

# Strahman Valves and Other Sampling Solutions

Are They Compliant with LDAR Requirements?

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## Outline

- What is a Sampling System?
  - Definition
  - Types of Sampling Systems
- Regulatory Applicability and Permitting
  - What Regulations Apply?
    - Sampling Connection Systems
    - Piping components on Sampling Connection Systems
  - Sample Station Emissions
- Common Pitfalls
- Choosing a Sample Station
- Questions

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# What is a Sampling System?

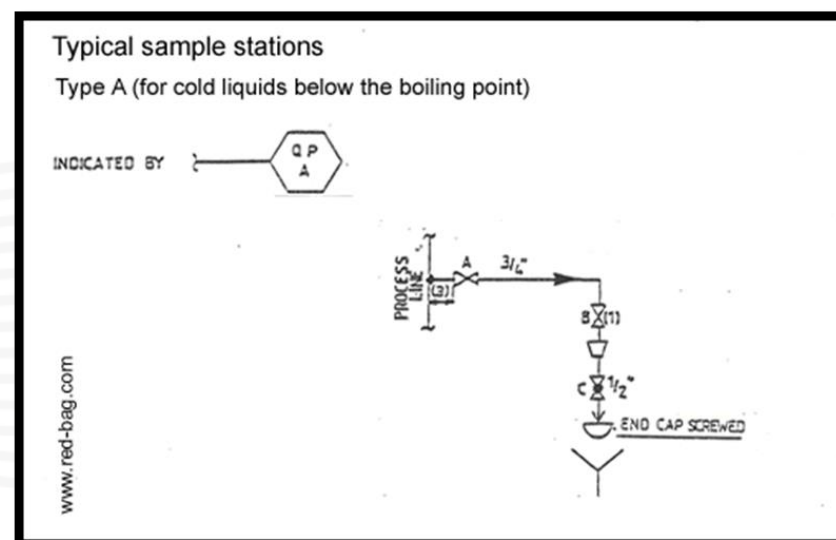
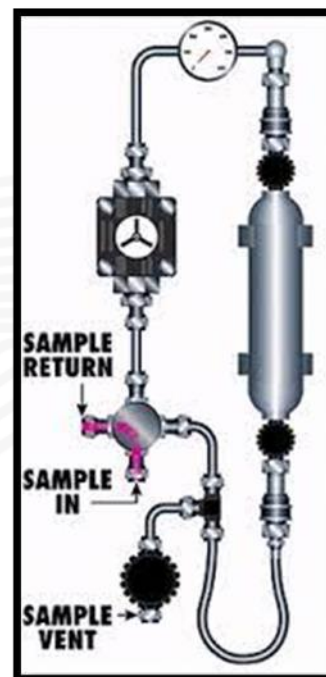
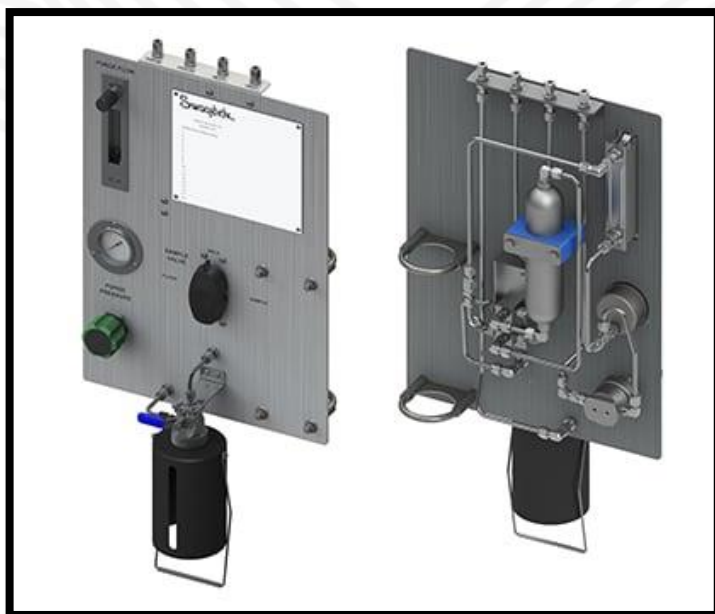
- This presentation will focus on Sampling Connection Systems in VOC service, and subject to Leak Detection and Repair (LDAR) regulations
- NSPS VVa, 40 CFR 60.481a “Sampling connection system” means an assembly of equipment within a process unit used during periods of representative operation to take samples of the process fluid. Equipment used to take nonroutine grab samples is not considered a sampling connection system.

