

October 31, 2017

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SUBJECT: RESPONSE FROM THE NUCLEAR REGULATORY COMMISSION  
REGARDING THE ANCHOR DARLING DOUBLE DISC GATE VALVE  
INDUSTRY RESPONSE ACTIONS

Dear Mr. Krueger:

This letter is to acknowledge receipt of the letter from Mr. Joseph E. Pollock, Nuclear Energy Institute (NEI), to Mr. Brian E. Holian, Nuclear Regulatory Commission (NRC), dated October 26, 2017 (ADAMS Accession No. ML17303A030), as well as to provide the NRC's understanding of topics to be discussed in the forthcoming November 3, 2017, public meeting on the subject.

It is the NRC's understanding that the NEI Nuclear Strategic Issue Advisory Committee (NSIAC) has determined that each utility or site will evaluate their Anchor Darling Double Disc Gate Valves (DDGVs) that perform an active safety function in accordance with the industry guidance found in TP16-1-112, Revision 4, "Recommendations to Resolve Flowserve 10CFR Part 21 Notification Affecting Anchor Darling Double Disk Gate Valve Wedge Pin Failures," dated August 2017 (ADAMS Accession No. ML17243A137). Further, each utility or site will provide, via letter to the NRC, a listing of the above valves with the relevant valve information, including the results of the evaluation and the repair status or the repair schedule if susceptible valves have not yet been repaired.

The staff previously conveyed its understanding of the industry response to the Anchor Darling DDGV failures by letter dated July 31, 2017 (ADAMS Accession No. ML17208A014). Since that time, industry developed the guidance in TP16-1-112, Revision 4, "Recommendations to Resolve Flowserve 10CFR Part 21 Notification Affecting Anchor Darling Double Disc Gate Valve Wedge Pin Failures (Revision 4)" (ADAMS Accession No. ML17243A137). It appears that following guidance in TP16-1-112, Revision 4, will generate the information identified in the staff's July 31, 2017, letter. The NRC staff also understands that industry representatives are developing templates to facilitate consistent reporting of information by licensees, and would like to present the contents of the templates in a public meeting on November 3, 2017. The staff considers this to be an effective way to support this initiative.

The staff has reviewed TP16-1-112, Revision 4 and has several questions on application of the guidance and would like to discuss these in the meeting on the November 3, 2017. Specifically, the staff would like to understand the following:

1. TP16-1-112, Revision 4, states that a valve may be removed from susceptibility using the method in Attachment 4. Attachment 4 of TP16-1-112, Revision 4, includes guidance for

demonstrating that the wedge pin is capable of withstanding the shear forces generated by the motor operator. Assumption 4 of Attachment F states, "If necessary, credit for thread resistance may be taken to reduce the torque-induced shear load on the wedge pin provide that the valve being analyzed shows no indication of thread damage (e.g., no anomalous behavior from diagnostic trending that could potentially be attributed to thread / upper wedge threaded joint damage)..." However, in the report for the LaSalle special inspection on the Anchor Darling DDGV failure, "Lasalle County Station, Units 1 and 2 – Special Inspection Team Report and Exercise of Discretion; Inspection Report 05000373/2017009; 05000374/2017009" (ADAMS Accession No. ML17423A098), the inspection team concluded that "the stem rotation checks and valve diagnostic testing were not reliable indicators to determine if stem-to-wedge joint degradation had occurred, nor did these tests demonstrate that the valve would perform its safety function in the future." For valves that will credit friction, the staff would like to understand the following:

