

PS Memo 14-03

To: Stationary Sources Program, Local Agencies and Regulated Community
From: Christopher Laplante and Rebecca Vasil
Date: August 8, 2014
Subject: Oil & Gas Industry Crude Oil, Condensate and Produced Water
Atmospheric Storage Tanks
Regulatory Definitions and Permitting Guidance for General Permit GP08

This guidance document is intended to answer frequently asked questions concerning both exploration and production (E&P) and non-E&P atmospheric storage tanks.

August 8, 2014 Issuance 1

Topic	Page
1. DEFINITIONS	2
2. GRANDFATHERING QUESTIONS AND ANSWERS (Q&A).....	6
3. AIR POLLUTANT EMISSION NOTICE (APEN) Q&A	7
4. STORAGE TANKS GP08 Q & A	9
5. EMISSION FACTORS AND SITE SPECIFIC SAMPLING Q&A.....	11
6. EMISSION CALCULATIONS Q&A.....	18
7. NEW SOURCE PERFORMANCE STANDARDS (NSPS) SUBPART OOOO AND GP08 QUESTION AND ANSWER	20
8. GUIDANCE ON HOW GP08 IMPLEMENTATION VARIES FROM GP01 AND GP05	22
9. COLORADO OIL AND GAS CONSERVATION COMMISSION (COGCC) 805 SERIES RULES	25

1. DEFINITIONS

This section contains definitions of terms that are used in this document and/or Colorado Air Quality Control Commission Regulation Number 3 (Reg. 3) and/or Regulation Number 7 (Reg. 7). Additional definitions are available in Reg. 3, Part A, Section II.B; Reg. 3, Part C, Section I.A; Reg. 7, Section II.A; XII.B and Section XVII.A, and Common Provisions Regulation Section I.G.

1.1. *Alternate Operating Scenario (AOS)*

An AOS is a provision in a General Permit (GP) that allows operational flexibility. It allows storage tanks to be modified without providing notice to the Colorado Air Pollution Control Division (Division) prior to the modification.

1.2. *Atmospheric Storage Tanks*

A type of storage tank that vents, or is designed to vent, to the atmosphere.

1.3. *Auto-Igniter*

A device which will automatically attempt to relight the pilot flame in the combustion chamber of a control device in order to combust volatile organic compound emissions.

1.4. *Condensate*

A hydrocarbon liquid that has an American Petroleum Institute (API) gravity greater than or equal to 40° API at 60° F based on an annual average of all samples. The annual average is based on the most recent 12 contiguous months. If the site did not operate at all times during the most recent 12 months, samples from previous months shall be included in the average such that 12 complete months of data is included. If the site has been in operation for less than 12 months, all available samples shall be used; the annual average shall be determined upon reaching 12 months of operation.

1.5. *Control Efficiency*

For the purpose of this guidance document, the term control efficiency refers to the overall control efficiency (i.e., the overall percentage by which emissions will be reduced.) This control efficiency should take into consideration the collection efficiency as well as destruction and/or emission reduction efficiency. The control efficiency accepted by the Division for flares and vapor recovery units (VRUs) is 95 percent. A higher efficiency may be used if appropriate and if supporting data is provided to and approved by the Division. (see Reg. 7, II.A.8)

1.6. *Crude Oil*

A hydrocarbon liquid that has an American Petroleum Institute (API) gravity less than 40° API at 60° F, based on an annual average of all samples. The annual average is based on the most recent 12 contiguous months. If the site did not operate at all times during the most recent 12 months, samples from previous months shall be included in the average such that 12 complete months of data is included. If the site has been in operation for less than 12 months, all available samples shall be used; the annual average shall be determined upon reaching 12 months of operation.

1.7. ***Date of First Production***

The date reported to the Colorado Oil and Gas Conservation Commission as the “first date of production”.

1.8. ***Denver 1-hour Ozone Attainment/Maintenance Area***

Jefferson and Douglas counties, the Cities and Counties of Denver and Broomfield, Boulder County (excluding Rocky Mountain National Park), Adams County west of Kiowa Creek, and Arapahoe County west of Kiowa Creek.

1.9. ***Drip Pot***

A container used to separate condensed liquids from gas streams. The Division considers a drip pot to be a non-exploration and production (E&P) condensate storage tank.

1.10. ***E&P Equipment***

All equipment from the wellhead through custody transfer. The first physical separation of the multi-phase mixture of gas, hydrocarbon liquids, and water from oil and gas wells occurs in E&P equipment. Typical E&P equipment includes the wellhead assembly, pump jack, separators, storage tanks, glycol dehydrator still vent, engines, miscellaneous natural gas combustion sources, truck loading, fugitive component leaks and control devices. For the purposes of this document, custody transfer occurs at the E&P site.

1.11. ***Eight-Hour Ozone Non-attainment Area***

Adams, Arapahoe, Boulder (includes part of Rocky Mountain National Park), Douglas, and Jefferson counties; the Cities and Counties of Denver and Broomfield; and portions of Larimer and Weld counties. For further information on the eight-hour ozone non-attainment area please visit www.colorado.gov/pacific/cdphe/aqcc-regs and view the document “Air Quality Standards, Designation and Emissions Budgets”.

1.12. ***General Permit (GP)***

A GP is a single permit issued to cover numerous single sources with similar operations, processes, and emissions and that are subject to similar requirements. The GP provides an additional, voluntary permitting option for these sources in lieu of a traditional individual permit. (Reg. 3, Part A, Section I.B.22. and Part B, Section III.I).

In this guidance document, GP refers to GP08 for oil and gas storage tanks. GP08 only covers sources located at minor or synthetic minor facilities. It does not apply to sources located at a major facility or at sources subject to a New Source Performance Standard (NSPS).

1.13. ***Grandfathered Equipment***

Condensate storage tanks and tank batteries located at both E&P and non-E&P sites that were in existence and exempt prior to December 30, 2002 have grandfathered status if they have not been modified. Therefore, they do not require a construction permit. Prior to a revision to Reg. 3 made at the end of 2002, condensate tanks had been exempt if they had a capacity of 40,000 gallons (952 barrels [bbl]) or less. Grandfathered status under the 2002 revision applies only to minor source construction permits (CPs); it does not

apply to Title V Operating Permits (T5OP) or Prevention of Significant Deterioration (PSD) permits or permitting requirements. A source loses its grandfathered status if a qualifying modification is made. In that case, a construction permit would be required if permit de minimis levels would be exceeded.

The Regulation 3 permit exemption for crude oil storage tanks less than 40,000 gallons capacity was removed effective April 14, 2014. Existing crude oil storage tanks installed prior to April 14, 2014 that previously qualified for this exemption are grandfathered from the requirement to obtain a permit if they have not been modified.

1.14. ***Individual Permit (IP)***

A permit that is issued through the traditional construction permit mechanism as defined in Reg. 3, Part B. IPs are either construction permits (CP) or Title V operating permits (T5OP). A GP is an alternative to an IP.

1.15. ***Intermediate Hydrocarbon Liquid***

Any naturally occurring, unrefined petroleum liquid.

