Air Emissions
Wood Finisher Worksheet

Date: 1-00-00

Company Name: Test Company 4

Facility Name: test 4

Emission Summary

	Particulate Material PM10	Volatile Organic Compounds VOCs	Sulfur Dioxide SO2	Nitrogen Oxides NOx	Carbon Monoxide CO
Dust Collection	0.28				
Painting		2.90			
Stand-by Generator					
Total Tons/Year	0.28	2.90	0.00	0.00	0.00

Basic Instructions

These calculation sheets use Microsoft Excel, so you will need the Microsoft Excel program to use these spread sheets.
Typing in the cell can delete everything in the cell, number or text or equation, it is good practice to create a master and then copy/rename a working file.

Step 1 Fill in the company, facility name and identifying information in the shaded boxes. These boxes are the only ones you can write in on this page unless you have additional emission sources, which can be added below the Painting line.

Step 2 The emissions for the dust collection and painting operations are calculated from the **attached sheets** (the tabs at the bottom of this page), Dust Collection, Paint Emissions, and HAP calculations. You enter the information on the attached sheets and the results are copied by the program to this page.
The text on the attached sheets details the calculations, the Excel program will do the calculation

Step 3 If you have other equipment with emissions you need to calculate these emissions and add them to this sheet.

Step 4 When you have completed all the calculations for all the emisssion points at the business, print out all the sheets and attach them to your submittal.
Note: To print the whole workbook, chose the 'entire workbook' button on the 'print what' box.

Painting operations also require the estimating of hazardous air pollutants (HAPs) be submitted with these calculations.

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Dust Collection Emissions - Particulate (PM 10)

Location/Name	Type: Cyclone Baghouse	Emission Rate (gr/cu ft) (A)	Fan Size CFM (cu ft/min) (B)	Hours of Operation per Year (C)	Emissions (lbs/year) (D)
Silo Vent	Baghouse	0.016	100	1000	13.71
Truck	Baghouse	0.016	2000	2000	548.57
Total PM10 Emissions in Pounds/Year				**Box X**	**562.29**
Total PM10 Emissions in Tons/Year				**Box Y**	**0.28**

Step 1 List the dust collection equipment, location, name and the type of dust collection device. Choose the type of dust collection equipment from the choices on the drop down menu. There are three choices, bag house, cyclone and blank. The blank is to correct errors. The typical emission rate will be listed as you choose baghouse or cyclone.

The emission rate, how dirty the air is as it leaves the control device, the Division typically uses 0.016 grains per cubic foot (gr/cf) for baghouse dust collection systems, if the manufacturers designed emissions rates are not known. For cyclone dust collection systems, use 0.055 gr/cf, if the manufacturers designed emissions rates are not known. Enter the number in Column A for each air pollution control device.
Note: Do not include dust emission estimates for equipment discharging to the inside of buildings for

Step 2 Enter your air flow in cubic feet per min (cfm) in Column B. Refer to your manufacturer's manual, name plate data or contact your vendor for this number. If you don't know your fan size, air flow thru the dust collector, use the last tab, Baghouse Size, to estimate air flow passing thru the equipment.

Step 4 Estimate the hours you operate your dust collector per year. You can do this on a monthly basis and then multiply by 12 for a yearly estimate. Enter number in Column C.

Step 5 The emission estimate, column D, is calculated by multipling Column A by the cfm in Column B. Multiply that number by 60 to convert from minutes to hours. Multiply that number by the hours in Column C. Divide by 7000 to convert grains per year to pounds per year. D=A x B x C x 60 / 7000, enter numbers in Column D.

Step 6 Add all the results in column D for a total in box X. Divide the total in X by 2000 to convert to tons per year, Y=X/2000, enter number in Box Y.
The totals will automatically be copied to the front sheet, Emissions Summary.

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Painting Emissions - Volatile Organic Compounds (VOCs)

Paint Name (A)	Volatile Organic Compounds lbs-VOC/gal (B)	Gallons Per Year (C)	Emissions Lbs-VOC Per Year (D)
Stains	5.8	1000	5800
Washcoats			0
Fillers			0
Sealers			0
Topcoats			0
Solvents			0
Other			0
Other			0
Other			0
Total Emissions in Lbs/Year		Box X	5800
Total Emissions in Tons/Year		Box Y	**2.9**

Step 1 Categorize your paint useage as outlined in Column A, this will make the emission estimate easier. Note: Your paint supplier may have a program that estimates volatile organic compounds in his products, so check with him to see if he does.

Step 2 Enter the typical VOC content for these products in Column B. Use the material safety data sheets (MSDS) for this information.

Step 3 Estimate the total gallons of products (use Column A as a guideline for catagories) that you use on an annual basis. Include all the chemicals you use at your business. This can be estimated by recording what you use in an average month and then multiplying by 12 to convert to annual basis. Enter the gallons in Column C.

