



PS Memo 15-01

To: Stationary Sources Program, Local Agencies, and Regulated Community
From: Stefanie Rucker and Christopher Laplante
Date Issued: September 6, 2018
Subject: Oil & Gas Storage Tank Control and Emission Management (STEM) Plan Requirements of Regulation Number 7, Section XVII.C.

This document is intended to answer frequently asked questions concerning oil and gas industry storage tank emission management requirements. These requirements are from Colorado Air Quality Control Commission Regulation Number 7, Section XVII.C.

Revision History	
September 23, 2015	Initial issuance
September 8, 2016	Updated to include answers to new questions (see 1.10, 1.11, 2.4, 2.8)
November 11, 2016	Updated to remove questions 2.4 and 2.8 from previous version
September 6, 2018	Added question 2.9 and updated questions 2.3 and 2.4 in accordance with November 2017 Regulation 7 rule revisions

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1. STORAGE TANK CONTROL REQUIREMENTS

- 1.1. *What does manifolded via liquid line mean in the definition of storage tank in Section XVII.A.15.? Are piping connections not used for the purposes of air pollution control equipment considered for determination of liquid manifolded? For example, would the division consider vessels to be manifolded where there are drain lines between storage vessels connected through liquids lines with a manual valve?*

The division considers individual storage vessels to be manifold by liquid line where the intention is to share the same liquid storage space between individual vessels. Drain lines, lines to a loading rack or loadout location, and vapor lines to air pollution control equipment are not considered in determining if storage vessels are manifold via liquid line. See Permit Section Memo 14-03, Section 1.16 for a definition of “liquid manifold” as it relates to storage tanks.

- 1.2. *Does the division interpret “within the first 90 days of production” to mean 3 months or exactly 90 days? For example, for requirements starting 90 days after May 1, 2014 are operators obligated to be in compliance by July 30, 2014 (exactly 90 days) or by August 1, 2014 (3 months)?*

Operators should be in compliance within a 90 calendar day period. Using the example above for provisions requiring compliance “within the first 90 days” after May 1, 2014, operators should be in full compliance by July 30, 2014.

Well Production Facility

- 1.3. *How does the division define the term “stationary source” in the definition of “well production facility”?*

Please refer to the definition of stationary source in Regulation Number 3, Part A. If you are unsure for your specific situation, please contact the O&G permitting section at the division.

- 1.4. *How does “well production facility” differ from the previously utilized “exploration and production facility”? Is this definition meant to be more specific or to encapsulate new types of facilities that aren’t covered under E&P?*

The definition of well production facility is narrower in concept than the exploration and production (E&P) sector. A well production facility is a facility within the E&P sector.

- 1.5. *Is an injection well for disposal of produced water considered a “well production facility”?*

No. A well production facility is limited to wells with the purpose of production of oil and/or natural gas. A disposal or injection well is not subject to the requirements of Section XVII.F.



1.6. *How is well production facility defined for the storage tank requirements of Section XVII.C?*

Well production facility is defined the same for the purposes of both Sections XVII.C. and XVII.F. The definition may be found in Section XVII.A.17.

Emission Calculation Methodologies

1.7. *How do operators estimate emissions for produced water, crude oil, and condensate tanks? For APEN/permitting? For comparison to the 6 tpy threshold?*

For more information on calculation of uncontrolled actual emissions, sources should refer to:

- PS Memo 09-02: Oil & Gas Produced Water Tank Batteries Regulatory Definitions and Permitting Guidance
- PS Memo 05-01: Oil & Gas Atmospheric Condensate Storage Tank Batteries Regulatory Definitions and Permitting Guidance
- PS Memo 14-01: 2014 Regulation No. 3 Changes
- PS Memo 14-03: Oil & Gas Industry Crude Oil, Condensate and Produced Water Atmospheric Storage Tanks

1.8. *Regarding applicability of the storage tank requirements, they seem to apply to “storage tanks with uncontrolled actual emissions of VOCs equal to or greater than six (6) tons per year based on a rolling twelve-month total...” How does this apply to storage tanks that are “permitted” for VOC emissions greater than six (6) tons per year but have “actual” emissions less than six (6) tons per year based on a rolling twelve-month total. Are those tanks exempt from the requirements based upon their “actual” emissions or are they subject to the rule based upon their permitted PTE greater than six (6) tons per year?*

The rule's threshold is not based on permitted emissions or PTE. The rule's threshold is based upon uncontrolled actual emissions. The division will rely on uncontrolled actual emissions to determine compliance with this control requirement. For new facilities applying for permits, the division will use the requested permit limits to establish the requirements for control in a permit.

