

PUBLIC HEALTH

Air Pollution—a Growing Menace

Although air pollution causes more than \$7.5 billion worth of damage each year, little action is taken against the irritating menace, Vincent Marteka reports.

➤ AIR POLLUTION is a growing menace in the United States, yet very little is being done about it.

Although scattered cries of protest are often heard throughout the country against this irritating and dangerous dirty air, no really strong nation-wide action to control this menace is in sight.

Air pollution causes \$7.5 billion worth of damage each year in the United States. The smog-shrouded air stains buildings, rusts plants, kills livestock and is a general nuisance to people. Medical evidence strongly links polluted air with diseases such as lung cancer, asthma and other respiratory diseases, but more research is needed before a definite correlation is proved.

Because so little research has been done on air pollution, a curtain of mystery still surrounds the exact cause of pollution in various parts of the country. Some sources blame sulfur dioxide, formed when industries burn coal or liquid fuel, as a principal foe to clean air; others blame the hydrocarbons and carbon monoxide spewed out of automobile exhaust pipes.

Air Pollution Defined

Air pollution is an all-inclusive term, covering the entire scale of pollutants—smoke, dusts, mists, odors, gases such as carbon monoxide and even smog itself. Smog is now popularly defined as any air pollution noticeably objectionable to persons. On the West Coast it means watery eyes, blurred visibility and crop damage. In London and some other areas, it means extremely poor visibility, bronchial irritations and sometimes death.

The worst tragedies resulting from air pollution are attributed to the London-type smog. The most disastrous air-pollution attack occurred in London in 1952 when a heavy toll of 3,500 deaths were chalked up in a five-day battle for life against pollutants mixed with fog.

The first recorded deaths from air pollution were registered in 1930 when 63 persons died in the heavily industrialized Meuse Valley, Belgium.

This tragedy was followed by another in the coal mining town of Donora, Pa., where 20 deaths and countless illnesses were attributed to the siege.

Although air pollution is possible without smog, certain impurities must be present in the air to produce smog. Scientists generally agree that there are two principal ingredients from which smog is made: the unburned hydrocarbons sent into the air from automobiles, buses, and trucks; and the oxides of nitrogen, a product of nearly all burning fuels.

When these impurities are suspended in air in amounts averaging only one part per million, bright sunlight triggers a chain of reactions that regroup the molecules of exhaust gas to form smog.

Another undesirable product is ozone, a form of oxygen that smells like chlorine gas. The odor is sometimes noticeable during a thunderstorm when ozone is formed in the air by a bolt of lightning.

Poor wind circulation as well as polluted particles is also needed in order to have air pollution. When persons are smoking in a smoke-filled crowded room with no ventilation the air becomes tolerable merely by opening a window or door.

In nature where the barrier to good ventilation is mountains or deep basins, the problem is not so easily solved.

One of the worst natural ventilation problems is temperature inversion, an atmospheric quirk that traps polluted air over cities by an invisible lid. Air normally becomes cooler with altitude, but on inversion days, a layer of warm air hovers many hundreds of feet overhead. This prevents surface air, with its load of impurities, from rising and escaping. The bright and blazing sun then takes over, changing the trapped gases and particles to smog.

Since the natural action of sun and air are beyond the control of man, the impurities must be controlled at their source and not allowed to enter the atmosphere. A big battle against auto exhausts is now being waged in California where automobiles, according to state law, must have an anti-smog device by 1965. Actual testing of the devices is under way.

Anti-Smog Devices

The anti-smog devices fall essentially into two groups: afterburners and catalytic converters. Both are generally fastened to the exhaust pipe, replacing the muffler, although some are placed under the car's hood. The afterburners use spark plugs to burn the gaseous "garbage," whereas the converters use a catalyst to increase the temperature of the exhaust gases until they burst into flame.

Other cities with smog problems are developing a "wait-and-see" attitude. Smoggy Los Angeles and the California state government have, of necessity, been the leaders in air pollution research. California passed the nation's first state-wide anti-smog bill in 1960, and more than half of the non-Federal spending on smog research is done in the same state.

Although industrial fumes must share part of the blame for smog, a big reason



RISING SMOG—Smog covers Los Angeles about two out of every three days. Auto exhaust fumes and poor wind circulation are the chief culprits. From left to right, the clear air has turned into a smoggy blanket.

why the problem has grown steadily worse throughout the nation is the increased cluttering of vehicles on the road. More than 70,000,000 vehicles now ride on the United States streets and highways, compared to 50,000,000 just ten years ago. The figure will be pushed even higher in the future as more vehicles dirty the air in greater quantities.

Although California has the worst case of polluted air, the problem is cropping up more frequently than ever before in both cities and rural areas scattered across the United States. Flowering plants in parks of eastern cities are showing tell-tale signs of withering, and tobacco leaves on fertile farms in the Connecticut Valley are sometimes rotting from polluted air. Even the beautiful nation's capital does not escape the curtain of pollution, for a brownish haze is sometimes seen above the Washington skyline as hordes of commuters pour in and out of the city.

An accelerated program on both state and Federal levels is urged by public authorities and experts to fight air pollution before it gets completely out of hand.