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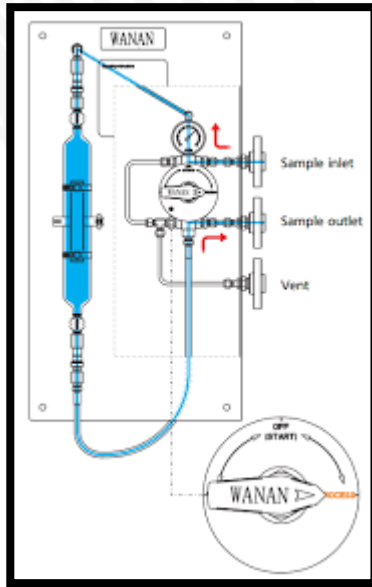
# What is a Sampling System?

- Some Examples Include:
  - Sample Panel
  - Bleeder Valves



# What is a Sampling System?

- Some Examples Include:
  - Strahman Valves
  - El Paso Sampler



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# What Regulations Apply?

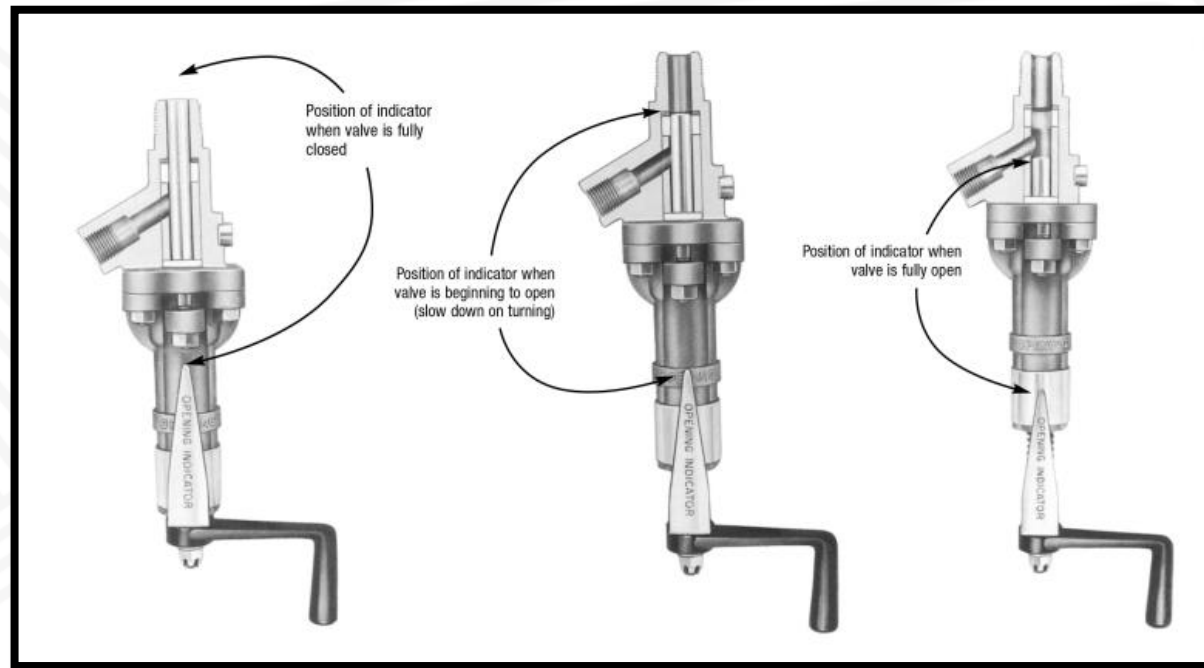
- Federal Requirements (NSPS VVa)
  - § 60.482-5a Standards: Sampling connection systems.
    - (a) Each sampling connection system shall be equipped with a closed-purge, closed-loop, or closed-vent system, except as provided in § 60.482-1a(c) and paragraph (c) of this section.
      - *Closed-loop system* means an enclosed system that returns process fluid to the process.
      - *Closed-purge system* means a system or combination of systems and portable containers to capture purged liquids. Containers for purged liquids must be covered or closed when not being filled or emptied.
      - *Closed vent system* means a system that is not open to the atmosphere and that is composed of hard-piping, ductwork, connections, and, if necessary, flow-inducing devices that transport gas or vapor from a piece or pieces of equipment to a control device or back to a process.

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# What Regulations Apply?

- Federal Requirements (NSPS VVa)
  - § 60.482-5a Standards: Sampling connection systems.



Closed-Loop System

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# What Regulations Apply?