1.9. *What happens if my permit requires control in accordance with Section XVII, but my uncontrolled actual emissions fall below the threshold?*

Sources can request a permit modification if regulatory applicability changes.

1.10. *When can site-specific emission factors be used for the purposes of determining LDAR (Section XVII.F.) and STEM (Section XVII.C.) monitoring frequency?*

In general, a site-specific emission factor can be used from the date it is received by the division in a complete application updating that emission factor, and cannot be



applied retroactively for calculating emissions prior the date the site-specific emission factor is received by the division in a complete application.

- If an operator is developing a site-specific emission factor during the first 90 days following the date of first production:
 - That site-specific emission factor may be used for up to the first 90 days following the date of first production, provided that the operator submits that site-specific emission factor to the division for approval, and the division receives that emission factor in a complete application within the first 90 days following the date of first production.
- For site-specific emission factors that are developed beyond the first 90 days since the date of first production:
 - That site-specific emission factor may be used only from the time that emission factor is received by the division in a complete application and forward.

If a site-specific emission factor is developed and the operator determines the emissions source does not require the submittal of an APEN (“APEN Exempt”) based on estimated uncontrolled actual emissions the site specific emissions factor may be used from the date the hydrocarbon sampling occurred to support the development of the emissions factor. The operator must maintain records of the timing of sampling and development of the emissions factor. If the site-specific emissions factor applies to an emissions source previously reported to the Division on an APEN or included in a permit, the operator should submit a request to cancel the emissions point from the Division’s emissions inventory.

1.11. *What is the appropriate averaging time to use in evaluating whether a monitoring threshold is exceeded in either Table 3 or Table 4 of Regulation Number 7, Section XVII.F?*

Emissions from well production facilities and natural gas compressor stations should be tracked on a rolling twelve month total to monitor if the inspection frequency changes as a result of an increase or decrease in emissions.

Commence Operation and Date of First Production

1.12. *Section XVII.C.1.b.(i)(a) provides that storage tanks constructed on or after May 1, 2014, must be in compliance with storage tank control requirements within 90 days of commencing operation. Section XVII.C.1.c.(i) provides that storage tanks constructed on or after May 1, 2014, must capture and control emissions during the first 90 days after the date of first production. Can the division please clarify how these rules operate in conjunction with one another and which dates or activities trigger control requirements?*

These provisions should be read to be consistent with each other. Under Section XVII.C.1.c, all non-temporary storage tanks at well production facilities must be controlled during the first 90 days after the “date of first production.” After this first



90 day period the controls must remain in place pursuant to Section XVII.C.1.b. if the uncontrolled actual VOC emissions from the tank will be 6 tons per year or greater.

- 1.13. *Does the obligation to develop a STEM plan in accordance with Section XVII.C.2. start when the tank commences operation?*

If the storage tank is constructed on or after May 1, 2014, the operator must have a STEM plan in place within 90 days of the date that the storage tank commences operation. A storage tank constructed before May 1, 2014 must have a STEM plan in place by May 1, 2015. See Section XVII.C.2.b.(ii)(a) and (b).

- 1.14. *How should operators determine the compliance dates for storage tanks at multi-well pad sites?*

Section XVII.C. is tied to storage tanks, regardless of location. Multiple storage tanks at the same well pad may have varying dates of first production, depending on the well feeding the storage tank.

2. STORAGE TANK EMISSION MANAGEMENT PLAN (STEM)

- 2.1. *What are the minimum requirements for a STEM plan?*

The minimum elements of a STEM plan are listed under Section XVII.C.2.b(i) and are described more fully in the Regulation Number 7, Section XIX.N. Statement of Basis and Purpose. The division has also published a template offering a format by which companies can address the minimum requirements, located on our website at <https://www.colorado.gov/pacific/cdphe/summary-oil-and-gas-emissions-requirements>.