- A. The staff would like to understand any advancements in valve diagnostics, since the LaSalle special inspection that would support long term credit for thread friction.
  - B. It is not clear whether the diagnostic test of stem-to-wedge joint degradation is a one-time test or whether the valves are tested periodically. The staff would like to understand how often the valves in this category would be subject to diagnostics to confirm the absence of stem-to-wedge joint degradation, and the basis.
  - C. Attachment 4 of TP16-1-112 indicates that the assumed thread friction should be conservative. It further states, "Provided that the required friction coefficient values are reasonably low based on engineering judgement, then credit for thread friction is acceptable." The staff notes that the friction factor can vary widely and can be very low for wetted or greased metal-on-metal joints. The staff would like to understand how licensees should apply the guidance for the friction factor.
2. TP16-1-112, Revision 4, Attachment 10, defines Category A valves as high or medium risk with multiple design basis post-accident strokes and recommends repair within two years. It defines Category B valves as the remaining high or medium risk valves, implying that they have a design-basis post-accident function to open or close but not to stroke, and recommends diagnostic test or internal inspection within two years and repair within four years. The staff would like to understand the basis for a longer repair schedule for valves that have a function to open vs. valves that are required to stroke.
  3. American Society of Mechanical Engineers Operation and Maintenance Code Case OMN-1, "Alternative Rules for Preservice and Inservice Testing of Active Electric Motor Operated Valve Assemblies in Light-Water Reactor Power Plants," (or the equivalent mandatory appendix, depending on Code edition) can be applied to Anchor Darling DDGVs and permits, in part, diagnostic testing in lieu of quarterly stroke tests. Paragraph 6.4.4 states that the functional margin shall account for potential performance-related degradation, and that the test interval shall be set such that the functional margin does not decrease below the acceptance criteria. The staff would like to understand how the guidance in TP16-1-112, Revision 4, would be used for plants that use this code case.
  4. Attachment 10 of TP16-1-112, Rev. 4, indicates a distinction between "Applicable GL96-05 [Generic Letter 96-05, "Periodic Verification of Design-Basis Capability of Safety-Related Motor Operated Valves [MOVs]]" MOVs" and "Applicable Critical Non-GL96-05 MOVs." The staff noted that in Section V of TP16-1-112, Rev. 4, Priority 1d is defined as "Applicable

Valves deemed Critical by the Plant (not GL 96-05)..." However, TP16-1-112, Rev. 4 does not provide criteria for licensees to define "Critical." The staff would like to understand the criteria licensees will use to determine whether a valve is considered "Critical."

5. Attachment 10 of TP16-1-112, Rev. 4 states that for "Applicable Critical Non-GL96-05 MOVs with symptoms of active stem wedge connection degradation," the recommended action is to repair or replace the valve within two years or to continue periodic diagnostic testing at the "Owners Discretion." The staff would like to understand the basis owners will use to decide whether to leave valves in this category in service.
6. GL 96-05 relies on the risk ranking that was performed for GL 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance." Industry owners groups developed guidance documents to address GL 89-10. One example is Topical Report NEDC 32264 (Rev.2), "Application of Probabilistic Safety Assessment [PRA] to Generically Letter 89-10 Implementation." NEDC 32264 (Rev. 2) recommends that licensees use an expert panel to provide qualitative insights for the effects of MOV failure with respect to external events such as fires, floods, and earthquakes, as well as during shutdown. Many licensees have updated their PRAs to address these hazards. The staff would like to understand whether licensees will include the insights from these PRAs when identifying the population of "applicable MOVs" (e.g., in the population of non-GL 96-05 valves, and potentially including non-safety-related MOVs).

The staff will provide a separate response following a more in-depth evaluation of the October 26, 2017, letter and the outcome of the public meeting. The staff looks forward to the November 3, 2017, meeting to understand whether industry is providing sufficient information to permit independent staff review of industry's corrective actions for this issue.

If you have questions concerning this letter please contact Stewart Bailey of my staff at [Stewart.Bailey@nrc.gov](mailto:Stewart.Bailey@nrc.gov) or 301-415-1321.

Sincerely,

*/RA/*

John W. Lubinski, Director  
Division of Engineering  
Office of Nuclear Reactor Regulation

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REGARDING THE ANCHOR DARLING DOUBLE DISC GATE VALVE  
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**NRR-106**

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