



**U.S. NRC**

UNITED STATES NUCLEAR REGULATORY COMMISSION

*Protecting People and the Environment*

# **Operating Experience Air Operated Valve Failure Study**

Michael F. Farnan

Component Performance, NDE & Testing Branch

Division of Engineering

Office of Nuclear Reactor Regulation

U.S. Nuclear Regulatory Commission

IST Owners Group

December 2014



## AOV Failure Study

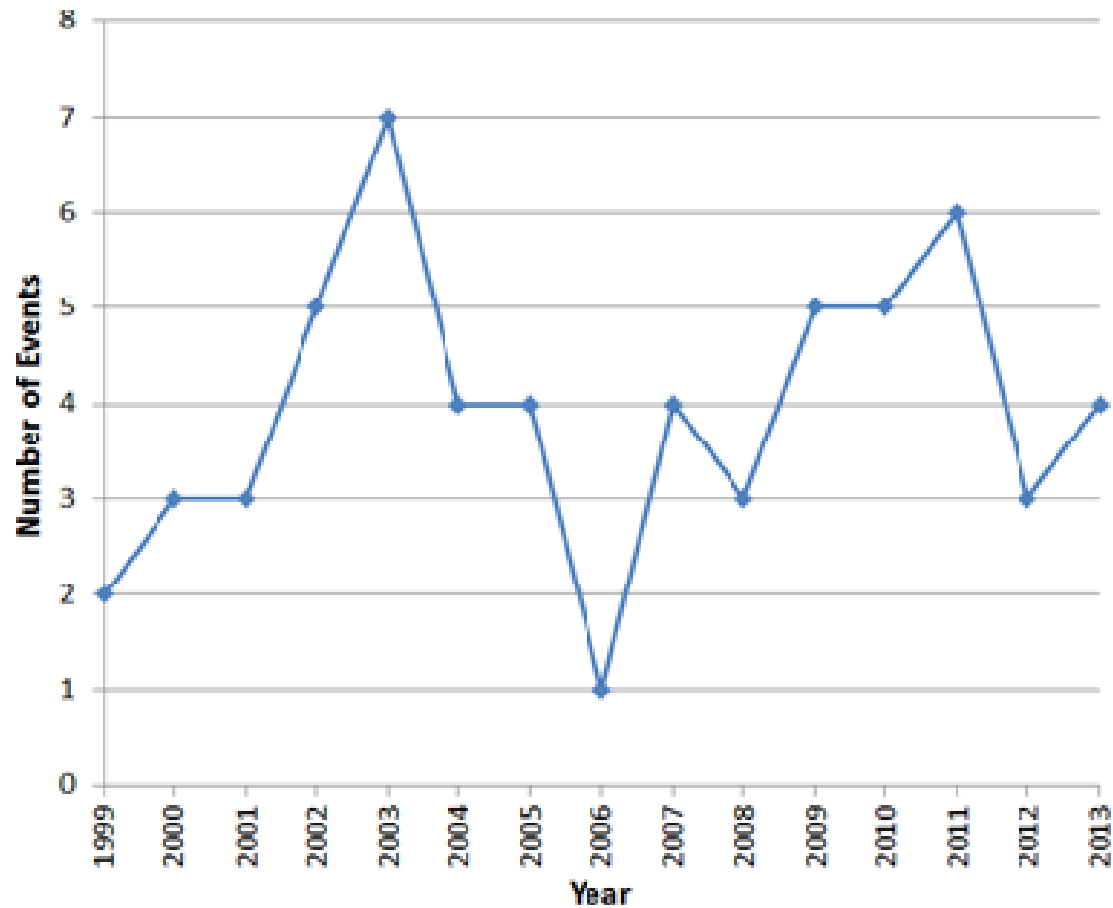
- Review INPO ICES database for the last 15 years (4/9/1999 to 4/9/2014)
- ICES search criteria:
  - Component Type = Valves, dampers
  - Component Type = Valve Operators
  - Sub Component Type = Valves, dampers – Operator – Pneumatic (Diaphragm or Cylinder) (AOV)
  - Text Exact Phrase = Failed to Open
  - Text Exact Phrase = Failed to Close



## **AOV Failure Study**

- 253 records captured for valves (gate, globe, butterfly, ball) Check valves not captured
- 86 events might have benefitted from a baseline and/or periodic diagnostic test
- The 86 events were reviewed for component being in IST program
- 59 events in IST program that might have benefitted from a baseline and/or periodic diagnostic test (28 additional IST events were not included due to solenoid valve failure because diagnostics would not identified)

