



# **Power-Operated Valve Inspections Lessons Learned Public Meeting**

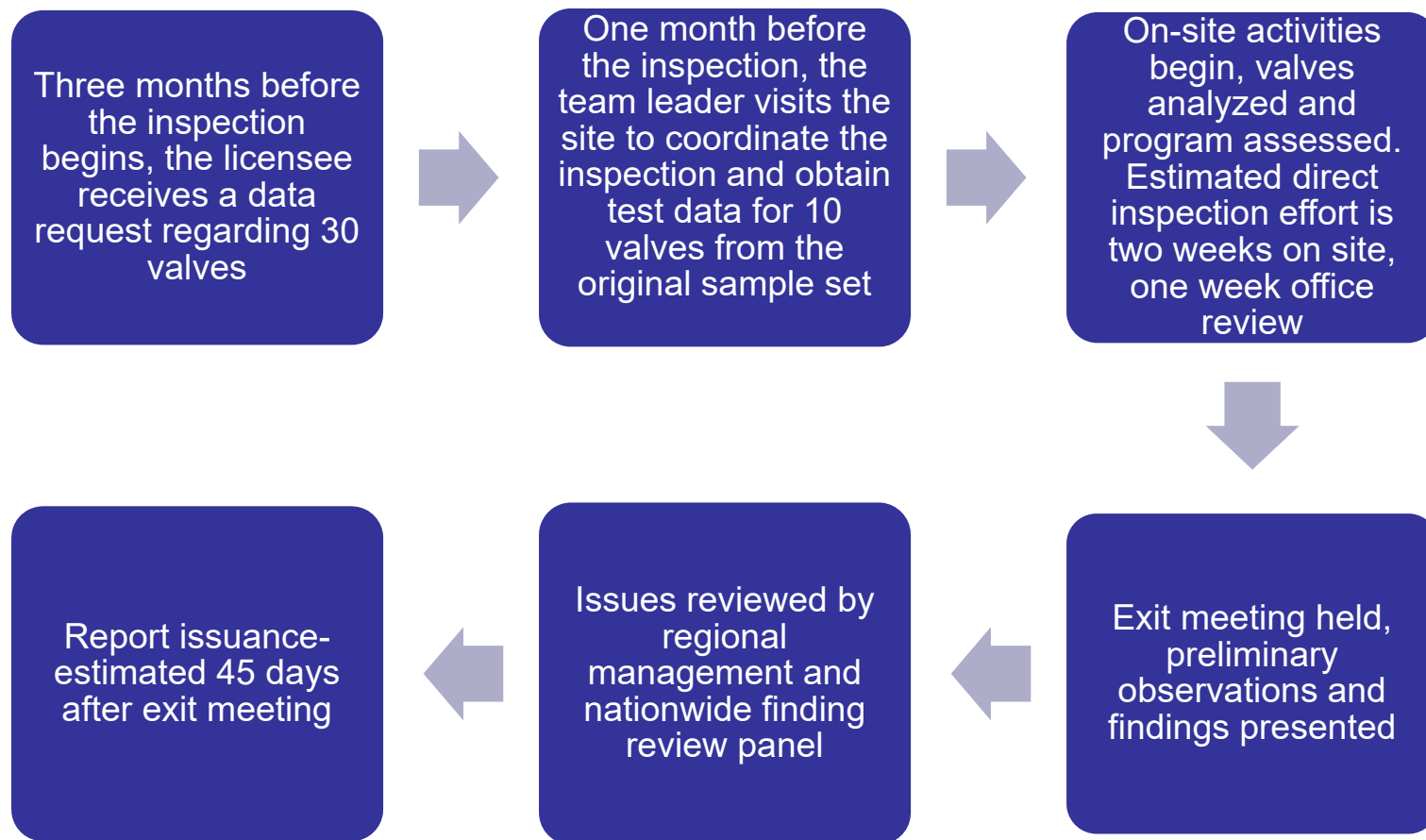
Douglas Bollock, Kenneth Kolaczyk,  
Thomas G. Scarbrough and Michael F. Farnan  
U.S. Nuclear Regulatory Commission  
December 8, 2020



# POV Lessons Learned Public Meeting Agenda

- Review the status of Power-Operated Valve (POV) inspection program
- Discuss issues identified and lessons learned from the completed POV inspections
- Question and Answer Period

# Inspection Process Flow





# POV Inspection Status

- 14 POV Inspections completed in 2020.
- Many inspections were conducted using remote means due to COVID-19.
- Many remote inspections conducted walkdowns onsite, or used resident inspectors as proxy in conducting walkdowns.