Specifically, a STEM plan must include the following:

- An identification and evaluation of the selected:
 - Control technologies,
 - Monitoring practices,
 - Operational practices, and/or
 - Other strategies;
- An analysis of the engineering design of the storage tank and air pollution control equipment, and where applicable, the technological or operational methods employed to prevent venting;
- A monitoring strategy including, at a minimum, the applicable inspection frequencies and methodologies:
 - In accordance with approved instrument monitoring methods requirements in Section XVII.C.2.b.(ii) and Table 1, and/or
 - In accordance with audio, visual, olfactory inspection requirements of Section XVII.C.1.d.;



- An identification of the personnel conducting the monitoring, and any training program, materials, or training schedule for such personnel. This element does not require training, but ensures that any training be documented to permit the owner or operator to demonstrate the quality and achievements of the STEM plan;
- The calibration methodology and schedule for emission detection equipment used in the monitoring;
- An identification of the procedures to be employed to evaluate ongoing capture performance after implementation of the STEM plan;
- A procedure to update the STEM plan when capture performance is not adequate, the STEM design is not operating properly, when otherwise desired by the owner or operator, or when required by the division; and
- The certification made by the appropriate personnel with actual knowledge of the STEM design for each storage tank.

2.2. *What are the requirements under Section XVII.C.2. for storage tanks subject to controls under Section XII.D.?*

Storage tanks with emissions less than 6 tpy VOC may be subject to development of a STEM plan, as required under Section XVII.C.2., if they are required to be equipped with control equipment as required by Section XVII.C.1. or to demonstrate compliance with the system-wide control requirements of Section XII.D. The division assumes that all storage tanks reported as controlled in the Regulation Number 7, Section XII system-wide reports are subject to the requirements of Section XVII.C.2.

Operators of such storage tanks are subject to the “operate without venting” standard in Section XVII.C.2.a. and are required to develop a STEM plan that includes the minimum requirements listed under Section XVII.C.2.b. There is no minimum AIMM inspection requirement under STEM for storage tanks with emissions less than 6 tpy VOC, and as such, the operator may elect the start date, monitoring method and frequency of monitoring as appropriate to meet the requirements of Section XVII.C.2.a.

Nothing in this FAQ should be interpreted to change, limit, or otherwise restrict an operator’s duty to comply with all applicable requirements of Sections XII.D. and XVII.C.

Venting (STEM) and Leaking (LDAR)

2.3. *What is the difference between venting under Section XVII.C.2.a. and leaking as it is used in Sections XVII.F and XII.L?*

Venting is defined in Section XVII.C.2.a.(i) as emissions from a controlled storage tank thief hatch, pressure relief device, or other access point to the storage tank, which:

- Are primarily the result of over-pressurization, whether related to design, operation, or maintenance; or



- Are the result of an open, unlatched, or visibly unseated pressure relief device (e.g., thief hatch or pressure relief valve), an open vent line, or an unintended opening in the storage tank (e.g., crack or hole).

For clarification, the emissions described in the second bullet above do not need to be related to over-pressurization to be considered venting. Venting is prohibited, unless reasonably necessary for maintenance, gauging, or safety.

Leaking includes emissions from components at the facility, as defined in Section XVII.A.5. The definition of component is “means each pump seal, flange, pressure relief device (including thief hatches or other openings on a controlled storage tank), connector, and valve that contains or contacts a process stream with hydrocarbons, except for components in process streams consisting of glycol, amine, produced water, or methanol.” For more information on the requirements for leak detection and repair, please see PS Memo 14-04, Guidance for Oil & Gas Industry Regulation Number 7, Section XVII.F, Leak Detection and Repair Program for Well Production Facilities and Natural Gas Compressor Stations and Section XVII.B., General Provisions for Open Ended Valves or Lines.

Following the revisions to Regulation Number 7 in 2017, the Commission clarified that leaks can occur from a thief hatch, pressure relief device, or other access point to the storage tank as may be seen in the inclusion of these terms in the definition of component. As discussed in the statement of basis and purpose the Commission, “authorizes the Division to request a demonstration from the owner or operator that ‘venting’ emissions observed by the Division were not primarily the result of over-pressurization. The Commission intends that such demonstration request allow an owner or operator to provide case specific information or other sufficient details that the design, operation, and maintenance of the facility is adequate to prevent overpressurization.” This requirement is captured in Section XVII.C.2.a.(ii) and further states, “Absent a demonstration that such emissions were not primarily the result of over-pressurization, such emissions will be considered venting for purposes of Section XVII.C.2.a”

See Question 2.9 for further clarification.

