

## PS Memo 09-02

**To:** Stationary Sources Program, Local Agencies, and Regulated Community  
**From:** Chris Laplante and Roland C. Hea, Colorado Air Pollution Control Division  
**Date:** February 8, 2010  
**Subject:** Oil & Gas Produced Water Tank Batteries  
Regulatory Definitions and Permitting Guidance

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This guidance document is intended to answer frequently asked questions concerning oil and gas industry produced water tank batteries. This document does not address any other equipment types that may be part of a common facility with a tank battery. Nothing in this guidance should be construed regarding Air Pollution Control Division (Division) permitting of evaporation ponds or water treatment facilities. Please consult with the Division for information regarding the permitting of evaporation ponds or water treatment facilities.

### Revision History

October 1, 2009	Initial issuance.
February 8, 2010	First revision. This guidance document replaces the October 1, 2009 version. Revised language to clarify APEN fee structure, definition of modification, APEN submittals, and produced water exemption.

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## 1. DEFINITIONS

This section contains definitions of some terms that are used in this document and/or Colorado Air Quality Control Commission (AQCC) Regulation Number 3 (Reg. 3) and/or Regulation Number 7 (Reg. 7). Additional definitions are available in Reg. 3, Part A, II.B; Reg. 3, Part C, I.A; Reg. 7, II.A; Reg. 7, XII.B; Reg. 7, XVII.A, and Common Provisions Reg. 2, 1.G.

### 1.1. *Alternate Operating Scenario (AOS)*

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

### 1.2. *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 are provided to and approved by the Division. (see Reg. 7, II.A.8)

### 1.3. *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 tank.

### 1.4. *Dual Product Storage Tank*

Contains commingled condensate and produced water generated via a 2-phase separator.

### 1.5. *Exploration & Production (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, tank batteries, glycol dehydrator still vent, engines, miscellaneous natural gas combustion sources, truck loading, and control devices. For the purposes of this document, custody transfer occurs at the E&P site.

### 1.6. *Eight-Hour Ozone Control 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 (see Reg. 7, II.A.1.a and II.A.1.b)

### 1.7. *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. (Reg. 3, Part A, Section I.B.21. and Part B, Section III.I).

In this guidance document, the term GP refers to GP05, which can be used to permit oil and gas industry produced water tank batteries. GP05 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).

1.8. ***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 (CPs) or Title V Operating Permits (T5OPs). A GP is an alternative to an IP.

1.9. ***Modification to a produced water tank battery***

A produced water 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, I.B.26):

- New tanks have been installed at the site
- An existing tank was replaced
- A new well was drilled and connected to the battery (E&P site only)
- A well was re-piped (E&P site only)
- A significant change (e.g., replacement of a separator) in the physical components of the tank or the equipment related to the functioning of the tank has occurred

The following are not considered modifications for CP purposes:

- Removal of a well from a tank battery. In this event, an Air Pollutant Emission Notice (APEN) revision is not required.

For tanks registered under the GP, certain changes may be called modifications per the provisions of the AOS. Please refer to Section III of GP05 for more information on how to address modifications that qualify for the AOS provisions.

1.10. ***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.

1.11. ***Oil and Gas Industry***

Includes E&P, non-E&P, midstream, and downstream equipment

1.12. ***Produced Water***

Produced water is generated during oil and gas production (E&P wellhead), transmission, and treatment (processing and conditioning). It may contain various contaminants including hydrocarbons.

1.13. ***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, I.B.41)

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.

1.14. ***Tank Battery***

A single tank or a group of tanks with the liquid streams manifolded (connected) together and used for the storage of produced water. Tanks whose vapor streams are connected solely for the purpose of routing emissions to a control device may be considered separate tank batteries. If a company chooses, co-located batteries meeting provisions of Reg. 3, Part A, Section II.B.4 may be grouped and reported on one APEN. For the purpose of this guidance document, terms tank, tanks, or battery refer to a tank battery.

1.15. ***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 bottomhole locations shall be considered a single well pad.

**2. AIR POLLUTANT EMISSION NOTICE Q&A**

2.1. ***When must APENs be submitted or revised for produced water tanks?***

APENs should be submitted for 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 APEN exemption for produced water 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 GP. The following are some circumstances under which APENs should be submitted or revised:

- For new E&P tank batteries, within 30 days after the report of first production is filed, but no later than ninety days following the first day of production. (see 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 30<sup>th</sup> of the year following the change.
- When there is a change in the owner or operator of any tank.
- Prior to installing, replacing (with a different type), or removing control equipment. (Exception: Tank batteries registered under the GP may file a revised APEN indicating control equipment changes annually, as specified in the AOS.)

