GUIDELINES FOR DETERMINATION OF VOC EMISSION FACTORS AND REPORTING CREDITS FOR RECYCLED WASTES

This appendix provides guidelines relative to emission credits generated by recycling of VOC containing waste materials, and this guideline provides clarification with respect to the following areas and gives examples:

- Rule 109 Records vs. Process Throughput
- Determining the Value of Waste Credit
    - ✓ Liquid Material Fraction or TAC/ODC Material Fraction
    - ✓ Emission Factor or TAC/ODC Density Determinations
    - ✓ Percent Credit
- Reporting

RULE 109 RECORDS VS. PROCESS THROUGHPUT

Depending on how wastes are disposed of and recorded, credits generated from VOC containing wastes can be applied against the originating material throughput of any process.

In order to qualify for credit, the waste must be disposed of by a licensed waste handler and be classified as liquid, hazardous, and VOC containing. Information pertinent to liquid organic wastes are found on waste manifests generated by a licensed waste hauler.

Rule 109 - Recordkeeping for Volatile Organic Compound Emissions requires records of daily or monthly usage of VOC containing materials to be maintained and kept for a period no less than two years. These records are the basis of demonstration of compliance with AQMD rules and permit conditions, and are the foundation of calculating annual emissions. They are not the basis for calculating waste credit. Process throughput is the correct basis for determining the balance of materials used versus those that are discarded as hazardous waste. The following example shows the difference.

Consider a five gallon container of a particular VOC containing coating, where only four gallons are used, and the fifth gallon is discarded as hazardous waste. Rule 109 records should indicate that only four gallons were used, and the emissions associated with the four gallons are calculated and recorded. If a waste credit approach is taken, then 5 gallons are considered input to the system, with one gallon of waste emissions subtracted out. The net result of VOC emissions is the same in either case.

DETERMINING THE VALUE OF WASTE CREDIT:

Once it is determined that waste credits are applicable, Form W, WU, and WT are used to calculate waste credits and offset emissions from material throughput itemized on Forms B3, B3U, and/or TACS. These forms are designed to input the necessary parameters used to calculating waste credits such as (1) liquid or TAC/ODC material fraction in the waste, (2) emission factor or TAC/ODC density, and (3) percent credit.

The credits from the waste stream can be determined using the following equations:

$$W_{credit} = Q * L_{fraction} * EF_{effective} * C\%$$

Where:

W_{credit}	Emission credits generated from recycling of waste and to be applied to discount emissions on Form B3, B3U, or TACS
Q	Quantity of disposed waste listed on waste manifest
$L_{fraction}$	Liquid fraction or TAC/ODC fraction in the waste stream
$EF_{effective}$	Effective emission factor for waste streams or TAC/ODC density
C%	Allowable percent credit (100% with certified lab analysis; otherwise, 50%)

Liquid Material Fraction [Form W and WU] or TAC/ODC Material Fraction [Form WT]

The AER web application considers the following default liquid fractions in the waste stream as follows:

- 0.70 by volume for waste solvents
- 0.30 by volume for general waste coatings or combinations of waste coatings and waste solvents
- 0.05 by volume for sludge wastes from the bottom of equipment (degreasers, dry cleaners, solvent stills or evaporators)

If specific information is available, the liquid fraction of the waste stream can be found and used as taken from the waste profile generated by a licensed waste hauler, or it can be obtained and used from an analytical report performed by a certified lab.

Emission Factor (Form W and WU) or TAC/ODC Density (Form WT)

The critical aspect in this calculation is the accuracy of the effective emission factor, $EF_{effective}$. It is a two step process to determining the effective emission factor:

(1) Determine the composite factor, $F_{composite}$, using the emissions from the use of VOC containing material

(2) Determine the effective emission factor, $EF_{effective}$, for the waste stream to show the impact of control equipment

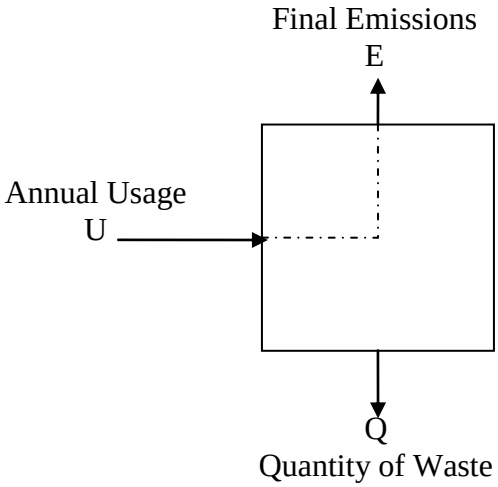
Note that:

- If the waste is quantitatively analyzed by a certified lab, then the $F_{composite}$ is the result of the analysis.

