

# Semi-Annual DNFSB Briefing on 242-A Evaporator Safety Bases

Prepared for the U.S. Department of Energy  
Assistant Secretary for Environmental Management



**P.O. Box 450**  
**Richland, Washington 99352**

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The logo for the Office of River Protection features the text "Office of River Protection" in a bold, sans-serif font. The text is set against a background of a stylized, wavy river or water surface, rendered in shades of gray and white.

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**APPROVED**  
*By Janis Aardal at 9:12 am, Oct 17, 2023*

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# THE HANFORD SITE

## **Semi-Annual DNFSB Briefing on 242-A Evaporator Safety Bases**

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*September 19, 2023*

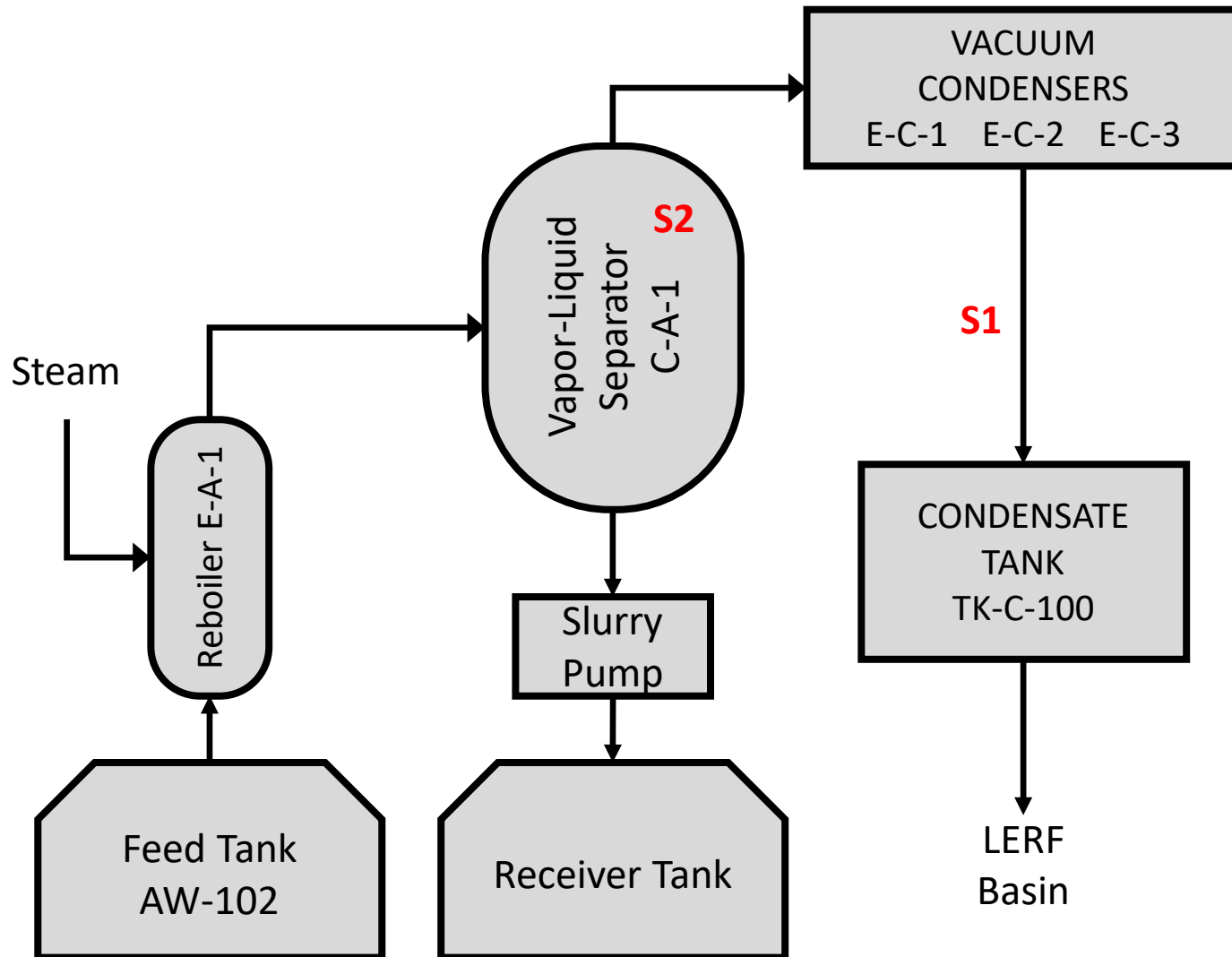
- Safety share
- Kick-off (DOE-ORP)
- Background
- Process & Hazards
- Interim Controls
- Planned Improvement Controls
- Questions



