

San Joaquin Valley Air Pollution Control District

EPA Method 21 – Determination of Volatile Organic Compound Leaks

Leak Detection and Repair (LDAR) Requirements

Southern Region Compliance

Presented By:

Senior Air Quality Inspectors

Steve Miller , Alex Oregon , Josue Gonzalez

Air Quality Inspectors

Ellie Rodriguez , Cristina LaFore , Jaimee Brownlow , Dylan Born , Lawrence Torres , Alberto Nuñez

Purpose

- Today's presentation will include the requirements of both EPA Method 21 and Leak Detection and Repair for District rules & State regulation
- EPA Method 21 was codified in the Federal Register in 1981 and appeared in both State and Local air quality regulations shortly thereafter
- Provides a means to quantify VOC emissions from regulated components (valves, threaded connections, flanges, etc.)
- Creates the foundation for a Leak Detection and Repair (LDAR) program
- EPA Method 21 includes:
 - Equipment specifications
 - Calibration procedures

Online Resources

<https://www.epa.gov/emc/method-21-volatile-organic-compound-leaks>

https://www.epa.gov/sites/default/files/2017-08/documents/method_21.pdf

Equipment Specifications

Portable Instrument

- A Portable Instrument is used to detect VOC leaks from individual sources
- The instrument detector type is not specified, but must meet EPA Method 21 standards specified in Section 6.0
- If standards are met, may be used for any inspections referring to EPA Method 21 leak detection

Equipment and Supplies (Section 6.0)

The Portable Instrument Requirements:

- Detector types: catalytic oxidation, flame ionization, infrared absorption, and photoionization
- Must be able to measure the defined leak concentrations to within +/- 2.5% (ex. For 100ppm leak definition, accuracy scale must be +/- 2.5ppm)
- Electrically driven pump providing constant flow rate to the detector
- Flow rate at probe tip must be 0.01 - 0.1 *liter/min*
- Probe tip cannot exceed 6.4mm in outside diameter
- Intrinsically safe

Qualitative vs Quantitative

- Instruments and leak detection screening used for EPA Method 21 inspections can be Qualitative or Quantitative
- Let's discuss what these mean

Qualitative Instruments/Tools

- Qualitative Instruments give an indication there may be a leak, but do not give a parts per million (ppm) value
- Are used to identify possible leaks to be further inspected by quantitative instruments
- Are helpful for difficult to reach locations or locations that have large number of components
- Can be used as an Alternative Screening Procedure
- These methods include Soap and Bubbles and Optical Gas Imaging (OGI)*

*OGI used for screening only, not EPA Method 21 approved

Quantitative Instruments

- Are used to identify a leak and provide a ppm value
- Used to determine compliance with applicable rule or regulation
- Need to be in close proximity to the leaking component
- Must survey one component at a time
- Includes, but not limited to, Eagles and TVAs (Toxic Vapor Analyzers)



RKI Eagle



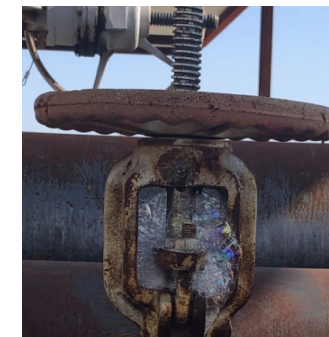
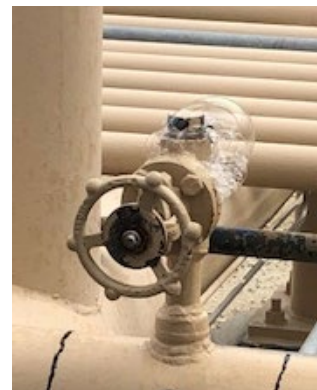
TVA

Soap and Bubbles

Qualitative Tool

- Any leaks observed must be quantified
- Used only on components/equipment that:
 1. Do not have continuously moving parts
 2. Do not have surface temperatures greater than the boiling point or less than the freezing point of the soap solution
 3. Do not have open areas to the atmosphere that the soap solution can bridge
 4. Do not exhibit evidence of liquid leakage

Threaded Connection
with Soap Solution



Valve Stem with Soap
Solution

Optical Gas Imaging (OGI)

Qualitative Tool

- Searches a wide area quickly
- Can pick up steam, dust, and other emissions
- Leaks must be verified with a quantitative instrument
- Excellent for screening high and hard to reach areas
- Operators using OGI as a screening tool must still quantify the emissions per the requirements of EPA Method 21



RKI Eagle

- Quantitative
- Catalytic Oxidation
- Battery powered
- Flow rate is 0.7-1.0l/min,
- Outside diameter is 1/4" (Section 6.0 compliant)
- Intrinsically safe



TVA (Toxic Vapor Analyzer)

- Quantitative
- Flame Ionization
- Battery and hydrogen powered
- Flow rate is 1 liter/min
- 6.35mm probe diameter (Section 6.0 compliant)
- Intrinsically safe



Equipment – Key Points

- Portable Instruments must be EPA Method 21 approved to conduct compliance inspections of components
- Instruments and Tools can be qualitative or quantitative
- Leaks must be verified quantitatively
- Qualitative: Soap and Bubbles, OGI
- Quantitative: RKI Eagle, TVA, may include other instruments

Instrument Calibration Procedures

Calibration (Section 10.0)

- Calibration is the adjustment of the portable analyzer's instrument meter readout to correspond to the calibration gas value
 - Warm up period
 - Zero Internal Calibration Procedure
 - Calibration of Span Gas
- EPA Method 21 does not explicitly mention a calibration frequency
 - District conducts daily calibration, per manufacturer recommendations

Instrument Performance Evaluation (Section 8.1)

- Response Factor (Section 8.1.1)
- Calibration Precision (Section 8.1.2)
- Response Time (Section 8.1.3)



Portable Analyzers



Calibration Gases

Response Factor (Section 8.1.1)

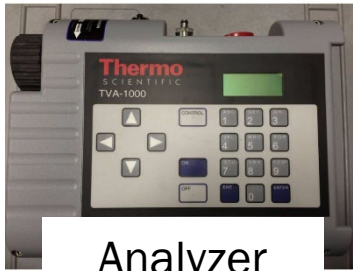
- Response factor means the ratio of the known concentration of a VOC compound to the observed meter reading when measured using an instrument calibrated with the reference compound specified in the applicable regulation
- Response factor must be <10
- Required prior to putting analyzer in service
 - Does **NOT** have to be repeated at subsequent intervals
- If response factor for the compounds of interest is published, existing results may be referenced
 - Methodology on how to calculate is found in Section 8.1.1.1

Calibration Precision (Section 8.1.2)

- Calibration precision means the degree of agreement between measurements of the same known value, expressed as the relative percentage of the average difference between the meter readings and the known concentration
- Calibration precision must be $\leq 10\%$
- Must be conducted prior to putting instrument into service and at subsequent 3-month intervals or at next use (whichever is later)



Calibration Gas
10,000 ppm



Analyzer

1st Reading: 9,800 ppm

2nd Reading: 10,300 ppm

3rd Reading: 9,600 ppm

Calibration Precision = 3%



Calculating Calibration Precision

- Calibration Gas Value = 10,000ppm
- Analyzer Measurements: 9,800ppm, 10,300ppm, and 9,600ppm
- $|10,000ppm - 9,800ppm| = 200 ppm$
- $|10,000ppm - 10,300ppm| = 300 ppm$
- $|10,000ppm - 9,600ppm| = 400 ppm$
- *Calculate the average:* $200 + 300 + 400 = \frac{900}{3} = 300$
- $\left(\frac{300}{10,000}\right) \times 100 = 3\%$ 

Response Time (Section 8.1.3)

- Response time means the time interval from a step change in VOC concentration at the input of the sampling system to the time at which 90 percent of the corresponding final value is reached as displayed on the instrument readout meter
- Response time must be ≤ 30 seconds
- Required prior to putting analyzer in service
 - NOT required again unless a modification is made to the sample pump system



Calculating Response Time

- Introduce zero gas
- Once stable, quickly switch to calibration gas
- Measure the time required to attain 90% of the final stable reading
- Perform this test sequence 3 times and record results
- Calculate the average response time
- Example: Reading stabilized at 10,000ppm, and took 12, 15, and 9 seconds to reach 9,000ppm. Average 90% response is 12 seconds: ≤ 30 seconds



Calibration - Key Points

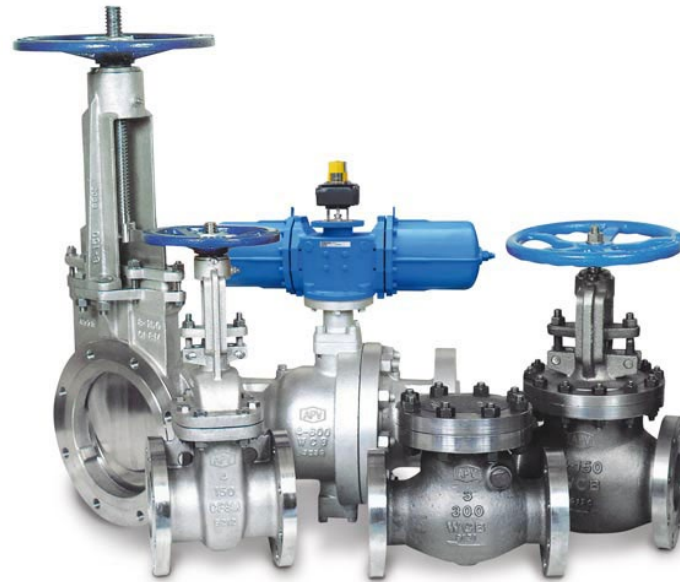
- The District calibrates TVAs and RKI Eagles per both EPA Method 21 and manufacturer specifications
- EPA Method 21 does not explicitly state a calibration frequency but rather speaks to how calibrations shall be conducted
- Response Factor: Must be <10 and must be determined prior to putting the instrument in service; Can use existing published response factors for compounds of interest
- Calibration Precision: must be $\leq 10\%$ difference and must be done prior to putting instrument into service and at subsequent 3-month intervals or at next use (whichever is later)
- Response Time: must be ≤ 30 seconds and must be determined prior to putting the instrument in service and again if any modifications are made to the sample pumping system

Questions?

Leak Detection and Repair (LDAR)

- Most facilities have LDAR provisions required by Federal, State, or local rules
- These requirements vary in frequency, applicable thresholds, and repair timeframes
- LDAR is time and labor intensive
- The LDAR section will include the following topics:
 - Components
 - Rule Applicability
 - District Inspection
 - Operator Inspection

Components



Key Definitions

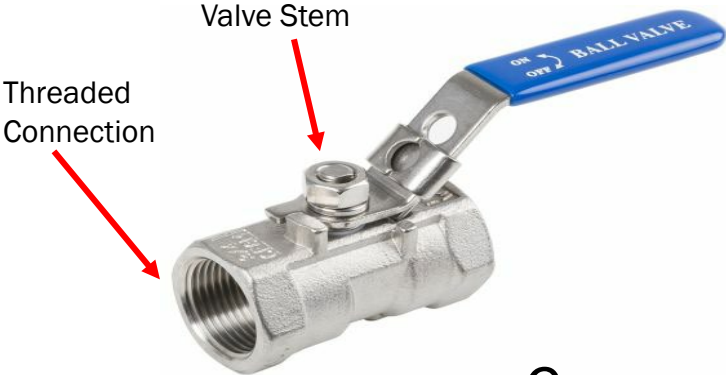
- Compressor: a device used to compress gases or vapors, includes all associated components used for connecting and sealing purposes. The phrase "all associated components used for connecting and sealing purposes" means the first VOC leak points (first components) connected on the body of the compressor.
- Pressure Relief Device: pressure-relieving device associated with a process vessel or piping system that is activated by pressure upstream of the device and relieves to the atmosphere.
- Pump: a device used to transport fluids, includes all associated components used for connecting or sealing purposes. The phrase "all associated components used for connecting and sealing purposes" means the first VOC leak points (first components) on the body of the pump.
- Valve: a device that regulates the flow of fluid in a piping system by means of an external actuator acting to permit or block passage of fluid.

Types of Oil and Gas Components

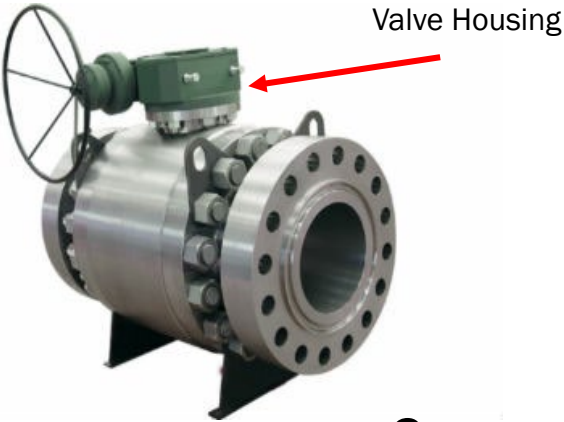
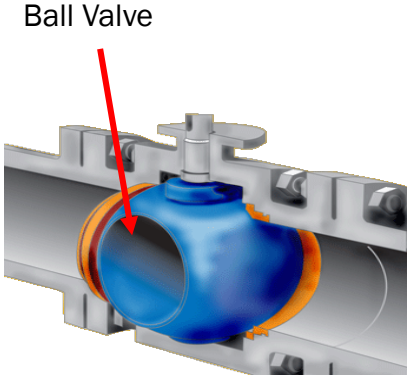
Ball Valve

- A one-way valve that is opened and closed by pressure on a ball that fits into a cup-shaped opening.

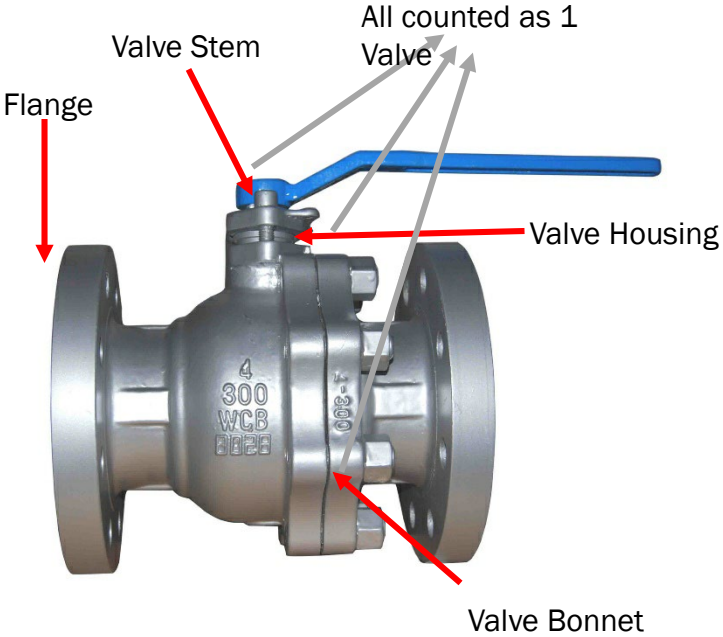
Ball Valve



Component
Count = 3



Component
Count = 3

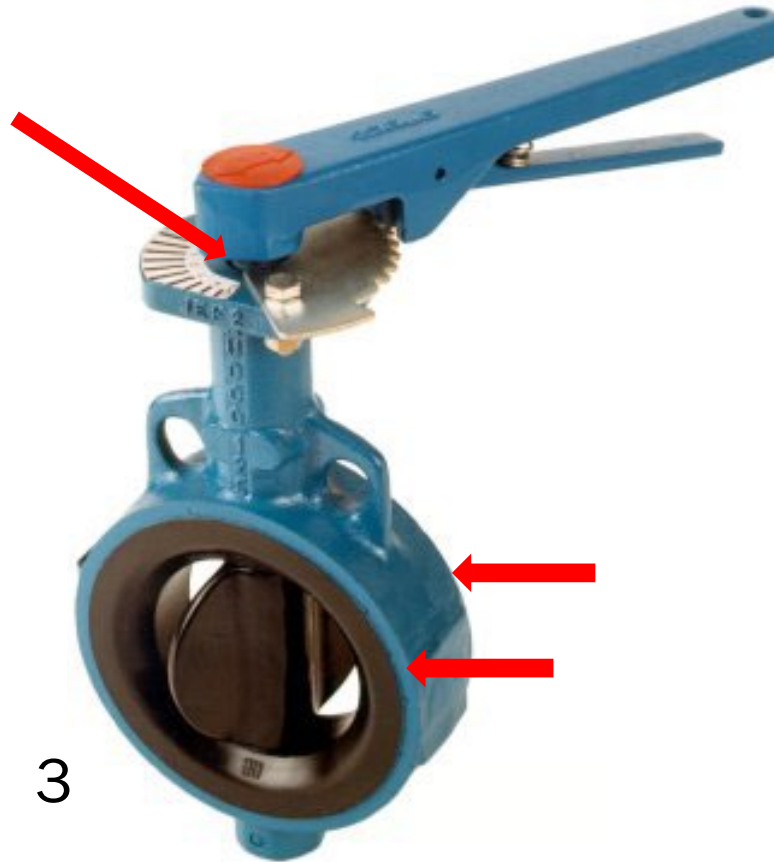


Component
Count = 3

Butterfly valve

- Valve that isolates or regulates the flow of a fluid. The closing mechanism is a disk that rotates.

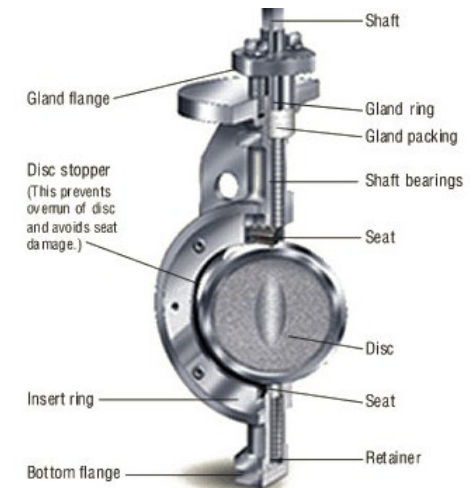
Butterfly Valve



Number of Inspection Points 3

Components Counted

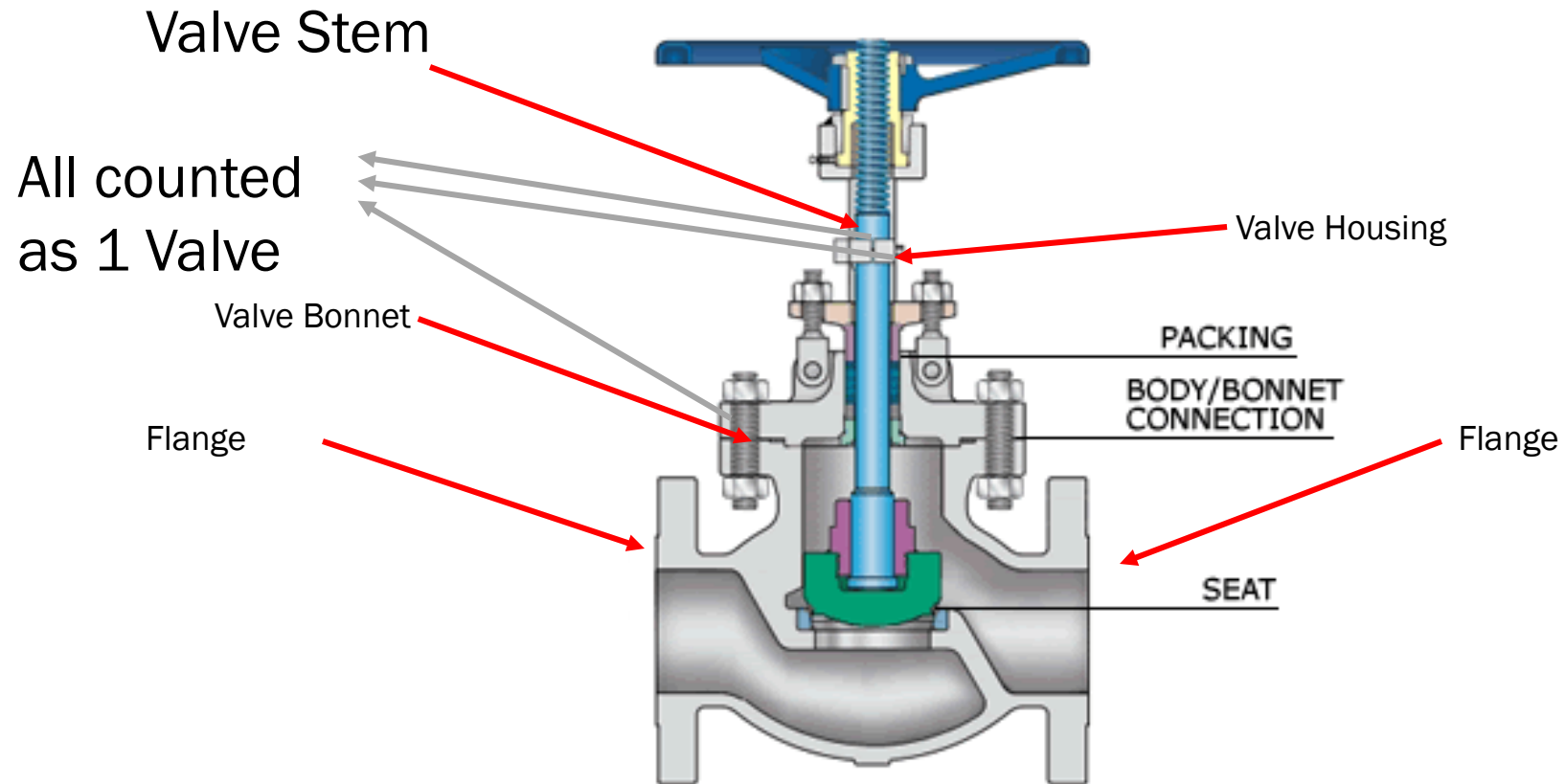
One Valve , Two Flanges



Globe valve

- A type of valve used for regulating flow in a pipeline, consisting of a movable disk-type element and a stationary ring seat in a generally spherical body.

Globe Valve



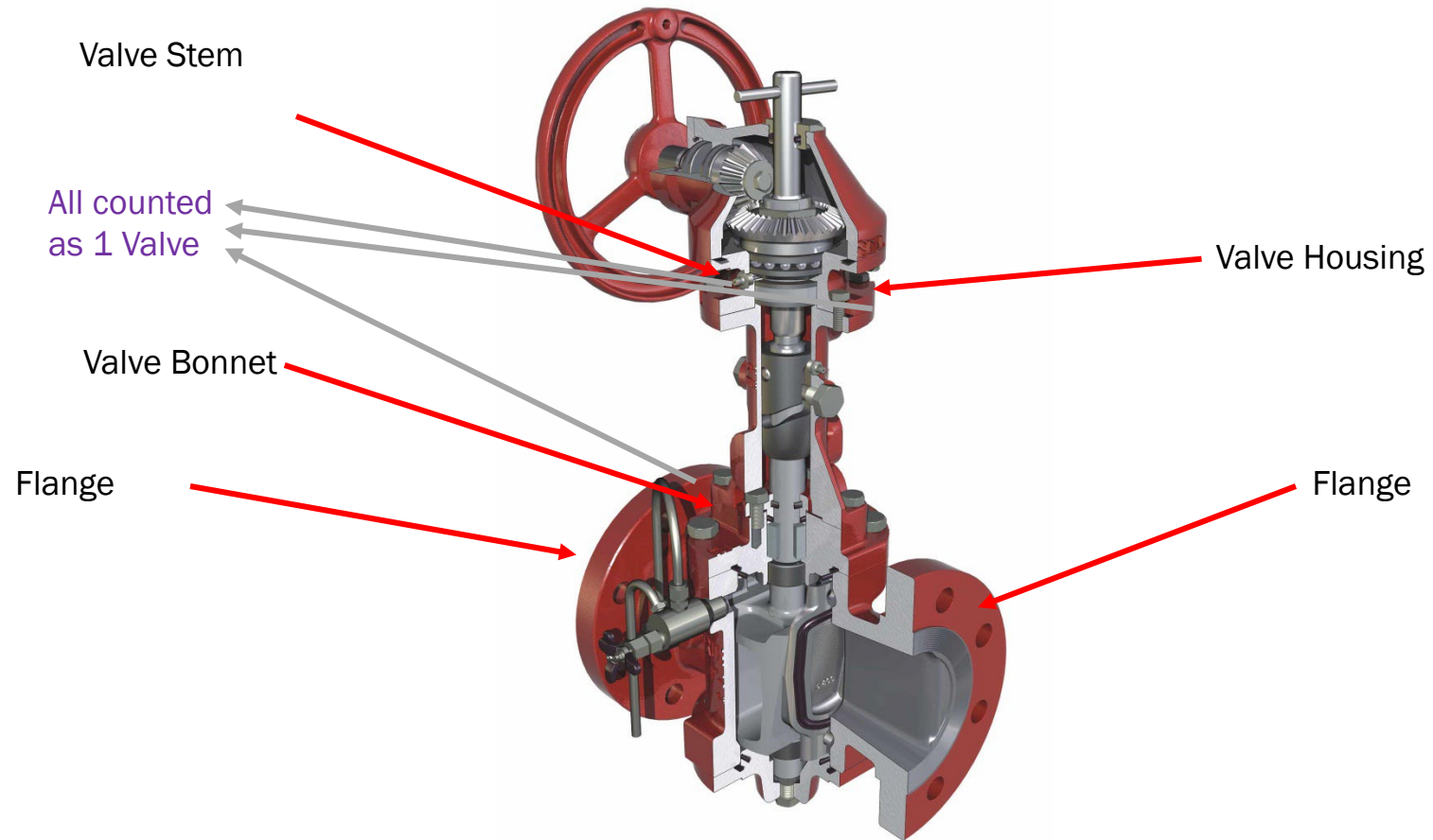
Number of Inspection Points 5

Components Counted One Valve Two Flanges

Plug Valves

- Valves with cylindrical or conically tapered "plugs" which can be rotated inside the valve body to control flow through the valve. The plugs in plug valves have one or more hollow passageways going sideways through the plug, so that fluid can flow through the plug when the valve is open.

