APPENDIX B

DETERMINING FACILITY EMISSIONS FOR TITLE V APPLICABILITY

Introduction

This appendix explains how to calculate a facility's emissions in order to determine whether the facility is subject to Title V.

This appendix provides instructions for determining both:

- ***Actual emissions***, which are used to determine applicability of Title V to existing and modified facilities during Phase One of the program (provided that the modification applications are deemed complete on or before March 31, 2000); ***and***
- ***Potential to emit (PTE)***, which is used to determine applicability for new and modified facilities during Phase Two.

The appendix first discusses the pollutants and emission sources to be included in the applicability determination, and then discusses the procedures to calculate actual emissions and PTE. Examples of PTE calculations are provided at the end of the appendix.

What Pollutants Need To Be Included In The Applicability Determination?

The facility is subject to Title V if it exceeds one or more of the pollutant emission thresholds described in Chapter 2, Applicability Determination. There are thresholds for both criteria pollutants and hazardous air pollutants (HAPs).

The criteria pollutants whose emissions are used to determine Title V applicability are listed in Table B-1.

Table B-1: Criteria Pollutants Used To Determine Title V Applicability

Criteria Pollutant
Volatile organic compounds (VOC)
Oxides of nitrogen (NOx)
Oxides of sulfur (Sox)
Carbon monoxide (CO)
Particulate matter equal to or less than 10 microns in diameter (PM-10)

Note: Lead is both a criteria pollutant and HAP. Since for lead the HAP thresholds for applicability are lower than the criteria pollutant thresholds, the HAP thresholds determine whether a facility is subject to Title V due to lead emissions.

HAPs are toxic pollutants regulated under Title III of the federal Clean Air Act. Table B-2 provides the list of HAPs as of November 2000.

The original list of HAPs in the federal Clean Air Act included 189 compounds. Since the 1990 amendments to the federal Clean Air Act, two compounds have been delisted. Table B-3 provides the delisted compounds. Emissions of the delisted compounds are not counted when determining whether a facility is a major source of HAPs.

Table B-2: Hazardous Air Pollutants

Pollutant	CAS No.	Pollutant	CAS No.
Acetaldehyde[h]	75-07-0	Chloroform[f]	67-66-3
Acetamide	60-35-5	Chloromethyl methyl ether[f]	107-30-2
Acetonitrile	75-05-8	Chloroprene	126-99-8
Acetophenone	98-86-2	Chromium compounds	---
2-Acetylaminofluorene	53-96-3	Cobalt compounds	---
Acrolein[f]	107-02-8	Coke oven emissions	---
Acrylamide	79-06-1	Cresols/Cresylic acid (isomers and mixture)	1319-77-3
Acrylic acid	79-10-7	o-Cresol	95-48-7
Acrylonitrile[f]	107-13-1	m-Cresol	1080-30-4
Allyl chloride	107-05-1	p-Cresol	106-44-5
4-Aminobiphenyl	92-67-1	Cumene	98-82-8
Aniline	62-53-3	Cyanide compounds[a, l, j]	---
o-Anisidine	90-04-0	2,4-D, salts and esters	94-75-7
Antimony compounds	---	DDE	3547-04-4
Arsenic compounds[g]		Diazomethane	334-88-3
Arsine[f]	7784-42-1	Dibenzofurans	132-64-9
Asbestos	1332-21-4	1,2-Dibromo-3-chloropropane	96-12-8
Benzene (including benzene from gasoline)	71-43-2	Dibutylphthalate	84-74-2
Benzidine	92-87-5	1,4-Dichlorobenzene	106-46-7
Benzotrichloride	98-07-7	3,3'-Dichlorobenzidene	91-94-1
Benzyl chloride	100-44-7	Dichloroethyl ether (bis(2-chloroethyl)ether)	111-44-4
Beryllium compounds	---	1,3-Dichloropropene	542-75-6
Biphenyl	92-52-4	Dichlorvos	62-73-7
Bis(2-ethylhexyl)phthalate (DEHP)	117-81-7	Diethanolamine	111-42-2
Bis(chloromethyl)ether[f]	542-88-1	N,N-Diethyl aniline (N,N-dimethylaniline)	121-69-7
Bromoform	75-25-2	Diethyl sulfate	64-67-5
1,3-Butadiene[h]	106-99-0	3,3-Dimethyloxybenzidine	119-90-4
Cadmium compounds	---	Dimethylaminoazobenzene	60-11-7
Calcium cyanamide	156-62-7	3,3-Dimethyl benzidine	119-93-7
Captan	133-06-2	Dimethyl carbamoyl chloride	79-44-7
Carbonyl	63-25-2	Dimethyl formamide	68-12-2
Carbon disulfide[f]	75-15-0	1,1-Dimethylhydrazine[f]	57-14-7
Carbon tetrachloride	56-23-5	Dimethyl phthalate	131-11-3
Carbonyl sulfide[h]	463-58-1	Dimethyl sulfate	77-78-1
Catechol	120-80-9	4,6-Daintier-o-cresol and salts	534-52-1
Chloramben	133-90-4	2,4-Dinitrophenol	51-28-5
Chlordane	57-74-9	2,4-Dinitrotoluene	121-14-2
Chlorine[f]	7782-50-5	1,4-Dioxane	123-91-1
Chloroacetic acid	79-11-8	1,2-Diphenylhydrazine	122-66-7
2-Chloroacetophenone	532-27-4	Epichlorohydrin[f]	106-89-8
Chlorobenzene	108-90-7	1,2-Epoxybutane	106-88-7
Chlorobenzilate	510-15-6	Ethyl acrylate	140-88-5

Table B-2: Hazardous Air Pollutants (Continued)