- 2021 – 2022: Series of Q/A sessions with DNFSB staff
- 7/19/2022: DNFSB letter regarding concerns
- 4/17/2023: DOE Letter to DNFSB with interim controls and planned improvements
- 6/27/2023: DNFSB letter requesting semi-annual briefings covering
  - Design, procurement, and installation of the planned improvements
  - Any emergent technical issues and funding constraints
  - Compensatory measures or interim controls to be used

- The safety posture at 242-A is continuously improving
- Current safety basis revisions include:
  - Improvements to safety instrumented systems (SISs)
  - Safety significant seismic switches
  - Further interim controls developed for hazards of concern
- Planned improvements will implement full engineered controls for fire and seismic events



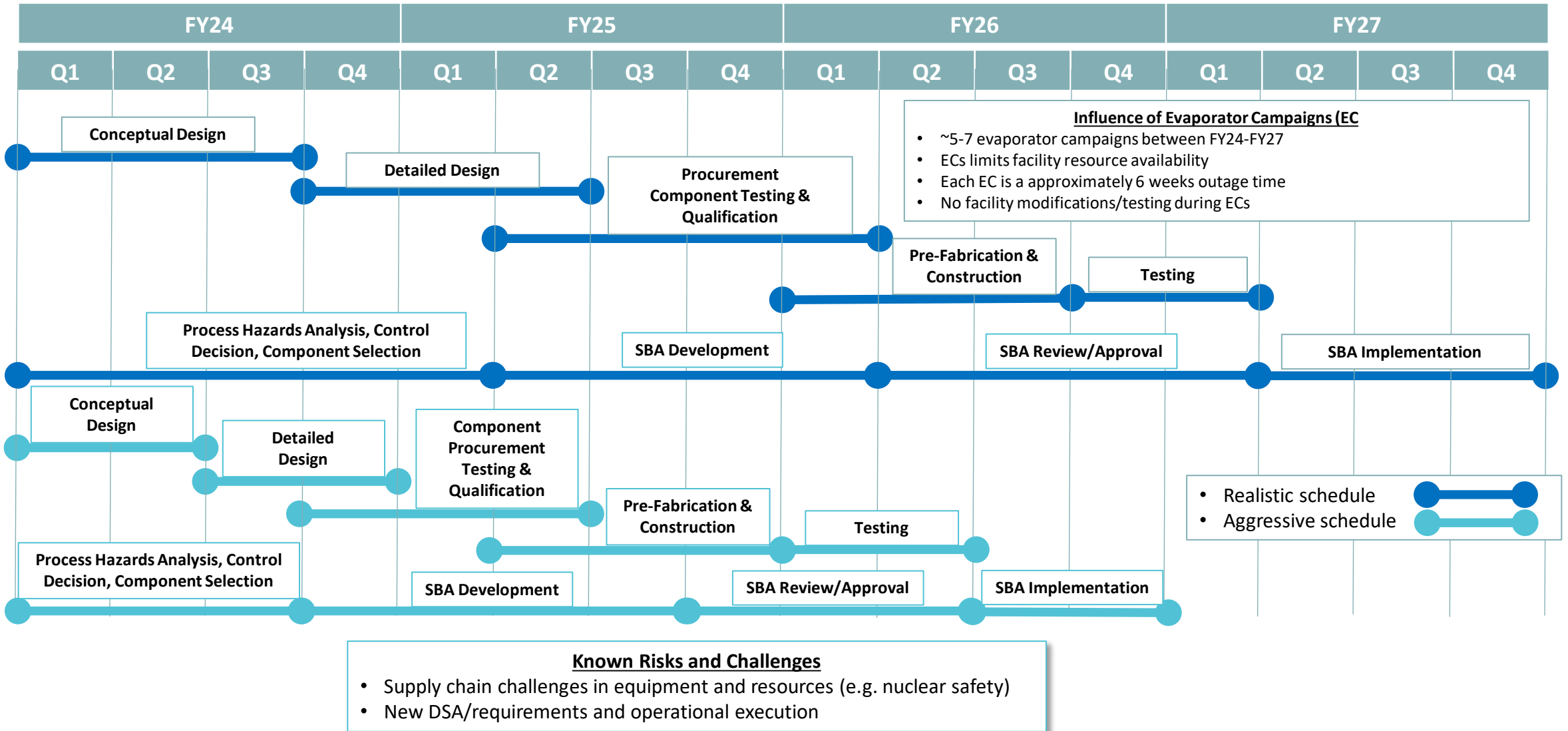


- **All interim controls will be implemented prior to next Evaporator campaign**
- **S1:** Overflow of waste leading to flammable gas deflagration in Tk-C-100 or piping
- **S2:** Flammable gas deflagration in C-A-1
- **S3:** Seismically induced flammable gas deflagration
- **S1/S2:** Mitigation through dump of material from C-A-1 back to the feed tank utilizing safety instrumented systems (SISs)
- **S3:** Specific Administrative control (SAC) actuated manually via SS control room switches or seismically qualified SS external switch

- Use of two Specific Administrative Controls (SACs) for fire and seismic response incorporated into the DSA/TSR prior to next operation of the 242-A evaporator
- SAC for Response to Seismic Events (upgraded from key element)
  - Two safety significant shutdown hand switches are located in easily accessible locations in the control room
  - Actuated manually using a seismically qualified safety significant seismic shutdown hand switch located on the southeast exterior concrete wall
- Combustible material SAC for Fires
  - Implemented in the 242-A Evaporator condenser room keeping the combustible loading below the temperatures at which the SS equipment can be affected
  - More stringent implementation of combustible material SAC, including procedural restrictions on maintenance activities, and removal of combustible materials
- Defense-in-depth programmatic element for fire detection to respond at conservative temperature/temperature change to protect the solenoid functionality