## **POV Inspection Status (continued)**

- Early communications between NRC inspectors and licensee staff were instrumental in focusing the inspection on safety significant and risk informed valve samples.



# Enablers of Success

- Identified singular technical and programmatic points-of-contact within the NRC.
- Enhanced training for inspectors was developed (both technical and inspection implementation focused).
- Enhanced Interactive SharePoint Site developed.
- Tabletop dry runs performed with Minor/more-than-minor examples discussed.
- Utilized an NRC inspector findings review panel after each inspection.
- Incorporated lessons learned from Environmental Qualification inspections.

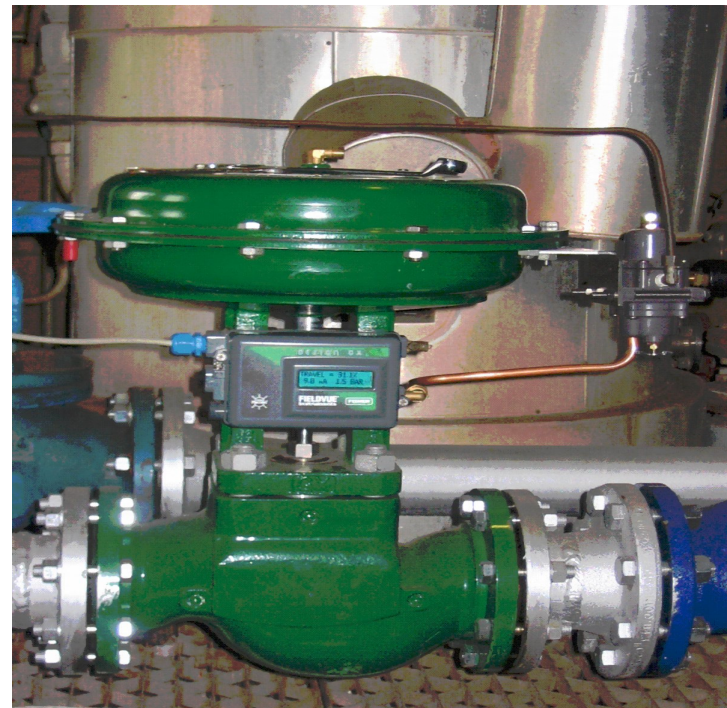


# Implementation of POV Inspections - Findings

- 8 Green Non-Cited Violations (NCVs) identified
- Multiple minor and licensee identified violations
  - Many licensee identified violations were found using experience from first two POV inspections



## Issues found during POV Inspections





## Issues Noted or Old Lessons not Being Learned

1. IST Programs were not fully consistent with the *ASME Operation and Maintenance of Nuclear Power Plants* (OM Code) as incorporated by reference in 10 CFR 50.55a for POVs within the scope of the ASME OM Code. Licensees need to update their IST Program Plans every 120 months including appropriate POV risk rankings for risk-informed approaches.



## Issues Identified

2. Some licensees did not address the ASME OM Code, Appendix III, requirement for a mix of static and dynamic testing of motor-operated valves (MOV's). For MOV's within Joint Owners Group (JOG) program scope, licensees may rely on dynamic testing conducted as part of JOG program to satisfy Appendix III requirement for a mix of static and dynamic testing.



## Issues Identified

3. Licensee modified their original plans in their response to GL 96-05 (e.g., not implementing certain provisions of the JOG program), which invalidated supporting NRC safety evaluation. To modify a GL 96-05 program, a licensee should follow its NRC-accepted commitment change process and notify the NRC in accordance with that process.



