



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
2100 RENAISSANCE BLVD. SUITE 1
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July 22, 2015

EA-14-092

Mr. David A. Heacock
President and Chief Nuclear Officer
Dominion Resources
5000 Dominion Blvd.
Glen Allen, VA 23060-6711

SUBJECT: MILLSTONE POWER STATION UNIT 3 – NRC SUPPLEMENTAL
INSPECTION REPORT 05000423/2015010 AND ASSESSMENT
FOLLOW-UP LETTER

Dear Mr. Heacock:

On June 12, 2015, the U. S. Nuclear Regulatory Commission (NRC) completed a supplemental inspection pursuant to Inspection Procedure (IP) 95001, "Supplemental Inspection for One or Two White Inputs in a Strategic Performance Area," at the Millstone Power Station, Unit 3. The enclosed inspection report (IR) documents the inspection results, which were discussed with the Site Vice President, Mr. John Daugherty, and other members of your staff.

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 second quarter of 2014. This issue was documented previously in NRC IR 05000423/2014008 (ML14240A051), dated August 28, 2014, and involved Dominion's failure to promptly identify and correct a condition adverse to quality. The Unit 3 turbine-driven auxiliary feedwater (TDAFW) pump was operated from August 2013 through February 2014 in an adverse configuration due to the installation of an incorrect cam follower bearing. The pump experienced three overspeed trips during the subject timeframe. The NRC issued the Final Significance Determination for this Finding within NRC letter (ML14294A220), dated October 20, 2014, and the NRC staff was informed on April 13, 2015, of your staff's readiness for this inspection.

The objectives of this supplemental inspection were to provide assurance that: (1) the root causes and the contributing causes of risk-significant performance issues were understood; (2) the extent of condition and extent of cause of risk-significant performance issues were identified; and (3) corrective actions for risk-significant performance issues are sufficient to address the root and contributing causes and prevent recurrence. The inspection consisted of examination of activities conducted under your license as they related to safety, compliance with the Commission's rules and regulations, and the conditions of your operating license.

Based on the results of this inspection, the NRC concluded that, overall, the supplemental inspection objectives were met and no significant weaknesses were identified. Additionally, no findings of significance were identified. The inspectors identified a few weaknesses with respect to corrective actions established through Dominion's root cause evaluations; however, they were determined to have an insignificant impact on Dominion's overall assessment of the issue.

D. Heacock

-2-

Based on the guidance in Inspection Manual Chapter (IMC) 0305, "Operating Reactor Assessment Program," and the results of this inspection, the White Finding under the Mitigating Systems Cornerstone will be closed, effective at the beginning of the third calendar quarter of 2015. However, Millstone Unit 3 will remain in the Regulatory Response Column of the NRC's Action Matrix due to a previously identified greater than Green finding under the Security Cornerstone.

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any), will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records System component of the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

/RA/

Raymond R. McKinley, Chief
Reactor Projects Branch 5
Division of Reactor Projects

Docket No. 50-423
License No. NPF-49

Enclosure:
Inspection Report 05000423/2015010
w/Attachment: Supplementary Information

cc w/encl: Distribution via ListServ

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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket No. 50-423

License No. NPF-49

Report No. 05000423/2015010

Licensee: Dominion Nuclear Connecticut, Inc.

Facility: Millstone Power Station, Unit 3

Location: P.O. Box 128
Waterford, CT 06385

Dates: June 8, 2015 through June 12, 2015

Inspectors: F. Arner, Senior Reactor Inspector
T. Daun, Resident Inspector

Approved by: Raymond McKinley, Chief
Reactor Projects Branch 5
Division of Reactor Projects

SUMMARY

IR 05000423/2015010; 6/08/2015 – 6/12/2015; Millstone Power Station Unit 3; Supplemental Inspection – Inspection Procedure 95001.

A senior reactor inspector from the Division of Reactor Safety and resident inspector from the Division of Reactor Projects, Region I, performed this inspection. No significant weaknesses or findings were identified. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 5, dated February 2014.

Cornerstone: Mitigating Systems

The NRC staff performed this supplemental inspection in accordance with IP 95001, "Supplemental Inspection for One or Two White Inputs in a Strategic Performance Area," to assess Dominion's evaluation associated with a performance deficiency issued in NRC IR 05000423/2014008, dated August 28, 2014. The performance deficiency was associated with Dominion's failure to identify and correct a condition adverse to quality. Specifically, from August 11, 2013 to February 3, 2014, the Unit 3 turbine-driven auxiliary feedwater (TDAFW) pump was operated with a non-conforming cam follower bearing within the governor valve stem interface with the governor linkage, which resulted in three TDAFW pump overspeed trips, thereby reducing the reliability of a risk-significant mitigating system.

Based on the results of the inspection, the inspectors concluded that Dominion had adequately performed root cause analyses of the event, and in general, corrective actions, both completed and planned, were reasonable to address the related issues. Based on the guidance in Inspection Manual Chapter (IMC) 0305, "Operating Reactor Assessment Program," dated April 9, 2015, and the results of this inspection, the White Finding will be closed effective at the beginning of the third calendar quarter 2015 (July 1, 2015).

