Air Pollution Problems in Medford Outlined

(Editor's note: Following is the general narrative of the report on air pollution in and around Medford. The study was made by the Oregon state sanitary authority in cooperation with the city. The report was presented to the Medford city council Thursday night.)

WHAT IS AIR POLLUTION

The presence of foreign substances in the air is called air pollution. This is a general definition of air pollution, but under it nearly all air is polluted just as the water from the clearest mountain stream always has traces of foreign matter. Only under laboratory controls is either chemically pure air or water possible.

We live with air pollution, or the forces of nature – the winds stirring earth's dust and even the steady fall of cosmic matter–pollute the air at the rate of several tons per square mile every month. Just moving around on foot we stir up dust and pollute the air.

Air pollution then is really a matter of degree and is not a problem until it becomes a nuisance, a noticeable irritation that begins to affect the health and well being of people and the value of their property. In many cities excessive air pollution has been recognized not only as being detrimental to the well-being of inhabitants of the cities, but also, in some extreme cases, has been pin-pointed as the cause of fatal disasters.

Weather Important

Weather and topographical location are important factors in any air pollution situation. A windy city surrounded by open plains can tolerate more air polluting emissions from its stacks and exhausts than a city hemmed in by hills or mountains.

Winds are the normal dispersal agents for air pollutants, either blowing them away near the ground or catching them aloft after they have been borne high above the surface on the normal rising currents of heated air.

But in some situations the normal process seems not to take place. The heated air hangs near the ground and takes on an increasing burden of pollutants. Actually it is not violating a law of physics in not rising, for it is held down by a higher layer of air heated by the sun so that it is as warm or warmer than the air near the ground.

The upper layer of heated air is, in effect, a lid. Meteorologists call this condition "temperature inversion" because the usual relationship between near-ground temperatures and those aloft is turned upside down.

Conditions Develop

When a temperature inversion happens in a region of heavy air pollution the most irritating of air pollution conditions can develop. In Los Angeles it is called smog. If prolonged, action of sunlight and heat may cause chemical combinations of the hydrocarbons from incomplete combustion of petroleum fuels with other pollutants, forming new pollutants irritating to eyes, throat and lungs.

Air pollution affects different people in different ways and in different degrees.

To a housewife smudge and cinders that soot up her clothes hung to dry, and dust that filters into her living room may be the most irritating.

To an airplane pilot or the owner of a home with a view, smoke and haze limiting visibility may be the worst form of air pollution.

Serious to Farmers

Chemicals in the air which affect crops may be the most serious to a farmer. Pollen from uncontrolled ragweed or other allergy-causing vegetation may be the worst form of air pollution to other people.

In a modern community hardly anyone has not at some time been annoyed, irritated, or even hurt by air pollution.

There are legal definitions of air pollution now in nearly every state. In Oregon air pollution is defined legally as "the discharge into the air of solids, liquids or gases so as to cause such injury to human, plant or animal life or to property as constitutes a public nuisance in the state of Oregon."

In measurement of air pollution the terms particulate matter, particle fallout rate and suspended particulate matter are used frequently.

Particulate Matter

Particulate matter means separate particles of a solid like cinders, dust or wood fibers or droplets of a liquid other than water like tars and resins.

Particle fallout rate is the amount of particulate matter which settles out of the air in a given length of time as measured by standard methods.

Suspended particulate matter refers to lighter material which does not readily settle out and remains in the air for long periods. In sampling procedures it is collected on a filter through which known volumes of air are passed.

MEDFORD'S AIR POLLUTION PROBLEM

No city's air pollution problem is exactly the same. Not only do the factors of weather and topography vary, but also there is great variance in the sources of air pollution. But generally true and almost axiomatic is that the major sources of air pollution are also major sources of community income.

Medford has physical and climatological characteristics which at times aid air pollution. It is set in a mountain valley where average wind speed is 4.7 miles per hour.

During the winter months of November, December and January layers of stable air, acting as a lid on the rising polluted air, are likely to lie over the valley.

