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Duane Arnold Energy Center
Docket 50-331
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Technical Specification 5.6.6 Post Accident Monitoring (PAM) Report, October 2015

The purpose of this letter is to submit the attached report required by the Duane Arnold Energy Center Technical Specifications (TS) Section 5.6.6, Post Accident Monitoring (PAM) Report. This letter makes no new commitments or changes to any existing commitments.

A handwritten signature in black ink, appearing to be "T. A. Vehec", written over a horizontal line.

T. A. Vehec
Vice President, Duane Arnold Energy Center
NextEra Energy Duane Arnold, LLC

Enclosure: Technical Specification 5.6.6 Post-Accident Monitoring (PAM) Report,
October, 2015

cc: Administrator, Region III, USNRC
Project Manager, DAEC, USNRC
Resident Inspector, DAEC, USNRC

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Enclosure to NG-15-0315

Technical Specification 5.6.6 Post-Accident Monitoring (PAM) Report, October, 2015

3 pages follow

**Technical Specification 5.5.6 Post-Accident Monitoring
(PAM) Instrumentation 14-Day Report, October, 2015**

Background

On September 9, 2015 at 0154, while operating at 99% power, the Control Room was engaged in testing of CV4639, the Inboard Recirculation Sample Primary Containment Isolation Valve (PCIV) when a loss of Post Accident Monitoring (PAM) valve position indication occurred. This required an entry into a Technical Specifications (TS) inoperability condition for loss of CV4639 position indication.

No automatic actions such as PCI valve closure were prevented by the CV4639 open position indication failure. The position indication of CV4639 was considered Inoperable, which required an entry into TS Section 3.3.3.1, "Post Accident Monitoring (PAM) Instrumentation," Condition A, as Function 6 in Table 3.3.3.1-1 (PCIV position) was not Operable for CV4639. Condition A requires restoration of the required indication channel to an Operable status within 30 days. Resolution of the issue within 30 days (October 9, 2015) was not met, then requiring, per TS 3.3.3.1 Condition B, that a report be submitted within the following 14 days (October 23, 2015) in accordance with TS Section 5.6.6. "PAM Report".

The TS 5.6.6 PAM report requirement states the cause of the Inoperability is to be discussed along with plans for restoration. The report requirement also assumes the condition has not been corrected and as such calls for outlining alternate monitoring methods and their equivalency to the lost function, or a justification of non-equivalency. The current Operable but Degraded status of the function has removed the need for alternate monitoring but its potential use if further issues develop is briefly discussed.

Cause of the Inoperability

The most likely cause of the loss of the Control Room indication of CV4639 open position is a spring in the open position indicating limit switch that can have reduced force when operating in its current environmental conditions. This limit switch is located inside the Primary Containment within the drywell structure, so it is not accessible during plant operation. The cause analysis with extent of condition will be finalized when drywell entry is possible.

The CV4639 open position indicating limit switch was installed in October 2014 during a refueling outage. The manufacturer, NAMCO, submitted a 10CFR 21.21(d)(3)(i) (Part 21) report (Event Notification 51280) on July 31, 2015 documenting that one lot of springs that are internal to the limit switch model (EA180-31402) have a reduced spring force when in a continuous ambient temperature above 123 °F, meaning the limit switch

will not consistently return to its initial, unactuated position. In August, 2015 as part of the plant's Part 21 impact review, it was determined the open position limit switch of CV4639, installed October 15, 2014, was the sole plant component having a spring from the suspected lot. The switch is located in an area of the drywell where operating temperatures are between 130 °F and 145 °F during power operation. For CV4639, the "initial, unactuated position" corresponds to an illuminated red light. A work request was initiated as part of the Part 21 review to replace the limit switch during a plant shutdown when drywell access is permitted. There has been no plant shutdown since that time.

The indication provided by this limit switch is also used for valve closure time testing. After the September 9, 2015 event, troubleshooting and development of alternate methods for timing of the CV4639 closure stroke resulted in the valve being cycled 11 times. Intermittent operation of the red light was observed in the first 6 cycles. However, the red light consistently functioned as designed in the next 5 cycles and remained on when CV4639 was returned to the open position at the end of the cycling. The Part 21 notice states the reduced spring force only affects the switch's ability to return to its initial, unactuated position, not its ability to maintain the unactuated position. If the red light is on (unactuated) when the valve is open it is ensured that the light will remain on until the valve reaches its closed seat. The closing force of CV4639 overcomes the limit switch spring force to turn the red light off. The purpose of the (reduced force) spring in this application is to turn the red light back on after a full valve closure. CV4639 is maintained in the open (red) position during online operation (Modes 1, 2 and 3) except during quarterly testing. With the red light on, as is currently the case, the PAM function of verifying CV4639 closed upon a PCI signal can be successfully completed. Weekly panel checks, performed in the Control Room, monitor this indication and confirm that the red light is on. If the indication problem is not caused by the Part 21 condition and the red light is lost while the valve remains open, this would be noted during the weekly checks.

Based on the above, the limit switch was declared Operable but Degraded on October 19, given the equipment's functional performance and the apparent presence of a known Part 21 issue.

Alternate Method(s) of Monitoring

An Adverse Condition Monitoring Plan has been established to monitor the CV4639 Control Room open (red) indication whenever the valve is cycled. If the issue with the red light reoccurs, the open limit switch for CV4639 will be declared Inoperable and alternate monitoring will be implemented unless position indication can be restored. The outboard valve on the line, CV4640, is Operable, with Operable Control Room indication allowing for confirmation that the Primary Containment penetration has been isolated. Should there be simultaneous issues with both CV4639 and CV4640 valve

position indication, alternate monitoring to ensure the Primary Containment penetration has been isolated is available in the Control Room via a process computer point that monitors line flow for the Crack Arrest Verification system. Also, two flow indicating controllers located in a normally-accessible part of the Reactor Building can provide (no) flow indication for the line if ongoing conditions in the area allow.

Plans and Schedule for Resolving the Operable but Degraded Condition

Replacement of the limit switch for CV4639 to correct the condition identified in the NAMCO Controls Part 21 notice requires a plant shutdown with drywell entry. The limit switch will be replaced as opportunity allows and no later than the next scheduled refueling outage (currently October 2016).

Assessment of Safety Consequences:

The Primary Containment penetration in question is served by isolation valves CV4639 and CV4640 in series. Both of these valves receive a close signal when conditions require isolation of Primary Containment. Each of these PCIVs has position indication in the Control Room. The closed (green) and open (red) position indications remained Operable for CV4640, the Outboard Recirculation Sample PCIV. The closed (green) position indication also remained Operable for CV4639. The open (red) indication for CV4639 was returned to Operable but Degraded status after the 30 day LCO time of TS 3.3.3.1 Condition A was reached. When the CV4639 open position indication was not available, neither intermediate nor open CV4639 valve position was indicated in the Control Room.

With CV4640 and its position indication Operable, upon isolation of Primary Containment the Control Room operators would have been able to verify the closed (isolated) status of the penetration flow path. If CV4640 or its indication had been rendered Inoperable during the period when the CV4639 indication was also not Operable, the Control Room would not have been immediately able to verify the penetration flow path was closed. (Alternate indication, though available, was not readily apparent.) The loss of the CV4639 open indication represented a loss of redundancy with respect to the capability of verifying that Primary Containment isolation of the Recirculation sample line penetration had been achieved. The valve position indication is independent from valve operation, and the actual capability of CV4639 to isolate upon a PCI signal was not impacted.