Notwithstanding this conclusion, the inspectors identified a general weakness associated with a missed opportunity within the root cause evaluations (RCE) to identify a corrective action to address a contributing cause for the event. Dominion had identified within the RCE that the organization failed to understand the integral relationship of the Unit 3 governor control system components. However, the evaluation did not establish a corrective action to ensure the TDAFW maintenance procedures resulted in the establishment of critical settings and tolerances for the governor linkage setup. The inspectors noted that proper control valve linkage setup ensures that the maximum force will be applied from the governor through the linkage to the valve stem to close the control valve on startup. Dominion identified this non-optimal linkage setup independent of the RCE's performed and corrective actions were implemented during the October 2014 refueling outage. The inspectors determined that this was not a significant weakness with respect to the evaluation of the three overspeed events as the condition was corrected and the inspectors noted there had been fourteen TDAFW pump starts without an overspeed condition given the non-optimal linkage setup from the January through October 2014 timeframe. This issue was previously docketed as an issue of very low safety significance, Green, associated with a NCV of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions" within IR 05000423/2014013 (ML15015A078), dated January 15, 2015. (Section 4OA4)

REPORT DETAILS

4. OTHER ACTIVITIES

4OA4 Supplemental Inspection (IP 95001)

.1 Inspection Scope

The NRC's staff performed this supplemental inspection in accordance with IP 95001 to assess Dominion's evaluation of a White Finding, which affected the Mitigating Systems cornerstone in the Reactor Safety strategic performance area. The inspection objectives were to:

- Provide assurance that the root and contributing causes of risk-significant performance issues were understood;
- Provide assurance that the extent of condition and extent of cause of risk-significant performance issues were identified, and;
- Provide assurance that corrective actions for risk-significant performance issues are sufficient to address the root and contributing causes and prevent recurrence

Millstone Unit 3 entered the Regulatory Response Column of the NRC's Action Matrix in the second quarter of 2014 as a result of one inspection finding of low to moderate (White) safety significance. The finding was associated with a performance deficiency issued in NRC IR 05000423/2014008 (ML14240A051), dated August 28, 2014. The performance deficiency was associated with Dominion's failure to identify and correct a condition adverse to quality. Specifically, from August 11, 2013 to February 3, 2014, the Unit 3 TDAFW pump was operated with a non-conforming cam follower bearing associated with the interface between the governor valve stem and the governor linkage, which resulted in three TDAFW pump overspeed trips. This reduced the reliability of a risk-significant mitigating system. The finding was characterized as having low to moderate (White) safety significance based on the result of the staff's risk evaluation, performed using IMC 0609, Appendix A, Exhibit 2, as discussed in NRC IR 05000423/2014008.

Dominion's staff informed the NRC on April 13, 2015, that they were ready for the supplemental inspection. Dominion evaluated the causes of the three TDAFW pump overspeed trips within the performance of three RCEs. RCE 001111, Revision 2, "Millstone 3 Turbine Driven Auxiliary Feedwater Pump, (TDAFW) 3FWA*P2, Trips on 11/4/13, 12/18/13, and 01/23/14," determined the direct and root causes for the events. RCE 001132, Revision 1, "Evaluation of Component Failure that Led to Millstone 3 TDAFW Pump, 3FWA*P2, Trips on 11/4/13, 12/18/13, and 01/23/14," subsequently evaluated the installation of a non-conforming part that resulted in the repeat trips of the TDAFW pump. Finally, RCE 001133, Revision 1, "Additional Organizational and Programmatic Issue Leading to Millstone 3 TDAFW Pump, 3FWA*P2, Trips on 11/4/13, 12/18/13, and 01/23/14," was developed to capture that the corrective action plan for the originally performed RCE 001111, had not fully addressed and corrected the corrective action program (CAP) implementation deficiencies that contributed to multiple TDAFW overspeed trips.

Enclosure

The inspectors reviewed the causal evaluations referenced above, in addition to other documents listed in the Attachment, which supported Dominion's actions to address the White Finding. The inspectors reviewed corrective actions, both completed and planned, to address the identified causes, extent of condition, and extent of cause. The inspectors also interviewed Dominion's personnel to ensure that the root and contributing causes and the contribution of safety culture components were understood. The inspectors also conducted an in-plant walkdown of the Unit 3 TDAFW pump to assess the material condition of the equipment. The inspectors viewed the three overspeed events fundamentally as an inability of the force available from the governor through the linkage to move the governor control valve against backpressure through the TDAFW governor valve stem and packing during the initiation of the system. Therefore, the team focused on the concept of margin with respect to the available force from the machine (governor through the linkage) versus the required force to move the stem under the dynamic starting conditions.