1.16. ***Liquid Manifold***

For the purpose of GP08, the term liquid manifold used in the definition of storage tank means the manifold of storage vessels to increase storage capacity (i.e., with overflow lines). Storage vessels manifold together by common piping for hydrocarbon load out operations are not considered liquid manifold for the purpose of GP08.

1.17. ***Modification to a storage tank***

An oil and gas industry storage tank battery will be considered modified for minor CP purposes if any of the following has occurred (This is not an all-inclusive list. For additional details about the definition of modification, see Reg. 3, Part A, Section I.B.26):

- New storage tank(s) or vessels have been installed at the site
- An existing storage tank or vessel was replaced
- A significant change (e.g., replacement of a separator) in the physical components of the storage tank or the equipment related to the functioning of the storage tank has occurred
- An existing well was recompleted, refractured, or otherwise stimulated (see Reg. 7, Section XII.B.10)

The following are not considered a modification for CP purposes (i.e., these changes would not cause a battery to lose its grandfathered status). For storage tanks registered under the GP, these changes may be called modifications per the provisions of the AOS:

- Removal of a well connected to or serviced by a storage tank. In this event, an Air Pollutant Emission Notice (APEN) is not required, but a letter of notification should be sent to the Division.
- Addition of a control device. If the source has an IP, the tank permit must include the control device in order to take credit for the potential-to-emit (PTE) achieved by the reduced emissions achieved from the control device. If a control device is

included in an IP, it may not be removed or rendered inoperable without a permit modification. However, a revised APEN is required for the addition of a control device per Regulation Number 3, Part A, II.C.1.c.

1.18. ***Non-E&P, Midstream, or Downstream Equipment***

Midstream and downstream equipment is located between the E&P site custody transfer up to and including transmission and storage. Non-E&P equipment may be midstream or downstream. E&P equipment may be co-located with non-E&P equipment.

1.19. ***Produced Water***

Water that is extracted from the earth from an oil or natural gas production well, or that is separated from crude oil, condensate, or natural gas after extraction. It may contain various contaminants including hydrocarbons.

1.20. ***Recompletion***

Entering another subsurface zone from the same well.

1.21. ***Refracturing***

Restimulating the present producing zone of a well to increase production, using fracture techniques such as hydraulic, acid, or gravel.

1.22. ***Re-piping a well***

Connecting an existing well to a different tank battery.

1.23. ***Sales oil***

Crude oil, condensate, or intermediate hydrocarbon liquid sold to a third party and transported from the E&P facility.

1.24. ***Site or facility***

Any stationary source or group of stationary sources that have the same two digit standard industrial code, are located on one or more contiguous or adjacent properties, and are under common control of the same person (or persons under common control). (Reg. 3, Part A, Section I.B.43)

This definition will be used in determining both minor and major New Source Review (NSR) applicability determinations. In interpreting this definition, the Division will rely on available Environmental Protection Agency (EPA) guidance and past EPA and Division determinations. Based on Division experience, many of these decisions will be made on a case-by-case basis.

1.25. ***Storage Tank***

A single storage vessel if not liquid manifold with another storage vessel or series of storage vessels if liquid manifold together. For the purpose of GP08, the emissions limits established in the permit are for the storage tank which, by definition includes the entire grouping of storage vessels if they are liquid manifold together.

1.26. ***Storage Vessel***

An individual tank or other vessel that contains an accumulation of crude oil, condensate,

intermediate hydrocarbon liquids, or produced water, and that is constructed primarily of nonearthen materials (such as wood, concrete, steel, fiberglass, or plastic) which provide structural support as defined in 40 CFR Part 60, Subpart OOOO.

1.27. ***Visible Emissions***

Observations of smoke for any period or periods of duration greater than or equal to one (1) minute in any fifteen (15) minute period during normal operation. Visible emissions do not include radiant energy or water vapor.

1.28. ***Well Pad***

The area that is directly disturbed during the drilling and subsequent operation of a well or areas affected by production facilities directly associated with a well. Well sites from which multiple wells may be drilled to various bottom hole locations shall be considered a single well pad.

2. GRANDFATHERING QUESTIONS AND ANSWERS (Q&A)

2.1. ***What equipment is considered grandfathered under the December 30, 2002 Reg. 3 revisions?***

Condensate tanks and tank batteries located at either E&P or non-E&P sites that were in existence prior to December 30, 2002 and were exempt until the Reg. 3 exemptions for condensate tanks with a capacity of 40,000 gallons or less were removed are considered grandfathered from the minor source permitting requirements. Once a modification (see definition under 1.17) occurs, a permit is required if uncontrolled actual emissions meet or exceed the permit de minimis levels defined in Reg. No 3, Part B, Section II.D.

2.2. ***What equipment is considered grandfathered under the April 14, 2014 Regulation 3 revisions?***

Crude oil storage tanks with a capacity of 40,000 gallons or less that were in existence prior to April 14, 2014 and qualified for a permit exemption under Regulation 3, Part B, Section II.D.1.n are considered grandfathered from the minor source permitting requirements. Once a modification (see definition under 1.17) occurs, a permit is required if uncontrolled actual emissions meet or exceed the permit de minimis levels defined in Reg. No 3, Part B, Section II.D.

2.3. ***What does our policy on grandfathering mean as it applies to major Federal programs?***

Grandfathered status under the 2002 revisions to Reg. 3 applies only to minor source construction permits; it does not apply to T5OP or PSD permits or permitting requirements. Grandfathering does not apply to any facility whose condensate tank emissions: 1) put an existing facility over the PSD level for a new source; 2) would act as a major modification (over the significance threshold) at a PSD facility; 3) would trigger T5OP, or; 4) if the emissions have (or could/should have been) been used in a PSD netting analysis.

A source can be grandfathered from the requirement to obtain a PSD permit if it was constructed prior to the applicable PSD date and has not undergone any qualifying modifications since then that would trigger PSD review. In the case of PSD, a case-by-

case analysis would have to be conducted.

Even if a facility has or needs a T5OP or PSD permit, the condensate tanks might still be grandfathered from the requirement to obtain a minor source construction permit, although they would need to revise/obtain a T5OP.

2.4. ***Can I replace a condensate or crude oil tank with the same size or smaller tank at a grandfathered facility and retain my grandfathered status?***

No. Replacing a tank is considered a modification and would end the grandfathered status.

2.5. ***If there is a catastrophic failure of a storage vessel (either grandfathered or permitted), may I replace the tank immediately without first obtaining a minor source construction permit?***

The Division will resolve these situations on a case-by-case basis and may use enforcement discretion in such emergency situations. Tanks registered under the general GP08 may use the AOS provision for tank replacements without providing notice to the Division prior to the modification.

