TOXIC AND HAZARDOUS AIR POLLUTANT EMISSION CALCULATIONS (MASS BALANCE METHOD) Instructions for Form D1-5

Form D1-5 is to be used to calculate the state regulated toxic air pollutants (TAPs) and the federally regulated hazardous air pollutants (HAPs) emissions from materials (coatings, inks, solvents, etc.) used at VOC emission sources. This form uses the mass balance method. If emission factors are used, complete Form D2-1. Make as many copies of the form as necessary.

DETERMINE WHICH AVERAGING PERIOD APPLIES (TAPs)
MCAPCO Regulation 1.5711 - "Emission Rates Requiring a Permit" must be consulted when calculating actual emissions for TAPs.
MCAPCO Regulation 1.5711 lists permitting limits for each TAP in either lb/year, lb/day, or lb/hour units. To determine the correct actual TAP emission, each calculation must begin with the actual usage of product per period listed in MCAPCO 1.5711.

CHOOSE THE CORRECT FORM FOR EACH POLLUTANT
Three forms are provided; one for each type of averaging period, annual (D1-5A), daily(D1-5D) or hourly(D1-5H). Choose the correct form for each TAP.

NAME OF MATERIALS USED OR APPLIED AND TAP/HAP CONSTITUENTS - To the left of the column, enter the name of the material (coating, ink, thinner, solvent) as it appears on the Material Safety Data Sheet (MSDS) and as it appears on Form D1-1. To the right of the column, enter the TAP and HAP constituents of the material. This information can usually be obtained from the MSDS (the MSDS may not be all inclusive) or from the vendor.

TAP and/or HAP? - Enter a "T" if the constituent is only a state regulated TAP. Enter a "H" if the constituent is only a federally regulated HAP. Enter "T/H" if the constituent is both a state regulated TAP and a federally regulated HAP. The TAP/HAP designations are listed in Appendix B.

ACTUAL USAGE (a) - **"Actual rate of emissions"** means:

(a) for existing sources:
  (i) for toxic air pollutants with an annual averaging period, the average rate or rates at which the source actually emitted the pollutant during the two-year period preceding the date of the particular modification and that represents normal operation of the source. If this period does not represent normal operation, the Director may allow the use of a different, more representative, period.
  (ii) for toxic air pollutants with a 24-hour or one-hour averaging period, the maximum actual emission rate at which the source actually emitted for the applicable averaging period during the two-year period preceding the date of the particular modification and that represents normal operation of the source. If this period does not represent normal operation, the Director may require or allow the use of a different, more representative, period.

(b) for new or modified sources, the average rate or rates, determined for the applicable averaging period(s), that the proposed source will actually emit the pollutant as determined by engineering evaluation.

Enter the actual usage under normal operation or the projected actual usage of the material in either pounds or gallons. The number entered here should correspond to the TAP/HAP content unit (% wt or lb/gal), as well as the usage entered on Form D1-4 if total VOC emission calculations are required. Attach documentation on how actual usages were determined if not submitted with Form D1-4.

POTENTIAL USAGE (b) - Enter the amount of the material in either pounds or gallons that would be used if the facility were operating under a worst case scenario (24 hours per day, 7 days per week, and 52 weeks per year for an annual averaging period). Physical limitations can be taken into consideration when determining potential usages (e.g. Drying must occur in the paint booth prior to removal of the object painted and positioning of a new object to paint). The number entered here should correspond to the TAP/HAP content unit, as well as the usages entered on Form D1-4 if total VOC emission calculations are required. Attach documentation on how potential usages were determined if not submitted with Form D1-4.

UNIT - Enter the unit of measure in which the actual and potential usages are reported on the form. The unit entered here should correspond to the TAP/HAP content unit (e.g. gallons if the TAP/HAP content unit is lbs/gallon or pounds if the TAP/HAP content is in % by wt).

TAP/HAP CONTENT (c) & UNIT -Enter the TAP/HAP content and the unit in which the TAP/HAP content is reported. A facility may select the unit of measure that is more convenient for emission calculations (e.g. lbs/gal or % by wt). If lbs/gal is selected, enter the lbs of TAP/HAP per gallon of the material in the "TAP/HAP Content" column and "lbs/gal" in the "Unit" column. If % by weight is selected, enter the percentage of VOC content of the material in the "TAP/HAP Content" column and "% by wt" in the "Unit" column. This information can be obtained from the MSDS or from the vendor.

