



## Guidance for Completing the Operating and Maintenance Plan Template Forms (APCD-300 Series)

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The Air Pollution Control Division (Division) developed templates for Operating and Maintenance Plans (O&M Plans) in an effort to standardize oil and gas maintenance and monitoring requirements. Templates are available for reciprocating internal combustion engines, glycol dehydration systems, amine sweetening systems, condensate and mixed liquid storage tanks, and fugitive component leak emission sources. The templates are available in APCD form series 300. Operators should use these template forms to develop O&M Plans required for new or modified permit applications. Operators are not required to use the O&M Plan template forms. Independent case specific O&M Plans may be developed and submitted for approval with the permit application. However, the Division encourages the use of the templates to expedite the permit approval process. If required, O&M plans must be developed and submitted with the permit application or the application will be considered incomplete. If the permit application is incomplete, the source will be asked to re-submit the application or to provide an O&M plan within 60 days of such a request. If the operator does not complete the permit application prior to the deadline the application will be denied and APEN filing fees will not be returned.

The Division will approve the O&M Plan during the permit application review process and a construction permit will be issued with a requirement to follow the O&M Plan as submitted. If the O&M template form is not completed correctly, the Division will work with the operator to make corrections. Once a construction permit is issued, the operator must comply with the requirements of each O&M Plan upon commencement of operation of the covered emissions source. The operator must keep a copy of each approved O&M Plan onsite, to be available to the Division upon request. Approved O&M Plan(s), referenced by submittal date(s), will be associated with construction permit(s) for the affected equipment until such time that the permit is modified, cancelled or until the source modifies the O&M Plan. Please note, the requirements of an approved O&M Plan remain constant even if the facility-wide emissions increase to exceed 80 tons/yr and the original O&M Plan approved refers to a facility with less than 80 tons/yr. In addition, this holds true if the facility-wide emissions fall below 80 tons/yr and the original O&M Plan approved refers to a facility with greater than 80 tons/yr.

To modify an O&M Plan without opening a permit for modification, operators may submit revisions for Division approval using either a standardized O&M Plan template form or a case specific independent O&M Plan. Either type undergoes the same review and approval process. However, approval may be expedited when the standardized O&M Plan template forms are used. In the case of some minor modifications, the Division may consider a letter requesting the changes. O&M plan changes that occur outside a permit action may be approved through correspondence via letter from the Division. In this case, the approval letter must be kept with the original O&M Plan.

Below is a description of each O&M Plan template and guidance for filling out each section. For further assistance, please contact 303-692-3150 and ask to be transferred to the oil and gas unit.

### O&M Plan Template Forms Description and Guidance

#### **Section 1 – Source Identification**

This section includes general information about the source, facility and equipment. Some information requested in this section may not be known at the time of permit application submittal (e.g., Facility Equipment ID, Permit Number, and AIRS Point ID). Only fill out those fields for which data is known and leave other fields blank.

One O&M Plan may cover multiple pieces of equipment as long as each are controlled and monitored in the same manner. For example, if an ethylene glycol and a tri-ethylene glycol dehydrator both have flash tanks that are routed to a fuel gas system and still vents that are routed to a flare and both systems will be monitored in the same manner, one O&M Plan can be used for both systems. However, if using a meter to measure the glycol circulation rate on one system and pump strokes per minute on the other system, each would require an O&M Plan. The engine O&M Plan is an exception because different monitoring requirements are clearly defined in the template for both rich- and lean-burn engines.

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**Section 2 - Maintenance Schedules**

This section outlines the type of maintenance procedures that will be followed. Operators may choose to one of two options for maintenance schedules. You shall follow manufacturer recommendations for equipment and control device maintenance activities and schedules or develop your own practices and schedules. All maintenance plans must be maintained by the operator and made available to the Division upon request. If the operator chooses to develop an individual maintenance plan and has questions regarding the plan's consistency with good air pollution control practices, the operator may contact the Division for approval. However, individual maintenance plans do not require approval by the Division.

**Section 3 - Monthly Emission Calculations**

This section provides the Division assurance the operator of the source will calculate actual emissions based on the methods provided in the permit application or emission factors or modeling requirements that are in the construction permit. To determine the appropriate method for actual monthly emission calculations, operators should review the permit requirements. Typically emissions calculations are required using either software modeling packages (i.e. GRI GlyCALC) or the emissions factors contained in the "Notes to the permit holder". If neither of these approaches is required in the permit, the operator should determine which emission factors were used in the permit application and use these as the basis for monthly calculations. Below are example calculations for different methods typically required in the permit or used in a permit application.

**Reciprocating Internal Combustion Engines**

Case #1: Emission factor (e.f.) provided in lb/hr– emissions will be determined based on hours of operation:

$$\text{CO (ton/mo)} = \text{lb/hr e.f.} * \text{hr/mo operation} * 1 \text{ ton/ 2000 lb}$$

Case #2: Emission factor provided in gm/hp-hr – emissions will be determined based on hours of operation:

$$\text{CO (ton/mo)} = \text{gm/hp-hr e.f.} * \text{hr/mo operation} * \text{BHP} * 1 \text{ lb/453.6 gm} * 1 \text{ ton/ 2000 lb}$$

Case #3: Emission factor provided in lb/MMBtu– emissions will be determined based either on fuel consumption<sup>1</sup>, engine heat input rating<sup>2</sup>, or associated brake-specific fuel consumption<sup>3</sup>.

