesses in implementation of the program and instances where PNPS did not meet the requirements outlined in the Employee Concerns Program process procedures, as described below.

Upon review of the qualification requirements for the station Employee Concerns Program Coordinator, the NRC team determined that at the time of this inspection, the PNPS Employee Concerns Program Coordinator was not fully qualified and could not complete an investigation independently. The NRC team identified that Entergy procedure EN-EC-100-01, "Employee Concern Coordinator Training Program," Revision 1, Attachment 9.1, and FFAM-ECPI-INIT, "Employee Concerns Coordinator Familiarization Guide," contain required training courses that were not available. Based on the NRC team's questions, Entergy documented this issue in CR-PNP-2016-09705 and CR-HQN-2016-01611. Planned corrective actions include revising the applicable procedures to document the replacement training courses, and scheduling the appropriate training for the PNPS Employee Concerns Program Coordinator. The NRC team also noted that the Entergy Corporate Employee Concerns Program Manager, as well as the Employee Concerns Program Coordinators from other Entergy sites are available, as needed, until the PNPS coordinator completes the required qualifications.

During review of Employee Concerns Program files, the NRC team identified that in at least one instance, an issue was classified as a "Rapid Response" case although the issue clearly involved safety conscious work environment. In accordance with

Entergy procedure EN-EC-100, “Guidelines for Implementation of the Employee Concerns Program,” this type of case should have warranted a full Employee Concerns Program case file. The NRC team also noted that the current Employee Concerns Program Coordinator completed this investigation after having only been in the position for two weeks. Although the existing practice allowed for an unqualified Employee Concerns Program Coordinator to complete a Rapid Response case with mentoring, a full Employee Concerns Program case file would have required a fully qualified coordinator to complete. The NRC team reviewed this case file and determined that despite this issue, this case appeared to be resolved appropriately. PNPS entered this issue into their corrective action program as CR-PNP-2017-02685.

The NRC team noted that the Employee Concerns Program files for substantiated cases included documentation of recommended actions from the Employee Concerns Program coordinator to the Site Vice President. However, information regarding the disposition of those corrective actions was not included in the corrective action program or the normal tracking system, TrakWeb, as required by Entergy procedure EN-EC-100, “Guidelines for Implementation of the Employee Concerns Program.” Per EN-EC-100, Section 5.17, “Open Corrective Action Tracking,” the Employee Concerns Program coordinator is responsible for ensuring that corrective actions are completed. Of the five files reviewed by the NRC team, all that included recommended or required corrective actions did not have the corrective actions entered into the corrective action program or tracked in TrakWeb. Based on interviews with Employee Concerns Program personnel, the NRC team determined that the station was using informal methods to track completion of these actions, instead of TrakWeb, and ANO was the only Entergy site consistently using this program. Notwithstanding the above, the NRC team did not find evidence of any actions that should have been completed but were not. The Entergy fleet Employee Concerns Program Manager has since reinforced the expectation that TrakWeb be used to track related corrective actions and follow-up activities, as required by procedure. Entergy entered this issue into their corrective action program as CR-PNP-2017-02686.

The NRC team evaluated each of these performance deficiencies in accordance with IMC 0612, Appendix B, and determined that each of these issues were minor. Specifically, none of the issues represented a precursor to a significant event, would have the potential to lead to a more significant safety concern, caused a performance indicator to exceed a threshold, or adversely affected a cornerstone objective.

Though not required by Entergy process, the NRC team did note the following:

- When requested, the Employee Concerns Program Coordinator had difficulty retrieving files. Related concerns were filed together, in some cases, which can make retrieval especially difficult as well.

- The NRC team noted that in some cases, Employee Concerns Program files did not have any information on monitoring the status of corrective actions or any EFRs of corrective actions. Though EFRs are not required by Entergy procedure EN-EC-100, conduct of EFRs is an industry best practice.

- The NRC team noted that the Employee Concerns Program procedures and guidelines did not address metrics; however, timeliness data, etc., was provided to Entergy Corporate for reporting purposes. No goals for timeliness were in place for PNPS or other Entergy sites other than ANO. Consequently, there were no standards in place to measure timeliness of completing reviews.

- The NRC team noted that in accordance with EN-EC-100, Section 5.15, "Reporting Investigation Results," the Program User Feedback Form is provided to a concerned individual at the time the investigation results are communicated. The PNPS Employee Concerns Program Coordinator was not reviewing or trending the results of these feedback forms in order to determine whether improvements to the program were needed; the forms were kept in the individual case files and only those with immediate actions were forwarded to the Corporate Employee Concerns Program Manager for action. Although there is no procedural requirement to trend these results for potential improvements, this is an industry practice.

Overall, the NRC team concluded that the process and procedures used to implement the Employee Concerns Program function were appropriate; however, not all procedure requirements were met, as described above. The results from focus group discussions conducted by the NRC team indicated that station personnel were willing to raise concerns using the Employee Concerns Program. A review of NRC allegation activity at PNPS did not result in any information that suggested a safety conscious work environment issue or any issues with the Employee Concerns Program at the station.

7.5.3 NRC Inspection Findings

No findings were identified.

7.6 Nuclear Safety Culture Monitoring Panel

7.6.1 NRC Inspection Scope

The NRC team assessed the site's Nuclear Safety Culture Monitoring Panel and Safety Culture Leadership Team programs and activities by reviewing PNPS's Safety Culture Monitoring procedures; reviewing Nuclear Safety Culture Monitoring Panel meeting minutes for meetings conducted between October 2014 and December 2016; reviewing Safety Culture Leadership Team meeting minutes for meetings conducted in March and June of 2016; performing interviews with the Nuclear Safety Culture Monitoring Panel Chairman, Director of Recovery, and various department managers; observing a monthly Nuclear Safety Culture Monitoring Panel meeting; and conducting focus group discussions with PNPS personnel.

7.6.2 NRC Inspection Observations and Assessment

PNPS used procedure EN-QV-136, "Nuclear Safety Culture Monitoring," to establish the Nuclear Safety Culture Monitoring Panel and monitor trends in nuclear safety culture. The NRC team observed a Nuclear Safety Culture Monitoring Panel meeting on December 8, 2016, and identified that the panel members' review of

information was less critical than may be necessary to result in an effective analysis of the site's safety culture traits. For example, the panel members were provided with summaries of recent CRs that included statistical trends prior to the meeting, but did not appear to refer to the data sheets during the discussion and rating of safety culture traits. Rather, it appeared as if a few panel members selectively discussed only a few CRs, and then recommended a rating and trend based on this sample. By ignoring trending data and relying solely on subjective consideration of a few choice CRs, the Nuclear Safety Culture Monitoring Panel implementation process is vulnerable to missing trends or faint signals that could only be identified by considering multiple CRs together. The NRC team concluded that a lack of benchmarking of sites with a mature monitoring process, including observation of a full Nuclear Safety Culture Monitoring Panel meeting, contributed to assessment results that appeared to be overly subjective.

The NRC team also noted one instance where the panel did not rigorously question all of the applicable safety culture aspects of the information presented to them. Specifically, one of the agenda items was for a presenter to report on actions to train and encourage workers in a department to use the corrective action program. During discussions, the presenter noted that an individual had taken the initiative to correct an industrial/vehicle safety concern, and categorized this as a success, even though the issue was not placed into the corrective action program as required. The Nuclear Safety Culture Monitoring Panel focused only on the worker's initiative, and did not discuss the corrective action program aspects of the issue, as well as the impact it could have on the safety culture at the station.

The NRC team also identified that although the Nuclear Safety Culture Monitoring Panel has been meeting monthly since January 2016, which was more frequently than required by procedure EN-QV-136, the panel did not appear to be fully effective at recognizing all safety culture trends. For example, in the June 23, 2016, meeting minutes, the panel documented multiple indications of safety culture issues in the radiation protection work group, including a possible chilling environment. In August 2016, additional information (i.e., results of an Ethics Hotline investigation, an ongoing Employee Concerns Program investigation, and two CRs) became available to the panel that indicated there may still be events impacting the safety culture in the radiation protection department. The NRC team noted that the panel narrowly focused on the results of the ethics investigation, and documented that the issue was investigated thoroughly. The panel did not appear to give consideration to the Employee Concerns Program investigation that was in process at the time. The Employee Concerns Program investigation was not complete until November 2016, and subsequent meeting minutes did not note that the panel revisited this issue. The NRC team concluded the Nuclear Safety Culture Monitoring Panel did not demonstrate a rigorous, consistent process for evaluating all available information concerning PNPS's safety culture. This was a missed opportunity for the panel, and the site, to recognize and mitigate a potential chilled work environment in the radiation protection work group (See Section 7.8 of this report for further discussion).

The NRC team also noted a lack of scrutiny by the panel following a misposition of ventilation associated with secondary containment isolation in February 2016. After the panel requested more information about how human error contributed to the event, a detailed report was provided to all panel members prior to the April 2016 meeting. The NRC team noted that the report states that time pressure induced by

procedural requirements and management was a contributing cause. The NRC team also noted that none of the corrective actions addressed management-induced time pressure. The minutes did not document any discussion of the report, that the panel discussed or questioned that time pressure induced by management was a contributing cause to the event, or that no corrective actions were in place to address this issue. The NRC team noted that the April 2016 meeting minutes did document an additional human performance error during a surveillance test. The panel did not appear to consider the possibility that these two human performance errors, occurring just two months apart, might have had similarities from which safety culture trend information could have been gleaned. This was a missed opportunity, not only to address the potential issue of time pressure imposed by management, but also to compare and contrast two human performance issues to gather any potential trend information.

The NRC team reviewed meeting minutes for the Safety Culture Leadership Team meetings in March and June 2016. No other minutes were available for review, as PNPS did not retain documentation from previous Safety Culture Leadership Team meetings. The NRC team noted that the Safety Culture Leadership Team's discussions and conclusions were consistent with the data provided by, and the recommendations from, the Nuclear Safety Culture Monitoring Panel.

In summary, the NRC team concluded that the processes and procedures used to implement the Nuclear Safety Culture Monitoring Panel and Safety Culture Leadership Team were appropriate. However, the NRC team determined that the panel may not always be reviewing information with sufficient rigor such that potential impacts on safety culture at the station can be identified and addressed. Entergy documented these observations in CR-PNP-2017-01249 and CR-PNP-2017-01250.

7.6.3 NRC Inspection Findings

No findings were identified.

7.7 Nuclear Safety Culture Assessments and Third Party Independent Assessment

7.7.1 NRC Inspection Scope

The NRC team evaluated the Third Party Nuclear Safety Culture Assessment report to determine whether: 1) the associated assessment was comprehensive; 2) the assessment methodology was sound; 3) the assessment team members were independent and qualified; 4) the data collected supported the conclusions derived from the assessment; and 5) PNPS's corrective actions in response to the assessment findings were appropriate.

In addition to the Third Party Nuclear Safety Culture Assessment, the NRC team reviewed the results of PNPS's independent safety culture surveys conducted in 2015 and the Integrated Nuclear Safety Culture Assessment Report. The Integrated Nuclear Safety Culture Assessment Report integrated results from the 2015 safety culture survey and 2016 Third Party Nuclear Safety Culture Assessment, and mapped the findings to the fundamental problems and corrective actions in the Comprehensive Recovery Plan. The NRC team also reviewed CR-PNP-2016-

04261, which documented corrective actions taken in response to the Integrated Nuclear Safety Culture Assessment Report. Finally, the NRC team reviewed results from the first periodic safety culture survey conducted by a third party vendor in December 2016, in order to evaluate whether more recent survey results indicated improving trends in safety culture.

7.7.2 NRC Inspection Observations and Assessment

The NRC team concluded that the Third Party Nuclear Safety Culture Assessment was comprehensive and provided appropriate indications of the safety culture that existed at PNPS at the time of the assessments in 2015 and 2016. The members of the Third Party Nuclear Safety Culture Assessment team were independent from PNPS and had appropriate qualifications to conduct the assessment. The Third Party Nuclear Safety Culture Assessment used multiple data collection methods, which consisted of reviewing results from the 2015 and 2016 independent safety culture surveys, performing document reviews, observing meetings and work activities, and conducting focus group discussions and individual interviews with PNPS personnel and long-term contractors at the station. The response rate for the 2016 independent safety culture survey was 86 percent with 35 percent of the respondents (191 of 650) providing written comments. The write-in comment participation rate doubled in comparison to the 2015 assessment and was equal to the industry average as typically observed by this Third Party Nuclear Safety Culture Assessment Team. This was a large enough sample to provide confidence that the survey results accurately reflected the safety culture perceptions at the site.

For the Independent Nuclear Safety Culture Assessment Review, PNPS formed a team of internal personnel and external consultants to review and consolidate the results from the 2015 independent safety culture survey and the 2016 Third Party Nuclear Safety Culture Assessment into a set of problem descriptions. The Independent Nuclear Safety Culture Assessment Review identified seven site organizations requiring priority attention based on the safety culture assessment results, and 17 descriptions for topical areas that should be addressed by safety culture improvement efforts.

Attachment B of the Independent Nuclear Safety Culture Assessment Review outlined how each of the safety culture topical areas were being addressed by corrective actions associated with other fundamental problems in PNPS's Comprehensive Recovery Plan or through corrective actions related specifically to that particular topical area. The Independent Nuclear Safety Culture Assessment Review identified a reasonable set of safety culture topical areas to be improved, which resulted in new corrective actions beyond those already identified within other fundamental problems. These corrective actions are documented in CR-PNP-2016-04261, "Nuclear Safety Culture Assessment".

The NRC team concluded that the Third Party Nuclear Safety Culture Assessment was of sufficient quality to identify weaknesses in PNPS's safety culture and facilitate the development of corrective actions. The NRC team's graded safety culture assessment found that, in some instances, the results from the Third Party Nuclear Safety Culture Assessment were not substantiated by results of focus group discussions. For example, though the Supply Chain organization was noted as a priority organization in the Third Party Nuclear Safety Culture Assessment, results of

interviews and focus groups did not support those conclusions. The Third Party Nuclear Safety Culture Assessment write-in comments supported an environment with anxiety with respect to the impending plant shutdown and may have affected results at that point in time. In addition, the NRC team noted a potential weakness with PNPS's planned monitoring tool, as discussed below.

CR-PNP-2016-04261 includes corrective actions for eight topical areas that were not directly addressed by a fundamental problem or problem area, as well as corrective actions for the seven priority outlier organizations noted in the Third Party Nuclear Safety Culture Assessment. The NRC team determined that some of the corrective actions documented in CR-PNP-2016-04261 to address some of the priority organizations may not be effective in sustaining behavior changes necessary to move safety culture forward at the station. For example, actions to address one of the outlier organizations with decreasing trends in the safety culture surveys included:

- A meeting and read-and-sign document to discuss the survey results
- An email containing a guide for how to track and follow issues in the corrective action program
- Development of a weekly look-ahead tool and scheduling a weekly look-ahead meeting to ensure the department was kept informed of major work and activities
- Development of a one-time briefing to other departments in order to foster communications between those departments

Noting that changing behaviors and attitudes affecting safety culture are long-term actions that require providing expectations, training, if appropriate, continuous positive reinforcement, and accountability, there appeared to be elements lacking in the actions taken to move the radiation protection department in a positive direction with respect to trust between management and technicians as well as between in-house technicians and contractors. Results from the focus groups conducted by the NRC team indicate that some individuals feel that there are still respectful work environment issues, and as such, these actions may not have been effective. In addition, focus group input resulted in a potential safety conscious work environment issue within this workgroup (see Section 7.8 of this report). The actions taken appear to be mainly focused on the short-term, and do not necessarily address the potential work environment issues. Discussions with PNPS management about this observation with respect to the long-term results of actions taken resulted in the issuance of EFR corrective actions for each priority organization (CR-PNP-2016-04261, CAs-84 – 91) to assess progress in these organizations and adjust actions as warranted based on the results of those EFRs. The NRC team concluded that this will be an important monitoring tool to maintain focus on improvements in these priority organizations.