.2 Evaluation of the Inspection Requirements

Problem Identification

- a. IP 95001 requires that the inspection staff determine that Dominion'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 inspectors determined that Dominion's RCE 001111, Revision 2, adequately documented the identification of the issue and provided a timeline of the applicable overspeed trip events during the pump starts associated with the applicable surveillance test procedure. The RCE noted that the first overspeed event occurred on November 4, 2013, with Unit 3 in mode 1 at 100% power, with similar overspeed trips occurring on 12/18/13 and 1/23/14. The RCE appropriately described the conditions of the issue with the increase in pump speed to the electrical overspeed trip setpoint resulting in the automatic closure of the trip throttle valve, 3MSS*MSV5. Additionally, the RCE noted that the Dominion staff, after the third overspeed trip, identified a nonconforming part which had been installed within the TDAFW governor control mechanism. Specifically, Dominion engineering identified a nonconforming spherical bearing within the governor valve stem to linkage interface. On 1/29/2014, Dominion personnel compared an old cam follower to one that had been recently removed and found that they had different manufacturer markings. This indicated that they were supplied by two different vendors. The design conforming spherical bearing contained a copper alloy insert that provides lubricity for the expected environmental condition. The nonconforming bearing was not self-lubricated and had lubrication grooves and holes to direct grease. Subsequent to the discovery of the nonconforming part by the Dominion staff, the vendor issued a Part 21 notification on the issue.

- b. IP 95001 requires that the inspection staff determine that Dominion's evaluation of the issue documents how long the issue existed and prior opportunities for identification.

The inspectors determined that Dominion's RCE's 001111, Revision 2, and RCE001132, Revision 1, adequately documented how long the issue existed and prior opportunities for identification. Specifically, the RCE's documented that a nonconforming spherical bearing associated with the TDAFW stem to linkage interface was first accepted into Millstone's inventory following a receipt inspection dated 7/21/06. The first installation of the non-conforming bearing into the Millstone 3 TDAFW pump occurred on 12/11/06. This bearing was then replaced by the correct bearing on 05/09/07 as part of general maintenance practice during a governor valve packing replacement. The non-conforming bearing was next installed into the Unit 3 TDAFW governor mechanism on 05/12/13. On 08/11/13, the cam follower bearing nut was found backed off and roughness was identified in the cam follower bearing. A new non-conforming bearing was again installed. Finally, a subsequent non-conforming bearing was installed following the 01/23/2014 TDAFW pump trip during the linkage inspection and valve packing rebuild. It was subsequently discovered by Dominion staff that the vendor had shipped a batch of ten incorrect nonconforming cam roller bearings to Millstone in 2006 under the identical part number. The correct cam roller was purchased and installed on 2/3/14 under work order 53102700183.

Additionally, the inspectors noted that Dominion had identified a linkage part which had been installed in the reverse direction since the 2008 timeframe. This was previously discussed in IR 05000423/2014008 associated with the Special Inspection performed for the overspeed events and was determined to have minor significance with respect to the cause of the overspeed events.

The inspectors noted that the RCE's appropriately identified that there were numerous opportunities for the organization to have detected and corrected the situation dating back to the original receipt inspection in 2006. RCE001132 was performed because Dominion recognized that the original RCE did not adequately describe the entire sequence of events that led or contributed to the overspeed trips. The RCE described several other opportunities to detect degradation within the stem/linkage interface such as the TDAFW control valve showing discreet versus smooth movement on 12/5/13, which was identified within condition report 534403. The RCE also noted that on 8/10/13, Dominion staff had identified roughness on the outer race of the bearing which had not been adequately questioned and investigated within the corrective action system. The inspectors determined that Dominion appropriately focused attention on missed opportunities since the installation of the non-conforming part in May 2013, since these provided insight into current station performance improvement opportunities.

- c. IP 95001 requires that the inspection staff determine that Dominion's evaluation documents the plant specific risk consequences, as applicable, and compliance concerns associated with the issue.

The inspectors determined that, in general, Dominion's evaluation adequately documented the plant specific risk consequences and compliance concerns associated with the issue. The RCE's documented that the root and contributing causes that led to the Unit 3 TDAFW pump overspeed trip events resulted in a reduction in nuclear safety defense-in-depth. Failure of the TDAFW pump results in loss of one of three redundant sources.

Enclosure

The inspectors noted that the RCE appropriately addressed the three overspeed trip events with respect to the impact on the Mitigating Systems Performance Index (MSPI). The MSPI monitoring period is on a three year rolling basis, with the indicator still within the Licensee control band. The RCE referenced the NRC Special IR 05000423/2014008, dated 8/28/14 with respect to the calculated conditional core damage probability (CCDP) to be 1.52E-6 for the TDAFW pump overspeed trip failures and associated unavailability times using the Millstone Unit 3 risk model. The inspectors noted that the RCE's had not captured that the most significant contributor to the risk of the TDAFW pump events was with respect to external postulated fire events. The inspectors noted that the RCE's performed by Dominion had used the initial estimate of risk versus the final calculated value. The external event contribution was the dominant contributor to the overall delta CDF, which resulted in a mid to upper E-6/year delta core damage frequency (CDF). The inspectors determined that the RCE's had not accurately reflected the contribution of fire events to the final Significant Determination Process (SDP) calculation of delta CDF for the exposure time of the degraded condition. The inspectors noted that this deficiency was of minor safety consequence because it did not have any impact on any of the causes, corrective actions, extent of condition, or extent of cause associated with the RCE's. The inspectors confirmed that while the RCE's had not incorporated the external event contribution, Dominion had initiated actions within their CAP to enhance procedures with respect to fire mitigation strategies after the initial identification of the overspeed contribution to increased risk due to fire events. Therefore the inspectors noted this was a documentation weakness within the RCE's and was of minor significance. Dominion initiated CR 581974 to capture the RCE documentation deficiencies.

