



A Simple Guide to: Calculating and Reporting Air Emissions for VOCs and HAPs

Business owners are sometimes required to calculate and report their annual air emissions of VOCs and HAPs. This means calculating the quantity of volatile organic compounds (VOCs) and hazardous air pollutants (HAPs) that evaporate into the air each year as a result of operating the business. Many permits require monthly or even daily calculations of emissions to demonstrate compliance with permit conditions. This guide provides step-by-step instructions on how to calculate VOC and HAP air emissions for your business.

➤ VOLATILE ORGANIC COMPOUNDS (VOC)

VOCs are defined as organic compounds that react in the presence of sunlight, with nitrogen oxides (NO_x) to form ozone, a regulated pollutant in Colorado. This lower level ozone combines with fine particles of dust and other material and contributes to smog formation. Although ozone is needed in the upper atmosphere, in the lower atmosphere (near the earth's surface) it acts as an irritant, causing health problems for all life, including animals and plants.

➤ HAZARDOUS AIR POLLUTANTS (HAPS)

HAPs are Hazardous Air Pollutants. A HAP is a compound that has been included on the EPA list of 188 chemicals that can have detrimental effects on humans and the environment. These substances have been known to cause headaches, dizziness, difficulty breathing, increased risk of cancer, birth defects, and other harmful effects.

➤ COMPILING YOUR MATERIAL SAFETY DATA SHEETS (MSDS):

The first step in calculating air emissions is to compile and review the Material Safety Data Sheets (or MSDSs) for each of your products. MSDSs are documents that provide detailed information on the chemical composition, health effects, safety procedures, and other characteristics of a variety of products and materials. Your material supplier is required to provide a MSDS for every material you use upon request. A current MSDS should be maintained at your facility for each hazardous chemical used in order to meet employee health and safety, and other state and federal regulatory requirements.

By reviewing your MSDS, you can identify the types and quantities of VOCs and HAPs contained in each gallon of paint, thinner, solvent, or other material used in your shop. By multiplying these quantities by the total numbers of gallons used in a day, month, or year, you can determine the amount that has evaporated (product emissions) during the operation of your business.

Your supplier may also be able to provide you with a document called a “Certified Product Data Sheet”. This document gives valuable information about the chemical and may provide more concise information (and easier to understand) than the MSDS for calculating your emissions. In addition, your supplier may be able to provide a report called a “VOC/HAP Report”. This report identifies the total numbers of gallons purchased in a month or a year, provides the VOC and HAP emissions for that product (calculated for you), and a total of VOC and HAP emissions from all products purchased from that supplier during the requested time period. In most instances, this report can be used to determine your VOC and HAP emissions to fulfill reporting and/or record keeping requirements, saving you the time and frustration of calculating your own air emissions.

➤ **CALCULATING VOLATILE ORGANIC COMPOUND (VOC) EMISSIONS**

Step 1: Calculate VOC Emissions from Each Product

On the MSDS, typically in the section called “Physical Properties,” you may find the total amount of VOC contained in the product. Be aware that the MSDS may list the *Volatiles*, *Volatile Ingredients*, or *Percent Volatiles by Weight* contained in the product. These are not the correct values to use in your calculations because they include water and other evaporative substances contained in the material. Using these values would result in overly high estimates of VOC emissions. Be aware the MSDS may also list *VOCs less water and exempt solvents*. Again, this is an incorrect value to use. Do select the value for VOCs that includes water and exempt solvents for use in your calculations. This value may be listed in terms of “pounds of VOC per gallon,” “grams of VOC per liter of liquid,” or “VOC weight percentage of the total liquid.”

If the VOC is listed in pounds per gallon:

Multiply the pounds of VOC per gallon of product by the total number of gallons of product used. This gives you the total emissions of VOC from that product. Here is an example calculation:

$$VOC \text{ Emissions} \left(\frac{\text{pounds}}{\text{year}} \right) = VOC \text{ Content} \left(\frac{\text{pounds}}{\text{gallon}} \right) \times \text{Quantity of Product Used} \left(\frac{\text{gallons}}{\text{year}} \right)$$

If the VOC is listed in grams per liter (g/l):

You will first need to convert VOC in “grams per liter” of product into VOC in “pounds per gallon” of product using the following equation:

$$VOC \text{ Content} \left(\frac{\text{pounds}}{\text{gallon}} \right) = \text{Weight of VOC} \left(\frac{\text{grams}}{\text{liter}} \right) \times \left(\frac{1 \text{ pound}}{454 \text{ grams}} \right) \times \left(\frac{1 \text{ liter}}{0.264 \text{ gallons}} \right)$$

Then use the equation provided in the previous step to calculate VOC emissions in pounds per year.

