



U.S. NRC

UNITED STATES NUCLEAR REGULATORY COMMISSION

Protecting People and the Environment

Nuclear Industry Check Valve Regulatory Activities

Michael F. Farnan

Component Performance, NDE & Testing Branch

Division of Engineering

Office of Nuclear Reactor Regulation

U.S. Nuclear Regulatory Commission

ASME OM Code Check Valve Subgroup / NIC Meeting

June 2016

Disclaimer

- This presentation was prepared by staff of the U.S. Nuclear Regulatory Commission (NRC). It may present information that does not currently represent an agreed upon NRC staff position. NRC has neither approved nor disapproved the technical content.

Current NRC Activities

- 10 CFR 50.55a Rulemaking
- Regulatory Guide (RG) Update – OM Code Case Acceptability
- NUREG-1482 Revision 2 “Guidelines for Inservice Testing at Nuclear Power Plants”
- ASME Related Generic Communications issued

10 CFR 50.55a Rulemaking

- Rulemaking for ASME OM Code 2009 Edition, 2011 Addenda, and 2012 Edition completed
- Published in the Federal Register and issued for public comment September 2015
- Public comment period ended 12/2/2015
- NRC staff working on addressing public comments
- Final rule tentatively issued in Fall 2016
- Currently reviewing ASME OM Code 2015 Edition for next rule making

10 CFR 50.55a Rulemaking

- Draft rulemaking for 2015 Edition scheduled to be published and issued for public comment Fall 2016
- Final rulemaking scheduled to be published Fall 2017
- Items of interest being considered include:
 - Periodic verification of design basis capability of high safety significant air-operated valves and hydraulic operated valves
 - Add NRC plan submittal and reporting requirements consistent with current edition of OM Code
 - Revise 10 CFR 50.55a(f)(4)(i) and (ii) and (g)(4)(i) and (ii) to relax the time schedule for complying with latest edition and addenda of the ASME OM or BPV Codes from 12 months to 18 months before the applicable milestones in these paragraphs

Reg Guide 1.192 Operation and Maintenance Code Case Acceptability, ASME OM Code

- Regulatory guide lists OM Code Cases that are acceptable to the NRC for implementation in the Inservice Test (IST) of light-water-cooled nuclear power plants
- Revision 2 to RG 1.192 (ASME OM Code Cases, 2009-2012 Edition / Addenda) – scheduled to be issued following incorporation 2009 Edition, 2011 Addenda and 2012 Edition into 10 CFR 50.55a currently scheduled to be final Fall 2016

NUREG-1482 Revision 2

- NUREG publications consist of reports or brochures on regulatory decisions, results of research, results of incident investigations, and other administrative information.
- Regulatory Guides provide guidance to licensees and applicants on implementing specific parts of the NRC's regulations, techniques used by the NRC staff in evaluating specific problems or postulated accidents, and data needed by the staff in its review of applications for permits or licenses.

NUREG-1482 Rev 2 – Check Valves

- NRC staff considers check valves and other automatic valves designed to close without operator action to be active
- ASME OM Code defines valves that are self actuating in response to some system characteristic such as flow direction for fulfillment of the required function(s) as Category C valves
- Category C check valves that must also be leak tight would be designated as Category A/C

NUREG-1482 Rev 2 – Check Valves

- **Grouping:**
 - Grouping check valves in multiple nuclear power plants is acceptable provided plants are identical and the grouped valves have similar operational experience and meet the grouping criteria of OM Code
 - Generic problem identified during disassembly and inspection of a valve part of a group would require all valves in group to be inspected
 - Valves grouped in other plant would require inspection. May be deferred to next refuel outage unless licensee's evaluation of the problem indicates it could impact safety of continued operation

NUREG-1482 Rev 2 – Check Valves

- **Non-Intrusive Techniques:**
 - Licensee may use non-intrusive techniques for IST of check valves
 - Non-intrusive technique must be qualified in accordance with plant's quality assurance program
 - A qualified non-intrusive technique is one that has been successfully and reliably demonstrated for the examination method and the specific valve application
 - Licensee may qualify the technique, or subcontract it to a vendor, or rely on results of NIC evaluation of non-intrusive diagnostic techniques for check valves
 - Qualification technique shall be documented