7.7.3 NRC Inspection Findings

No findings were identified.

7.8 Other Observations

While onsite, the NRC team was made aware of several precursors to a potential chilled work environment in the radiation protection department. During focus groups, the NRC team learned of an Ethics Hotline incident perceived by workers as punitive; specifically, an individual had been removed from duty and denied site access while Entergy investigated a hotline allegation. The allegation was not substantiated and the individual returned to work without loss of pay or punishment. Some focus group participants indicated that there was stress and uncertainty in the department during the investigation period in that most felt that the affected worker had been punished for doing his/her job, and that if they raised a similar concern, they may also be subject to the same actions. While nearly all radiation protection focus group participants stated that they would still find an avenue to raise a concern, such as writing a CR or making a complaint to the Employee Concerns Program, a few still felt that they might get punished if they questioned the wrong person during the course of performing their duties.

The NRC team determined that the station had some opportunities to recognize the impact this issue had on safety culture at the station. As discussed in Section 7.4 of this report, PNPS should have conducted an Executive Review Board related to this action to ensure that the action did not create a chilling effect in the affected workgroup and/or other workgroups on site. Another opportunity would have been review by the Nuclear Safety Culture Monitoring Panel, as discussed in Section 7.6 of this report. Finally, the NRC team determined that the station had an additional opportunity to recognize the impact this incident had on safety culture during the associated Employee Concerns Program investigation and follow-up. The NRC team reviewed the Employee Concerns Program case report and found anecdotal indications pointing to safety culture weaknesses or areas of improvement, such as employee frustration with the corrective action program, and personnel stating that this was bordering on a safety conscious work environment issue during interviews. Additionally, though the Employee Concerns Program report stated that monitoring would occur to ensure that the safety conscious work environment conditions did not deteriorate, as of this inspection, the NRC team found no evidence of any actions taken, or plan for future actions, to monitor the safety conscious work environment in the radiation protection department.

Based on a review of this information, the NRC team determined that this issue is a precursor to a potential chilled work environment in the radiation protection department; a chilled work environment does not currently exist in this or any other department as a result of this issue. Nearly all radiation protection focus group participants indicated that they would still raise safety concerns through other available avenues, including the corrective action program and the Employee Concerns Program. However, the NRC team did conclude that this example illustrated a vulnerability in PNPS's monitoring of safety culture at the station. Though several programs and processes are in place to accomplish this task, each of those programs were working in isolation.

8. Performance Deficiency Cause Analysis

Per IP 95003, Section 3.10, the purpose of the performance deficiency cause analysis was to provide a diagnosis of the principle causes for the decline in performance as well as a prognosis for future improvement. This section also stated that the NRC may perform a collective risk assessment of multiple separate or independent findings that overlap in time to gain an understanding of the aggregated or collective risk profile.

The NRC team considered the collective risk impact associated with the findings identified during this inspection. The NRC team determined that it was appropriate to only consider the finding related to the 'A' emergency diesel generator gearbox (Section 6.7.4.1) since it was the only finding that represented an actual loss of design function. The detailed risk evaluation associated with this issue is documented in Attachment 1 of this inspection report.

Additionally, the NRC team reviewed all of the root and apparent cause evaluations conducted by PNPS during this analysis. The NRC team also considered the results of the PNPS Third Party Nuclear Safety Culture Assessment and the NRC Independent Safety Culture Assessment (Section 7.2).

Per PNPS's recovery process, the fundamental problems were categorized as those that drove performance at PNPS, and the problem areas were those that were driven by the fundamental problems. As discussed previously, PNPS identified three fundamental problems and six problem areas. In general, the NRC team agreed with the fundamental problems and problem areas identified during PNPS's recovery evaluations. However, the NRC team noted the following areas of concern during the inspection, which will need to be addressed by Entergy.

Weaknesses in Adequacy and/or Implementation of CAPRs

In general, the NRC team noted that Entergy exhibited weaknesses in the adequacy and/or implementation of the CAPRs for the root causes reviewed during this inspection. Specifically:

- Corrective Action Program Fundamental Problem Root Cause Evaluation: The NRC team noted that the root cause focused on the station senior leadership and failed to adequately address the role that lower-level leaders had in implementation in the day-to-day prioritization and resolution of corrective action program items. The NRC team determined that the definition of 'leaders' associated with the root cause was too narrow and failed to recognize that department performance improvement coordinators had a significant leadership role in the implementation and assessment of the corrective action program. This was evident in the NRC team's review of the associated CAPR, which revealed that the department performance improvement coordinators and the Performance Improvement Review Group members were absent from the CAPR, or the supporting corrective action mentoring/coaching function. Instead, it was described that these individuals would receive "trickle down" mentoring/coaching from their respective department directors. Through interviews, the NRC team verified that PNPS implemented no systematic or structured coaching/mentoring to reach all station personnel with leadership responsibilities in the implementation of the corrective action program. (Section 5.1.4)

- September 2016 Feedwater Regulating Valve Failure Root Cause Evaluation: During review of the root cause evaluation and associated CAPR, the NRC team could not reconcile how revising an already adequate "informational use" procedure, which was not understood, or creating a new site-specific procedure that mirrored the requirements of EN-FAP-WM-011, which was also going to be "informational use" based on interviews, would ensure that planning personnel

would always know and understand work order planning standards. Additionally, the NRC team noted that Entergy's planned corrective actions did not ensure that new planners would be aware of the operating experience associated with this event and did not revise any initial or create any planner refresher training requirements, which could reasonably result in repetition of the issue. (Section 5.3.3)

- Nuclear Safety Culture Fundamental Problem Root Cause Evaluation: In some cases, the NRC team was not able to clearly link the causal factors identified in the root cause evaluation to the CAPRs. Additionally, the NRC team determined that there were multiple significant weaknesses associated with Entergy's implementation of the Targeted Performance Improvement Plans, which were intended to "ensure that Pilgrim leaders are held accountable to improving performance associated with identified gaps in behaviors that demonstrate a healthy nuclear safety culture." Examples of weaknesses identified by the NRC team include parallel implementation of the plans, insufficient duration of corrective actions to improve of behaviors, generic versus specific counseling to address adverse behaviors, success criteria that would not be expected to result in substantial performance improvement at the station, and a substantial number of administrative issues. The NRC team concluded that these significant implementation weaknesses severely limited the overall effectiveness of the CAPR. The NRC team also noted that the Targeted Performance Improvement Plans were a part of the CAPR for the Decision-Making/Risk Recognition Fundamental Problem. (Section 7.1.4)

Operations Department Standards

As discussed in Section 4.7, the NRC team identified that Entergy's conclusions and assumptions throughout the SRV root cause evaluation were incorrect, which directly affected the results of the analysis. Specifically, the station concluded that the CR written for the 'A' SRV in 2013 did not have enough information to appropriately identify and evaluate 'A' SRV performance. The station also concluded that one of the contributing causes was inadequate operator fundamental training, as it relates to the use of the steam tables, and management oversight of the corrective action program and operability determination process. Based on a review of the CR, interviews with those involved in the event, and review of Entergy's interview records, the NRC team concluded that there was enough information in the CR such that a knowledgeable senior reactor operator could reasonably conclude that the 'A' SRV did not open in 2013. Further, the NRC team determined that the shift manager that approved the associated operability evaluation possessed adequate training and knowledge to ensure an adequate operability evaluation was completed. Thus, the NRC team concluded that the cause of the incorrect and inadequate operability determination related to the 'A' SRV was associated with inadequate shift manager operability determination review rigor and any associated causal factors.

As discussed in Section 6.3, during the recovery evaluations, Entergy identified a standards performance deficiency related to performance of operability determinations and functionality assessments. The NRC team concluded that identification of this area as a standards performance deficiency was appropriate. Based on a review of the apparent cause evaluation and associated corrective actions, the NRC team determined that Entergy has made significant improvement in the application and implementation of

the operability determination and functionality assessment program. However, the NRC team also concluded that Entergy continues to have some issues with the program that are rooted in technical rigor and teamwork with the engineering department.

Given the NRC team's findings related to the SRV root cause evaluation and implementation of the operability determination program, as well as station performance during past events (e.g., NRC Inspection Report 05000293/2015007), the NRC team adjusted the IP 95003 inspection plan during the onsite weeks to include additional focused inspection of the operations department (Section 6.4) to ensure that Entergy had not missed a fundamental problem or problem area related to operations performance at PNPS. The NRC team concluded that in general, the operations staff at PNPS can operate the plant safely, within design basis limits, and in a manner granted to them in their license. However, numerous examples observed by both the NRC team and the resident inspector staff indicated a lack of formality, appropriate technical specification usage, and attention to detail for implementation of administrative programs, which could represent precursors to a further decline in performance. The NRC team determined that this was likely a result of inadequate management standards, accountability, and expectations, as well as the operations staff having become complacent with respect to conduct of plant operations over a number of years. Based on observations conducted during the onsite weeks, as well as the results of this inspection, the NRC team also determined that the operations department has not consistently demonstrated strong site ownership, leadership, and high standards of performance. Examples of this are ownership of equipment issues (e.g., 'A' emergency diesel generator radiator fan gearbox issue, Section 6.7.4), acceptance of operability evaluation information with less than adequate technical rigor (Sections 6.3.4 and 6.3.5), and behaviors in the main control room that are contrary to Entergy procedure EN-OP-115, "Conduct of Operations" (Section 6.4).

The NRC team determined that additional actions will be needed by Entergy to fully define the extent of the weaknesses related to operator standards at PNPS, as well as develop appropriate corrective actions to address those weaknesses.

Implementation of Subject Matter Experts at PNPS

Entergy identified the following root causes during their IP 95003 recovery process at PNPS:

- Corrective Action Program Fundamental Problem: (Section 5.1) PNPS leaders have not fostered a sufficient change to the organizational culture that is needed to improve and sustain corrective action program performance. As a result, the station continues to experience longstanding corrective action program shortfalls.

- Decision-Making/Risk Recognition Fundamental Problem: (Section 6.1) Station leadership has not consistently exhibited behaviors that set the requisite standards and expectations for consequence-biased decision making and effective operational risk management, consistent with a strong nuclear safety culture. As a direct result, station leadership has not provided management oversight and associated accountability to reinforce the proper expectations regarding risk management. This root cause led to significant station events and regulatory challenges at PNPS.

- Nuclear Safety Culture Fundamental Problem: (Section 7.1) PNPS leaders have not held themselves and their subordinates accountable to high standards of performance. This reduced effectiveness of the performance improvement/ corrective action processes to recognize and stop the decline in nuclear safety culture. As a consequence, the station has experienced long-standing problems and increased regulatory oversight.

Based on a review of these root causes, the NRC team concluded that weaknesses in PNPS leadership standards and behaviors were drivers for Column 4 performance at the station. This is also supported by the results of the PNPS Third Party Nuclear Safety Culture Assessment, which indicated that the senior leadership team had not been consistently engaged in demonstrating and demanding higher levels and standards of performance from the site. The NRC team reviewed station organizational charts and noted that at the time of the inspection, there had been minimal changes in the station's management organization since PNPS's transition to Column 4. Given this information, the NRC team reviewed and assessed the CAPRs for each of these root causes to determine whether these actions would be sufficient to correct leadership standards and behaviors, and ensure sustained, improving nuclear safety performance to the planned end of plant operating life in 2019.

As discussed in this report, the NRC team noted weaknesses in the adequacy and/or implementation of the CAPRs associated with the corrective action program and the Targeted Performance Improvement Plans. Specifically, the NRC team identified lack of structured coaching and mentoring for all levels of leadership involved in implementation of the corrective action program, and significant weaknesses in adequacy and implementation of the Targeted Performance Improvement Plans, which were intended to "ensure that Pilgrim leaders are held accountable to improving performance associated with identified gaps in behaviors that demonstrate a healthy nuclear safety culture." Given these issues, the NRC team concluded that the subject matter experts and mentors currently embedded in the PNPS organization currently play and will continue to play a key role in improving and sustaining positive changes in safety culture and performance at the station. This is especially true since it is commonly accepted that safety culture takes on the order of years to change, and it is evident, based on the observations and findings documented by the NRC team, as well as the NRC independent safety culture assessment, that improved standards have not yet taken hold across the entire organization.

Based on the results of this inspection, the NRC team concluded that the subject matter experts and mentors appeared to have a positive impact on recovery efforts at PNPS. However, the NRC team noted that with the exception of the lead corrective action program subject matter expert and the Nuclear Safety Culture Advocate, who are committed to the current end of plant operations, the station has the flexibility to remove the subject matter experts and mentors following a successful EFR of the related area. Also of note, the lead corrective action program subject matter expert was only required to provide a minimum of one weekly on-site visit per month. The NRC team determined that in general, the periodic reports provided by the subject matter experts contained critical and constructive critiques of PNPS performance, along with recommendations for improvement. These reports were a valuable tool in improving station performance, provided that PNPS actively reviews and implements actions based on the recommendations in the report. NRC team interviews and review of current corrective action program items generated by the subject matter experts suggested that in some

cases, there may be an underlying level of resistance to these improvement recommendations by some station managers (Section 6.1.3).

Given this situation, the NRC team determined that more robust and comprehensive action is prudent related to implementation of the subject matter experts and mentors at PNPS. At a minimum, this would include more significant time spent at the site, objective evidence showing positive, timely actions taken in response to items identified in the subject matter expert status reports, and addition of subject matter experts and/or mentors at strategic levels in the operations department organization. Implementation of subject matter experts and mentors should continue until a positive change in safety culture is sustained and verified by NRC inspection. Ideally, implementation of the subject matter experts and mentors would be upgraded to CAPRs and/or Category 1 Comprehensive Recovery Plan actions, if not already designated as such. Additionally, more robust and comprehensive action is needed related to implementation of the Targeted Performance Improvement Plans, as this action, in concert with the subject matter experts and mentors, would be the foundation for improving the safety culture at PNPS. Each of the weaknesses identified related to implementation of these plans needs to be addressed and verified by NRC inspection.

9. Consideration of IMC 0305 Criteria

IMC 0305, "Operating Reactor Assessment Program," Section 10.02e, provides examples of unacceptable performance which represent situations in which the NRC lacks reasonable assurance that the licensee can or will conduct its activities to ensure protection of the public health and safety. The NRC's assessment of these examples of unacceptable performance was as follows:

- *Multiple escalated violations of the facility's license, technical specifications, regulations, or orders.*

  The NRC determined that this criteria was not met, as multiple significant violations (i.e., greater-than-Green for significance determination process findings or greater than Severity Level IV for non-significance determination process findings) had not occurred since Entergy started implementation of their Comprehensive Recovery Plan actions at Pilgrim. This inspection report documented one potential greater-than-Green violation related to the 'A' emergency diesel generator that is still under review. Specifically, the NRC was aware of ongoing efforts by Entergy to further refine some of the key assumptions used in support of the risk analysis, and plans to consider any additional relevant information resulting from these efforts. Once this issue is finalized, the NRC will determine its impact on the overall assessment of performance at PNPS, and document the results of that review in an assessment follow-up letter.

- *Loss of confidence in Entergy's ability to maintain and operate the facility in accordance with the design basis (e.g., multiple safety-significant examples where the facility was determined to be outside of its design basis, either because of inappropriate modifications, the unavailability of design basis information, inadequate configuration management, or the demonstrated lack of an effective Corrective Action Program).*

This criteria was not met, as the NRC had not identified multiple safety-significant examples where PNPS was determined to be outside of its design basis. Entergy identified the corrective action program as a fundamental problem (Section 5) and established corrective actions to address this area. Though the NRC identified weaknesses in the CAPRs associated with the corrective action program fundamental problem during this inspection, the NRC did not consider PNPS's corrective action program to be ineffective. As mentioned previously, once the issue related to the 'A' emergency diesel generator is finalized, the NRC will determine its impact on the overall assessment of performance at PNPS, and document the results of that review in an assessment follow-up letter.

