

PUBLIC HEALTH

Battle Against Exhaust Pollution

Automobile exhaust control devices have been accepted and approved to help clear the air of pollution. But total control is far from perfected, William E. Small reports.

► THE AUTOMOBILE exhaust problem is being attacked from many directions in an effort to preserve man's most necessary commodity, air. Millions upon millions of motor vehicles send thousands of tons of toxic gases into the atmosphere daily. Engineers are hard at work developing devices for control of air pollution.

In response to regulations by local and state governments and prodding from the Federal Government, several exhaust-trapping devices for cars have come on the market, none of which controls all of the poisonous gases emitted during combustion. One, the "blow-by" or crankcase ventilation system, has received Federal approval and will be standard equipment on all 1963 cars.

There are at present two ways of monitoring automobile exhaust: 1. Recycling unburned exhaust gases back to the engine, 2. Reburning the gases in the exhaust system. Several manufacturers have marketed equipment, utilizing these methods.

Each type is faced with unique development problems. Some depend upon a chemical catalyst, such as a vanadium-alumina compound, for a reaction which reburns or filters the harmful gases. The device must be small to fit the car, low in price, yet efficient enough to relieve the smog problem.

The last category is the toughest.

At least nine crankcase circulation devices have been approved or are undergoing final testing and three exhaust system burners have been accepted by municipalities or the Federal Government. Some have been approved as conventional equipment for new cars. The most efficient model supposedly controls 80% of the noxious and harmful pollutants. Other decrease pollution by a mere 20% or 25%.

The devices which have been approved for standard use on 1963 cars will only partially solve the over-all auto emission problem. Older cars, which are the worst offenders, will go on contributing to the air problem until they are scrapped or until the owner is forced to install the equipment, which does not seem likely at present.

All systems can be or have been modified to fit most makes and models of foreign and domestic cars. A trained mechanic can install a blow-by device on a car in about an hour, the same time it takes for a check-up or lubrication.

The blow-by device, which collects previously vented gases from the crankcase and recirculates them through the intake of the carburetor, reduces pollutants by 25%. It will cost the car manufacturer between

\$4.50 and \$6.50 extra. Persons with older cars who want the device will pay slightly more to car dealers or garages. These prices may be further reduced by mass production.

The exhaust system devices, which remove up to 60% of the toxic fumes, are expected to cost \$50 to \$60 from most manufacturers, but the cost may be warranted by the increased efficiency of the process.

Still, as more cars clog the highways and gas consumption rockets higher, the relatively large percentage of pollutants removed by these devices may be a drop in the bucket within 10 years. The number of motor vehicles currently registered in the United States is 74,000,000, and will nearly double in 10 years. Since 1930, the annual consumption of gasoline has jumped from millions of gallons to millions of billions of gallons.

Sources of Air Pollution Many

The automobile is not, however, the only moving vehicle that contributes to air pollution. Diesels, jets, trains, planes, boats, moving equipment, mass transit vehicles and even lawn mowers do their fair share, blowing pollutants into the already heavily polluted atmosphere.

Despite the fact that buses and trucks, both diesel and gasoline driven, put out a darker and more noxious exhaust, U.S. experts are not as worried as European experts about controls for these vehicles. Diesel fumes are probably not as toxic as gasoline fumes, research shows. There are also far fewer diesels and mass transit vehicles on the road. But in most European countries intensive research and control measures against diesels are being taken.

Blast furnaces and other industrial processes are also major causes of air pollution. Chimneys pour out the soot from a thousand different manufacturing processes. Mining and oil refining industries as well as homes add to the danger.

Air pollution costs Americans an estimated \$7.5 billion a year in property damage alone.

But more than cost, air pollution is a serious health hazard. Enough evidence has been found to show that respiratory diseases of many kinds, both infectious and chronic, are related to, made worse, or actually caused by air pollution, according to V. G. MacKenzie, chief of the division of air pollution, U.S. Public Health Service (PHS).

Emphysema, a chronic respiratory disease, is estimated to affect over a million Americans severely enough to disable them, and researchers give conclusive evidence that this relatively new disease is caused by pollution.

Projects on the effect of pollutants, both artificially created and those from a normal city street, have shown that plants and animals develop cancerous tumors more rap-

(Continued on p. 61)



SMOG CONTRIBUTOR—Diesel smoke and auto exhaust add to the already heavy California smog.

Battle Against Pollution

(Continued from p. 55)

idly and more often when exposed to pollutants. Some of the biological specimens die from exposure, are stunted or malformed.

In 20 city areas, the U.S. has made a positive connection between air pollution and deaths from various diseases.

As to the lung cancer effect, a French newspaper recently estimated that a quarter-hour traffic jam at the Place de la Concorde generated as much toxic matter per individual as a week of smoking.

Dr. Luther L. Terry, Surgeon General of the U.S. Public Health Service, has claimed that one car exhaust produces enough poison in one year to kill several people.

All of these health findings are down on paper, in black and white, the result of years of research. Anti-smog devices may be the answer, but more engineering research and cooperation between car owners and manufacturers are needed before total control of air pollution can be found.

Although air pollution is a problem in most metropolitan areas, Los Angeles has always been pictured as the typical problem area because of its smog. It has also been particularly active in the fight to control auto exhaust, testing new devices as they come on the market and testing the effects of pollutants on plants and animals.

All exhaust devices approved by car manufacturers were first approved by the California State Board of Health and the city of Los Angeles.

