Reference: BAPC Permit Classes

The BAPC addresses Federal and State air quality permitting requirements by grouping them into permit "Classes." Permit Classes range from 1-4, with Class 1 sources emitting the largest quantity of pollutants (>100 tons), Class 2 a moderate amount (<100 tons), Class 3 (<5 tons) and Class 4 the lowest amount.

- **Class 1** - Typically for facilities that emit more than 100 tons per year for any one regulated pollutant or
  emit more than 25 tons per year total HAPs or
  emit more than 10 tons per year of any one HAP or
  is a PSD source or
  major MACT source.

  - For "major" stationary sources
  - Class 1 Air Quality Operating Permit (AQOP) is also a "Title V" and "PSD" federal permit. Permit for construction and operation.
  - Class 1 Operating Permit to Construct (OPTC) is for construction (only) and after 12 months must convert into a Class 1 AQOP for operation. State permit.
  - Class 1 Mercury Operating Permit to Construct (MOPTC). Permit for gold and silver facilities that emit mercury. Permit under the State's Nevada Mercury Control Program. State permit.

- **Class 2** - Typically for facilities that emit less than 100 tons per year for any one regulated pollutant and emit less than 25 tons per year total HAP and emit less than 10 tons per year of any one HAP. State permits.
  - For "minor" sources
  - Class 2 Air Quality Operating Permit (AQOP). Allows for the construction and operation of stationary minor sources.
  - Class 2 General permit. Allows for the operation and re-location of temporary, portable road and highway equipment.
  - "COLA" – Change of Location Approval allows re-location of equipment.
    - Temporary is < 12 months at one location
  - Class 2 Surface Area Disturbance (SAD) – a permit required for a Surface Area Disturbance of >5 acres.

- **Class 3** - Typically for facilities that emit 5 tons per year or less in total of regulated air pollutants and emit less than one-half ton of lead per year, and must not have any emission units subject to Federal Emission Standards (ie: NSPS, NESHAPS, MACT, etc.) State permits.
  - For "minor" sources
  - Class 3 Air Quality Operating Permit (AQOP). Allows for the construction and operation of minor stationary sources.

- **Class 4** - For a facility with a single emission unit subject to 40CFR Part 63 "*National Emission Standards for Hazardous Air Pollutants*" that is not also subject to a Class 1, 2 or 3 permit. State permit.
  - For minor or "area" sources of Hazardous Air Pollutants (HAPs).

Reference: Criteria Pollutants & Health Risk Overview

The Clean Air Act requires EPA to set national ambient air quality standards (NNAQS) for "criteria pollutants." These include: carbon monoxide, ozone, lead, sulfur oxides, nitrogen oxides, and particulate matter. The law also requires EPA to review the standards periodically and revise them if appropriate to ensure that they provide the requisite amount of health and environmental protection and to update those standards as necessary. **BAPC performs pollutant air dispersion modeling for criteria pollutants to demonstrate compliance with the NAAQS.**

The pollutant overview below is taken directly from EPA's website at http://www.epa.gov/airquality/urbanair/.

Ozone (O_3)

Ground level or "bad" ozone is not emitted directly into the air, but is created by chemical reactions between oxides of nitrogen (NO_x) and volatile organic compounds (VOC) in the presence of sunlight. Emissions from industrial facilities and electric utilities, motor vehicle exhaust, gasoline vapors, and chemical solvents are some of the major sources of NO_x and VOC.

About 25 million people, including 7 million children, have asthma and over 12 million people report having an asthma attack in the past year. Breathing ozone can trigger a variety of health problems including chest pain, coughing, throat irritation, and congestion. It can worsen bronchitis, emphysema, and asthma. Ground level ozone also can reduce lung function and inflame the linings of the lungs. Repeated exposure may permanently scar lung tissue.

Ground level ozone can have harmful effects on sensitive vegetation and ecosystems. Plant species that are sensitive to ozone and potentially at an increased risk from exposure include trees such as black cherry, quaking aspen, ponderosa pine and cottonwood. These trees are found in many areas of the country. These effects can also have adverse impacts on ecosystems, including loss of species diversity and changes to habitat quality and water and nutrient cycles.

Particulate Matter (PM)

Particle pollution (also called particulate matter or PM) is the term for a mixture of solid particles and liquid droplets found in the air. Some particles, such as dust, dirt, soot, or smoke, are large or dark enough to be seen with the naked eye. Others are so small they can only be detected using an electron microscope.

The size of particles is directly linked to their potential for causing health problems. Small particles less than 10 micrometers in diameter pose the greatest problems, because they can get deep into your lungs, and some may even get into your bloodstream. Exposure to such particles can affect both your lungs and your heart. Small particles of concern include "inhalable coarse particles" (such as those found near roadways and dusty industries), which are larger than 2.5 micrometers and smaller than 10 micrometers in diameter; and "fine particles" (such as those found in smoke and haze), which are 2.5 micrometers in diameter and smaller.