Although some states have followed in California's footsteps by adopting legislation restricting air pollution, the national effort "is far from adequate for dealing effectively with the needs for air pollution control," V. G. MacKenzie, head of the

air pollution division of the U. S. Public Health Service, charged.

"Virtually 90% of the U. S. urban population lives in localities having air pollution problems and the problem will get worse in the near future due to the mushrooming population," the scientist stated. The industrial output is also expected to double within the next ten years, which will produce a flood of new products and processes contributing indirectly to air pollution.

The PHS fight against air pollution is piling up impressive evidence linking air pollution with various diseases, but the evidence is still circumstantial, Mr. MacKenzie cautioned. The Public Health Service recently announced a unique plan to expose thousands of mice, guinea pigs and rabbits to the smog-enshrouded air that humans breathe along the Los Angeles freeways. The study should reveal quickly the effects of dirty air on health that would take decades to occur in human beings.

Although the Public Health Service and some states are fighting to control pollution with their limited funds, more money for research programs and more action on all levels of government are needed. The United States appears closer to putting a man on the moon than creating a healthy environment in which to live and breathe on earth.

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MEDICINE

Hormone Cancer Aid

► THE LONG-TERM search for male hormones useful in treating female cancer is seen helped by a discovery that oxygen is not necessary to the hormones' activity.

Natural male hormones have oxygen atoms attached to the carbon ring structures. Heretofore, scientists have believed oxygen to be necessary for male hormone effects.

The finding completely upsets prevailing theories, the American Cancer Society, which has been supporting the research, said. Drs. Albert Segaloff and R. Bruce Gabbard of the Alton Ochsner Medical Foundation in New Orleans succeeded in

stripping the steroid skeleton of oxygen atoms and found to their surprise that the bare "bones" of the molecule still showed male hormone (androgen) effects.

Testosterone is a natural androgen, which has two oxygen atoms in the molecule. Relatively minor alterations—the addition or shifting of one or a few carbon, oxygen and hydrogen atoms—transforms the steroid skeleton into an amazing array of potent hormones with masculinizing, feminizing, stress-withstanding and other effects.

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TECHNOLOGY

Underground Network

► A REVOLUTIONARY underground communications network that sends messages deep within the earth even if the United States is under a nuclear bombardment is being developed.

Low frequency radio signals shot through a dense rock mass underlying the entire United States would be picked up by long underground antennas scattered in drill holes throughout the country. The deep natural radio "cable" is jam-proof and its messages cannot be detected at the surface.

The system is still in the experimental stage. Antennas could be placed as much as 100 miles apart although 50 miles is now

thought more realistic. Antennas up to a mile in length would be lowered into a drill hole lined with a protective coating.

The dense granite rock mass generally ranging from 500 to several thousand feet below the earth's surface acts as a channel for low-frequency waves sent by a transmitter. The overlying layered rocks prevent any "burrowing" messages from being intercepted or jammed.

The system was originally pioneered by Gregory J. Harmon, an engineer at the Raytheon Company, Waltham, Mass. Other organizations are also currently conducting research in trying to push the project past

the developmental stage. The unique underground system could prevent a repetition of the temporary weakening in the United States communications system that recently occurred in Nevada when communication installations were blown up.

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SPACE

U.S. Will Launch Canadian Satellite

► CANADA'S S-27 topside sounder satellite scheduled to be launched from Vandenberg Air Force Base, Calif., early in 1962 will be the first foreign satellite put up by the United States. The 280-pound satellite is designed to sound the ionosphere from an orbit 625 miles up. A prototype now is undergoing vibration and other tests.

The Canadian agency responsible for the project is the Defence Research Board in Ottawa working in close cooperation with the National Aeronautics and Space Administration. The launching vehicle will be a Thor-Agena B. rocket.

One feature of the satellite will be two antennas each 75 feet long and two others each 37½ feet long. They will be extended after the satellite is in orbit. Two 75-foot antennas will be tested in a four-stage Javelin rocket to be launched by NASA in June from Wallops Island. Purpose is to make sure that the antennas after uncoiling through specially-designed guides extend completely.

Dr. John Chapman of the Defence Research Telecommunications Establishment at Ottawa said the Canadian satellite will provide information leading to better worldwide communications and improved measurement of radar wave distortion in the ballistic missile early warning system.

Dr. Chapman said two satellites like the S-27 could carry out all the sounding of the ionosphere now being done by 140 ground stations around the world. He predicted this might be accomplished in five to ten years.

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ASTRONOMY

Artificial Moon Used To Study the Real One

► RUSSIAN scientists are using an artificial moon to learn more about the true moon's surface.

The strength of radio signals sent by the moon is compared with artificial signals of the land-based moon by alternately pointing a radio telescope at the moon and the disk, Prof. V. Troitskiy at the Yalta Observatory reports in a translation by the U.S. Joint Publications Research Service in Washington, D. C. The true intensity of the moon's signals can then be determined.

Radio signals tell scientists much about the moon's surface and its temperature. By finding out the true strength of the signals, scientists can be more exact about certain moon features such as thickness of the moon dust believed coating the surface.

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