3. AIR POLLUTANT EMISSION NOTICE (APEN) Q&A

3.1. ***When must APENs be submitted or revised for storage tanks?***

APENs should be submitted for storage tanks that have volatile organic compound (VOC) emissions that are greater than threshold levels (1 tons per year [tpy] in nonattainment areas; 2 tpy in attainment areas), unless the source is exempt under Reg. 3, Part A, II.D. The categorical E&P condensate storage tank exemption for storage tanks that have a production rate of 730 bbl/yr or less was removed January 30, 2009. The categorical APEN exemption for produced water storage tanks that contain less than 1 percent by volume crude oil on an annual average was removed from Reg. 3 on January 30, 2009. APENs should be revised for circumstances as described in Reg. 3, Part A, II.C or as described in the GP08. The following are some circumstances under which APENs should be revised:

- For new storage tanks located at exploration & production (E&P) sites, within 30 days after the report of first production is filed, but no later than ninety days following the first day of production. (Reg. 3, Part A, Section II.D.1.III.)
- When a significant change in annual actual emission occurs, as defined in Reg. 3, Part A, Section II.C.2. APENs filed for this reason should be submitted by April 30th of the year following the change.
- When there is a change in the owner or operator of any storage tank.
- Prior to replacing (with a different type), or removing control equipment. The following two exceptions apply to this requirement.
 - Tank batteries subject to the requirements in Reg. 7, Section XII may file a revised APEN indicating control equipment changes annually as specified in Reg. 3, Part A, Section II.C.3.d. However, if a storage tank has a control device listed in an IP, the permit must be modified (and thus

an APEN submitted) prior to implementing the change.

- Tank batteries registered under the GP08 may file a revised APEN indicating control equipment changes annually, as specified in the AOS.
- When a grandfathered storage tank is modified. Grandfathered storage tanks lose their grandfathered status when a modification occurs.
- Before an individually permitted storage tank modifies a permit limitation or equipment description.
- When a storage tank initially registered under GP08 at a minor source becomes an emissions unit at a major source due to facility emissions increases. The operator would need to submit an APEN and request an individual permit.
- No later than thirty days before the five-year term of the current APEN expires.
- When a control device is added or modified per Regulation Number 3, Part A, II.C.1.c.

3.2. ***What time period should be used to calculate actual emissions for an APEN?***

APENs are used to report actual emissions for the previous calendar year. Therefore, actual reporting levels should represent the prior calendar year throughput and emissions. For APENs submitted during the first year of operation, projected annual condensate, crude oil, produced water and intermediate hydrocarbon liquid production and associated emissions are acceptable. In subsequent years, actual data from the previous calendar year shall be reported.

3.3. ***What time period should be used to calculate requested emissions for an APEN?***

Requested production throughput and associated emission values are used to determine source permit limits for IPs. Therefore, these values should represent the best estimate of projected future maximum throughput and emissions. Requested values are not applicable for storage tanks registering under the GP08 because permit limits are set by GP conditions.

3.4. ***What must be submitted with an APEN when applying for GP08?***

An APEN must be completed per the instructions provided with the form. If a site-specific emission factor is used to calculate emissions, documentation supporting the emission factor shall be submitted with the APEN. Documentation includes, but is not limited to:

- Emissions Calculation Sheet
- Extended Gas and/or Liquids analysis, Gas Water Ratio (GWR) analysis
- Associated model run (E&P TANK, HySys, ProMax)

In addition to the APEN, operators should submit Form APCD-102 Facility Wide Inventory form.

3.5. ***What fees must be submitted with the APEN?***

The filing fee for each APEN submitted is \$152.90 for storage tanks associated with non-

E&P operations. For storage tanks associated with E&P operations up to five APENs may be submitted while paying only one filing fee of \$152.90. For the purpose of calculating filing fees required for E&P storage tanks; crude oil, condensate and produced water tanks may not be comingled within a 5 for 1 fee grouping.

A \$250 general permit registration fee must be submitted along with each APEN for emissions points being newly registered under the GP08 permit.

4. STORAGE TANKS GP08 Q & A

4.1. *What sources qualify for coverage for the storage tanks GP08?*

Sources that comply with all terms and conditions in the GP qualify to be covered by the GP. General applicability requires:

- The facility is an oil & gas facility;
- The equipment is one or more storage vessels each with a design capacity equal to or less than 10,000 bbls;
- The facility is a true minor or synthetic minor source for T5OP, NSR, and MACT;
- Actual storage tank VOC emissions are equal to or less than 5.9 tpy, on a rolling 12 month basis for synthetic minor facilities or a calendar year basis for true minor facilities; and
- Equipment must not be subject to a New Source Performance Standard (NSPS).

Note: Equipment located at a major facility are **not qualified** to operate under the GP08.

4.2. *May a storage tank currently registered as a minor source under the storage tank GP08 remain eligible for coverage if a future modification causes uncontrolled actual emissions to exceed 100 tpy?*

GP08 coverage is available to sources that are either true minor or synthetic minor. A storage tank approved for coverage under the GP08 must have actual controlled VOC emissions equal to or less than 5.9 tpy, although its uncontrolled actual emissions may exceed 100 tpy. Therefore, if a storage tank's uncontrolled actual emissions increase such that they exceed 100 tpy, it will remain eligible for continued coverage under the GP presuming actual emissions are controlled to a level below the allowable VOC permit limit. The source's classification would change from true minor to synthetic minor.

4.3. *What is the process for permitting a storage tank under the GP08?*

The owner/operator should:

- 1) Submit a completed Crude oil, Condensate or Produced water storage tank APEN (Forms APCD-210, APCD-205 or APCD-207).
- 2) Place a check mark in the box labeled "Request for coverage under general permit" and the box labeled "GP08" in Section 02 on the APEN form.
- 3) Include the appropriate APEN filing fee and the GP08 registration fees according to

3.5 above along with supporting documentation as required in 3.4.

- 4) The operator is conditionally qualified to operate under the GP08 upon submittal of a complete application.

The Division will:

- 5) Review the registration request and determine if the storage tank qualifies for GP08 registration.
- 6) If the source qualifies for GP08 registration, the Division will issue an approval letter authorizing GP08 coverage.
- 7) If the source does not qualify for operation under GP08, the Division will work with the operator to obtain the appropriate permit. Please note, the operator may be liable for operating without a permit.
- 8) If the tank is currently permitted under an IP and the source is requesting a change to GP08 coverage, the Division will cancel the existing IP upon GP08 registration approval.

4.4. ***May facilities continue to utilize IPs rather than the GP08 for storage tanks?***

Yes, storage tanks may be covered under IPs. The GP08 is a voluntary permitting option for qualified sources. The same APEN form is used for both situations. The permittee must check the correct box on the APEN indicating which type permit they are requesting.

4.5. ***May facilities utilize both the GP01 for condensate tanks, GP05 for produced water tanks and GP08 for storage tanks (crude oil, condensate and produced water) at the same stationary source?***

Yes, operators may use a combination of GP01, GP05 and GP08 at the same stationary source. If this approach is used the operator will need to clearly register each storage tank associated with each general permit on separate APENs as separate emissions points at the facility. For more information on using a combination of these permits at the same stationary source please see Section 8 of this document.