If the VOC is listed as percent weight (% wt):

Begin by determining the weight of one gallon of the product. This could be the weight of a gallon of paint or solvent or some other product used in your shop. The weight of the product may be

listed in pounds per gallon in the “Physical Properties” section of the MSDS. If this value is not provided on the MSDS, then you must calculate the weight of one gallon of the product by multiplying the “Specific Gravity” of the product (provided on the MSDS) by 8.34 (the density of water) as follows:

$$\text{Weight of Product} \left(\frac{\text{pounds}}{1 \text{ gallon}} \right) = \text{Specific Gravity} \times 8.34$$

Next, divide the percent weight (% wt.) of VOC by 100, and then multiply this number by the weight of one gallon of the product and by the number of gallons of product used. This gives you the total emissions of VOC from that product. Here is an example calculation:

$$\text{VOC Emissions} \left(\frac{\text{pounds}}{\text{year}} \right) = \frac{\% \text{ Wt. of VOC}}{100} \times \text{Weight of Product} \left(\frac{\text{pounds}}{1 \text{ gallon}} \right) \times \text{Quantity of Product Used} \left(\frac{\text{gallons}}{\text{year}} \right)$$

Note:

- a) The quantity of product used may not always be listed in gallons. If the quantity of product used is listed in liters, you can convert liters to gallons using the formula: (1) liter = 0.2642 gallon.

Here is an example calculation:

$$65.0 \left(\frac{\text{liters}}{\text{year}} \right) \times 0.2642 \left(\frac{\text{gallons}}{\text{liter}} \right) = 17.2 \left(\frac{\text{gallons}}{\text{year}} \right)$$

- b) If the quantity of product used is listed in quarts, you can convert quarts to gallons using the formula: (4) quarts = (1) gallon. Here is an example calculation:

$$8.0 \left(\frac{\text{quarts}}{\text{year}} \right) \times 4.0 \left(\frac{\text{gallon}}{\text{quarts}} \right) = 2.0 \left(\frac{\text{gallons}}{\text{year}} \right)$$

Step 2: Calculate Your Operation’s Total VOC Emissions

Once you have determined the VOC emissions for each of your products, simply add these numbers together to calculate your operation’s *total* VOC emissions.

Finally, you can convert your operation’s total VOC emissions from pounds per year to tons per year using the following equation:

$$\text{VOC Emissions} \left(\frac{\text{tons}}{\text{year}} \right) = \text{VOC Emissions} \left(\frac{\text{pounds}}{\text{year}} \right) \times \text{Conversion Factor} \left(\frac{1 \text{ ton}}{2000 \text{ pounds}} \right)$$

CALCULATING HAZARDOUS AIR POLLUTANT (HAP) EMISSIONS

Step 1: Calculate HAP Emissions from Each Product

In addition to VOC emissions, businesses are also required to calculate and report emissions of Hazardous Air Pollutants (or HAPs). In Colorado, reportable HAPs are listed in Regulation No. 3, Appendix B (attached).

On the MSDS, typically on the first page, you will find a list of toxic (or reportable) ingredients. By comparing this list to the list of chemicals in Regulation No. 3, Appendix B, you can identify the HAPs in your products. You can positively identify each reportable chemical by using the CAS number. Any given chemical may have several different names, but will always have only one CAS number.

To calculate your HAP emissions, begin by determining the weight of one gallon of the product. This could be the weight of a gallon of paint or solvent or some other liquid used in your shop. The weight of the product may be listed in pounds per gallon in the “Physical Properties” section of the MSDS. If this value is not provided on the MSDS, then you must calculate the weight of one gallon of the product by multiplying the “Specific Gravity” of the product (provided on the MSDS) by 8.34 (the density of water) as follows:

$$\text{Weight of Product} \left(\frac{\text{pounds}}{1 \text{ gallon}} \right) = \text{Specific Gravity} \times 8.34$$

Next, for each HAP, determine the percent of the HAP per weight of the product. The percent weight (% wt.) of each HAP will be provided on the MSDS. If a range of percentages is listed, such as 10 – 50%, use the highest number in the range (in this example, you would use 50%). To determine your HAP emissions, divide the percent weight by 100, and then multiply by the total weight per gallon of the product and by the number of gallons of product used. This gives you the total emissions of the HAP from that product. Here is an example calculation:

$$\text{HAP Emissions} \left(\frac{\text{pounds}}{\text{year}} \right) = \frac{\% \text{ Wt. of HAP}}{100} \times \text{Weight of Product} \left(\frac{\text{pounds}}{1 \text{ gallon}} \right) \times \text{Quantity of Product Used} \left(\frac{\text{gallons}}{\text{year}} \right)$$

Step 2: Calculate Your Operation’s Total HAP Emissions

Once you have calculated the emissions for each HAP in each product, add these numbers together to determine your operation’s *total* emissions for each HAP. For example, if three different liquids contain toluene, add together the amount of toluene from each liquid to determine the total amount of toluene emitted. Do this for each separate HAP. Compare the total amount of each HAP to the emission thresholds in Appendix A to determine if you must report the HAP to the Division.

You may also be required to calculate the total HAP emissions of all of your products. Once you have determined the HAP emissions for each of your products, simply add these numbers together to calculate your operation’s total HAP emissions. For example, add together the total amount of

toluene emitted plus the total amount of xylene or other HAP to determine the total of all HAPs emitted.