Plug Valve



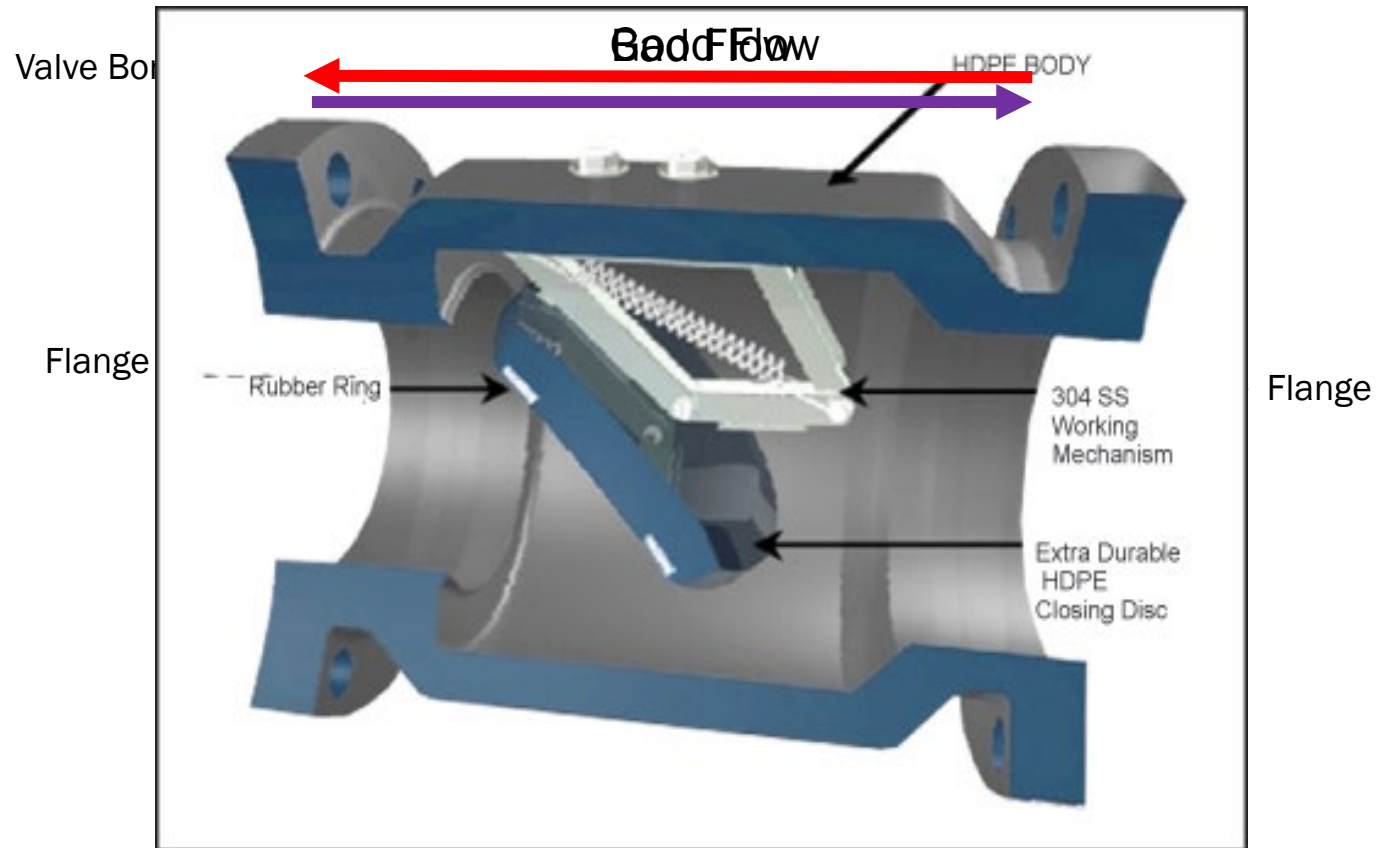
Number of Inspection Points 5

Components Counted One Valve Two Flanges

Check Valve

- A valve that closes to prevent backward flow of liquid. Although in the name, a check valve is not a valve. This component does not regulate flow, but instead is used as a safety device to prevent back flow.

Check Valve Counted as other Component



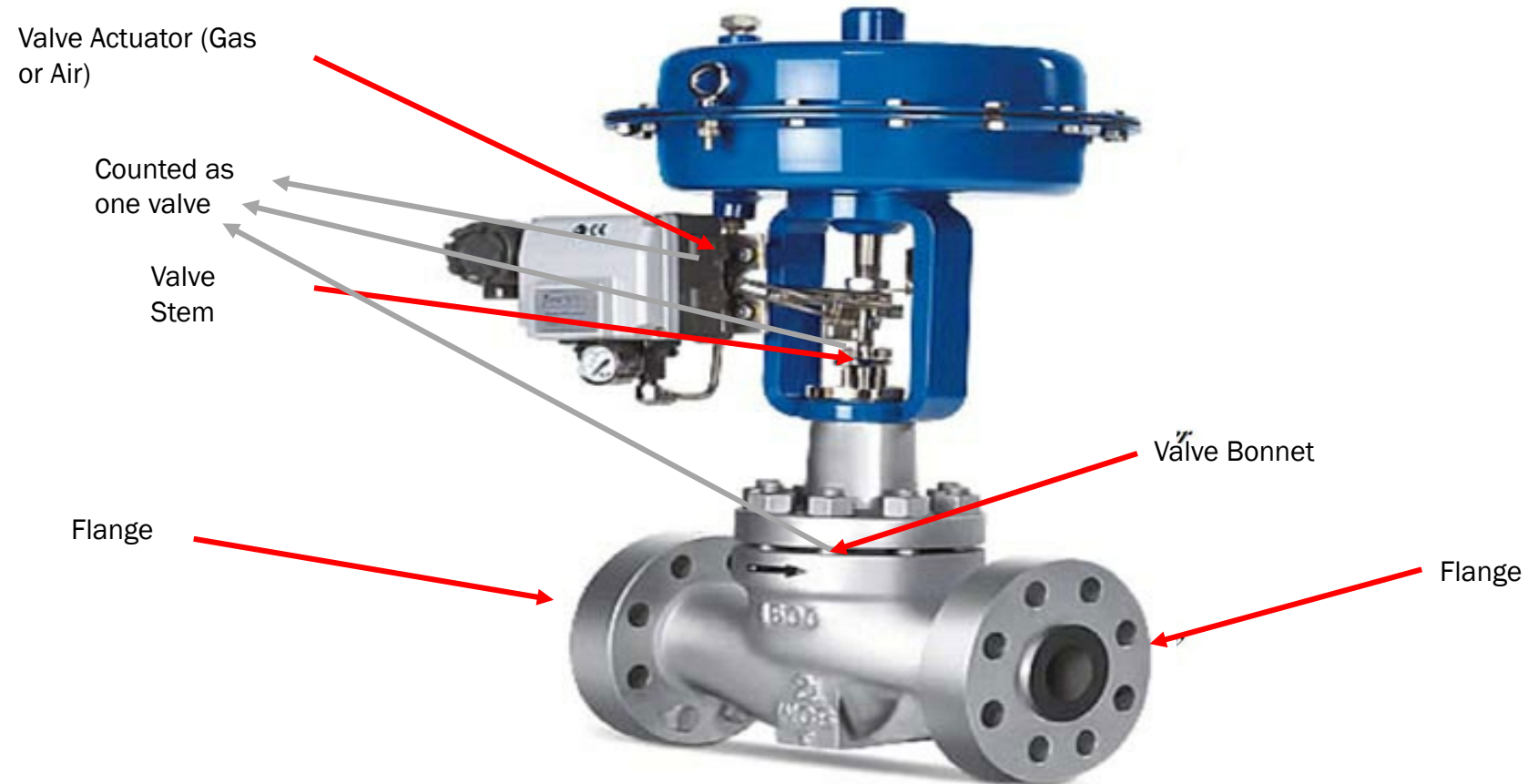
Number of Inspection Points 3

Components Counted One Other Two Flanges

Control valve

- Valve used to control fluid flow by varying the size of the flow passage as directed by a signal from a controller. This enables the direct control of flow rate and the consequential control of process quantities such as pressure, temperature, and liquid level.

Control Valve

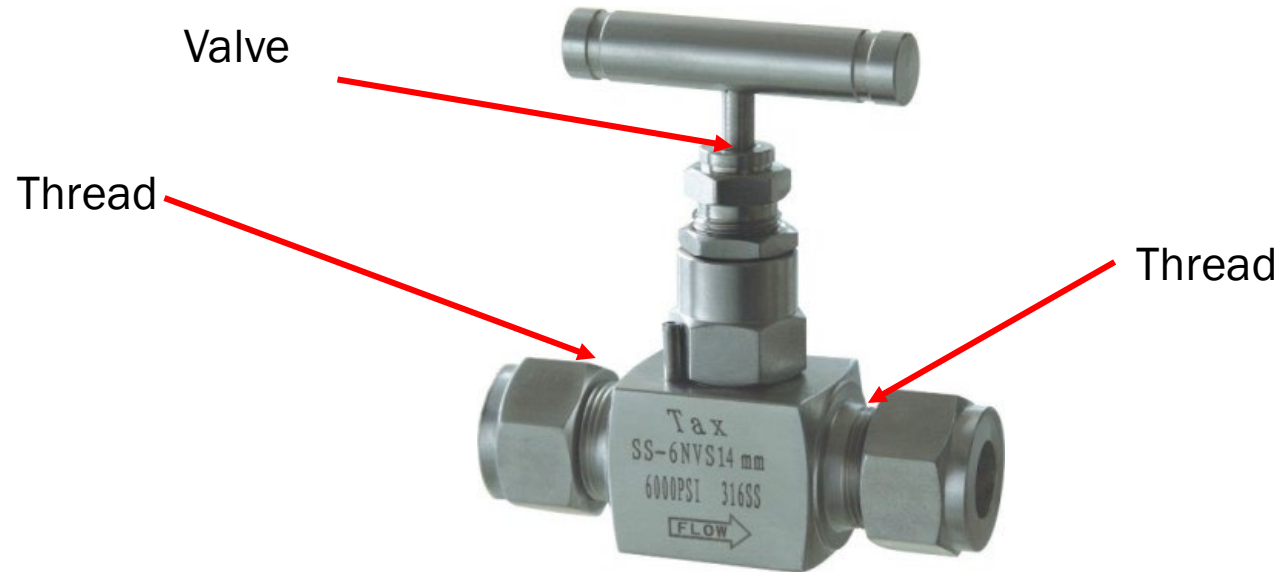


Number of Inspection Points 5 or 6

One Valve

Components Counted Two Flanges

Needle Valve



Number of Inspection Points? 5

Components Counted? One Valve

2 Threaded Connections

Regulator Valve

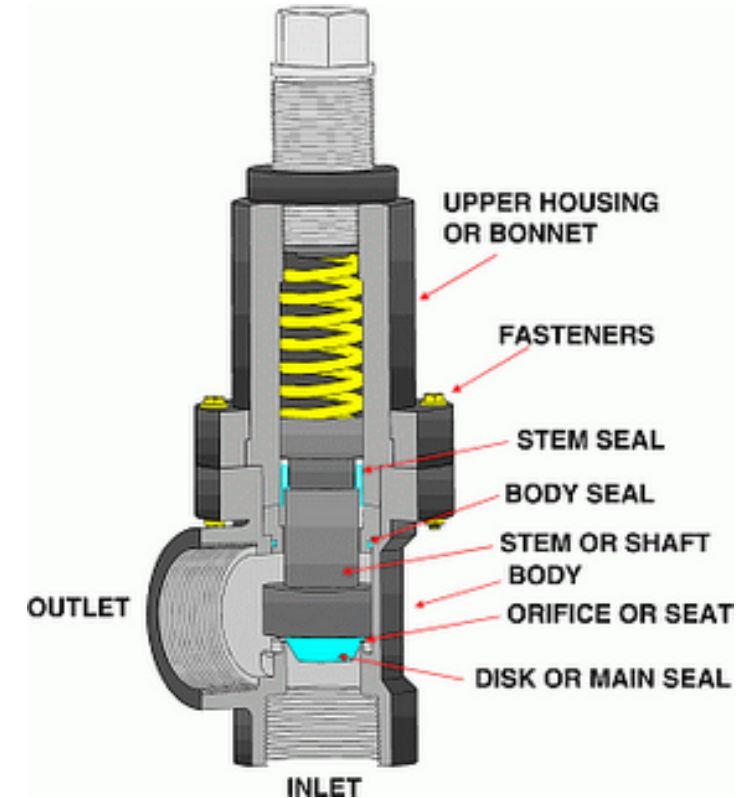
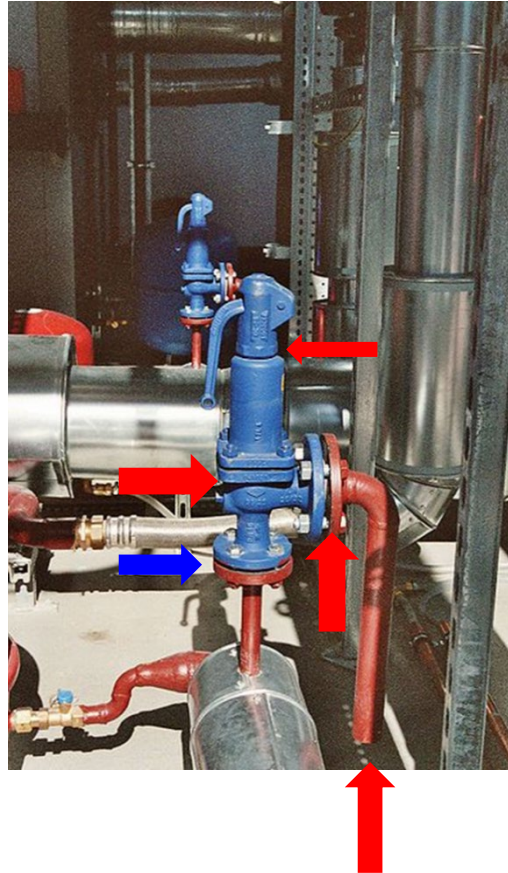
- Valve used to control the pressure in a gas or liquid system. This valve can use an external source to actuate the valve or uses the gas from the system to actuate the valve. This valve can be used to control flow by adjusting different set pressures.

Valve Regulator



Many Inspection Points

Pressure Relief Device



Number of Inspection Points? 5

One PRD

Components Counted? One Flange

Threaded Connections



Number of Inspection Points? 2

Components Counted? **Two Threaded Connections**

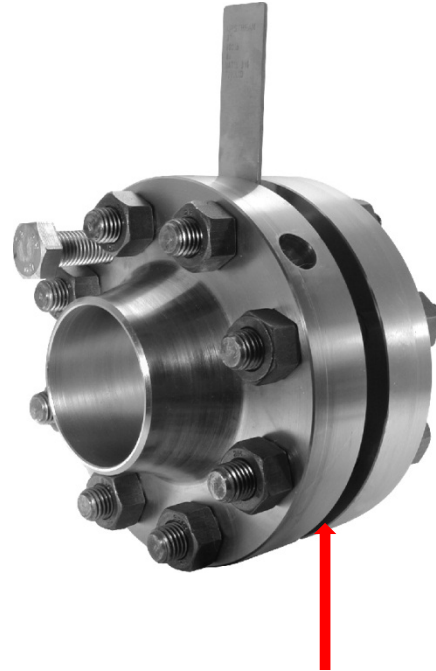
Union Fitting



Number of Inspection Points? 3

Components Counted? Three Threaded Connections

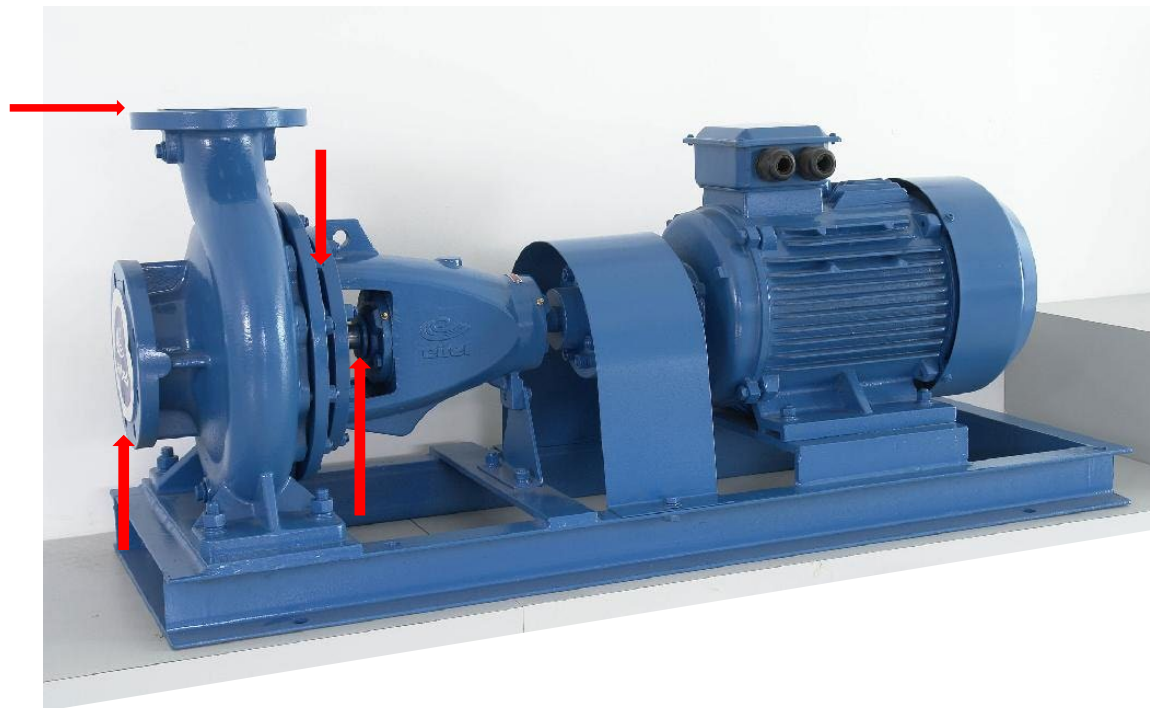
Flange



Number of Inspection Points? 1

Components Counted? One Flange

Pump



Number of Inspection Points 4

Components Counted One Pump

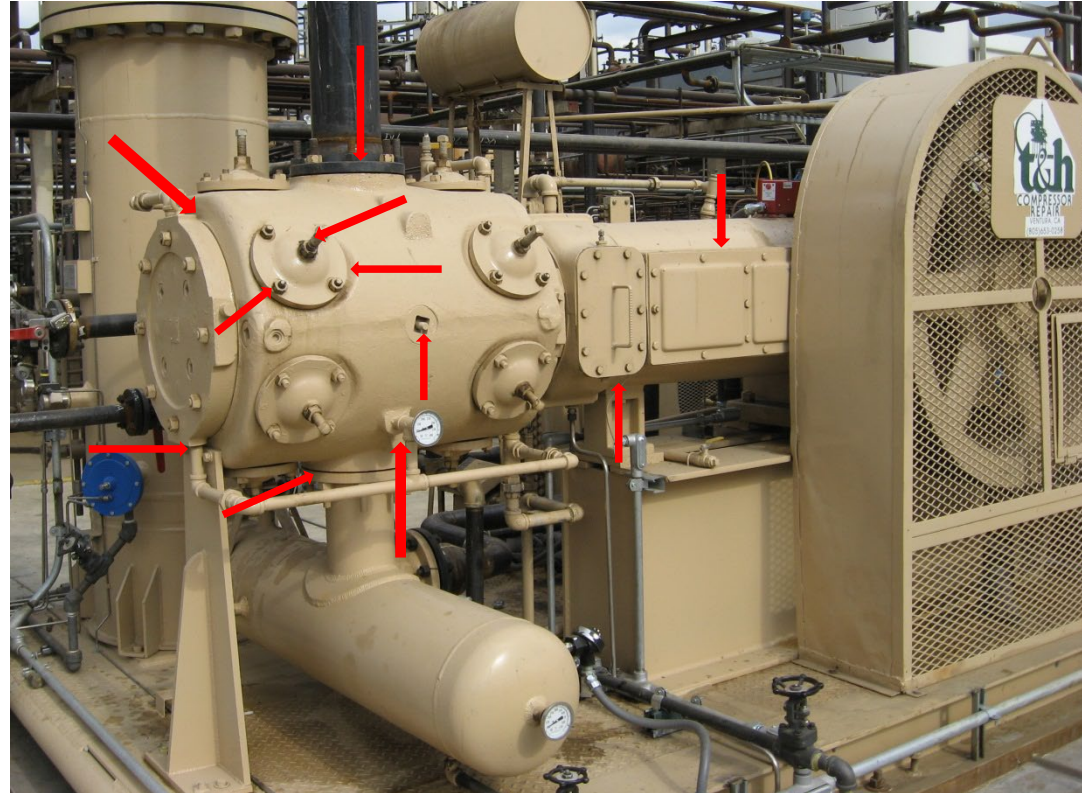
Pump



Number of Inspection Points? 3

Components Counted? One Pump

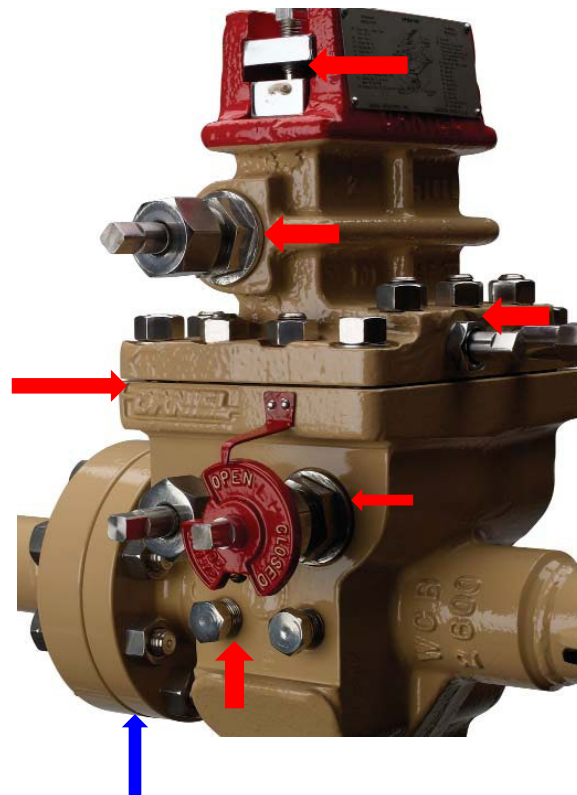
Compressor



Number of Inspection Points? Many

Components Counted? **One Compressor**

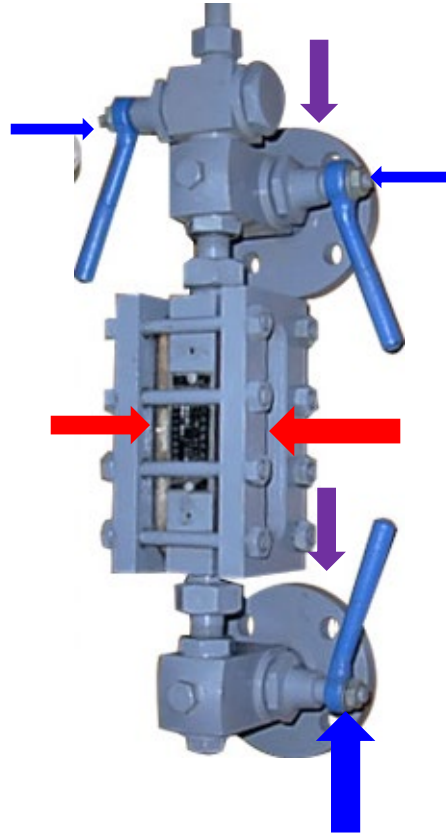
Daniel's Fitting / Orifice Flow Meter



Number of Inspection Points? Many

Components Counted? **One Other** (Specify as Daniel's Fitting on inspection report form.)
One Flange

Sight Glass



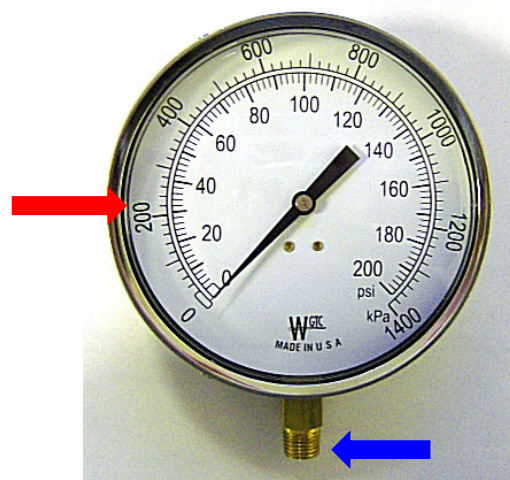
Components Counted?