Pollutant	CAS No.	Pollutant	CAS No.
Ethyl benzene	100-41-4	Methylene chloride	75-09-2
Ethyl chloride (chloroethane)[h]	75-00-3	Methylene diphenyl diisocyanate (MDI)	101-68-8
Ethylene dibromide	106-93-4	4,4-Methylene bis(2-chloro-aniline)	101-14-4
Ethylene dichloride	107-06-2	4,4'-Methylenedianiline	101-77-9
Ethylene glycol	107-21-1	Naphthalene	91-20-3
Ethylene imine (aziridine)[f]	151-56-4	Nickel compounds[l]	---
Ethylene oxide[f]	75-21-8	Nitrobenzene	98-95-3
Ethylene thiourea	96-45-7	4-Nitrobiphenyl	92-93-3
Ethylidene dichloride	75-34-3	4-Nitrophenol	100-02-7
Fine mineral fibers[b]	---	2-Nitropropane	79-46-9
Formaldehyde[f]	50-00-0	N-Nitrosodimethylamine	62-75-9
Glycol ethers[c]	---	N-Nitroso-N-methylurea	684-93-5
Heptachlor	76-44-8	N-Nitrosomorpholine	59-89-2
Hexachlorobenzene	118-74-1	Parathion	56-38-2
Hexachlorobutadiene	87-68-3	Pentachloronitrobenzene (quintobenzene)	82-68-8
Hexachlorocyclopentadiene	77-47-4	Pentachlorophenol	87-86-5
Hexachloroethane	67-72-1	Phenol	108-95-2
Hexamethylene-1,6-diisocyanate	822-06-0	p-Phenylenediamine	106-50-3
Hexamethylphosphoramide	680-31-9	Phosgene[f]	75-44-5
Hexane	110-54-3	Phosphine[f]	7803-51-2
Hydrazine[f]	302-01-2	Phosphorus	7723-14-0
Hydrochloric acid[f]	7647-01-0	Phthalic anhydride	85-44-9
Hydrogen fluoride[f]	7664-39-3	Polychlorinated biphenyls	1336-36-3
Hydroquinone	123-31-9	Polycyclic organic matter[d]	---
Isophorone	78-59-1	1,3-Propane sultone	1120-71-4
Lead compounds[k]	---	beta-Propiolactone	57-57-8
Lindane (all isomers)	58-89-9	Propionaldehyde	123-38-6
Maleic anhydride	108-31-6	Propoxur (Baygon)	114-26-1
Manganese compounds	---	Propylene dichloride (1,2-dichloropropane)	78-87-5
Mercury compounds	---	Propylene oxide[f]	75-56-9
Methanol	67-56-1	1,2-Propylenimine (2-methyl aziridine)[f]	75-55-8
Methoxychlor	72-43-5	Quinoline	91-22-5
Methyl bromide (bromomethane)	74-83-9	Quinone	106-51-4
Methyl chloride[f]	74-87-3	Radionuclides (including radon)[e]	---
Methyl chloroform (1,1,1-TCA)	71-55-6	Selenium compounds	---
Methyl ethyl ketone (2-butanone)	78-93-3	Styrene	100-42-5
Methyl hydrazine[f]	60-34-4	Styrene oxide	96-09-3
Methyl iodide (iodomethane)	74-88-4	2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746-01-6
Methyl isobutyl ketone (hexone)	108-10-1	1,1,2,2-Tetrachloroethane	79-34-5
Methyl isocyanate[f]	624-83-9	Tetrachloroethylene (perchloroethylene)	127-18-4

Table B-2: Hazardous Air Pollutants (Continued)

Pollutant	CAS No.	Pollutant	CAS No.
Methyl methacrylate	80-62-6	Titanium tetrachloride	7550-45-0
Methyl tert butyl ether	1634-04-4	Toluene	108-88-3
2,4-Toluene diamine	95-80-7	Triethylamine	121-44-8
2,4-Toluene diisocyanate[f]	584-84-9	Trifluralin	1582-09-8
o-Toluidine	95-53-4	2,2,4-Trimethylpentane	540-84-1
Toxaphene (chlorinated camphene)	8001-35-2	Urethane (ethyl carbamate)	51-79-6
1,2,4-Trichlorobenzene	120-82-1	Vinyl acetate[f]	108-05-4
1,1,2-Trichloroethane	79-00-5	Vinyl bromide	593-60-2
Trichloroethylene	79-01-6	Vinyl chloride[h]	75-01-4
2,4,5-Trichlorophenol	95-95-4	Vinylidene chloride (1,1-dichloroethylene) [h]	75-35-4
2,4,6-Trichlorophenol	88-06-2	Xylenes (isomers and mixture)	---

CAS No. = Chemical Abstract Service number

[a] X'CN where X' = H or any other group where a formal dissociation may occur. For example, KCN or $Ca(CN)_2$.

[b] Includes mineral fiber emissions from facilities manufacturing or processing glass, rock or slag fibers (or other mineral derived fibers) of average diameter 1 micrometer or less.

[c] Includes mono- and di-ethers of ethylene glycol, diethylene glycol and triethylene glycol $R(OCH_2CH_2)_n$-OR' where n = 1, 2 or 3, R = alkyl or aryl groups, and R' = R, H, or groups which, when removed, yield glycol ethers with the structure: $R(OCH_2CH)_n$-OH. Polymers are excluded from the glycol category.

[d] Includes organic compounds with more than one benzene ring, and which have a boiling point greater than or equal to 100 degrees C.

[e] A type of atom which spontaneously undergoes radioactive decay.

[f] This substance is also listed in Table 1 and Table 2 in 40 CFR Part 68, Section 68.130 as a Regulated Toxic Substance for Accidental Release Prevention pursuant to Section 112 (r) of the federal Clean Air Act.