➤ **REPORTING REQUIREMENTS:**

Submitting an APEN:

In Colorado, most businesses that are or will be emitting air pollutants above certain levels are required to submit an Air Pollution Emission Notice (APEN) to the Colorado Air Pollution Control Division (the Division).

For VOCs, the reporting threshold is 2 tons per year for businesses located in attainment areas (i.e., areas that meet the National Ambient Air Quality Standards (NAAQS) for pollutants) and 1 ton per year for business located in non-attainment areas. The Division can assist you in determining whether your business is located in an attainment or non-attainment area.

For HAPs, the reporting thresholds must be determined using the procedures provided in Regulation No. 3, Appendix A (attached). The procedures in Regulation No. 3, Appendix A enable you to select appropriate emission thresholds based on the scenario that best matches your business operations. If you are unsure which scenario applies to your business, you may select the most conservative (lowest) threshold (i.e., Scenario 1) to determine if an APEN must be filed.

APEN and reporting forms are available through the Division and can be downloaded at <http://www.colorado.gov/cs/Satellite/CDPHE-AP/CBON/1251596441866>. “Specialty APEN” forms exist for several types of operations e.g., paint booth and printing operations. If the Division determines that your business requires an air permit, the APEN submission will begin the permitting process, and your APEN will become part of your permit application package.

Submitting a Revised APEN:

Revised APENs must be submitted to the Division when certain business or operational changes occur. Specifically, revised APENs must be submitted in the following situations:

1. Whenever a significant change in emissions occurs.

Sources must submit a revised APEN to inform the Division of significant changes in actual emissions. Changes must be reported by April 30th of the following year (e.g., a change in emissions in calendar year 2003 must be reported by April 30, 2004.) The definition of a “significant change in emissions” varies based on whether the source emits criteria (including VOCs) or non-criteria pollutants (HAPs and other reportable air pollutants) as described below.

VOCs or “Criteria Pollutants”:

- For sources emitting less than 100 tons per year a change in actual annual emissions of 5 tons per year or more above the level reported on the last APEN submitted to the Division;

- For volatile organic compound (VOC) sources in ozone nonattainment areas emitting less than 100 tons per year of VOC, a change in actual annual emissions of 1 ton or more, or 5 percent, whichever is greater above the level reported on the last APEN submitted to the Department;
- For sources emitting 100 tons per year or more, a change in actual annual emissions of 50 tons or more, or 5 percent, whichever is less above the level reported on the last APEN submitted to the Division;
- A change in actual emissions of 50 pounds per year of lead, above the level reported on the last APEN submitted to the Division.

HAPS or “Non-Criteria Pollutants”:

- An increase in actual annual emissions of 50 percent or 5 tons, whichever is less.

2. When there is a change in ownership or a change in the business/source location.

An APEN must be submitted to the Division whenever the ownership or location of a business (or source) changes. For a change in ownership, the new owner must also supply a signed agreement containing the specific date for the transfer of the permit, responsibility, coverage and liability between the current and new permittee. After the Division receives the APEN, fee, and written agreement, the Division will issue a new permit reflecting the ownership change.

3. When new or different air pollution control equipment is installed.

An APEN is required whenever new control equipment is installed, or whenever a different type of control equipment replaces an existing type of control equipment.

4. When a permit limit is modified.

If you have an existing permit that requires modification (e.g., the owner wishes to change the operation equipment or throughput), a revised APEN must be submitted.

5. Before the current APEN expires.

An APEN is valid for five years. A new, fully completed APEN form must be submitted at least 30 days before expiration of the five-year term of the current APEN.

➤ **RECORDKEEPING**

Business owners are often required to maintain records of material usage and/or VOC and HAP calculations. Records must be maintained and made available to the Division for inspection upon request. An example recordkeeping format for VOC and HAP emissions is provided in Table 1. Business owners/operators should also maintain copies of the most recent APENs and permits.

TABLE 1

EXAMPLE OF MONTHLY FORMAT FOR MAINTAINING RECORDS OF CONSUMPTION OF MATERIALS AND TRACKING EMISSIONS

CALENDAR MONTH:					POLLUTANTS					
MATERIALS CONSUMED	CONSUMPTION				VOLATILE ORGANIC COMPOUNDS (VOCs)		NON-CRITERIA REPORTABLE POLLUTANTS (HAPs)*			
							POLLUTANT _____ CAS No: _____ BIN: _____		POLLUTANT _____ CAS No: _____ BIN: _____	
	QUANTITY	UNIT	PRODUCT DENSITY (Lbs./Gal.)	TOTAL (Lbs.)	VOC WEIGHT (show units)	EMISSIONS (Tons)	WEIGHT (show units)	EMISSIONS (Lbs.)	WEIGHT (show units)	EMISSIONS (Lbs.)
TOTAL			-----		-----		-----		-----	

*Include all non-criteria reportable pollutants, even those that may be below reportable thresholds.