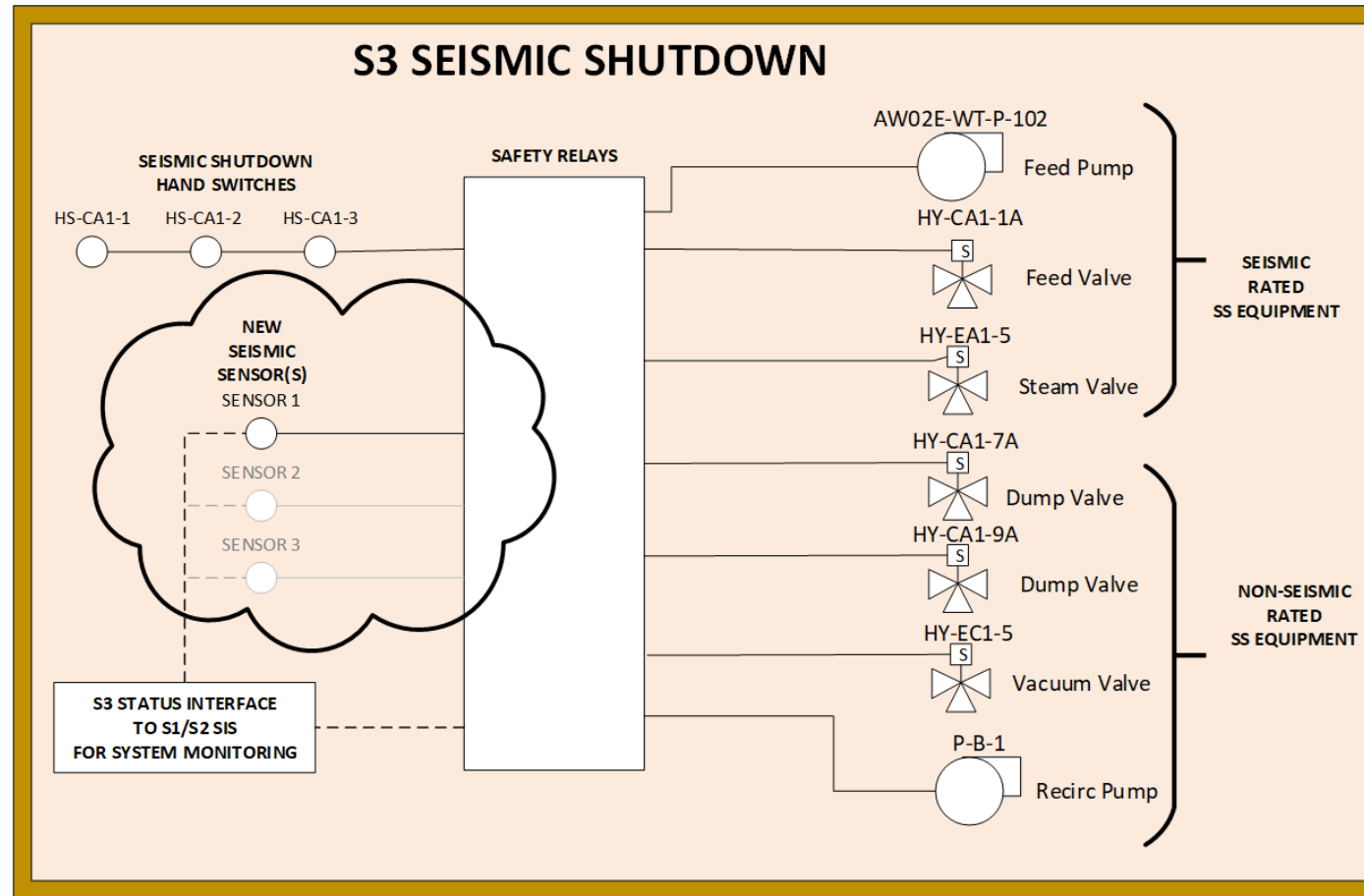
- Execution plan has been established and acceleration opportunities are being identified
  - Committed to establishing engineered controls as planned improvements
  - No budget/funding constraints are currently anticipated
  - Known supply chain challenges with procurement of I&C, communications components
  - Preliminary Schedule has been developed to incorporate the planned improvements
- Initial technical concepts of deployment have been developed for fire response and seismic response built upon the current system upgrades
- Fire response
  - Incorporate depressurization of the air supply lines to the dump valve actuators
  - Two technologies available are fusible plugs that melt at certain temperatures and a ®FireChek valve that shuts off the upstream pressure and vents the downstream pressure
- Seismic response
  - Seismic detection system and automated actuation of the 242-A Evaporator vessel dump system
  - Taking lessons learned from other Hanford facilities in procuring and testing seismic shutdown switches
  - Failure Modes and Effects Analyses (FMEAs) as part establishing design requirements have been initiated