## 59 Failure Event Distribution by Year





## 59 Failure Events – Valve Types

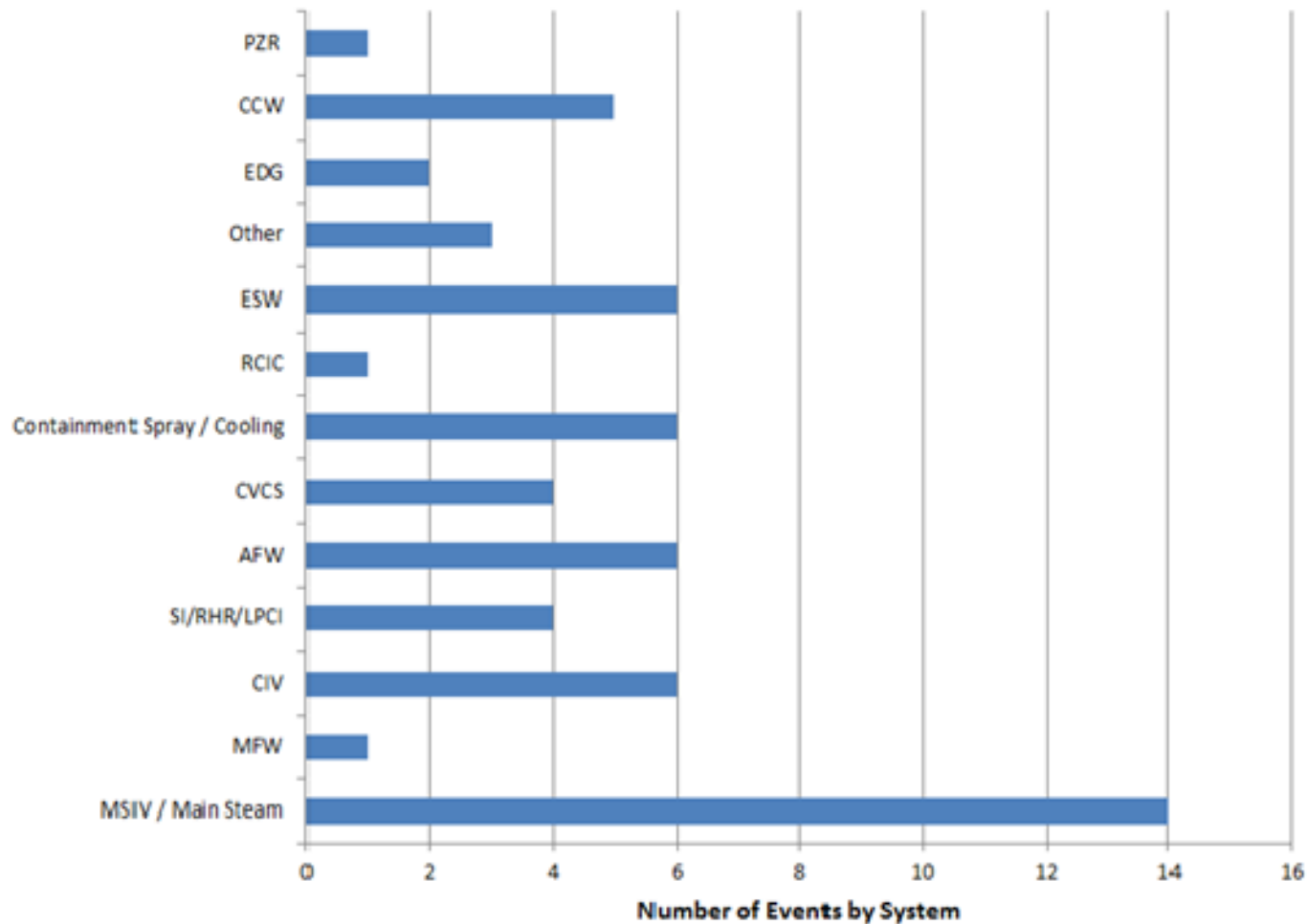
- Globe – 22
- Gate – 16
- Butterfly – 13
- Ball – 2
- Unknown - 6



## 59 Failure Events – Apparent Cause

- Accessories – 11 Events
  - solenoid, air supply, lubricant, supporting equipment, maintenance errors
- Design – 20 Events
  - Inadequate design, improper setup, low margin, PLTB
- Mechanical – 28 Events
  - Binding, corrosion, fouling, wear, FME

## 59 Failure Event Distribution - Systems





# QUESTIONS?

**Future Questions**

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

**301-415-1486**