◆ RESOURCES

- ❖ Air Pollution Control Division (APCD) at the Colorado Department of Public Health and Environment at (303) 692-3100.

Websites: Home page: <http://www.colorado.gov/cs/Satellite/CDPHE-AP/CBON/1251582562056>

Air quality regulations: <http://www.colorado.gov/cs/Satellite/CDPHE-Main/CBON/1251601911433>

- ❖ **Small Business Assistance Program (SBAP)** at the Colorado Department of Public Health and Environment. The SBAP offers free and confidential assistance to small businesses with environmental questions.

Small Business Assistance Program: (303) 692-3175 or (303) 692-3148

Small Business Ombudsman: (303) 692-2135

Website: <http://www.colorado.gov/cs/Satellite/CDPHE-AP/CBON/1251596441985>



Negligibly Reactive Volatile Organic Compounds (VOCs)

As described in the Colorado Common Provisions Regulation, the following negligibly reactive VOCs do not need to be included in the calculation of VOC emissions at your business:

- Methyl Acetate
- Acetone
- Methane
- Ethane
- Methylene Chloride (Dichloromethane)
- 1,1,1-Trichloroethane (Methylchloroform)
- 1,1,2-Trichloro-1,2,2-Trifluoroethane (CFC-113)
- Trichlorofluoromethane (CFC-11)
- Dichlorodifluoromethane (CFC-12)
- Chlorodifluoromethane (HCFC-22)
- Trifluoromethane (HFC-23)
- 1,2-Dichloro 1,1,2,2-Tetrafluoroethane (CFC-114)
- Chloropentafluoroethane (CFC-115)
- 1,1,1-Trifluoro 2,2-Dichloroethane (HCFC-123)
- 1,1,1,2-Tetrafluoroethane (HCFC-134A)
- 1,1-Dichloro 1-Fluoroethane (HCFC 141B)
- 1-Chloro 1,1-Difluoroethane (HCFC-142B)
- 2-Chloro-1,1,1,2-Tetrafluoroethane (HCFC-124)
- Pentafluoroethane (HFC-125)
- 1,1,2,2-Tetrafluoroethane (HFC-134)
- 1,1,1-Trifluoroethane (HFC-143A)
- 1,1-Difluoroethane (HFC-152A)
- Parachlorobenzotrifluoride (PCBTF)
- Common Provisions Regulation Page 16
- Cyclic, Branched, or linear completely methylated siloxanes
- Perchloroethylene (Tetrachloroethylene)
- 3,3-dichloro-1,1,1,2,2-pentafluoropropane (HCFC-225ca)
- 1,3-dichloro-1,1,2,2,3-pentafluoropropane (HCFC-225cb)
- 1,1,1,2,3,4,4,5,5,5-decafluoropentane (HFC 43-10mee)
- Difluoromethane (HFC-32)
- Ethylfluoride (HFC-161)
- 1,1,1,3,3,3-hexafluoropropane (HFC-236fa)
- 1,1, 2, 2,3-pentafluoropropane (HFC-245ca)
- 1,1,2,3,3-pentafluoropropane (HFC-245ea)
- 1,1,1,2,3-pentafluoropropane (HFC-245eb)
- 1,1,1,3,3-pentafluoropropane (HFC-245fa)
- 1,1,1,2,3,3-hexafluoropropane (HFC-236ea)

- 1,1,1,3,3-pentafluorobutane (HFC-365mfc)
- Chlorofluoromethane (HCFC-31)
- 1 chloro-1-fluoroethane (HCFC-151a)
- 1,2-dichloro-1,1,2-trifluoroethane (HCFC-123a)
- 1,1,1,2,2,3,3,4,4-nonfluoro-4-methoxy-butane (C₄F₉OCH₃)
- 2-(difluoromethoxymethyl)-1,1,1,2,3,3,3-heptafluoropropane ((CF₃)₂CF₂OCH₃)
- 1-ethoxy-1,1,2,2,3,3,4,4,4-nonfluorobutane (C₄F₉OC₂H₅)
- 2-(ethoxydifluoromethyl)-1,1,1,2,3,3,3-heptafluoropropane ((CF₃)₂CF₂OC₂H₅)
- Methyl acetate and Perfluorocarbon Compounds in these categories:
 - Cyclic Branched or Linear, Completely Fluorinated Alkanes
 - Cyclic, branched, or linear, completely fluorinated ethers with no unsaturations
 - Cyclic, Branched, or Linear, Completely Fluorinated Tertiary amines with no unsaturations
 - Sulfur containing Perfluorocarbons with no Unsaturations and with Sulfur Bonds only to Carbon and Fluorine

METHOD FOR IDENTIFYING HAP REPORTING THRESHOLDS

REGULATION NO. 3 AIR CONTAMINANT EMISSIONS NOTICES -APPENDIX A- Method For Determining De Minimis Levels For Non-Criteria Reportable Pollutants

The following procedures must be followed in order to determine the appropriate de minimis (minimum) reporting level for each pollutant that is emitted from each emission point at a contiguous site. If you do not wish to use the three-scenario approach at your facility, you may elect to use Scenario 1 for all emission points.