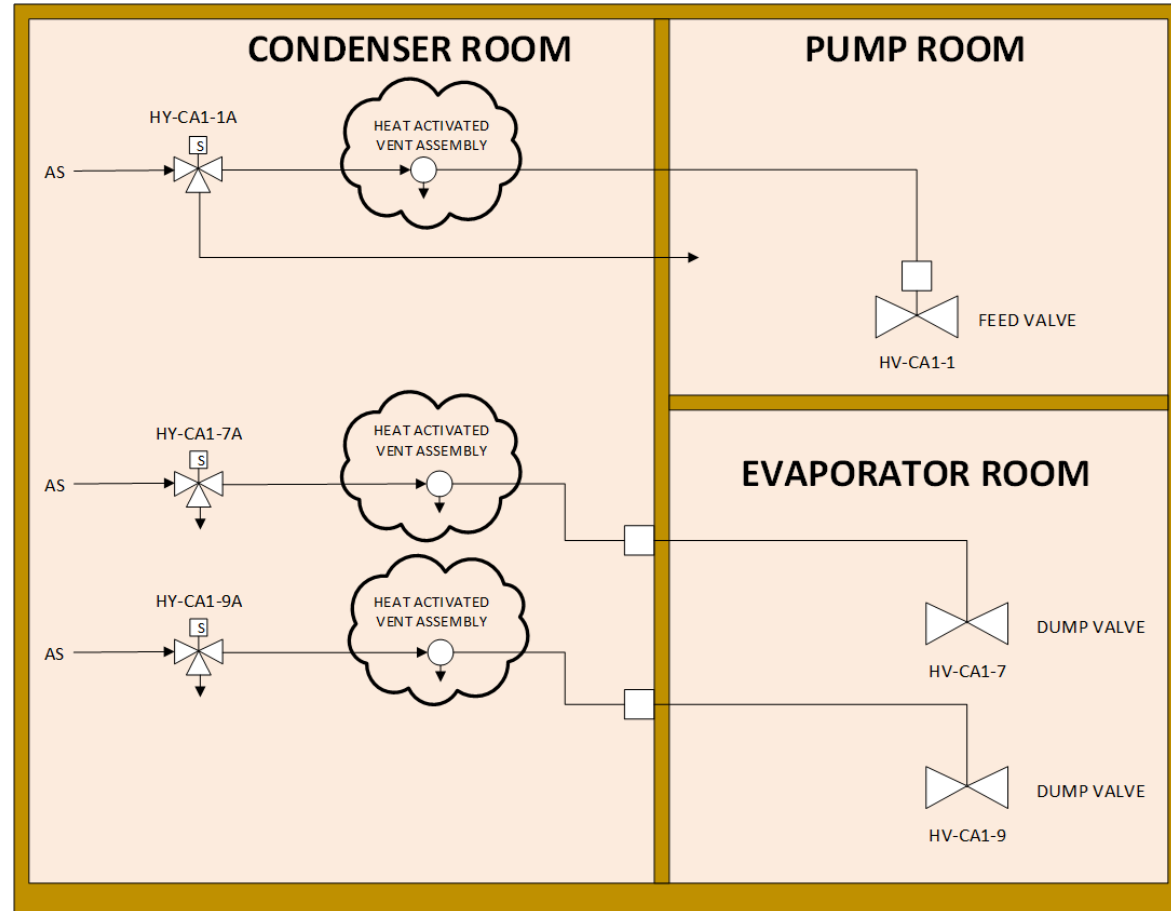
# Preliminary Planned Improvement Schedule