- 2.4. *When an operator observes or is notified of emissions from a thief hatch, pressure relief valve, or other access point on a storage tank, can the operator complete Method 21 testing to quantify the emissions to avoid noncompliance with Section XVII.C.2.a.?*

There is no minimum concentration threshold for when an operator would be excused from attempting to take action to address venting emissions from a thief hatch, pressure relieve valve or other access point on a storage tank, and therefore, no additional testing could be completed to avoid the requirements of Section XVII.C.2.a.

In contrast, when emissions are observed from a thief hatch, pressure relief device, or other access point to the storage tank and are determined to be leaking rather than venting, operators have the ability to measure the concentration of the emissions to determine whether repair is required under Section XVII.F.6 or Section XII.L.4. More information on acceptable leak testing can be located in PS Memo 14-04, Guidance for Oil & Gas Industry Regulation Number 7, Section XVII.F., Leak Detection and Repair Program for Well Production Facilities and Natural Gas Compressor Stations and Section XVII.B., General Provisions for Open Ended Valves or Lines.



- 2.5. *Are storage tanks at well production facilities with VOC emissions less than 6 tpy only required to meet the LDAR requirements as listed in Section XVII.F.4. or do they need to also implement the STEM requirements?*

STEM and LDAR are separate programs, and a storage tank may have components which are subject to LDAR regardless of STEM applicability. Please note that a storage tank with less than 6 tpy of VOC emissions may be subject to STEM, as described in Question 2.2 of this document.

- 2.6. *As production and emissions decrease, how does the threshold in Table 1 apply to well production facilities that have storage tanks “permitted” for VOC emissions greater than six (6) tons per year but where the storage tanks have “uncontrolled actual” emissions less than six (6) tons per year based on a rolling twelve-month total?*

Sources should use uncontrolled actual emissions, not permitted emissions, to determine inspection requirements and frequency for inclusion in their STEM plans. Section XVII.C.2.b.(ii) states that the threshold for well production facilities with storage tanks is based upon uncontrolled actual emissions, regardless of permitted emissions for the storage tanks. Please note that a storage tank with less than 6 tpy of VOC emissions may be subject to STEM, as described in Question 2.2 of this document.

- 2.7. *Are the uncontrolled actual VOC emissions described in both Table 1 (storage tank inspection for STEM) tied to the highest emitting storage tank?*

For purposes of STEM and determining the inspection frequency in Table 1 of Section XVII.C.2.b.(ii)., operators need to look at the uncontrolled actual VOC emissions of each storage tank. If there is more than one storage tank at a particular site, the operator has the discretion to employ the inspection frequency set by the highest emitting storage tank at that particular site, or to monitor each storage tank per its own individual monitoring frequency. This is a good example of an operator policy that should be expressed in and dictated by the operator’s STEM plan for those storage tanks.

- 2.8. *If two storage tanks are on a well pad, should the storage tank emissions be considered together for the purpose of applicability determinations under Regulation Number 7, Section XVII.C.? For the purposes of this question, assume the storage tanks are not manifolded together.*

The threshold for storage tanks under Section XVII.C. are not cumulative for a well pad; each storage tank should be evaluated against the threshold and requirements of Section XVII.C. individually.