- When an individually permitted tank modification requires a permit limitation or equipment description change.
- No later than thirty days before the five-year term of the current APEN expires.

2.2. ***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 best estimate of prior calendar year throughput and emissions. For APENs submitted during the first year of operation, projected annual produced water throughput and associated emissions are acceptable. In subsequent years, actual data from the previous calendar year shall be used.

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

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

2.4. ***What fees are associated with APENs?***

At non-E&P, midstream or downstream locations, the applicant must submit a \$152.90 APEN filing fee for each APEN. However, a modified fee structure for E&P produced water storage tank batteries allows for up to five individual tank battery APENs to be submitted simultaneously for a single filing fee of \$152.90.

The application will not be processed without payment of the APEN filing fee. Please note that filing less than five E&P produced water storage tank battery APENs does not result in a prorated fee. The following table lists fees for up to seven E&P produced water storage tank batteries as an example:

<b>APEN Fee Structure for E&amp;P Produced Water Storage Tank Batteries</b>	
<b># APENs Submitted</b>	<b>Fee (\$)</b>
1	152.90
2	152.90
3	152.90
4	152.90
5	152.90
6	305.80
7	305.80

2.5. ***What must be submitted with an APEN when applying for GP05?***

An APEN must be completed per the instructions provided with the APEN form. If a site-specific emission factor is used to calculate emissions, documentation supporting the emission factor shall be submitted with the APEN.

A \$250 general permit registration fee must be paid for each GP registration request in order for it to be processed.

2.6. ***What must be submitted with an APEN when applying for an IP or permit exemption?***

An APEN must be completed per the instructions provided with the APEN form. If a site-specific emission factor is used to calculate emissions, documentation supporting the emission factor shall be submitted with the APEN. In addition, an application checklist (Form APCD-100) and associated attachments must be submitted.

If the tank battery is being applied for coverage under an IP, a permit fee based on the application review time will be charged after APENs have been submitted and prior to permit issuance. If applying for a permit exemption, only APEN filing fees are required.

2.7. ***If a company has multiple tank APEN updates to submit, may it file electronically?***

No. It is not possible to file produced water tank APENs electronically.

2.8. ***Which produced water tank related APEN exemptions were removed as part of the Reg. 3 revision, effective January 30, 2009?***

The exemption from Reg. 3, Part A, II.D.1.uu was removed. II.D.1.uu stated: "Oil production wastewater (produced water tanks), containing less than one percent by volume annual average crude oil, except for commercial facilities that accept oil production wastewater for processing."

2.9. ***Does Regulation 3, Part A, Section II.D.1.uuu categorically exempt produced water tanks or surface impoundments containing less than 1 percent by volume crude oil from APEN emission reporting?***

No. The Division specifically removed the produced water tank categorical APEN exemption during the December 2008 AQCC hearing. As discussed above in 2.8, the categorical exemption for produced water tanks was contained in Section II.D.1.uu of the previous version of Reg. 3. The current version of Reg. 3, Section II.D.1.uuu is specific to surface water impoundment operations and does not exempt produced water tanks.

Although the regulation, as currently written, may infer that produced water tanks containing less than one percent by volume crude oil on an annual average basis may be exempt, that is not the intent. Produced water tanks are not categorically APEN exempt regardless of crude oil percentage. In addition, produced water surface impoundments, regardless of crude oil content, are not categorically APEN exempt.

### 3. EMISSION FACTORS AND SITE SPECIFIC SAMPLING Q&A

#### 3.1. *What are the State approved default emission factors for produced water tanks?*

County	Produced Water Tank Default Emission Factors <sup>1</sup> (lb/bbl) <sup>2</sup>		
	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 <sup>3</sup>	0.262	0.007	0.022

<sup>1</sup> Testing may be performed at any site to determine site-specific emissions factors. These default emission factors may be revised by the Division in the future, pending approved data and testing results.

<sup>2</sup> Units of lb/bbl means pounds of emissions per barrel of produced water throughput

<sup>3</sup> For counties not listed in this table, use the emissions factors listed as a conservative measure or perform testing to determine a site-specific emission factor

#### 3.2. *What type of emissions are included in the produced water tank state default emission factors?*

State default emission factors for produced water tanks include flash, working, and breathing losses.

#### 3.3. *Are there limits as to when produced water tank state default emission factors may be used?*

State default emission factors may be used at all oil and gas industry tank batteries. The Division intends to work with industry to refine emission factors and may develop separate emission factors for E&P and non-E&P sites.

#### 3.4. *When are site-specific emission factors required for tank batteries?*

Site-specific emission factors may be developed and used on a voluntary basis for any tank battery. The Division reserves the authority to require site-specific emission factors at any time. Site-specific emission factors may only be applied at the tank battery for which they were developed, unless otherwise approved by the Division.

