

The Recent History

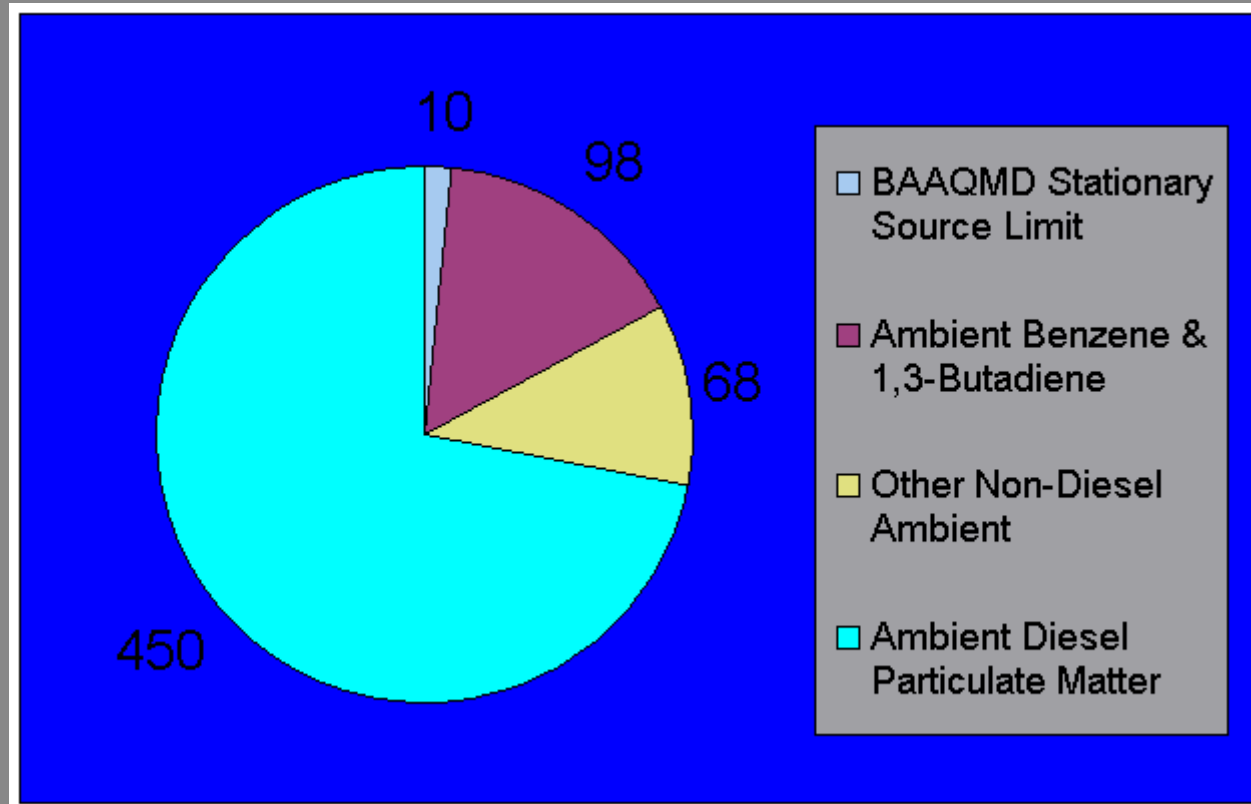
The US EPA and the OEHHA declare diesel exhaust particulate matter (DPM) to be a "toxic air contaminant" (TAC).

--> <--

The California electrical power crisis brings about visions of many generators running at once and causes municipalities to become concerned about DPM and public health.

The Office of Environmental Health Hazard Assessment of California sets standards pertaining to exposures to toxic substances. It is not merely agglomerated diesel exhaust particulate matter, the matter that sometimes makes diesel exhaust visible (e.g., on startup) as black smoke, which is harmful. Generally the most potentially harmful particles that are emitted are not seen.

Lifetime Cancer Risks Per Person [Chances Per Million]



The benzene and 1,3-butadiene mainly come from automobiles and gasoline production and handling. The striking thing about the relative proportions of the risks is that the ambient risks for the fuel-related compounds are higher than the BAAQMD limit for stationary sources. One has to wonder if variations in the exposures of individuals, as they wander about in ambient concentrations, aren't greater than the 10 in a million cancer risk regulatory limit for a given stationary source. It may be helpful to know that roughly one in four persons (250,000 chances in a million) ultimately dies of cancer. Also, this chart pertains to cancers, but not every cancer leads to a death. [Source: BAAQMD TAC Control Program Annual Report 2000]

Regulatory Requirements

CEQA REQUIREMENTS: Mobile & Stationary Sources

BAAQMD REQUIREMENTS: Stationary Sources Only

BOTH REQUIREMENTS?