Step 4 Multiply the gallons per year in Column C by the pounds of VOCs per gallon that is given in Column B. D= B x C, enter the number in Column D. The VOC content per gallon of coating can be obtained from your Material Safety Data Sheets (MSDS), if the content is not listed in Column B.

Step 5 Add the numbers in column D and enter total in Box X. Divide Box X by 2,000 to convert pounds to tons, Y= X / 2000, enter the number in Box Y.
The totals will automatically be copied to the front sheet, Emissions Summary.

Remember volatile organic compounds are often hazardous air pollutants, so include an estimate of the hazardous air pollutants in the paints, solvents and other chemicals used at the business.

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Hazardous Air Pollutants Emission Worksheet

Chemicals Used				Insert HAP name		Insert HAP name		Insert HAP name		Insert HAP name	
Paints, Glues, Solvents (A)	Gallons Per Year (B)	Pounds Per Gallon (C)	Pounds Per Year (D)	Fraction (E)	Pounds Per Year (F)	Fraction	Pounds Per Year	Fraction	Pounds Per Year	Fraction	Pounds Per Year
			0		0		0		0		0
			0		0		0		0		0
			0		0		0		0		0
			0		0		0		0		0
			0		0		0		0		0
			0		0		0		0		0
			0		0		0		0		0
			0		0		0		0		0
			0		0		0		0		0
			0		0		0		0		0
			0		0		0		0		0
			0		0		0		0		0
			0		0		0		0		0
			0		0		0		0		0
			0		0		0		0		0
			0		0		0		0		0
			0		0		0		0		0
				Sub - Total =	**0.0**	**Sub - Total =**	**0.0**	**Sub - Total =**	**0.0**	**Sub - Total =**	**0.0**

Grand Total =	**0**	pounds/year (Combined HAPs)
	0	tons / year

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Hazardous Air Pollutants Emission Worksheet

Instructions

Step 1 Enter the different product categories in Column A; washcoats,sealers, topcoats, stains, and clean-up solvents.

Step 2 Estimate the total gallons of product that you use on an annual basis for each designated product category and fill in the number in Column B. The gallons per year can be estimated by recording what you use in an average month and then multiplying by 12 to convert to annual basis.

Step 3 The pounds per gallon in Column C can be determined from your representative MSDS for the product category. If the specific gravity (S.G.) is given instead, use the following formula to calculate pounds per gallon: S.G. X 8.3 lbs/gal. The S.G. will be in the range of 0.8 to 1.3. For example, most solvents are less than 1.0 since they are less dense than water. Specific gravity is the density of the paint compared to water.

Step 4 Multiply the gallons per year in Column B by the pounds per gallon given in Column C. B x C = D, fill in the number in Column D.

Step 5 Using your representative MSDS, compare all the chemicals listed on the MSDS to the list of 188 hazardous air pollutants (HAPs) list. List all the HAPs and percent by weight in the space provided in Column E. Note: Copy the HAP name from the list so you don't have to type out the chemical name. If the MSDS gives a range of 10-20% for a chemical, use the midpoint of 15%. Convert the percentage (15%) to a fraction (.15) and enter in column E. Keep in mind that an MSDS lists many chemicals that are not HAPs.

Step 6 To determine the pounds per year for each HAP in a product category, multiply the pounds per year in Column D by the fraction in Column E. Enter the number in the space provided in Column F.

Step 7 Add the pounds per year for each HAP in Column F and enter the total at the bottom of the table. Enter the pounds per year for all HAPs (grand total) in Box X. If you have more HAPs then provided add columns for more HAPs by selecting, copy and paste.

Insert HAP name		Insert HAP name		Insert HAP name		Insert HAP name		Insert HAP name		Insert HAP name		Insert HAP name	
Fraction	Pounds Per Year	Fraction	Pounds Per Year	Fraction	Pounds Per Year	Fraction	Pounds Per Year	Fraction	Pounds Per Year	Fraction	Pounds Per Year	Fraction	Pounds Per Year
	0		0		0		0		0		0		0
	0		0		0		0		0		0		0
	0		0		0		0		0		0		0
	0		0		0		0		0		0		0
	0		0		0		0		0		0		0
	0		0		0		0		0		0		0
	0		0		0		0		0		0		0
	0		0		0		0		0		0		0
	0		0		0		0		0		0		0
	0		0		0		0		0		0		0
	0		0		0		0		0		0		0
	0		0		0		0		0		0		0
	0		0		0		0		0		0		0
	0		0		0		0		0		0		0
	0		0		0		0		0		0		0
	0		0		0		0		0		0		0
	0		0		0		0		0		0		0
Sub - Total =	**0.0**	**Sub - Total =**	**0.0**	**Sub - Total =**	**0.0**	**Sub - Total =**	**0.0**	**Sub - Total =**	**0.0**	**Sub - Total =**	**0.0**	**Sub - Total =**	**0.0**