Definitions

Release Point - the lowest height above ground level from which the pollutants are emitted to the atmosphere.

Property Boundary - the distance from the base of the release point to the nearest property boundary.

Point - an individual emission point or a group of individual emission points reported on one Air Pollutant Emission Notice as provided for in Part A, section II.B.4.

Methodology

To determine the de minimis level for a single pollutant being emitted from a point (single or grouped).

STEP 1:

Determine which of the three scenarios below applies to the emission point. If different scenarios can be applied to the same emission point, use the highest numbered scenario that applies. In the case of grouped emission points, use the lowest scenario number (for the entire group) that applies to any of the single emission points within the group.

Scenario 1: Release point less than 10 meters or property boundary less than 100 meters;

Scenario 2: Release point equal to or greater than 10 meters, but less than 50 meters, or property boundary equal to or greater than 100 meters, but less than 500 meters; or

Scenario 3: Release point equal to or greater than 50 meters, or property boundary equal to or greater than 500 meters.

STEP 2:

Use Appendix B to identify which of the three bins (Bin A, B, or C) the chemical is listed under.

If the pollutant is not listed, it does not have to be reported unless it is included in a chemical compound group.

STEP 3:

Use the table below to determine the de minimis level.

All values are in pounds per year.

Chemical Bin	Scenario 1 De Minimis	Scenario 2 De Minimis	Scenario 3 De Minimis
Bin A	50	125	250
Bin B	500	1250	2500
Bin C	1000	2500	5000

STEP 4:

Repeat the above steps for each pollutant emitted from each emission point (single or grouped). One Air Pollutant Emission Notice must be filed for each emission point that emits one or more chemicals above the de minimis level.

LIST OF HAPS

REGULATION NO. 3 AIR CONTAMINANT EMISSIONS NOTICES -APPENDIX B- Non-criteria Reportable Pollutants

(Sorted Alphabetically)

Note: HAP means federal, or federal and state hazardous air pollutant
HAPs means state-only hazardous air pollutant
No Designation means not a HAP, but still reportable.

CAS		Toxics	BIN
HAP	71556	1,1,1-Trichloroethane (Methyl chloroform)	C
HAP	79345	1,1,2,2-Tetrachloroethane	A
HAP	79005	1,1,2-Trichloroethane	A
HAP	75354	1,1-Dichloroethylene (Vinylidene chloride)	A
HAP	57147	1,1-Dimethyl hydrazine	A
HAP	120821	1,2,4-Trichlorobenzene	A
HAP	96128	1,2-Dibromo-3-chloropropane	A
HAP	122667	1,2-Diphenylhydrazine	A
HAP	106887	1,2-Epoxybutane	A
HAP	75558	1,2-Propylenimine (2-Methyl aziridine)	A
HAP	106990	1,3-Butadiene	A
HAP	542756	1,3-Dichloropropene	A
HAP	1120714	1,3-Propane sultone	B
HAPs	55981	1,4-Butanediol dimethanesulphonate	A
HAPs	7644410	1,4-Dichloro-2-butene	A
HAP	106467	1,4-Dichlorobenzene	A
HAP	123911	1,4-Dioxane (1,4-Diethyleneoxide)	A
HAP	540841	2,2,4-Trimethylpentane	C
HAP	1746016	2,3,7,8-TCDD (Dioxin)	A
HAP	95954	2,4,5-Trichlorophenol	C
HAP	88062	2,4,6-Trichlorophenol	A
HAP	94757	2,4-D, salts and esters (2,4-Dichlorophenoxyacetic acid)	A
HAP	51285	2,4-Dinitrophenol	A
HAP	121142	2,4-Dinitrotoluene	A
HAP	95807	2,4-Toluene diamine	B
HAP	584849	2,4-Toluene diisocyanate	A
	91087	2,6-Toluene diisocyanate	A