One Other (Specify As Sight Glass On Inspection Report Form)

Two Flanges

Three Valves

Pressure Gauge



Number of Inspection Points? 2

Components Counted? **One Other** (Specify as Pressure Gauge on inspection report form.)
Threaded Connection

Drains

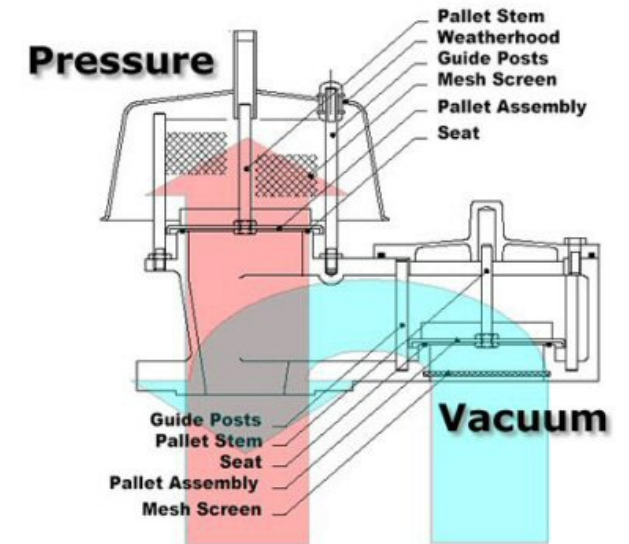
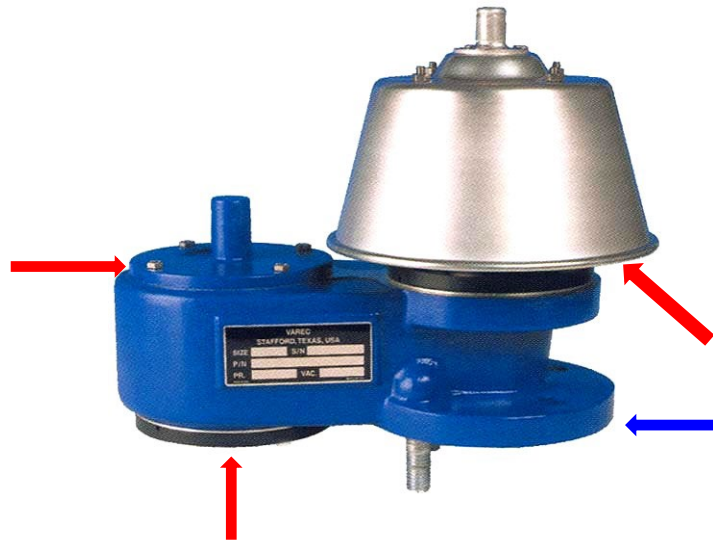


Do not break plane of drain.

Number of Inspection Points? 1

Components Counted? One other

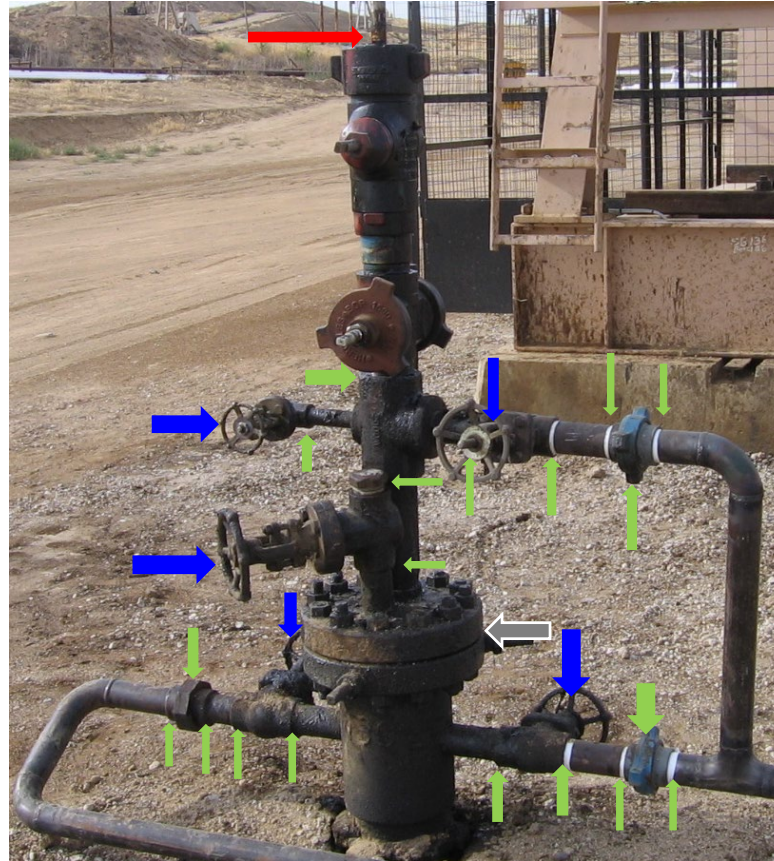
Pressure Vacuum Relief Valve



Number of Inspection Points? 4

Components Counted? **One PVRV** (If Not Associated With Rule 4623)
One Flange

Polished Rod Stuffing Box



Number of Inspection Points? Many

Components Counted? One Polished Rod Stuffing Box

Five Valves

One Flange Nineteen Threaded Connections

Components - Key Points

- Drains – Do not break plane of drain
- Check Valves & Regulator Valves are considered other components
- Pumps and compressors are counted as one component
- Inspections need to occur at interface of the component

Rule Applicability

LDAR Rules

- LDAR requirements are found in several District rules and the State regulation.
- Each rule has exemptions that become important in determining what LDAR requirements apply to various operations.
- This section will highlight those requirements for the following rules:

LDAR Rules	
Rule 4401	Rule 4409
Rule 4623	Rule 4624
California Oil & Gas Regulation (COGR)	

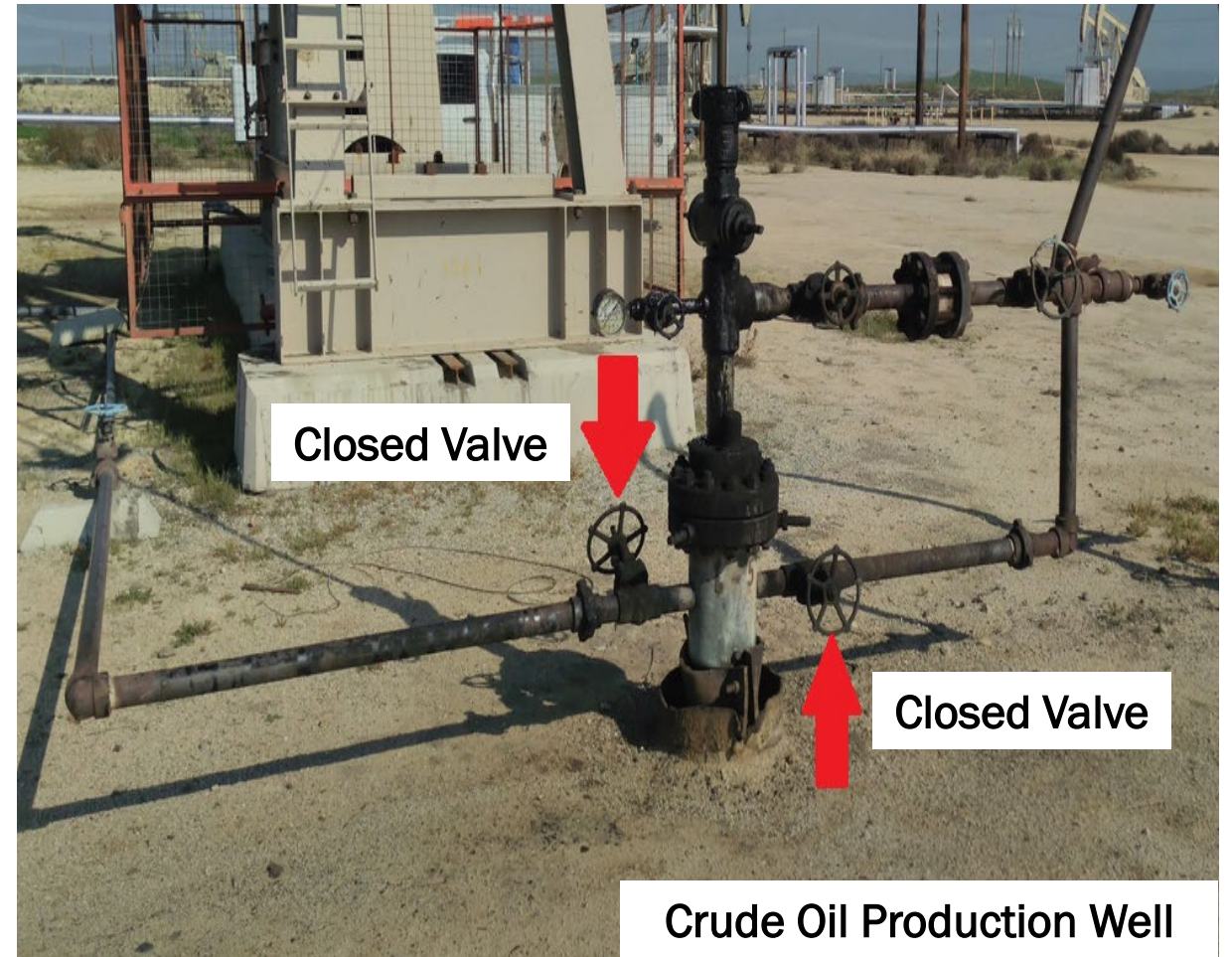
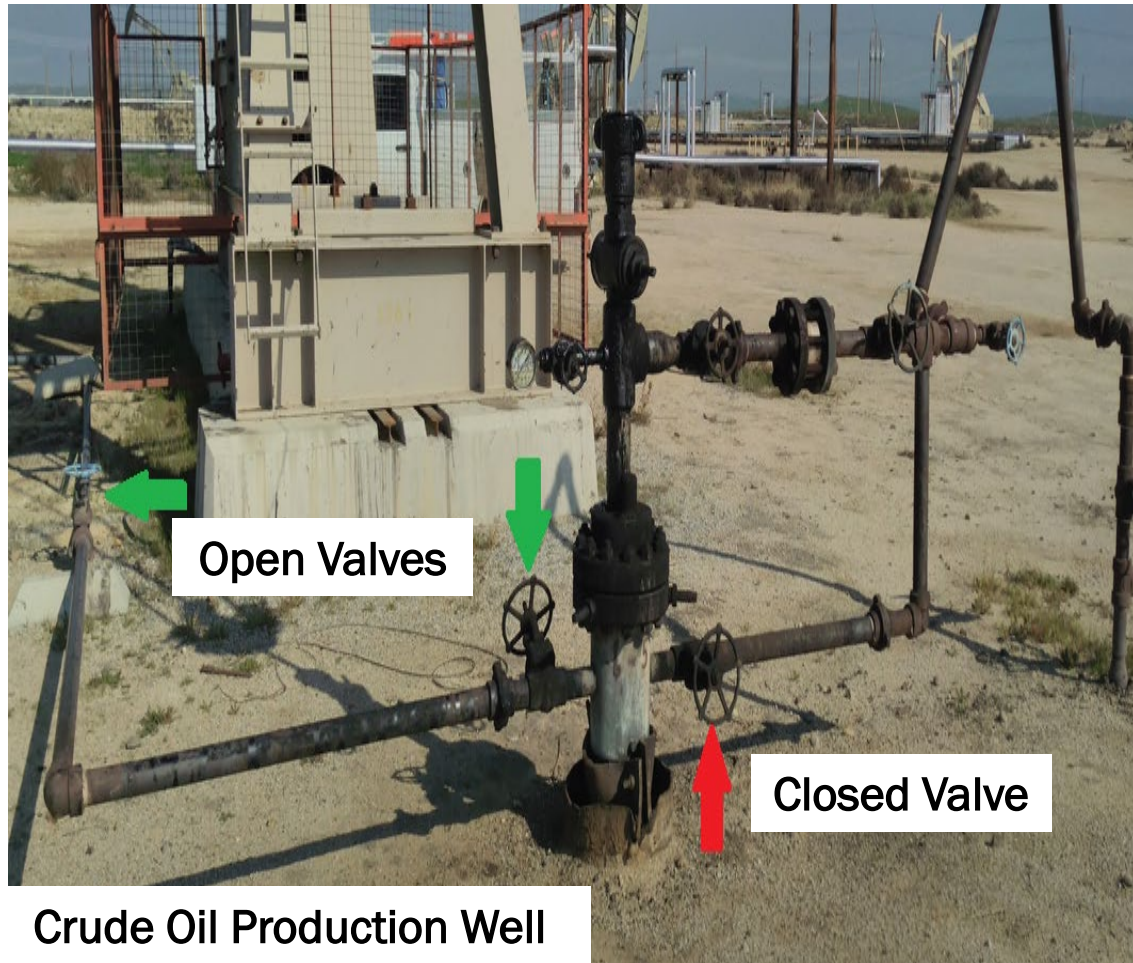
Rule 4401 Steam-Enhanced Crude Oil Production Wells

Rule 4401 Applicability

This rule is applicable to all steam-enhanced crude oil production wells and any associated VOC collection and control systems.

- Closed Casing - In this operation, the casing line is closed and vapors are entrained in the produced fluid line to storage tanks. Additionally, the rule requires that Front Line Production equipment be served by a vapor recovery system
- Open Casing - In this operation, the well casings are open and routed to a VOC collection system

Open Casing vs Closed Casing



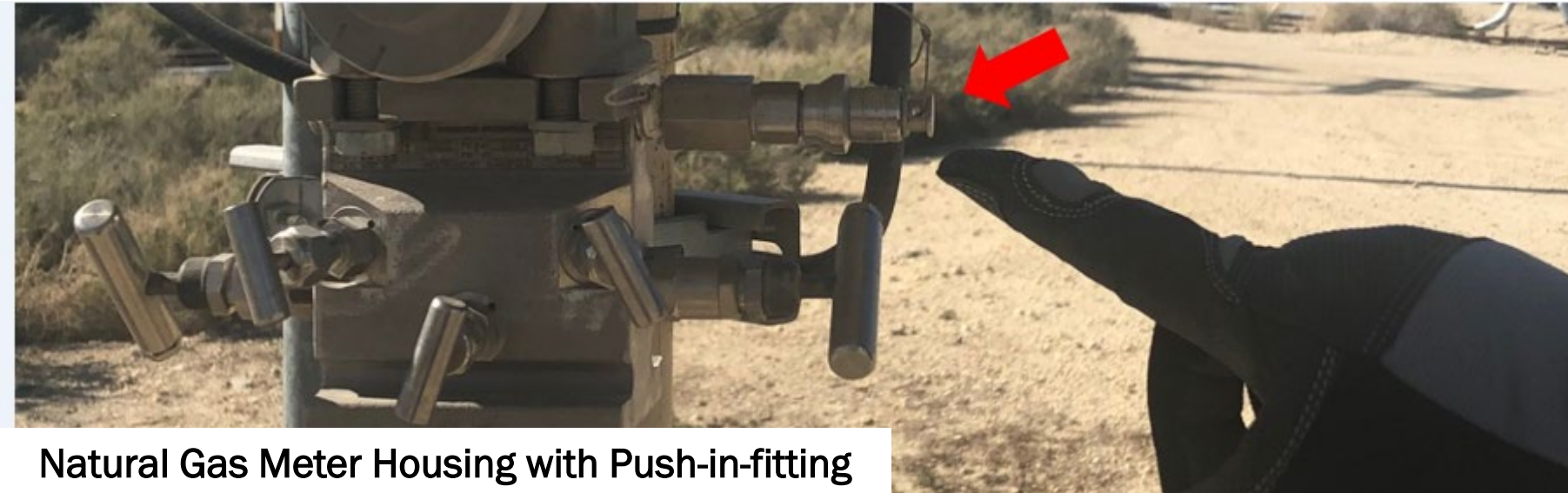
Rule 4401 Exemptions

- Shall not apply to components serving the produced fluid line
- Any steam-enhanced crude oil production well undergoing service or repair during the time the well is not producing
- Shall not apply to up to 40 wells owned by a company and undergoing pilot testing provided;
 - the production zone on that property has not been injected with steam during the preceding two (2) years
 - the well is located more than 1000 feet from an existing well vent vapor collection and control system operated by the company, and the operation is under District permit
- Shall not apply to up to 40 cyclic wells owned by a company and undergoing well stimulation, provided; the well is located more than 1000 feet from an existing well vent vapor collection and control system operated by the company, and the operation is under District Permit
- Shall not apply to up to five (5) cyclic wells owned by a company that is not a small producer, in each stationary source as defined in Rule 2201, and up to 20 cyclic wells owned by a small producer, provided the requirements of Section 4.4.1 and Section 4.4.2 are met

Rule 4401 Exemptions

- The well is located more than 1000 feet from an existing well vent vapor control system operated by the company, and 4.4.2 the operation is under District permit
- Shall not apply to components described in Section 4.6.1 through Section 4.6.4. An operator claiming an exemption pursuant to Section 4.6 shall provide proof of the applicable criteria to the satisfaction of the APCO
 - 4.6.1 Pressure relief devices, pumps, and compressors that are enclosed and whose emissions are controlled with an operating VOC collection and control system as defined in Section 3.0
 - 4.6.2 Components buried below ground
 - 4.6.3 Components used exclusively in vacuum service
 - 4.6.4 One-half inch nominal or less stainless steel tube fittings which have been demonstrated to the APCO to be leak-free based on initial inspection using the test method specified in Section 6.3.3

1/2" or Less Stainless Steel Tube Fittings



Natural Gas Meter Housing with Push-in-fitting

Fitting - a component, excluding flanges and threaded connectors, used to attach or connect pipes or piping system. Examples of a “fitting” include, but are not limited to quick-disconnect fitting, push-in-fittings, and cam-locks

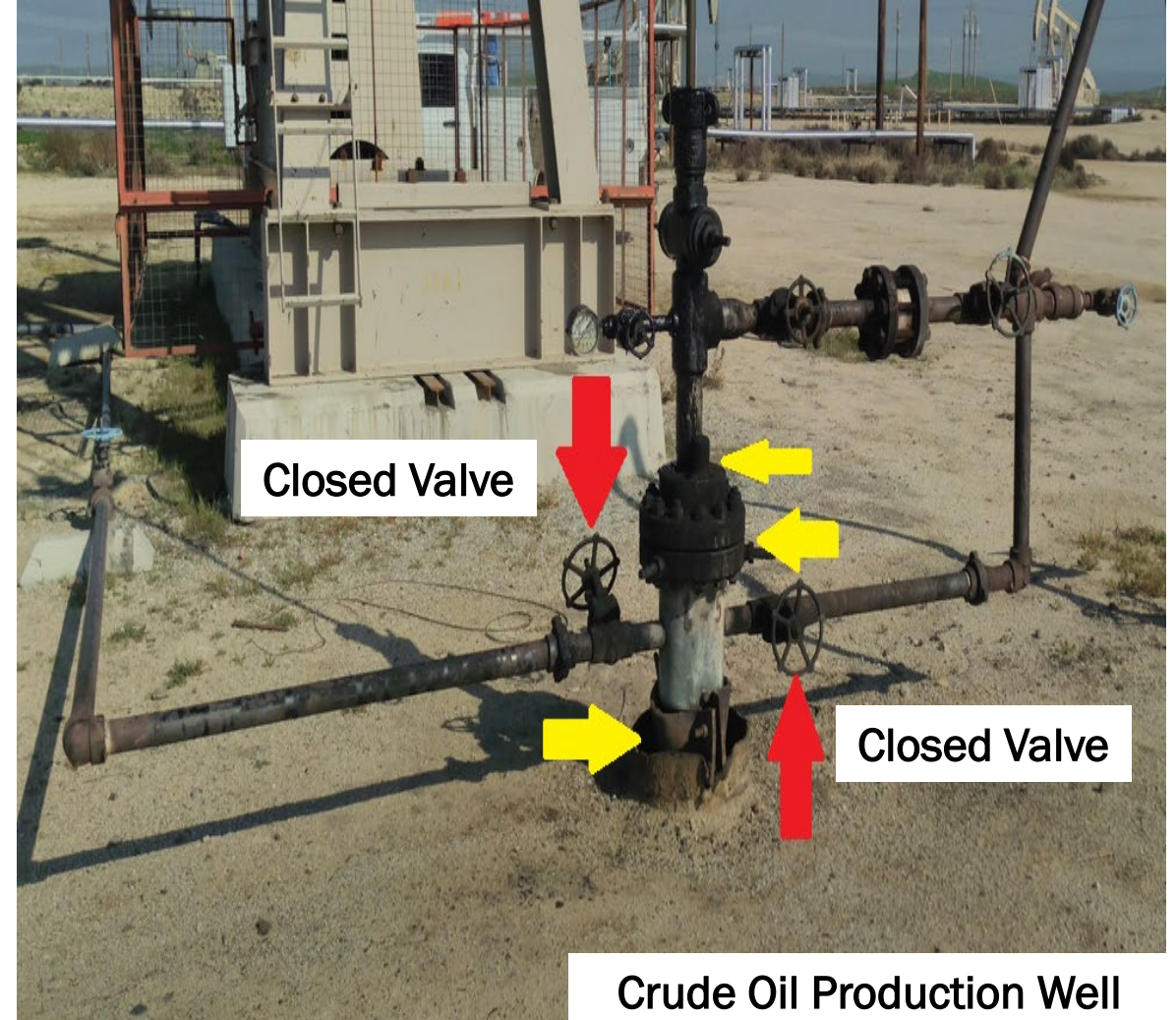
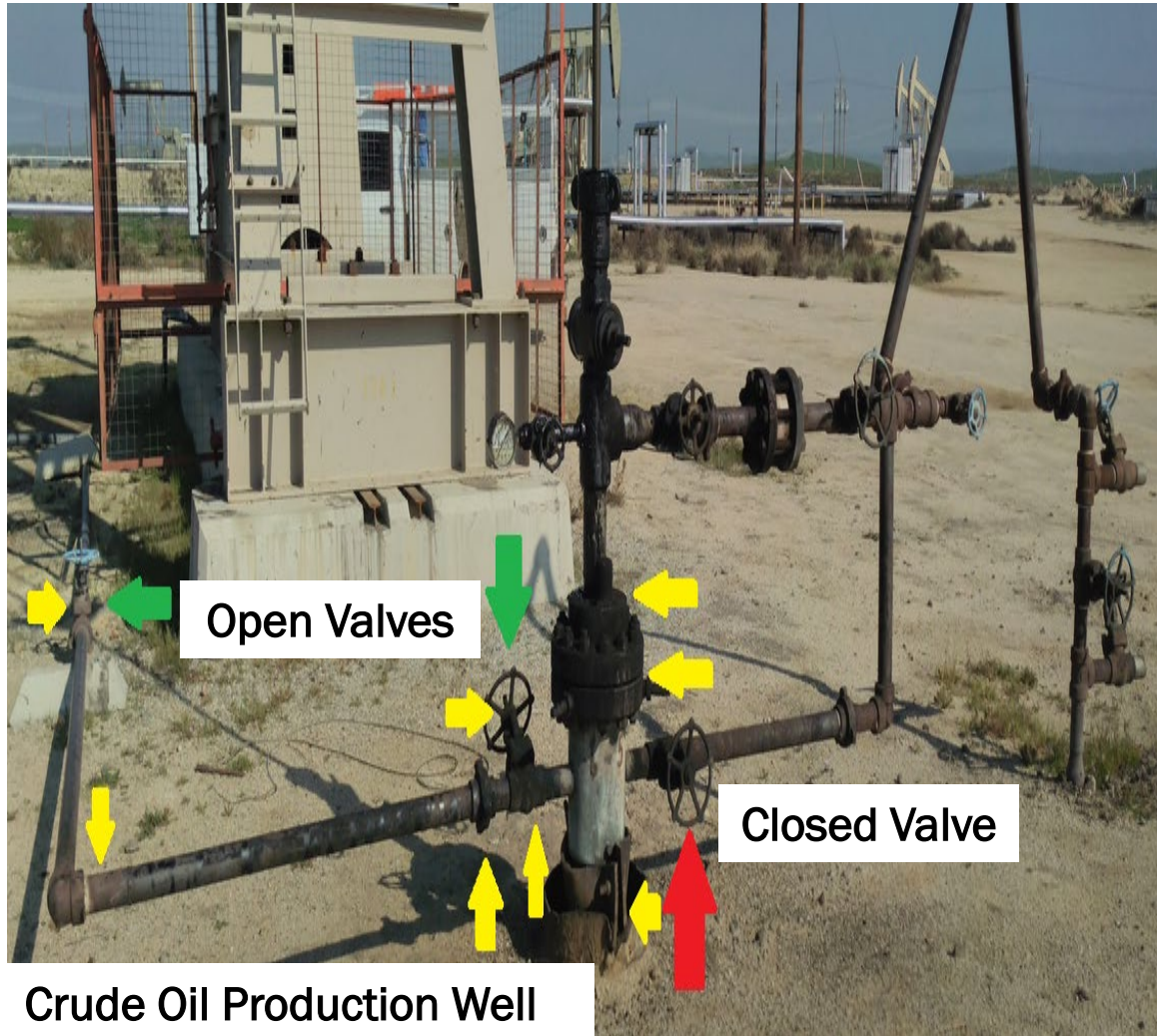
Rule 4401 Exemptions