4.6. *What is the difference between a GP and an IP for storage tanks?*

General Permit	Individual permit
Flexibility	
Controls may be installed, replaced and removed as needed to meet the emission limit.	Must specify a control device if credit is claimed for emissions control and must be modified if that control device is changed.
Contains AOS provision to allow modifications without prior notice.	Must be modified prior to making changes.
Conditions	
No unique permit number. Storage tanks are uniquely identified with the AIRs ID.	A unique permit number is assigned.
Equipment descriptions and conditions are standard for every storage tank registered.	Contains unique conditions and descriptions of the specific equipment to be covered.
The GP does not contain a production limit , only an emissions limit.	Contains an annual production and associated emissions limit (set at the level requested on the APEN).
Permit fees	
The GP registration fee is a one-time fee that does not require repayment except in limited circumstances.	Permit fees based on actual processing time must be paid every time a permit is modified and may vary widely.

5. **EMISSION FACTORS AND SITE SPECIFIC SAMPLING Q&A**

5.1. *What are the state approved emission factors for condensate storage tanks?*

Facility County	Condensate Storage Tanks State Emission Factors* (lb/bbl)		
	VOC	Benzene	n-Hexane
Adams, Arapahoe, Boulder, Broomfield, Crowley, Denver, Douglas, El Paso, Elbert, Jefferson, Larimer, Logan, Morgan, Phillips, Pueblo, Sedgwick, Washington, Weld, & Yuma	13.7	0.024	0.210
Garfield, Mesa, Rio Blanco, & Moffat	10.0	0.048	0.140
Cheyenne, Kiowa, Kit Carson & Lincoln	3.0	0.004	0.070
Remainder of Colorado	11.8	0.034	0.185

* These state emission factors may be revised in the future, pending new data and analysis results.

5.2. ***What are the state approved emission factors for crude oil storage tanks?***

Facility County	Crude Oil Storage Tanks State Emission Factors* (lb/bbl)		
	VOC	Benzene	n-Hexane
All counties of Colorado	3.2	0.046	0.245

* These state emission factors may be revised in the future, pending new data and analysis results.

5.3. ***What are the state approved default emission factors for produced water storage tanks?***

County	Produced Water Storage Tanks State Emission Factors* (lb/bbl)		
	VOC	Benzene	n-Hexane
Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, Jefferson, Larimer, & Weld	0.262	0.007	0.022
Garfield, Mesa, Rio Blanco, & Moffat	0.178	0.004	0.010
Remainder of Colorado	0.262	0.007	0.022

*These state emission factors may be revised in the future, pending new data and analysis results.

5.4. ***What type of emissions are included in the state emission factors?***

State emission factors for storage tanks account for flashing, working, and breathing losses.

5.5. ***When are site-specific emission factors required for condensate storage tanks?***

Site-specific emission factors must be developed and used as the basis to estimate emissions in the following circumstances or locations:

- For exploration and production (E&P) facilities when uncontrolled VOC emissions from a storage tank are greater than or equal to 80 tpy when calculated using state emission factors.
- Site specific emissions factors are required for all non-E&P operations.

Site-specific emission factors may be developed and used on a voluntary basis for any condensate storage tank.

Site-specific emission factors may only be applied at the condensate storage tank for which they were developed unless otherwise approved by the Division.

Site specific emissions factors must be approved by the Division.

5.6. ***When are site-specific emission factors required for crude oil storage tanks?***

Site-specific emission factors must be developed and used as the basis to estimate emissions in the following circumstances or locations:

- Uncontrolled VOC emissions from a storage tank are greater than or equal to

20 tpy when calculated using state emission factors.

- Site specific emissions factors are required for all non-E&P operations.

Site-specific emission factors may be developed and used on a voluntary basis for any crude oil storage tank.

Site-specific emission factors may only be applied at the crude oil storage tank for which they were developed unless otherwise approved by the Division.

Site specific emissions factors must be approved by the Division.

5.7. ***When are site-specific emission factors required for produced water storage tanks?***

Currently the Division does not have emissions threshold based criteria for when site specific emissions factors must be developed for produced water storage tanks. Site-specific emission factors may be developed and used on a voluntary basis. The Division reserves the authority to require site-specific emission factors at any time. Site-specific emission factors may only be applied at the storage tank for which they were developed, unless otherwise approved by the Division. Site specific emissions factors must be approved by the Division.

5.8. ***How are site-specific emission factors for condensate and crude oil storage tanks developed?***

For operations where the condensate or crude oil may exhibit “flashing” emissions site-specific emission factors for condensate and crude oil storage tanks are developed by sampling low pressure oil (pre “flash”) and sales oil and then using results from the sample analysis as inputs to a software model. Results of all sampling and analyses must be submitted to the Division. If more than one sample is taken from a storage tank during the sample period, an average will be used for permit and APEN emission reporting purposes.

Samples of low pressure oil, which is the pre-flash pressurized oil obtained from the separator outlet to the sales tank, must be taken during normal operating conditions. If added, xylene and/or methanol injections that occur upstream of the tank battery must be captured by the sampling. Reid Vapor Pressure (RVP) and API gravity may be determined by either sampling sales oil or estimated via calculations. API gravity may be obtained from averaging sales receipt values or if the specific gravity of the sales oil is known calculated with Equation 1:

$$\text{(Equation 1)} \quad \text{API Gravity} = (141.5 \div \text{specific gravity at } 60 \text{ }^\circ\text{F}) - 131.5$$

Sales oil RVP must either be measured from a sales oil sample taken at the same time as the low pressure oil sample or calculated with Equation 2:

$$\text{(Equation 2)} \quad \text{RVP} = (0.179 \times \text{sales oil API Gravity}) - 1.699$$

The following pressurized liquid sampling and analytical methods are approved by the Division (Analysis by other methods must be approved by the Division prior to submittal):

Sampling Method

- Gas Processors Association (GPA) Method 2174 piston cylinder sample

container (or a method derived from this method)

Analytical Methods

- American Society of Testing and Methods (ASTM) D6730 (used by Empact Analytical Systems Inc.)
- GPA Method 2186 (used by Questar Energy Services analytical division Applied Technology Services)

Flash, working, and breathing loss emissions must be calculated using an approved software model. The following models are currently approved for developing site specific emissions factors for both condensate and crude oil storage tanks:

- American Petroleum Institute (API) E&P TANK version 2.0 or later
- Commercial process simulators including: WinSim, Aspen HYSYS, ProSim and ProMax

While E&P TANK version 2.0 is able to calculate flash, as well as, working and breathing losses, some commercial process simulators will only calculate flash and not working and breathing losses. In these cases, EPA TANKS 4.0 or later must be used to calculate working and breathing loss emissions in conjunction with the process simulator used to calculate flash emissions. The results of both model runs should be combined to represent a single emissions factor. Use of modeling programs other than those listed above must be Division approved prior to submittal.

5.9. *How is a site-specific emission factor for produced water storage tanks developed?*

A site-specific emission factor for produced water storage tanks may be developed by either of the following two methods:

1. Performing a Division approved storage tank vent stack test and analysis of vent gas composition. The test length must be a minimum of 24 hours and the volume of produced water introduced into the storage tank recorded during the duration of the test period. Results of the test shall be used to calculate the mass of VOC, n-hexane and benzene emitted per barrel of produced water throughput into the storage tank. A test protocol must be submitted and approved by the Division prior to performing the test. Once a test protocol has been approved by the Division, subsequent testing may be performed following the approved protocol without submittal to the Division. The Division must be notified of the stack testing at least 30-days prior to the actual test date.
2. Collect a pressurized (pre “flash”) sample of produced water from the separator outlet to the produced water tank and submit to a lab for flash liberation analysis to determine the gas to water ratio (GWR) in units of SCF gas/BBL water. Ensure the laboratory also analyzes the resultant flash gas using gas chromatography (GC) to determine total VOC, n-hexane and benzene content. The laboratory results should be used to develop VOC, n-hexane and benzene emissions factors in units of pounds per BBL of produced water (lb/BBL).