The inspectors determined that the RCE's had appropriately referenced the applicable Licensee Event Reports (LER 2014-001-00 and LER 2014-003-00) for the overspeed events and had identified the appropriate compliance concerns associated with the repetitive overspeed events.

d. Findings

No findings were identified.

02.02 Root Cause, Extent of Condition, and Extent of Cause Evaluation

- a. IP 95001 requires that the inspection staff determine that Dominion evaluated the issue using a systematic methodology to identify the root and contributing causes.

The inspectors determined that Dominion evaluated the White Finding using a systematic methodology to identify root and contributing causes. The inspectors verified that Dominion's staff implemented PI-AA-3001, "Root Cause Evaluation" in the conduct of the station's causal analyses to identify the root and contributing causes.

The station utilized the following systematic methods to complete RCE's:

- Data gathering through interviews and document review
- Barrier analysis and
- Event and causal factor analysis

The inspectors verified that these methods were completed by reviewing attachments to the RCE documents, and verified that the root and contributing cause conclusions were consistently understood and supported by Dominion's staff through the conduct of interviews.

- b. IP 95001 requires that the inspection staff determine that Dominion's RCA was conducted to a level of detail commensurate with the significance of the issue.

The inspectors determined that Dominion's RCE was conducted at a level of detail commensurate with the significance of the White Finding. Consistent with PI-AA-300, "Cause Evaluation," and PI-AA-3001, "Root Cause Evaluation," Dominion conducted RCEs that included a comprehensive timeline of the Unit 3 TDAFW pump overspeed events, causal factors, extent-of-condition and extent-of-cause. Additionally, a safety culture evaluation, a safety significance evaluation, operating experience (OE) reviews, corrective actions, and an effectiveness review were completed consistent with procedural requirements. The inspectors noted that Dominion performed three RCEs to address the TDAFW overspeed events. RCE001111 was developed to address that troubleshooting and operability determinations had not appropriately identified an adverse condition which resulted in three TDAFW pump overspeed events. RCE001132 addressed that a non-conforming part was installed within the roller bearing/cam plate interface which resulted in the failure of the governor valve to prevent the overspeed trips. RCE001133 was directed at the additional organizational and programmatic issues leading to the Unit 3 TDAFW pump trips to further evaluate the weaknesses in the safety culture components identified within RCE001111.

RCE001111 documented the root cause associated with the Unit 3 TDAFW pump overspeed events as leaders failing to ensure personnel applied adequate technical considerations and appropriate technical basis to support operability conclusions. Additionally, Dominion identified that troubleshooting procedures had provided inadequate guidance to ensure appropriate rigor was applied in the evaluations of the events. A contributing cause identified was that the organization failed to understand the integral relationship of the Unit 3 TDAFW pump governor control system components.

RCE001132 documented an additional historic root cause associated with the Unit 3 TDAFW pump overspeed events as the failure of the receipt inspection performed on 7/20/2006 to identify that the shipped parts (non-conforming spherical bearings) did not conform to what was specified in the purchase order. The inspectors noted that the current Dominion Receipt Inspector program requirement is that parts are physically inspected for correct markings without reliance on paperwork or vendor labeling.

The evaluation identified various contributing causes for the issue, including: the material information for the spherical bearing did not include the full name/description of the part; like for like parts verification in the field did not identify that the spherical bearing did not match; the quality receipt inspection guide did not require verification of identifying markings; and the part validation process failed to identify the part discrepancy.

RCE001133 documented the root cause of the organizational and programmatic issues as inadequate management engagement to ensure timeliness and quality of CAP products. The significant contributing cause was that the CAP process implementation was challenged by shortcuts in CAP documentation and shortcuts taken during assignment closeout. The inspectors concluded that Dominion's RCE's sufficiently captured the root and contributing causes.

- c. IP 95001 requires that the inspection staff determine that Dominion's RCA included a consideration of prior occurrences of the issue and knowledge of OE.

The inspectors determined that Dominion's RCEs included a consideration of prior occurrences of the issue including an assessment of previous historical overspeed trip events. The assessment included a review of previous opportunities to identify and correct the Unit 3 TDAFW pump overspeed events. Dominion reviewed operating experience from multiple sources including industry information and the site corrective action process, as well as relevant NRC generic information and communication items.

- d. IP 95001 requires that the inspection staff determine that Dominion's RCA addresses the extent of condition and extent of cause of the issue.

The inspectors determined that, in general, Dominion's RCEs adequately addressed the extent of condition and extent of cause of the issues. Dominion's evaluation considered the extent of condition associated with the automatic overspeed trips due to the incorrect cam roller bearing and corrosion induced binding of the cam roller bearing. Dominion determined that this was applicable to automatic starts and control of steam driven turbines. Dominion inspected the Unit 2 TDAFW pump, and found it to have the correct cam roller bearing. This review appropriately identified that the Unit 2 TDAFW pump had experienced historical overspeed trips but they were not related to an incorrect cam roller bearing. Dominion's evaluation also looked at the Unit 2 and Unit 3 emergency diesel generators which have automatic starts with overspeed trip protection but determined that they do not have cam rollers in the linkage. The inspectors reviewed Dominion's evaluation and determined that their conclusions were reasonable.