[g] Arsenous trichloride (CAS No. 7784-34-1) falls under the general category of "Arsenic Compounds" and is listed in Table 1 and Table 2 in 40 CFR Part 68, Section 68.130 as a Regulated Toxic Substance for Accidental Release Prevention pursuant to Section 112 (r) of the federal Clean Air Act.

[h] This substance is also listed in Table 3 and Table 4 in 40 CFR Part 68, Section 68.130 as a Regulated Flammable Substance for Accidental Release Prevention pursuant to Section 112(r) of the federal Clean Air Act.

[i] Hydrocyanic acid (CAS No. 74-90-8), Cyanogen chloride (CAS No. 506-77-4), Methyl isocyanate (CAS No. 624-83-9), Methyl thiocyanate (CAS No. 556-64-9), Toluene diisocyanate (CAS No. 26471-62-5) and Toluene 2,6-diisocyanate (CAS No. 91-08-7) fall under the general category of "Cyanide Compounds" and are listed in Table 1 and Table 2 in 40 CFR Part 68, Section 68.130 as Regulated Toxic Substances for Accidental Release Prevention pursuant to Section 112 (r) of the federal Clean Air Act.

[j] Cyanogen (CAS No. 460-19-5 falls under the general category of "Cyanide Compounds" and is listed in Table 3 and Table 4 in 40 CFR Part 68, Section 68.130 as a Regulated Flammable Substance for Accidental Release Prevention pursuant to Section 112(r) of the federal Clean Air Act.

[k] Tetramethyllead (CAS No. 75-74-1 falls under the general category of "Lead Compounds" and is listed in Table 1 and Table 2 in 40 CFR Part 68, Section 68.130 as a Regulated Toxic Substance for Accidental Release Prevention pursuant to Section 112 (r) of the federal Clean Air Act.

[l] Nickel carbonyl (CAS No. 13463-39-3 falls under the general category of "Nickel Compounds" and is listed in Table 1 and Table 2 in 40 CFR Part 68, Section 68.130 as a Regulated Toxic Substance for Accidental Release Prevention pursuant to Section 112 (r) of the federal Clean Air Act.

Table B-3: De-Listed Compounds Formerly Identified As Hazardous Air Pollutants

Pollutant	CAS No.
Caprolactam	105-60-2
Hydrogen sulfide [32]	7783-06-4

What Emission Sources Must Be Included In The Applicability Determination?

For determining actual emissions or potential to emit, your applicability determination must include **ALL EMISSION SOURCES AT THE FACILITY BOTH PERMITTED AND UNPERMITTED, EXCEPT THE FOLLOWING**:

- Emissions from "trivial activities" as defined by EPA. Table B-4 lists such trivial activities;
- Fugitive emissions, unless these emissions come from a source category identified by EPA or they are HAP emissions. Table B-5 lists the source categories for which fugitive emissions must be included in the applicability determination;
- On-road and off-road mobile equipment, as defined in Rule 219 - Equipment Not Requiring a Written Permit Pursuant to Regulation II);
- In determining applicability for a rental equipment facility, off-site emissions from portable equipment permitted to the rental equipment facility to operate at various locations;
- Emissions from non-road engines, as defined by 40 CFR Part 89, Section 89.2; and,
- Emissions from military tactical support equipment registered to operate state-wide pursuant to Article 5 - Portable Engine and Equipment Registration, Title 13 of the California Code of Regulations.

NOTE THAT SOME EMISSION SOURCES THAT MAY BE EXCLUDED FROM THE APPLICABILITY DETERMINATION MUST STILL BE INCLUDED IN THE TITLE V APPLICATION AND PERMIT IF THE EMISSION SOURCES ARE SUBJECT TO APPLICABLE REQUIREMENTS.

[32] Even though this substance has been de-listed as a Hazardous Air Pollutant, it is listed in Table 1 and Table 2 in 40 CFR Part 68, Section 68.130 as a Regulated Toxic Substance for Accidental Release Prevention pursuant to Section 112 (r) of the federal Clean Air Act.

What Are Considered Fugitive Emissions?

In 40 CFR Part 70, Section 70.2, and Rule 3000, "fugitive emissions" are defined as:

> "...those emissions which cannot reasonably pass through a stack, chimney, vent, or other functionally-equivalent opening."

Fugitive emissions are not included in the applicability determination unless:

- The fugitive emission source belongs to a source category listed in Table B-5; or
- The fugitive emissions are HAPs. Total HAP emissions, including fugitives, must be used to determine whether a facility exceeds the HAP thresholds for applicability.
- Some examples of sources of fugitive emissions, which do not need to be included in the applicability determination (unless they are HAP emissions), are:
- Architectural coating used on stationary structures and their appurtenances, to mobile homes, to pavements, or to curbs;
- Spillage from gasoline dispensing; and,
- Pumps and valves from oil and gas production facilities.

It should be noted that these requirements are specific to Title V applicability determinations. Emissions from fugitive sources may need to be determined for other AQMD requirements.