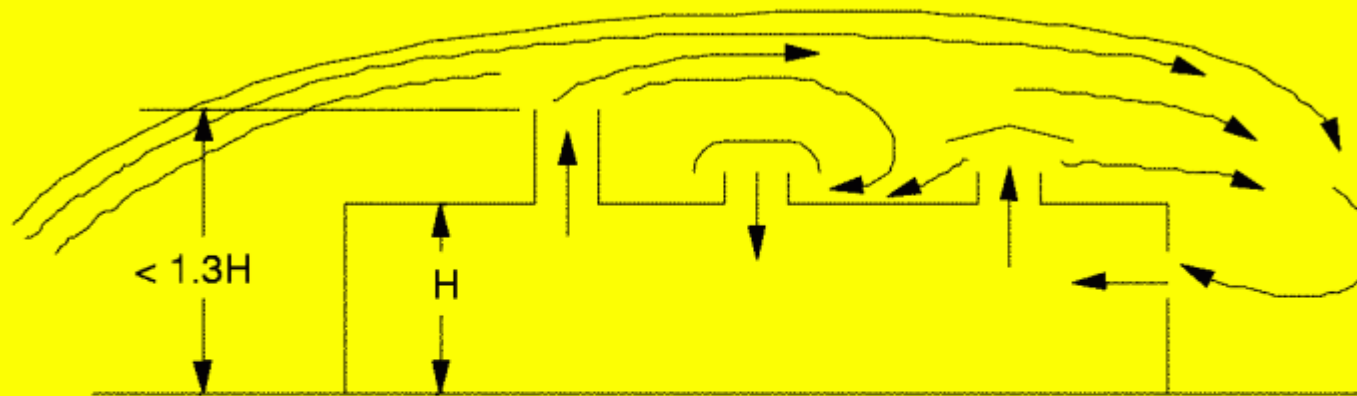
Municipalities administering the California Environmental Quality Act in the San Francisco Bay area generally follow the CEQA guidelines of the Bay Area Air Quality Management District. However the District's CEQA guidelines neither set forth standards for determining how substantial the diesel exhaust emissions have to be in order to require a risk analysis, nor do they discuss methods. Separately, there is the District matter of a *permit* being needed for stationary diesel engines of more than 50 horsepower. The OEHHA and the US EPA do publish methods for the evaluation of stationary sources.

Diesel Generator Set Emissions Abatement Measures

- * Increase Stack Height
- * Maximize Source-Receptor Distances
- * Limit Planned Hours of Operation
- * Minimize Engine Horsepower
- * Use Non-Diesel Fuel
- * Catalytic Conversion (Particle Filter)

Higher stack heights and greater stack-receptor distances, as may be arranged by consideration of the placement of the stack on the site, generally minimize exposures. The running of engines for maintenance and testing purposes should be minimized. Lower horsepower requirements may be realized by refraining from providing standby power to non-critical circuits. Natural gas-fueled engines produce rather benign emissions, but leaks from supply tanks could hypothetically bring about explosions, and, the alternative of relying on the underground distribution system is made less attractive by the fact that earthquakes could rupture pipes. Filters that work by catalysis can produce a 70% reduction in particulate emissions.