HAP	53963	2-Acetylaminofluorene	C
HAPs	132274	2-Biphenylol sodium salt	B
HAP	532274	2-Chloroacetophenone	A
HAP	79469	2-Nitropropane	A
HAPs	60153493	3-(N-Nitrosomethylamine) (Propionitrile)	B
HAP	91941	3,3-Dichlorobenzidine	A
HAP	119904	3,3-Dimethoxybenzidine	A
HAP	119937	3,3'-Dimethyl benzidine	A
HAP	101144	4,4-Methylene bis (2-chloroaniline)	A
HAP	101779	4,4-Methylenedianiline	A
HAP	534521	4,6-Dinitro o-cresol, and salts	A
HAP	92671	4-Aminobiphenyl	A
HAP	92933	4-Nitrobiphenyl	C
HAP	100027	4-Nitrophenol	C
HAP	75070	Acetaldehyde	A
HAP	60355	Acetamide	B
HAP	75058	Acetonitrile	A
HAP	98862	Acetophenone	C
HAP	107028	Acrolein	A
HAP	79061	Acrylamide	A
HAP	79107	Acrylic acid	A
HAP	107131	Acrylonitrile	A
	814686	Acrylyl chloride	C
HAPs	1402682	Aflatoxins	A
	116063	Aldicarb (Temik)	A
HAPs	309002	Aldrin	A
	107186	Allyl alcohol	A
HAP	107051	Allyl chloride	A
	20859738	Aluminum phosphide	A
	54626	Aminopterin	C
	78535	Amiton	C
	3734972	Amiton oxalate	C
	7664417	Ammonia	B
HAP	62533	Aniline	A
	88051	Aniline,2,4,6-Trimethyl	C
HAP	0	Antimony compounds	A
	1397940	Antimycin A	C
	86884	ANTU (alpha-naphthylthiourea)	A
HAP	0	Arsenic compounds	A
HAP	1332214	Asbestos	A
HAP	71432	Benzene	A
HAP	92875	Benzidine (p-Diamino diphenyl)	A

HAP	98077	Benzotrichloride	A
HAP	100447	Benzyl chloride, (Chloromethyl)benzene	A
HAP	0	Beryllium compounds	A
HAP	92524	Biphenyl	C
HAP	117817	Bis(2-ethylhexyl) phthalate (DEHP) (Dioctyl phthalate)	A
	534076	Bis(chloromethyl)ketone	C
HAP	542881	Bischloromethyl ether	A
	10294345	Boron trichloride	C
	7726956	Bromine	A
	28772567	Bromodiolone	C
HAP	75252	Bromoform	A
HAP	0	Cadmium compounds	A
HAP	156627	Calcium cyanamide	A
HAP	133062	Captan	A
HAP	63252	Carbaryl	C
	1563662	Carbofuran	A
HAP	75150	Carbon disulfide	A
HAP	56235	Carbon tetrachloride	A
HAP	463581	Carbonyl sulfide	C
	786196	Carbophenothion	C
HAP	120809	Catechol	A
HAP	133904	Chloramben (3-amino-2,5-dichloro benzoic acid)	A
HAP	57749	Chlordane	A
HAPs	115286	Chlorendic acid	B
	470906	Chlorfenvinfos	C
HAPs	108171262	Chlorinated paraffins (C12, 60% chlorine)	B
HAP	7782505	Chlorine	A
	24934916	Chlormephos	C
HAP	79118	Chloroacetic acid	A
HAP	108907	Chlorobenzene	A
HAP	510156	Chlorobenzilate (ethyl-4,4'-dichlorobenzilate)	B
	107073	Chloroethanol	A
HAP	67663	Chloroform (Trichloromethane)	A
HAP	107302	Chloromethyl methyl ether	A
	3691358	Chlorophacinone	C
HAP	126998	Chloroprene (2-Chloro-1,3-butadiene)	A
	1982474	Chloroxuron	C
	21923239	Chlorthiophos	C
HAP	0	Chromium compounds (incl. 6+ compounds, etc.)	A
HAPs	117102	Chrysazin (Dorbane)	B
HAPs	2646175	CI Solvent Orange 2	B
HAP	0	Cobalt compounds (as cobalt metal dust and fumes)	A

HAP	0	Coke Oven Emissions	A
	56724	Coumaphos	C
	5836293	Coumatetralyl	C
HAP	1319773	Cresylic acid/Cresols	A
	535897	Crimidine	C
	4170303	Crotonaldehyde	A
	123739	Crotonaldehyde (E)	A
HAP	98828	Cumene	A
HAP	0	Cyanide compounds	A
	675149	Cyanuric fluoride	C
	66819	Cyclohexamide	C
	108918	Cyclohexylamine	C
HAP	3547044	DDE (Dichlorodiphenyldichloroethylene)	A
	8065483	Demeton	A
	919868	Demeton-s-methyl	C
	10311849	Dialifor	C
HAP	334883	Diazomethane	A
HAP	132649	Dibenzofurans	C
	19287457	Diborane	A
HAP	84742	Dibutyl phthalate	C
HAP	111444	Dichloroethyl ether (Bis(2-chloroethyl)ether)	A
	149746	Dichloromethylphenylsilane	C
HAP	62737	Dichlorvos	A
	141662	Dicrotophos	A
HAPs	60571	Dieldrin	A
	1464535	Diepoxybutane	B
HAP	111422	Diethanolamine	A
HAP	64675	Diethyl sulfate	B
	1642542	Diethylchlorophosphate	B
	115264	Dimefox	A
	60515	Dimethoate	A
HAP	60117	Dimethyl aminoazobenzene	B
HAP	79447	Dimethyl carbamoyl chloride	B
HAP	131113	Dimethyl phthalate	C
HAP	77781	Dimethyl sulfate	A
	75183	Dimethyl sulfide (Methyl sulfide)	C
HAP	68122	Dimethylformamide	A
	2524030	Dimethylphosphorochloridothioate	C
	99989	Dimethyl-p-phenylenediamine	C
	644644	Dimetilan	C
	1420071	Dinoterb	C
	78342	Dioxathion	A