$$\text{CO (ton/mo)}^1 = \text{lb/MMBtu e.f.} * \text{Current Btu/SCF} * \text{MMSCF/mo} * 1 \text{ ton/ 2000 lb}$$

$$\text{CO (ton/mo)}^2 = \text{lb/MMBtu e.f.} * \text{MMBtu/hr} * \text{hrs/mo operation} * 1 \text{ ton/ 2000 lb}$$

$$\text{CO (ton/mo)}^3 = \text{lb/MMBtu e.f.} * \text{Btu/hp-hr} * \text{hrs/mo operation} * \text{BHP} * 1 \text{ ton/ 2000 lb} * 1,000,000$$

**Glycol Dehydration Systems**

Case #1: GlyCalc required to be run on a monthly basis to determine emissions – emissions will be based directly on hours of operation and indirectly on the volume of gas processed, glycol circulation rate, gas composition, and several other factors.

$$\text{VOC (ton/mo)} = \text{lb/hr GlyCalc e.f. output} * \text{hrs/ mo operation} * 1 \text{ ton / 2000 lb}$$

Case #2: Emission factor provided in lb/hr – emissions based on hours of operation

$$\text{VOC (ton/mo)} = \text{lb/hr e.f.} * \text{hr/mo operation} * 1 \text{ ton/ 2000 lb}$$

Case #3: Emission factor provided in lb/gal glycol – emissions based on the glycol circulation rate and hours of operation

$$\text{VOC (ton/mo)} = \text{lb/gal e.f.} * \text{average gal/hr circ rate} * \text{hrs/mo operation} * 1 \text{ ton/ 2000 lb}$$

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**Amine Sweetening Systems**

Case #1: Emission factor provided in lb/hr – emissions based on hours of operation

$$\text{VOC (ton/mo)} = \text{lb/hr e.f.} * \text{hr/mo operation} * 1 \text{ ton} / 2000 \text{ lb}$$

Case #2: Emission factor provided in lb/gal amine – emissions based on the amine circulation rate and hours of operation

$$\text{VOC (ton/mo)} = \text{lb/gal e.f.} * \text{average gal/hr circ rate} * \text{hrs/mo operation} * 1 \text{ ton} / 2000 \text{ lb}$$

Case #3: AmineCalc or other model required to be run on a monthly basis to determine emissions – emissions will be based directly on hours of operation and indirectly on the amine circulation rate, gas composition, and several other factors.

$$\text{VOC (ton/mo)} = \text{lb/hr Model e.f. output} * \text{hrs/ mo operation} * 1 \text{ ton} / 2000 \text{ lb}$$

**Condensate and Mixed Liquid Storage Tanks**

Case #1: E&P Tanks required to be run on a monthly basis to determine emissions – emissions will be based directly on hours of operation and indirectly on liquid composition, RVP and API gravity, condensate throughput, and other factors.

$$\text{VOC (ton/mo)} = \text{lb/hr E\&P Tanks e.f. output} * \text{hrs/ mo operation} * 1 \text{ ton} / 2000 \text{ lb}$$

Case #2: Emission factor provided in lb/bbl condensate – emissions based on the condensate throughput

$$\text{VOC (ton/mo)} = \text{lb/bbl e.f.} * \text{bbl/mo throughput} * 1 \text{ ton} / 2000 \text{ lb}$$

**Fugitive Emission Sources**

Case #1: Emission factor provided in lb/hr-component – emissions based on hours of operation and component counts. The source may calculate emissions based on the permitted component count, an estimated but more accurate component count, or actual components count, as shown below:

If using the permitted component count then:

$$\text{VOC (ton/mo)} = \text{ton/yr emission limit} * 1 \text{ yr} / 8760 \text{ hrs} * \text{hrs/mo operation}$$

If using estimates or actual component counts then:

$$\text{VOC (ton/mo)} = \Sigma \text{ component type (tons/mo) emissions as described below:}$$

$$\text{VOC (ton/mo) per component type} = \text{lb/hr-component} * \text{component count} * \text{hrs/mo operation} * 1 \text{ ton} / 2000 \text{ lb}$$

**Section 4 - General Monitoring Requirements**

This section outlines monitoring frequencies and methods for operating parameters utilized in monthly compliance demonstrations. General monitoring requirements include but are not limited to hours of operation, fuel consumption, volumes of gas processed, and recirculation rates.

**Section 5 - Emission Control or Recycling Equipment Monitoring Requirements**

This section addresses required monitoring of control devices or closed loop emission recycling systems. The operator will determine monitoring frequencies and methods in this section to ensure capture and control of emissions. Monitoring frequencies are based upon the facility-wide permitted (or proposed) emissions. By checking the applicable in this section, the operator will commit to performing the monitoring as described.

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**Section 6 – Recordkeeping Requirements**

This section describes the recordkeeping requirements for synthetic minor sources. By checking the box the operator agrees to follow these requirements. Please note, operators must also comply with other recordkeeping requirements contained in the permit.

**Section 7 - Additional Notes and O&M Activities Supplied by the Operator**

This section provides facility operators an opportunity to explain unusual or important aspects of equipment or control device operations and related maintenance and monitoring activities.

*Note: These templates are intended to address the operation and maintenance requirements of the State of Colorado for equipment operated at synthetic minor facilities. If the source or facility is subject to other state or federal regulations with duplicative requirements then the source shall follow the most stringent regulatory requirement.*