## Issues Identified

4. Some licensees were not properly determining the operating requirements for POVs to perform their safety functions.
  - For example, appropriate parameters for calculating valve operating requirements and actuator capability (such as valve friction coefficients, maximum differential pressure conditions, motor torque temperature derating factors, stem friction coefficients, and butterfly valve bearing friction coefficients) need to be adequately addressed.



## Issues Identified

5. Some licensees incorrectly assumed that the valve friction coefficients determined for MOVs as part of the JOG Program on MOV Periodic Verification represented a database of friction coefficients that can be applied in general to calculate the thrust and torque required to operate various MOVs under design-basis conditions.



## Issues Identified

6. Some licensees had not established methods to periodically demonstrate the design-basis capability of their MOVs that are JOG Category D valves (valves outside JOG scope). Static diagnostic testing **does not** provide information on the operating requirements related to differential pressure and flow.



## Issues Identified

7. Some licensees that evaluated MOVs using the Electric Power Research Institute (EPRI) MOV Performance Prediction Methodology (PPM) did not address all of the applicable provisions when implementing the EPRI MOV PPM to determine valve operating requirements.



## Issues Identified

8. Some confusion exists in the nuclear industry with respect to the justification for increasing the thrust ratings for certain Limitorque motor actuators. For example, Limitorque Technical Update 92-01 allows 140% actuator thrust rating with conditions, while some licensees assumed a higher thrust increase.



## Issues Identified

9. Some POV testing was not conducted properly and results not adequately evaluated to demonstrate the POVs can perform their safety functions. For example, POV test acceptance criteria must be properly translated from design calculations to test procedures.



## Issues Identified

10. Some licensees with MOVs that have a safety function to close are setting the motor control switch trip circuit to be controlled by the limit switch gear train instead of the torque switch.
  - For example, some licensees were conducting static testing of limit switch controlled MOVs associated with 10 CFR Part 50, Appendix J, containment leakage testing in assuming the periodic verification of design basis capability.



## Issues Identified

11. Some licensees did not provide additional attention to the qualified life of POVs installed in their nuclear power plants.
  - For example, valve assemblies assumed to be acceptable for exceeding the specific number of cycles in their qualified life need to have the provisions specified in the EPRI guidance for extending cycle life fully addressed.



## Issues Identified

12. Some licensees did not properly implement the guidance provided by the Boiling Water Reactor Owners Group (BWROG) when assessing the susceptibility for separation of the stem-disk connection in Anchor/Darling double-disk gate valves.





## Issues Identified

13. There appears to be confusion in the nuclear industry with respect to the condition in 10 CFR 50.55a(b)(3)(xi), “OM condition: Valve Position Indication,” associated with ISTC-3700, “Position Verification Testing,” in Subsection ISTC of the 2012 Edition, and later editions, of the ASME OM Code. The NRC regulations require implementation of the condition upon updating the IST Program to the 2012 or later edition of the ASME OM Code.

## Issues Identified

### 14. Inspectors found issues with POV preventive maintenance.

- For example, some licensees did not justify their lubrication interval for the MOV stem where brittle or degraded lubrication grease was identified. Also, some licensees have MOVs installed with the limit switch compartment oriented vertically downward, which might result in grease or seal leakage onto internal electrical subcomponents.



## Summary

- Our POV program inspections effort was an appropriate design bases assurance area to review (following the Environmental Qualification inspection program).
  - Confirmed widespread compliance with NRC rules and regulations.
  - Identified isolated instances where lessons learned were not incorporated into licensee POV programs.



## Going Forward

- NRC staff considering methods to communicate the POV inspection lessons learned.
- Complete implementation of POV inspections through the inspection cycle.
- Review, assess and communicate any new lessons learned going forward.

# Q & A Session





**For additional information,  
contact**

**Doug Bollock**

**[Douglas.Bollock@nrc.gov](mailto:Douglas.Bollock@nrc.gov)**

**Ken Kolaczyk**

**[Kenneth.Kolaczyk@nrc.gov](mailto:Kenneth.Kolaczyk@nrc.gov)**

**Tom Scarbrough**

**[Thomas.Scarbrough@nrc.gov](mailto:Thomas.Scarbrough@nrc.gov)**

**Mike Farnan**

**[Michael.Farnan@nrc.gov](mailto:Michael.Farnan@nrc.gov)**