#### 3.5. *How is a site-specific emission factor developed?*

A site-specific emission factor for tank batteries is developed by performing a Division approved stack test. 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 site specific testing at least 30-days prior to the actual test date.

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

Prior to the use of a site-specific emission factor, the results of the Division approved stack test must be submitted to the Division. Test results must demonstrate the mass emission rate and include the water production data. Results of the tests shall be expressed in units of pounds of VOC emissions per barrel of water produced (lb/bbl).

3.7. ***What emission factors are used for steady state water tanks that do not have flash emission associated with them?***

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 Division approved methods and analyses.

**4. EMISSION CALCULATIONS Q&A**

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

Uncontrolled and controlled actual and requested emissions must be calculated to complete an APEN. When a control device is only operational part of the year, emissions for that year are calculated by adding the uncontrolled and controlled portions. These emissions are entered in the “controlled” column of the APEN. Equations 1, 2, and 3 may be used to calculate actual or requested emissions, depending on whether the produced water throughput value represents actual or requested conditions. Emissions calculated with these equations are in units of lbs VOC per year. The same methodology should be used to calculate hazardous air pollutant (HAP) emissions. Use Equation 1 if emissions were uncontrolled for the entire year. Use Equation 2 if emissions were controlled for the entire year. Use Equation 3 if emissions were controlled for a portion of the year.

(Equation 1) 
$$\text{Uncontrolled Emissions} = T \times \text{EF}$$

(Equation 2) 
$$\text{Controlled Emissions}_{(\text{controlled entire year})} = T_c \times \text{EF} \times (1-C)$$

(Equation 3) 
$$\text{Controlled Emissions}_{(\text{controlled partial year})} = [(T-T_c) \times \text{EF}] + [T_c \times \text{EF} \times (1-C)]$$

Where:

T = Total annual produced water throughput, actual or requested (bbl/year)

EF = State or site-specific emission factor (lb VOC/bbl produced water) (See Section 3)

T<sub>c</sub> = Portion of produced water throughput occurring while controls were installed and operational, actual or requested (bbl/year)

C = Control efficiency (fraction between 0 and 1; e.g., 0.95 represents 95 percent)

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

Calculate PTE as described in Equation 1 for uncontrolled emissions, except use a produced water throughput value (T) based on the maximum annual throughput for the tank battery as follows in Equation 4:

$$\text{(Equation 4)} \quad \text{PTE Emissions} = T_{\text{PTE}} \times 1.2 \times \text{EF}$$

Where:

$T_{\text{PTE}}$  = Produced water throughput, maximum (bbl/year) where the maximum throughput is the greater of either the highest rolling 12-month production total during the last five years or the production forecast for the following 12-month period.

PTE is calculated in a different manner when calculating emissions solely for the purposes of Colorado Oil and Gas Conservation Commission (COGCC) House Bill (HB) 07-1341. See Section 7 of this document for more information on those calculations.

4.3. ***How should emissions be estimated for dual product storage tanks?***

These tanks should be considered condensate storage tanks for the purposes of permitting and emission estimates. Please see PS Memo 05-01 for information regarding estimating condensate tank emissions.

**5. CONSTRUCTION PERMIT Q&A**

5.1. ***If one or more tank battery(ies) is connected to a single control device, is the emission source the tank battery(ies) or the control device?***

Tank batteries are considered to be the emission source. If several batteries are connected together solely to vent emissions through a control device, individual batteries may either be considered individual sources or grouped as one source.

5.2. ***Does the Division assign a control efficiency to enclosed flares and/or VRUs?***

The control efficiency accepted by the Division for enclosed flares and VRUs is 95 percent. The Division may approve use of a higher efficiency if appropriate and if supporting data are provided.

5.3. ***Does the Division require RACT on produced water tanks?***

RACT is required if the source is located in an ozone nonattainment area or an attainment maintenance area.

5.4. ***Is self-certification required for produced water tanks?***

Self-certification is a process with an enforceable signature by a responsible official stating that a facility is in compliance with its permit. Generally, self-certification is not required for true minor source produced water tanks. Construction permits for these sources are typically issued as Final Approval. The rationale for this decision is that these tanks have already been in operation, and the APEN signature provides the self-certification. Tank batteries not covered under the GP that include emission controls or are synthetic minor sources may still require an Initial Approval permit and self-certification.

**5.5. What permit exemptions are available to produced water storage tanks?**

Regulation 3, Part B, Section II.D.1.m provides a categorical permit exemption for, “Oil production wastewater (produced water tanks), containing less than one percent by volume crude oil on an annual average, except for commercial facilities that accept oil production wastewater for processing.”