- Federal Requirements (NSPS VVa)
  - § 60.482-7a Standards: Valves in gas/vapor service and in light liquid service.
  - § 60.482-6a Standards: Open-ended valves or lines.
    - Open-ended valve or line means any valve, except safety relief valves, having one side of the valve seat in contact with process fluid and one side open to the atmosphere, either directly or through open piping.
- The specific Regulations differ based on the type of Sample Station used

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# Sample Station Emissions

- Fugitive Emissions from Sample Connections must be determined
- AP-42 has a specific emission factor for Sampling Connections

**Table 2-6. Refinery and SOCMI Average Component Emission Factors<sup>a</sup>**

Equipment Type	Service	Refinery Emission Factor (kg/hr/source) <sup>b</sup>	SOCMI Emission Factor (kg/hr/source) <sup>c</sup>
Valves	Gas	0.0268	0.00597
	Light liquid	0.0109	0.00403
	Heavy liquid	0.00023	0.00023
Pump seals <sup>d</sup>	Light liquid	0.114	0.0199
	Heavy liquid	0.021	0.00862
Compressor seals	Gas	0.636	0.228
Pressure relief valves	Gas	0.16	0.104
Connectors	All	0.00025	0.00183
Open-ended lines	All	0.0023	0.0017
Sampling connections	All	0.0150	0.0150

Note: kg/hr/source = kilograms per hour per source

<sup>a</sup> Source: U.S. EPA, 1995b.

<sup>b</sup> The refinery emission factors are for non-methane organic compound emission rates.

<sup>c</sup> The SOCMI emission factors are for TOC (including methane).

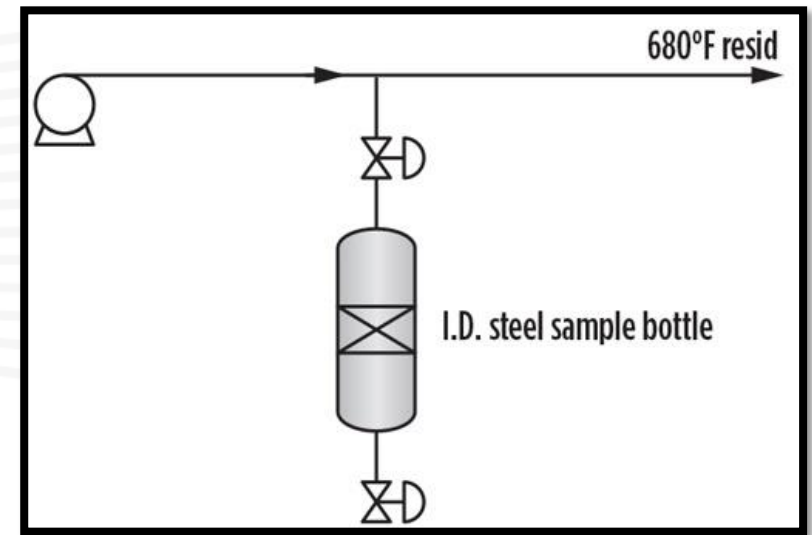
<sup>d</sup> The light liquid pump seal factor can be used to estimate the leak rate from agitator seals.