- *A pattern of failure of Entergy management controls to effectively address previous significant concerns to prevent recurrence*.

  The NRC determined this criteria was not met. This was based on the NRC's review of the three White inputs that resulted in PNPS's transition to Column 4. The NRC noted that Entergy has not had a recurrence of an SRV failing to open following issuance of the White finding on September 1, 2015 (ML15230A217). The NRC also considered the trend of the performance indicators for unplanned scrams and unplanned scrams with complications. The NRC noted that these performance indicators are currently Green and have experienced a positive and/or steady trend since the fourth quarter of 2015.

  As documented above, the NRC concluded that Entergy exhibited weaknesses in the adequacy and/or implementation of CAPRs, operations department standards, and leadership standards and behaviors. While each of these items could potentially represent precursors to recurrence of significant issues or declining performance, they have not yet resulted in any risk-significant issues. Additionally, Entergy had started implementation of their Comprehensive Recovery Plan, as well as implementation of interim corrective actions to address these issues.

  As mentioned previously, this report documented one potential greater-than-Green violation related to the 'A' emergency diesel generator that is still under review. Once the issue is finalized, the NRC will determine its impact on the overall assessment of performance at PNPS, and document the results of that review in an assessment follow-up letter.

Based on the above, the NRC determined that performance at PNPS did not warrant transition to Column 5.

10. Licensee-Identified Violations

The following licensee-identified violations of NRC requirements were determined to be of very low safety significance and meet the NRC Enforcement Policy criteria for being dispositioned as non-cited violations.

10.1 Failure to Update Vendor Manuals

10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires, in part, that activities affecting quality shall be prescribed by documented

instructions, procedures, or drawings, and shall be accomplished in accordance with those structures, procedures, and drawings. Entergy procedure EN-DC-148, "Vendor Manuals and Vendor Re-Contact Process," Revision 6, requires, in part, that the station update vendor manuals every three years. Contrary to this, in July 2016, PNPS determined through a self-assessment that they had 13 vendor manuals that had not been evaluated for changes within 3 years. The NRC team determined that this finding did not affect the design or qualification of a mitigating structure, system or component; did not represent a loss of a system and/or function; did not result in loss of a train or two safety systems greater than any technical specification allowed outage time; did not result from an actual loss of safety function; and did not involve loss of any external event mitigating system. Consequently, the NRC team determined that this performance deficiency screened as having very low safety significance (Green). PNPS documented this issue in their corrective action program as CR-PNP-2016-05115.

10.2 H_2O_2 monitors and Post Accident Sampling System out of Service

10 CFR 50.54(q)(2) requires, in part, that the licensee follow and maintain the effectiveness of an emergency plan to meet the planning standard of 10 CFR 50.47(b)(4). Specifically, the licensee was to maintain the necessary equipment to support the effectiveness of EALs. Contrary to these requirements, PNPS identified in CR-PNP-2016-01491 that on three past occasions (March 15 through August 8, 2012; September 4 through October 14, 2012; and June 4 through June 14, 2015) both trains of the H_2O_2 monitors and the Post-Accident Sampling System were unavailable to ensure the effectiveness of EAL 24, "Deflagration concentrations exist inside PC," for the potential loss of the containment barrier within the Fission Product Barrier category of the EALs. This issue meets the criteria for very low safety significance (Green) because, due to other EALs, an appropriate emergency declaration could have been made in an accurate and timely manner.

11. Exit Meeting

On March 21, 2017, the NRC presented the inspection results to Mr. John Dent, Site Vice President, and members of the PNPS staff, at a public exit meeting at the Plymouth Memorial Hall in Plymouth, MA. The NRC verified that no proprietary information was retained by the NRC team or documented in this report.

ATTACHMENT 1: DETAILED RISK EVALUATION
ATTACHMENT 2: SUPPLEMENTAL INFORMATION

Pilgrim Nuclear Power Station

'A' Emergency Diesel Generator Cooling Water System Degradation

Detailed Risk Evaluation

Conclusion:

The total increase in core damage frequency (CDF) for the performance deficiency related to the degraded cooling system was estimated to be Preliminary Greater than Green, a finding with greater than very low safety significance. The calculated conditional risk increase is dependent on the assumed fault exposure time, assumption of emergency diesel generator cooling failure, credit considered for FLEX implementation and is dominated by external events such as postulated fires within the 'B' 4KV switchgear room. Based on an initial best estimate assumption that the degraded cooling system would fail the function of the 'A' emergency diesel generator, the assumed exposure time, and an appropriate consideration of the risk mitigation provided by the FLEX strategies, the upper bound for the CDF associated with this performance deficiency was determined to be 7.2E-5 (i.e., of substantial safety significance or Yellow).

The NRC recognizes that there may be some uncertainty associated with the primary assumptions relied upon in this risk analyses and the impact of any of these potential uncertainties would be to lower the calculated CDF. Nevertheless, based on available known information, the NRC has characterized the significance of this performance deficiency as Preliminary Greater than Green. At the conclusion of the period, the NRC was aware of on-going efforts by Entergy to further refine some of the key assumptions used in support of the risk analysis. Consistent with the normal process for finalizing the significance of an inspection finding, the NRC plans to consider any additional relevant information that may be provided by Entergy in support of the final risk assessment.

Assumptions:

1. Impact on Emergency Diesel Generator 'A' (X-107A) Operation: The major assumption is that with the integrity of the gearbox lost with the relief valve cap and setscrew displaced a severe loss of oil within the box occurred and would impact the continued operation of the gearbox to drive the 108 inch radiator fan to support engine cooling. With the as-found loss of the majority of the oil (82% loss) and potential to impact the gear driven oil pump, the assumption is that excessive heat would be generated, potentially damaging the bearings or gears. There was no test data available at the time of this evaluation to indicate the gearbox could support the emergency diesel generator mission time with the loss of the closed cooling oil system integrity. The 'A' emergency diesel generator was assumed to fail under these conditions within the first hour; however, the assumption of failure within an hour was not a critical assumption. The ability to perform for its mission time of 24 hours is the critical assumption due to the potential impact on risk for postulated external events such as fires in the 'B' 4KV switchgear room.

2. Exposure Time: The most influential assumption is the exposure time of the degraded gearbox for the estimate of the risk increase for the degraded condition. A 233 day exposure time was determined by summing the past surveillance test 'A' emergency diesel generator run times until an accumulated 24 hour run time was calculated. This

approach assumes there was no degradation of the external gear box relief valve during standby conditions. The assumption is that an impact to the relief valve integrity could only occur or be applied when the 'A' emergency diesel generator was in operation. While the exact mechanism of the insert (setscrew) backing off was not known, it could be speculated that the lack of insert thread engagement, potential loss of capscrew preload due to gasket degradation or other degradation mechanisms contributed to the eventual backing off of the cap and setscrew (here-after referred to as the threaded insert) and loss of oil system integrity over time. Therefore the assumption was that the degradation of the gearbox was 'A' emergency diesel generator run time dependent.

3. Common Cause: The gearbox modifications were performed in the early 2000 timeframe and the design is similar between both emergency diesel generators where external cooling lines with relief valves were added. The performance deficiency relative to the lack of identification of a new failure mechanism during the design review process when viewed in the broader context, had the potential to impact the redundant emergency diesel generator as well and therefore the potential for common cause failure on emergency diesel generator 'B' was assumed. The analyst noted this was not a dominant contributor to the overall calculated increase in risk.

4. Recovery Credit for 'A' Emergency Diesel Generator: Recovery credit for the assumed failure of the 'A' emergency diesel generator gearbox was not given based on the postulated nature of the failure and the time that would be required for the repair and restoration of the emergency diesel generator.

Standardized Plant Analysis Risk (SPAR) Model Changes invoked to calculate a best estimate change in risk due to condition

- To provide a more realistic assessment of the risk significance due to the performance deficiency impacting the 'A' emergency diesel generator run time performance, the conditional risk assessment reduced the offsite power recovery failure probabilities from the base case model to credit emergency diesel generator run time which had been completed during the previous monthly surveillance tests. This increased the allowable SPAR model offsite power recovery hours (allowing more time for recovery) to reflect that a safety bus (A5) would have been powered for a period of time until the 'A' emergency diesel generator would have failed due to the condition. Each surveillance test run time was added until the 24 hour run time was shown to have been achieved going back to February 8, 2016. Therefore the assumed exposure time was determined to be 233 days. The 233 day run time assumption was determined to be consistent with Section 2.5 within the Risk Assessment Standardization Project (RASP) Handbook Volume 1 – Internal Events guidance which applies for degrading mechanisms which are dormant when the component is in standby.

- The dominant core damage sequences involve loss of offsite power (LOOP) initiating events with failure of the emergency diesel generators and the station blackout (SBO) diesel generator. This results in a complete loss of alternating current (AC) power. Site procedures direct the declaration of an extended loss of AC power (ELAP) by operations staff within an hour and entering procedures involved with the FLEX mitigation strategies in parallel with implementation of the appropriate emergency operating procedures. The emergency diesel generator recovery failure probability was revised from a nominal 8 to 12 hours depending on the event sequence to 2 hours in the SPAR model to account for

the procedural direction to strip the control power from the emergency diesel generators within 2 hours of declaring an ELAP. This was assumed to impact the potential recovery of the 'B' emergency diesel generator. The intent of the ELAP procedure step is to lengthen the battery life to support reactor core isolation cooling and high pressure coolant injection performance along with the ability to use the safety relief valves to depressurize the reactor.

- The SPAR model was revised specifically for SBO sequences. The model was revised to remove the automatic failure of the reactor vessel depressurization, diesel driven firewater low pressure makeup, and containment venting functions. These mitigating functions were replaced with best estimate fault trees given the event sequences. The model revision credited the detailed battery stripping procedures. The ability to depressurize using the safety/relief valves (SRVs) is enhanced because there would be more time available for the batteries to support this function. The procedural strategy reviewed utilizes the SRVs to depressurize the vessel to remain below the heat capacity temperature limit which would be approached in the torus at about 7 to 8 hours into an SBO event. Depressurization would allow the diesel driven firewater pumps (low pressure injection source) to be available for a few hours to fill the vessel as vessel inventory is lost through decay heat and depressurization, delaying time to core boil-off. The containment venting function was determined to be manually achievable even with loss of power and was credited with a new fault tree. SPAR-H calculations for manual operator actions were used to develop best estimate values for failures for each of the above mitigating strategies. Finally, credit to manually close 4KV breakers without control power (if offsite power is recovered) was considered through the 23KV line as this was reviewed as being a viable recovery action for up to 16 hours following a SBO event. Entergy supplied a thermal hydraulic analysis which was reviewed by the analyst in crediting several hours of additional time to core uncovery after SRV closure on loss of DC power. At this point the diesel driven firewater pumps could not inject as the reactor would re-pressurize to the SRV mechanical setpoint. The intent was to account for the time for core boil-off at the mechanical set pressures of the SRVs with no injection available. This change was reflected by increasing the allowable time to recover offsite power from 12 hours to 16 hours in various sequences.

  Basic Event Changes The following basic events were incorporated based on best estimate SPAR-H calculations for the appropriate SBO sequences:

  Depressurization (ADS-XHE-XM-MDEPRLT, 2E-3), SPAR-H based on high stress all other nominal conditions for blackout sequences;

  Diesel Driven Firewater (FWS-XHE-XM-ERRLT, 1.2E-2), SPAR-H based on nominal time, high stress, moderately complex due to potential changing reactor backpressure conditions and manual re-alignments which may be required, experience low;

  Containment Venting (CVS-XHE-XM-VENTLT, 6E-2) in place of 0.3 which is referenced in existing Pilgrim SPAR model change sets. SPAR-H based on nominal time, high stress, nominal complexity, experience low, ergonomics poor as potentially hot local conditions relative to required manual actions.

Internal Event Conditional Risk

Internal Risk was calculated for each period between surveillance test runs. The offsite power recoveries were adjusted to reflect credit for the proven emergency diesel generator run time going back to the satisfaction of a 24 hour mission time.

Internal Risk for Exposure Period

Calculated 'A' emergency diesel generator run times during surveillance tests

Interval	Dates	Duration (days)	Runtime (hours)	Cumulative run time (hours)	Emergency Diesel Generator Run Time (hours)
1	8/31/16 to 9/28/16	28	0	0	0
2	7/26/16 to 8/31/16	36	1.9	1.9	2
3	6/27/16 to 7/26/16	29	2.3	4.2	4
4	5/31/16 to 6/27/16	27	2	6.2	6
5	4/26/16 to 5/31/16	35	2.6	8.8	9
6	3/28/16 to 4/26/16	29	2.5	11.3	11
7	3/1/16 to 3/28/16	27	2.9	14.2	14
8	2/8/16 to 3/1/16	22	2.3	16.5	17
9	1/25/16 to 2/8/16	14	18.4	34.9	24

The first interval assumed less than an hour run time during a postulated LOOP due to the as-found 82% loss of oil in gearbox. The analyst noted test data did not exist to justify success of the cooling function for the as-found degraded configuration. For simplicity run time hours were rounded up or down to match offsite power non-recovery basic events.

An 18 hour run was conducted on the emergency diesel generator during a test that occurred on February 8 – 9, 2016. As a result, it was determined that the last time the 'A' emergency diesel generator could complete its 24 hour mission was on February 8, 2016. This represented a 233 day exposure time.

Internal Risk Increase Calculation Given Assumed Conditional 'A' Emergency Diesel Generator Failure

The analyst worked with Idaho National Labs to incorporate a best estimate revision to the event trees and fault trees involved with SBO scenarios. This was performed to credit and/or acknowledge equipment capabilities in the field including expected operational strategies based

on procedures and operator manual actions. The revised model also incorporated post-processing rules to adjust the recovery factors for offsite power to credit that the 'A' emergency diesel generator had run multiple times successfully during previous surveillance testing. Average test and maintenance for basic events was assumed over the assumed exposure period.

Each surveillance testing run was credited to increase the time available to recover offsite power before core boil-off would occur. The intervals between surveillance tests were broken up to calculate the increase in risk between test intervals until the 24 hour mission was proven.

INTERNAL RISK CALCULATION

Interval	Cumulative Emergency Diesel Generator run time	Base Case/Yr *	Cond. Case/Yr	Delta CDF/yr	Exposure days	Delta CDF/interval
1	0	6.71E-7	4.56E-6	3.89E-6	28	2.98E-7
2	2	6.84E-7	4.39E-6	3.71E-6	36	3.66E-7
3	4	6.84E-7	4.25E-6	3.57E-6	29	2.84E-7
4	6	6.84E-7	4.15E-6	3.46E-6	27	2.56E-7
5	9	6.84E-7	4.08E-6	3.39E-6	35	3.25E-7
6	11	6.84E-7	4.07E-6	3.39E-6	29	2.69E-7
7	14	6.84E-7	4.07E-6	3.39E-6	27	2.51E-7
8	17	6.84E-7	4.07E-6	3.39E-6	22	2.04E-7
						2.26E-6/yr

***Base Case for 1st interval slightly different using SPAR model Events & Condition Analysis (ECA) method – resulted in no significant change**
Increase in CDF/yr for 233 day exposure time = 2.26E-6/yr

The conditional internal risk increase due to the performance deficiency was dominated by the Initiating Event LOOP weather-related, with a failure of the 'B' emergency diesel generator to run, a failure of the SBO diesel generator to run, failure to recover an emergency diesel generator within 2 hours, failure to recover offsite power within 16 hours, with convolution factor applied.

Secondary sequences included a LOOP weather-related initiating event with failures to properly align and start the SBO diesel generator along with the 'B' emergency diesel generator being in test and maintenance conditions.

The dominant internal event sequences were SBO related loss of all AC sequences with subsequent core damage.