UNCONTROLLED ACTUAL EMISSIONS (Equation d (lb/period) and Equation e (tons/period) - Calculate and enter the uncontrolled actual emissions.

Equation: d = a x c for lb/gal or d = a x c/100 for % by wt
e = d/2000

UNCONTROLLED POTENTIAL EMISSIONS (Equation f (lb/period) and Equation g (tons/period) - Calculate and enter the uncontrolled potential emissions.

Equation: f = b x c for lb/gal or d = b x c/100 for % by wt
e = f/2000

CONTROL EFFICIENCY - Enter the control efficiency if there is a control device for TAP/HAP. Provide documentation of the control efficiency determination in the proper Form C. If there is no control device enter "NA" and proceed to "Total TAP/HAP".

CONTROLLED ACTUAL EMISSIONS (Equation i (lb/period) and Equation j (tons/period)) - Calculate and enter the controlled actual emissions.

Equation: i = d - (d X (h/100))
j = i/2000

CONTROLLED POTENTIAL EMISSIONS (Equation k (lb/period) and Equation l (tons/period)) - Calculate and enter the controlled potential emissions.

Equation: k = f - (f X (h/100))
l = k/2000

TOTAL TAP/HAP (sum of emissions) - Add the following columns and enter the total (d ,e, f, g, i, j, k, and l).

SECTION D

ANNUAL TOXIC AND HAZARDOUS AIR POLLUTANT EMISSION CALCULATIONS

Mass Balance Method

D1-5A

Name of Material Used or Applied and TAP/HAP Constituents	TAP and/or HAP? (T/H)	Annual Usage			TAP/HAP Content	Unit (wt.% or lb/gal)	Uncontrolled Emissions				Control Eff. (%)	Controlled Emissions			
							Actual		Potential			Actual		Potential	
		Actual (Unit/yr)	Potential (Unit/yr)	Unit (lb or gal)			lb/yr	tons/yr	lb/yr	tons/yr		lb/yr	tons/yr	lb/yr	tons/yr
Reference for Equation & Notes:		a, (1)	b, (1)	(2)	c	(2)	d	e	f	g	h, (3)	I, (4)	j	k	l
Material X		*20,000*	*40,000*	*lb*											
Arsenic	*T, H*				*50*	*%*	*10,000*	*5*	*20,000*	*10*	*95*	*500*	*0.250*	*1,000*	*0.500*
Benzene	*T,H*				*25*	*%*	*5,000*	*2.5*	*10,000*	*5*	*95*	*250*	*0.125*	*500*	*0.250*
Material Y		*5,000*	*15,000*	*gal*											
Benzene	*T,H*				*2*	*lb/gal*	*10,000*	*5*	*30,000*	*15*	*95*	*500*	*0.250*	*1,500*	*0.750*
Total Arsenic							***10,000***	***5***	***20,000***	***10***		***500***	***0.250***	***1,000***	***0.500***
Total Benzene							***15,000***	***8***	***40,000***	***20***		***750***	***0.375***	***2,000***	***1.000***

EQUATIONS:

d	= a x c	for lb/gal	g	= f / 2000	
d	= a x c / 100	for wt.%	i	= d – (d x (h/100))	
e	= d / 2000		j	= i / 2000	
f	= b x c	for lb/gal	k	= f – (f x (h/100))	
f	= b x c / 100	for wt.%	**l**	= k / 2000	

Notes:

(1) Please provide documentation for how actual usage & potential usage values were calculated

(2) If usage is reported in pounds, VOC content must be provided in % by weight. If usage is reported in gallons, VOC content must be reported in lb / gallon.

(3) Please provide information about capture efficiency and documentation for how control efficiency was determined. Attach information about retention factors and/or any assumptions made where applicable.

(4) Use these actual numbers to compare to TPERs in MCAPCO Regulation 1.5711.