Table B-4: "Trivial" Activities That May Be Presumptively Omitted From The Applicability Determination

Trivial Activity
• Combustion emissions from propulsion of mobile sources, except for vessel emissions from Outer Continental Shelf sources
• Air-conditioning units used for human comfort that do not have applicable requirements under Title VI of the Act
• Ventilating units used for human comfort that do not exhaust air pollutants into the ambient air from any manufacturing/industrial or commercial process
• Non-commercial food preparation
• Consumer use of office equipment and products, not including printers or businesses primarily involved in photographic reproduction
• Janitorial services and consumer use of janitorial products
• Internal combustion engines used for landscaping purposes
• Laundry activities, except for dry-cleaning and steam boilers
• Bathroom/toilet vent emissions
• Emergency (backup) electrical generators at residential locations
• Tobacco smoking rooms and areas
• Blacksmith forges
• Plant maintenance and upkeep activities (e.g., grounds-keeping, general repairs, cleaning, painting, welding, plumbing, re-tarring roofs, installing insulation, and paving parking lots) provided these activities are not conducted as part of a manufacturing process, are not related to the source's primary business activity, and not otherwise triggering a permit modification[33]
• Repair or maintenance shop activities not related to the source's primary business activity, not including emissions from surface coating or de-greasing (solvent metal cleaning) activities, and not otherwise triggering a permit modification
• Portable electrical generators that can be moved by hand from one location to another[34]
• Hand-held equipment for buffing, polishing, cutting, drilling, sawing, grinding, turning or machining wood, metal or plastic
• Brazing, soldering and welding equipment, and cutting torches related to manufacturing and construction activities that do not result in emission of HAP metals[35]

[33] Cleaning and painting activities qualify as trivial if they are not subject to VOC or HAP control requirements. Asphalt batch plant owners/operators must still get a permit if otherwise required.

[34] "Moved by hand" means it can be moved without the assistance of any motorized or non-motorized vehicle, conveyance or device.

[35] Brazing, soldering and welding equipment, and cutting torches related to manufacturing and construction activities that emit HAP metals are more appropriate for treatment as unpermitted equipment. Brazing, soldering, welding and cutting torches directly related to plant maintenance and upkeep and repair or maintenance shop activities that emit HAP metals are treated as trivial and listed separately in this appendix.

Table B-4: "Trivial" Activities That May Be Presumptively Omitted From The Applicability Determination (Continued)

Trivial Activity
• Air compressors and pneumatically operated equipment, including hand tools
• Batteries and battery charging stations, except at battery manufacturing plants
• Storage tanks, vessels and containers holding or storing liquid substances that will not emit any VOC or HAP[36]
• Storage tanks, reservoirs, and pumping and handling equipment of any size containing soaps, vegetable oil, grease, animal fat and nonvolatile aqueous salt solutions, provided appropriate lids and covers are utilized
• Equipment used to mix and package soaps, vegetable oil, grease, animal fat, and nonvolatile aqueous salt solutions, provided appropriate lids and covers are utilized
• Drop hammers or hydraulic presses for forging or metalworking
• Equipment used exclusively to slaughter animals, but not including other equipment at slaughterhouses, such as rendering cookers, boilers, heating plants, incinerators, and electrical power generating equipment
• Vents from continuous emissions monitors and other analyzers
• Natural gas pressure regulator vents, excluding venting at oil and gas production facilities
• Hand-held applicator equipment for hot melt adhesives with no VOC in the adhesive formulation
• Equipment used for surface coating, painting, dipping or spraying operations, except those that will emit VOC or HAP
• CO_2 lasers, used only on metals and other materials which do not emit HAP in the process
• Consumer use of paper trimmers/binders
• Electric or steam-heated drying ovens and autoclaves, but not the emissions from the articles or substance being processed in the ovens or autoclaves or the boilers delivering the steam
• Salt baths using nonvolatile salts that do not result in emissions of any regulated air pollutants
• Laser trimmers using dust collection to prevent fugitive emissions

[36] Exemptions for storage tanks containing petroleum liquids or other volatile organic liquids should be based on size limits such as storage tank capacity and vapor pressure of liquids stored and are not appropriate for this list.

Table B-4: "Trivial" Activities That May Be Presumptively Omitted From The Applicability Determination (Continued)

Trivial Activity
• Bench-scale laboratory equipment used for physical or chemical analysis, but not lab fume hoods or vents[37]
• Routine calibration and maintenance of laboratory equipment or other analytical instruments
• Equipment used for quality control/assurance or inspection purposes, including sampling equipment used to withdraw materials for analysis
• Hydraulic and hydrostatic testing equipment
• Environmental chambers not using hazardous air pollutant (HAP) gasses
• Shock chambers
• Humidity chambers
• Solar simulators
• Fugitive emission related to movement of passenger vehicles, provided any required fugitive dust control plan or its equivalent is submitted
• Process water filtration systems and demineralizers
• Demineralized water tanks and demineralizer vents
• Boiler water treatment operations, not including cooling towers
• Oxygen scavenging (de-aeration) of water
• Ozone generators
• Fire suppression systems
• Emergency road flares
• Steam vents and safety relief valves
• Steam leaks
• Steam cleaning operations
• Steam sterilizers

[37] Many lab fume hoods or vents might qualify for treatment as unpermitted equipment.

Table B-5: Stationary Source Categories For Which Fugitive Emissions Must Be Included In The Applicability Determination

Trivial Activity
• Carbon black plants (furnace process)
• Charcoal production plants
• Chemical process plants
• Coal cleaning plants (with thermal dryers)
• Coke oven batteries
• Fossil-fuel boilers (or combination thereof) totaling more than 250 million BTU per hour heat input
• Fossil-fuel-fired steam electric plants of more than 250 million BTU per hour heat input
• Fuel conversion plants
• Glass fiber processing plants
• Hydrofluoric, sulfuric or nitric acid plants
• Iron and steel mills
• Kraft pulp mills
• Lime plants
• Municipal incinerators capable of charging more than 250 tons of refuse per day
• Petroleum refineries
• Petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels
• Phosphate rock processing plants
• Portland cement plants
• Primary aluminum ore reduction plants
• Primary copper smelters
• Primary lead smelters
• Primary zinc smelters
• Secondary metal production plants
• Sintering plants
• Sulfur recovery plants
• Taconite ore processing plants
• All other stationary source categories regulated by a standard promulgated under Section 111 or 112 of the federal Clean Air Act, but only with respect to those air pollutants that have been regulated for that category.