In accordance with guidance within the RASP Volume I for determining exposure time this includes the time the equipment remained out of service until repaired and available.

<u>REPAIR TIME – Internal Event Estimate</u>

The best estimate repair time was gathered from the following information:

The technical specification limiting condition for operation was entered at 08:15 on 9/28/16 for pre-start 'A' emergency diesel generator checks (fuel rack tripped). The leak was found at

08:20 9/28/16. The emergency diesel generator run after repairs was completed at 00:45 on 9/29/16 and the limiting condition for operation exited after senior reactor operator review at 02:00 on 9/29/16. The analyst used the actual repair time of 18 hours which resulted in negligible internal event risk increase as compared to the assumed exposure time for internal events.

Therefore the results of the internal event analysis using a modified SPAR model yielded an estimate in the increase in core damage frequency of 2.3E-6/yr for an assumed 233 day exposure period.

External Events

The analyst reviewed the Individual Plant Examination of External Events for PNPS and concluded that the only external events that had notable impact for this performance deficiency were seismic and fire.

Seismic. A postulated seismic event could result in a long-term demand for the station emergency diesel generators and/or SBO diesel generator if the seismic event was large enough to damage the switchyard insulators causing a non-recoverable LOOP. The seismic events of concern were those that would cause a LOOP but not a loss of emergency diesel generator supplied buses. Based on the RASP Handbook Volume II for PNPS, the seismic frequency which will cause a LOOP is 3.25E-4/yr. This value was substituted into a change set and the internal initiating event LOOPGR was used as a surrogate to evaluate the increase in risk. A change set was used for both a base case and condition case with the 'A' emergency diesel generator set to TRUE. The LOOPGR basic event was set to a probability of 1.0. Additionally, offsite power recovery was failed for the relevant sequences in both the base case and condition case.

The calculated increase in CDF was determined by multiplying the delta Conditional Core Damage Probability (CCDP), condition case minus the base case, by the seismic frequency causing a LOOP condition. The increase in CDF was determined to be 1.11E-6/yr. A 233 day exposure period reduced this value to a nominal 7E-7/yr.

Fire. The SPAR model for PNPS does not include fire external events. The performance deficiency impacted the ability to cope with fire events that resulted in reliance of the 'A' emergency diesel generator. The dominant fire event would be a fire in the 'B' switchgear room impacting 4KV bus A6 since fires in this area have the potential to challenge the 'B' emergency diesel generator, offsite power via the startup transformer (X4) or unit auxiliary transformer (X-3), and power from Bus A8 which is fed in parallel by either the shutdown transformer (X-13) from the 23KV line or the SBO diesel generator. Smaller fire contributors included main and startup transformer failures that resulted in a transient and challenged bus A8 and switchyard relay house fires that challenged the startup transformer and 345KV ring bus air circuit breakers. Buses A5 and A6 are the two safety-related 4KV buses fed by 'A' emergency diesel generator (X-107A) and 'B' emergency diesel generator (X-107B), respectively.

Major Risk Contributor 'B' 4kV A6 Switchgear

Due to the complexities of this fire area, Entergy contracted fire modeling support from a vendor to model the conditions. The Region I analyst performed a site visit and utilized the insights from IMC 0609, Appendix F to understand the fire impacts in the high risk fire areas. Additionally, the analyst interviewed operators and fire protection staff to understand and

evaluate the ability to mitigate the consequences of fires and evaluate recovery potential such as FLEX strategies. From the walkdowns and modeling, fires in buses A6 (Train 'B' safety-related 4KV), and A2 and A4 ('B' switchgear room) were determined to be the most risk significant. The area has fire detection but no fixed fire suppression. Cable type for fire modeling was assessed as thermoset. The fire area also contains several additional ignition sources such as 480 VAC switchgear, DC load centers, and battery chargers. These were determined to be lesser contributors to the overall risk and were not specifically evaluated. Since the main contributors were 4KV circuit breakers, three types of fire conditions were evaluated, specifically, small electrical fires, large electrical fires, and high energy arcing faults. For high energy arcing faults, fire modeling assumptions in IMC 0609, Appendix F, Attachment 5, Characterizing Non-Simple Fire Ignition Sources, were applied. Specifically, the zone of influence extends 3 feet out and 5 feet above the source, the severity factor is assumed to be 1.0 and probability of non-suppression is also assumed to be 1.0. The high energy arcing fault contribution was determined to be significant due to the large number of sources, damage footprint susceptible targets, and lack of suppression.

The physical layout of the cable feeds from bus A8 (fed by SBO diesel generator or the shutdown transformer) to safety buses A5 and A6 contributed significantly to the risk. Specifically, the feed from bus A8 enters A6 switchgear at breaker 600. Power from A8 is then routed through breaker 601 in A6 to feed A5 through breaker 501. Therefore, any fault that impacts breakers 600 and 601 impacts the feed from the SBO diesel generator and shutdown transformer (Bus A8) to bus A5.

Bus A6 contains 11 cubicles. These include feeds from 'B' emergency diesel generator, offsite power via the startup transformer and unit auxiliary transformer, and power from the 23KV line via Bus A8. Based on the potential to damage the bus work it was assumed that a high energy arcing fault in Bus A6 would result in the unrecoverable loss of the 23KV (Bus A8 feed), SBO diesel generator, unit auxiliary transformer, startup transformer, and B emergency diesel generator feeds. Since a fault on the supply side of the breaker is assumed either as the direct cause or due to fire damage, this would also prevent offsite power from feeding Bus A5 ('A' train safety-related 4KV). Evaluation of small and large fires in Bus A6 breakers was also evaluated. Based on the fire size and location to various control power feeds, various off-site feed damage states and recoveries were evaluated. For cases where recovery could be credible, a failure probability of 0.1 was assumed. Although the manual operation of a 4KV breaker is not complex, the actions would have to occur post-fire, possibly in the vicinity of fire damage. Given this scenario, a 0.1 value seems appropriate for screening.

Bus A4 adjoins A2 and they are parallel to and six feet away from bus A6. There are 13 breaker cubicles in A2/4. A bus duct connects A6 to A4. Two cable trays run between A2/4 and A6 approximately even to the tops of the switchgear. Control cables from A6 run in the tray closest to A2/4. For a high energy arcing fault, these cables are in the zone of influence. Additionally, small and large electrical fires originating in the cabinets have the potential to propagate and cause cable damage. Based on the fire size and location to various control cables, various off-site feed damage states and recoveries were evaluated. For recovery, a failure probability of 0.1 was assumed. Although the manual operation of a 4KV breaker is not complex, the actions would have to occur post fire, possibly in the vicinity of fire damage. Given this as stated above, 0.1 seems appropriate for screening.

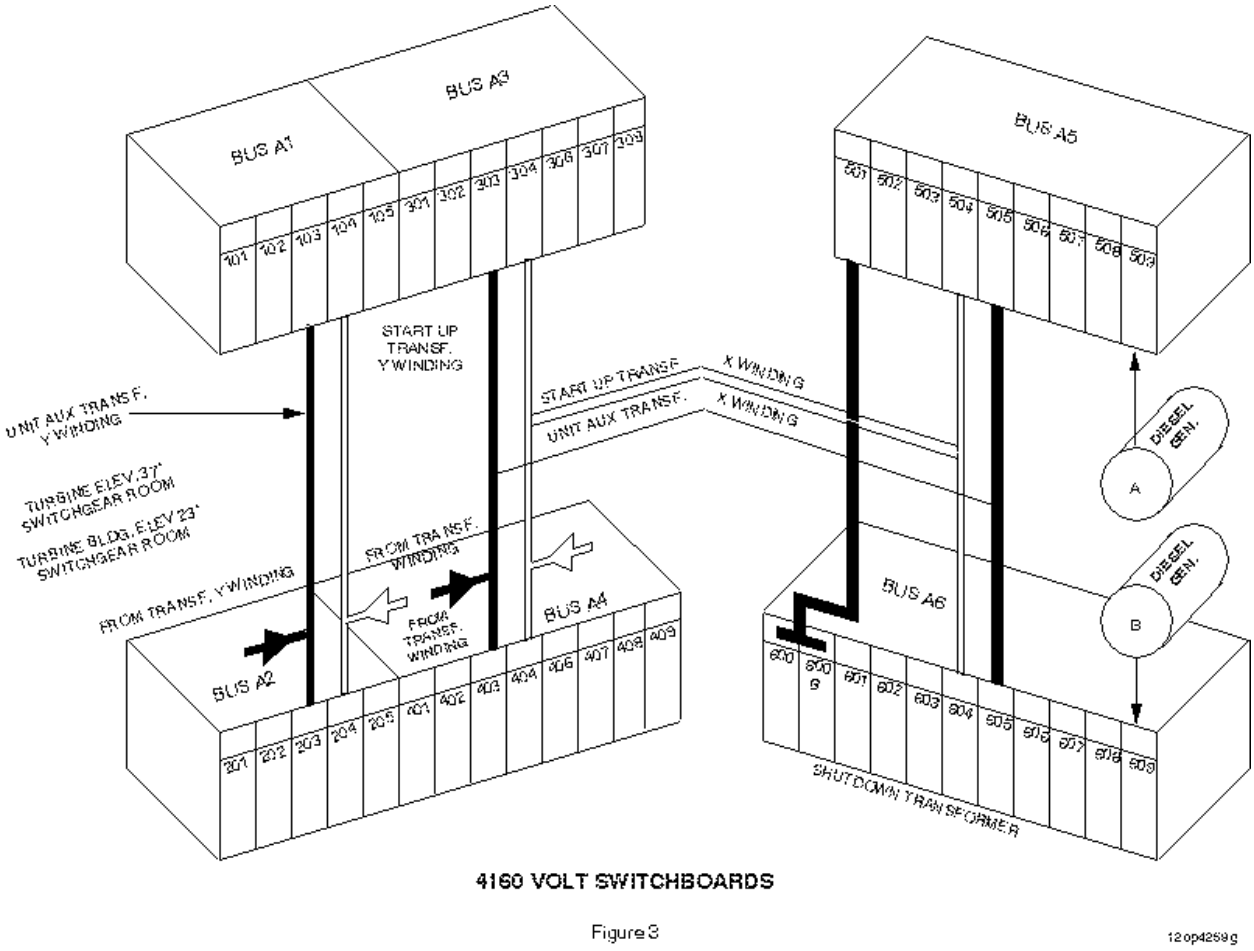

Figure 3

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Figure 3 above is a simplified layout of the 4KV switchboards. The switchgear buses are shown at an angle for simplicity of viewing. The actual installation in the field is with the switchgear panels in a parallel configuration. Buses A2, A4, and A6 are located in the 'B' switchgear room. Buses A1, A3, and A5 are located in a room which is separated and above the lower switchgear room. As stated above, Bus A4 adjoins A2 and they are parallel to and six feet away from bus A6. The lower level in the above picture depicts a part of the 'B' switchgear and Load Center room which contains other equipment such as 125VDC, 250VDC, and 480V load centers along with the 4KV buses.

The PNPS SPAR plant centered LOOP was used to approximate the baseline CDF for the postulated fire event along with the conditional CDF. Offsite power recovery was not credited in the model due to the postulated fire scenarios and equipment configuration and basic events relative to offsite power recovery failure were set to TRUE. Fire frequency data was derived from IMC 0609, Appendix F, Attachment 4, Fire Ignition Source Mapping Information: Fire Frequency, Counting Instructions, Applicable Fire Severity Characteristics, and Applicable Manual Fire Suppression Curves. As stated above, in cases where there was a potential for recovery, the fire frequency was adjusted to reflect the recovery credit. The overall fire frequency determined to impact offsite power, power from Bus A8, and the 'B' emergency diesel generator given the configuration of the buses was estimated to be 1.25E-4/yr.

For both the base case and condition case change sets were utilized in the SPAR model. The base case used the LOOPPC initiating event as a surrogate for postulated fires in the 'B' switchgear room. The LOOPPC basic event was set to a probability of 1.0, with the A8 and A6 buses assumed failed (TRUE). Offsite power recovery was failed as well. The condition case added the failure of the 'A' emergency diesel generator (set to TRUE).

The conditional case CCDP was determined to be 0.934. The base case for a fire in this area was calculated to be 4.5E-2. The delta CCDP was .934-.045 = .889

Delta CCDP (.889) x calculated ignition fire frequency related to 'B' SWGR room (1.25E-4/yr) = 1.11E-4/yr

For a 233 day exposure, 1.11E-4/yr x 233/365 days) = 7E-5/yr estimated increase in CDF

From the above it can be seen that postulated fires related to the 'B' 4KV switchgear were determined to dominate the risk increase for this performance deficiency. With the assumed condition of the 'A' emergency diesel generator failure, the risk is dominated by the calculated ignition fire frequency removing the capability of the A8 supply, offsite power, and 'B' emergency diesel generator.

Other Fire Areas of Interest

Main/Shutdown Transformer

A catastrophic failure of the main transformer would result in a plant transient and a potential loss of Bus A8 due to exposure and direct fire impacts. Due to the proximity, and with the transformer surge tank above A8, a severity factor of 1 was assigned. Due to the nature of the fire, the probability of non-suppression before damage to A8 was assumed to be 1.0. In addition to the main transformer fire, the A8 is also exposed to a shutdown transformer fire. This transformer is energized but not normally loaded. An assumption was made that a fire would lead to a plant transient due to smoke interaction/faulting across the main transformer output lines resulting in load reject. Due to the nature of the fire, the probability of non-suppression was conservatively set to 1.0. IMC 0609, Appendix F, table A4.1, lists the fire frequency for outdoor/yard transformers for very large fires as 4.2E-3 per transformer. No generic information was determined to differentiate between loaded and unloaded transformers. Therefore the total Fire Ignition Frequency for the scenario was assumed to be 2 x (4.2E-3/yr) or 8.4E-3/yr.

The internal event PNPS SPAR model was used with the Transient initiating event as a surrogate for this scenario. The base case and condition case used a change set with Transient set to 1.0 and the loss of Bus A8 assumed. The condition case failed the 'A' emergency diesel generator. The delta CCDP of 1.01E-4 was multiplied by the frequency (8.4E-3/yr) to obtain 8.4E-7/yr. This was adjusted for credit for potential 'B' emergency diesel generator recovery at 2 hours. The result was 6.7E-7/yr and when adjusted to 233 days the increase in CDF was 4.2E-7/yr. The dominant core damage sequence was a Transient (loss of power from unit), failure of offsite power with no recovery, and a failure of the 'B' emergency diesel generator to run with failure to recover.

Switchyard Relay House

A fire in the 208V relay panel could impact the 345KV ring bus and startup transformer. The internal cabinet fire estimated from IMC 0609, Appendix F, table A4.1, lists the fire frequency as 6E-5/yr for small general electrical cabinet fires. No high energy arcing fault sources were

identified in this room. The severity factor (SF) was assumed to be 1.0 for a fire originating and contained within the associated cabinet. There is no automatic suppression and therefore the probability of non-suppression (PNS) was assumed to be 1.0. The Event initiating frequency was FF (fire frequency) x SF x PNS = 6E-5/yr.

The analyst used the internal event initiating event LOOPSC as a surrogate for the area. The event was set to 1.0 with failure of offsite power recovery. The condition case added the failure of the 'A' emergency diesel generator. The delta CCDP (3.4E-3) x event initiating frequency (6E-5/yr) = 2E-7/yr

For a 233 day exposure the increase in risk was calculated to be a nominal 1.3E-7/yr. The dominant core damage sequence was an assumed loss of the unit auxiliary generator feed on reject, LOOP, with failure of the 'B' emergency diesel generator to run without recovery and failure of the SBO diesel generator to run.