- The requirements of Section 5.4.1 through Section 5.4.7 of this rule shall not apply to components exclusively handling gas/vapor or liquid with a VOC content of ten percent by weight or less (≤ 10 wt.%), as determined by the test methods in Section 6.3.4. This would exempt operators from the requirement to conduct annual LDAR per Rule 4401
- Any facility that meets this exemption is required to conduct quarterly LDAR per COGR

Rule 4401 LDAR Conditions

- Upon detection of a leak, an operator shall affix a readily visible weatherproof tag to that leaking component that includes the following information: 1) The date and time of leak detection; 2) The date and time of the leak measurement; 3) For a gaseous leak, the leak concentration in ppmv; 4) For a liquid leak, whether it is a major or minor liquid leak; and 5) Whether the component is an essential component, and unsafe-to-monitor component, or a critical component. [District Rule 4401, 5.5.1] Y
- An operator shall minimize a component leak in order to stop or reduce leakage to the atmosphere immediately to the extent possible, but not later than one (1) hour after detection of the leak. [District Rule 4401, 5.5.3] Y

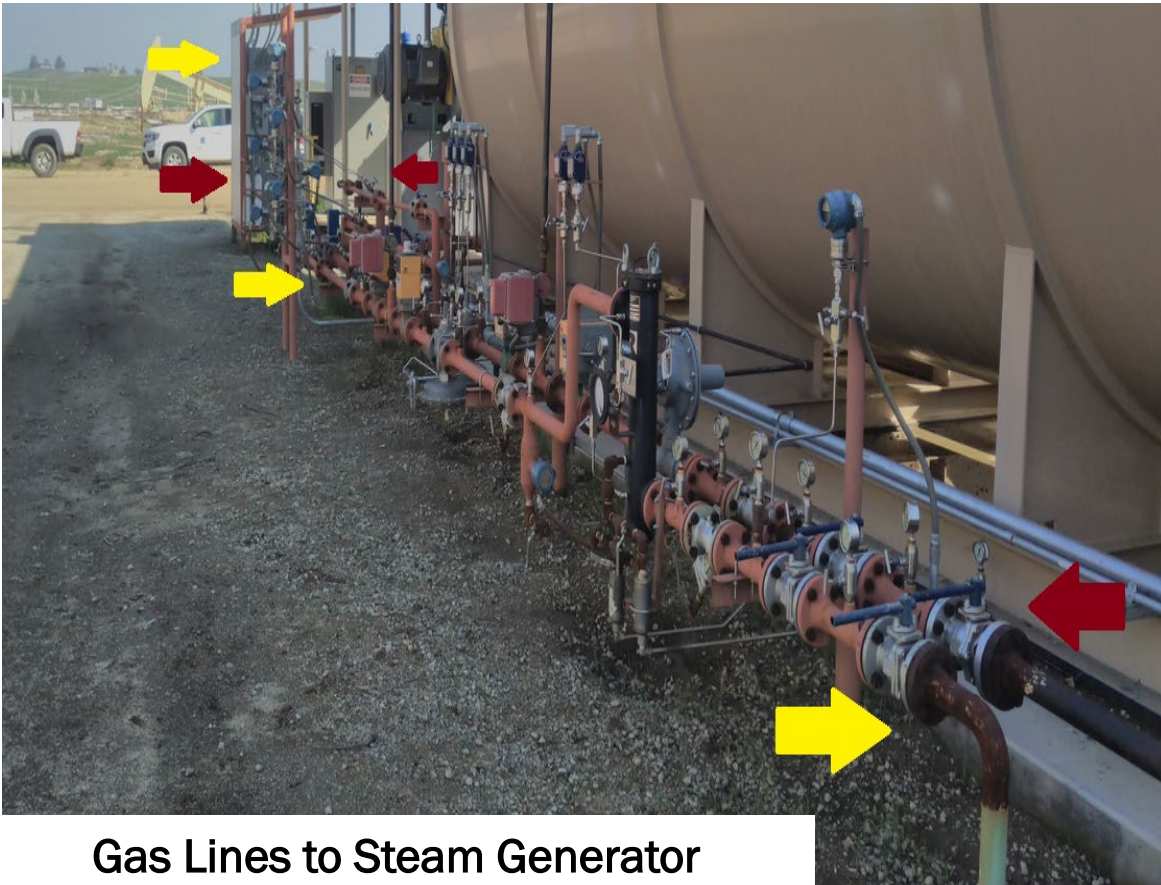
Components to Check Open Casing vs Closed Casing



Rule 4401 Subject Components

Red Arrows Indicate Utility Gas Inspection Points

Yellow Arrows Indicate Produced Gas Inspection Points



Gas Lines to Steam Generator



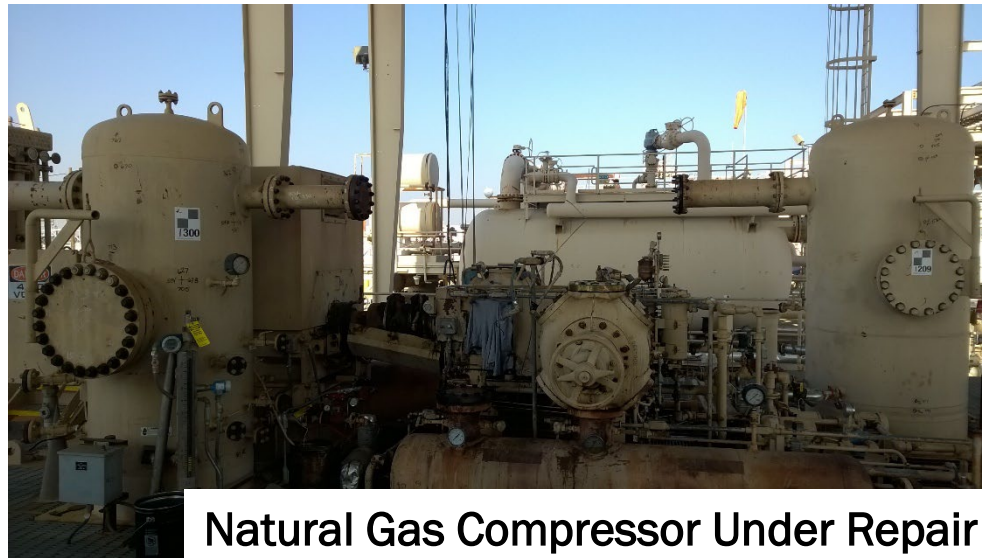
Waste Gas Line to Steam Generator

Rule 4409 Components At Light Crude Oil Production Facilities, Natural Gas Production Facilities, And Natural Gas Processing Facilities

Rule 4409 Applicability

This rule shall apply to components containing or contacting VOC streams at light crude oil production facilities, natural gas production facilities, and natural gas processing facilities

- All components that handle or come in contact with oil & gas streams with a gravity equal to or greater than 30 API & greater than 1.5 psia TVP

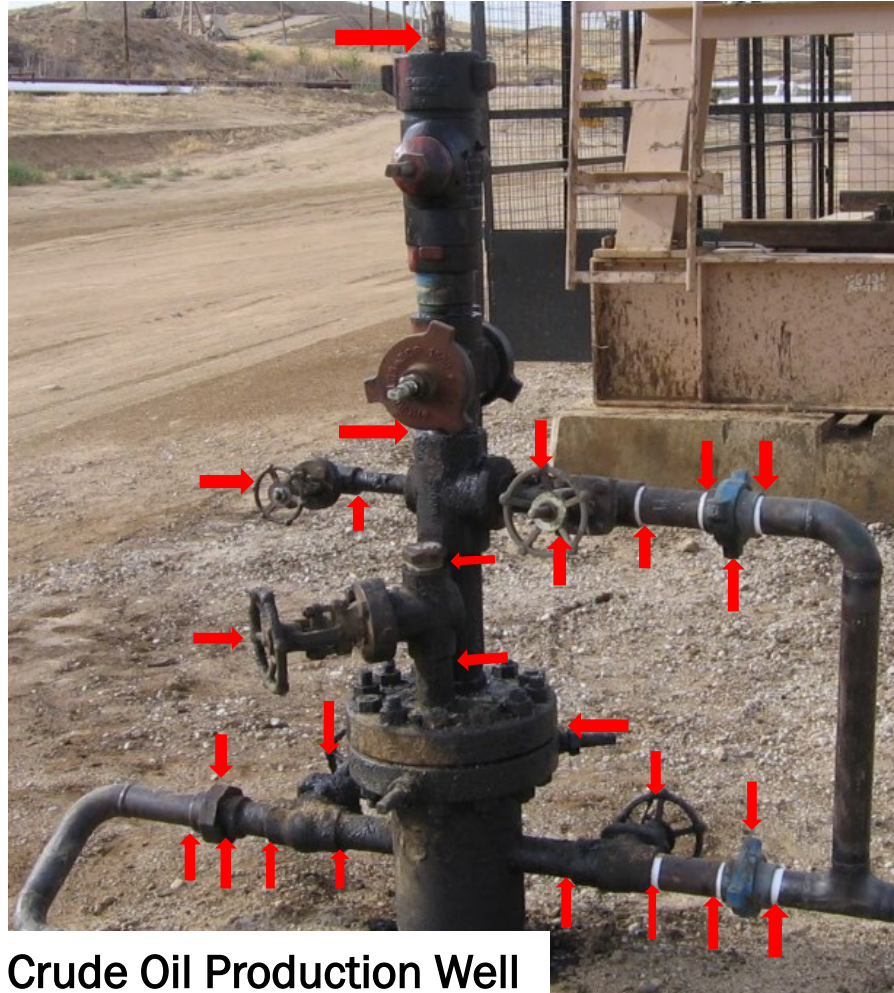


Natural Gas Compressor Under Repair

Rule 4409 Exemptions

- Components subject to Rule 4623 or Rule 4401
- Components buried below ground
- Components exclusively handling liquid streams which have less than 10% by weight evaporation at 150 °C
- Components handling liquids with 90% by volume or greater water concentration if the components are located after initial oil/water separation
- Components at oil production facilities and gas production facilities exclusively handling gas/vapor or liquid with a VOC content of 10% by weight or less
- Components at natural gas processing facilities exclusively handling gas/vapor or liquid with a VOC content less than 1% by weight
- Components exclusively in vacuum service
- Components exclusively handling commercial quality natural gas
- One-half inch nominal or less stainless steel tube fittings which have been demonstrated to the APCO to be leak-free based on initial inspection. As defined by fitting definition in District Rules

Rule 4409 Subject Components



Crude Oil Production Well

Rule 4409 Applicability



Rule 4409 Applicability



Process Flare



Process Flare

Rule 4409 LDAR Conditions

- Permittee shall comply with all applicable requirements of Rule 4409. [District Rule 4409] N
- Except for inaccessible components, unsafe-to-monitor components, or pipes, all components, in service, shall be tested for leaks at least once every calendar quarter. [District Rule 4409, 5.2.4] N
- Records of leaks detected during quarterly or annual operator inspections, and each subsequent repair and re-inspection, shall be submitted to the District, ARB, and EPA upon request. [District Rule 4409, 6.2.2] N

Rule 4623 Storage of Organic Liquids

Rule 4623 Applicability

This rule applies to any tank with a capacity of 1,100 gallons or greater in which any organic liquid is placed, held, or stored

- The tank, any components connected to the tank, and any components handling tank vapors through the destruction or disposal device



Crude Oil Production Tanks

District Rule 2201 New Source Review (NSR)

- Tanks may be subject to Rule 4623 Leak and LDAR requirements per Rule 2201
- An operator with a tank that is exempt from Rule 4623 may enroll in the I&M program through Rule 2201 conditions
- During a New Source Review for modifying or a new installation, a tank may be required to be leak tight and the operator may be required to perform annual inspections per Rule 2201

Rule 4623 Exemptions

- Pressure vessels. Ex: Spheres & Bullet Tanks
- Gasoline storage tanks with a capacity of less than 19,800 gallons that are subject to the requirements of Rule 4621 (Gasoline Transfer Into Stationary Storage Containers, Delivery Vessels, and Bulk Plants)
- Tanks that are used for storage/processing of clean produced water, or other water that meets the VOC standard specified in the definition of “clean produced water” in Rule 1020 (Definitions)
- Tanks used in wine fermentation and for storage of resulting products, by-products, and spirits
- Small Producer’s Tank with a throughput of less than 50 bbl a day
- Tanks receiving/storing organic liquid with a TVP less than 0.5 psia
- Temporary Tanks (500 barrels or less left on site for six months or less)

Rule 4623 Voluntary Tank Preventative Inspection & Maintenance Program

- The purpose of the voluntary I&M program is to allow operators to inspect and repair tanks on their own. This leads to ensured compliance with District Rules, minimization of emissions, alleviating some of the workload from Compliance staff, and allows the operator of storage tanks to remedy problems
- Facilities subject to the requirements of District Rule 4623 may choose to participate in the Voluntary Inspection and Maintenance Program, as outlined in Tables 3 through 5 of District Rule 4623

Rule 4623 Voluntary Tank Inspection & Maintenance Program

Only operators who elect to participate in the voluntary tank preventive inspection and maintenance, and tank interior cleaning program (program) shall be allowed to use the provisions specified in Tables 3 to 5 and Section 5.7.5. When using Tables 3 to 5 and Section 5.7.5 provisions, operators shall perform the procedures as expeditiously as practicable and minimize emissions to the maximum extent practicable. To participate in this program, the operator shall comply with the requirements of Sections 5.7.1 through 5.7.4

- 5.7.1 Submit a letter to the APCO prior to conducting tank inspection, maintenance, and cleaning activities. The letter shall contain a list of each tank that will be subject to this program. The list shall include the tank identification number and location, and/or PTO numbers
- 5.7.2 Keep in their facility at all times a copy of the letter sent to the APCO and maintain the records of annual tank inspection, maintenance and cleaning activities, to document their participation in the program
- 5.7.3 The absence of a copy of the letter and/or failure to maintain appropriate records shall be deemed as non-participation in the program, and therefore the operator will not be eligible to use the provisions specified in Tables 3 to 5 and Section 5.7.5. Those who have not voluntarily participated in the program but are found to be using the provisions of Tables 3 to 5, and Section 5.7.5 shall be deemed to be in violation of this rule
- 5.7.4 Operators who elect to participate in this program but who fail to comply with all of the requirements specified in Tables 3 to 5 and Section 5.7.5 shall be deemed to be a violation of the provisions of this rule

Rule 4623 LDAR Requirement

Sample Conditions For Fixed Roof Tanks

- Operator shall visually inspect tank shell, hatches, seals, seams, cable seals, valves, flanges, connectors, and any other piping components directly affixed to the tank and within five feet of the tank at least once per year for liquid leaks, and with a portable hydrocarbon detection instrument conducted in accordance with EPA Method 21 for gas leaks. Operator shall also visually or ultrasonically inspect as appropriate, the external shells and roofs of uninsulated tanks for structural integrity annually. [District Rule 4623, Table 3]