Determination Of Actual Emissions For Title V Applicability

Title V applicability for existing facilities may be based on actual emissions. For purposes of Regulation XXX, ***actual emissions means the facility's reported emissions as provided to the AQMD by the facility in their annual Emission Fee Billing (AER) reports*** [see Rule 3000(b)(25) and Rule 3001(a)].

Some facilities may need to make an adjustment to their AER report to subtract the following emissions that are not used to determine Title V applicability:

- Emissions from certain on-road and off-road mobile equipment, off-site emissions from portable equipment permitted to operate at various locations), and emissions from certain non-road engines and military tactical support equipment as described in Rule 3004 (h)(5);
- Fugitive emissions which are not HAPs and which do not belong to a source category listed in Table B-5; and,
- Emissions from "trivial activities" which do not belong to a source category listed in Table B-4.

Determination Of PTE For Title V Applicability

PTE is used to determine Title V applicability for new and modified facilities during Phase One, and for all facilities during Phase Two.

PTE is defined as:

> "...the maximum capacity of a facility to emit any air pollutant under its physical and operational design. Any physical or operational limitation on the capacity of a facility to emit an air pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of materials combusted stored or processed, shall be treated as part of its design if the limitation is enforceable by the EPA Administrator[38]." [Rule 3000 (b)(17)]

If there is a permit condition on the permit limiting emissions for a particular pollutant, it will be the basis for PTE. The general formula for calculating PTE when there is a condition limiting emissions on the permit is as follows:

[38] EPA has issued a policy that any permit condition that is legally and practically enforceable by a local District may also be considered as a basis for the PTE.

PTE (unit mass/year) = MAXIMUM HOURLY LIMIT (unit mass/hour) x 24 hours/day x 365 day/year; or

= MAXIMUM DAILY LIMIT (unit mass/day) x 365 days/year; or

= MAXIMUM 30-DAY LIMIT (unit mass/30-day average month) x 12 months/year; or

= MAXIMUM MONTHLY LIMIT (unit mass/month) x 12 months/year; or

= MAXIMUM ANNUAL LIMIT (unit mass/year)

If there is not a permit condition on the permit limiting emissions, the PTE may be calculated using one of the following general formulas:

PTE = MAXIMUM THROUGHPUT x MAXIMUM EMISSION FACTOR[39]

Throughput and emission factor may be expressed in different ways, depending on the equipment. Here are some examples:

Annual Throughput	Emission Factor
Tons of Material	Pounds(Lbs)/Ton of Material
Million Cubic Feet of Fuel	Lbs/Million Cubic Feet of Fuel
Gallons of Coating	Lbs/Gallon of Material
Hours	Lbs/Hour
Standard Cubic Feet of Exhaust	Lbs/Standard Cubic Foot

The procedures for determining maximum throughput and maximum emission factor are described below.

Facility owners/operators can calculate their facility PTE or provide the operational and design data necessary for AQMD staff to determine the PTE of specific permit units. AQMD staff will review and verify calculations provided by the facility.

[39] There are exceptions, such as breathing losses from storage tanks, and fugitive emissions from valves, flanges and pumps, which are not a function of throughput.

Maximum Throughput

The maximum throughput -- that is, the maximum operating hours, maximum materials usage, maximum flow rate, etc. -- can be determined from the design and operational parameters of the emission source. Table B-6 lists the equipment design and operational parameters that are typically needed to determine the maximum throughput.

Table B-6: Design And Operational Parameters

Operational Parameters	Design Parameters
Operation Schedule Hours/day Days/week Weeks/year Material Type Maximum Throughput Operating Conditions Temperature Pressure Flow rate	Combustion Equipment Size Number of burners Rating of burners Burner type Control equipment Other Equipment Dimension Capacity Control equipment Texture/color

The maximum values for the parameters from the above table that can be demonstrated are inherent to the design of the equipment must be used, unless there is a permit condition on the permit that limits the parameter and that ***is federally enforceable,*** or legally and practically enforceable by AQMD. Such permit conditions may include, but are not limited to:

- Restrictions on the hours of operation; or
- Restrictions on the type or amount of materials.

Facility owners/operators may request to have federally enforceable limits placed on the operation of a permit unit in order to limit throughput. Such limits will establish the operational limit of the permit unit. However, ***the facility owner/operator should be aware that such limits must be complied with during the operation of the equipment***.

The following examples illustrate how to establish the maximum throughput of an emission source.

Maximum Throughput Example 1

Company A operates a boiler rated at a maximum of 16 MMBTU/hour. The permit for the boiler does not include any restrictions on the hours of operation or fuel usage. Therefore the maximum throughput of the boiler is determined by:

- The maximum operating schedule of 24 hours/day, 365 days/year;
- The maximum boiler rating of 16 MMBTU/hr.

The maximum throughput is:

(16 MMBTU/hr)(24 hrs/day)(365 days/yr) = 140,160 MMBTU/yr

MMBTU = million British thermal units

Maximum Throughput Example 2

Company B operates a 10,000-gallon fixed-roof storage tank to store fuel for its emergency generator. The tank is vented to the atmosphere.

A permit condition for the tank states that the throughput cannot exceed 5,000 gallons in any one year. The condition is federally enforceable in this case.

Therefore, the maximum throughput of the storage tank is 5,000 gallons/year.

Emission Factor

An emission factor is expressed as a mass of emissions per unit of throughput. Examples of emission factors include:

- lbs of VOC per gallon of coating material;[40]
- lbs of NOx per million BTU;
- lbs of PM-10 per ton of material processed; and
- grains of PM-10 per standard cubic foot.[41]

The emission factor should be based on either the most stringent limit (federal, state or local) that currently applies to the facility, or the limit that is a condition on the equipment's permit, whichever is lower.