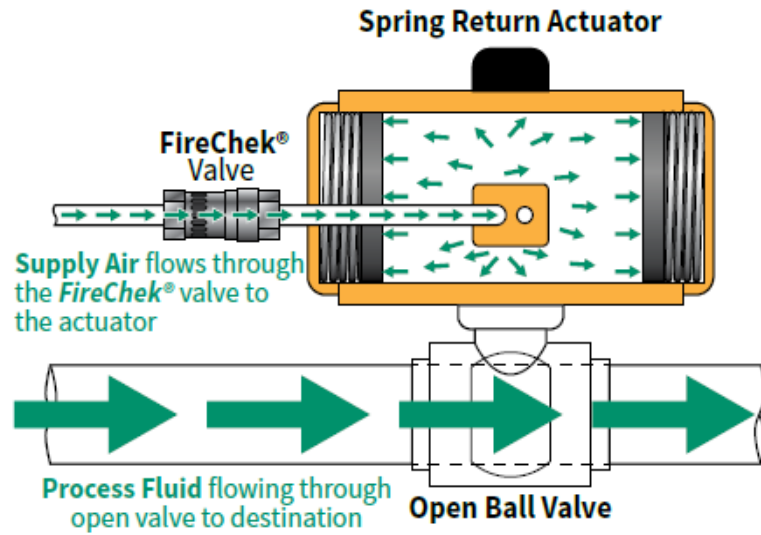




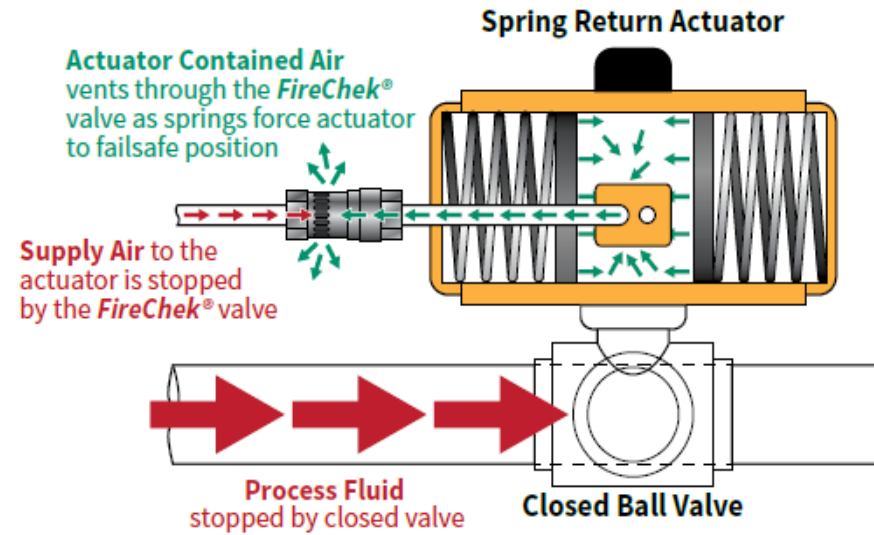




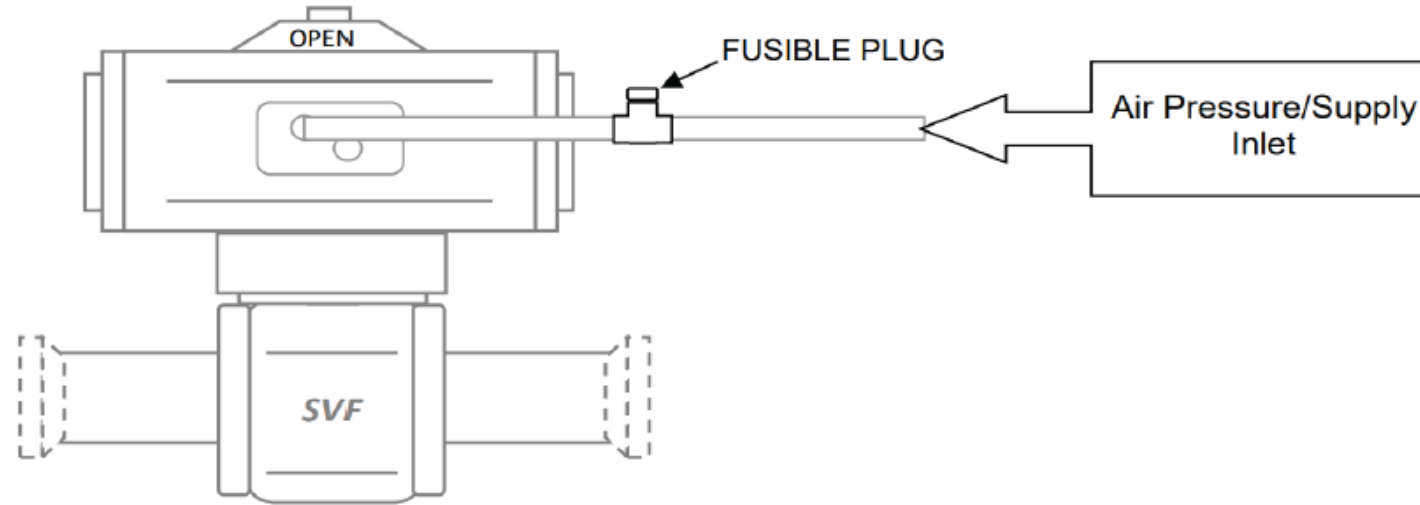
## NORMAL OPERATION



## EMERGENCY OPERATION



# Fusible Plug Style



*Fusible plug to be chosen based upon materials of construction and temperature ranges for use*