Large Early Release Frequency

For issues resulting in an increase in CDF > 1E-7, IMC 0609 requires an evaluation of Large Early Release Frequency (LERF) using the guidance of NUREG-1765, "Basis Document for LERF Significance Determination Process," and IMC 0609, Appendix H, "Containment Integrity Significance Determination Process." The performance deficiency associated with the failure of the 'A' emergency diesel generator would be considered a Type A finding and, as such, the calculated increase in CDF value is used in conjunction with an appropriate LERF factor (multiplier) to determine the estimated increase in LERF associated with the issue. Per Appendix H, Table 5.2, LERF factors of 1.0 or 0.6 are used for high pressure core damage accident sequences with the drywell dry or flooded, respectively. These Appendix H LERF factors are considered conservative bounding values. More recent insights from an NRC Office of Research sponsored study by Energy Research, Inc. (ERI/NRC-03-04, November 2003) and the State of the Art Reactor Consequence Analysis Project at Peach Bottom Nuclear Power Station (NUREG/CR-7110) have identified that improved modeling and analysis of anticipated types and sizes of reactor coolant system ruptures, projected containment heating and fuel-coolant interactions, and operator actions taken in accordance with emergency operating procedures significantly reduce the potential for containment breach and the likelihood of a large early release. Furthermore, the dominant sequences discussed above would result in considerable time before postulated core damage and potential containment breach. In the absence of early core damage sequences for this condition, LERF was determined to not be a significant risk contributor and the safety significance of this performance deficiency is defined by the estimated increase in CDF.

Sensitivity Analyses

The analyst performed sensitivity runs showing the results for various scenarios altering some of the assumptions:

The SPAR model ECA tool was used to check the sensitivity of several assumptions. This was considered a valid tool because the effects of the reduction in risk due to crediting emergency diesel generator run time was determined to not have a major impact on the risk determination (less than 5%). The ECA was used for the sensitivity runs.

Sensitivities 1 and 2 were determined not to result in a large uncertainty to the calculated risk.

These sensitivity runs were applicable to the internal risk calculations and therefore did not have a major impact as the fire risk from the 'B' switchgear room dominated the total risk increase.

Sensitivity 1

- Emergency Diesel Generator 'B' recovery time not limited to 2 hours – adjusted to 8 hours
  An ECA run was performed to determine the difference in the increase in risk by assuming an increased time allowance for an emergency diesel generator recovery given the dominant internal event core damage sequences. Specifically, the SPAR model for the redundant 'B' emergency diesel generator recovery time allowance in the SBO sequences was changed to 8 hours versus 2 hours and resulted in a conditional increase in CDF of 1.54E-6/yr as compared to 2.3E-6/yr.

Sensitivity 2

- Common cause not considered to be applicable
  Assuming that common cause did not apply to this condition and the failure of the 'A' emergency diesel generator gearbox would have been an independent event from the 'B' emergency diesel generator resulted in a conditional increase in CDF of 1.93E-6/yr.

Sensitivity 3

- Use and acknowledgment of FLEX strategy and equipment
  This sensitivity was applicable to both internal and external events and can have an impact on the determination of the best estimate calculated increase in risk. The analyst for this sensitivity run built into the SPAR model a top event which considered that FLEX strategies may be successful in reducing the calculated risk. The licensee indicated they had FLEX procedures and equipment available at the site which would be utilized for the dominant core damage scenarios. FLEX generators would be used to support re-powering the selected safety DC buses as applicable and for FLEX designated low pressure injection pumps to support core cooling.

  The NRC at the time of this evaluation has not made a final decision on quantification of the FLEX credit in the significance determination process analyses.

  The analyst performed a review of the PNPS overall FLEX strategy studies along with specific procedures for safety-related DC bus stripping and evaluated timing sequences relative to implementing FLEX equipment. The analyst conducted several best estimate sensitivity evaluations using a simplified semi-quantitative approach by turning on an assumed FLEX recovery in the top event for the dominant SBO core damage event sequences. This recovery was only turned on for the applicable sequences which the FLEX strategy relies on. FLEX requires reactor depressurization for the low pressure pumps, therefore when reactor depressurization would fail in an event sequence the FLEX credit was not applied. Additionally, containment venting was assumed to have to be successful in accordance with FLEX evaluations for this recovery to have been turned on.

  The first sensitivity run used a simplistic overall order of magnitude risk reduction, while crediting the FLEX strategy. This was simply applied to the 'B' switchgear room fire scenario since it dominates the risk. This approach did not use the modified SPAR

model which applied FLEX recovery only for specific sequences. The below reviews were conducted using assumed values for FLEX credit that have not been endorsed by the NRC but are provided here strictly for the purpose of understanding some of the potential impact of the assumptions on the overall risk reduction. The second and third sensitivity analytical considerations use specific values for FLEX credit but were only applied in the specific sequences of the model where FLEX credit would be appropriate.

A simplified 0.1 order of magnitude reduction

(Fire in the 'B' switchgear room) Assuming the majority of risk was from SBO sequences and an assumed overall FLEX failure probability of 0.1, resulted in an external event increase in CDF of 7E-5/yr x 0.1 or 7E-6/yr. It is noted using a 0.1 reduction for fire scenarios may be a non-conservative assumption given only one battery charger may be available to re-power under these situations, and the remaining battery charger in the 'A' switchgear room above may have some complications due to the environment, smoke etc. Notwithstanding this, using a nominal FLEX credit of 0.1 the combined estimated increase in risk (internal and external would be in the High E-6/yr range.

Modified SPAR model with a top event FLEX recovery of 0.1 assumed

The estimated failure probability of FLEX was set to 0.1 for sensitivity analysis purposes only. The modified SPAR model with the built in FLEX recovery only applies for sequences where it was estimated it could be successful (i.e. depressurization successful, containment venting successful, success of one of the high pressure injection sources such as high pressure coolant injection or reactor core isolation cooling where there likely would be time to set up equipment, etc.)

Turning on the FLEX recovery (0.1) for the conditional assessment for the 'B' switchgear room postulated fire event using the fire ignition frequency of 1.25E-4/yr resulted in an estimated increase in CDF for 233 days of 1.1E-5/yr or a nominal 16% of the CDF increase without FLEX credit. This number reflects that FLEX is not applicable to all of the core damage sequences. This was applied for the external risk because it dominates the risk increase. The same method would reduce the internal event risk as well into the E-7/yr range. There are uncertainties with this application, because a fire event would result in some personnel being devoted to the fire brigade, and smoke and environmental factors may impact the ability to re-install power to the battery chargers from FLEX equipment. However, it should be noted that the 7 month exposure time does not recognize that for many months, the 'A' emergency diesel generator would have been likely successful for hours before failure such that the fire brigade would have time to address the 'B' switchgear room fire and the environment may become more accessible given the amount of time the 'A' emergency diesel generator would run before failure.

Modified SPAR model with a top event FLEX recovery of 0.2 assumed

Using a 0.2 failure probability for the FLEX top event for the purposes of conducting the sensitivity analysis only. Turning on the FLEX recovery (0.2) for the conditional assessment, for the 'B' switchgear room postulated fire event using the fire ignition frequency of 1.25E-4/yr resulted in an estimated increase in CDF of 1.7E-5/yr for the 233 day exposure. (24 hour mission time)

Uncertainties

Due to the complexity of the analysis, uncertainties were not able to be captured. Sensitivity runs were made to address uncertainty.

Qualitative Considerations

RASP Volume I guidance was used for an exposure time estimate. This utilizes the criteria of proof of emergency diesel generator run times adding up to a 24 hour run time for the emergency diesel generator mission. A qualitative consideration is that while the assumed failure is being assessed as a run time failure, this assessment of a linear function for degradation may be overly conservative. In other words, perhaps there could be some function of degradation which is not linear with respect to run time which would reduce the exposure time from 233 days.

Entergy has additional mitigation capabilities as required by 10 CFR 50.54(hh)(2) to deal with losses of the plant due to large fires and explosions. B.5.B low pressure pumps may also be available in the situation where they would need low pressure injection sources above and beyond the diesel driven firewater pump and FLEX low pressure pumps. Additionally, PNPS has B.5.B direction to utilize automatic depressurization system SRV battery carts, which can be utilized to power 2 of the 4 SRVs according to interviews with the plant staff, outside of the normal DC connections (B.5.B). This would allow an extension of time to ensure the reactor remains depressurized.

Interviews with senior reactor operator staff indicate FLEX can be implemented in about 3.5 to 4 hours. In about 4 hours the 86kW Flex generator can be hooked up to power the 125VDC 'A' Battery Charger. The 150kW hook up would be used for the 125VDC 'B' Battery Charger and 250VDC equipment and this is pre-staged in the turbine building. Therefore, for the dominant fire scenario in the 'B' switchgear, the 86kW Flex generator may still be available to hook up to the 'A' 125 VDC battery charger, and power the SRVs and reactor core isolation cooling system controls. This would be dependent on the fire conditions, smoke, available resources, etc. This could of course reduce the risk near an order of magnitude depending on credit given.

Decay Heat Considerations

Because the 'A' emergency diesel generator was considered run time dependent, going back several months in LOOP scenarios, or the fire scenario, the 'A' safety-related loads would have been maintained to remove decay heat and cool the torus until the 'A' emergency diesel generator would have failed. This would allow decay heat generation to be lower than that of a LOOP which quickly leads to SBO conditions. This would extend the time available to develop recovery plans for other postulated failures such as the SBO diesel generator or 'B' emergency diesel generator and extend time available to recover offsite power as it may take longer for core boil off.

Competing Priorities

In the sequences that lead to core damage, failure of the 'A' emergency diesel generator would not be the only failure which would occur. Control room operators would have numerous competing priorities which would complicate responses and recoveries. For example, operators may also have to assist in offsite power restoration, 'B' emergency diesel generator evaluation and/or restoration, and SBO diesel generator evaluation and/or restoration if these components failed. These competing priorities could increase uncertainties.

Emergency Planning
Dependent on the 'A' emergency diesel generator failure and other component failures, the Technical Support Center should eventually be staffed when required along with other emergency preparedness personnel available to assist in the evaluation and recovery of equipment.

Entergy's Analysis

Entergy's initial cause evaluation for the integrity failure of the 'A' emergency diesel generator gearbox closed oil system was inconclusive relative to the exact failure mechanism. The initial conclusion was that either vibration may have caused the condition or an operator error, where the relief valve may have been inadvertently loosened by operations staff. This would have potentially impacted the capscrew and threaded insert, assuming there was confusion in where the oil level needed to be checked. However, the team interviewed various operators who displayed the proper knowledge of how they were to ensure proper gear box oil level and there were no indications that operator error may have occurred. If operator error were to have occurred, a different performance deficiency would exist, with a different exposure time and different risk impact. Entergy, as of early April 2017, has not ruled out the potential for operator error which would reduce the exposure time of the issue and relate to a different potential performance deficiency. Additionally, Entergy had requested a vendor to assess the potential failure mechanism relating to vibration in causing the degraded gearbox oil condition and will make a final conclusion after their reviews are completed.

Entergy staff had verbally indicated, regarding only internal events, they obtained similar results in the 2E-6/yr range for an increase in CDF for the 233 day exposure time used in the NRC evaluation (without FLEX consideration.) The exposure time was from the NRC RASP guidance relative to achieving a 24 hour mission time. This was not a final determination by Entergy that they agreed with this exposure time but simply that they came out in the same risk increase range using that assumption for internal events. Entergy's external event risk increase conclusion had not been provided as further evaluation is on-going.

Entergy stated they may pursue additional evaluations relative to the risk determination for this issue. The licensee contracted for fire modeling of the 'B' switchgear room along with various other fire areas. The assumptions and analyses were reviewed by a senior reactor analyst from Region I and was a major input to the external event risk analysis.

Lastly, Entergy has stated they may perform a detailed study on evaluating FLEX credit by developing detailed fault trees and event tree sequences to further analyze the condition.

Model Data

For internal events and external events from fire and seismic, the analyst used the limited use model for PNPS (February 17, 2017), Version 8.24, ran on SAPHIRE, Version 8.1.4. Truncation at the 1E-12 level was used.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Entergy Personnel
J. Dent, Site Vice President
J. MacDonald, General Manager of Plant Operations
S. Asplin, Service Water System Engineer
J. Barilaro, Mechanical Maintenance Planner
G. Blankenbiller, Chemistry Manager
A. Bouchard, Department Performance Improvement Coordinator
D. Burdick, Corrective Action Program Trending Subject Matter Expert
S. Burke, Fire Protection Engineer
D. Calabrese, Emergency Preparedness Manager
G. Cassell, Lead Facilities and Equipment Specialist
F. Clifford, Manager, Operations Support
E. Cobey, Senior Corrective Action Program Subject Matter Expert
R. Coolige, Senior Control Room Engineer
E. Cota, Mechanical Maintenance Coordinator/Scheduler
K. Coupland, Electrical Maintenance Coordinator/Scheduler
L. Cummins, Senior Maintenance Specialist
W. Deacon, Senior Maintenance Specialist
M. Dagnello, Fix it Now Team Specialist
P. Doody, Design Engineering, Senior Staff Engineer
K. Drown, Performance Improvement Manager
G. Flynn, Operations, Senior Manager
P. Gavine, Fix-it-Now Team Supervisor
J. Gerety, Systems Engineering Manager
P. Gerry, Performance Improvement, Site Operating Experience Coordinator
P. Gresh, Training, Senior Operations Instructor
R. Haislet, Operations, Shift Manager
J. Hendy, Operations, Licensed Operator
M. Hetwer, Operations, Shift Manager
C. Kearins, Operations Specialist
R. Kiley, Operations Specialist
P. Leavitt, Chemistry Supervisor
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D. Miller, Maintenance Coordinator
P. Miner, Nuclear Safety/Licensing Specialist
P. Moore, Predictive Maintenance Engineer
R. Morris, System Engineer
D. Mortimer, Operations Support, Department Performance Improvement Coordinator
K. Murphy, Training, Operations Instructor

B. Naeck, Senior Engineer
A. Notbohm, Performance Improvement, Corporate Functional Area Manager
D. Noyes, Recovery Director
J. O'Donnell, System Engineer
J. Ohrenberger, Maintenance Manager and Decommissioning Director
P. O'Neil, Corrective Action Program Subject Matter Expert
R. O'Neil, Operations, Shift Manager
M. Pait, Training
J. Parmentor, Senior Emergency Planner
D. Perry, Recovery Manager
N. Reece, Senior Engineer
G. Riva, Recovery, Cause Analyst
M. Romeo, Regulatory Assurance and Performance Improvement, Director
F. Russell, Preventive Maintenance Engineer
J. Sabina, In-Service Testing Engineer
E. Simpson, Work Week Manager
J. Shumate, Production Manager
P. Smith, Operations Support, Consultant
K. Sullivan, Senior Emergency Planner
R. Swanson, Systems Engineering, Maintenance Rule Coordinator
R. Tessier, Operations Support, Mentor, Subject Matter Expert
M. Thornhill, ALARA Coordinator
J. Vincent, Instrumentation and Controls Coordinator/Scheduler
J. Webers, Operations, Control Room Supervisor
J. Whalley, Operations, Shift Manager
T. White, Engineering Manager
M. Williams, Licensing Specialist
K. Woods, Supervisor, Balance of Plant Systems Engineering

NRC Personnel
E. Carfang, Senior Resident Inspector, PNPS
C. Cahill, Senior Reactor Analyst, Region I
M. Gray, Branch Chief, Region I
B. Pinson, Resident Inspector, PNPS
J. Vazquez, Resident Inspector, PNPS (acting)
L. Brandt, Resident Inspector, PNPS (acting)

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000293/2016011-06	AV	Design Change Not Appropriately Reviewed by Entergy (Section 6.7.4.1)

Opened/Closed

05000293/2016011-01	NCV	Failure to Identify All Root Causes of a Significant Condition Adverse to Quality (Section 4.7)