Ventilation I

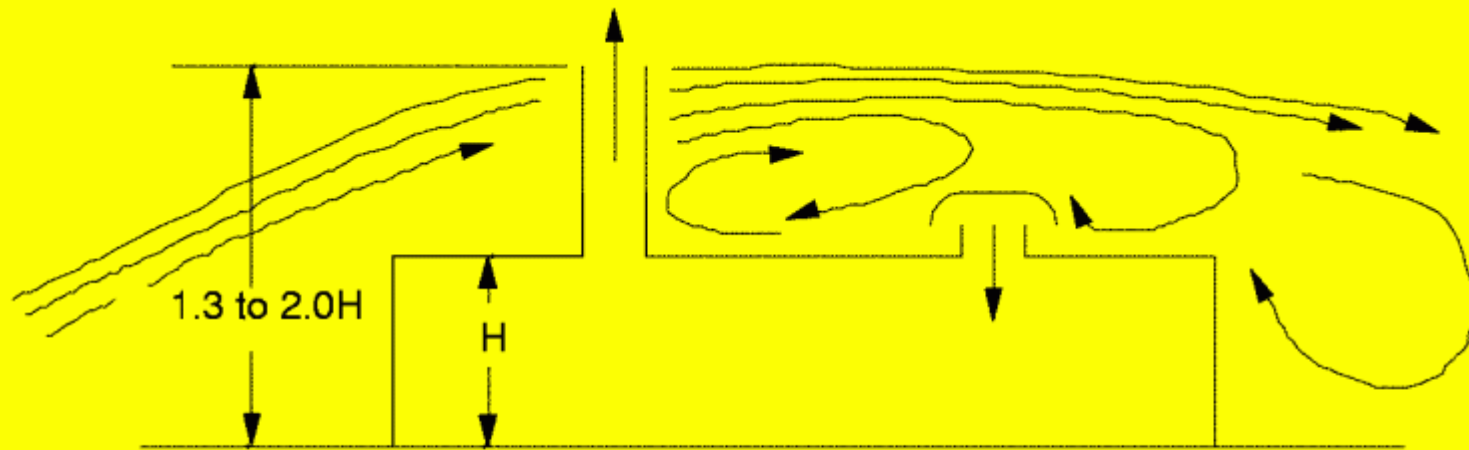


Not Acceptable

Stack too short (left); stack has poor cap (right);
Effluent is not dispersed, and may enter inlets.

References: Clark, J.H., "Air Flow Around Buildings", Heating, Piping and Air Conditioning, 39, 5, May 1967, pp. 145-154; "Military Handbook: Industrial Ventilation Systems", Department of Defense, September 30, 1993

Ventilation II



Good

Stack extends above eddy zone;
Effluent is dispersed and does not enter inlet.

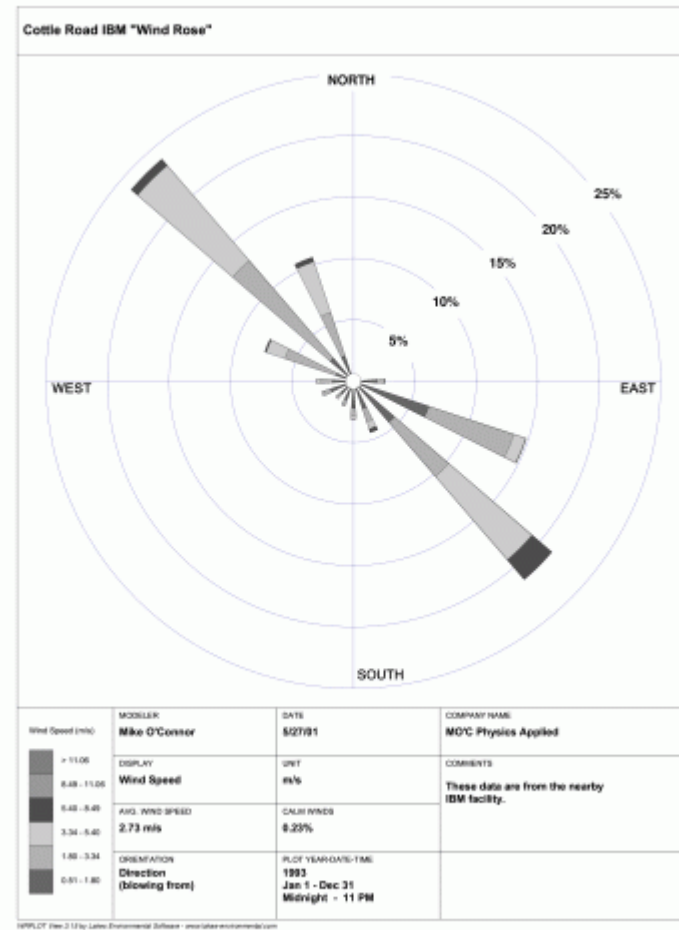
References: Clark, J.H., "Air Flow Around Buildings", Heating, Piping and Air Conditioning, 39, 5, May 1967, pp. 145-154; "Military Handbook: Industrial Ventilation Systems", Department of Defense, September 30, 1993

An Enclosure for a Small Diesel Generator Set



This is a Caterpillar photo of a Caterpillar, Inc. product. Note the skids under it, which are there because it is intended to be mounted on the ground. The enclosure is designed, in part, to reduce noise emissions. This one specifically encloses diesel or natural gas generator sets of the Olympian product line, which are intended for residences, apartment houses, and the like.

A San Jose Wind Rose



The story here is that the wind directions at the mouth of the Santa Clara Valley are predominately aligned as air flow up and down the Valley. Cross-valley directions are not prominent. The asymmetrical character of the "wind rose" may have significant implications for the dispersal of exhaust fumes, it being preferable for receptors not to be located downwind of sources with prevailing winds.

A Fire Department Station in a Suburban Setting



The site is not large, so that the distances between receptors and any diesel-generator set that could be put onsite would be measured in tens of feet. (The proportions of the soundwall that shields the home on the left from transportation corridor noise were specified by MO'C Physics Applied.)