Rule 4623 Subject Tanks

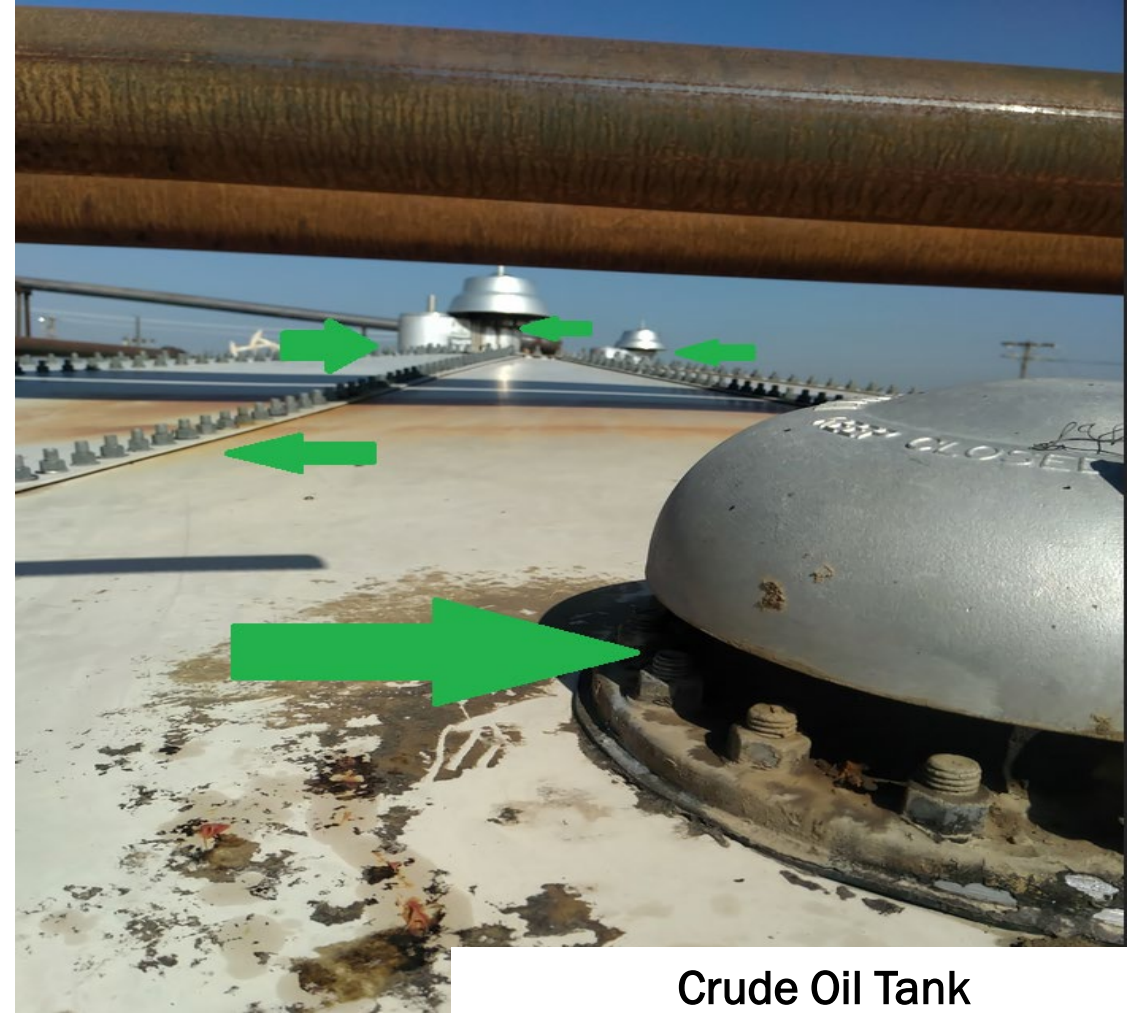


Crude Oil Stock Tanks

Rule 4623 Subject Tank Components

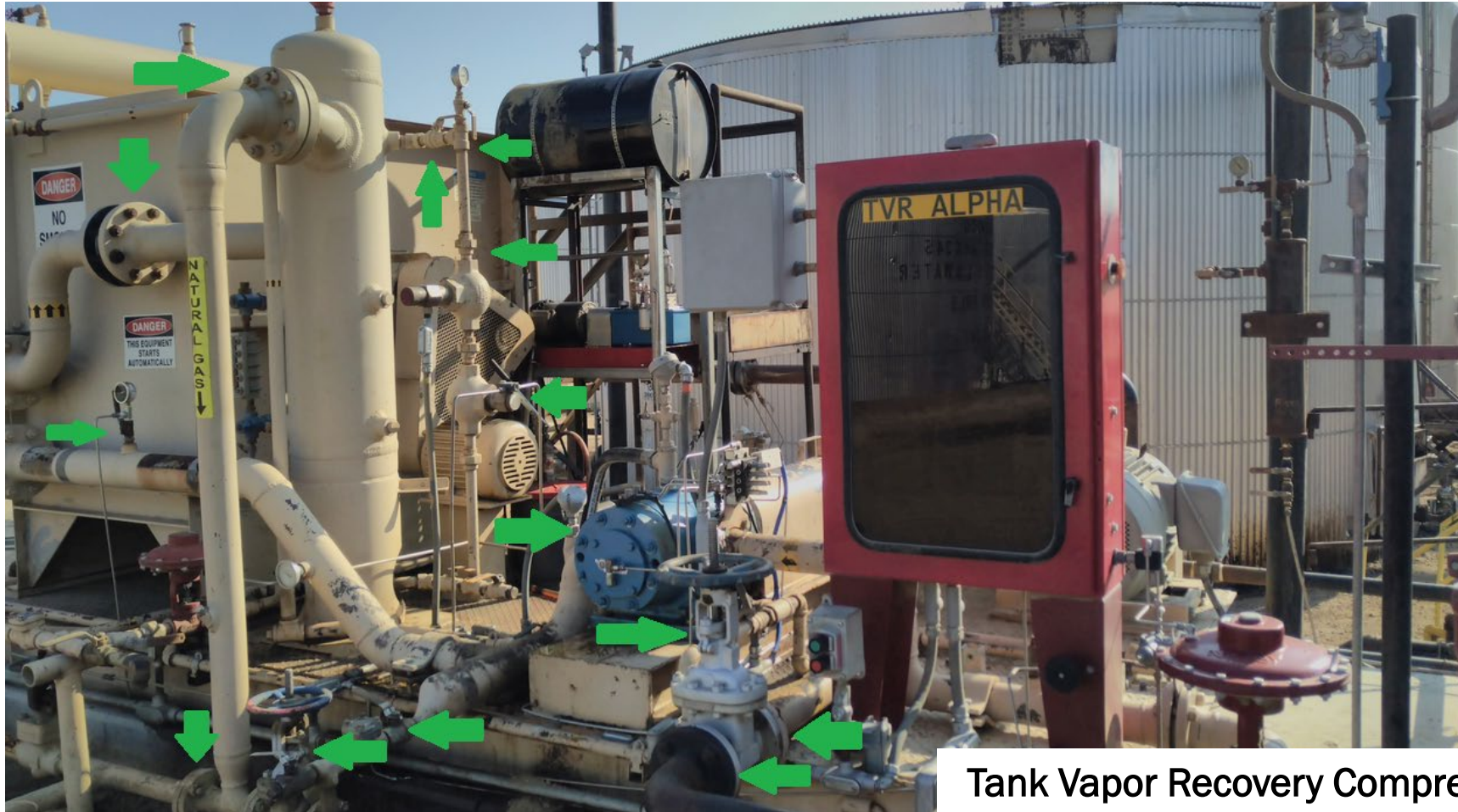


Crude Oil Tank



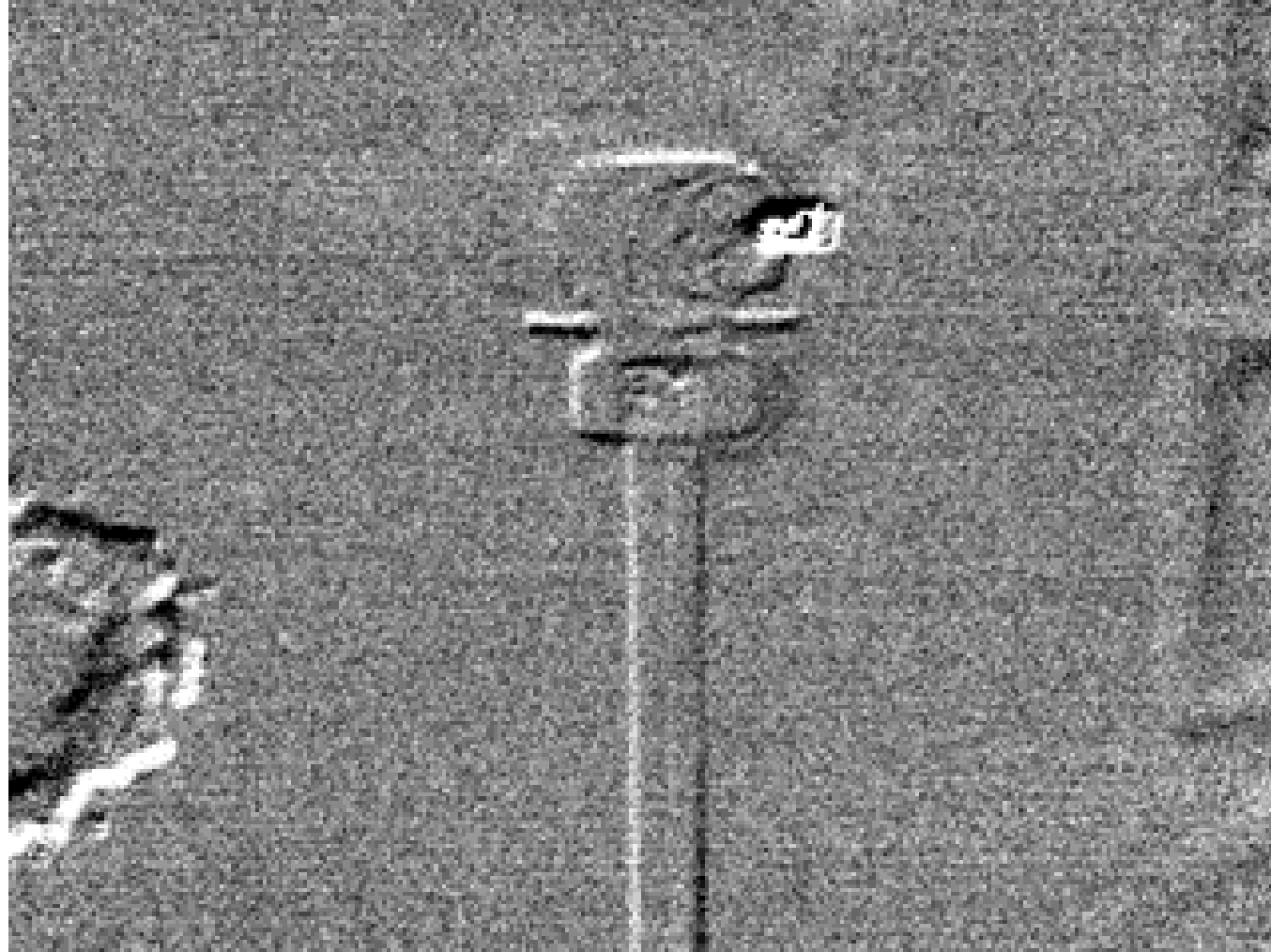
Crude Oil Tank

Rule 4623 Subject Components



Tank Vapor Recovery Compressor

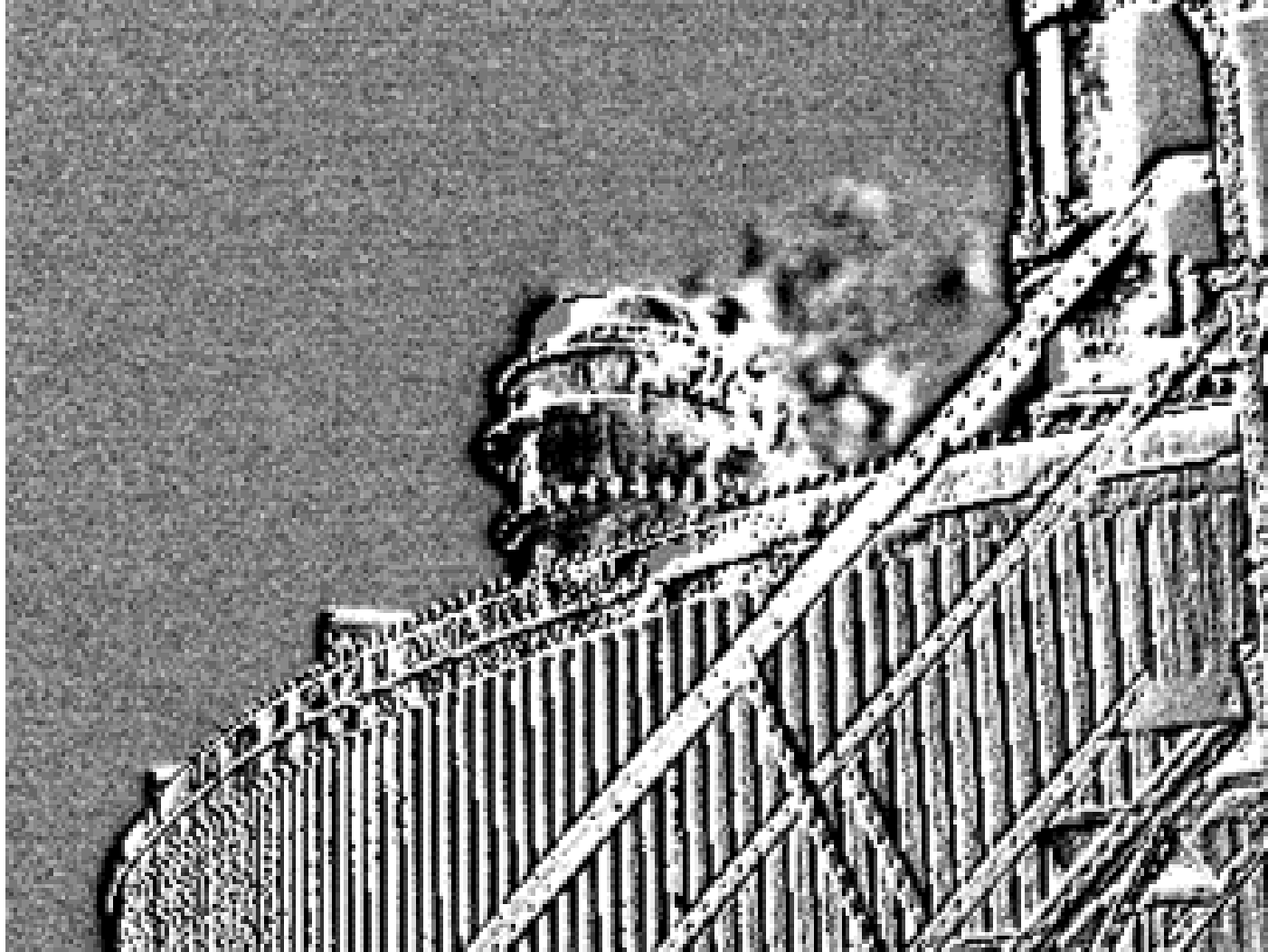
FLIR Video



FLIR Video



FLIR Video



Rule 4624 Transfer of Organic Liquid

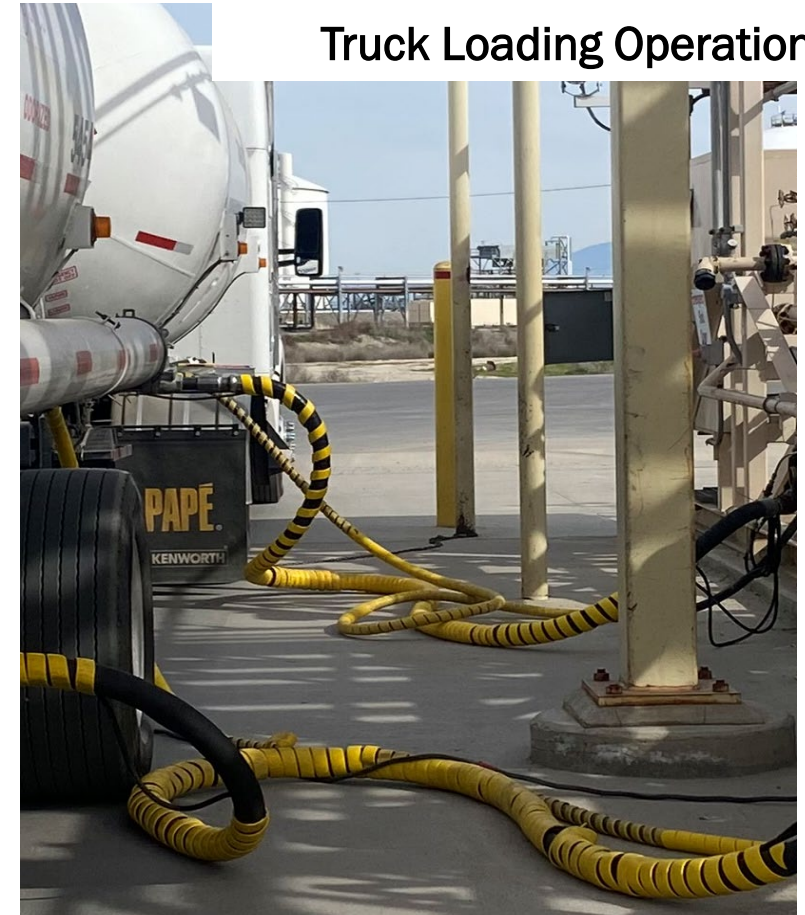
Rule 4624 Applicability

This rule shall apply to organic liquid transfer facilities as defined in this rule

- Organic Liquid Transfer Facility: any aggregate or combination of transfer racks and vapor control equipment at a location, including, but not limited to, the stationary organic liquid pump, and the hose end connector, and the discharge of the vapor control device(s)
- All components between the pump and the unloading/loading operation.

Rule 4624 Definitions

- Loading Rack: any aggregate or combination of equipment which loads organic liquid into tank trucks, trailers or railroad tank cars. The loading rack is the portion from the connection at the inlet of the organic liquid pump to and including the hose and connector at the portable delivery tank.
- Unloading Rack: any aggregate or combination of equipment or control equipment that unloads organic liquid into a storage tank from tank trucks, trailers, or railroad tank cars. The unloading rack is the portion of the connection system from the connection at the inlet of the organic liquid pump to and including the hose and connector at the delivery tank.



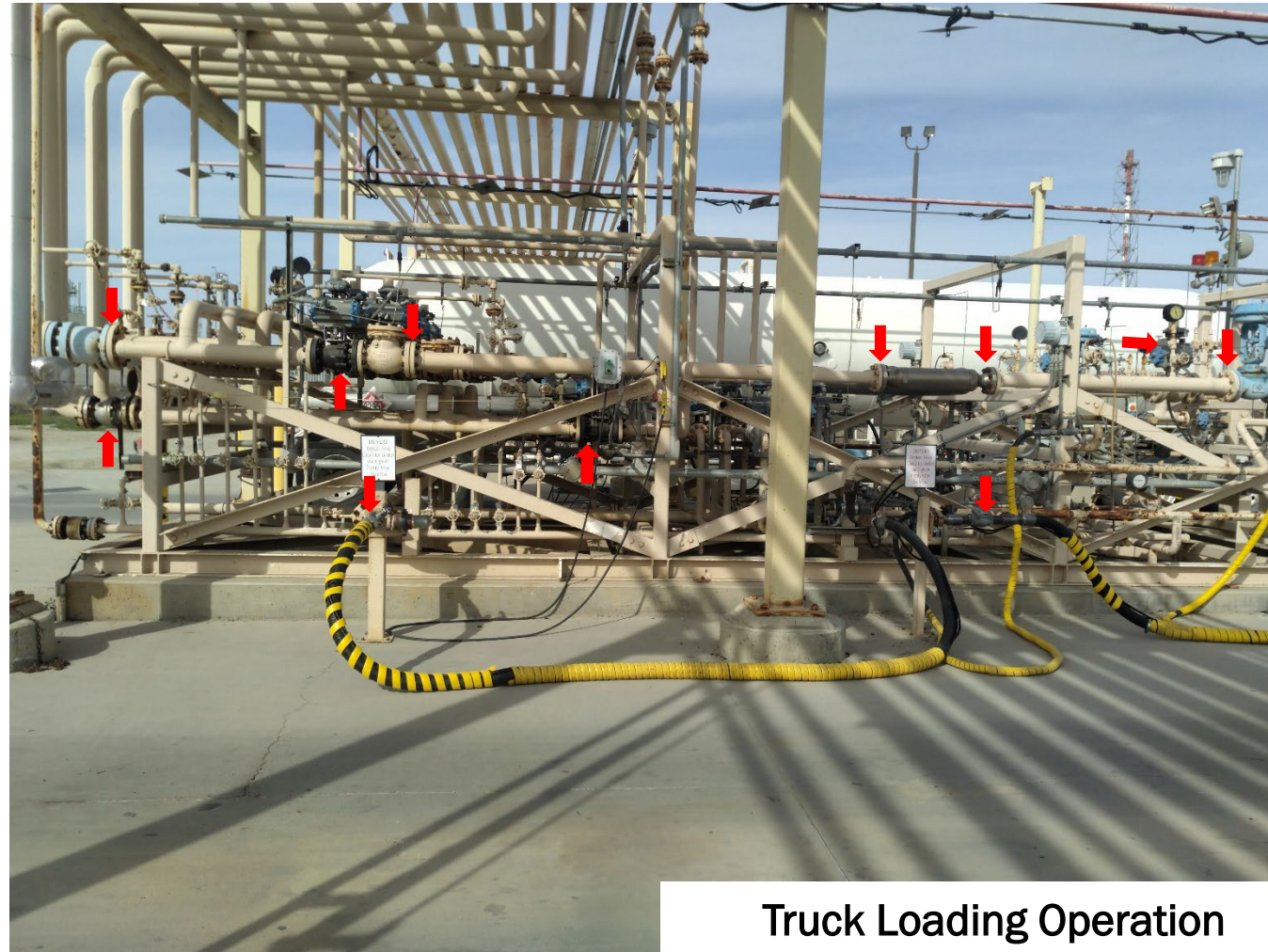
Rule 4624 Exemptions

- Organic liquid transfer facilities which transfer less than 4,000 gallons of organic liquids per day
- Transfer operations subject to the requirements of Rule 4621 or to operations that are subject to Rule 4622
- Transfer of organic liquids with a TVP less than 1.5 psia
- Components subject to District Rules 4409, 4455, and 4623
- Transfer operations involving vacuum trucks

Rule 4624 LDAR Conditions

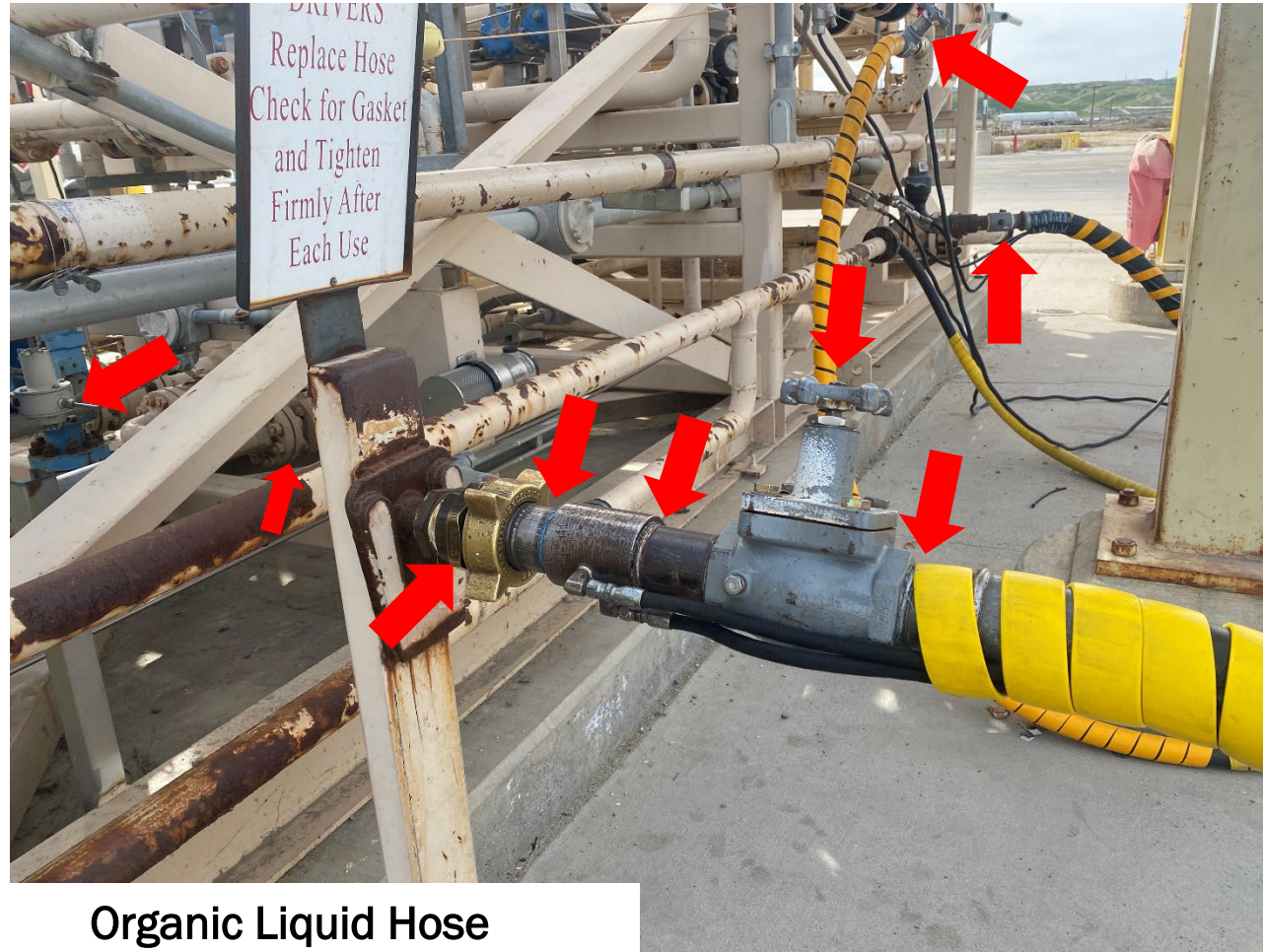
- The operator of an organic liquid transfer facility shall inspect the vapor collection system, the vapor disposal system, and each transfer rack handling organic liquids for leaks during transfer at least once every calendar quarter using the test method prescribed in Section 6.3.8 of Rule 4624. [District Rule 4624] N
- There shall be no leaks in excess of 10,000 ppmv (as methane) for gasoline and no leaks in excess of 1,000 ppm (as methane) for organic liquids other than gasoline measured with a portable hydrocarbon detection instrument pursuant to EPA Method 21. There shall be no liquid leaks in excess of three drops per minute. [District Rule 4624] N

Rule 4624 Applicability



Truck Loading Operation

4624 Applicability



Organic Liquid Hose

California Code of Regulations, Title 17, Division 3, Chapter 1, Subchapter 10 Climate Change, Article 4

Subarticle 13: Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities (COGR)

California Oil and Gas Regulation (COGR) Background

- In 2006, the Legislature passed and Governor Schwarzenegger signed the California Global Warming Solutions Act of 2006
- Established a statewide Green House Gas emissions cap for 2020
- The regulation covers greenhouse gas emissions, predominately methane, from oil production, natural gas gathering and boosting stations, and processing as well as natural gas storage and transmission compressor stations
- The District signed an Memorandum of Agreement with the California Air Resources Board to implement and enforce the regulation

COGR Rule Format

- COGR is broken up into different sections. There are two sections that apply to components and equipment at subject facilities
 - Standards 95668
 - Leak Detection and Repair 95669
- Both Standards and LDAR sections have their own specific exemptions and requirements

COGR LDAR Section 95669 Applicability

- All components that handle oil & gas streams with a gravity equal to or greater than 20 API
- All gas components handling vapors collected from wells or tanks with a gravity less than 20 API and are not subject to a District Rule
- All components handling produced water, that are downstream of a separator and tank system that are not on vapor recovery and have an API gravity equal to or greater than 20
 - COGR does not utilize rounding to determine API gravity subjectivity. However the District utilizes the Significant Figures Policy (COM 1135) when determining subjectivity with District rules.

COGR Frequently Asked Questions

- Q11: Section 95669 (b)(2) (LDAR) provides an exemption for components, including components found on tanks, separators, and pressure vessels used exclusively for heavy crude oil (<20° API Gravity). Does this mean that a facility producing heavy crude oil is exempt from LDAR?

Answer: No. Section 95669(b)(2) of the Oil & Gas Methane Regulation exempts only components, not facilities, that are “used exclusively for crude oil with an API Gravity less than 20 averaged on an annual basis.” This exemption applies to both the crude oil components and the produced water components. It also applies to any components on a crude oil tank or produced water tank, such as a pressure relief valve or pressure vacuum valve. In other words, these oil and produced water components are not subject to LDAR.

However, this exemption does not apply to the gas components at these facilities, such as those on gas lines transporting produced gas to a sales gas system, fuel gas system, gas disposal well, flare, or other combustion device. This exemption also does not apply to the gas components at these facilities that are part of a vapor collection system and vapor control device. In other words, these gas components are subject to LDAR.

COGR Frequently Asked Questions

- Q9: Is equipment that is exempt from facility-conducted inspections (pursuant to Rule 4401 Section 4.7) subject to Section 95669 (LDAR) requirements?

Answer: Yes. Equipment is subject to Section 95669 (LDAR) unless it is specifically exempt. Section 95669 (b)(1) provides exemption for equipment subject to local LDAR requirements as of January 1, 2018. Equipment that is exempt from the facility conducted inspections of Rule 4401 (per Rule 4401 Section 4.7) is subject to Section 95669 (LDAR).

COGR Frequently Asked Questions

- Q26: Are produced water tanks serving light oil production (20° API gravity and above) subject to LDAR Section 95669?

Answer: Yes, light oil production equipment, including that serving the water side, is subject until the water is disposed, recycled, and/or reinjected.

COGR Frequently Asked Questions

- Q25: Are casing leaks coming up from around the outside of the casing exempt by virtue of being “components buried below ground” in Section 95669 (b)(5)?

Answer: No. The casing or a portion thereof, is available for inspection and is not considered a buried component. Components that are not available for inspection such as buried pipelines are exempt. The casing is a pipe (one of the components defined in Section 95667 (a)(9)), it carries the gasses subject to the regulation and, therefore, the leaks must be repaired according to the rule requirements.

Additional COGR Questions

Enrollment in the Tank Inspection and Maintenance Program requires an annual LDAR inspection. Would components included in the Tank Inspection and Maintenance Program be exempt from COGR LDAR requirements?

Yes. The exemption in COGR Section 95669(b)(1) applies to these components as long as they were subject to a local air district LDAR requirement prior to 1/1/2018. However, the provisions of the Voluntary Tank Inspection and Maintenance Program, as codified in Section 5.7 of Rule 4623, only apply to components directly affixed to the tank enrolled in the program and within five feet of that tank. All other components, including those associated with the tank vapor recovery (TVR) system, would be subject to COGR LDAR, provided that no other exemptions from COGR LDAR apply. In limited cases, another District LDAR requirement, such as NSR-based LDAR may apply to select components. Please note that participation in the Tank Inspection and Maintenance Program is voluntary and subject to APCO approval.

While the annual LDAR requirement in Section 5.7 of Rule 4623 only applies to components directly affixed to the tank and within five feet of the tank, the leak standards may apply from the tank to the destruction device, which may include any TVR system.

COGR LDAR Section 95669 Exemptions

- Components, -- including components found on tanks, separators, wells, and pressure vessels -- that are subject to local air district leak detection and repair requirements if the requirements were in place prior to January 1, 2018.
- Components, -- including components found on tanks, separators, wells, and pressure vessels -- used exclusively for crude oil with an API Gravity less than 20 averaged on an annual basis. The average annual API gravity shall be determined using certified reports submitted to the California Department of Conservation Division of Oil, Gas, and Geothermal Resources.
- Components incorporated into produced water lines located downstream of a separator and tank system that is controlled with the use of a vapor collection system.
- Natural gas distribution pipelines located at a crude oil production facility used for the delivery of commercial quality natural gas and which are not owned or operated by the crude oil production facility.

COGR LDAR Section 95669 Exemptions

- Components that are buried below ground. The portion of well casing that is visible above ground is not considered a buried component.
- Components used to supply compressed air to equipment or instrumentation.
- One-half inch and smaller stainless steel tube fittings used to supply natural gas to equipment or instrumentation that have been measured using US EPA Reference Method 21 (October 1, 2017) and verified to be below the minimum allowable leak threshold at startup or during the first leak inspection performed after installation.
- Components operating under a negative gauge pressure or below atmospheric pressure.
- Components at a crude oil or natural gas production facility that are located downstream from the point of transfer of custody and which are not owned or operated by the production facility.
- Temporary components used for general maintenance and used less than 300 hours per calendar year if the owner or operator maintains, and can make available at the request of the ARB Executive Officer, a record of the date when the components were installed.

COGR LDAR Section 95669 Exemptions

- Well casing vents that are open to the atmosphere which are subject to the requirements specified in section 95668(g) of this subarticle.
- Components found on steam injection wells or water flood wells.
- Pneumatic devices or pumps that use compressed air or electricity to operate.
- A compressor rod packing which is subject to annual emission flow rate testing as specified in section 95668(c)(4)(B) of this subarticle.