05000293/2016011-02	NCV	Failure to Establish Corrective Actions to Preclude Repetition of a Significant Condition Adverse to Quality (Section 5.1.4)
05000293/2016011-03	FIN	Failure to Issue Appropriate Corrective Actions to Preclude Repetition for the Causes of the September 2016 Scram (Section 5.3.3)
05000293/2016011-04	NCV	Programmatic Issue with Implementation of the Operability Determination Process (Section 6.3.4)
05000293/2016011-05	NCV	Failure to Establish Corrective Actions to Address Scope of Procedure Quality Issues (Section 6.5.4)
05000293/2016011-07	NCV	Failure to Report Condition Prohibited by Technical Specifications and a Safety System Functional Failure (Section 6.7.4.2)
05000293/2016011-08	NCV	Failure to Adequately Monitor the Performance of Maintenance Rule Scoped Components (Section 6.9.4.1)
05000293/2016011-09	NCV	Ineffective Corrective Actions to Address Conditions Adverse to Quality Regarding Components in Contact with or Close Proximity to the Drywell Liner (Section 6.9.4.2)
05000293/2016011-10	NCV	Failure to Promptly Correct a Condition Adverse to Quality for the Residual Heat Removal System (Section 6.9.4.3)
05000293/2016011-11	FIN	Failure to Adequately Develop and Implement Targeted Performance Improvement Plans (Section 7.1.4)

Table 1: Procedures with Quality Issues

Procedure	Title	Revision
1.3.4-1	Procedure Writers Guide	25
2.1.42	Operation During Severe Weather	0
2.2.125.1	Reset of Primary and Secondary Containment Isolations (Group I, II, III, IV, V, VI, and VII)	24
2.2.2	Main Generator and Main Transformer	1
2.2.28	Plant Heating System	0
2.2.3	Startup Transformer	0
2.2.32	Salt Service Water System (SSW)	95
2.2.39	Turbine Building Heating, Cooling and Ventilation System	37
2.2.46	Control Room Cable Spreading Room and Computer Room Heating, Ventilation, and air Conditioning System	58
3.M.2-10	Feedwater Control Valve Isolation and Maintenance	0
3.M.3-33	345KV Startup Transformer Calibration and Functional Relay Testing	34
3.M.3-39	Turbine Generator Calibration of Relays, Lockout Test and Associated Annunciator Verification	0
3.M.3-40	Relay House Protective Relay Calibration/Functional Test and Remote Alarm/Local Annunciator Verification	37
3.M.3-47.1	“A” Train Functional Test of Individual Load Shed Components	0
3.M.3-57	“ACB” Air Tank Inspection	0
3.M.4-115	Traveling Water Screen Inspections	15
3.M.4-14.2	Salt Service Water Pumps; Routine Maintenance	68
7.2.34	Operation of Feedwater Sample Sink-C122	18
7.8.1	Water Quality Limits	0
8.7.4.8.5	H_2/O_2 Sample Entry Rack Panel Isolation Valve Position Indication Verification	0
8.C.19	Main Transformer Surveillance	44
8.C.21	345 kV Breaker Weekly Surveillance	0
8.C.22	Startup Transformer & 345 KV Switchyard Surveillance	0
8.E.24.1	Switchgear Rm Emergency Ventilation Sys (SREVS) Instrument Calibration and Functional Test	0
8.E.70	Main Generator Runback Functional Calibration	44
8.F.24.1	Reactor Building Heating, Ventilation and Air Conditioning (HVAC) Instrument Calibration and Functional Test	0
8.F.6	Reactor Feedwater Instrument Calibration	0
8.M.3-14	H_2/O_2 Analyzer System Calibration	0
8.P.1	Determination of Optimum Operating Liquid Level for Feed Water Heaters	5
8.P.8	Control Room Tracer Gas Testing for In-leakage	0
8.Q.2-3	H_2/O_2 Analyzer Panel Component Maintenance	0

LIST OF DOCUMENTS REVIEWED

Condition Reports

CR-HQN-2016-00767	CR-HQN-2016-01611*	CR-HQN-2017-00049*
CR-PNP-2006-03712	CR-PNP-2009-01970	CR-PNP-2013-00867
CR-PNP-2013-00913	CR-PNP-2013-01566	CR-PNP-2013-07110
CR-PNP-2013-08495	CR-PNP-2014-00936	CR-PNP-2014-01049
CR-PNP-2014-02880	CR-PNP-2014-03139	CR-PNP-2014-03238
CR-PNP-2014-03946	CR-PNP-2014-04108	CR-PNP-2014-04246
CR-PNP-2014-04380	CR-PNP-2014-04549	CR-PNP-2014-04741
CR-PNP-2014-05698	CR-PNP-2014-05699	CR-PNP-2014-05778
CR-PNP-2014-05779	CR-PNP-2014-05828	CR-PNP-2014-05946
CR-PNP-2014-06343	CR-PNP-2014-06375	CR-PNP-2014-06489
CR-PNP-2014-06504	CR-PNP-2014-06557	CR-PNP-2014-06701
CR-PNP-2014-06831	CR-PNP-2014-06877	CR-PNP-2014-06878
CR-PNP-2015-00261	CR-PNP-2015-00626	CR-PNP-2015-00756
CR-PNP-2015-00948	CR-PNP-2015-01190	CR-PNP-2015-01254
CR-PNP-2015-01312	CR-PNP-2015-01535	CR-PNP-2015-01865
CR-PNP-2015-01907	CR-PNP-2015-02501	CR-PNP-2015-02706
CR-PNP-2015-02708	CR-PNP-2015-02763	CR-PNP-2015-03476
CR-PNP-2015-05204	CR-PNP-2015-05728	CR-PNP-2015-06110
CR-PNP-2015-06755	CR-PNP-2015-06795	CR-PNP-2015-07377
CR-PNP-2015-07440	CR-PNP-2015-07441	CR-PNP-2015-07452
CR-PNP-2015-07469	CR-PNP-2015-07482	CR-PNP-2015-07487
CR-PNP-2015-07551	CR-PNP-2015-07583	CR-PNP-2015-08207
CR-PNP-2015-08251	CR-PNP-2015-08252	CR-PNP-2015-08293
CR-PNP-2015-08396	CR-PNP-2015-08400	CR-PNP-2015-08496
CR-PNP-2015-08723	CR-PNP-2015-08736	CR-PNP-2015-09570
CR-PNP-2015-09641	CR-PNP-2015-09645	CR-PNP-2015-09673
CR-PNP-2015-09686	CR-PNP-2015-09687	CR-PNP-2015-09688
CR-PNP-2015-09708	CR-PNP-2015-09809	CR-PNP-2015-09824
CR-PNP-2015-09834	CR-PNP-2015-09869	CR-PNP-2015-09902
CR-PNP-2016-00162	CR-PNP-2016-00203	CR-PNP-2016-00208
CR-PNP-2016-00215	CR-PNP-2016-00272	CR-PNP-2016-00295
CR-PNP-2016-00308	CR-PNP-2016-00340	CR-PNP-2016-00351
CR-PNP-2016-00352	CR-PNP-2016-00353	CR-PNP-2016-00360
CR-PNP-2016-00386	CR-PNP-2016-00406	CR-PNP-2016-00415
CR-PNP-2016-00446	CR-PNP-2016-00521	CR-PNP-2016-00540
CR-PNP-2016-00543	CR-PNP-2016-00565	CR-PNP-2016-00701
CR-PNP-2016-00742	CR-PNP-2016-00782	CR-PNP-2016-00793
CR-PNP-2016-00847	CR-PNP-2016-00849	CR-PNP-2016-00941
CR-PNP-2016-00987	CR-PNP-2016-01183	CR-PNP-2016-01193
CR-PNP-2016-01209	CR-PNP-2016-01228	CR-PNP-2016-01340
CR-PNP-2016-01370	CR-PNP-2016-01371	CR-PNP-2016-01372
CR-PNP-2016-01376	CR-PNP-2016-01377	CR-PNP-2016-01380
CR-PNP-2016-01382	CR-PNP-2016-01383	CR-PNP-2016-01396
CR-PNP-2016-01409	CR-PNP-2016-01491	CR-PNP-2016-01494
CR-PNP-2016-01497	CR-PNP-2016-01506	CR-PNP-2016-01507
CR-PNP-2016-01510	CR-PNP-2016-01554	CR-PNP-2016-01738
CR-PNP-2016-01840	CR-PNP-2016-01853	CR-PNP-2016-02057
CR-PNP-2016-02058	CR-PNP-2016-02059	CR-PNP-2016-02067

CR-PNP-2016-02167	CR-PNP-2016-02253	CR-PNP-2016-02436
CR-PNP-2016-02437	CR-PNP-2016-02467	CR-PNP-2016-02501
CR-PNP-2016-02604	CR-PNP-2016-02605	CR-PNP-2016-02636
CR-PNP-2016-02917	CR-PNP-2016-02985	CR-PNP-2016-02990
CR-PNP-2016-03048	CR-PNP-2016-03078	CR-PNP-2016-03090
CR-PNP-2016-03097	CR-PNP-2016-03120	CR-PNP-2016-03144
CR-PNP-2016-03169	CR-PNP-2016-03244	CR-PNP-2016-03270
CR-PNP-2016-03334	CR-PNP-2016-03340	CR-PNP-2016-03630
CR-PNP-2016-04013	CR-PNP-2016-04165	CR-PNP-2016-04241
CR-PNP-2016-04261	CR-PNP-2016-04361	CR-PNP-2016-04372
CR-PNP-2016-04385	CR-PNP-2016-04386	CR-PNP-2016-04399
CR-PNP-2016-04532	CR-PNP-2016-04556	CR-PNP-2016-04583
CR-PNP-2016-04744	CR-PNP-2016-04754	CR-PNP-2016-04755
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CR-PNP-2016-04934	CR-PNP-2016-04974	CR-PNP-2016-05025
CR-PNP-2016-05115	CR-PNP-2016-05314	CR-PNP-2016-05315
CR-PNP-2016-05328	CR-PNP-2016-05329	CR-PNP-2016-05395
CR-PNP-2016-05414	CR-PNP-2016-05423	CR-PNP-2016-05456
CR-PNP-2016-05536	CR-PNP-2016-05566	CR-PNP-2016-05567
CR-PNP-2016-05605	CR-PNP-2016-05666	CR-PNP-2016-05667
CR-PNP-2016-05668	CR-PNP-2016-05669	CR-PNP-2016-05834
CR-PNP-2016-05836	CR-PNP-2016-05837	CR-PNP-2016-05843
CR-PNP-2016-05847	CR-PNP-2016-05855	CR-PNP-2016-05864
CR-PNP-2016-05865	CR-PNP-2016-05866	CR-PNP-2016-05886
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CR-PNP-2016-06127	CR-PNP-2016-06128	CR-PNP-2016-06170
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CR-PNP-2016-07252	CR-PNP-2016-07280	CR-PNP-2016-07443
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CR-PNP-2016-07694	CR-PNP-2016-07702	CR-PNP-2016-07707
CR-PNP-2016-07810	CR-PNP-2016-07823	CR-PNP-2016-07923
CR-PNP-2016-07977	CR-PNP-2016-07993	CR-PNP-2016-08016
CR-PNP-2016-08099	CR-PNP-2016-08147	CR-PNP-2016-08155
CR-PNP-2016-08252	CR-PNP-2016-08253	CR-PNP-2016-08254
CR-PNP-2016-08255	CR-PNP-2016-08272	CR-PNP-2016-08273
CR-PNP-2016-08280	CR-PNP-2016-08285	CR-PNP-2016-08296
CR-PNP-2016-08316	CR-PNP-2016-08335	CR-PNP-2016-08355
CR-PNP-2016-08413	CR-PNP-2016-08429	CR-PNP-2016-08452
CR-PNP-2016-08455	CR-PNP-2016-08458	CR-PNP-2016-08504
CR-PNP-2016-08507	CR-PNP-2016-08508	CR-PNP-2016-08514
CR-PNP-2016-08523	CR-PNP-2016-08569	CR-PNP-2016-08586
CR-PNP-2016-08610	CR-PNP-2016-08617	CR-PNP-2016-08631
CR-PNP-2016-08640	CR-PNP-2016-08659	CR-PNP-2016-08669
CR-PNP-2016-08789	CR-PNP-2016-08797	CR-PNP-2016-08801

CR-PNP-2016-08806	CR-PNP-2016-08857	CR-PNP-2016-08863
CR-PNP-2016-08864	CR-PNP-2016-08870	CR-PNP-2016-08879
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CR-PNP-2016-08921	CR-PNP-2016-08926	CR-PNP-2016-08927
CR-PNP-2016-08928	CR-PNP-2016-08929	CR-PNP-2016-08930
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CR-PNP-2016-08943	CR-PNP-2016-08948	CR-PNP-2016-08953
CR-PNP-2016-09001	CR-PNP-2016-09011	CR-PNP-2016-09012
CR-PNP-2016-09039	CR-PNP-2016-09085	CR-PNP-2016-09093
CR-PNP-2016-09101	CR-PNP-2016-09138	CR-PNP-2016-09147
CR-PNP-2016-09156	CR-PNP-2016-09158	CR-PNP-2016-09174
CR-PNP-2016-09190	CR-PNP-2016-09201	CR-PNP-2016-09207
CR-PNP-2016-09208	CR-PNP-2016-09219	CR-PNP-2016-09220
CR-PNP-2016-09221	CR-PNP-2016-09222	CR-PNP-2016-09223
CR-PNP-2016-09229	CR-PNP-2016-09242	CR-PNP-2016-09247
CR-PNP-2016-09258	CR-PNP-2016-09269	CR-PNP-2016-09271
CR-PNP-2016-09272	CR-PNP-2016-09282	CR-PNP-2016-09299
CR-PNP-2016-09314	CR-PNP-2016-09316	CR-PNP-2016-09318
CR-PNP-2016-09337	CR-PNP-2016-09340*	CR-PNP-2016-09343
CR-PNP-2016-09344	CR-PNP-2016-09346*	CR-PNP-2016-09348
CR-PNP-2016-09368*	CR-PNP-2016-09375	CR-PNP-2016-09376
CR-PNP-2016-09377*	CR-PNP-2016-09380*	CR-PNP-2016-09382*
CR-PNP-2016-09383*	CR-PNP-2016-09389	CR-PNP-2016-09411*
CR-PNP-2016-09415	CR-PNP-2016-09426	CR-PNP-2016-09429
CR-PNP-2016-09436*	CR-PNP-2016-09445	CR-PNP-2016-09446*
CR-PNP-2016-09447*	CR-PNP-2016-09450	CR-PNP-2016-09452*
CR-PNP-2016-09454	CR-PNP-2016-09456	CR-PNP-2016-09465
CR-PNP-2016-09469	CR-PNP-2016-09483	CR-PNP-2016-09484
CR-PNP-2016-09490	CR-PNP-2016-09492*	CR-PNP-2016-09509
CR-PNP-2016-09511*	CR-PNP-2016-09526	CR-PNP-2016-09527
CR-PNP-2016-09530	CR-PNP-2016-09531*	CR-PNP-2016-09540*
CR-PNP-2016-09545*	CR-PNP-2016-09546*	CR-PNP-2016-09547*
CR-PNP-2016-09552*	CR-PNP-2016-09555*	CR-PNP-2016-09563
CR-PNP-2016-09567*	CR-PNP-2016-09568*	CR-PNP-2016-09574*
CR-PNP-2016-09576*	CR-PNP-2016-09577*	CR-PNP-2016-09586*
CR-PNP-2016-09591*	CR-PNP-2016-09596*	CR-PNP-2016-09603*
CR-PNP-2016-09617	CR-PNP-2016-09621*	CR-PNP-2016-09623*
CR-PNP-2016-09625*	CR-PNP-2016-09628*	CR-PNP-2016-09633*
CR-PNP-2016-09638*	CR-PNP-2016-09644*	CR-PNP-2016-09646*
CR-PNP-2016-09647*	CR-PNP-2016-09648*	CR-PNP-2016-09653*
CR-PNP-2016-09659*	CR-PNP-2016-09660*	CR-PNP-2016-09666*
CR-PNP-2016-09669*	CR-PNP-2016-09672*	CR-PNP-2016-09675*
CR-PNP-2016-09683*	CR-PNP-2016-09684*	CR-PNP-2016-09690*
CR-PNP-2016-09696*	CR-PNP-2016-09701*	CR-PNP-2016-09705*
CR-PNP-2016-09706*	CR-PNP-2016-09717*	CR-PNP-2016-09721*
CR-PNP-2016-09733*	CR-PNP-2016-09736	CR-PNP-2016-09739*
CR-PNP-2016-09740*	CR-PNP-2016-09746*	CR-PNP-2016-09767*
CR-PNP-2016-09787*	CR-PNP-2016-09789*	CR-PNP-2016-09798*
CR-PNP-2016-09805*	CR-PNP-2016-09810*	CR-PNP-2016-09843*
CR-PNP-2016-09843*	CR-PNP-2016-09846*	CR-PNP-2016-09849*
CR-PNP-2016-09875*	CR-PNP-2016-09879*	CR-PNP-2016-09927*