Although Los Angeles smog is the prime reason why California health authorities are working on the problem, agricultural losses have also been a large factor. Damage to crops in southern California has risen from \$500,000 in 1939 to more than \$8,000,000 in 1958.

The two principal ingredients of smog are hydrocarbons from partially burned fuel and oxides of nitrogen (the products of combustion of almost any fuel). About twice as much hydrocarbon material is emitted as are oxides of nitrogen. There is also a large quantity of ozone (heavy oxygen) formed which burns the lining of the lungs.

When a warmer layer of atmospheric air forms over cooler air near the ground, it acts as a lid trapping the load of pollutants. Sunshine then triggers a reaction between the substances, and creates the well-known smog that is so common in several U.S. and foreign cities including London.

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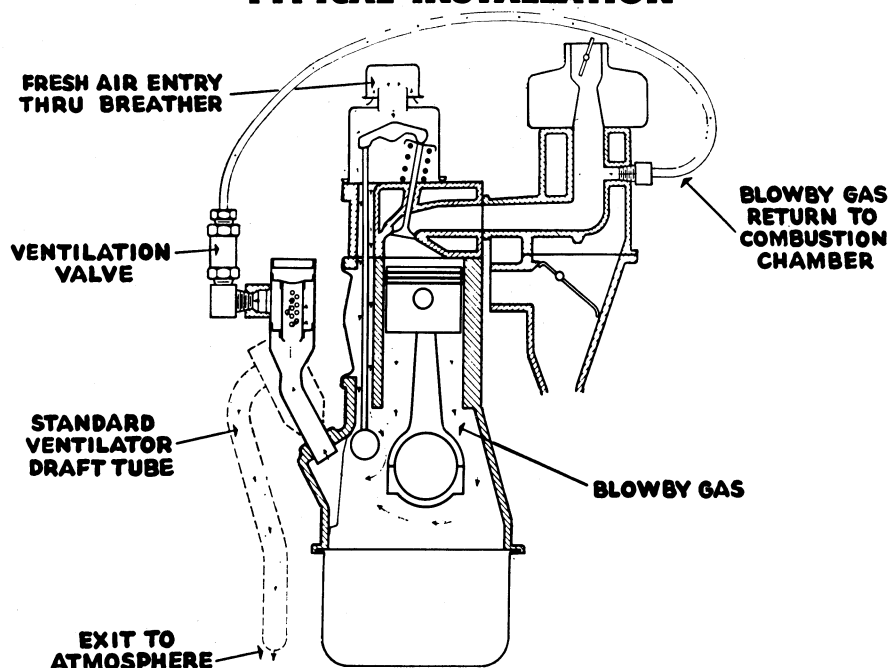
PHYSICS

Nuclear Reactor Used In Insect Pest Research

➤ A NUCLEAR REACTOR has proved a valuable new weapon for scientists battling the insect pests that take heavy toll of stored grains and other agricultural commodities.

A research project of the University of California at Riverside is aimed at establishing new standards for fumigating grains and grain products, providing maximum protection against insects, and extending

TYPICAL INSTALLATION



BLOW-BY DEVICE—A typical blow-by device for a six-cylinder engine, used to control air pollution. An adapter (left) is placed on the crankcase to draw hot vapors from the car's system. These are returned (upper right) to the combustion chamber where they are further reduced after re-entering the system.

storage life while holding bromine residues within tolerance levels set by the U.S. Food and Drug Administration. An ultra-sensitive technique, neutron activation analysis, is used to identify and measure elemental constituents of pesticide residues in quantities as small as one part per million. Fumigated samples of wheat and flour are being irradiated, under neutron bombardment, in a TRIGA research reactor at the laboratories of General Dynamics Corporation's General Atomic Division.

In contrast to chemical methods previously used in such research, neutron activation analysis is simpler, faster, more precise, non-destructive and relatively inexpensive.

Working with the University scientists is Dr. Vincent P. Guinn of General Atomic, one of the originators of the use of neutron activation analysis in determining bromine-containing pesticide residues.

In addition to the studies for the University of California, other foodstuffs are being analyzed. These include milk products, citrus fruits, vegetable oils and spices. They are being tested for chlorine and bromine residues and "traces" of sodium potassium, aluminum, vanadium, manganese, copper and tin.

According to Dr. David L. Lindgren, University of California entomologist, much of the food produced in the United States is fumigated with brominated or chlorinated organic compounds, including methyl bromide, which is used as an insecticide for grains, flour, bran and other grain derivatives.

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MEDICINE

Effectiveness of Oral Birth Control Pills

➤ BIRTH CONTROL pills taken by mouth seem highly successful, but undesirable side effects may discourage at least one out of every four women from using them.

This prediction made by Dr. Edwin J. DeCosta of Northwestern University Medical School, Chicago, was reported in the Journal of the American Medical Association, 181:122, 1962.

Many physicians are not entirely sold on the idea of oral contraceptives, according to an informal survey conducted by Dr. DeCosta. He found that "about half of the physicians find the side effects such a nuisance that they discourage the use of oral contraceptives."

One such side effect is the upsetting of and actually postponing the menstrual cycle for one month. This frequently causes anxiety and unhappiness in those women who fear they are pregnant.

Although more than seven years of experience with oral contraceptives have not revealed serious dangers, there is still much to learn.

Successful results of studies on the use of oral contraceptives in the Caribbean islands may be misleading, because side effects ignored by a Caribbean native may not be taken so lightly by a woman in the United States.

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