[40] Most coatings and AQMD coating rules specify VOC limits as pounds of VOC per gallon of coating, less water and exempt solvents. When the coating contains any water or exempt solvent, be sure to only use pounds of VOC per gallon of material. Otherwise, actual emissions will be significantly overestimated.

[41] This is not actually an emission factor in its traditional sense, but, if the throughput is expressed as standard cubic feet of exhaust, it works in the basic equation for calculating emissions.

If there is no applicable emission limit in a rule or on the permit, then the emission factor should be based on the highest emission factor that could occur with the equipment. This may be based on the following sources of information:

- AQMD-approved source test results;
- Continuous emission monitoring systems (CEMS) data;
- AQMD emission factors;
- AP-42 or other emission factors;
- Manufacturer's data;
- Mass balance; and
- Engineering calculations.

These methods are discussed below. AQMD approval may be required for any of the methods and emission factors used.

AQMD-Approved Source Test Results

Source testing is one of the most accurate techniques for quantifying emissions, provided that the test is conducted by qualified personnel in accordance with approved test procedures. Test methods generally include a series of stack tests over a period of several hours, continuous emission monitoring, or a combination of these source testing methods. The testing must be conducted when the emission factor is at its highest.

Source test conditions, methods, and results must be approved by AQMD in order to be used for the applicability determination.

Facility owners/operators may use source test results of other equipment that is similar or identical, provided that the equipment operates under the same types of conditions.

Source test results are usually expressed in terms of parts per million (ppm of pollutant), and can be converted to an emission factor.

CEMS Data

A CEMS collects, conditions (if necessary), and analyzes flue gas to quantify air emissions. Generally, the system displays the results of the analysis on a console at regular intervals, usually every 15 minutes. CEMS data yield accurate emission results.

CEMS data are usually expressed in terms of ppm of and can be converted to an emission factor. The highest emission factor measured by the CEMS would be the maximum emission factor.

AQMD Emission Factors

The AQMD compiles and publishes many emission factors in the AER forms. Some of these factors are based on emission limitations specified in BACT guidelines or AQMD rules.

AP-42 or Other Emission Factors

Emission factors are a common method for estimating emissions. References for emission factors include:

- Compilation of Air Pollutant Emission Factors, generally referred to as AP-42;
- EPA's Factor Information Retrieval System (FIRE) database;
- EPA's Aerometric Information Retrieval System (AIRS) Facility Subsystem Source Classification Codes and Emission Factor Listing for Criteria Pollutants; and
- EPA's Crosstalk/Air Toxics Emission Factor database.

These factors are based on process throughput or production rate and are generally expressed in terms of pounds/million gallons transferred, pounds/MMBTU, grams/kilogram, or pounds/day per fugitive component.

Manufacturer's Data

Manufacturer's data may also be used to quantify the maximum emission factor. In such cases, the AQMD may request a copy of the manufacturer's source test report or Material Safety Data Sheet (MSDS) for review and approval.

Mass Balance

The mass balance approach can be used when emission factors are not available or when mass balance will provide a more accurate determination of maximum emissions than the use of emission factors.

Mass balance equates the input of a substance to the consumption, accumulation, and loss of that substance. Mass balance calculations must account for all routes of inflow and outflow, as well as any accumulation or depletion of the substance in the equipment or process (including control devices) and through any chemical reactions.

The facility must have the following information in order to determine the mass balance of a substance in a material used at the facility:

- The amount of material in storage at the beginning of the time period (starting inventory);
- Total purchases of the materials used in the equipment or process during the time period;

- The amount of material in storage at the end of the time period (ending inventory);
- Total hazardous waste taken from the facility to be recycled or destroyed;
- The fraction of the substance in the material; and
- The capture and destruction efficiencies, which combine to determine the overall control efficiency, of any control devices used.

Using this information, the total material usage is calculated from the equation:

MATERIAL USAGE = STARTING INVENTORY + TOTAL PURCHASE - HAZARDOUS WASTE - ENDING INVENTORY

The material usage multiplied by the fraction of the substance in the material and the control efficiency (where applicable) will yield the total emissions of the substance during the time period from the use of that material.

Engineering Calculations

Engineering calculations use principles of chemistry and physics to determine maximum emissions. Information about the design of the unit of operation, equipment design or emission information from similar equipment or processes are used to determine emissions.

Proper Calculations Using Emission Factors

The most frequent source of error in calculating emissions is the improper use of emission factors. These pointers will help ensure proper calculations:

- ***Select the correct emission factor for the emission source***. Be sure that the selected emission factor is applicable to the particular source.
- ***Use a uniform unit of measurement***. For example, if the density of methylene chloride is expressed in pounds/gallon, the usage should be expressed in gallons/year, not pounds/year, liters/year, etc.
- ***Use the correct number of parameters***. Make sure that all operational and design parameters that are needed for a complete calculation are obtained and used.

Table B-7 shows the correct use of emission factors to determine emissions from combustion equipment.