COGR Fittings Exemption



COGR Fittings Exemption



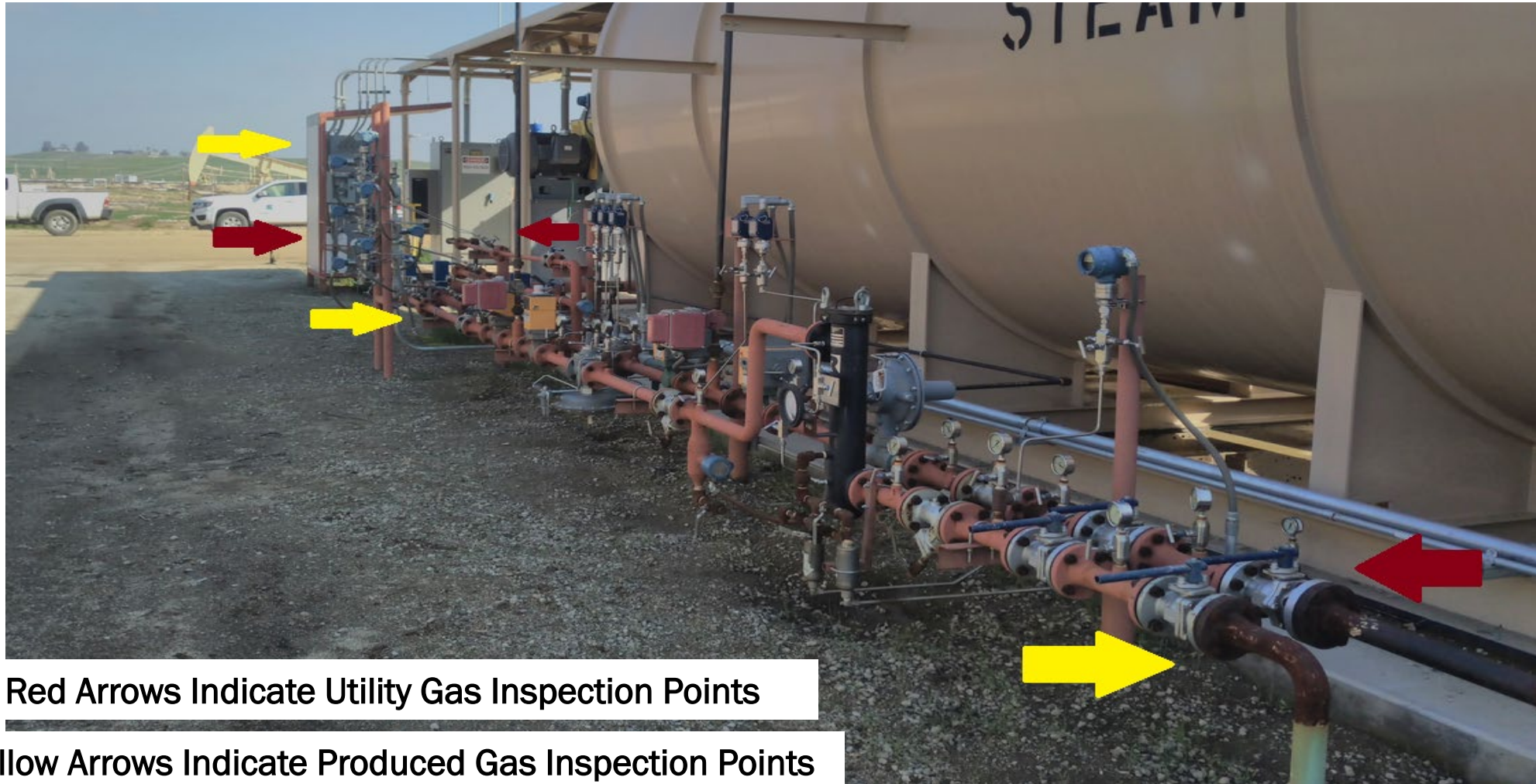
COGR LDAR Registration Conditions

- At least once each calendar quarter, owners or operators shall inspect all accessible components for leaks of total hydrocarbons in units of parts per million volume (ppmv) calibrated as methane in accordance with US EPA Reference Method 21, excluding the use of PID instruments

COGR LDAR Registration Conditions

- Optical Gas Imaging (OGI) instruments may not be used in place of US EPA Reference Method 21 during quarterly leak inspections. OGI may be used as a leak screening device, provided they are approved for use by the District and used by a technician with a certification or training in infrared theory, infrared inspections, and heat transfer principles (e.g., Level II Thermography or equivalent training). All leaks detected with the use of an OGI instrument shall be measured using US EPA Reference Method 21 within 2 calendar days of initial OGI leak detection or within 14 calendar days of initial OGI leak detection of an inaccessible or unsafe to monitor component to determine compliance with the leak thresholds and repair timeframes.

COGR Subject Components



Red Arrows Indicate Utility Gas Inspection Points

Yellow Arrows Indicate Produced Gas Inspection Points

COGR Subject Well



Crude Oil Production Well with Engine Powering Pumping Unit



Produced Gas Separator Pot

Rule Applicability - Key Points

Rule 4401

- Rule 4401 components that are exempt from LDAR per <10% VOC weight are subject to COGR quarterly LDAR
- ½ or less stainless steel fittings as defined in District Rules are exempt in from 4401 & 4409

Rule 4409

- This rule applies to all components containing or contacting VOC streams with a API >30 and TVP > 1.5.
- Components are exempt if they're subject to Rules 4401 or 4623

Rule 4623

- Even though a tank may be exempt from Rule 4623, leak and LDAR standards may still apply per Rule 2201 or COGR

Rule 4624

- Applies to any transfer facility that transfers more than 4,000 gallons of organic liquid on any given day
- Transfer operations of organic liquids with a TVP less than 1.5 psia are exempt

COGR

- All components handling oil & gas with a gravity equal to or greater than 20 API
- All gas components handling vapors collected from wells or tanks with a gravity less than 20 API

Questions?

Let's take a 10 minute break!

Operator Inspection

Operator LDAR Program Requirements

- An operator conducted leak detection and repair program consists of the following general requirements which vary by rule or regulation:
 - Inspection frequency
 - Leak thresholds
 - Leak repair time frames
 - Record keeping

District Rule 4401 LDAR Requirements



Steam Generator

District Rule 4401 LDAR Requirements

Annual LDAR is required unless exempt, as discussed in Rule Applicability section

LDAR required once a year if gas is greater 10% VOC

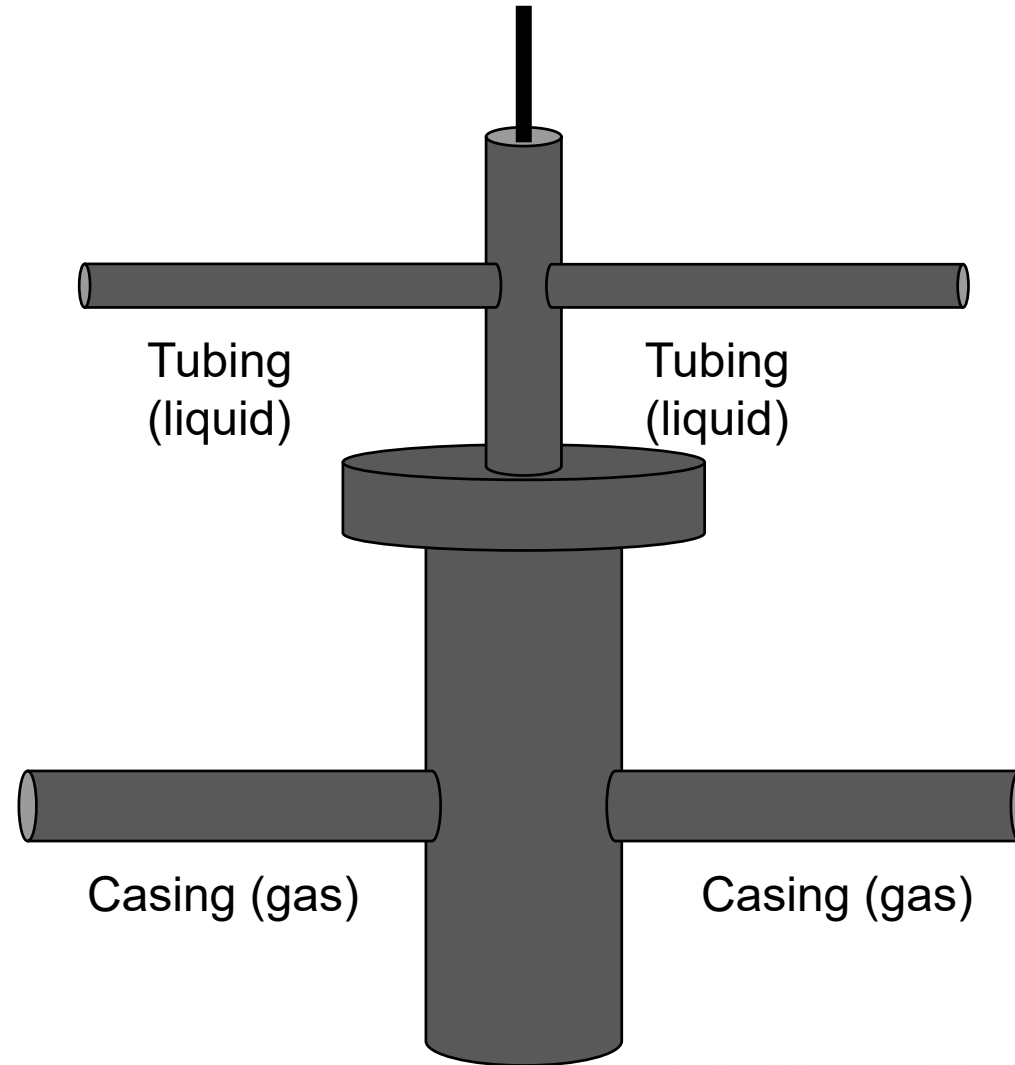
- If less than 10% VOCs or required by permit condition, operator shall conduct COGR quarterlies
- Any rule violation discovered by operator (Open Ended Lines (OEL) & leaks >50k ppm), Notice Of Violation (NOV) issued

District Rule 4401 LDAR Conditions

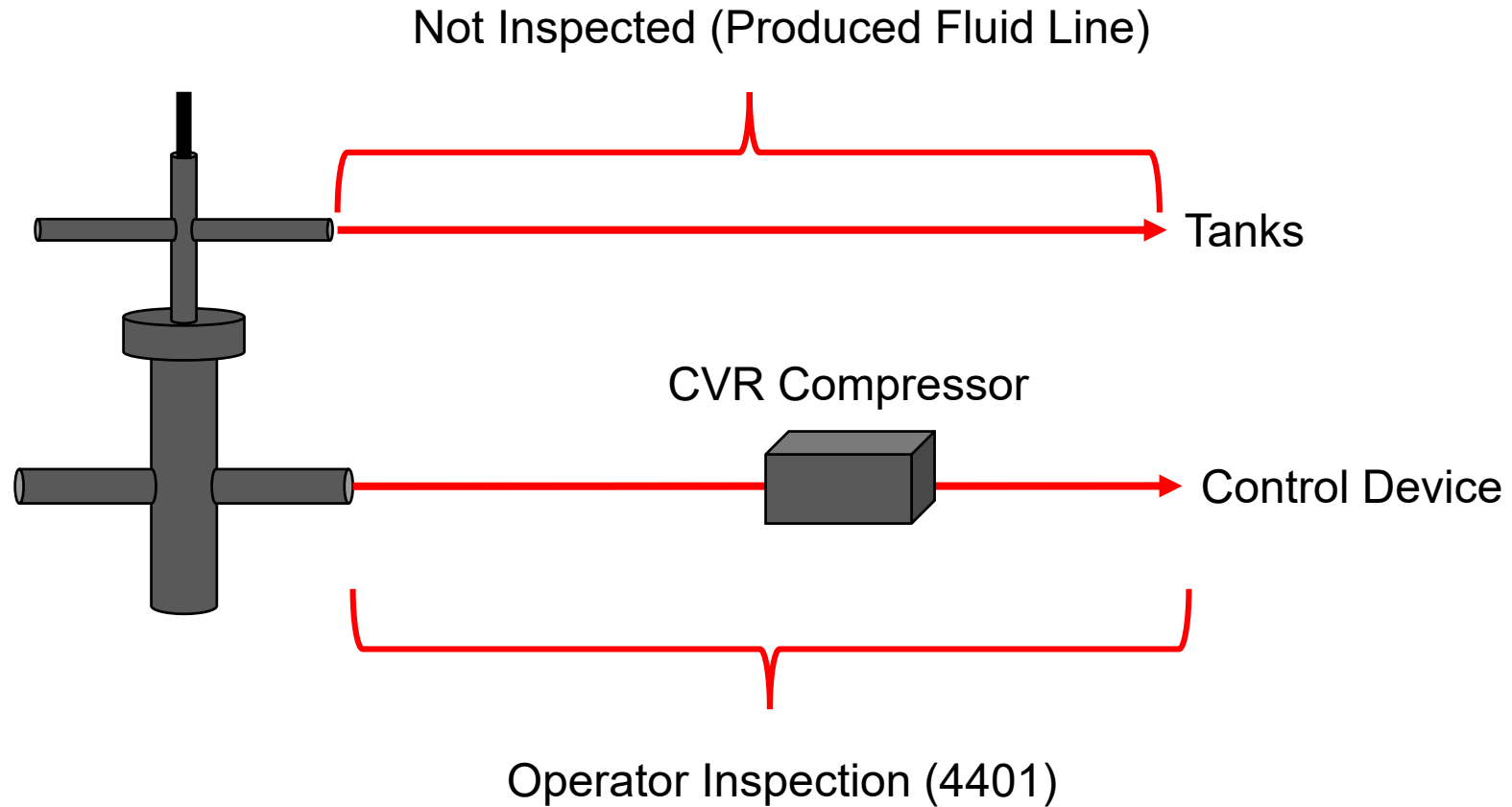
Examples of some conditions that may be on permits:

- The fugitive emissions component inspection and reinspection requirements of Section 5.4.1 through Section 5.4.6 of this rule shall not apply to components exclusively handling gas/vapor or liquid with a VOC content of ten percent by weight or less (10 wt.%), as determined by the test methods in Section 6.3.4
- There shall be no components with a major liquid leak as defined in Section 3.0 of Rule 4401
- There shall be no components with a gas leak of greater than 50,000 ppmv
- An operator shall be in violation of this rule if any District inspection demonstrates or if any operator inspection conducted pursuant to Section 5.4 of Rule 4401 demonstrates the existence of any combination of components with minor liquid leaks, minor gas leaks, or gas leaks greater than 10,000 ppmv up to 50,000 ppmv that totals more than number of leaks allowed by Table 2 of Rule 4401

Well LDAR Diagram



Rule 4401 LDAR Diagram



District Rule 4401 LDAR Requirements

In addition to the LDAR requirements, Operators must conduct the following:

- Except for pipes and unsafe-to-monitor components, an operator shall inspect all other components pursuant to the requirements of Section 6.3.3 at least once every year.
- An operator shall visually inspect all pipes at least once every year. Any visual inspection of pipes that indicates a leak that cannot be immediately repaired to meet the leak standards of this rule shall be inspected within 24 hours after detecting the leak. If a leak is found, the leak shall be repaired as soon as practicable but not later than the time frame specified in Table 3 of this rule.

District Rule 4401 LDAR Requirements

- An operator shall audio-visually (by hearing and by sight) inspect for leaks all accessible operating pumps, compressors, and PRDs in service at least once each calendar week
- Any audio-visual inspection of an accessible operating pump, compressor, and PRD performed by an operator that indicates a leak that cannot be immediately repaired to meet the leak standards of this rule shall be inspected not later than 24 hours after conducting the audio-visual inspection. If a leak is found, the leak shall be repaired as soon as practicable but not later than the time frame specified in Table 3 of this rule
- Any audio-visual inspection of an accessible operating pump, compressor, and PRD performed by an operator that indicates a leak that cannot be immediately repaired to meet the leak standards of this rule shall be inspected not later than 24 hours after conducting the audio-visual inspection. If a leak is found, the leak shall be repaired as soon as practicable but not later than the time frame specified in Table 3 of this rule

District Rule 4401 LDAR Requirements

- An operator shall inspect all new, replaced, or repaired fittings, flanges, and threaded connections within 72 hours of placing the component in service.
- Inspect unsafe / inaccessible components except for PRDs subject to the requirements of Section 5.4.4.1, an operator shall inspect a component that has been repaired or replaced not later than 15 calendar days after the component was repaired or replaced
- An operator shall inspect all unsafe-to-monitor components during each turnaround.
- A District inspection in no way fulfills any of the mandatory inspection requirements that are placed upon operators and cannot be used or counted as an inspection required of an operator

District Rule 4401 LDAR Requirements



Rule 4401 Well with an OEL

District Rule 4401 Operator Records

An operator shall maintain records for a period of five (5) years.

- An operator shall keep a copy of the APCO-approved Operator Management Plan (OMP) at the facility.
- The operator shall maintain an inspection log.
- Records of leaks detected during quarterly or annual operator inspection, and each subsequent repair and re-inspection.
- Records of VOC content.

District Rule 4409 LDAR Requirements



Light Crude Oil Production Well

District Rule 4409 LDAR Requirements

Operator LDAR is required unless exempt, as discussed in Rule Applicability section

- Quarterly or Annual LDAR required. API above 30 and TVP greater than 1.5 psia
- Any stream containing or contacting applicable gas/liquid streams would be subject to the LDAR requirements

District Rule 4409 LDAR Requirements

Operator Annual LDAR

- Any operator inspection conducted annually for a component type that demonstrates one or more of the conditions in Section 5.1.4 exist at the facility shall constitute a violation of this rule regardless of whether or not the leaking components are repaired, replaced, or removed from operation within the allowable repair time frame specified in this rule.

Operator Quarterly LDAR

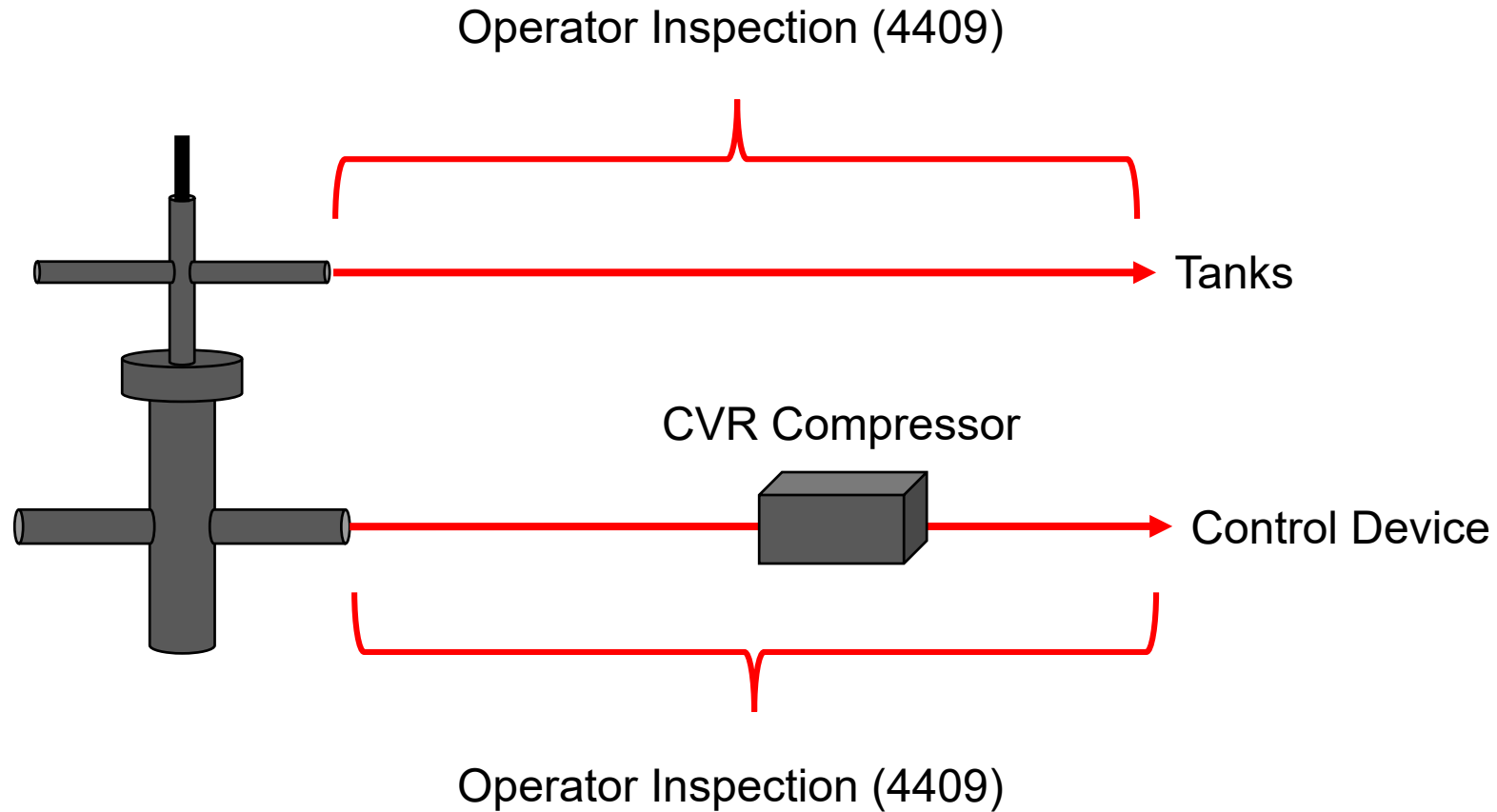
- Any operator inspection that demonstrates one or more of the conditions in Section 5.1.4 exist at the facility shall not constitute a violation of this rule if the leaking components are repaired as soon as practicable but not later than the time frame specified in this rule. Such components shall not be counted towards determination of compliance with the provisions of Section 5.1.4.

District Rule 4409 LDAR Requirements

In addition to the LDAR requirements, Operators must conduct the following:

- The operator shall inspect all components at least once every calendar quarter, except for inaccessible components, unsafe-to-monitor components, or pipes.
- The operator shall inspect all inaccessible components at least once every 12 months.
- The operator shall inspect all unsafe-to-monitor components during each turnaround.
- The operator shall inspect, immediately after placing into service, all new, replaced, or repaired fittings, flanges, and threaded connections.

Rule 4409 LDAR Diagram



District Rule 4409 LDAR Requirements

- Any audio-visual inspection of all accessible operating pumps, compressors, and PRDs performed by an operator that indicates a leak that cannot be immediately repaired to meet the leak standards of this rule shall be inspected using the test method specified in Section 6.3.1 not later than 24 hours after conducting the audio-visual inspection. If a leak is found, the leak shall be repaired as soon as practicable but not later than the time frame specified in Table 3 of this rule.
- The operator shall visually inspect all pipes for leaks at least once every 12 months.
 - Any visual inspection of pipes that indicates a leak that cannot be immediately repaired to meet the leak standards of this rule shall be inspected using the test method specified in Section 6.3.1 within 24 hours after detecting the leak. If a leak is found, the leak shall be repaired as soon as practicable but not later than time frame specified in Table 3 of this rule.

District Rule 4409 LDAR Requirements

- The operator shall initially inspect a PRD that releases to the atmosphere using the test method specified in Section 6.3.1 as soon as practicable but not later than 24 hours after the time of the release.
- The operator shall reinspect the PRD using the test method specified in Section 6.3.1 not earlier than 24 hours after the initial inspection but not later than 15 calendar days after the date of the release and is leak-free.
- If the PRD is found to be leaking at either inspection, the PRD leak shall be treated as if the leak was found during quarterly operator inspections.

District Rule 4409 LDAR Requirements

- For manned light oil production facilities, gas production facilities, and gas processing facilities, an operator shall audio-visually (by hearing and by sight) inspect for leaks all accessible operating pumps, compressors, pressure relief valves in service at least once every 24 hours except when operators do not report to the facility for that given 24 hours.
- For unmanned light oil production facilities, gas production facilities, or gas processing facilities, the operator shall audio-visually inspect for leaks all accessible operating pumps, compressors, PRDs in service at least once per calendar week.

Rule 4409 Manned vs Unmanned Facilities

- An unmanned facility is a facility which has no permanent-sited operators. Permanent-sited operators means personnel responsible for the operation of the equipment subject to this rule is not in attendance at the facility 24 hours per day
- A manned facility is any operation that does not meet the definition above.

District Rule 4409 LDAR Requirements

A District inspection in no way fulfills any of the mandatory inspection requirements that are placed upon operators and cannot be used or counted as an inspection required of an operator. Any attempt by an operator to count such District inspections as part of the mandatory operator's inspections is considered a willful circumvention of the rule and is a violation of this rule.

District Rule 4409 Operator Records

An operator shall maintain records for a period of five (5) years.

