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Office of Nuclear Reactor Regulation

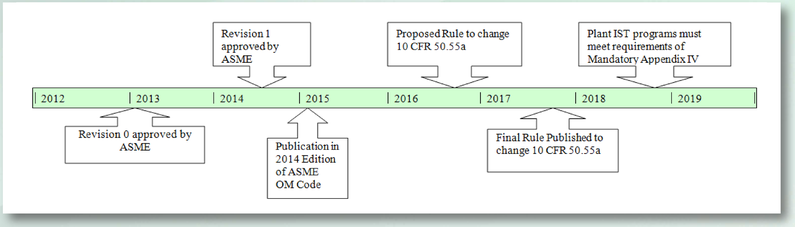
NRC Perspectives on Recent Developments in Inservice Testing of Air-Operated Valves

Background: Air-Operated Valve (AOV) History

- The U.S. Nuclear Regulatory Commission (NRC) has been working on issues associated with Air-Operated Valves (AOVs) for several decades.
- AOVs were included in Generic Safety Issue (GSI) 158, "Performance of Safety-Related Power-Operated Valves under Design Basis Conditions."
- Regulatory Issue Summary (RIS) 2000-03 documented the resolution of GSI-158 and stated that the NRC would continue to work with industry on these issues.
- Efforts have resulted in the development of Mandatory Appendix IV, "Preservice and Inservice Testing of Active Pneumatically Operated Valve Assemblies in Light-Water Reactor Power Plants."

ASME OM Code, Mandatory Appendix IV: Development, Publication, and Approval

- Mandatory Appendix IV, Revision 0, was approved by ASME in 2013.
- ASME OM Subgroup on Air-Operated Valves (SG-AOV) is currently developing Revision 1 of Mandatory Appendix IV.
- Mandatory Appendix IV will be included in 2014 Edition of the ASME OM Code.
- Publication in the ASME OM Code begins official NRC review process for incorporation by reference in Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a, "Codes and Standards."
- NRC conditions (if any) on the use of Mandatory Appendix IV will be determined during NRC rulemaking process.
- Final Rule incorporating the 2014 Edition of the ASME OM Code is currently expected by October 2017 (tentative).
- Plants with inservice testing intervals starting on or after October, 2018 will need to implement the requirements of Mandatory Appendix IV.
- Meeting the new review requirements will require significant work prior to the start of the inservice test interval.



New Requirements

- Mandatory Appendix IV imposes new requirements on the inservice testing of AOVs.
- Industry is considering development of an implementation guide for these new requirements.

Design Review

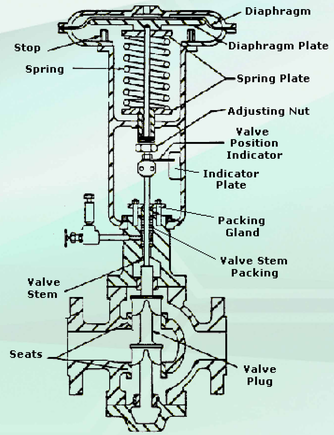
- A design review is required for each AOV to meet its intended function and establish design basis.
- One of the following methods must be used to verify design-basis:
  - Test at or near design basis conditions (in situ or prototype facility)
  - Analytical techniques where justified by an engineering evaluation
  - Data from other valves if justified by an engineering evaluation
  - Grouping at plant with similar valves
  - Operating experience for certain valve types

Diagnostic Testing

- Mandatory Appendix IV requires a Preservice Test and Inservice Diagnostic Tests every 3 refueling cycles or 6 years (whichever is longer).
- If normal operation provides adequate demonstration, Diagnostic Testing may be omitted provided that periodic cycling conditions meet or exceed the design-basis conditions.
- Grouping of AOVs for inservice diagnostic testing is allowed.

Risk Categorization (Optional)

- Mandatory Appendix IV allows categorization of valves as high safety-significant component/low safety-significant component (HSSC/LSSC) using a risk-categorization technique.
- Regular Diagnostic Testing required for HSSC AOVs.
- Regular Diagnostic Testing not required for LSSC AOVs



Relief Request Process

- Licensees may request relief from or alternative to requirements as per 10 CFR 50.55a(a)(3) and 50.55a(f)(6)(i), respectively.
- Relief or alternative requests from requirements of the 2014 Edition (including Appendix IV) would require review and approval prior to the start date of the 120-month IST interval.
- For new or complex relief requests, the NRC recommends early submittal of relief request to ensure adequate review time.

NRC Oversight of Programs

- Direct NRC oversight of IST programs is handled by regional NRC staff and resident inspectors.
- NRC Headquarters staff serves as a technical point of contact for resident inspectors when questions about the IST program or operability arise in the field.
- The NRC periodically reviews operating experience to monitor effectiveness of programs and policies.

Summary / Takeaways

- Mandatory Appendix IV will appear in the 2014 Edition of the ASME OM Code.
- NRC approval of Mandatory Appendix IV is expected by October 2017.
- Plants with inservice testing intervals beginning a year after approval will need to meet the new requirements contained in Mandatory Appendix IV.
- Meeting the new requirements for AOVs may require significant work ahead of inservice test intervals that are subject to the requirements of Mandatory Appendix IV

Contact / Questions?

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