Table B-7: Correct Use Of Emission Factors For Combustion Equipment

Fuel Type	Emission Rate	=	Fuel Usage	x	Heating Value	x	Emission Factor
Gaseous fuel	$\frac{\text{lbs pollutant}}{\text{year}}$	=	$\frac{\text{MMSCF}}{\text{year}}$	x	$\frac{\text{MMBTU}}{\text{MMSCF}}$	x	$\frac{\text{lb pollutant}}{\text{MMBTU}}$
Liquid fuel	$\frac{\text{lbs pollutant}}{\text{year}}$	=	$\frac{\text{MGAL}}{\text{year}}$	x	$\frac{\text{MMBTU}}{\text{MGAL}}$	x	$\frac{\text{lb pollutant}}{\text{MMBTU}}$
Solid fuel	$\frac{\text{lbs pollutant}}{\text{year}}$	=	$\frac{\text{lb fuel}}{\text{year}}$	x	$\frac{\text{MMBTU}}{\text{lb fuel}}$	x	$\frac{\text{lb pollutant}}{\text{MMBTU}}$
Gaseous fuel	$\frac{\text{lbs pollutant}}{\text{year}}$	=	$\frac{\text{MMSCF}}{\text{year}}$	x			$\frac{\text{lb pollutant}}{\text{MMSCF}}$
Liquid fuel	$\frac{\text{lbs pollutant}}{\text{year}}$	=	$\frac{\text{MGAL}}{\text{year}}$	x			$\frac{\text{lb pollutant}}{\text{MGAL}}$
Solid fuel	$\frac{\text{lbs pollutant}}{\text{year}}$	=	$\frac{\text{lb fuel}}{\text{year}}$	x			$\frac{\text{lb pollutant}}{\text{lb fuel}}$

MMSCF = million standard cubic feet
MMBTU = million British thermal units
MGAL = thousand gallons

PTE Calculation Examples

The following examples illustrate the methods for calculating PTE.

PTE Calculation Example 1

Company C operates a 50 MMBTU/hour refinery gas-fired heater. The heater has five low-NOx burners, each rated at 10 MMBTU/hour. Although the heat content of refinery gas varies frequently, the permit has a federally enforceable condition that the highest heating value of the gas must not exceed 1,200 BTU/SCF.

The permit limits NOx emissions from this heater to 0.03 lb/MMBTU.

There are no permit limits on fuel use or hours of operation.

Maximum Throughput

Operational and Design Parameters: The operation schedule is 24 hours/day, 365 days/year. The material is refinery gas with maximum heat content of 1,200 BTU/SCF. The combustion equipment is a heater with five low-NOx burners each rated at 10 MMBTU/hour.

Calculate the maximum annual fuel usage in MMBTU as follows:

1. Calculate the annual operating hours:

Annual operating hours = 24 hours/day x 365 days/year
= 8,760 hours/year

2. Calculate the maximum annual fuel usage:

Maximum annual fuel usage
= Annual operating hours x Hourly fuel usage
= 8,760 hours/year x 50 MMBTU/hour
= 438,000 MMBTU/year

Emission Factors

NOx

The maximum NOx emission factor is 0.03 lbs/MMBTU, as specified on the permit.

SOx

There is no SOx emission limit on the permit, but the most stringent rule is Rule 431.1, which limits the sulfur content of the fuel to 40 ppm.

Calculate the maximum emission factor:

$\frac{40 \text{ ppm} \times 10^6 \text{ SCF} \times 64 \text{ lbs/lb-mole}}{10^6 \times 379 \text{ CF/lb-mole}} = 6.75 \text{ lbs/MMSCF}$

$\frac{6.75 \text{ lbs/MMSCF}}{1200 \text{ BTU/SCF}} = 0.0056 \text{ lbs/MMBTU}$

CO

There is no CO limit on the permit, but the most stringent rule is Rule 1146, which limits CO in the exhaust to 400 ppm, dry and corrected to 3% oxygen.

1. Calculate the exhaust volume, dry and corrected to 3% oxygen[42]:

   8710 DSCF/MMBTU x 20.9/(20.9-3.0) = 10,170 DSCF/MMBTU

   DSCF = Dry Standard Cubic Foot

2. Calculate the maximum CO emission factor:

$\frac{400 \text{ ppm} \times 10{,}170 \text{ DSCF/MMBTU} \times 28 \text{ lbs/lb-mole}}{10^6 \times 379 \text{ CF/lb-mole}} = 0.30 \text{ lbs/MMBTU}$

PM-10

There is no PM-10 limit on the permit, but Rule 409 limits combustion contaminant (particulate) emissions to 0.1 grains/cubic foot, corrected to 12% carbon dioxide. EPA's AP-42 estimates that all particulate emissions from natural gas are PM-10.

1. Calculate the exhaust volume, corrected to 12% carbon dioxide:

   1040 SCF CO_2/MMBTU / 0.12 = 8667 SCF/MMBTU

2. Calculate the maximum PM-10 emission factor:

[42] EPA Method 19, 40 CFR Part 60

0.1 grains/SCF x 8667 SCF/MMBTU = 0.12 lbs/MMBTU

7000 grains/lb

VOC

There is no VOC limit on the permit, and there is no rule limiting VOC emissions from this type of equipment. AP-42 has an emission factor of (0.48)(5.8) = 2.8 lbs non-methane VOC/MMSCF of natural gas. AQMD's AER Form B-1 emission factor is higher, 7.0 lbs VOC/MMSCF of natural gas. Use the higher emission factor for PTE.

Calculate the maximum VOC emission factor:

7.0 lbs/MMSCF = 0.0058 lbs VOC/MMBTU

1200 BTU/SCF

Potential To Emit

Pollutant	Max. Annual Fuel Usage	x	Emission Factor	=	PTE
NOx	438,000 MMBTU/yr	x	0.030 lb/MMBTU	=	13,100 lb/yr = 6.6 tpy
SOx	438,000 MMBTU/yr	x	0.0056 lb/MMBTU	=	250 lb/yr = 0.125 tpy
CO	438,000 MMBTU/yr	x	0.30 lb/MMBTU	=	131,000 lb/yr = 65.5 tpy
PM-10	438,000 MMBTU/yr	x	0.12 lb/MMBTU	=	53,000 lb/yr = 26 tpy
VOC	438,000 MMBTU/yr	x	0.0058 lb/MMBTU	=	2,500 lb/yr = 1.3 tpy

PTE Calculation Example 2

Company D has an abrasive blasting system consisting of several pressure pots and nozzles located inside an enclosed room. Air contaminants are released to the room's air space as streams of sand are forcibly propelled against the surface of heat exchangers and condensers. The room is vented to a 10,000 standard cubic feet per minute (SCFM) baghouse (current BACT for sandblasting operations) to reduce particulate emissions.