SECTION D

DAILY TOXIC AND HAZARDOUS AIR POLLUTANT EMISSION CALCULATIONS

Mass Balance Method

D1-5D

Name of Material Used or Applied and TAP/HAP Constituents	TAP and/or HAP? (T/H)	Actual Usage			TAP/HAP Content	Unit (wt.% or lb/gal)	Uncontrolled Emissions				Control Eff. (%)	Controlled Emissions			
							Actual		Potential			Actual		Potential	
		Actual (Unit/day)	Potential (Unit/day)	Unit (lb or gal)			lb/day	tons/day	lb/day	tons/day		lb/day	tons/day	lb/day	tons/day
Reference for Equation & Notes:		a, (1)	b, (1)	(2)	c	(2)	d	e	f	g	h, (3)	I, (4)	j	k	l
Material X		*20*	*40*	*lb*											
1,4-Dioxane	*T,H*				*50*	*%*	*10*	*0.005*	*20*	*0.01*	*95*	*0.5*	*0.00025*	*1*	*0.0005*
Toluene	*T,H*				*25*	*%*	*5*	*0.0025*	*10*	*0.005*	*95*	*0.25*	*0.000125*	*0.5*	*0.00025*
Material Y		*5*	*15*	*gal*											
Toluene	*T,H*				*2*	*lb/gal*	*10*	*0.005*	*30*	*0.015*	*95*	*0.5*	*0.00025*	*1.5*	*0.00075*
Total 1,4-Dioxane							***10***	***0.005***	***20***	***0.01***		***0.5***	***0.00025***	***1***	***0.0005***
Total Toluene							***15***	***0.008***	***40***	***0.02***		***0.75***	***0.000375***	***2***	***0.001***

EQUATIONS:

d	= a x c	for lb/gal	g	= f / 2000	
d	= a x c / 100	for wt.%	i	= d – (d x (h/100))	
e	= d / 2000		j	= i / 2000	
f	= b x c	for lb/gal	k	= f – (f x (h/100))	
f	= b x c / 100	for wt.%	**l**	= k / 2000	

Notes:

(1) Please provide documentation for how actual usage & potential usage values were calculated

(2) If usage is reported in pounds, VOC content must be provided in % by weight. If usage is reported in gallons, VOC content must be reported in lb / gallon.

(3) Please provide information about capture efficiency and documentation for how control efficiency was determined. Attach information about retention factors and/or any assumptions made where applicable.

(4) Use these actual numbers to compare to TPERs in MCAPCO Regulation 1.5711.

SECTION D

HOURLY TOXIC AND HAZARDOUS AIR POLLUTANT EMISSION CALCULATIONS

Mass Balance Method

D1-5H

Name of Material Used or Applied and TAP/HAP Constituents	TAP and/or HAP? (T/H)	Actual Usage			TAP/HAP Content	Unit (wt.% or lb/gal)	Uncontrolled Emissions				Control Eff. (%)	Controlled Emissions			
							Actual		Potential			Actual		Potential	
		Actual (Unit/hr)	Potential (Unit/hr)	Unit (lb or gal)			lb/hr	tons/hr	lb/hr	tons/hr		lb/hr	tons/hr	lb/hr	tons/hr
Reference for Equation & Notes:		a, (1)	b, (1)	(2)	c	(2)	d	e	f	g	h, (3)	I, (4)	j	k	l
Material X *Ammonia*	*T*	*20*	*40*	*lb*	*50*	*%*	*10*	*0.005*	*20*	*0.01*	*95*	*0.5*	*0.00025*	*1*	*0.0005*
Toluene	*T,H*				*25*	*%*	*5*	*0.0025*	*10*	*0.005*	*95*	*0.25*	*0.000125*	*0.5*	*0.00025*
Material Y *Toluene*	*T,H*	*5*	*15*	*gal*	*2*	*lb/gal*	*10*	*0.005*	*30*	*0.015*	*95*	*0.5*	*0.00025*	*1.5*	*0.00075*
Total Ammonia							***10***	***0.005***	***20***	***0.01***		***0.5***	***0.00025***	***1***	***0.0005***
Total Toluene							***15***	***0.008***	***40***	***0.02***		***0.75***	***0.000375***	***2***	***0.001***

EQUATIONS:

d	= a x c	for lb/gal	g	= f / 2000	
d	= a x c / 100	for wt.%	i	= d – (d x (h/100))	
e	= d / 2000		j	= i / 2000	
f	= b x c	for lb/gal	k	= f – (f x (h/100))	
f	= b x c / 100	for wt.%	**l**	= k / 2000	

Notes:

(1) Please provide documentation for how actual usage & potential usage values were calculated

(2) If usage is reported in pounds, VOC content must be provided in % by weight. If usage is reported in gallons, VOC content must be reported in lb / gallon.

(3) Please provide information about capture efficiency and documentation for how control efficiency was determined. Attach information about retention factors and/or any assumptions made where applicable.

(4) Use these actual numbers to compare to TPERs in MCAPCO Regulation 1.5711.