Numerous scientific studies have linked particle pollution exposure to a variety of problems, including: premature death in people with heart or lung disease, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and increased respiratory symptoms, such as irritation of the airways, coughing or difficulty breathing.

Environmental impacts include: visibility impairment, environmental damage and aesthetic damage. Fine particles ($PM_{2.5}$) are the main cause of haze in parts of the United States. Particles can be carried over long distances by wind and then settle on ground or water. The effects of this settling include: making lakes and streams acidic; changing the nutrient balance in coastal waters and large river basins; depleting the nutrients in soil; damaging sensitive forests and farm crops; and affecting the diversity of ecosystems. Particle pollution can stain and damage stone and other materials, including culturally important objects such as statues and monuments.

Carbon Monoxide (CO)

Carbon monoxide (CO) is a colorless, odorless gas emitted from combustion processes. Nationally and, particularly in urban areas, the majority of CO emissions to ambient air come from mobile sources. CO can cause harmful health effects by reducing oxygen delivery to the body's organs (like the heart and brain) and tissues. At extremely high levels, CO can cause death.

Exposure to CO can reduce the oxygen-carrying capacity of the blood. People with several types of heart disease already have a reduced capacity for pumping oxygenated blood to the heart, which can cause them to experience myocardial ischemia (reduced oxygen to the heart), often accompanied by chest pain (angina), when exercising or under increased stress. For these people, short-term CO exposure further affects their body's already compromised ability to respond to the increased oxygen demands of exercise or exertion.

Nitrogen Oxides (NO_x)

Nitrogen dioxide (NO_2) is one of a group of highly reactive gasses known as "oxides of nitrogen," or "nitrogen oxides (NO_x)." Other nitrogen oxides include nitrous acid and nitric acid. EPA's National Ambient Air Quality Standard uses NO_2as the indicator for the larger group of nitrogen oxides. NO_2 forms quickly from emissions from cars, trucks and buses, power plants, and off-road equipment. In addition to contributing to the formation of ground-level ozone, and fine particle pollution, NO_2 is linked with a number of adverse effects on the respiratory system.

Current scientific evidence links short-term NO_2 exposures, ranging from 30 minutes to 24 hours, with adverse respiratory effects including airway inflammation in healthy people and increased respiratory symptoms in people with asthma. Also, studies show a connection between breathing elevated short-term NO_2 concentrations, and increased visits to emergency departments and hospital admissions for respiratory issues, especially asthma.

NO_x react with ammonia, moisture, and other compounds to form small particles. These small particles penetrate deeply into sensitive parts of the lungs and can cause or worsen respiratory disease, such as emphysema and bronchitis, and can aggravate existing heart disease, leading to increased hospital admissions and premature death.

Sulfur Dioxide (SO_2)

Sulfur dioxide (SO_2) is one of a group of highly reactive gasses known as "oxides of sulfur." The largest sources of SO_2 emissions are from fossil fuel combustion at power plants (73%) and other industrial facilities (20%). Smaller sources of SO_2 emissions include industrial processes such as extracting metal from ore, and the burning of high sulfur containing fuels by locomotives, large ships, and non-road equipment. SO_2 is linked with a number of adverse effects on the respiratory system.

Current scientific evidence links short-term exposures to SO_2, ranging from 5 minutes to 24 hours, with an array of adverse respiratory effects including bronchoconstriction and increased asthma symptoms. These effects are particularly important for asthmatics at elevated ventilation rates (e.g., while exercising or playing.) Studies also show a connection between short-term exposure and increased visits to emergency departments and hospital admissions for respiratory illnesses, particularly in at-risk populations including children, the elderly, and asthmatics.

EPA's National Ambient Air Quality Standard for SO_2 is designed to protect against exposure to the entire group of sulfur oxides (SO_x). SO_2 is the component of greatest concern and is used as the indicator for the larger group of gaseous sulfur oxides (SO_x). SO_x can react with other compounds in the atmosphere to form small particles. These particles penetrate deeply into sensitive parts of the lungs and can cause or worsen respiratory disease, such as emphysema and bronchitis, and can aggravate existing heart disease, leading to increased hospital admissions and premature death. EPA's NAAQS for particulate matter (PM) are designed to provide protection against these health effects.

Lead (Pb)

Lead is a metal found naturally in the environment as well as in manufactured products. The major sources of lead emissions have historically been from fuels in on-road motor vehicles (such as cars and trucks) and industrial sources. Today, the highest levels of lead in air are usually found near lead smelters. The major sources of lead emissions to the air today are ore and metals processing and piston-engine aircraft operating on leaded aviation gasoline.

In addition to exposure to lead in air, other major exposure pathways include ingestion of lead in drinking water and lead-contaminated food as well as incidental ingestion of lead-contaminated soil and dust. Lead-based paint remains a major exposure pathway in older homes.