Favorable for Pollution

This condition of low wind and stable air, favorable for atmospheric pollution, was found to exist in the early morning hours year around. But in the months of May through September, when the sun heats up the valley as the day wears on, the heat usually becomes sufficient in the afternoon to break up the stable air masses, letting the smoky, polluted air rise and lose itself in the sky.

Thus, in the sunny season the Rogue river valley around Medford is something like an "Old Faithful" geyser: its air is quiet and placid in the mornings and smoke and pollutants hang close to the ground. But regularly in the afternoons, the air heated by the sun boils up and out of the valley, carrying with it the morning's collection of smoke and pollutants. The change is often rapid.

The smudge pot is Medford's special problem. Orchard heating operations around Medford in the time when low temperatures could damage the developing fruit crop, create the most severe air pollution conditions.

High Concentrations

When in use the burners produce extremely high concentrations of suspended particulate matter in the air of Medford. Fortunately they are lighted only on an average of 10.4 days each year. The 1959 orchard heating season was unusually long, requiring 10 consecutive nights of firing between April 12 and 21.

It was once thought that smoke as well as heat was desirable in protecting fruit crops. Development of heating equipment which is virtually smokeless when properly maintained has proved this not true.

In the area surrounding Medford, according to an inventory taken by the Jackson County Fruit Growers association, half of the 119,470 heating units in use are still of the open pot type with no control over combusion or smoke emission. These open pots burning fuel oil, plus the burning of rubber tires and careless operation of well-designed equipment, causes most of the excessive smoke.

A voluntary program of replacing the nearly 60,000 offending units by 1954 has been started under the guidance of the Fruit Growers association. This program should not be allowed to lapse if the Medford area is to escape the inconveniences and irritations which visited it during April, 1959, when on 23 of the 30 days the smoke and soot in the air was above the public nuisance threshold determined by the state sanitary authority.

Medford's other sources of air pollution are more common. Predominant among them are the hog fuel - fired boilers and waste wood burners of six lumber and plywood mills in or near the city.

Inefficient combustion in such equipment and inadequate control of cinder and flyash can and does cause a heavy fallout of cinders and partly burned material over the city.

Medford Corporation and Elk Lumber company have already installed cinder and flyash removal equipment to control emissions from their hog fuel-fired boilers. Similar installations are needed to serve the steam plants at Donna Timber Products, KOGAP and Timber Products.

Wastewood Burners

Ten wigwam waste wood burners serve these mills to dispose of unmarketable wood residue. When overloaded or otherwise improperly operated or maintained, these burners can be the source of large quantities of smoke, cinder and flyash.

KOGAP and several other mills are working to develop uses for excess wood. If successful, these efforts will reduce the amount of residue to be burned.

Everywhere is the automobile. Pacific Coast residents own more automobiles per capita than people of any other region. In Jackson county there is one automobile for every two people. In addition, there are some 4,000 trucks.

Contribute to Pollution

These automobiles and trucks and those owned elsewhere which pass through, each contributes its bit to air pollution. In some cities, like Los Angeles, the problem of pollution from automobile exhausts has become so great that automobile manufacturers are developing devices to minimize motor vehicle exhaust pollutants.

Burning of fuel oil, wood and sawdust for heating of homes or buildings can also contribute to air pollution when heating equipment is poorly designed or imporperly maintained.

Another source of air pollution is open burning of refuse. Some buildings, stores and industrial plants operate incinerators, which must be efficiently designed, carefully operated and properly maintained if they are not to produce excessive smoke and fallout.

Open Burning

Considerable open burning of industrial waste is done at White City. Medford's existing dump location near Central Point is being replaced by a sanitary fill at another location.

It is possible by complex measurements to pin point the type and quantity of contaminants released by all of these sources. This expensive procedure was not followed for every source, but available data permits reasonable evaluation of them.

HOW MEDFORD'S AIR POLLUTION WAS MEASURED

Medford was found at times to have both particle fallout rates and concentrations of suspended particulate matter in excess of allowable maximums.

Ten stations located about three-fourths of a mile apart throughout the city were set up to measure particle fallout which settles out of the air by gravity.