	82666	Diphacinone	C
	152169	Diphosphoramidate, octamethyl	A
HAPs	2475458	Disperse Blue 1	B
	298044	Disulfoton	A
	541537	Dithiobiuret	C
	115297	Endosulfan	A
	2778043	Endothion	C
	72208	Endrin	A
HAP	106898	Epichlorohydrin (1-Chloro-2,3-epoxypropane)	A
	563122	Ethion	A
	13194484	Ethoprophos (Ethoprop)	C
HAP	140885	Ethyl acrylate	A
	2642719	Ethyl azinphos	C
HAP	100414	Ethyl benzene (Phenylethane)	C
	538078	Ethyl bis (2-chloroethyl)amine	C
HAP	51796	Ethyl carbamate (Urethane)	B
HAP	75003	Ethyl chloride (Chloroethane)	C
	107153	Ethylene diamine	C
HAP	106934	Ethylene dibromide (1,2-Dibromoethane)	A
HAP	107062	Ethylene dichloride (1,2-Dichloroethane)	A
	371620	Ethylene fluorohydrin	C
HAP	107211	Ethylene glycol	C
HAP	151564	Ethylene imine (Aziridine)	A
HAP	75218	Ethylene oxide	A
HAP	96457	Ethylene thiourea	A
HAP	75343	Ethylidene dichloride (1,1-Dichloroethane)	B
	542905	Ethylthiocyanate	C
	22224926	Fenaminophos (Fenamiphos)	A
	122145	Fenitrothion	C
	115902	Fensulfothion	A
HAP	0	Fine mineral fibers	A
	4301502	Fluometil	C
	144490	Fluoroacetic acid	B
	7782414	Fluorine	C
	640197	Fluoroacetamide	C
	359068	Fluoroacetyl chloride	C
	944229	Fonofos	A
HAP	50000	Formaldehyde	A
	23422539	Formotenate hydrochloride	C
	2540821	Formothion	C
	17702577	Formparanate	C
	21548323	Fosthietan	C

	3878191	Fuberidazole	C
	110009	Furan	A
HAP	0	Glycol ethers	A
HAP	76448	Heptachlor	A
HAP	118741	Hexachlorobenzene	A
HAP	87683	Hexachlorobutadiene	A
HAP	77474	Hexachlorocyclopentadiene	A
HAP	67721	Hexachloroethane	A
HAP	822060	Hexamethylene-1,6-diisocyanate	A
	4835114	Hexamethylenediamine, N,N-dibutyl	C
HAP	680319	Hexamethylphosphoramide	B
HAP	110543	Hexane	C
HAP	302012	Hydrazine	A
HAP	7647010	Hydrochloric acid (Hydrogen chloride)	A
HAP	7664393	Hydrogen fluoride (Hydrofluoric acid)	A
	7783064	Hydrogen sulfide	A
HAP	123319	Hydroquinone	C
	297789	Isobenzan	C
	465736	Isodrin	A
	55914	Isofluorphate	B
HAP	78591	Isophorone	A
	4098719	Isophorone diisocyanate	A
	108236	Isopropyl chlorformate	C
	625558	Isopropyl formate	C
	119380	Isopropylmethylpyrazolyl dimethylcarbamate (Isolan)	C
HAPs	64091914	Ketone, 3-pyridyl-3-(N-methyl-N-nitrosoamino) propyl	B
HAP	0	Lead compounds (except elemental lead)	A
	21609905	Leptophos	C
HAP	-	Lindane (all isomers of hexachlorocyclohexane)	A
HAP	108316	Maleic anhydride	C
HAP	0	Manganese compounds	A
HAP	108394	m-Cresol	B
	950107	Mephosfolan	A
HAP	0	Mercury compounds	A
	126987	Methacrylonitrile	A
	10265926	Methamidophos	A
HAP	67561	Methanol (Methyl alcohol)	C
	950378	Methidathion	A
	2032657	Methiocarb	C
	16752775	Methomyl	B
HAP	72435	Methoxychlor	A
	86500	Methyl azinphos	A