Insert HAP name		Insert HAP name		Insert HAP name	
Fraction	Pounds Per Year	Fraction	Pounds Per Year	Fraction	Pounds Per Year
	0		0		0
	0		0		0
	0		0		0
	0		0		0
	0		0		0
	0		0		0
	0		0		0
	0		0		0
	0		0		0
	0		0		0
	0		0		0
	0		0		0
	0		0		0
	0		0		0
	0		0		0
	0		0		0
	0		0		0
Sub - Total =	**0.0**	**Sub - Total =**	**0.0**	**Sub - Total =**	**0.0**

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Hazardous Air Pollutant List

75070	Acetaldehyde
60355	Acetamide
75058	Acetonitrile
98862	Acetophenone
53963	2-Acetylaminofluorene
107028	Acrolein
79061	Acrylamide
79107	Acrylic acid
107131	Acrylonitrile
107051	Allyl chloride
92671	4-Aminobiphenyl
62533	Aniline
90040	o-Anisidine
0	Antimony Compounds
0	Arsenic Compounds (inorganic including arsine)
1332214	Asbestos
71432	Benzene (including benzene from gasoline)
92875	Benzidine
98077	Benzotrichloride
100447	Benzyl chloride
0	Beryllium Compounds
92524	Biphenyl
542881	Bis(chloromethyl)ether
117817	Bis(2-ethylhexyl) phthalate (DEHP)
75252	Bromoform
106990	1,3-Butadiene
0	Cadmium Compounds
156627	Calcium cyanamide
133062	Captan
63252	Carbaryl
75150	Carbon disulfide
56235	Carbon tetrachloride
463581	Carbonyl sulfide
120809	Catechol
57749	Chlordane
133904	Chloramben
7782505	Chlorine
79118	Chloroacetic acid
532274	2-Chloroacetophenone
108907	Chlorobenzene
510156	Chlorobenzilate
67663	Chloroform
126998	Chloroprene
107302	Chloromethyl methyl ether
0	Chromium Compounds
0	Cobalt Compounds
0	Coke Oven Emissions
108394	m-Cresol
95487	o-Cresol
106445	p-Cresol
1319773	Cresols/Cresylic acid (isomers and mixture)
98828	Cumene
0	Cyanide Compounds
94757	2,4-D (2,4Dichloro-phenoxyacetic acid, including salts and esters)
3547044	DDE
334883	Diazomethane
132649	Dibenzofurans
96128	1,2-Dibromo-3-chloropropane
84742	Dibutylphthalate
106467	1,4-Dichlorobenzene(p)
91941	3,3-Dichlorobenzidene
111444	Dichloroethyl ether (Bis(2-chloroethyl)ether)
542756	1,3-Dichloropropene
62737	Dichlorvos
111422	Diethanolamine
121697	N,N-Diethyl aniline (N,N-Dimethylaniline)
64675	Diethyl sulfate
534521	4,6-Dinitro-o-cresol, and salts
51285	2,4-Dinitrophenol
121142	2,4-Dinitrotoluene
60117	Dimethyl aminoazo-benzene
79447	Dimethyl carbamoyl chloride
68122	Dimethyl formamide
57147	1,1-Dimethyl hydrazine
131113	Dimethyl phthalate
77781	Dimethyl sulfate
119904	3,3-Dimethoxy-benzidine
119937	3,3',-Dimethyl benzidine
123911	1,4-Dioxane (1,4-Diethyleneoxide)
122667	1,2-Diphenylhydrazine
106898	Epichlorohydrin (l-Chloro-2,3-epoxy propane)
106887	1,2-Epoxybutane
100414	Ethyl benzene
51796	Ethyl carbamate (Urethane)
75003	Ethyl chloride (Chloroethane)
106934	Ethylene dibromide (Dibromoethane)
107062	Ethylene dichloride (1,2-Dichloroethane)
107211	Ethylene glycol
151564	Ethylene imine (Aziridine)
75218	Ethylene oxide
96457	Ethylene thiourea
75343	Ethylidene dichloride (1,1-Dichloroethane)