**5.6. Under what circumstances should an operator obtain a produced water storage tank permit?**

Produced water storage tanks should be permitted under the following circumstances:

1. The storage tank is subject to COGCC 805 series rules and must reflect the tank and control device in a Division approved permit; or
2. The storage tank does not qualify for the permit exemption contained in Regulation 3, Part B, Section II.D.1.m and, in addition, any of the following apply:
  - a. Uncontrolled actual VOC emissions exceed the permit de minimus thresholds contained in Regulation 3, Part B, Section II.D.2 or II.D.3; or
  - b. Uncontrolled actual VOC emissions exceed the APEN de minimus thresholds contained in Regulation 3, Part A, Section II.D.1.a and the tank is located at a stationary source that exceeds the permit de minimus thresholds contained in Regulation 3, Part B, Section II.D.2 or II.D.3. (Reference: Regulation 3, Part B, Section II.D.5)

The guidance contained above does not represent all the circumstances under which a permit may be required under Regulation 3.

**6. OIL AND GAS INDUSTRY PRODUCED WATER TANK GP Q & A**

**6.1. *What sources qualify for coverage under the produced water tank battery GP?***

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

- The facility is an oil & gas industry produced water storage facility
- The facility is a true minor or synthetic minor source for T5OP, NSR, and Maximum Achievable Control Technology (MACT).
- Combined actual controlled VOC emissions are equal to or less than 10 tpy, on a rolling 12 month basis for synthetic minor facilities or a calendar year basis for true minor facilities.

Sources located at a major facility or sources subject to an NSPS standard are not qualified to operate under the GP.

6.2. ***May a battery currently registered as a minor source under the produced water tank battery GP remain eligible for coverage if a future modification causes uncontrolled emissions to exceed 100 tpy?***

GP coverage is available to sources that are either true minor or synthetic minor. A battery approved for coverage under the GP must have actual controlled VOC emissions equal to or less than 10 tpy, although its uncontrolled emissions may exceed 100 tpy. Therefore, if a source's uncontrolled emissions increase such that they exceed 100 tpy, it will remain eligible to continue coverage under the GP independent of subsequent modifications provided that the source remains compliant with all terms and conditions of the GP. The source's classification would change from true minor to synthetic minor.

6.3. ***What is the process for permitting a produced water tank under the GP?***

Step 1: Submit a completed Produced Water APEN form, APCD-207. Place a check mark in the box labeled "Request for coverage under general permit no. GP05" under Section 02-Requested Action. Include APEN filing fees and GP registration fees as described in Sections 2.4 and 2.5. Annual emission fees will need to be paid in subsequent years.

Step 2: The Division will review the APEN and determine if the tank qualifies for GP registration.

Step 3: If the source qualifies for the GP, an approval letter authorizing GP coverage will be sent to the applicant. If all applicable fees were not paid at the time of submittal, an invoice will be sent. Approval will not be granted until fees are paid in full. If the source does not qualify for the GP, the GP registration fee will be refunded.

Step 4: If the tank is currently permitted under an IP and the source is requesting a change to GP coverage, the Division will cancel the existing IP upon GP registration approval.

6.4. ***May facilities continue to utilize IPs rather than the GP for produced water tanks?***

Yes, produced water tanks may be covered under IPs. The GP 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.

6.5. **What is the difference between a GP and an IP for produced water tanks?**

General Permit	Individual permit
<b>Flexibility</b>	
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.
<b>Conditions</b>	
No unique permit number. Batteries are uniquely identified with the AIRs ID.	A unique permit number is assigned.
Equipment descriptions and conditions are standard for every produced water 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 throughput limit (set at the level requested on the APEN).
<b>Permit fees</b>	
The GP registration fee is a one-time fee that does not require repayment each time a source is modified.	Permit fees based on actual processing time must be paid every time a permit is modified and may vary widely.

7. **HOUSE BILL 07-1341**

7.1. **What is 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 produced water tanks. HB 07-1341 can be found at the COGCC website: <http://cogcc.state.co.us/>.

7.2. **What does Section 805.b(2)B require?**

Section 805.b(2)B requires that all produced water tanks with a potential to emit 5 tpy or more of VOCs that are located in Garfield, Mesa, and Rio Blanco Counties and within ¼ mile of an affected building (see complete list of building types 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.

7.3. **How is PTE defined in the context of Section 805.b(2)?**

For the purposes of HB 07-1341 Section 805.b(2), the term PTE is considered the actual uncontrolled emissions as calculated based on the actual throughput for existing sources and the actual uncontrolled emissions as calculated based on the projected throughput for new sources. Additional guidance is available in Appendix B of “CDPHE Consultation Guidance for the COGCC Amended Rules.”