Dominion's evaluation also considered the extent of cause associated with inadequate technical considerations and bases. Dominion determined that this was applicable to operability determinations OD000561, (inadequate technical basis for assumption of water to have caused overspeed trips) and OD000577, (low margin on TDAFW pump relief valve), performed to support operability of safety related components.

Therefore, Dominion determined that an appropriate extent of cause would consist of all active operability determinations. Dominion took corrective actions to validate the assumptions and conclusions pertaining to all active operability determinations. The inspectors reviewed Dominion's evaluation and determined that their conclusions were reasonable.

Dominion's evaluation also considered the extent of cause associated with quality assurance receipt inspection process failures. Dominion determined that a review of receipt inspections from the past year found examples that supported the conclusion that the inventory management deficiency associated with the nonconforming bearing was an isolated historical event with respect to the receipt inspection process. With respect to issues relative to the condition reporting system, Dominion evaluated this extent of cause and identified one notable case of a weakness in the condition reporting system involving fuses. Specifically, fuses related to a Part 21 Notification had been used in the Unit 2 EDGs despite operating experience indicating that the manufacturer date range extended beyond what was determined by the vendor. An equipment failure subsequently resulted in Apparent Cause Evaluation (ACE) 19821. Dominion took corrective actions under this ACE. The inspectors reviewed Dominion's overall evaluation of extent of condition and cause and determined that their conclusions were reasonable.

- e. IP 95001 requires the inspection staff to determine that Dominion's root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0305, "Operating Reactor Assessment Program."

The inspectors determined that Dominion's root cause, extent of condition, and extent of cause evaluations appropriately considered the safety culture components as described in IMC 0305. Dominion performed a detailed safety culture review within RCE001111 and identified numerous weaknesses associated with safety culture components that were root causes or significant contributing causes of the performance deficiency. Dominion performed RCE001133 to understand and address the organizational and programmatic issues leading to the Unit 3 TDAFW pump trips. Dominion identified weaknesses in the following three cross-cutting areas within RCE001133:

Problem Identification and Resolution, Evaluation and Resolution Components (Root Cause)

Dominion identified several instances where evaluations of issues or events were not complete, evaluations were less than timely and/or thorough and corrective actions were not sustainable through the RCE. Dominion's corrective action was to make changes in the organizational behavior through station leadership stand downs and improving the scheduling of daily CAP related meetings to ensure adequate engagement in the processing and review of CAP products. The RCE identified several issues, such as, TDAFW pump relief valve setpoints, governor linkage movement, and the use of locktite on the cam bearing connection where the evaluations of the issues were not complete.

Human Performance, Procedure Adherence Component (Significant Contributor)

Dominion identified instances where corrective actions were not completed as written, a process which is in conflict with procedures that direct the completion of corrective actions. Dominion's corrective action was to put measures in place to prevent, or to catch, error likely precursors. These measures include CAP group reviews for significance level 1 and 2 corrective action assignments that will not be reviewed by the corrective action review board (CARB), implementing a CARB coordinator, and restricting manager level functions in central reporting system (CRS) to department managers.

Human Performance, Conservative Bias Component (General Weakness)

Dominion identified instances of inadequate decision making and bypassing the CAP program implementation. Dominion's corrective action was to make changes in the organizational behavior through station leadership stand downs and improving the scheduling of daily CAP related meetings to ensure adequate engagement in the processing and review of CAP products.

Overall, the inspectors noted that Dominion appropriately identified station performance gaps in the cross-cutting areas of human performance and problem identification and resolution. Dominion's RCE's included proper consideration of whether a weakness in any safety culture component was a root cause or a significant contributing cause of the issue. However, the inspectors noted that a significant period of time had elapsed from when the RCE001111 identified seven weaknesses in the safety culture components that contributed to the overspeed trips until RCE001133 was initiated to ensure the station understood the causes of these weaknesses and implemented corrective actions to address them. The inspectors noted that while RCE001132 also identified safety culture components that were root causes or significant contributing causes relative to the performance deficiency, these aspects were historical and were not indicative of current licensee performance.

f. Findings

No findings were identified.

02.03 Corrective Actions

- a. IP 95001 requires the inspection staff to determine that (1) Dominion specified appropriate corrective actions for each root and/or contributing cause, or (2) an evaluation stating no actions are necessary is adequate.

The inspectors concluded that Dominion's planned and implemented corrective actions were generally appropriate and addressed the root and contributing causes.

Dominion addressed the root causes and contributing causes identified through various corrective actions implemented and proposed. Dominion implemented guidance

Enclosure

pertaining to the validation of technical assumptions, made a revision to procedure MA-AA-103, "Conduct of Troubleshooting," to include a requirement to assign a manager the responsibility to support complex troubleshooting team leads and developed case studies based on the results of the RCE for this issue. This was performed to address the root cause of leaders failing to ensure personnel applied adequate technical considerations and appropriate technical basis to support operability of the Unit 3 TDAFW pump. Dominion implemented a procedure for troubleshooting the Unit 3 TDAFW pump to address the root cause of troubleshooting procedures provided inadequate guidance to ensure appropriate rigor was applied to the Unit 3 trips.

Dominion developed training for mechanical maintenance and engineering to address the contributing cause of the organization failing to understand the integral relationship of the Unit 3 TDAFW pump governor control system components. This included the procurement of a TDAFW governor linkage stem setup where maintenance can perform training and dry runs on setup.