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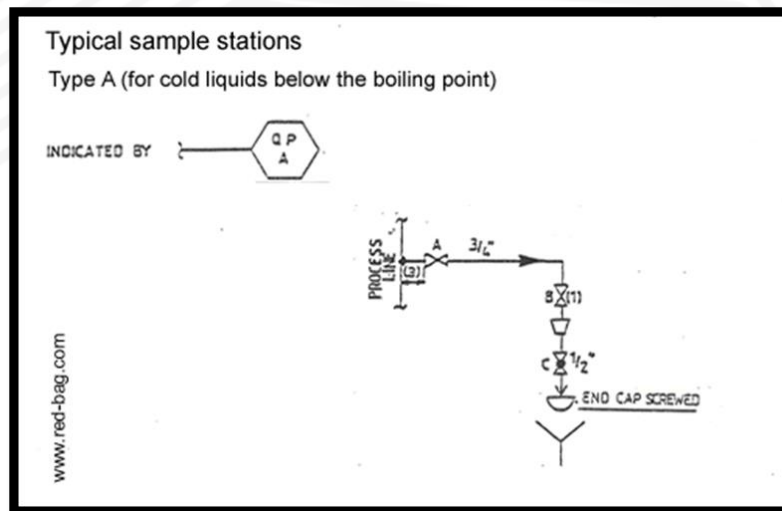
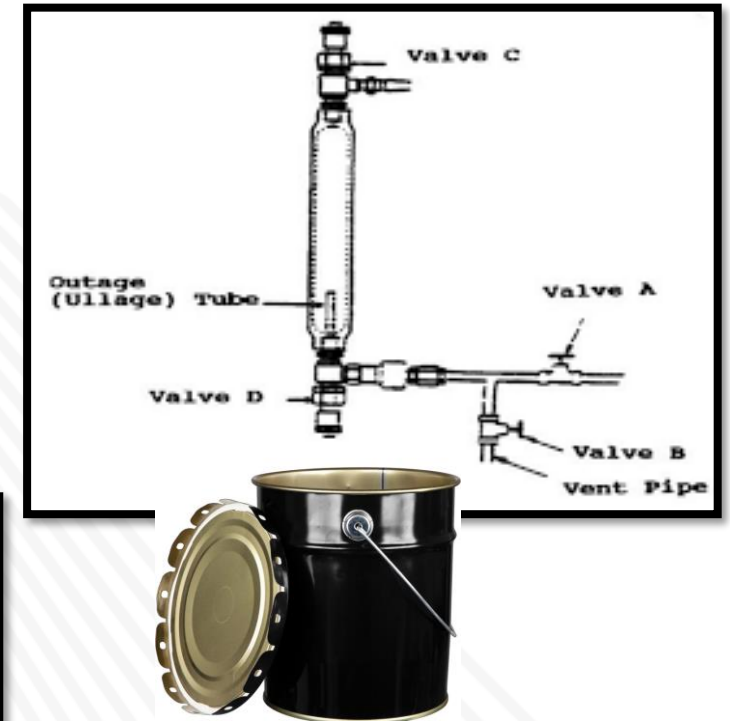
# Sample Station Emissions

- Texas' Fugitive Air Permit Technical Guidance for Chemical Sources
  - Specific emission factor for sampling connections in terms of pounds per hour per sample taken
  - Specifies that valves, connectors, and open-ended lines on sample stations should be quantified separately
  - Has a 0% control efficiency available for Sampling Connections.
    - Control efficiencies are covered under other equipment and services. Sampling emissions are based on the number of samples taken per year as opposed to the number of connections. Fugitives for a closed loop sampling system are based on the component count.



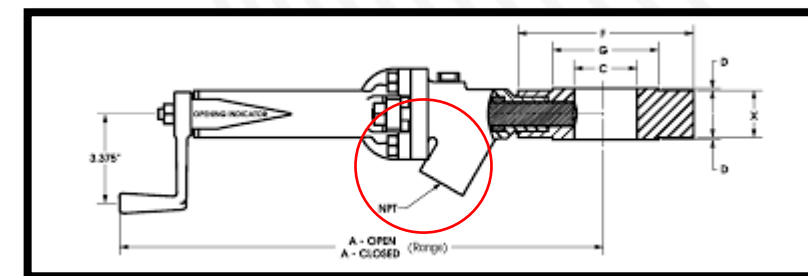
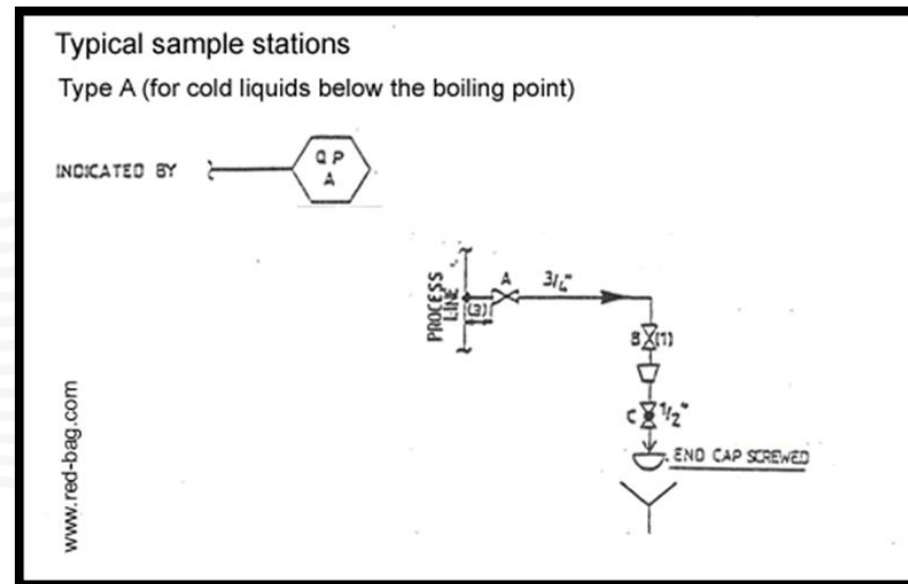
# Common Pitfalls