The permit limits maximum sand usage to 500 tons/day, hours of operation to 10 hours per day, and requires the baghouse to have a minimum control efficiency of 98 percent.

Note: Although maximum sand usage and the baghouse control efficiency are permit conditions, the permit does not limit emissions per ton of sand. Rules 404 and 405 directly limit particulate emissions. All particulates emitted from the baghouse are assumed to be PM-10.

Maximum Throughput

Rule 404 limits the particulate concentration in grains/DSCF. The corresponding throughput is DSCF. Rule 405 limits particulate emissions in lbs/hr, based on the process weight per hour. The throughput is hours.

Rule 404 throughput:

10,000 DSCF/min x 60 min/hour x 10 hours/day x 365 days/year

= 2.19×10^9 DSCF/year

Rule 405 Throughput:

10 hours/day x 365 days/year = 3,650 hours/year

Emission Factor

Rule 404 Emission Factor:

Rule 404 limits a 10,000 DSCFM exhaust to 0.0792 grains/DSCF (by interpolation).

Rule 405 Emission Factor:

The process weight per hour is 500 tons/day x 2000 lbs/ton /10 hours/day = 100,000 lbs/hour. For this process weight, Rule 405 limits the emission rate to 7.752 lbs/hour (by interpolation).

Potential to Emit

Rule 404:

2.19×10^9 DSCF/year x 0.0792 grains/DSCF / 7000 lbs/grain / 2000 lbs/ton = 12.4 tons/yr.

Rule 405:

3,650 hours/year x 7.752 lbs/hour / 2000 lbs/ton = 14.15 tons/yr.

Rule 404 is more stringent, so the PTE is 12.4 tons/yr.

PTE Calculation Example 3

Company E manufactures toys and operates a spray booth and oven. Enamel paint is applied to metal parts in the spray booth and allowed to further dry on a conveyor before entering the oven. The oven is vented to an afterburner with a control efficiency of 90 percent.

A similar system was source-tested in 1993. The source test showed that VOC emissions are approximately 76 percent from the spray booth and conveyor with the remainder (from the oven) venting to the afterburner.

The permit limits maximum coating usage, as applied, to 200 gallons/day.

Maximum Throughput

Calculate the maximum annual coating usage:

200 gallons/day x 365 days/year = 73,000 gallons/year

Emission Factor

Rule 1107 limits VOC content to 2.3 lbs/gal, less water and exempt solvent. The actual coating is formulated to this limit, but because it contains exempt solvent, the actual VOC content is 1.2 lbs/gal of material.

Potential to Emit

1. Using the emission factor, calculate the annual VOC sprayed:

   Annual VOC (Enamel) = 73,000 gallon/year x 1.2 lb/gallon
   = 87,600 lb/year
   = 43.8 tons/year

2. Calculate the quantity of VOC lost to the atmosphere from the spray booth and conveyor, and the afterburner and oven. Based on these values, calculate the total annual PTE of VOC.

   Annual VOC (Spray booth and conveyor)
   = 0.76 x 43.8 tons/year
   = 33.3 tons/year

   Annual VOC (Afterburner and oven)
   = 1 - 0.90 x 43.8-33.3 tons/year
   = 1.05 tons/year

   Total annual PTE of VOC = 33.3 + 1.05 tons/year
   = 34.4 tons/year

(Emission of other pollutants than VOC from the afterburner also need to be calculated.)

PTE Calculation Example 4

Company F manufactures eyeglass lenses and uses methylene chloride (MC), a HAP, in its degreaser to clean the lenses. The degreaser is not equipped with air pollution control. The permit limits maximum MC loss to 12 gallons/day.

Maximum Throughput

Calculate the annual MC loss:

Annual MC loss

= 12 gallons/day x 365 days/year
= 4380 gallons/year

Emission Factor

The emission factor is the solvent density:

√ MC: 10.98 lb/gallon

Potential to Emit

PTE = Annual maximum MC loss x Emission factor
= 4380 gallons/year x 10.98 lb/gallon
= 48,090 lbs/year
= 24.05 tons/year

PTE Calculation Example 5

This example demonstrates the calculation of total facility PTE by aggregating the PTE for the individual emission sources at the facility.

Company G, located in the South Coast Air Basin, operates a petroleum storage and transfer operation with a maximum storage capacity of 1,000,000 barrels. The facility wants to determine whether its PTE exceeds the Phase Two applicability thresholds. The facility operates:

- 2 boilers;
- 16 storage tanks;
- 4 loading/unloading stations; and
- 5 gasoline fueling stations.

All of these operations are permitted and therefore must be included in the PTE calculation. Since the facility belongs to a stationary source category that must include fugitive emissions (petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels), the fugitive emissions must be included in the PTE calculation.

The facility estimates the PTE of each permit unit series and fugitive source as follows:

	Tons/Year					
Permit Unit Series	**VOC**	**NOx**	**SOx**	**CO**	**PM-10**	**Benzene**
Boilers	0.1	11.0	0	0	0.1	--
Storage tanks	58.4	0	0	0	0	0.5
Loading/unloading	52.9	0	0	0	0	0.4
Fugitives from loading/unloading	3.1	0	0	0	0	0
Gasoline fueling stations	10	0	0	0	0	0.1
TOTAL FACILITY PTE	**124.5**	**11.0**	**0**	**0**	**0.1**	**1.0**

Company G exceeds the PTE thresholds for VOC and NOx, and therefore meets the Title V applicability criteria for Phase Two.