5.10. ***How long can a site-specific emission factor be used?***

Site-specific emission factors can be used for the following length of time:

- For minor and synthetic minor storage tanks, the site-specific emission factor may be used indefinitely.
- For storage tanks at Title V facilities, a site-specific emission factor must be developed annually, regardless of the storage tank emissions. This requirement is for Title V periodic monitoring purposes. The T5OP may contain additional requirements about frequency of modeling and calculating emissions.

5.11. ***What information is required to document a site-specific emission factor for condensate and crude oil storage tanks?***

The following information must be submitted to the Division prior to using a site-specific emission factor for condensate or crude oil storage tanks:

- Complete composition analytical results of the pre-flash low pressure oil sample
- Sales oil RVP and API gravity analyses or estimates
- Emission model results; include site-specific emission factor(s) and input/output reports

In addition, the Division requests the following information be submitted if practicably available:

- Geologic producing formation of wells serviced by the tank battery

5.12. ***What information is required to document a site-specific emission factor for produced water storage tanks?***

Prior to the use of a site-specific emission factor, the results of the vent stack test must be submitted to the Division. Test results must report the mass emission rate of VOC, n-hexane and benzene, as well as, the water production volume data during the test period. Results of the tests shall be expressed in units of pounds of emissions per barrel of water produced (lb/bbl).

For sources using a GWR analysis, the operator must submit the laboratory analytical reports demonstrating the GWR and gas composition along with emissions calculations that demonstrate the mass emissions rate of VOC, n-hexane and benzene in units of pounds of emissions per barrel of water produced (lb/bbl).

5.13. ***What emission factors are used for steady state (i.e., stabilized) storage tanks that do not have flash emissions associated with them?***

Storage tanks that do not emit flash emissions do not need to use the default emission factors, but may do so as a conservative estimate. Otherwise, emissions may be calculated using methods that estimate only working and breathing loss emissions. For condensate and crude oil storage tanks, this should be completed using EPA Tanks 4.0 or later.

5.14. ***How should I permit storage vessels and associated separators if I have installed multi-stage gas/liquid separation technology between the wellhead and the storage tanks?***

As technology advances operators using multi-stage gas/liquid separation technology have improved their ability to capture rich “flash” gas and direct it into the sales line for increased economic return rather than combusting the “flash” gas as a waste product. Typical multi-stage separation seen today includes the use of High/Low Pressure (HLP) separators in addition to vapor recovery towers (VRT). In these cases there are 2-3 pressure drops through which associated gas is separated from the hydrocarbon liquid in the high pressure fluids coming from the wellhead. Often the operator may need to use vapor recovery unit (VRU) compressors to boost the associated gas coming off the low pressure separator vessel or the VRT in order to direct the gas into the sales gas gathering line. Since the intention of the multi-stage separation is to enable operators to preserve valuable hydrocarbon product the Division looks at the VRU and separator pressure vessels as process equipment and not emissions controls for Regulation 3, Part A and Part B purposes as long as one of the following scenarios applies:

- i) the well is designed to automatically shut in production when associated gas would otherwise be routed to the VRU, but the VRU is not operational; or
- ii) the VRU compressors are maintained operational to ensure venting associated gas emissions to atmosphere or an emissions control device does not occur at levels exceeding Air Pollutant Emissions Notice (APEN) reporting thresholds contained in Regulation 3, Part A (1 ton VOC per year in non-attainment areas and 2 tons VOC per year in attainment areas).

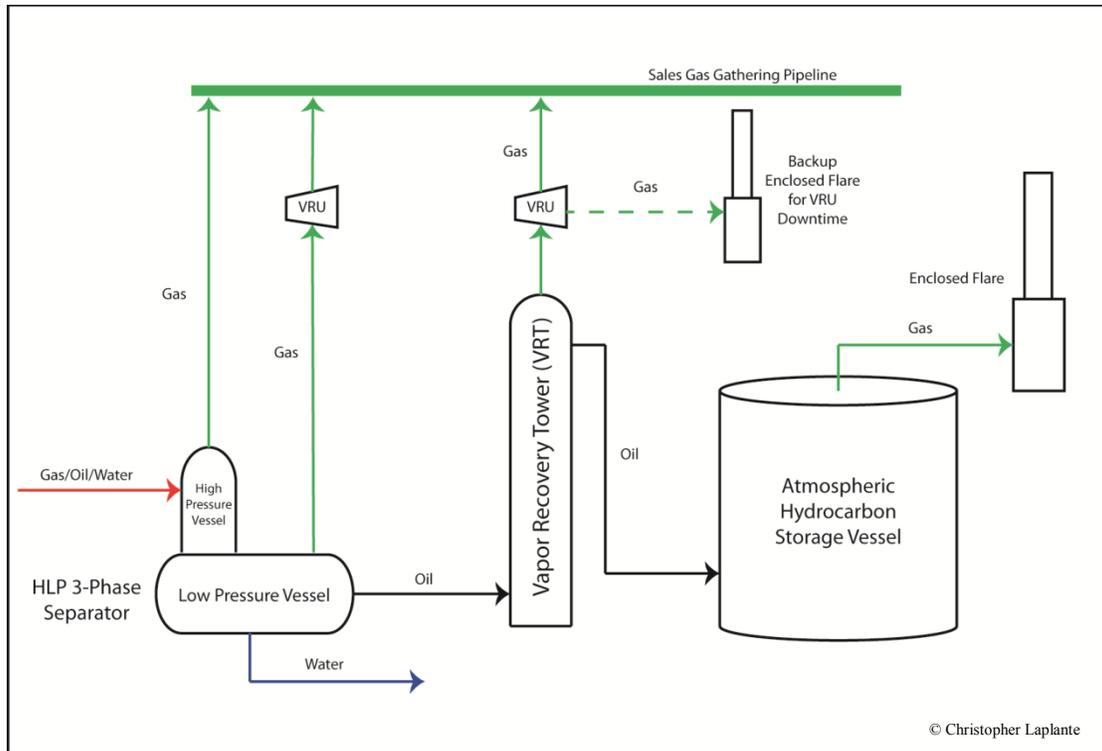
If scenario ii) above is used as a basis to justify not reporting or permitting the separator, operators must track the following information to demonstrate the separation process does not trigger APEN and/or permit requirements:

- Hours of VRU downtime; and
- Total production gas volume vented (MMSCF/year) without being inlet into the sales gas gathering pipeline. Total production gas volume vented may include emissions to atmosphere or to an emissions control device (i.e. combustor) during any period of operation including VRU downtime and gas gathering pipeline shut-in; and
- Test results representing the speciation of production gas (i.e. VOC, benzene, toluene, xylene, ethylbenzene, n-hexane) and BTU content; and
- Calculations of annual uncontrolled actual VOC and hazardous air pollutant emissions.