NUREG-1482 Rev 2 – Check Valves

- **Full Flow Testing**
 - IST full flow testing of check valves may be verified by passing the necessary flow through the valve to perform its function. This is considered an acceptable full-stroke. Any flow rate less than is considered a partial stroke exercise.
 - Alternatives to direct flow measurement may be acceptable.
 - For example, indirect measurement such as change in tank level over specified period of time
 - Some form of quantitative criteria should be established to demonstrate full stroke capability

NUREG-1482 Rev 2 – Check Valves

- Alternatives to Full Flow Testing
 - Alternative techniques for meeting Code requirements must be authorized by NRC staff pursuant to 10 CFR 50.55a(z)(1)
 - Alternative test must be quantifiable and repeatable and meet the intent of the ASME OM Code
 - A description of the alternative technique or method and basis for acceptance criteria must be included in the alternative request to the NRC
 - Non-intrusive techniques could be applied in the alternative

NUREG-1482 Rev 2 – Check Valves

- **Disassembly and Inspection Alternative to Flow Testing**
 - Should involve grouping similar valves of same design, manufacturer, size, model #, materials of construction, and same service conditions
 - At least one valve from group should be disassembled and examined each refuel outage; all valves in each group shall be disassembled at least once every 8 years
 - Disassembly/Inspection must be qualified to evaluate the condition of the valve and to assess its continued operability
 - Licensee responsible for development and implementation of program to ensure IST personnel are properly trained and qualified. Licensees should implement ANSI/ASME N45.2.6 “Qualifications of Inspection, Examination, and Testing Personnel for Nuclear Power Plants.”

NUREG-1482 Rev 2 – Check Valves

- **Permissible Leak Rates**
 - ISTC-3630(e) requires that leakage rate measurement shall be compared with permissible leakage rate specified by the licensee for valve or valve combination
 - Licensee should set leak rate limits within certain bounds
 - Appropriate permissible leakage rates can only be developed and refined by analyzing and trending leak rate data for specific valves or similar valves at other plants therefore NRC staff has not provided specific guidance
 - Licensees should document their methods for establishing initial permissible leak rates and procedures for verifying compliance with the leak rate limits.

NUREG-1482 Rev 2 – Check Valves

- Testing and Examination of Check Valves using Manual Mechanical Exercisers
- Acceptance criteria is specified by the owner
- Owner should consider:
 - Interactions of wear and effects of the valve parts on friction forces (hinge wear, packing changes over time, leakage control adjustments, etc.)
 - Preventive maintenance activities

NUREG-1482 Rev 2 – Check Valves

- Check Valve Bidirectional Testing and Condition Monitoring Program
 - Bidirectional testing ensures a CV is adequately tested regardless of its safety function
 - Condition Monitoring (CM) provides option to standard ASME OM Code test requirements
 - NRC considers CM to be improvement and encourages licensees to implement the alternative (Appendix II)
 - NRC considers testing or examination of the check valve obturator movement to both the open and closed positions necessary to assess its condition and confirm acceptable valve performance

ASME Relate Generic Communications

- **Bulletins (BL)**
 - None
- **Generic Letters (GL)**
 - None
- **Information Notices (IN)**
 - IN 2015-13 “Main Steam Isolation Valve Failure Events”
(12/10/2015)
- **Regulatory Issue Summaries**
 - RIS 2016-01 “Nuclear Energy Institute Guidance for the Use of Accreditation in Lieu of Commercial Grade Surveys for Procurement of Laboratory Calibration and Test Services”
(3/16/2016)

ASME Relate Generic Communications

- Regulatory Issue Summaries (cont'd)
 - RIS 2016-03 “10 CFR 50.59 Issues Identified in NRC’s San Onofre Steam Generator Tube Degradation Lessons Learned Report” (4/13/2016)
 - RIS 2016-05 “Embedded Digital Devices in Safety-Related Systems” (4/29/2016)

QUESTIONS?

Future Questions

Michael.Farnan@nrc.gov

301-415-1486