- If the characteristics of the waste stream are known (e.g., solvents only or coatings only), then $F_{composite}$ can be selectively based on the before-controlled emissions and usages of such materials.

The following illustrations will assist a facility in the determination of $F_{composite}$ and $EF_{effective}$

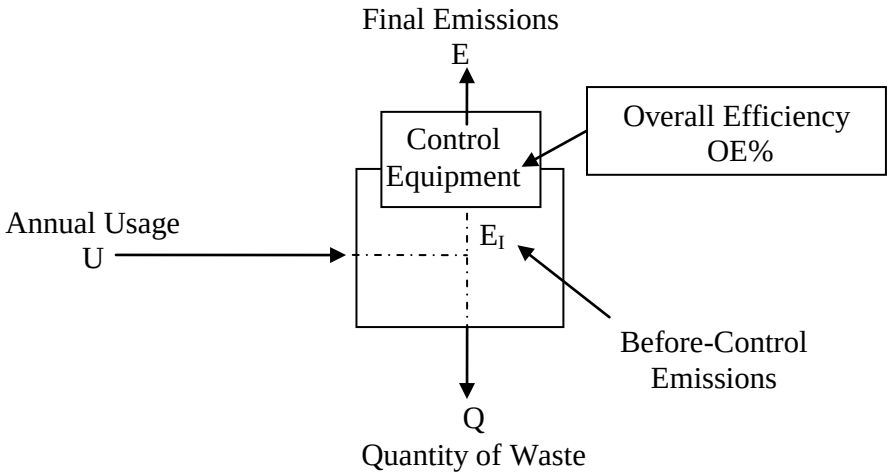
Case 1: No Control



In this case, the effective emission factor, $EF_{effective}$, is equivalent to the composite factor, $F_{composite}$, determined from the final emissions, E, and the annual usage, U, as follows:

$$EF_{effective} = F_{composite} = \frac{E}{U}$$

Case 2: Total Control



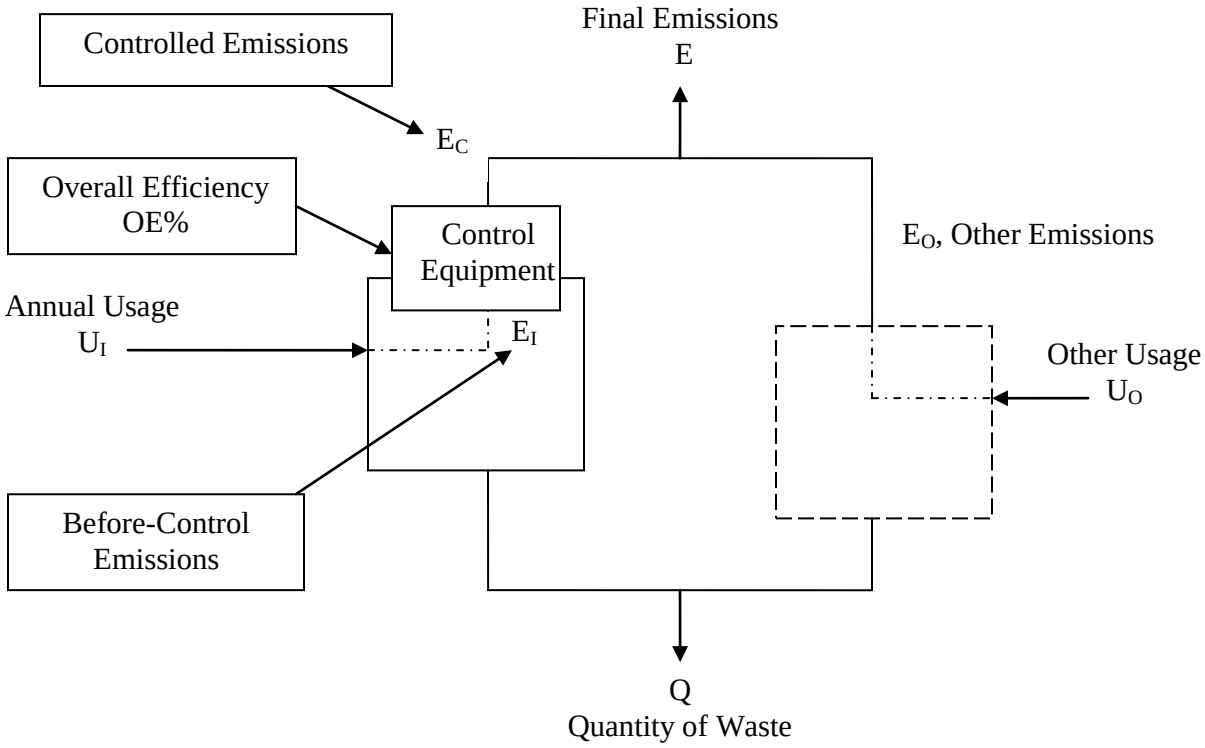
Step 1: The composite factor, $F_{composite}$, determined from the before-control emissions, E_I, and the annual usage, U, as follows:

$$F_{composite} = \frac{E_I}{U}$$

Step 2: The effective emission factor, $EF_{effective}$, is affected by the overall efficiency of the control equipment through the following relationship:

$$EF_{effective} = \frac{E_I}{U} * (1 - OE\%) = F_{composite} * (1 - OE\%) = \frac{E}{U}$$

Case 3: A Mix of Controlled and not Controlled Sources



Step 1: The composite factor, $F_{composite}$, determined from the before-control emissions, E_I, no-control emissions, E_O, and total usages as follows:

$$F_{composite} = \frac{E_I + E_O}{U_I + U_O} = \frac{\text{Total Before and No-Control Emissions}}{\text{Total Usages}}$$

Step 2: The effective emission factor, $EF_{effective}$, is affected by the efficiency of the control equipment and can be found as follows:

$$EF_{effective} = F_{composite} * \frac{E}{E_I + E_O}$$

Percent Credit

There are two types of credit percentage allowed in calculating VOC in recycled waste:

- 100% for waste shipment that was fully analyzed by a certified laboratory who has an environmental laboratory accreditation program (ELAP) number issued by California Department of Health and Services.
- 50% for non-analyzed waste.

REPORTING

(A) If your waste shipment **was not** analyzed by an ELAP laboratory, then use one of the following methodologies for reporting waste credits: Two different methods are suggested to calculate waste credits from recycled organic liquid waste. If you know the solvent content of your waste shipment, report the solvent percent (in decimal fraction) and use the emission factor (liquid density) of that solvent. Otherwise, report the amount of liquid material shipped as waste, and use the corresponding emission factor for that material. Please make sure to use consistent units: If the usage reported is in gallons, use an emission factor in lbs/gal. If the usage reported is in pounds, use an emission factor in lbs/lb.

(B) If the waste shipment **was analyzed**, then use one of the following methodologies for reporting waste credits. If the lab analysis provides the VOC content of the waste shipment, then report 1.00 for 100% of liquid waste shipment and report the VOC content of the waste shipment as the emission factor. If the lab analysis provides the solvent content of the waste shipment, then report the solvent content in decimal fraction as the liquid material and use the emission factor of that solvent, as reported on the corresponding Form B3, B3U, and/or TACS and TACS. Please make sure to use consistent units: If the reported annual usage in gallons, use an emission factor in lbs/gal; if the reported annual usage in pounds, use an emission factor in lbs/lb.

Example

The following example demonstrates the two methods of reporting waste credits. If the solvent fraction of your waste shipment is known, use Method 1 for reporting waste credits, otherwise use Method 2

Consider a 55 gallon drum shipment of waste paint containing 20 percent sludge by volume. The remaining 80 percent of the waste shipment is liquid material of which 30 percent is organic solvent. The emission factor of the organic solvent (liquid density of solvent) is 6.0 pounds per

gallon and the emission factor of the waste paint (VOC content of waste paint) is 1.8 pounds per gallon of material.

Method 1: On Form W, enter the liquid material fraction as 0.24 for 24% (which is 30% solvent of 80% liquid) in the appropriate field, enter the quantity of material as 55 gallons, and enter the emission factor of the solvent (6.0 lb/gal) in the emission factor column. If the waste shipment was not lab analyzed, then only 50% credit can be claimed, and the emission credit can be calculated to be 39.6 lbs. [i.e., (0.80 x 0.30) x 55 gal x 6 lb/gal x 0.50 = 39.6 lbs]

Method 2: On Form W, enter the liquid material percent as 0.80 for 80% by volume (which is the liquid portion of the waste) in the appropriate column, enter the quantity of material as 55 gallons, and enter the emission factor of the waste paint as 1.8 lb/gal in the emission factor column. If the waste shipment was not lab analyzed, then only 50% credit can be claimed, and the emission credit can be calculated to be 39.6 lbs.[i.e., 0.80 x 55 gal x 1.8 lb/gal x 0.50 = 39.6 lbs]

As the example demonstrates, the two different methods of reporting result in the same waste credit. Therefore, use either of these methods depending on the records available. **Remember to be consistent: if the solvent content in the waste shipment is reported, use the emission factor of the solvent; if the liquid material content in the waste shipment is reported, use the emission factor of the material.**