CR-PNP-2016-09945*	CR-PNP-2016-09960*	CR-PNP-2016-09998*
CR-PNP-2016-10001*	CR-PNP-2016-10018*	CR-PNP-2016-10037*
CR-PNP-2016-10077*	CR-PNP-2016-10188*	CR-PNP-2016-10241*
CR-PNP-2016-10378*	CR-PNP-2017-00051*	CR-PNP-2017-00052*
CR-PNP-2017-00053*	CR-PNP-2017-00068*	CR-PNP-2017-00169*
CR-PNP-2017-00212*	CR-PNP-2017-00224*	CR-PNP-2017-00237*
CR-PNP-2017-00270*	CR-PNP-2017-00279*	CR-PNP-2017-00288*
CR-PNP-2017-00294*	CR-PNP-2017-00295*	CR-PNP-2017-00296*
CR-PNP-2017-00303*	CR-PNP-2017-00307*	CR-PNP-2017-00308*
CR-PNP-2017-00330*	CR-PNP-2017-00333*	CR-PNP-2017-00338*
CR-PNP-2017-00339*	CR-PNP-2017-00340*	CR-PNP-2017-00341*
CR-PNP-2017-00342*	CR-PNP-2017-00357*	CR-PNP-2017-00363*
CR-PNP-2017-00365*	CR-PNP-2017-00366*	CR-PNP-2017-00367*
CR-PNP-2017-00385*	CR-PNP-2017-00386*	CR-PNP-2017-00399*
CR-PNP-2017-00400*	CR-PNP-2017-00401*	CR-PNP-2017-00406*
CR-PNP-2017-00407*	CR-PNP-2017-00409*	CR-PNP-2017-00410*
CR-PNP-2017-00411*	CR-PNP-2017-00419*	CR-PNP-2017-00433*
CR-PNP-2017-00437*	CR-PNP-2017-00445*	CR-PNP-2017-00446*
CR-PNP-2017-00449*	CR-PNP-2017-00455*	CR-PNP-2017-00456*
CR-PNP-2017-00626*	CR-PNP-2017-00687*	CR-PNP-2017-00700*
CR-PNP-2017-00755*	CR-PNP-2017-00828*	CR-PNP-2017-00896*
CR-PNP-2017-00902*	CR-PNP-2017-00935*	CR-PNP-2017-00936*
CR-PNP-2017-01101*	CR-PNP-2017-01134*	CR-PNP-2017-01148*
CR-PNP-2017-01169*	CR-PNP-2017-01248*	CR-PNP-2017-01249*
CR-PNP-2017-01250*	CR-PNP-2017-01251*	CR-PNP-2017-01767*
CR-PNP-2017-02242*		

Learning Organization Documents

LO-PNPLO-2013-00080	LO-PNPLO-2014-00063	LO-PNPLO-2014-00084
LO-PNPLO-2015-00024	LO-PNPLO-2015-00025	LO-PNPLO-2015-00026
LO-PNPLO-2015-00027	LO-PNPLO-2015-00028	LO-PNPLO-2015-00104
LO-PNPLO-2015-00155	LO-PNPLO-2015-00212	LO-PNPLO-2015-00214
LO-PNPLO-2015-00217	LO-PNPLO-2016-00029	LO-PNPLO-2016-00087
LO-PNPLO-2015-00207	LO-PNPLO-2016-00085	LO-PNPLO-2016-00086
LO-PNPLO-2016-00043	LO-PNPLO-2016-00039	LO-PNPLO-2015-00178
LO-PNPLO-2016-00072	LO-PNPLO-2016-00106	LO-PNPLO-2015-00157
LO-PNPLO-2015-00158	LO-PNPLO-2016-00054	LO-PNPLO-2016-00055
LO-PNPLO-2016-00004	LO-PNPLO-2014-00122	LO-HQNLO-2016-00029

Work Tracker Documents

LO-WTPNP-2016-72

CR-WTHQN-2013-0078, dated January 14, 2013, “2012/2013 ECP Self-Assessment Recommendation”

CR-WTHQN-2013-0128, dated January 24, 2013, “Benchmark ECP Fleet Reporting to Corporate Management”

CR-WTHQN-2014-0219, dated March 10, 2014, actions from 2014 ECP assessment

CR-WTHQN-2015-0193, dated March 4, 2015, Actions in response to September 2014 ECP Assessment

WT-WTPNP-2016-16, Dedicated Notification Network issues

Emergency Operating Procedures
EOP-1, RPV Control, Revision 14
EOP-2, RPV Control – Failure to Scram, Revision 14
EOP-3, Primary Containment Control, Revision 11
EOP-4, Secondary Containment Control, Revision 12
EOP-11, Figures, Cautions and Icons, Revision 6
EOP-16, RPV Flooding, Revision 7
EOP-26, RPV Flooding – Failure to Scram, Revision 6

Engineering Changes
33538, Replace RHR Total Flow Indicator FI-1040-1A with an Equivalent, Revision 0
52583, Setpoint Change for TE-1291-60A (RWCU Filter Area 74-ft Elevation, Revision 0
61828, Replace Screenwash Dechlorination Pump Event Recorder ER-3905, Revision 0
62362, Lower Ultimate Heatsink Alarm Setpoint from 73 ºF to 71 ºF, Revision 0
67111, Evaluate HPCI/RCIC Coupling And Use of Mobilux EP 111 Grease, Revision 0
67308, Update Vendor Manual V0636 with Vendor Contact Information, Revision 0
68225, Update Emergency Lighting Catalog Vendor Manual V1032 to Satisfy the Vendor Manual Review, Revision 0

Procedures
1.3.142, PNPS Risk Review and Disposition, Revision 5
1.3.142, PNPS Risk Review and Disposition, Revision 6
1.3.142, PNPS Risk Review and Disposition, Revision 7
1.3.144, Maintenance Performance of Trip Sensitive Activities, Revision 4
1.3.145, PNPS Recovery Procedure," Revision 0
1.3.34, Operations Administrative Policies and Processes, Revision 141
1.3.4-1, Procedure Writers Guide, Revision 25
1.3.4-10, Writers Guide for Emergency Operating Procedures, Revision 13
2.1.12.1, Emergency Diesel Generator Surveillance, Revision 82
2.2.32, Salt Service Water System (SSW), Revisions 93 and 94
2.2.8, Standby AC Power System (Diesel Generators), Revision 115
2.4.16, Distribution Alignment Electrical System Malfunctions, Revision 46
3.M.3-24.15, Valve Stem Lubrication, Revision 11
3.M.4-78, RCIC Turbine Major Preventative Maintenance Inspection, Revision 12
3.M.4-79, HPCI Turbine Preventive Maintenance Inspection – Critical Maintenance, Revision 19
4.01, Control, Issuance and Maintenance of Weapons, Revision 23
5.7.3.2, Drywell and Torus Atmospheric Sampling under Emergency Conditions, Revision 14
7.1.65, Manually Sampling Using Panel C41, Revision 8
7.4.17, Drywell Continuous Atmospheric Monitoring System, Revision 45
8.5.2.10, RHR Piping Temperature and Pressure Monitoring, Revision 16
8.9.1, Emergency Diesel Generator and Associated Emergency Bus Surveillance, Revision 134
8.9.13, Diesel Generator Alternate Shutdown Panel Test, Revision 19
8.C.13-2, Residual Heat Removal and Core Spray Augmented IST Manual Valve Operability, Revision 0
8.E.10, LPCI System Instruments Calibration, Revisions 49 & 50
8.I.11.3, Residual Heat Removal A Loop Valve Cold Shutdown Operability, Revision 10
8.M.1-11, Turbine Stop Valve Closure Test, Revision 41
8.M.1-32.4, Analog Trip System - Trip Unit Calibration - Cabinet C2229-B2 – Critical Maintenance, Revision 65
8.M.2-1.5.5, Residual Heat Removal (RHR) Isolation Valve Control - Test B – Outboard Reactor Pressure Less Than 70 Psig - Critical Maintenance, Revision 32

8.M.2-2.10.2-11, RHR System Pump P-203C Automatic Start Functional Test, Revision 36
8.M.2-2.10.8.5, Diesel Generator 'A' Initiation by Loss of Offsite Power Logic – Critical Maintenance
8.M.2-3.3, Source Range Monitor, Revision 52
8.M.3-14, H_2/O_2 Analyzer System Calibration – Critical Maintenance, Revision 42
8.M.3-2, Instrument Line Flow Check Valve Functional Test – Critical Maintenance, Revision 45
EN-AD-101, Procedure Process, Revision 27
EN-DC-148, Vendor Manuals and the Vendor Re-Contact Process, Revision 6
EN-DC-151, PSA Maintenance and Update, Revision 6
EN-DC-153, Preventive Maintenance Component Classification, Revision 14
EN-DC-324, Preventive Maintenance Program, Revision 17
EN-DC-329, Engineering Programs Control and Oversight, Revision 6
EN-DC-336, Plant Health Committee, Revision 10
EN-DC-346, Cable Reliability Program, Revision 6
EN-EC-100, Guidelines for Implementation of Employee Concerns Program, Revision 9
EN-EC-100-01, Employee Concern Coordinator Training Program, Revision 1
EN-FAP-HR-004, Developing and Implementing Knowledge Management Action Plans
EN-FAP-HR-006, Fleet Approach to Leadership Development & Organizational Effectiveness, Revision 1
EN-FAP-OM-001, Leadership forums for Continuous Improvement, Revision 26
EN-FAP-OM-002, Management Review Meetings, Revision 6
EN-FAP-OM-011, Corporate Oversight Model, Revision 17
EN-FAP-OM-016, Performance Management Processes and Practices, Revision 6
EN-FAP-OM-021, Critical Decision Procedure, Revision 5
EN-FAP-OM-023, Entergy Nuclear Change Management, Revision 4
EN-FAP-WM-002, Critical Evolutions, Revision 4
EN-FAP-WM-011, Work Planning Standard, Revision 4
EN-FAP-WM-012, Work Management Process Indicators, Revision 6
EN-HR-135, Disciplinary Action, Revision 1
EN-HR-138, Executive Review Board Process for Employees, Revision 5
EN-HR-138-01, Executive Review Board Process for Supplemental Employees, Revision 1
EN-HU-101, Human Performance Program, Revision 18
EN-HU-102, Human Performance Traps and Tools, Revision 14
EN-HU-105, Human Performance – Manager Defenses, Revision 9
EN-HU-106, Procedure and Work Instruction Use and Adherence, Revision 3
EN-LI-102, Corrective Action Program, Revision 28
EN-LI-102, Corrective Action Program, Revision 26
EN-LI-104, Assessments and Benchmarking, Revision 11
EN-LI-104, Assessments and Benchmarking, Revision 12
EN-LI-104, Assessments and Benchmarking, Revision 13
EN-LI-104, Self-Assessment and Benchmark Process, Revision 13
EN-LI-118, Cause Evaluation Process, Revision 23
EN-LI-118, Cause Evaluation, Revision 22
EN-LI-121, Trending and Performance Review Process
EN-LI-123-08-PNP-RC, Comparative Assessment Review, Revision 0
EN-LI-123-10-PNP-RC, Nuclear Safety Culture Assessment, Revision 0
EN-LI-123-11-PNP-RC, Collective Evaluation and Action Plan Development, Revision 1
EN-LI-128, Mid-Cycle Assessment Process, Revision 10
EN-LI-128, Mid-Cycle Assessment Process, Revision 11
EN-MA-130, Fix It Now (FIN) Team Process, Revision 4
EN-OM-123, Fatigue Management Program, Revision 13

EN-OP-104, Operability Determination Process, Revision 10
EN-OP-115, Conduct of Operations, Revision 17
EN-OP-115-01, Operator Rounds, Revision 1
EN-OP-115-02, Control Room Conduct and Access Control, Revision 4
EN-PL-100, Nuclear Excellence Model, Revision 7
EN-PL-187, Safety Conscious Work Environment (SCWE) Policy, Revision 2
EN-PL-190, Maintaining a Strong Safety Culture, Revision 3
EN-QV-109, Audit Process, Revision 32
EN-QV-136, Nuclear Safety Culture Monitoring, Revision 6
EN-TQ-127, Supervisor Training Program, Revision 18
EN-TQ-202, Simulator Configuration Control, Revision 9
EN-WM-101, On-line Work Management Process, Revision 14
EN-WM-104, On Line Risk Management, Revision 15
EN-WM-105, Planning, Revision 16
EP-AD-270, Equipment Important to Emergency Response, Revision 2
EP-AD-302, Facilities and Equipment Surveillances, Revision 8
EP-AD-413, Emergency Communications Test, Revision 7
EP-AD-418, Monthly Testing of the Prompt Alert and Notification System, Revision 14
EP-AD-419, Annual Maintenance of the Prompt Alert and Notification System, Revision 13
EP-AD-601, Emergency Action Level Technical Bases Document, Revision 7
EP-IP-100, Emergency Classification and Notification, Revision 43
EP-IP-260, Emergency Operations Facility (EOF) Operations, Revision 10
EP-IP-261, Technical Support Center (TSC) Operations, Revision 10
EP-IP-262, Operations Support Center (OSC) Operations, Revision 9
EP-IP-310, Offsite Monitoring Team Activation and Response, Revision 11
EP-IP-330, Core Damage, Revision 6
EP-IP-440, Emergency Exposure Controls, Revision 13
JA-PI-01, Analysis Manual, Revision 3
NOP98A1, Procedure Process, Revision 39
TP 15-004, General Procedure for Eddy Current Testing of Heat Exchanger Tubing, Revision 0
TP 15-031, Operation Procedure for the Barker/Diacom S4000NM Snubber Test Machine, Revision 0
TP 16-001, Tri-Nuclear Filter/Demineralizer Resin Transfer, Revision 0
TP 16-003, Boron-10 Areal Density Gauge for Evaluating Racks (BADGER) Testing, Revision 0
TP 16-018, Turbine Stop Valve Closure Functional Test with Turbine Stop Valve SV-2 Slow Closure Test Circuit Not Functioning Properly, Revision 0

Procedure Change Forms (DRN No.)