- No Closed Purge
  - Open Bucket of Process Fluid below Sample Station when not in use
  - Sample station drains to an open, uncontrolled sewer



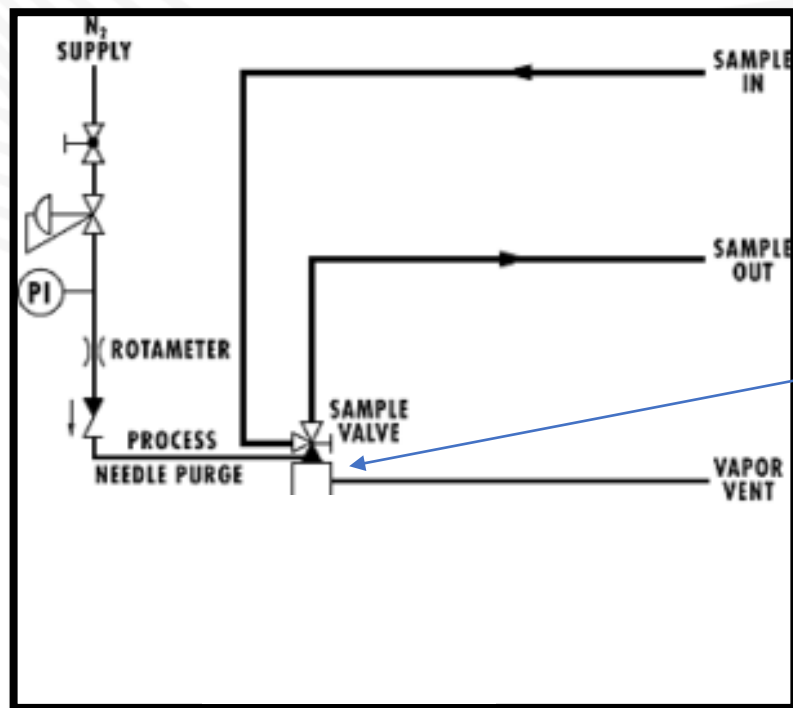
# Common Pitfalls

- Open-Ended Line
  - No cap/plug/second valve
  - One valve left open
  - Downstream valve closed before the upstream valve

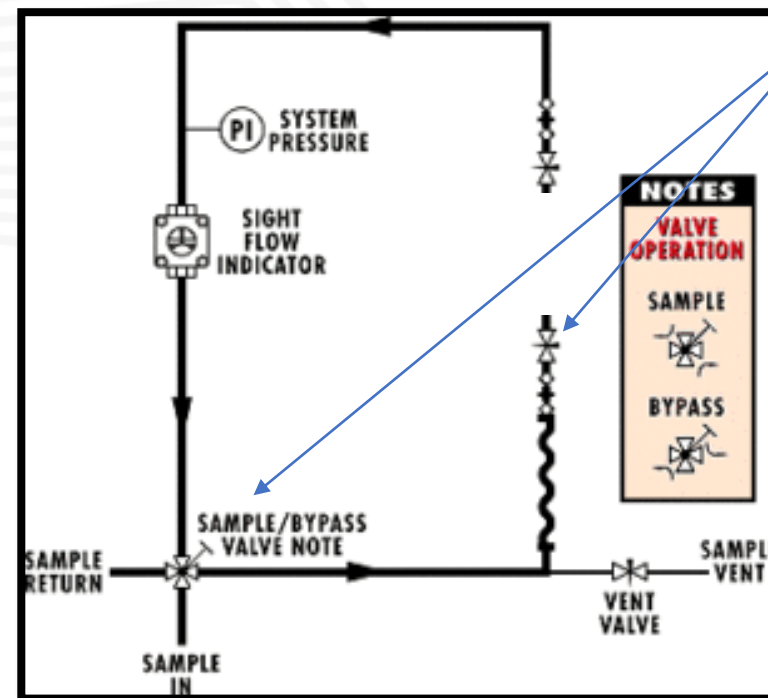


# Common Pitfalls

- Open-Ended Line
  - Missing Sample Bottle (Cont'd)



Potential  
Open-End



Two  
Valves  
providing  
Double  
Block

# Choosing a Sample Station

- Cost
- Design Considerations
  - Meeting process requirements
    - Temperature, Pressure, Viscosity, Reactivity
- Complying with LDAR Standards
  - Closed Loop, Closed Purge or Closed Vent
  - Reducing potential for open-ended lines
- Minimizing Potential Emissions
  - Major Source/Modification Thresholds
  - Nonattainment Thresholds
    - VOC Emission Offsets
  - Air Dispersion Modeling Limitations

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Questions?

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