For scenario ii) above, if the operator is not able to keep the uncontrolled actual associated gas mass VOC emissions routed to the atmosphere or a backup emissions control device below APEN reporting thresholds, the separator and emissions would need to be reported on Form APCD-211 and a permit obtained. The atmospheric storage vessel or storage tank supported by the multi-stage separation process may be permitted

using GP01, GP08 or a traditional permit.

Contained below is one example graphical representation of a multi-stage gas/liquid separation process. The first stage occurs in the high pressure vessel of the HLP separator and does not require a compressor to move gas into the sales line. The second stage occurs in the low pressure vessel of the HLP separator and does require a VRU compressor to boost the gas into the sales line. In this example, the 2nd stage VRU is not backed up by a flare as it is interlocked to shut in the well if the compressor ceases operation (i.e., scenario “i”) above). The third stage of separation occurs in the vapor recovery tower (VRT) and requires a VRU compressor to boost the gas into the sales line. This compressor is backed up by an enclosed flare for periods of time when the VRU is not operating or directing gas into the sales line. For the third stage of separation the operator would need to track all information as described for scenario ii) above in order to demonstrate APEN reporting and permitting requirements are not triggered.



5.15. ***How should I develop site specific emissions factors for atmospheric hydrocarbon storage vessels if I have installed multi-stage gas/liquid separation technology between the wellhead and the storage tanks?***

For multi-stage separation between the well head and the storage vessel, the operator may characterize the uncontrolled actual emissions factors developed per Section 5.8 above based on the composition of the pressurized liquid in the last gas/liquid separation vessel in the processing train prior to dumping the hydrocarbon liquids into the storage vessel (i.e., “sales oil vessel”). In most cases this is the low pressure side of the 3-phase separator. In the case diagramed in 5.14 above, this would be the outlet of the vapor recovery tower (VRT).

6. EMISSION CALCULATIONS Q&A

6.1. ***How are uncontrolled and controlled emissions calculated?***

Uncontrolled and controlled actual emissions must be calculated to complete all APENs submitted. In addition, if the operator is applying for an individual permit instead of a general permit, requested uncontrolled and controlled allowable emissions must also be calculated.

The following discussion will focus on calculating actual uncontrolled and controlled emissions for reporting on an APEN. However, the method applies to both actual and requested allowable emissions.

Uncontrolled actual emissions calculations are straightforward in that they represent the level of emissions that would occur if the total reported actual production (condensate, crude oil or produced water) throughput was produced without a control device operating at any point in time. On the other hand, the controlled actual emissions estimates include both the portion of emissions that occurred while the control device was not operating, in addition to, the portion of emissions that occurred while the control device did operate. Let’s take an example where the actual volume of condensate production for the calendar year was 8,750 BBLs and the portion of production while emissions controls are operational was 4,600 BBLs. We will use the state default emissions for condensate production in Garfield County for this example.

Uncontrolled Actual Emissions

$$\frac{8,750 \text{ bbl}}{\text{year}} \times \frac{10.0 \text{ lb VOC}}{\text{bbl}} \times \frac{1 \text{ ton}}{2000 \text{ lbs}} = \frac{43.8 \text{ tons VOC}}{\text{year}}$$

$$\frac{8,750 \text{ bbl}}{\text{year}} \times \frac{0.048 \text{ lb Benzene}}{\text{bbl}} = \frac{420 \text{ pounds Benzene}}{\text{year}}$$

$$\frac{8,750 \text{ bbl}}{\text{year}} \times \frac{0.14 \text{ lb n-Hexane}}{\text{bbl}} = \frac{1,225 \text{ pounds n-Hexane}}{\text{year}}$$

Controlled Actual Emissions

The first step is to calculate the portion of emissions that occurred while no control device was operated. For this example, the volume of uncontrolled condensate production is equal to 8,750 bbl – 4,600 bbl = 4,150 bbl/year. Using this value we calculate the uncontrolled portion of the emissions as follows:

$$\frac{4,150 \text{ bbl}}{\text{year}} \times \frac{10.0 \text{ lb VOC}}{\text{bbl}} \times \frac{1 \text{ ton}}{2000 \text{ lbs}} = \frac{20.8 \text{ tons VOC}}{\text{year}}$$

$$\frac{4,150 \text{ bbl}}{\text{year}} \times \frac{0.048 \text{ lb Benzene}}{\text{bbl}} = \frac{199 \text{ pounds Benzene}}{\text{year}}$$

$$\frac{4,150 \text{ bbl}}{\text{year}} \times \frac{0.14 \text{ lb n-Hexane}}{\text{bbl}} = \frac{581 \text{ pounds n-Hexane}}{\text{year}}$$

The second step is to calculate the portion of emissions that occurred while the control device was operated. For this example, 4,600 bbls were produced while the control device was operational. Using this controlled production value and a 95% control efficiency we calculate the controlled portion of the emissions as follows:

$$\frac{4,600 \text{ bbl}}{\text{year}} \times \frac{10.0 \text{ lb VOC}}{\text{bbl}} \times \frac{1 \text{ ton}}{2000 \text{ lbs}} \times (1.0 - 0.95) = \frac{1.2 \text{ tons VOC}}{\text{year}}$$

$$\frac{4,600 \text{ bbl}}{\text{year}} \times \frac{0.048 \text{ lb VOC}}{\text{bbl}} \times (1.0 - 0.95) = \frac{11 \text{ pounds Benzene}}{\text{year}}$$

$$\frac{4,600 \text{ bbl}}{\text{year}} \times \frac{0.140 \text{ lb VOC}}{\text{bbl}} \times (1.0 - 0.95) = \frac{32 \text{ pounds n-Hexane}}{\text{year}}$$

The final step is to sum both the uncontrolled and controlled portions of the emissions to determine the emissions to list as controlled actual emissions on the APEN.

$$\frac{20.8 \text{ tons VOC}}{\text{year}} + \frac{1.2 \text{ tons VOC}}{\text{year}} = \frac{22.0 \text{ tons VOC}}{\text{year}}$$

$$\frac{199 \text{ pounds Benzene}}{\text{year}} + \frac{11 \text{ pounds Benzene}}{\text{year}} = \frac{210 \text{ pounds Benzene}}{\text{year}}$$

$$\frac{581 \text{ pounds n-Hexane}}{\text{year}} + \frac{32 \text{ pounds n-Hexane}}{\text{year}} = \frac{613 \text{ pounds n-Hexane}}{\text{year}}$$

By following the method described above, operators may be certain to accurately report both uncontrolled and controlled actual emissions on APEN forms provided to the APCD.

6.2. ***How is potential to emit (PTE) calculated?***

PTE is calculated based on the same formula above for uncontrolled actual emissions with one change. Instead of using the actual production throughput volume (bbl/year) in the equation, the operator should use a PTE production throughput. PTE production throughput is the greater of the following:

- the highest rolling 12-month actual production total (bbl/year) during the last five years multiplied by a factor of 1.2; or
- the production forecast (bbl/year) for the following 12-month period multiplied by a factor of 1.2.