Hazardous Air Pollutant List

0	Fine mineral fibers
50000	Formaldehyde
0	Glycol ethers
76448	Heptachlor
118741	Hexachlorobenzene
87683	Hexachlorobutadiene
77474	Hexachlorocyclo-pentadiene
67721	Hexachloroethane
822060	Hexamethylene-1,6-diiso-cyanate
680319	Hexamethylphos-phoramide
110543	Hexane
302012	Hydrazine
7647010	Hydrochloric acid (Hydrogen chloride)
7664393	Hydrogen fluoride (Hydrofluoric acid)
123319	Hydroquinone
78591	Isophorone
0	Lead Compounds
58899	Lindane (all isomers)
108316	Maleic anhydride
0	Manganese Compounds
0	Mercury Compounds
67561	Methanol
72435	Methoxychlor
74839	Methyl bromide (Bromomethane)
74873	Methyl chloride (Chloromethane)
71556	Methyl chloroform (1,1,1-Trichloroethane)
78933	Methyl ethyl ketone (2-Butanone)
60344	Methyl hydrazine
74884	Methyl iodide (Iodomethane)
108101	Methyl isobutyl ketone (Hexone)
624839	Methyl isocyanate
80626	Methyl methacrylate
1634044	Methyl tert butyl ether
101144	4,4-Methylene bis(2-chloroaniline)
75092	Methylene chloride (Dichloromethane)
101688	Methylene diphenyl diisocyanate (MDI)
101779	4,4,-Methylenedianiline
91203	Naphthalene
0	Nickel Compounds
98953	Nitrobenzene
100027	4-Nitrophenol
79469	2-Nitropropane
684935	N-Nitroso-N-methylurea
59892	N-Nitrosomorpholine
62759	N-Nitrosodimethylamine
92933	4-Nitrobiphenyl
56382	Parathion
82688	Pentachloronitrobenzene (Quintobenzene)
87865	Pentachlorophenol
108952	Phenol
106503	p-Phenylenediamine
75445	Phosgene
7803512	Phosphine
7723140	Phosphorus
85449	Phthalic anhydride
1336363	Polychlorinated biphenyls (Aroclors)
0	Polycylic Organic Matter
1120714	1,3-Propane sultone
57578	beta-Propiolactone
123386	Propionaldehyde
114261	Propoxur (Baygon)
75558	1,2-Propylenimine (2-Methyl aziridine)
78875	Propylene dichloride (1,2-Dichloropropane)
75569	Propylene oxide
91225	Quinoline
0	Radionuclides (including radon)
0	Selenium Compounds
96093	Styrene oxide
100425	Styrene
1746016	2,3,7,8-Tetrachloro-dibenzo-p-dioxin
79345	1,1,2,2-Tetrachloro-ethane
127184	Tetrachloroethylene (Perchloroethylene)
7550450	Titanium tetrachloride
108883	Toluene
95807	2,4-Toluene diamine
584849	2,4-Toluene diisocyanate
95534	o-Toluidine
8001352	Toxaphene (chlorinated camphene)
120821	1,2,4-Trichlorobenzene
79005	1,1,2-Trichloroethane
79016	Trichloroethylene
95954	2,4,5-Trichlorophenol
88062	2,4,6-Trichlorophenol
121448	Triethylamine
1582098	Trifluralin
540841	2,2,4-Trimethylpentane
108054	Vinyl acetate
75014	Vinyl chloride
75354	Vinylidene chloride (1,1-Dichloroethylene)
106514	Quinone
1330207	Xylenes (isomers and mixture)
108383	m-Xylenes
95476	o-Xylenes
106423	p-Xylenes

Air Emissions
Wood Finisher Worksheet

Date: 1-00-00

Company Name:	Test Company 3
Facility Name:	test 4

How to Estimate Fan Size

If you don't know the air flow thru the bag house, the following method will estimate the fan size, air flow rate in cubic feet per minute (cfm), using the surface area of the bags and assume a typical air to cloth ratio. The air to cloth ratio is the air volumne per square foot of bag (cfm).

First calculate the filter area of the bag house in square feet by estimating the surface area of all the bags in the bag house:

Start by measuring the diameter and length of a bag. Next calculate the distance around the bag, Bag Circumference, using the bag diameter

Bag Circumference = 3.1416 (times) Bag Diameter (inches)

= 3.1416 X 10 (Bag Diameter) = 31.42 Inches ("A")

Next determine the filter area of all the bags in the bag house:

Bag length in inches (times) bag circumference in inches, "A", (times) Number of Bags in Bag House (divide by) 144 square inches to square feet:

8.0 (Length) X 31.42 ("A") X 200 (Number of Bags) / 144 = 349.07 ("B") sq feet

Now using the above filter area and a typical air to cloth ratio the flow rate thru the bag house can be estimated.

Determine which bag cleaning method you have in your bag house, each cleaning method has a typical air to cloth ratio : shaker cleaning = 3 cfm/sq ft
pulse jet cleaning = 7 cfm/sq ft

Flow Rate = Bag filter area (times) exhaust ratio for the bag house cleaning system.

= 349.07 ("B") X 3 (3 or 7 cfm/sq ft) = 1047 CFM ("C")

Note: There are many ways to estimate flow rates thru ventilation systems, this is one method, you may use any logical method. Please include the calculation method you use with the information you are submitting.