Dominion reinforced the procedural requirements of the materials receipt inspection and inventory processes through training. This was performed to address the root cause of the receipt inspection of the nonconforming spherical bearing not properly verifying parts against specifications. Dominion also removed the nonconforming spherical bearing from material stock and restricted use of the part. Dominion incorporated changes to the supply chain management processes and procedures for receipt inspection of the spherical bearing, added the expectations for verifying parts that are replaced against the part to be installed to the Maintenance Fundamentals Handbook, included documentation of physical inspection and visual verification for item markings in the current receipt inspection instructions, and reinforced lessons learned from the RCE with planners through work group specific training. The above corrective actions were developed to address the root and contributing causes relative to the installation of a nonconforming part within the TDAFW control system.

Dominion implemented actions in an attempt to change the organizational behavior to ensure adequate management engagement in the processing and review of CAP products. This was performed to address the root cause of inadequate management engagement to ensure timeliness and quality of CAP products. These corrective actions included timing daily corrective action assignment review team (CAART) meetings to facilitate attendance by a wide section of station leaders to include directors and the Site Vice President (VP). The intent was to ensure better challenges and consistency of management oversight of condition report review team (CRT) assignments, tracking CAP assignments returned to CRT by CAART and reviewing weekly with continuous coaching to CRT based on CAART feedback. Additional planned focus was on initiating condition reports when corrective action assignments have been found to be improperly closed, plant manager review of CAP rework assignments to maintenance, and trending CARB rejections for operations, maintenance and engineering. A stand down session to station supervisors and above, on the subject of corrective action process requirements, expectations, and current station performance was also conducted. Annual CARB training will include reinforcement of CAP rules for corrective action closure and CAP rules for modifying corrective action plans as well as the lessons learned from RCE001111.

Enclosure

Dominion implemented actions to address challenges to CAP process implementation follow through by putting in measures to prevent, or to catch, error likely precursors. This was performed to address the contributing cause of the CAP process implementation being challenged by shortcuts in CAP documentation and shortcuts being taken during assignment closeout.

These corrective actions included:

- Adding a CAP group review to all significance level 1 and 2 corrective action assignments that will be reviewed by CARB or similar oversight body;
- Ensuring the CAP group review of all significant level 1 and 2 corrective action assignments emphasizes compliance with PI-AA-200 requirements, including, fully addressing all aspects of the detailed assignment and the creation of any identified follow on assignments determined to be necessary;
- Implementing a CARB coordinator who is responsible for documenting CARB disposition of CARB products, obtaining CARB chair approval of meeting minutes, and documenting the CARB minutes;
- Removing the CAP power user status from all non-CAP group individuals;
- Modifying the current list of supervisors that can perform manager level functions in CRS so that only the department manager can perform manager review of CAP products, and;
- Modifying the current list of supervisors that can perform department corrective action coordinator (DCAC) level functions in the CRS so that only approved supervisors can perform DCAC closure of CAP products.

The inspectors determined that Dominion's corrective actions to address the overspeed events were in general, comprehensive. However, the inspectors identified two weaknesses relative to actions generated through the RCE's for the issue.

The first weakness was associated with the procedural setup of the TDAFW governor linkage. The inspectors determined that RCE001111 had missed an opportunity to identify procedure improvements. Specifically, the RCE had determined that the linkage setup procedure was not a factor based on linkage sticking not being observed during troubleshooting of the overspeed events. Additionally, the RCE noted that dimensional checks had been performed in accordance with approved procedures during the last outage. Subsequent to the approval of the RCE in April 2014, Dominion initiated action to "blueprint" the linkage to vendor specifications. This involved the detailed performance of the linkage setup during the October 2014 3R16 outage. This action was taken independent of the RCE developed actions. This detailed check performed with the assistance of the vendor, identified maintenance setup procedure gaps and actual control system linkage misalignment. The inspectors noted that this had the potential to reduce the force available from the governor through the linkage to the valve stem to move the control valve off its full open position during startup of the TDAFW pump. The inspectors noted that a reduction in available force is a loss in margin with respect to preventing an overspeed condition and considered the procedure gap as a potential contributing cause to the events.

Enclosure

The inspectors determined this was not a significant deficiency within the RCE corrective actions, because it was a slight margin reduction which would not have prevented the overspeed events. There had been fourteen successful TDAFW pump starts without overspeed from the January to October 2014 timeframe, given this loss of linkage efficiency. The inspectors noted that Dominion had taken actions to enhance the procedural setup of the governor linkages to ensure conformance with vendor specifications. Dominion initiated condition report, CR582059, to address that the RCE had missed an opportunity to identify procedure improvements for linkage alignment prior to the October 2014 identification of the issue. The linkage nonconformance with vendor specifications was previously docketed as an issue of very low safety significance, Green, associated with an NCV of 10 CFR50, Appendix B, Criterion XVI, "Corrective Actions" within IR 05000423/2014013 (ML15015A078), dated January 15, 2015.