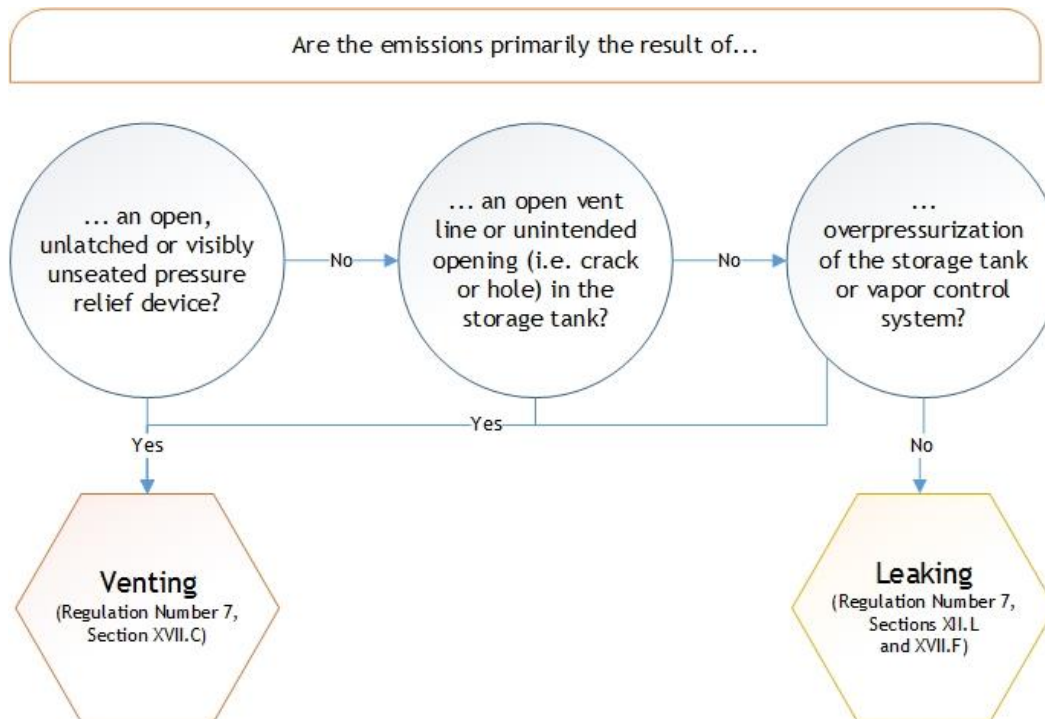
- 2.9. *What are the repair, remonitoring, and recordkeeping requirements when emissions are observed from a controlled storage tank thief hatch, pressure relief device, or other access point?*

For emissions determined to be venting, repairs should occur as quickly as possible in order to minimize the duration of venting emissions. While there are no explicit monitoring requirements following an observation of venting in the regulation, Section XVII.C.3.b requires operators to document the duration of emissions. Remonitoring the source of the emissions after repair is one effective method to demonstrate that emissions have ended. Records must be maintained per Section XVII.C.3.

For emissions determined to be leaking, the operator must follow the provisions of Section XVII.F.7 & XII.L.5 (Repair and Re-monitoring), Section XVII.F.8 and XII.L.6 (Recordkeeping) and Sections XVII.F.9, XVII.F.10 and XII.L.7 (Reporting).

As there are different repair, remonitoring, and recordkeeping requirements, the operator must first make an accurate determination on whether the emissions observed are venting or leaking to ensure appropriate repair, remonitoring and necessary records are maintained. The burden to identify whether emissions are venting or leaking remains on the operator. Per Section XVII.C.2.a.(ii), when emissions from a controlled storage tank are observed, the Division may require the owner or operator to submit sufficient information demonstrating whether or not the emissions were primarily the result of over-pressurization. Absent a demonstration that emissions were not primarily the result of over-pressurization, such emissions will be considered venting for purposes of Section XVII.C.2.a. The Division recommends using Figure 1 to aid in this determination.

Figure 1: Venting or Leaking Emissions Determination



In determining whether the emissions are the result of over-pressurization, the operator should consider the adequacy of the design, operation and maintenance of their storage tank and vapor control system.



3. APPROVED INSTRUMENT MONITORING METHODS (AIMM) AND STEM

3.1. *What is a division approved instrument monitoring method (AIMM)?*

An Approved Instrument Monitoring Method (AIMM) can be an infrared camera designed for and capable of detecting hydrocarbon and VOC emissions (examples include the FLIR GF300/320 cameras and the OPGAL EyeCGas camera), EPA Reference Method 21, or other instrument-based monitoring device or method approved by the division.

More information on AIMM, including those technologies approved to date, can be found on the division's website at <https://www.colorado.gov/pacific/cdphe/AIMM>.

3.2. *Does the division intend that operators will be conducting AIMM prior to developing a STEM plan and prior to the "operate without venting" requirements of Section XVII.C.2.a being effective?*

It depends on when the storage tank was constructed and the storage tank's emission levels.