Production forecasts may use a default decline factor of 60 percent for the first 12 months of operation to estimate maximum annual throughput. That is, the production after a year can be estimated to be 40 percent of the original production, using a standard decline curve. Higher decline factors may be used if supporting documentation is provided to the Division.

7. NEW SOURCE PERFORMANCE STANDARDS (NSPS) SUBPART OOOO AND GP08 QUESTION AND ANSWER

7.1. ***What is a storage vessel according to NSPS OOOO?***

A storage vessel is a tank or other vessel that contains an accumulation of crude oil, condensate, intermediate hydrocarbon liquids, or produced water, and that is constructed primarily of nonearthen materials (such as wood, concrete, steel, fiberglass, or plastic) which provide structural support. For the purposes of subpart OOOO, the following are not considered storage vessels:

- (1) Vessels that are skid-mounted or permanently attached to something that is mobile (such as trucks, railcars, barges or ships), and are intended to be located at a site for less than 180 consecutive days. If you do not keep or are not able to produce records, as required by §60.5420(c)(5)(iv), showing that the vessel has been located at a site for less than 180 consecutive days, the vessel described herein is considered to be a storage vessel since the original vessel was first located at the site.
- (2) Process vessels such as surge control vessels, bottoms receivers or knockout vessels.
- (3) Pressure vessels designed to operate in excess of 204.9 kilopascals and without emissions to the atmosphere.

7.2. ***What is a storage tank according to GP08 and Colorado Regulation 7?***

A storage tank means any fixed roof storage vessel or series of storage vessels that are liquid manifold together. Storage vessel is as defined in 40 CFR Part 60, Subpart OOOO.

7.3. ***Why does the Division differentiate the terms “storage tank” and “storage vessel”?***

The Division considers any series of individual storage vessels that are liquid manifold together to essentially operate as a single storage vessel as the liquid compartments are manifold together to provide increased storage capacity. Under the provisions of Regulation 7 Section XII and XVII storage tanks are regulated under this structure. EPA adopted a definition of storage vessel in NSPS Subpart OOOO. For affected storage vessel facility determinations under NSPS OOOO, EPA allows operators to evaluate each single storage vessel regardless of whether they are liquid manifold.

The GP08 defines storage tank consistent with Regulation 7 and establishes a 5.9 tons per year VOC emissions limit for storage tanks.

7.4. ***If I register a storage tank under GP08, will NSPS OOOO be applicable to storage vessel(s) associated with the storage tank?***

No, by establishing an enforceable emission limit for your storage tank below the 6 tpy applicability threshold, NSPS OOOO will not apply to the storage vessel.

7.5. ***My storage tank uncontrolled emissions are above the 6 tpy VOC threshold, but I will control VOC emissions below 5.9 tpy. May I still apply for a GP08?***

Yes, as long as you control VOC emissions less than or equal to 5.9 tpy you are able to qualify for GP08. Under NSPS OOOO when determining the PTE, the source can take into account emissions limits from a legally and practically enforceable state rule or permit.

7.6. ***I am not able to control my storage tank VOC emissions less than or equal to 5.9 tons per year and determined my storage vessel is subject to NSPS OOOO requirements. What are my permitting options?***

There are two options, you may use another general permit or apply for an individual permit. There are 2 general permits available for condensate and produced water storage vessels subject to NSPS OOOO. The GP01 may be used for condensate tanks and establishes a 39 tpy VOC emissions limit. The GP05 may be used for produced water tanks and establishes a 10 tpy VOC emissions limit. An individual permit may be used for condensate tanks, produced water tanks or crude oil tanks. The individual permit will establish emissions and production limits as requested in the application by the source.

8. GUIDANCE ON HOW GP08 IMPLEMENTATION VARIES FROM GP01 AND GP05

8.1. *How does registering a storage tank under GP08 differ from how operators have historically registered storage tanks under GP01 and GP05?*

Historically, operators have often registered all storage vessels located on a common well pad (i.e., E&P site) under GP01 for condensate tanks and under GP05 for produced water tanks as a single emissions point reported on a single APEN. This process is allowed regardless of whether or not the storage vessels are liquid manifold or operate independently from one another. In some cases, operators choose to register individual series of liquid manifold storage vessels (a “Storage Tank”) located on a common well pad as separate emissions points by reporting them on separate APENs. Under either of these registration scenarios, the total combined emissions from registered emissions points at the common stationary source had to remain below the applicable general permit emissions limit (i.e., 39 tons per year VOC for condensate tanks and 10 tons per year VOC for produced water tanks). For GP01 and GP05 the permit emissions limits apply to all storage vessels registered under the general permit regardless of how the many emissions points the operator decides to register the storage vessels under.

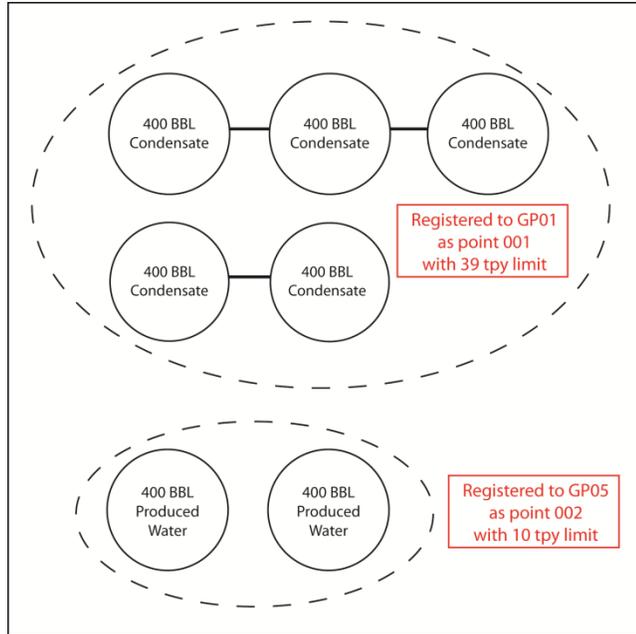
When registering storage vessels under GP08, operators are required to register each individual series of liquid manifold storage vessels (i.e., a “Storage Tank”) as a separate emissions point. This approach clearly establishes the 5.9 tons per year VOC emissions limit applies to the registered storage tank. Operators are not allowed to group multiple series of storage tanks on a common APEN as a single emissions point when registering storage tanks under GP08.

8.2. *What are some example scenarios of how to register storage tanks with the existing general permits GP01, GP05 and GP08?*

For each of the following E&P well pad examples the horizontal lines between storage vessels represent liquid manifold (see definition under 1.16) connections intended to expand storage capacity. The dashed lines encompass the storage vessels as they are grouped on a single APEN and reported to the Division for registration under the referenced general permit. Scenarios 1-4 are accurate and appropriate methods to report and register storage tanks under Division general permits. Scenario 5 is an example of an approach that will not be allowed by the Division and should be avoided.