The inspectors identified a second weakness of minor significance with corrective actions associated with RCE001111. The RCE identified that the station had previously used linkage pull tests inappropriately as the primary bases for TDAFW pump operability. This pull test had been developed in response to several overspeed events in the 2005 and 2006 timeframe. The intent of the test was to detect abnormal friction within the linkage and control valve under static conditions. The inspectors noted the pull test had been used as a basis to rule out a problem with the linkage when water in the steamlines was postulated to be the cause of the first two overspeed events. Dominion took a corrective action to address the issue by requiring the use of Universal Data Acquisition System (UDS) information within the revised TDAFW troubleshooting procedure, C EN 118, "Turbine Driven Auxiliary Feedwater Pump Troubleshooting," Revision 1. This data was to be used in addition to pull test information for troubleshooting the control system. The inspectors noted that the UDS or strain gauge equipment, attached to the valve stem and governor linkage, is only available during planned surveillance testing. The inspectors noted that if the system started during an actual event and failed, then UDS would not be available to capture information relative to the equipment performance. The inspectors were concerned that troubleshooting of a postulated overspeed condition under non-test conditions, had the potential for using the pull test to justify linkage operation without UDS availability. Dominion acknowledged the concern and stated they would revise the new troubleshooting procedure to provide additional assurance and clarification that the linkage pull test will not be used as the primary basis of linkage acceptability going forward in the absence of UDS data. Dominion entered the issue into their CAP as CR581881. The inspectors determined this observation to be a minor weakness because the pull test and UDS information were both included in the existing troubleshooting procedure.

The inspectors evaluated these issues in accordance with IMC 0612, Appendix B, "Issue Screening," and IMC 0612, Appendix E, "Examples of Minor Issues." The inspectors determined each issue was of minor safety significance because the issues could not reasonably be viewed as a precursor to a significant event and did not adversely affect the mitigating systems cornerstone objective.

- b. IP 95001 requires that the inspection staff determine that Dominion prioritized corrective actions with consideration of risk significance and regulatory compliance.

Dominion's corrective actions to address the root and contributing causes were prioritized in accordance with procedure PI-AA-200, "Corrective Action." In setting priority, Dominion considered plant risk and evaluated the Unit 3 TDAFW pump as a high risk component. The inspectors determined that the majority of the corrective actions were completed and remaining corrective actions had appropriate due dates. Based on the guidance in PI-AA-200, the inspectors determined that the corrective actions were prioritized with consideration of the risk significance and regulatory compliance.

- c. IP 95001 requires that the inspection staff determine that Dominion established a schedule for implementing and completing the corrective actions.

Dominion assigned due dates for corrective actions in accordance with procedure PI-AA-200's requirements for timeliness. Completion dates for corrective actions were established and documented in the applicable RCEs. The inspectors verified that corrective actions scheduled to be completed before the date of this inspection were completed and appropriately documented. The inspectors also reviewed the status of other assigned corrective actions. The inspectors determined that a schedule had been appropriately established for implementing and completing the corrective actions.

- d. IP 95001 requires that the inspection staff determine that Dominion developed quantitative and/or qualitative measures of success for determining the effectiveness of the corrective actions to prevent recurrence.

The inspectors determined that Dominion had developed quantitative and qualitative measures for determining the effectiveness of the corrective actions implemented and proposed with respect to RCE001111 and RCE001132. These measures included reviewing a sampling of operability determinations and completed troubleshooting plans, as well as conducting interviews with supervisors and engineers specific to the task objectives. Additionally, Dominion established measures to conduct independent reviews using a sample of receipt inspections for safety-related components.

For RCE001133, Dominion established measures to monitor, on a monthly basis, CRS documentation (CRT Comments and CARB minutes) for program compliance, including the monitoring of CAP program implementation requirements. Also on a monthly basis, Dominion established measures to perform a review of a sample (10% or more) of significant level 3 corrective action assignment closures. The focus of this review was ensuring that actions fully addressed all aspects of the detailed assignment and follow on assignments were appropriately created when further actions were identified. These monitoring actions were implemented in March 2015 with an interim effectiveness review to be completed in July 2015 and the final effectiveness review to be completed in December 2015. The inspectors determined that at the time of this inspection there was not an adequate amount of time elapsed from the implementation of corrective actions to assess the effectiveness of these corrective actions.

The NRC will continue to assess the effectiveness and sustainability of these efforts to address challenges in CAP implementation through continued implementation of baseline inspections within the reactor oversight process (ROP).

- e. IP 95001 requires that the inspection staff determine that Dominion's planned or taken corrective actions adequately address a Notice of Violation (NOV) that was the basis for the supplemental inspection.

The inspectors determined that the corrective actions taken by Dominion adequately addressed the NOV associated with the Millstone Unit 3 TDAFW pump overspeed events. In Dominion's November 19, 2014, response to the NOV, Dominion outlined the corrective actions that have been taken and those that were not yet completed. The inspectors determined that the corrective actions outlined in the NOV response aligned with the corrective actions in the RCEs with the exception of the blueprinting of the Unit 3 TDAFW pump control valve linkage. The inspectors determined that the corrective actions from the RCEs, combined with the additional action outlined in the NOV response, adequately addressed the NOV.

- f. Findings

No findings were identified.

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

This part of IP 95001 was not implemented as Dominion did not request credit for self-identification of an old design issue and the performance issue did not meet the requirements of IMC 305 for consideration as an old design issue.

