environment

Pollution moves indoors

City dwellers who rush inside their air-conditioned apartment or office buildings to escape the noxious fumes of city traffic will receive little comfort from a new report issued by the Environmental Protection Agency. Pollution, the report states, may be as bad indoors as out.

General Electric scientists, working under EPA contract, conducted a study last year of pollution levels in two New York City buildings, one a new apartment complex straddling the George Washington Bridge approach and the other an older, 20-story office building on West 40th Street. They found that Federal health standards for carbon monoxide levels were exceeded at the Washington Bridge Apartments 23 percent of the time during the heating season and 15 percent of the time during nonheating season. At the office building the standards were violated 47 percent of the time during the heating season and 33 percent of the time during the nonheating season.

Other pollutants measured included hydrocarbons, suspended particulates and lead. Hydrocarbons, particularly, seem to become concentrated inside the buildings. Levels of hydrocarbon pollution were found to be higher inside both buildings than outside. This was true at all floor levels, and during both heating and nonheating seasons.

The findings have severe implications for future urban building design, particularly for the increasingly popular "air space" buildings. These buildings straddle congested roadways in an effort to more efficiently use the air space above streets, which can take up 60 to 70 percent of downtown land areas. Some 150,000 vehicles pass under the Washington Bridge complex daily, but its isolated position, open to winds, prevents pollutant levels from concentrating as much as in the downtown office building. Only 7,000 cars pass by that building daily, but their fumes are trapped in the canyon of surrounding skyscrapers, producing worse indoor pollution.

Lighter cars vs. 'minitanks'

In the time-honored tradition of "bigger and better," American auto manufacturers have, for some time, been studying ways of making cars safer by reinforcing them with steel. Now a research group at Columbia University's School of Engineering reports that such projects may be a costly waste of time.

"Safety cars," Detroit calls them, and estimates their cost at around $12,000. Columbia's John Tien, head of the research group, prefers the term "minitanks," and says their introduction would lead to more, not fewer, auto deaths.

Lulled by a sense of their own security, drivers of the heavy cars would become more accident prone, the group reports. Since few people could afford a "safety car," the majority of accidents would involve older, lighter cars that would be decimated in the crash. The researchers recommend lighter, less powerful cars as a solution to the accident problem, with an emphasis on built-in automatic speed and guidance devices.

Another supporter of smaller, simpler cars is Robert Sanson of the Environmental Protection Agency. The most important factor in determining the fuel economy and the resulting pollution of today's cars, he says, is size. A 5,000-pound vehicle consumes twice the fuel of a 2,500-pound vehicle. Adding an air conditioner results in a fuel penalty of 9 percent. He cites the introduction of radial tires and the increased number of American-made compacts as positive trends in fuel economy.

earth sciences

Geomagnetic storms may influence atmosphere

An apparent link between high-altitude low-pressure troughs in the atmosphere and geomagnetic storms has been suggested by two scientists as a step in understanding a possible connection between global weather patterns and the sun's effect on earth's magnetic field.

The troughs, elongated areas of relatively low atmospheric pressure, measured at 30,000 feet over the Gulf of Alaska, seem to intensify in response to storms in the geomagnetic field, according to Walter Orr Roberts, president of the University Corporation for Atmospheric Research, and Roger H. Olson of the National Oceanic and Atmospheric Administration's Environmental Data Service. The magnetic storms are marked by the appearance of auroras, the northern lights.

About a third of the Gulf's low-pressure systems eventually move down into the central United States. Those preceded by auroras, the researchers report, seem to penetrate about 200 miles farther south and bring colder weather.

In a study of winter weather data from 1964 through 1971, Roberts and Olson found that the 94 troughs preceded by auroras were larger on the average during the first day than were the 300 others with no light show.

The magnetic-atmospheric link is mysterious, but might be due to trapping of the blackbody radiation that is normally lost to space over the relatively warm North Pacific during winter, which in turn could be due to cirrus cloud formation related to geomagnetic disturbance.

Climate vs. magnetism: Short-term match

Long-term correlations, covering thousands or millions of years, have been suggested in the past between climate and changes in earth's magnetic field. Now a research team from Lamont Doherty Geological Observatory reports similar short-term links, some as abrupt as year by year.

Data from more than 200 observing stations around the globe, going back to 1930, indicate that 10-year means of air temperature seem to go up as the geomagnetic field weakens, and vice versa, according to Goesta Wollin and four colleagues in the March 2 NATURE. Even in the minority of studied cases where the 10-year means do not correlate, winter temperature trends often do. Areas where no positive correlation exists are often those influenced by some strong oceanic current, such as the Japan current.

Even abrupt, year-to-year changes in field intensity are sometimes followed by correlatable temperature shifts, usually with a lag of about a year.

Dry winters and mine explosions

Disastrous coal mine explosions seem to occur more frequently during the winter months, due to the drier air, according to a study by Fred N. Kissell, Allen E. Nagel and Michael G. Zabetakis of the Pittsburgh Mining and Safety Research Center, covering blasts from 1911 to 1970.

Another factor suggested in the past has been winter's characteristic sharp drops in barometric pressure, which might allow methane trapped in underground cavities to expand into the mines. However, the researchers believe that the relatively high pressure that forces methane into the mine spaces from the coal beds would be little affected by barometric changes.

It is dust, rather than gas, explosions that get the biggest boost from winter, the investigators write in the March 2 SCIENCE. The dry air means that the coal dust is more easily dispersed and susceptible to ignition.

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