For storage tanks constructed on or after May 1, 2014, operators must comply with the "operate without venting" requirement by the date the tank commences operation. Operators of these tanks must implement AIMM and develop a STEM plan within 90 days of the date the tank commences operation.

For storage tanks constructed before May 1, 2014, operators must comply with the "operate without venting" requirement and develop a STEM plan by May 1, 2015. Operators of these tanks must implement AIMM in accordance with a specified number of days of the schedule set forth in Table 1, depending on the tank's emission levels. For example, an existing storage tank with 10 tpy VOC emissions must have a STEM plan and comply with the "without venting" requirement by May 1, 2015, and must implement AIMM within 90 days of January 1, 2016. An existing storage tank with 100 tpy VOC emissions must also have a STEM plan and comply with the "operate without venting" requirement by May 1, 2015, but must implement AIMM within 30 days of January 1, 2015.

4. AUDIO-VISUAL-OLFACTORY (AVO) MONITORING

4.1. *What is involved in audio-visual-olfactory (AVO) monitoring under Section XVII.C.1.d.?*

Consistent with NSPS 0000, AVO monitoring involves the following:

- An audio inspection of the storage tank and associated equipment to determine if you can hear any noises indicating the presence of emissions.
- A visual inspection to determine if there are any emissions visible to the naked eye from the tank or associated equipment (this is different than "visible emissions" which is defined as smoke observable for 1 minute in any 15 minute period). Emissions visible to the naked eye include, but are not limited to:
 - Wave refractions that distort the air or background adjacent to the inspection point;



- Wave refraction shadows reflected on the equipment or on the ground/snow; or
- Observation of bubbling or other visual cues at the leak/venting location is considered a visual observation.
- An olfactory inspection to determine if you can smell any odors indicating emissions from the tank or associated equipment.

Pursuant to Section XVII.C.1.d., storage tanks are subject to additional visual inspections, during which it is important for operators to pay special attention to the open/closed status of thief hatches, the pilot light, auto-igniters and valves on combustion devices and the piping to combustion devices, and to the presence of smoke from combustion devices.

4.2. *When does the obligation to conduct AVO and additional visual inspections begin?*

AVO monitoring must commence in accordance with the schedule set forth in Section XVII.C.1.b.(i)(a) - (c). Therefore, for storage tanks constructed on or after May 1, 2014, AVO monitoring must commence within 90 days of the date that the storage tank commences operation. This is consistent with the requirement that operators must control storage tanks during the first 90 days after the date of first production.

4.3. *Can the division clarify that the obligation for AVO in Section XVII.C.1.d. is meant to only include storage tank thief hatches (or other access points) and pressure relief devices, and not separators or other equipment?*

The AVO requirement under Section XVII.C.1.d. is related to but different from the requirements of both STEM and LDAR. It includes an inspection of all equipment associated with storage tanks, including at a minimum, but not limited to, separators, air pollution control equipment, or other pressure reducing equipment. The division expects that operators will include this equipment in their AVO monitoring for compliance with this requirement.

4.4. *Section XVII.C.3 states "the owner or operator must maintain records of any required monitoring." Are AVO inspections and visual inspections considered monitoring and thus subject to the recordkeeping requirements?*

Yes, the recordkeeping requirements of Section XVII.C.3. apply to the AVO inspection and visual monitoring requirements of Section XVII.C.1.d.

4.5. *How will the new definition of "visible emissions" affect the visible emissions requirements under Section XII?*

The visible emission requirements under both Section XII and XVII are applied identically. See the memo titled "Procedures on Visible Emissions" for additional information, located on the APCD website at:

<https://www.colorado.gov/pacific/cdphe/summary-oil-and-gas-emissions-requirements>.



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- 4.6. *What visual monitoring requirements should be followed for operators with condensate storage tanks subject to the requirements of Section XVII.C.1.a. (i.e. condensate tanks with emissions ≥ 20 tpy)?*

Operators with these storage tanks, already being controlled in compliance with Section XVII.C.1.a., should begin following the revised monitoring requirements in Section XVII.C.1.d. beginning April 14, 2014, the effective date of the new rule revisions.