- An operator shall keep a copy of the APCO-approved Operator Management Plan (OMP) at the facility.
- The operator shall maintain an inspection log.
- Records of leaks detected during quarterly or annual operator inspection, and each subsequent repair and re-inspection.

Detected Leaks

- An operator shall affix a readily visible weatherproof tag to a leaking component upon detection of the leak. An operator shall include the following information on the tag:
 - The date and time of leak detection
 - The date and time of leak measurement
 - For a gaseous leak, the leak concentration in ppmv
 - For a liquid leak, whether it is a major liquid leak or a minor liquid leak
 - Whether the component is an essential component, an unsafe-to-monitor component, or a critical component



Detected Leaks

An attempt to minimize the leak shall be made immediately but no later than one hour. (District Rules 4401, 4409)

- District Rule 4409 Example: a 50,000+ ppm leak detected and minimized within 1 hour changes the 2 day repair period to:

Minimized Leak	New Repair Time Frame
Major Leak (10,000 to 49,999 ppm)	5 days
Minor Leak (1,000 to 9,999 ppm)	7 days

- District Rule 4401 Example: a 50,000+ ppm leak detected and minimized within 1 hour changes the 2 day repair period to:

Minimized Leak	New Repair Time Frame
Major Leak (10,000 to 49,999 ppm)	5 days
Minor Leak (1,000 to 9,999 ppm)	14 days

District Rule 4624 LDAR Requirements

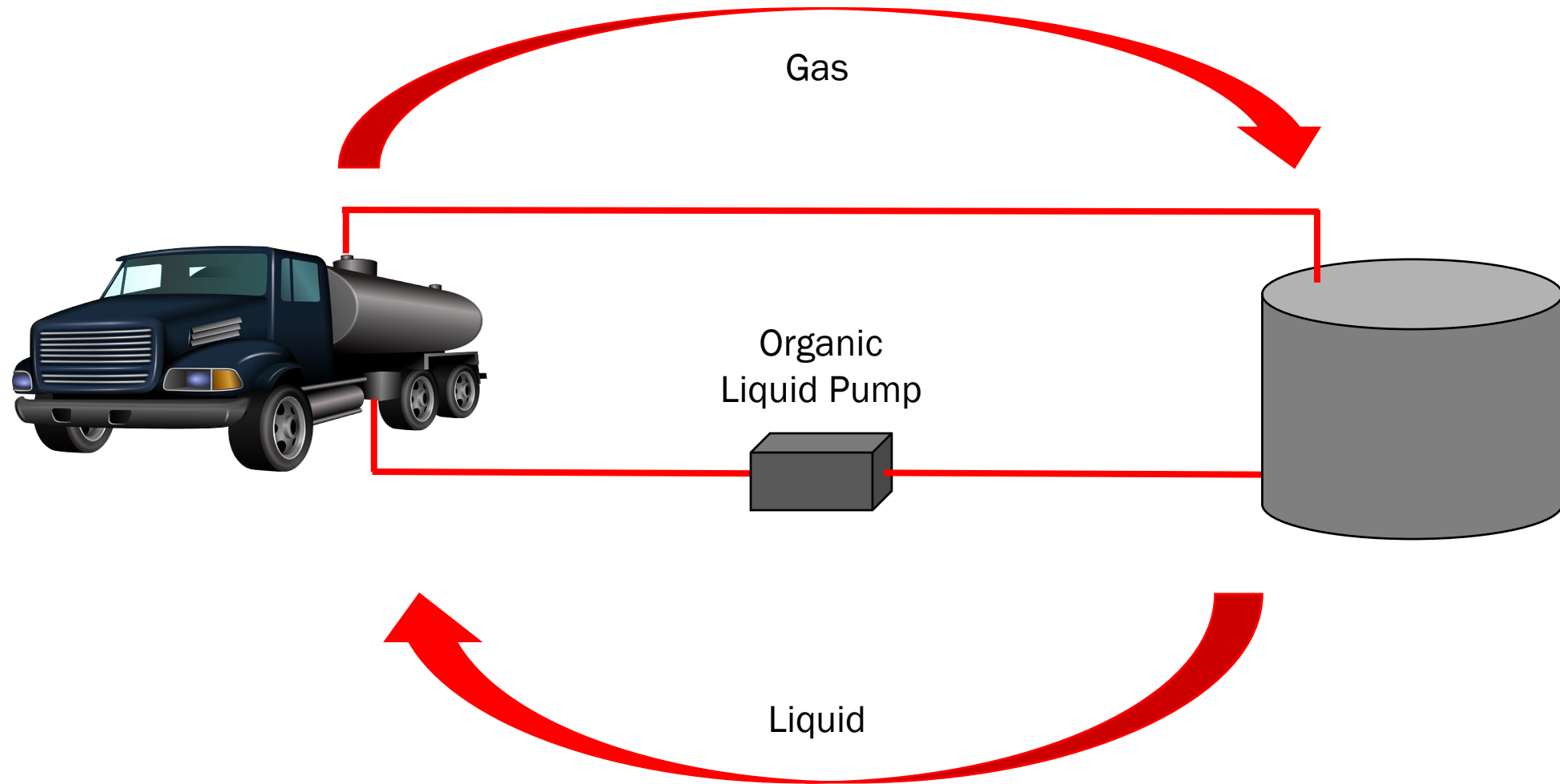


District Rule 4624 LDAR Requirements

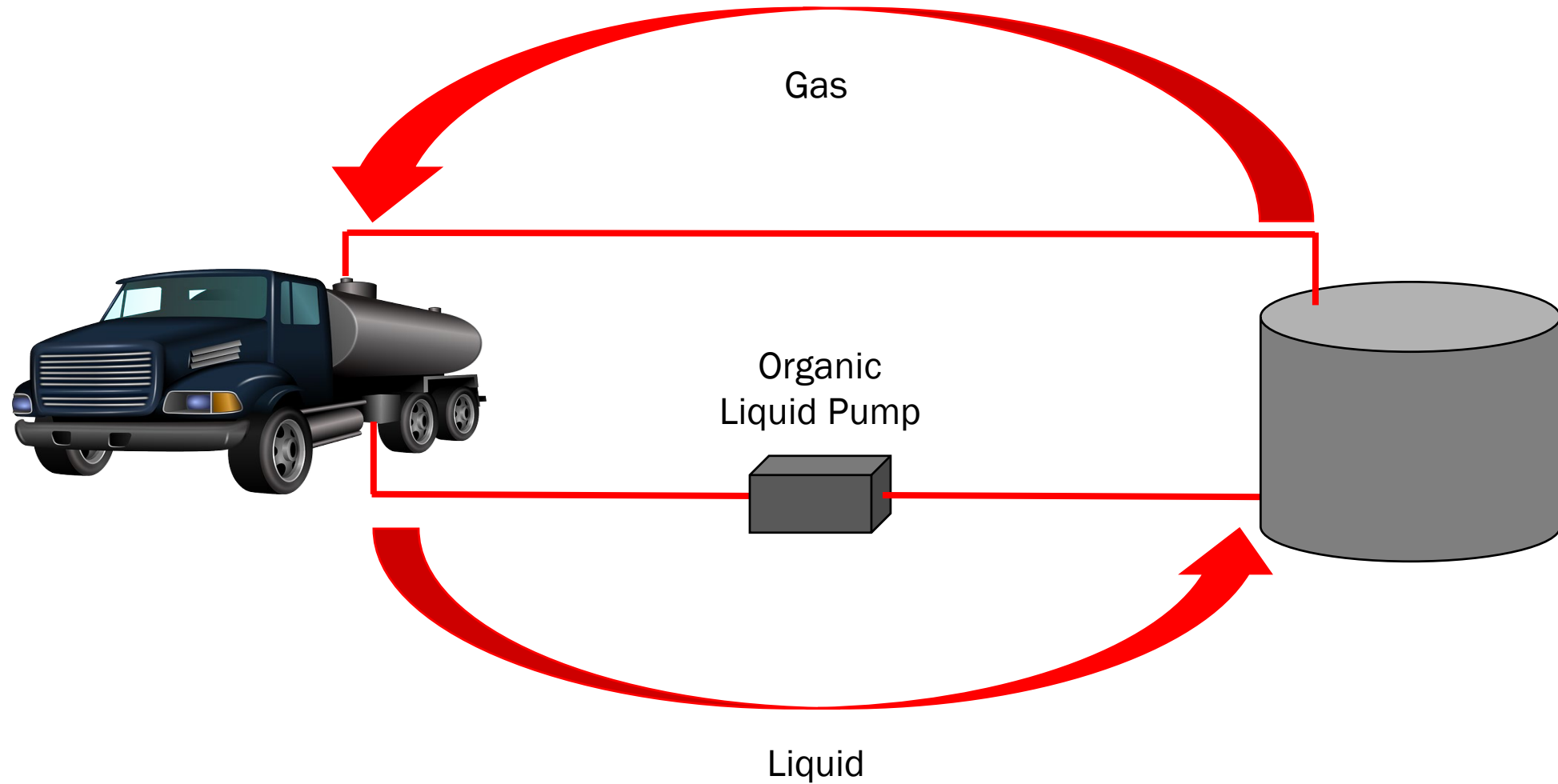
Quarterly LDAR is required unless exempt, as discussed in Rule Applicability section.

- The operator of an organic liquid transfer facility shall inspect the vapor collection system, the vapor disposal system, and each transfer rack handling organic liquids for leaks during transfer at least once every calendar quarter

Rule 4624 Loading LDAR Diagram



Rule 4624 Unloading LDAR Diagram



District Rule 4624 LDAR Requirements

In addition to the LDAR requirements, Operators must conduct the following:

- All equipment that are found leaking shall be repaired or replaced within 72 hours. If the leaking component cannot be repaired or replaced within 72 hours, the component shall be taken out of service until such time the component is repaired or replaced. The repaired or replacement equipment shall be reinspected the first time the equipment is in operation after the repair or replacement.

District Rule 4624 Operator Records

An operator shall retain accurate records required by this rule for a period of five years.

- An operator subject to any part of Section 5.0 shall keep records of daily liquid throughput and the results of any required leak inspections.

California Oil and Gas Regulation (COGR)



Natural Gas Pipeline

California Oil and Gas Regulation (COGR)

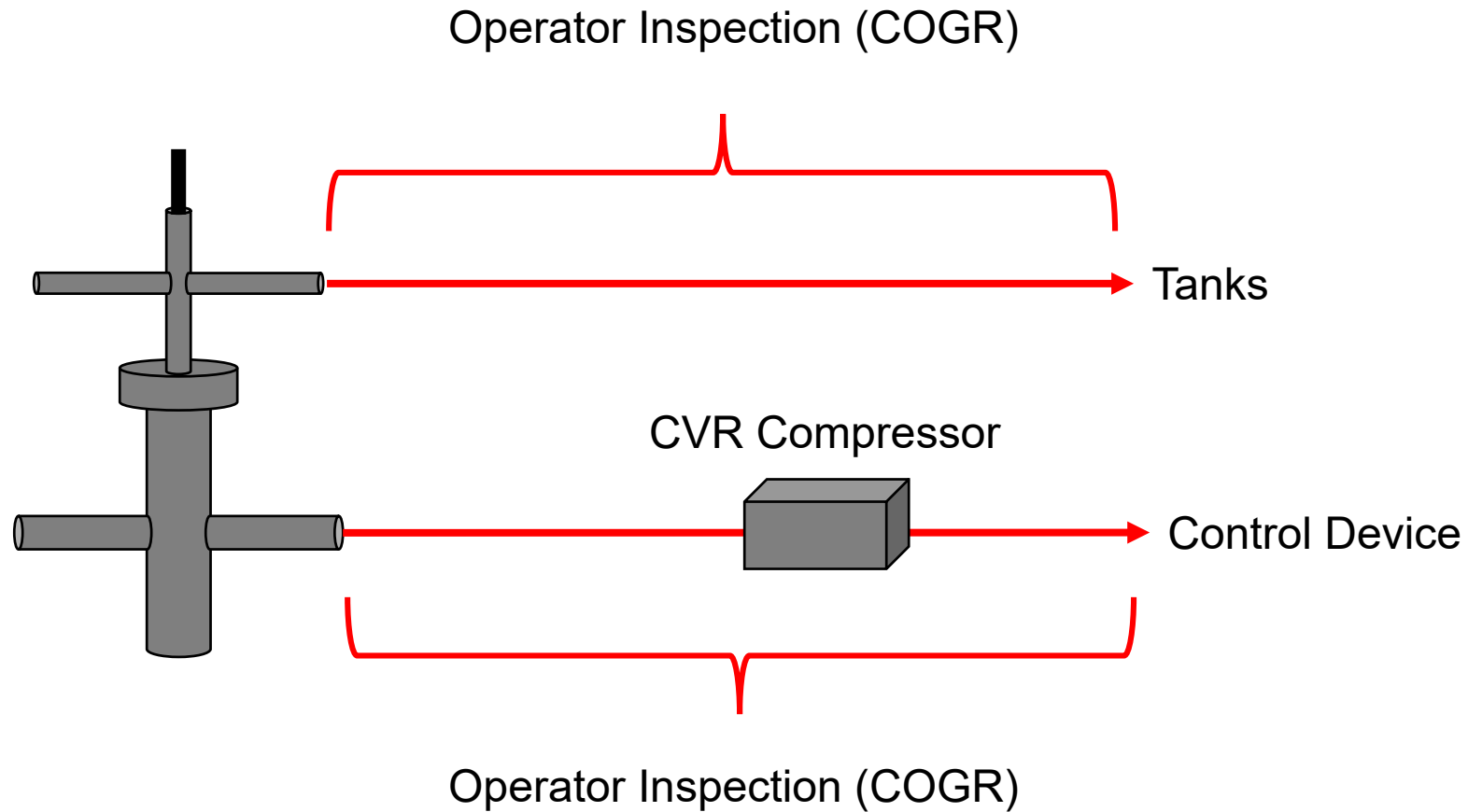
Quarterly LDAR is required unless exemption, met as discussed in Rule Applicability section. In addition to the LDAR requirements, Operators must conduct the following:

- Except for inaccessible or unsafe to monitor components, owners or operators shall audio-visually inspect (by hearing and by sight) all hatches, pressure-relief valves, well casings, stuffing boxes, and pump seals for leaks or indications of leaks at least once every 24 hours for facilities that are visited daily, or at least once per calendar week for facilities that are not visited at least once every 24 hours; and,
- Owners or operators shall audio-visually inspect all pipes for leaks or indications of leaks at least once every 12 months.

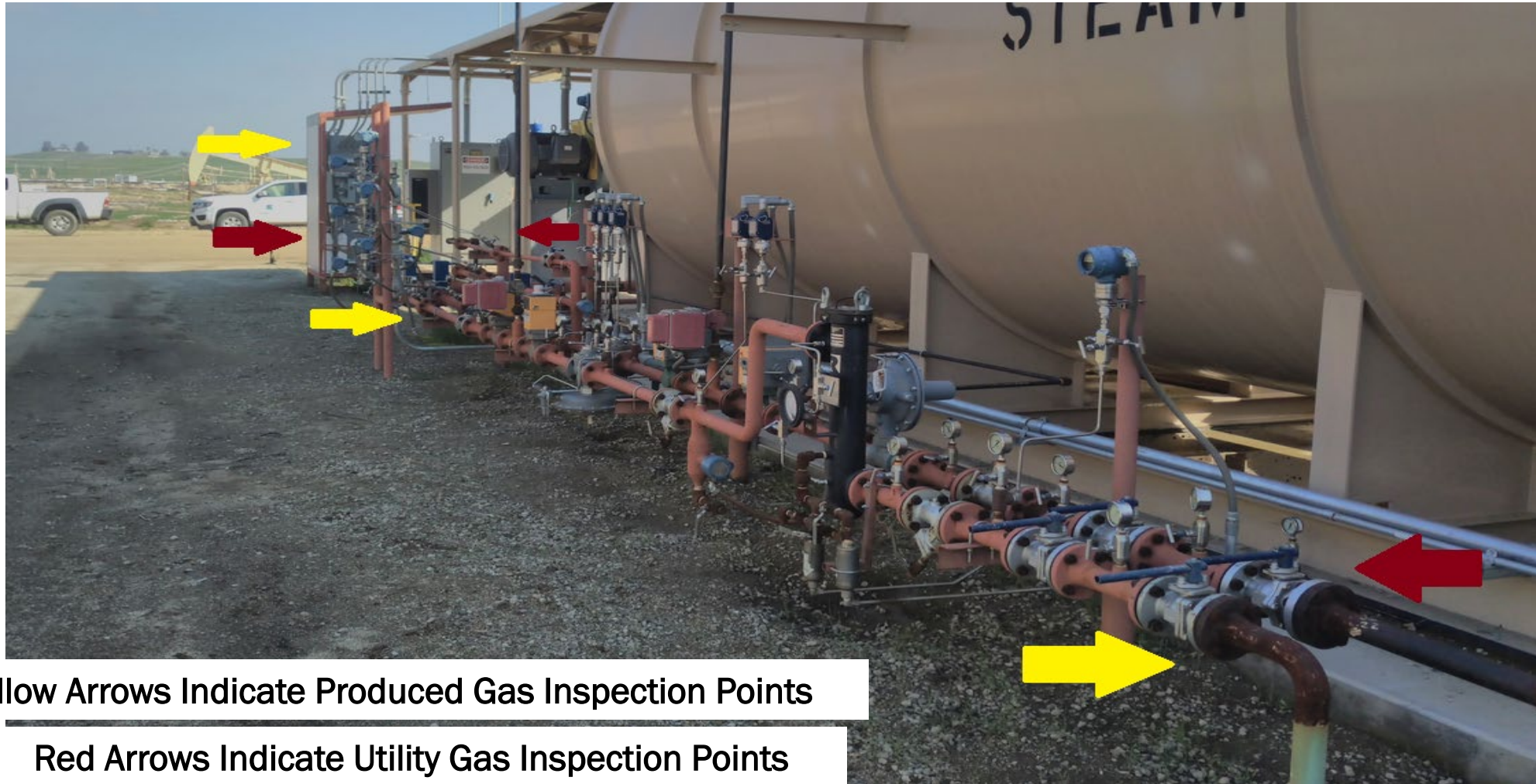
California Oil and Gas Regulation (COGR)

- Any audio-visual inspection specified in 95669(e) that indicates a leak that cannot be repaired within 24 hours shall be tested using US EPA Reference Method 21 within 24 hours after initial leak detection, and the leak shall be repaired in accordance with the repair timeframes specified in this section.
- All inaccessible or unsafe to monitor components shall be inspected at least once annually.

COGR LDAR Diagram



COGR LDAR Applicability



Yellow Arrows Indicate Produced Gas Inspection Points

Red Arrows Indicate Utility Gas Inspection Points

California Oil and Gas Regulation (COGR)

Maintain for at least five years a record of each leak detection and repair inspection

- Maintain, for at least five years from the date of each inspection, a component leak concentration and repair form for each inspection as specified in Appendix A Table A5
- Maintain records that provide proof that parts or equipment required to make necessary repairs have been ordered
- Maintain gas service utility records that demonstrate that a system has been temporarily classified as critical to reliable public gas operation throughout the duration of the classification period
- <https://ssl.arb.ca.gov/Cal-eGGRT/login.do>

District Rule 4623 LDAR Requirements



Crude Oil Tank Battery

District Rule 4623 LDAR Requirements

Tank I&M Program allows facilities to degas/clean with written notification

Conduct annual inspections with maintenance and repair of components

- If a component type for a given tank is found to leak during an annual inspection, then conduct quarterly inspections of that component type on the tank or tank system for four consecutive quarters. If a component type is found to have no leak after four consecutive quarterly inspections, then revert to annual inspections

District Rule 4623 LDAR Requirements

Two types of leaks defined in the Tank I & M Program:

- Gas leak any reading >10,000 ppmv (measured in accordance with EPA Method 21 by a portable hydrocarbon detection instrument that is calibrated with methane)
- Liquid Leak is any component with a rate of ≥ 3 to <30 drops per minute

District Rule 4623 LDAR Requirements

Repair times required in the Tank I & M Program:

- Gas leak:
 - Eliminate the leak within 8 hours after detection OR
 - If the leak can not be eliminated, then minimize the leak to the lowest possible level within 8 hours after detection by using best maintenance practices AND
 - Eliminate the leak within 48 hours after minimization AND
 - In no event that the total time to minimize and eliminate the leak shall exceed 56 hours after detection

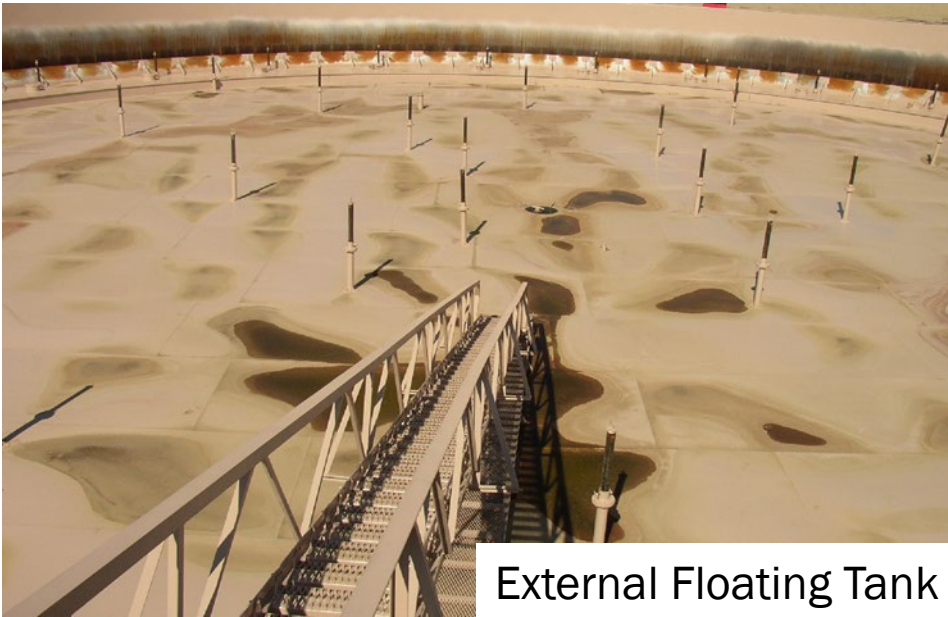
District Rule 4623 LDAR Requirements

Repair times required in the Tank I & M Program:

- Liquid Leak:
 - Within 8 hours after detection or 24 hours after detection depending on the size of the leak

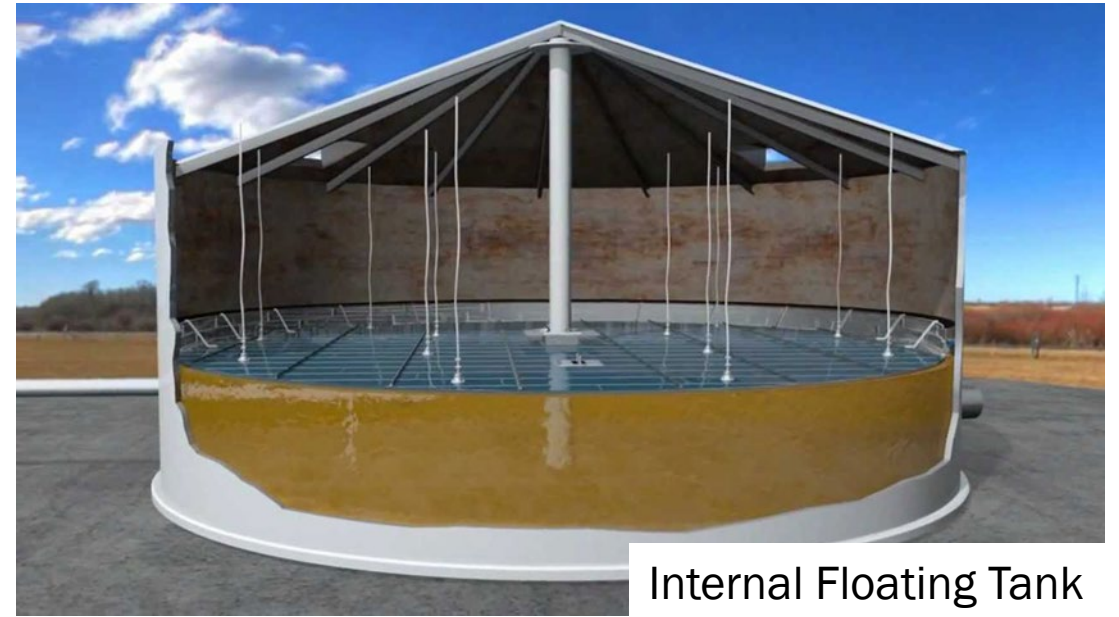
District Rule 4623 LDAR Requirements

External



External Floating Tank

Internal



Internal Floating Tank

District Rule 4623 LDAR Requirements

External Floating

- Inspect all floating tanks at least once every 12 months
- Inspect the primary and secondary seals for compliance with the requirements of this rule every time a tank is emptied or degassed

Internal Floating

- Visually inspect, through the manholes, roof hatches, or other openings on the fixed roof, the internal floating roof and its appurtenant parts, fittings, etc., and the primary seal and/or secondary seal at least once every 12 months
- Conduct actual gap measurements of the primary seal and/or secondary seal at least once every 60 months

District Rule 4623 Operator Records

An operator shall retain accurate records required by this rule for a period of five years:

- TVP and API gravity
- Maintain inspection log
- If in Tank I&M Program, retain letter and necessary documentation
- Tank degassing and cleaning notifications

Upcoming Examples

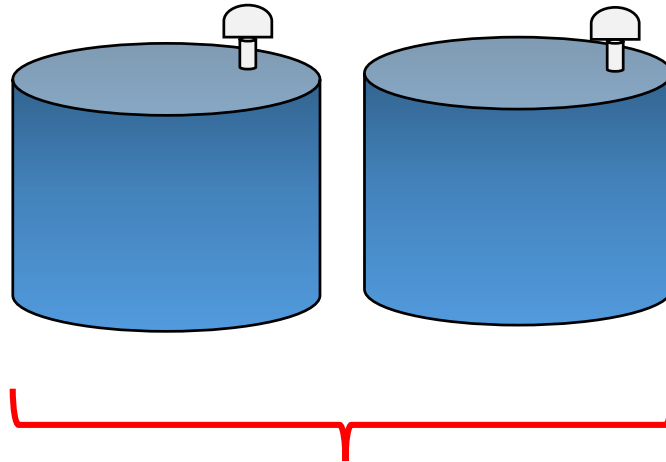
Please note that these examples may not reflect your facility.