40A6 Exit Meeting and Regulatory Performance Meeting

On June 12, 2015, the inspectors presented the inspection results to Mr. John Daugherty, Site Vice President, and other members of his staff, who acknowledged the inspection results. The inspectors asked Dominion if any of the material examined during the inspection should be considered proprietary. Dominion did not identify any proprietary information.

Upon completion of the exit meeting, the Region I Chief, Reactor Projects Branch 5, Mr. Raymond McKinley, conducted the Regulatory Performance Meeting, in accordance with IMC 0305, with Mr. John Daugherty, Site Vice President, and other members of his staff. The purpose of the meeting was to discuss Dominion's corrective actions in response to the White Finding and NOV, and the removal of the White Finding as an input within the NRC's Action Matrix, effective at the beginning of the third quarter of 2015.

ATTACHMENT: SUPPLEMENTARY INFORMATION

Enclosure

SUPPLEMENTARY INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

D. Blakeney, Director Safety and Licensing
F. Cietek, Nuclear Engineer, PRA
T. Cleary, Licensing Supervisor
G. Closius, Licensing Engineer
C. Maxson, Manager, Nuclear Engineering, Site
D. Scott, Senior Engineer
H. Thompson, Contract Engineer

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Closed

05000423/2014008-02	NOV	Failure to identify and promptly correct a condition adverse to quality EA-14-092
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LIST OF DOCUMENTS REVIEWED

Procedures

C EN 118, "Turbine Driven Auxiliary Feedwater Pump Troubleshooting," Revision 1
MA-AA-103, "Conduct of Troubleshooting," Revision 13
MP 3762AB, "Terry Turbine Governor Control Valve Maintenance," Revision 4
MS-AA-PTE-401-1002, "Sampling Methodology for Material Acceptance," Revision 0
PI-AA-300, "Cause Evaluation," Revision 7
PI-AA-103, "Conduct of Troubleshooting," Revision 13
PI-AA-300-3001, "Root Cause Evaluation," Revision 5
PI-AA-300-3002, "Apparent Cause Evaluation," Revision 9
PI-AA-200, "Corrective Action," Revision 23
PI-AA-100-1013, "Fleet Challenge Process," Revision 1
SP 3622.3, "Auxiliary Feedwater Pump 3FWA*P2 Operational Readiness Test,"
Revision 017-28
WM-AA-101, "Work Order Planning," Revision 5

Drawings

Drawing 12179-EM-123A, "Piping and Instrumentation Diagram Main Steam and Reheat,
Sht. 1, Revision 59
Drawing 12179-EM-123A, Sht.2, "Piping and Instrumentation Diagram Feedwater System"
Revision 48

Drawing 12179-EM-123A, Sht. 3, "Piping and Instrumentation Diagram Condensate System"
Revision 25

Drawing 25212-29736, Sht. 1, "Governor Lever and Valve-Section," Revision D

Drawing 25212-32001, Sht. 7RF, "Elementary Diagram 125 VDC TDAFW Pump
Motor Speed Changer, Revision 12

Condition Reports

CR541414	CR539041	CR562807
CR540138	CR539064	CR581885*
CR551507	CR539142	CR581881*
CR563885	CR535411	CR581974*
CR538172	CR537862	CR582059*
CR538720	CR540227	CR581861

*Issued as a result of NRC inspection

Miscellaneous

Dominion Nuclear Maintenance/NSS Standards & Expectations Handbook

Drawing 25212-29736, Sht. 13, "Governor Setting with Woodward Governor – CAM Operated"

M-06-00244, "Root Cause Evaluation – Unit 3 Turbine Driven Auxiliary Feed water Pump Trip
(2006)"

Self-Assessment "Unit 3 TDAFW Pump 95001 Readiness Assessment," dated 2/15/15

ACE 019851, "NRC Green NCV for Unit 3 TDAFW Linkage", Revision 3

RCE 001111, "Millstone 3 Turbine Driven Auxiliary Feed Water Pump 3FWA*P2, Trips on
11/4/13, 12/18/13, and 01/23/14," Revision 2

RCE 001132, "Evaluation of Component Failure that Led to Millstone 3 Turbine Driven Auxiliary
Feed Water Pump, 3FWA*P2, Trips on 11/4/13, 12/18/13, and 01/23/14," Revision 1

RCE 001133, "Additional Organizational & Programmatic Issue Leading to Millstone 3 Turbine
Driven Auxiliary Feed Water Pump, 3FWA*P2, Trips on 11/4/13, 12/18/13, and 01/23/14,"
Revision 1

LIST OF ACRONYMS USED

ACE	Apparent Cause Evaluation
CAART	Corrective Action Assignment Review Team
CAP	Corrective Action Program
CARB	Corrective Action Review Board
CCDP	Conditional Core Damage Probability
CFR	Code of Federal Regulations
CRS	Central Reporting System
CRT	Condition Report Review Team
DCAC	Department Corrective Action Coordinator
IP	Inspection Procedure
IMC	Inspection Manual Chapter
IR	Inspection Report
LER	Licensee Event Report
NOV	Notice of Violation
NRC	U. S. Nuclear Regulatory Commission
OD	Operability Determination
OE	Operating Experience
RCE	Root Cause Evaluation
TDAFW	Turbine Driven Auxiliary Feed Water