Once taken into the body, lead distributes throughout the body in the blood and is accumulated in the bones. Depending on the level of exposure, lead can adversely affect the nervous system, kidney function, immune system, reproductive and developmental systems and the cardiovascular system. Lead exposure also affects the oxygen carrying capacity of the blood. The lead effects most commonly encountered in current populations are neurological effects in children and cardiovascular effects (e.g., high blood pressure and heart disease) in adults. Infants and young children are especially sensitive to even low levels of lead, which may contribute to behavioral problems, learning deficits and lowered IQ.

Lead is persistent in the environment and accumulates in soils and sediments through deposition from air sources, direct discharge of waste streams to water bodies, mining, and erosion. Ecosystems near point sources of lead demonstrate a wide range of adverse effects including losses in biodiversity, changes in community composition, decreased growth and reproductive rates in plants and animals, and neurological effects in vertebrates.

Other Permitted Pollutants: Non-Criteria

There are pollutants besides criteria pollutants that are (State and federally) regulated and have permit requirements. Non-criteria pollutants are not typically modeled with a pollutant air dispersion model.

Volatile Organic Compounds (VOC). Organic compounds are chemicals composed of carbon. Volatile organic compounds (VOCs) produce vapors readily. At room temperature and normal atmospheric pressure, vapors escape easily from volatile liquid chemicals. VOCs are the leading cause of ground-level ozone (air pollution, also

known as "smog"). Common sources which may emit VOC into the air include housekeeping and maintenance products; paints, coatings, and inks; and building and furnishing materials. In sufficient quantities, VOC can cause eye, nose, and throat irritations, headaches, dizziness, visual disorders, memory impairment; some are known to cause cancer in animals; some are suspected of causing, or are known to cause, cancer in humans. Volatile organic compounds include a variety of chemicals such as gasoline, benzene, toluene, xylene, formaldehyde, tetrachloroethylene, and perchloroethylene.

Hazardous Air Pollutants (HAP). Defined under the Clean Air Act as pollutants that cause or may cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental and ecological effects. Currently, the Clean Air Act regulates 188 chemicals and chemical categories as HAPs.

Dioxins and Furans - Dioxins and furans is the abbreviated or short name for a family of toxic substances that all share a similar chemical structure. Dioxins, in their purest form, look like crystals or a colorless solid. Most dioxins and furans are not man-made or produced intentionally, but are created when other chemicals or products are made.

Reference: National Ambient Air Quality Standards

At a minimum, every Air Quality Operating Permit issued must be protective of the standards, below. BAPC must affirm prior to issuing a permit that the permit requirements (monitoring, recordkeeping, testing and reporting) are adequate to demonstrate compliance with the standards. To perform this analysis, the BAPC "models" against the standards using EPA-approved pollutant air dispersion modeling.

The excerpt below is copied from EPA's website at http://www.epa.gov/air/criteria.html.

National Ambient Air Quality Standards (NAAQS)

The Clean Air Act, which was last amended in 1990, requires EPA to set National Ambient Air Quality Standards (40 CFR part 50) for pollutants considered harmful to public health and the environment. The Clean Air Act identifies two types of national ambient air quality standards. ***Primary standards*** provide public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly. ***Secondary standards*** provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

EPA has set National Ambient Air Quality Standards for six principal pollutants, which are called "criteria" pollutants. They are listed below. Units of measure for the standards are parts per million (ppm) by volume, parts per billion (ppb) by volume, and micrograms per cubic meter of air ($\mu g/m^3$).

Pollutant [final rule cite]		Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide [76 FR 54294, Aug 31, 2011]		primary	8-hour	9 ppm	Not to be exceeded more than once per year
			1-hour	35 ppm	
Lead [73 FR 66964, Nov 12, 2008]		primary and secondary	Rolling 3 month average	0.15 $\mu g/m^3$ (1)	Not to be exceeded
Nitrogen Dioxide [75 FR 6474, Feb 9, 2010] [61 FR 52852, Oct 8, 1996]		primary	1-hour	100 ppb	98th percentile, averaged over 3 years
		primary and secondary	Annual	53 ppb (2)	Annual Mean
Ozone [73 FR 16436, Mar 27, 2008]		primary and secondary	8-hour	0.075 ppm (3)	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particle Pollution Dec 14, 2012	$PM_{2.5}$	primary	Annual	12 $\mu g/m^3$	annual mean, averaged over 3 years
		secondary	Annual	15 $\mu g/m^3$	annual mean, averaged over 3 years
		primary and secondary	24-hour	35 $\mu g/m^3$	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24-hour	150 $\mu g/m^3$	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide [75 FR 35520, Jun 22, 2010] [38 FR 25678, Sept 14, 1973]		primary	1-hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year