14-00831	14-00894	15-01020
16-00363	16-00417	16-00668
16-00880		

T-11 Work Week Schedules
Work Week 1636 (05-Sep-16~12-Sep-16 A Train) – Ops
Work Week 1636 (05-Sep-16~12-Sep-16 A Train) – Ops
Work Week 1637 (12-Sep-16~19-Sep-16 B Train) – Ops
Work Week 1638 (19-Sep-16~26-Sep-16 B Train) – Ops
Work Week 1639 (26-Sep-16~03-Oct-16 A Train) – Ops
Work Week 1646 (14-Nov-16~21-Nov-16 B Train) – Ops
Work Week 1647 (21-Nov-16~28-Nov-16 B Train) – Ops

Vendor Manuals and Procedures

Procedure 100-ET-005, Eddy Current Inspection of Non-Ferromagnetic Heat Exchanger Tubes, Revision 1
Procedure TR-954, Operation Procedure for the Barker/Diacon S4000 NM Snubber Test Machine from BASIC-PSA, INC., Revision 4
Special Engineering Procedure 28087-000-01, Procedure for Assembly and Testing of the Boron 10 Areal Density Meter at Pilgrim Nuclear Power Station, Revision 2
V0251, Lubrication Manual, Revision 131
V0303, Byron Jackson Pumps, Revision 38
V0348, Bingham Pumps, Revision 16
V0834, ALCO, Revision 0

Nuclear Safety Culture Monitoring Panel Meeting Minutes

Third Quarter 2014, dated October 16, 2014
Fourth Quarter 2014, dated February 11, 2015
First Quarter 2015, dated April 15, 2015
Second Quarter 2015, dated July 9, 2015
Third Quarter 2015, dated November 2, 2015
Fourth Quarter 2015, dated January 21, 2016
January 2016, dated February 29, 2016
February 2016, dated March 17 and March 24, 2016
March 2016, dated April 28 and May 3, 2016
April 2016, dated May 25, 2016
May 2016, dated June 23, 2016
June 2016, dated July 28, 2016
July 2016, dated August 26, 2016
August 2016, dated September 22, 2016
September 2016, dated October 24, 2016
Emergent Meeting for CR-PNP-2016-8280, dated October 31, 2016
October 2016, dated November 18, 2016
November 2016, dated December 8, 2016

Miscellaneous Safety Culture Documents

Safety Culture Lead Team (SCLT) Monitor report for Fourth Quarter 2015 and January 2016, dated March 21, 2016
White Paper for NSC, SCWE and Anonymous CR Response
Nuclear Safety Culture Interim Actions Report #48, dated November 16, 2016
Nuclear Safety Culture Interim Actions Report #49, dated November 23, 2016
Nuclear Safety Culture Interim Actions Report #50, dated November 30, 2016
Nuclear Safety Culture Code Dataset, Dataset List for Trend Code NP11 (NRC P.1) Identification
Nuclear Safety Culture Code Dataset, Dataset List for Trend Code NWP4 (NRC H.8)
Nuclear Safety Culture Code Dataset, Dataset List for Trend Code NLA1 (NRC H.1)
Nuclear Safety Culture Code Dataset, Dataset List for Trend Code NPA1 (NRC X.6)
Nuclear Safety Culture Monitoring Panel Worksheet, November Dept Info Sheet, for December 8, 2016 NSCMP
Pilgrim Nuclear Power Station 95003 Recovery Plan, Integrated Nuclear Safety Culture Assessment Report (INSCAR)
Station Update Meeting Slides for disseminating 2016 Synergy Survey results, dated July 13, 2016

2016 Independent Nuclear Safety Cultural Assessment Pilgrim Nuclear Power Station slides, dated June 15, 2016, provided to all first line supervisors and above
2016 PNPS INSCA Final Results Report and Appendices
2016 PNPS INSCA - Site PowerPoint Presentation
2016 PNPS INSCA - Management PowerPoint Presentation
CR-PNP-2016-2052-060, "Provide Gap Refresher 'Nuclear Safety Culture' Training
Nuclear Safety Culture Slides Respectful Work Environment, dated June 1, 2016
Nuclear Safety Culture Slides Problem Identification and Resolution, dated August 1, 2016
Nuclear Safety Culture Slides Effective Safety Communication, dated May 23, 2016
Nuclear Safety Culture Slides Leadership Safety Values and Actions, dated August 22, 2016
Nuclear Safety Culture Slides Decision-Making
Pilgrim Nuclear Power Station 95003 Recovery Plan, Integrated Nuclear Safety Culture Assessment Report (INSCAR),
Station Update Meeting Slides for disseminating 2016 Synergy Survey results, dated July 13, 2016
2016 Independent Nuclear Safety Cultural Assessment Pilgrim Nuclear Power Station slides, dated June 15, 2016, provided to all first line supervisors and above
CR-PNP-2016-04261, actions in response to INSCAR, CRs 1 through 91
Nuclear Safety Culture Offsite Meeting slides, dated July 12, 2016
NSC Attendance Rosters, dated January 11, 2016
SCLT Monitor report for Feb-April Review, dated June 3, 2016
Nuclear Safety Culture Slides Work Processes, dated June 26, 2016
FSEM-SUPV-NSC, Rev. 1, "Nuclear Safety Culture", dated July 2016
Nuclear Safety Culture Slides Continuous Learning, dated June 20, 2016
Nuclear Safety Culture Slides Questioning Attitude, dated July 21, 2016

Work Orders

00325532-01	00325532-02	00325532-03
00438020-02	00460039-01	52429570-01
52581882-01		

Training Documents

O-RQ-04-01-238, Operability Determination Functionality Assessment Fundamentals, Revision 0
Lesson Plan PGAT-ADM-NSCCAP, "Improving Our Nuclear Safety Culture," dated November 4, 2016
FCBT-GET-PATSS, "Entergy Fleet Plant Access Training"
PGAT-ADM-NSCCAP, Rev. 2, "Improving Our Nuclear Safety" presentation slides and case studies
Module #O-RO-03-04-13; Scenario #01; EOP-01/03, Loss of Off-Site Power, Small Break LOCA, Loss of RPV Injection, Steam Cooling and Emergency Depressurization Required; Revision 3

Audit/Assessment Reports

Assessment Report, Assessment of Pilgrim Station Employee Concerns Program, dated March 2013
Assessment Report, Assessment of Pilgrim Station Employee Concerns Program, dated November 2014
Focused Self-Assessment: Pre-NRC 95003 Preventive Maintenance Program, dated August 17, 2016
Operational Focus Meeting Planned Schedule/Desired Attendees/Proposed Agendas

Operations - Snapshot - Interim Controls – HU, dated December 31, 2015
Performance Improvement - Snapshot - Interim Controls – CAP, dated January 30, 2016
PNPS 95003 Inspection Readiness Assessment Report dated September 2, 2016
PNPS Comparative Assessment Review Assessment Area Report
PNPS IACPD – Allocation of Resources Performance Area Report
PNPS Identification, Assessment & Correction of Performance Deficiencies (IACPD) Assessment Area Report
QA-16-005, Monthly Recovery Plan Follow-up (June 2016), dated July 27, 2016
QA-16-008, Monthly Recovery Plan Follow-up (September 2016), dated October 14, 2016
QA-16-010, Monthly Recovery Plan Follow-up (October 2016), dated November 15, 2016
QA-16-011, Monthly Recovery Plan Follow-up (November 2016), dated December 15, 2016
QA-5-2016-PNP-1, Document Control/Records Management, Licensing, Operations, Maintenance, and Security, dated October 19, 2016
Self-Assessment - Production / Outage - EN-FAP-OU-110 (Critical Maintenance Identification and Oversight), dated September 29, 2016
Self-Assessment of Entergy Vendor Manuals and Vendor Re-contact Process (LO-PNPLO-2016-00033), dated June 30, 2016
Self-Assessment: Entergy Nuclear North Pre-NIEP Assessment of Nuclear Independent Oversight/Quality Assurance, dated June 16, 2016
Snapshot Assessment - Air Operated Valve Program, dated August 31, 2016
Snapshot Assessment - Check Valve Maintenance and Monitoring Program, dated August 31, 2016
Snapshot Assessment - Engineering (Recovery) - Predictive Maintenance Program, dated September 29, 2016
Snapshot Assessment - Engineering Director (Recovery) - Engineering Health Reports, dated September 30, 2016
Snapshot Assessment - Fatigue Rule Compliance, dated August 3, 2016
Snapshot Assessment of Interim Procedure Quality Reviews (LO-PNPLO-2015-00162, CA007), dated August 8, 2016
Snapshot Assessment of Interim Procedure Quality Reviews (LO-PNPLO-2015-00162, CA008), dated August 29, 2016
Snapshot Assessment of Interim Procedure Quality Reviews (LO-PNPLO-2015-00162, CA009), dated October 3, 2016
Snapshot Assessment of Interim Procedure Quality Reviews (LO-PNPLO-2015-00162, CA010), dated November 18, 2016

Drawings

Drawing No. 29050, 345 One Line & Relay Diagram, Revision 12
Drawing No. 29053, 345 Schematic Diagram CT's & PT's STA650-Switchyard, Revision 31
Drawing No. E1, Single Line Diagram Station, Revision 24

Miscellaneous

10CFR50.54(q) Screening: Adoption of the Unified RASCAL Interface for Emergency Dose Assessment
10CFR50.54(q) Screening: Emergency Action Level Technical Bases Document (EALs HU1.1 and HU4.1
10CFR50.54(q) Screening: Emergency Action Level Technical Bases Document, (EAL Table F-3 Secondary Containment Area Temperature and Radiation Maximum Safe Operating Values)
2016 Annual Siren Test Results
2016 Assessment Schedule

2016 Pilgrim Mid-Cycle Assessment Final Report
4th Quarter Quarterly ERF Facilities Surveillance
95003 Pilgrim Recovery Action Timeline
Composite AP-913 Equipment Reliability Index and Industry Guidance Document, Revision 6
Condition Analysis for Turbine Stop Valve Failure to Stroke
Condition report list with procedure quality in the condition report description from June 2016 through November 2016
Condition report list with trend code equal to procedure quality from June 2016 through November 2016
CR-PNP-2016-2052, CA-60; Training Attendance List
Dynamic Learning Activity (DLA); FDLA-ADM-FUNDMNTL_000-1; Revision 0
ECP Investigation Plan Guidelines
ECP Investigation Report Format Guidance
ECP Investigation Scope and Depth Guidelines
Email from David Noyes to Peter Miner, “Information Request 006ED (partial)” dated November 23, 2016
Email from Philip Chase to David Noyes, “Priority Organization Action Plans,” dated December 6, 2016
EN-FAP-OM-016, Attachment 7.1, “Monthly Performance Management Meeting” records (various)
EOF HVAC System Maintenance and Testing, December 2016
ER and RR and DM mentoring Project Plan, dated September 30, 2016
FFAM-ECPI-INIT, Employee Concerns Coordinator Familiarization Guide, Revision 1
FFAM-SUPV-0001, Supervisory Training Program Familiarization Guide, Revision 13
Fleet Refocus Observation WILL Sheet
Guidelines for Administration of the Employee Concerns Program
List of 1.3.142 Risk Reviews completed since 04/25/2016
Maintenance CFAM November 2016 Report
Maintenance CFAM September 2016 Report
Maintenance Fundamentals MA-3 Conservatism & Risk
Most Error Likely Task COACH Briefing Summary Report
NIOS Escalation Letter QA-16-009: Work Management, dated October 18, 2016
NIOS Quality Assurance Audit Report – Emergency Preparedness, dated March 28, 2016
NIOS Quality Assurance Audit Report – Fire Protection, dated January 11, 2016
NIOS Quality Assurance Audit Report – Maintenance, dated June 6, 2016
Nuclear Safety Culture Monitoring Panel Reports (various)
Operating Experience – Couplings Using EP 111 Compared with Manufacturer/Supplier Recommendations
Operating Experience ICES 189941, Failure of Main Generator Stator Cooling System Mechanical Coupling That Supports Main Generator Stator Cooling System Centrifugal Pump 7T051MPA002
People Health Committee Meeting Agenda dated December 16, 2016
Performance Improvement CFAM April 2016 Report
Performance Improvement CFAM February 2016 Report
Performance Improvement CFAM July 2016 Report
Pilgrim 95003 Mentor Team Report (various)
Pilgrim 95003 Mentor Team Report, dated November 30, 2016
Pilgrim 95003 Mentor Team Report, dated November 4, 2016
Pilgrim 95003 Mentor Team Report, dated October 21, 2016
Pilgrim Equipment Reliability and Risk Recognition and Decision Making Mentor Team Project Plan, dated September 12, 2016

Pilgrim Handbook, Building Our Legacy of Excellence
Pilgrim Mentors' Resumes and List of Roles/Responsibilities
Pilgrim NIOS Staffing Organizational Chart
Pilgrim Security Standing Order SO#2015-002, Security Communications Methods," Revision 1
Pilgrim Site Work Schedules (various)
Pilgrim Station 95003 HU Observation Form
Pilgrim Station Backlog Detail – Priority 2, dated December 8, 2016
Pilgrim Station Backlog Detail – Priority 3, dated December 8, 2016
Pilgrim Station Coordinated Meeting Schedule
Plant Health Committee Agenda, dated November 28, 2016
PNPS Comprehensive Recovery Plan, Revision 1
PNPS Emergency Plan Section E, Notification Methods and Procedures, Revision 47
PNPS Emergency Plan Section F, Emergency Communications, Revision 47
PNPS Emergency Plan Section H, Emergency Facilities and Equipment, Revision 47
PNPS Emergency Plan Section I, Accident Assessment, Revision 47
PNPS EOP/SAG Design Considerations, Revision 10
PNPS ERO Team Roster (January 2016)
PNPS Plant-Specific Technical Guidelines & Severe Accident Technical Guidelines, Revision 10
PNPS Procedure Use and Adherence WILL Sheet
PNPS Siren Performance Monthly Report (November 2016)
Power Point Presentation: Pilgrim People Health and Workforce Planning Strategy CA-56 and CA-57; December 2016
PPA AP-907-05, Procedure Writer's Manual, Revision 2
PSA-PNPS-06-001, PNPS 2013 PSA Update – Applications Review – Maintenance Rule
RC03.2011.10 (Eliminate PASS from TS; Develop and Maintain Contingency Plans)
Response to CFAM Elevation: Preventative Maintenance Process Indicators not Meeting Fleet Standards (CR-2016-175), dated January 12, 2016
Response to CFAM Elevation: Work Management Indicators not Meeting Fleet Standards (CR-2016-176), dated January 12, 2016
Response to NIOS Elevation Letter - Maintenance Repetitive Red-Yellow Functional Area Ratio – (CR-PNP-2016-03090), dated May 6, 2016
Response to NIOS Escalation Letter for Work Management - NIOS (CR-PNP-2016-08099), dated December 17, 2016
Response to NIOS Escalation Letter for Work Management – NIOS, dated November 6, 2016
Reviewed PNPS Procedure Quality Technical Review WILL sheets performed during the T-11 schedule weeks for work weeks 1636 to 1702 for the following groups: operations, radiation protection, electrical maintenance, instrumentation and controls maintenance, and mechanical maintenance
Reviewed System Risk Ranking, Revision 0
T-2 Technical Rigor Meeting, Week 1560, "B" Division, dated December 5, 2016
Targeted Performance Improvement Plans (TPIPs) (various)
White Paper, "Intent Change Basis for CR-PNP-2016-2056, CA-35 & CA-36 and CR-PNP-2016-2052, CA-45 (undated)
White Paper: Corrective Actions with Intent Changes after Completion; undated
White Paper: Intent Changes Bases for CR 16-2056, CA-35 and CA-36; and CR 16-2052, CA-45
White Paper: Resource Needs Analysis and Results; undated

LIST OF ACRONYMS

ADAMS	Agencywide Documents Access and Management System
ANO	Arkansas Nuclear One
ASME	American Society of Mechanical Engineers
CAPR	corrective action to preclude repetition
CFR	*Code of Federal Regulations*
CR	condition report
EAL	emergency action level
EC	engineering change
EFR	effectiveness review
EPRI	Electric Power Research Institute
IMC	Inspection Manual Chapter
IP	Inspection Procedure
KV	kilovolts
LOOP	loss of offsite power
MΩ	megaohms
MORT	Management Oversight Risk Tree
NIOS	Nuclear Independent Oversight
NRC	Nuclear Regulatory Commission
PNPS	Pilgrim Nuclear Power Station
SBO	station blackout
SRV	safety/relief valve
UFSAR	Updated Final Safety Analysis Report
WILL	what it looks like