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NUCLEAR ENERGY INSTITUTE

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Mr. John Lubinski
Director, Division of Engineering
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Response to NRC Questions Regarding Application of the Industry Methodology Associated with Anchor Darling Double Disc Gate Valves

Project Number: 689

References:

(1) Letter, J. Lubinski (NRC) to G. Krueger (NEI), Response from the Nuclear Regulatory Commission Regarding the Anchor Darling Double Disc Gate Valve Industry Response Actions , dated October 31, 2017

(2) Letter, L. Hill (Boiling Water Reactor Owners Group) to US NRC, Submittal of TP16-1-112R4, Recommendations to Resolve Flowserve 10CFR Part 21 Notification Affecting Anchor Darling Double Disc Gate Valve Wedge Pin Failures, dated August 29, 2017

Dear Mr. Lubinski:

On behalf of the nuclear energy industry, the Nuclear Energy Institute (NEI)[1] is providing responses to NRC questions cited in Reference 1 and discussed during the Anchor Darling Double Disc Gate Valve public meeting held on November 3, 2017.

Question 1:
TP16-1-112, Revision 4 (Reference 2), 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

[1] The Nuclear Energy Institute (NEI) is the organization responsible for establishing unified industry policy on matters affecting the nuclear energy industry, including the regulatory aspects of generic operational and technical issues. NEI's members include all entities licensed to operate commercial nuclear power plants in the United States, nuclear plant designers, major architect/engineering firms, fuel cycle facilities, nuclear materials licensees, and other organizations and entities involved in the nuclear energy industry.

of Attachment 4 states, "If necessary, credit for thread resistance may be taken to reduce the torque-induced shear load on the wedge pin provided 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:

Question 1A: 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.

Response: *The diagnostic test data collected from the LaSalle disc-to-stem separation event was included in TP16-1-112, R4. This diagnostic test data includes thrust / torque profiles indicative of "active degradation" of the stem / upper wedge joint. Stem rotation checks are recommended to be performed in conjunction with the diagnostic test. TP16-1-112, R4, provides a maximum allowable stem rotation of 5 deg (specific guidance for how to perform stem rotation checks has been included as Attachment 7 of the TP16-1-112, R4). The combination of these two activities provides assurance that the stem-upper wedge joint integrity has been maintained and the threads are not compromised.*

In addition to the above, TP16-1-112, R4, recommends that stations have a bias towards repair versus acceptance (i.e., stations should take aggressive corrective action should any anomalous behavior be observed that could potentially be attributed to "active degradation" of the threaded stem / upper wedge joint integrity). It should be noted that for all GL 96-05 valves, the diagnostic testing / stem rotation checks allow the final repair / resolution to be extended up to a maximum of six years (3RFO) depending on the risk / safety function of that particular valve (maximum repair interval in accordance with TP16-1-112, R4, Attachment 10).

Question 1B: 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.

Response: *The diagnostic test (including stem rotation check) is recommended to be conducted periodically for all GL 96-05 valves, regardless whether the underlying condition has been resolved. Specific guidance from TP16-1-112, R4, on the diagnostic testing frequency is as follows:*

a. *If considered to be susceptible, Stem Rotation Check and Diagnostic Testing would be performed every refuel outage until final repair is complete (note maximum repair intervals vary depending on risk and are in accordance with TP16-1-112, R4, Attachment 10).*

b. *If considered to be not susceptible, the stem rotation check would be performed at the GL96-05 periodic verification (diagnostic testing) interval. (New with TP16-1-112, R4).*

Question 1C: 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.

Response: *Recent testing conducted by Kalsi Engineering (Doc 3436C, R0) determined a conservatively low friction for the threaded interface for lubricated and non-lubricated connections in both water and air. Should a utility credit thread friction, it would be reasonable to utilize the minimum thread coefficient of friction contained in this document (note: zero thread friction is most conservative). Alternatively, utilities may justify a different coefficient of friction based on their own testing and / or analysis given sound engineering basis is established. No specific thread friction value is recommended by TP16-1-112, R4.*

Question 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.

Response: *Category A MOVs that are required to function for multiple design basis strokes (O-C), (O-C-O), (C-O-C) etc. are considered to be more vulnerable to this issue than a Category B MOV with a single design basis stroke with no evidence of "active degradation" preceding it. There is no operating experience that would suggest that a susceptible MOV would experience a stem-disc separation without some precursor evidence of "active stem/wedge degradation".*

Question 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.

Response: *Revision 4 of the guidance document works collaboratively with OMN-1. Revision 4 recommends performing periodic stem rotation checks for all valves in the scope of GL 96-05 (e.g., those MOVs with active safety functions) to verify joint integrity is maintained on an interval synonymous with the OMN-1 (or GL 96-05) prescribed diagnostic testing interval. Should these checks / tests indicate an "active degradation" issue, the corrective action process would drive the appropriate resolution. In addition to the above, those valves that are subject to the OMN-1 code case also have to meet the obturator verification provisions of the ASME OM Code, Subsection ISTC.*

Question 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."

Response: *It is expected that the licensees use their own definition as to what constitutes a "critical" component. It should be reiterated that this set of Critical MOVs have no active safety function and are excluded from GL 96-05.*

Question 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.

Response: *Per the Attachment 10 guidance in Revision 4 of the document, the decision to leave valves in service that fall in the category of "Applicable Critical Non GL 96-05 MOVs with symptoms of active stem wedge connection degradation" would be evaluated using the applicable Operational Decision Making process to justify the risk of not repairing. No additional guidance was provided by Revision 4 for valves that do not have active safety functions.*

Question 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).

Response: *The intent of Revision 4 was not to redefine the existing GL 89-10/96-05 component risk ranking but, rather, use the existing risk ranking licensees have established in addressing this issue.*

NEI continues to coordinate with industry organizations to assure effective communications and completion of the NSIAC supported actions. We will also continue our interactions with the NRC to provide updates on the status of industry progress and address any identified concerns or information needs.

If you have any questions, please contact me at 202.739.8099; gak@nei.org.

Sincerely,

Greg Krueger

c: Stewart Bailey