HAP	74839	Methyl bromide (Bromomethane)	A
HAP	74873	Methyl chloride (Chloromethane)	A
	79221	Methyl chloroformate	B
	624920	Methyl disulfide	C
HAP	60344	Methyl hydrazine	A
HAP	74884	Methyl iodide (Iodomethane)	A
HAP	108101	Methyl isobutyl ketone (MIBK) (Hexone)	B
HAP	624839	Methyl isocyanate	A
	556616	Methyl isothiocyanate	C
	74931	Methyl mercaptan (Methanethiol)	A
HAP	80626	Methyl methacrylate	C
	3735237	Methyl phenkapton	C
	78944	Methyl vinyl ketone (3-butene-2-one)	C
HAP	75092	Methylene chloride (Dichloromethane)	A
HAP	101688	Methylene diphenyl diisocyanate (MDI)	A
HAPs	78988	Methylglyoxal	B
	7786347	Mevinphos	A
	315184	Mexacarbate	C
HAP	1634044	MTBE (Methyl tertiary butyl ether)	C
	505602	Mustard gas (Dichlorodiethyl sulfide)	A
HAP	108383	m-Xylene	C
HAP	121697	N,N-Diethyl aniline (N,N-Dimethylaniline)	A
HAP	91203	Naphthalene	B
HAP	0	Nickel compounds (incl. nickel subsulfide)	A
	54115	Nicotine	A
	7697372	Nitric acid	A
HAPs	-	Nitrilotriacetic acid, Ca-, Na-, K salts	B
HAP	98953	Nitrobenzene	A
	1122607	Nitrocyclohexane	C
HAPs	55185	N-Nitrosodiethylamine	A
HAP	62759	N-Nitrosodimethylamine	A
HAPs	924163	N-Nitroso-di-n-butylamine	A
HAP	59892	N-Nitrosomorpholine	B
HAP	684935	N-nitroso-N-methylurea	B
HAPs	615532	N-nitroso-N-methylurethane	C
	991424	Norbormide	C
HAP	90040	o-Anisidine	A
HAP	95487	o-Cresol	B
HAP	95534	o-Toluidine	A
	23135220	Oxamyl	B
	2497076	Oxydisulfoton	C
HAP	95476	o-Xylene	C

	-	Ozone depleting compounds (CFC, etc.)	C
	1910425	Paraquat	A
	2074502	Paraquat methosulfate	A
HAP	56382	Parathion	A
	298000	Parathion-methyl	A
HAP	106445	p-Cresol	A
HAP	82688	Pentachloronitrobenzene (Quintobenzene)	A
HAP	87865	Pentachlorophenol	A
	79210	Peracetic acid	C
HAP	127184	Perchloroethylene (Tetrachloroethylene)	A
HAP	108952	Phenol	C
	64006	Phenol,3-(1-methylethyl)-methylcarbamate	C
HAPs	122601	Phenyl glyceryl ether (3 phenoxy 1,2 propanediol)	A
	298022	Phorate	A
	947024	Phosfolan	C
HAP	75445	Phosgene	A
	732116	Phosmet	B
	13171216	Phosphamidon	C
HAP	7803512	Phosphine	A
HAP	7723140	Phosphorous	A
HAP	85449	Phthalic anhydride	B
	110894	Piperidine	C
	23505411	Pirimifos-ethyl	C
HAP	1336363	Polychlorinated biphenyls (PCBs) (Aroclors)	A
HAP	0	POLYCYCLIC ORGANIC MATTER	A
HAP	106503	p-Phenylenediamine	C
	2631370	Promecarb	C
	106967	Propargyl bromide	C
HAP	57578	Propiolactone, beta	A
HAP	123386	Propionaldehyde	C
HAP	114261	Propoxur (Baygon)	A
HAP	78875	Propylene dichloride (1,2-Dichloropropane)	A
HAP	75569	Propylene oxide	A
HAP	106423	p-Xylene	C
	140761	Pyridine, 2-methyl-5-vinyl	C
	53558251	Pyriminil	C
HAP	91225	Quinoline	A
HAP	106514	Quinone	A
HAP	0	Radionuclides (including radon)	A
	107448	Sarin	B
HAP	0	Selenium compounds	A
	62748	Sodium fluoroacetate	A

	131522	Sodium pentachlorophenate	A
	57249	Strychnine	A
	60413	Strychnine sulfate	C
HAP	100425	Styrene	C
HAP	96093	Styrene oxide	C
	3689245	Sulfotep	A
	7446119	Sulfur trioxide	C
	7664939	Sulfuric acid	B
	77816	Tabun	B
	13494809	Tellurium	A
	107493	TEPP (Tetraethyldithiopyrophosphate)	A
	13071799	Terbufos	A
	509148	Tetranitromethane	A
	-	Thallium compounds	A
	297972	Thionazin (o,o diethyl-0-2-pyridinylphosphorothioate)	C
	108985	Thiophenol (Phenyl mercaptan)	A
	79196	Thiosemicarbizide	C
HAP	7550450	Titanium tetrachloride	C
HAP	108883	Toluene	C
HAP	8001352	Toxaphene (Camphechlor)	A
	110576	Trans 1,4-dichlorobutene	B
HAP	79016	Trichloroethylene (TCE)	C
HAP	121448	Triethylamine	A
HAP	1582098	Trifluralin	A
	555771	Tris(2-chloroethyl)amine	C
	2001958	Valinomycin	C
HAP	108054	Vinyl acetate	C
HAP	593602	Vinyl bromide	A
HAP	75014	Vinyl chloride	A
	81812	Warfarin	A
	129066	Warfarin sodium	A
HAP	1330207	Xylene (and mixed isomers)	C
	28347139	Xylylene dichloride	C
	1314847	Zinc phosphide	A