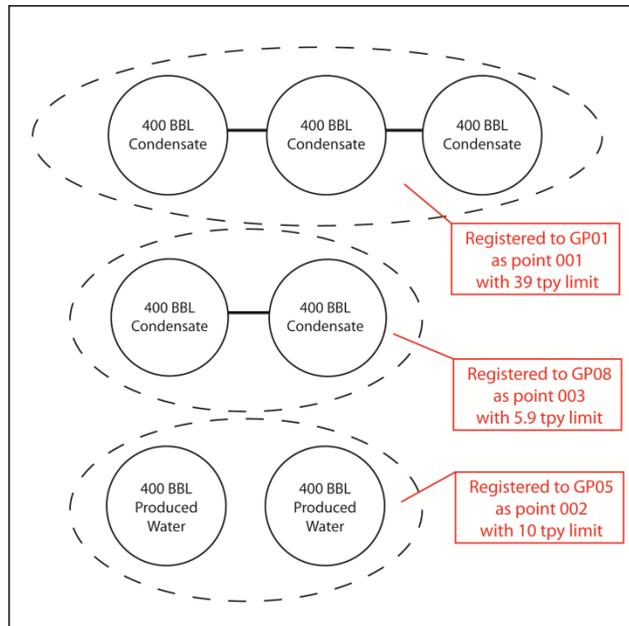
Scenario #1

This is an example well pad which registered tanks under GP01 and GP05 prior to the availability of GP08. Individual series of storage tanks were grouped under point 001 and individual storage vessels grouped under point 002.



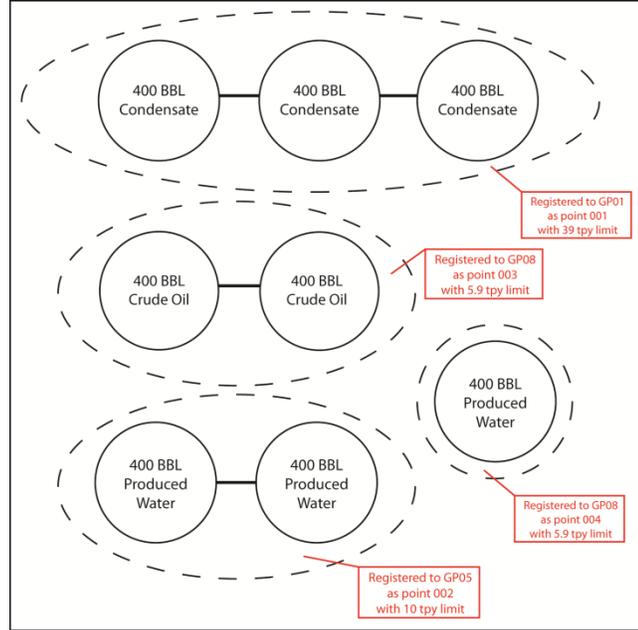
Scenario #2

This is an example well pad which registered tanks under GP01 and GP05 prior to the availability of GP08 and a newly constructed condensate storage tank with GP08.



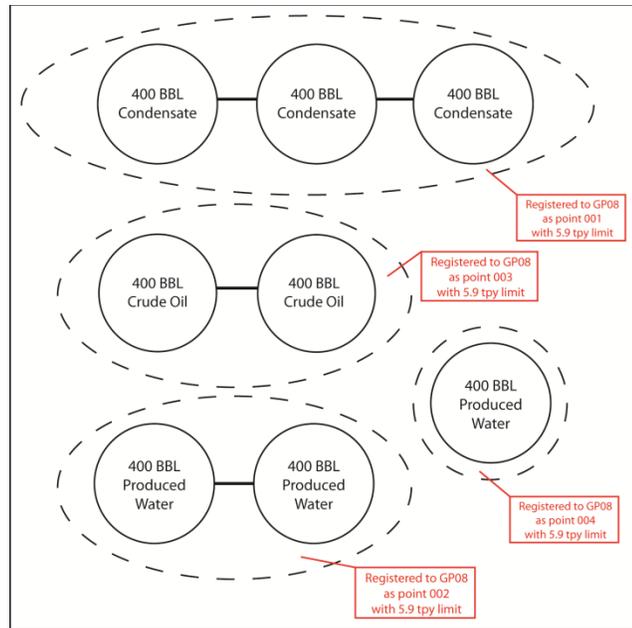
Scenario #3

This is an example well pad which registered tanks under GP01 and GP05 prior to the availability of GP08 and a newly constructed crude oil storage tank and produced water storage vessel each under GP08.



Scenario #4

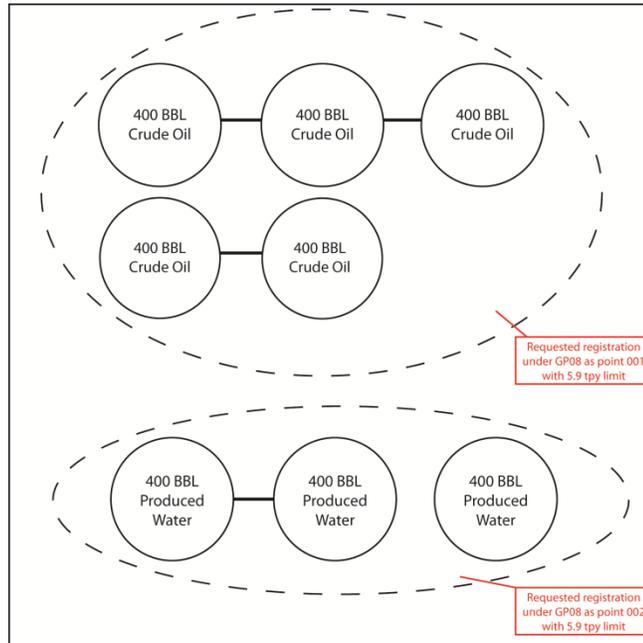
This is an example well pad for which all storage vessels were installed after the applicability date (August 23, 2011, the date of rule proposal) of NSPS Subpart OOOO. The operator registered a condensate storage tank as point 001, a crude oil storage tank as point 003, and separate produced water storage tanks as points 002 and 004 under GP08.



Scenario #5

The following scenario is not allowed while registering storage vessels under GP08.

The error here is the operator attempts to register multiple series of storage tanks under one emissions point (i.e., on one APEN). When registering storage tanks under GP08, each storage tank must be reported on an individual APEN and designated as a separate emissions point (see scenario #4 above).



9. COLORADO OIL AND GAS CONSERVATION COMMISSION (COGCC) 805 SERIES RULES

9.1. *What is House Bill (HB) 07-1341?*

HB 07-1341 is a legislative action to “protect public health, safety, and welfare, including the environment and wildlife resources, from the impacts resulting from the dramatic increase in oil and gas development.” Section 805.b(2)A regulates storage tanks. HB 07-1341 can be found at the Colorado Oil and Gas Conservation Commission (COGCC) website: cogcc.state.co.us.

9.2. *What does Section 805.b(2)A require?*

Section 805.b(2)A requires that all condensate, crude oil and produced water storage tanks with uncontrolled actual emissions of 5 tons per year (tpy) or more of VOCs located within 1,320 feet of an affected building unit or a designated outside activity area (see complete list in HB 07-1341) shall utilize a control device capable of achieving 95 percent control efficiency of VOC and shall hold a valid permit from the Division.