

Hayward Power Plants and “Criteria Pollutants”

The U.S. EPA has identified six “criteria pollutants” that can injure health, harm the environment and cause property damage:

- Nitrogen Oxides
- Carbon Monoxide
- Precursor Volatile Organic Compounds
- Sulfur Dioxide
- Particulate Matter
- Lead

At least five of these six criteria pollutants will be emitted from the planned power plants in the West Hayward Shoreline Corridor. Bay Area Air Quality Management District (BAAQMD) statistics for annual emission of criteria pollutants from RUSSELL CITY ENERGY CENTER are:

Nitrogen oxides_____	134 tons
Carbon monoxide_____	389 tons
Precursor volatile organic compounds_____	28.5 tons
Sulfur dioxide_____	12 tons
Airborne particulate matter_____	86 tons

BAAQMD statistics for annual emission of criteria pollutants from EASTSHORE ENERGY CENTER are:

Nitrogen oxide_____	54 tons
Carbon monoxide_____	84 tons
Precursor volatile organic compounds_____	84 tons
Sulfur dioxide_____	6 tons
Airborne particulate matter_____	64 tons

Descriptions of Criteria Pollutants:

NITROGEN OXIDES (NO_x)

Nitrogen oxides (NO_x) include various nitrogen compounds like nitrogen dioxide (NO₂) and nitric oxide (NO). These compounds play an important role in the atmospheric reactions that create ozone (O₃) and acid rain. Individually, they may affect ecosystems, both on land and in water. NO_x forms when fuels are burned at high temperatures. The two major emissions sources are transportation vehicles and stationary combustion sources such as electric utility and industrial boilers.

NITROGEN DIOXIDE (NO₂)

Nitrogen dioxide (NO₂) is a brownish, highly reactive gas that is present in all urban atmospheres. NO₂ can irritate the lungs, cause bronchitis and pneumonia, and lower

resistance to respiratory infections. The major mechanism for the formation of NO₂ in the atmosphere is the oxidation of nitric oxide (NO), which is produced by most combustion processes.

CARBON MONOXIDE (CO)

Carbon monoxide (CO) is a colorless, odorless and poisonous gas produced by incomplete burning of carbon in fuels. When CO enters the bloodstream, it reduces the delivery of oxygen to the body's organs and tissues. Health threats are most serious for those who suffer from cardiovascular disease. Exposure to elevated CO levels can cause impairment of visual perception, manual dexterity, learning ability and performance of complex tasks.

77% of the nationwide CO emissions are from transportation sources. The largest emissions contribution comes from highway motor vehicles. Thus, the focus of CO monitoring has been at traffic-oriented sites in urban areas where the main source of CO is motor vehicle exhaust. Other major CO sources are wood-burning stoves, incinerators and industrial sources.

VOLATILE ORGANIC COMPOUNDS (VOC)

Volatile organic compounds (VOC) are defined by the Clean Air Act as chemicals that participate in forming ozone (O₃). [Ozone](#) is a respiratory toxicant. The class of VOCs includes many specific chemicals which may also cause adverse health effects in their own right (such as cancer or reproductive toxicity). VOCs are emitted from diverse sources, including automobiles, chemical manufacturing facilities, drycleaners, paint shops and other commercial and residential sources that use solvent and paint. VOC emissions form O₃ through complex chemical reactions with oxides of nitrogen (NO_x) in the presence of sunlight.

SULFUR DIOXIDE (SO₂)

High concentrations of sulfur dioxide (SO₂) affect breathing and may aggravate existing respiratory and cardiovascular disease. Sensitive populations include asthmatics, individuals with bronchitis or emphysema, children and the elderly. SO₂ is also a primary contributor to acid rain which causes acidification of lakes and streams and can damage trees, crops, historic buildings and statues. In addition, sulfur compounds in the air contribute to visibility impairment in large parts of the country. This is especially noticeable in national parks.

Sulfur dioxide (SO₂) is released primarily from burning fuels that contains sulfur (like coal, oil and diesel fuel). Stationary sources such as coal- and oil-fired power plants, steel mills, refineries, pulp and paper mills, and nonferrous smelters are the largest releasers.

PARTICULATE MATTER (PM)

Particulate matter (PM) is a mixture of particles that can adversely effect human health, damage materials and form atmospheric haze that degrades visibility. PM is usually divided up into different classes based on size, ranging from total suspended matter (TSP) to PM-10 (particles less than 10 microns in aerodynamic diameter) to PM-2.5 (particles less than 2.5 microns). In general, the smallest particles pose the highest human health risks. PM exposure can affect breathing, aggravate existing respiratory and cardiovascular disease, alter the body's defense systems against foreign materials, and damage lung tissue, contributing to cancer and premature death. Individuals with chronic obstructive pulmonary or

cardiovascular disease, asthmatics, the elderly and children are most sensitive to the effects of PM. Particulate matter (PM) includes dust, dirt, soot, smoke and liquid droplets directly emitted into the air by sources such as factories, power plants, cars, construction activity, fires and natural windblown dust. Particles formed in the atmosphere by condensation or the transformation of emitted gases such as SO₂ and VOCs are also considered particulate matter.

(Source: Scorecard, The Pollution Information Site: www.scorecard.org/env-releases/cap/pollutant-desc.tcl)