Please refer to District Rule, District Permits, California Oil and Gas Regulations, and COGR Registrations.

If additional questions or guidance is needed, please contact your District Inspector.

Example 1

Tank Setting

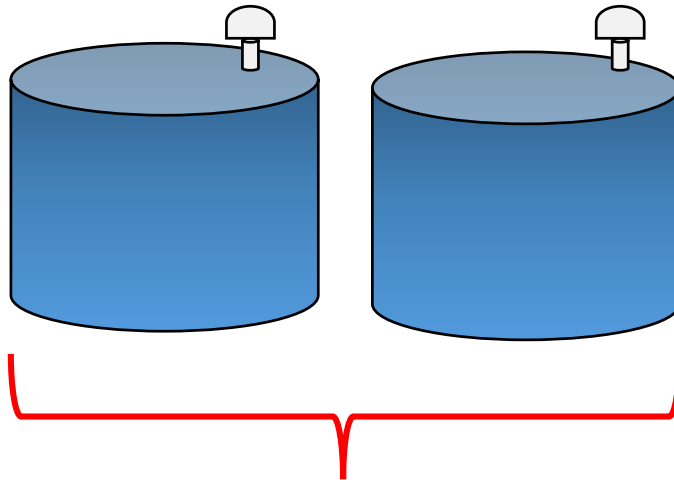


Operator Inspection (No subjectivity)

API	Less than 20
Gas collection	No
Small Producer Exemption (< 50 Barrels/Day)	Yes
I&M	No

Example 2

Tank Setting

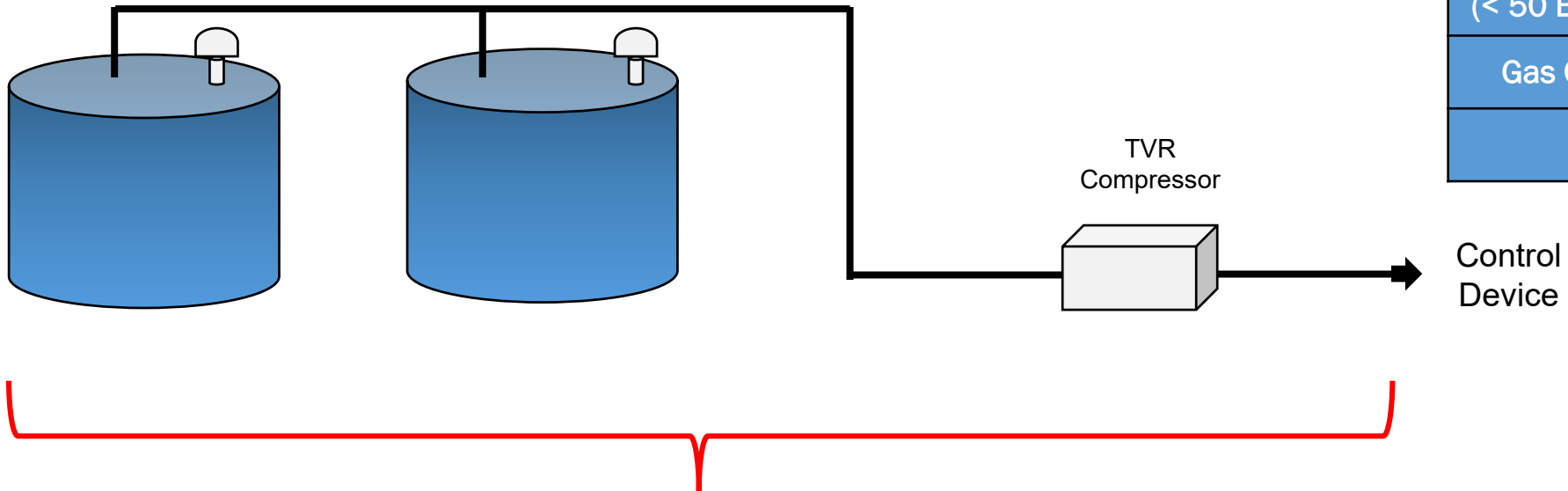


Operator Inspection (COGR)

API	Greater than 20
Gas collection	No
Small Producer Exemption (< 50 Barrels/Day)	Yes
I&M	No

Example 3

Tank Setting



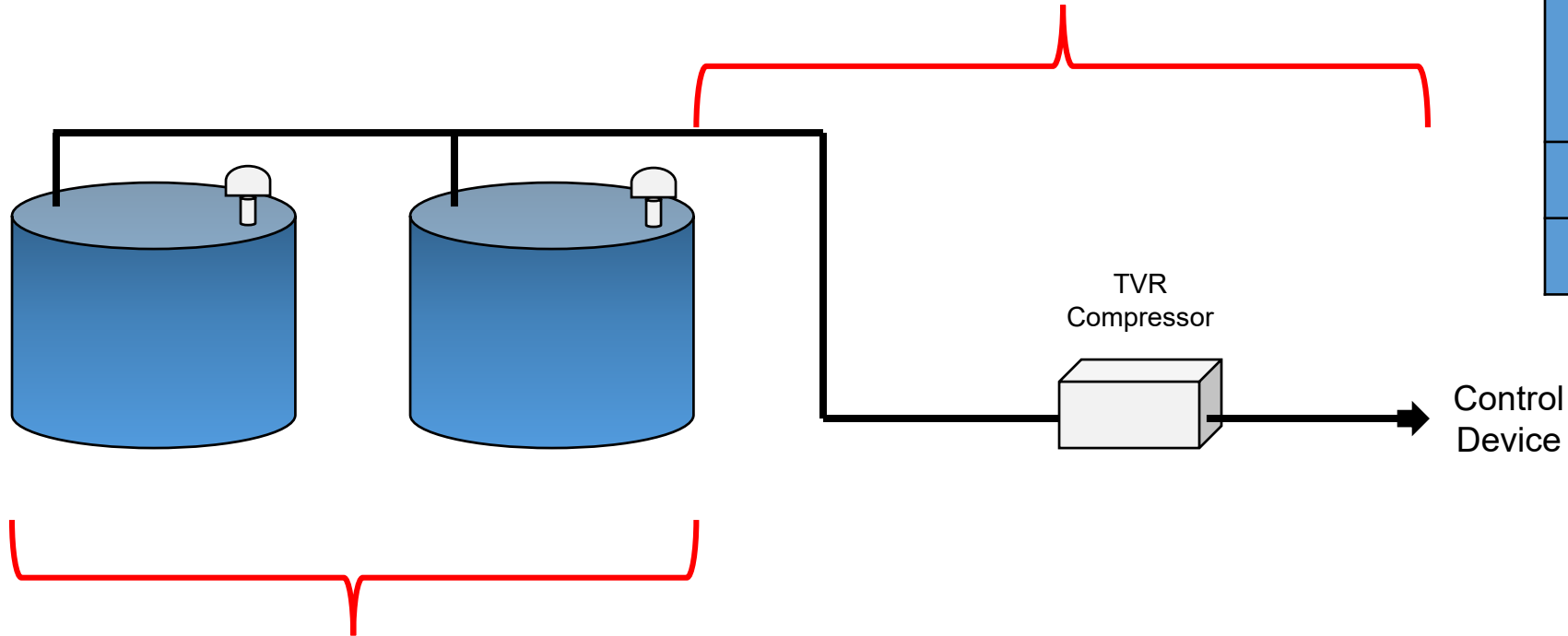
API	Greater than 20
TVP	Greater than 0.5
Small Producer Exemption (< 50 Barrels/Day)	No
Gas Collection	Yes
I&M	No

Operator Inspection (COGR)

Example 4

Tank Setting

Operator Inspection COGR (After 5 feet)



API	Greater than 20
TVP	Greater than 0.5
Small Producer Exemption (< 50 Barrels/Day)	No
I&M	Yes
Gas Collection	Yes

Operator Inspection Rule 4623 Tank I&M

Operator Inspection – Key Points

- EPA Method 21 approved methods for all LDAR inspections
- If leaks found, attempt to minimize leak and affix a tag
- Rule 4401 – Annual inspection, >50K ppm and Open-Ended-Line found is a Notice Of Violation
- Rule 4409 – Quarterly inspection
- Rule 4624 – Quarterly inspection
- COGR – Quarterly inspection
- Rule 4623 – Annual inspection (Tank I & M)
- Repair leaks within appropriate time frames

Questions?

District Inspection

District Inspection

- The District performs routine inspections of facilities subject to:

Rules
4401
4409
4623
2201
4624
COGR

- As part of the inspection, record review is conducted
- Document findings
- Issue enforcement
- Re-inspection for leaking components

Equipment



TVA



FLIR



Eagle

Sample Collection

Per the requirements of EPA Method 21:

- Place the probe inlet at the surface of the *component interface* where leakage could occur
- Move the probe along the interface periphery while observing the instrument readout
- If an increased meter reading is observed, slowly sample the interface where leakage is indicated until the maximum meter reading is obtained
- Leave the probe inlet at this maximum reading location for approximately two times the instrument response time

District Inspection Rule Reference

	Steam Enhanced		Non-Steam Enhanced	
API	Gas	Liquid	Gas	Liquid
<20	4401	Exempt	COGR	Exempt
20-30	4401	COGR	COGR	COGR
>30 & >1.5 TVP	4401	4409	4409	4409

Rule 4401 Steam-Enhanced Crude Oil Production Wells

Rule 4401 defines what a leak concentration is, the allowable number of leaks, and the repair periods for such discoveries.

Table 1 Gas Lean in ppmv as Methane

Type of Component	Major Gas Leak	Minor Gas Leak
1. PRDs	Greater than 10,000	400 to 10,000
2. Components other than PRDs	Greater than 10,000	2,000 to 10,000

Table 2 Number of Allowable Leaks

Number of Steam-Enhanced Crude Oil Production Wells Connected to a VOC Collection and Control System	Number of Allowable Leaks
1 to 25	3
26 to 50	6
51 to 100	8
101 to 250	10
251 to 500	15
More than 500	One (1) for each 20 wells tested with a minimum of 50 wells tested.

Table 3 Repair Period

Type of Leak	Repair Period in Calendar Days
Gas Leaks	
Minor Gas Leak	14
Major Gas Leak less than or equal to 50,000 ppmv	5
Gas Leak greater than 50,000 ppmv	2
Liquid Leaks	
Minor Liquid Leak	3
Major Liquid Leak	2

Rule 4401 Wells



Rule 4409 Light Crude Oil Production

Rule 4409 defines what a leak concentration is, the allowable number of leaks, and the repair periods for such discoveries.

Table 2– Maximum Allowable Number or Percent of Leaking Components
Per Inspection Period

Component	Maximum Number of Leaks for 200 or fewer Components Inspected*	Maximum Percent or Number of Leaks for more than 200 Components Inspected*
1. Valves	1	0.5% of number inspected
2. Threaded Connections	1	0.5% of number inspected
3. Flanges	1	0.5% of number inspected
4. Pumps	2	1.0% of number inspected
5. Compressors	1	1 leak
6. PRDs	1	1 leak
7. Polished Rod Stuffing Boxes	4	2.0% of number inspected
8. Other Components not listed in items 1, 2, 3, 4, 5, 6, 7, 9, and 10	1	1 leak
9. Pipes at Light Crude Oil Production Facilities or Gas Production Facilities	Maximum Number of Leaks for 200 or fewer production wells inspected	Maximum Number of Leaks for more than 200 production wells inspected
	2	1% of number inspected
10 Pipes at Natural Gas Processing Facilities	Maximum Number of Leaks	
	2	

Rule 4409 Light Crude Oil Production

Rule 4409 defines what a leak concentration is, the allowable number of leaks, and the repair periods for such discoveries.

Table 1 Gas Leak Standards in ppmv as Methane

Type of Component	Major Gas Leak	Minor Gas Leak	
		Components in Liquid Service	Components in Gas/Vapor Service
1. Valves	Greater than 10,000	1,000 to 10,000	2,000 to 10,000
2. Threaded Connections	Greater than 10,000	1,000 to 10,000	2,000 to 10,000
3. Flanges	Greater than 10,000	1,000 to 10,000	2,000 to 10,000
4. Pipes	Greater than 10,000	1,000 to 10,000	2,000 to 10,000
5. Pumps	Greater than 10,000	1,000 to 10,000	2,000 to 10,000
6. Compressors	Greater than 10,000	1,000 to 10,000	2,000 to 10,000
7. PRDs	Greater than 10,000	200 to 10,000	400 to 10,000
8. Polished Rod Stuffing Boxes	Greater than 10,000	1,000 to 10,000	1,000 to 10,000
9. Other Components not listed in items 1, 2, 3,4, 5, 6,7, and 8 above	Greater than 10,000	1,000 to 10,000	2,000 to 10,000

Table 3. Repair Period

Type of Leak	Repair Period in Calendar Days	Extended Repair Period in Calendar Days
Gas Leaks		
Minor Gas Leak (See Table 1)	7	7
Major Gas Leak greater than 10,000 ppmv but equal to or less than 50,000 ppmv	3	2
Major Gas Leak greater than 50,000 ppmv	2	0
Liquid Leaks		
Minor Liquid Leak (See Section 3.20.2)	3	0
Major Liquid Leak (See Section 3.20.1)	2	0

Rule 4623 Storage of Organic Liquids

- Leak Threshold: 10,000 ppm
- The District inspection would survey components attached to the tank and the associated vapor recovery system.



Crude Oil Storage Tanks with Vapor Recovery

Rule 2201

- In conjunction with or in place of Rule 4623
- Leak Threshold: 10,000 ppm
- The District would inspect equipment with permit conditions outlining leak thresholds
- *All piping, valves, and fittings shall be constructed and maintained in a leak-free condition. [District Rule 2201]*
- *A leak-free condition is defined as a condition without a gas leak or liquid leak. A gas leak is defined as a reading in excess of 10,000 ppmv, above background, as measured by a portable hydrocarbon detection instrument in accordance with the procedures specified in EPA Test Method 21. A liquid leak is defined as the dripping of organic liquid at a rate of more than 3 drops per minute. [District Rule 2201]*

Rule 4624 Transfer of Organic Liquid

- Organic liquids other than gasoline

Leak threshold: >1,000 ppm

- Gasoline

Leak threshold: >10,000 ppm

Repair Period: 72 hours



Organic Liquid Loading
(Rail Car Operation)

COGR

- There are two sections in COGR that apply to components and equipment located at these operations:
- 95668 Standards apply to the following
 - Separators and Tank Systems
 - Reciprocating Natural Gas Compressors
 - Centrifugal Natural Gas Compressors
 - Natural Gas Powered Pneumatic Devices and Pumps
 - Well Casing Vents Open to the atmosphere
 - Natural Gas underground storage Facility Monitoring Requirements
- 95669 Leak Detection and Repair

COGR

Allowable Number of Leaks and Repair Times (1/1/2020)

Leak Category	≤200 Components	>200 Components	Repair Time Periods*
1,000-9,999	5	2% of total inspected	14
10,000-49,999	2	1% of total inspected	5
≥50,000	0	0	2

*Critical components must be repaired by the end of next shutdown or 12 months, whichever is sooner

*Delay of repair can be granted by CARB due to parts availability or reliability of the public NG system

Upcoming Examples

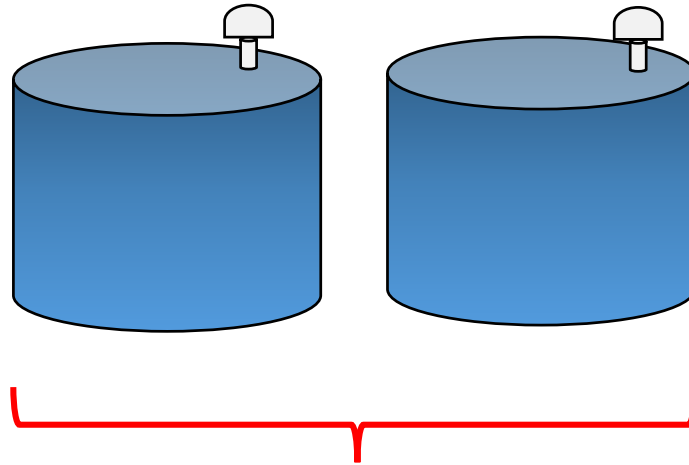
Please note that these examples may not reflect your facility.

Please refer to District Rule, District Permits, California Oil and Gas Regulations, and COGR Registrations.

If additional questions or guidance is needed, please contact your District Inspector.

Example 1

Tank Setting

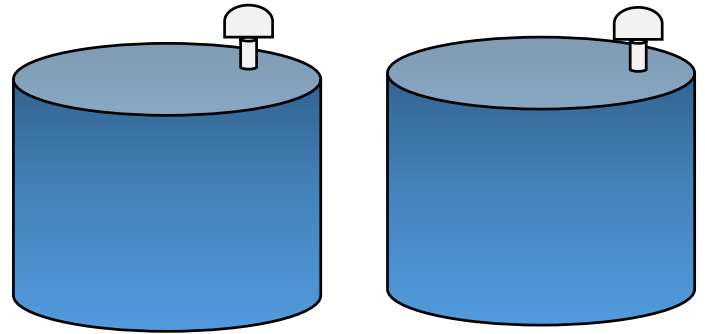


District Inspection (No subjectivity)

API	Less than 20
Gas collection	No
Small Producer Exemption (< 50 Barrels/Day)	Yes
I&M	No

Example 2

Tank Setting

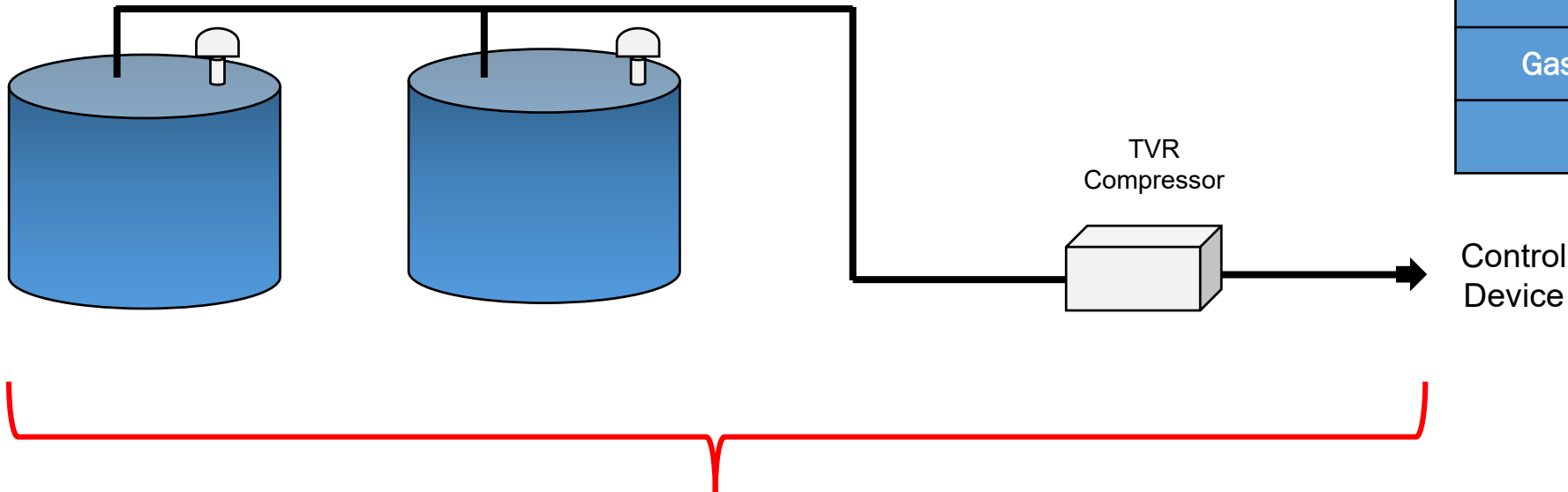


District Inspection (COGR)

API	Greater than 20
Gas collection	No
Small Producer Exemption (< 50 Barrels/Day)	Yes
I&M	No

Example 3

Tank Setting

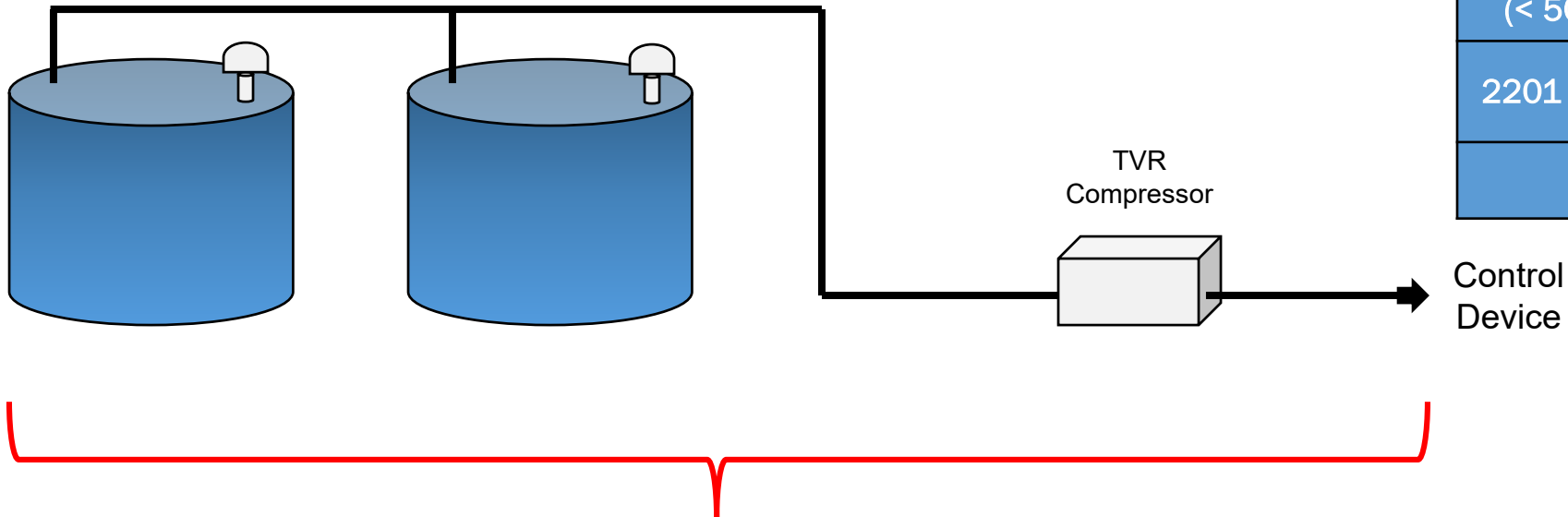


API	Greater than 20
TVP	Greater than 0.5
Small Producer Exemption (< 50 Barrels/Day)	No
2201 Leak Standards	No
Gas Collection	Yes
I&M	Yes

District Inspection (Rule 4623)

Example 4

Tank Setting



API	Less than 20
TVP	Less than 0.5
Small Producer Exemption (< 50 Barrels/Day)	No
2201 Leak Standards	Yes
I&M	Yes

District Inspection (Rule 2201)

District Inspection – Key Points

- Rules 4401, 4409, 4623, 2201, 4624, and COGR
- Number of wells to inspect, minimum 10%
- Types of equipment used for source sampling: TVA, FLIR, Eagle
- Instrument response time

Questions?

Thank you for coming!

34946 Flyover Court
Bakersfield, CA 93308
661-392-5500

<https://www.valleyair.org/Home.htm>

<https://www.valleyair.org/busind/pto/ptoforms/oil-and-gas-registration.htm>