To measure the smaller particles of soot, smoke and flyash which make up most of the suspended particulate matter, a filtering device was installed on the roof of the Medical Center building located between West Sixth and Seventh sts., on Central ave.

Basic equipment of each of the 10 fallout measuring stations was a polyethlene canister, set on a tripod and placed on the roof of a building at the station location. The cinders, wood particles, tars, resins, dust and other matter that fell from the air were trapped in distilled water maintained in the bottom of the container.

Under regulations of the state sanitary authority particle fallout of up to 20 tons per square mile per month is allowable. This includes five tons, considered normal fallout from natural sources, such as wind blown soil and vegetation. Particle fallout rates in excess of 20 tons per square mile per month are considered to create public nuisance conditions in residential and commercial areas.

Rates in Nuisance

By this standard Medford's downtown business district suffered particle fallout rates in the nuisance category in four out of five samples taken at monthly intervals between March 11 and Sept. 1, 1959. The downtown stations were at the city hall and at the Medical Center building.

The highest fallout was measured at the station located at the Union Oil company bulk plant at 103 McAndrews rd., in a commercial and industrial land use area. The highest sample taken here indicated a particle fallout rate of more than 100 tons per month in excess of the rate allowable for commercial areas and more than 80 tons in excess of the 50-ton allowable rate for heavy industrial areas.

Stations at both the Medford airport and Memorial park on the South Pacific highway had values exceeding the allowable rate in every sampling. The relatively high airport readings, however appeared due to dust and other matter stirred up by the ground movement of aircraft.

Eastern Section

Three stations in the eastern part of Medford–at Rogue Valley hospital, at Medford's water department reservoir on Pierce Heights and at Grandview Market at Crater Lake ave., and Roberts rd.,–had clean bills in every sampling, none exceeding the allowable fallout rate.

Testing for suspended particulate matter was done with high volume filter sampling units. It is a device quite similar to a tank type vacuum cleaner, which draws air through a fibre glass filter about 50 cubic feet per minute. This collects material of such light weight that it remains suspended in the air for long periods. In periods of stable air and low win velocity high concentrations of this material built up.

Laboratory processing of the filters permits analysis and weighing of the suspended material. It is measured in micrograms per cubic meter of air. State sanitary authority regulations set 200 micro grams per cubic meter as the maximum allowable concentration of this microscopic matter in residential and commercial areas. This includes 50 micro grams considered normal from natural sources.

Highest Values

The highest values of suspended particulate matter measured in downtown Medford came when the smudge pots were at work in the orchards in April. The count in April rose as high as 480 micro grams per cubic meter–more than double the value where smoke and soot concentration becomes a public nuisance.

Daily samples were taken all through April. On 23 days the suspended particulate concentrations exceeded the allowable maximum.

Through May, June and July the record was clean with none of the samples showing excessive amounts of suspended matter. Two days in August exceeded the allowable concentration.

There has been no regular sampling for the October through January period, but it may be anticipated that considerably higher concentrations than in the summer months would be shown because of the stable air conditions prevalent in winter.

GAS CONTAMINANT LEVELS

A two-day survey was conducted in June, 1959, to determine if significant concentrations of the gases and particles which create the Los Angeles type of smog are present in Medford.

This form of air pollution is created by reactions between unsaturated hydrocarbons, mostly from gasoline and other petroleum fuels, with oxidizing substances in the presence of sunlight.

From samples taken on the roof of the Medical Center building, hourly concentrations of oxidant, oxides of nitrogen, carbon monoxide and sulfur dioxide were obtained. The concentrations found were in general below the amounts necessary to create nuisance conditions. However, the tests showed high oxidizing potential present, indicating the possibility of chemical reaction which could cause smog of the Los Angeles type if other contaminants were present in significant amounts.

The gas contaminant samples were taken when conditions were favorable for dilution of air pollutants. For comparison, the procedure should be repeated during the fall and winter season when wind velocity is low and temperature inversion conditions possible.

WHAT NEEDS TO BE DONE

In almost every community where real improvement in air conditions have been produced, a community-wide effort has sparked the drive. This action has included the individual citizen, commercial activities as well as the management of industrial plants.

Usually the city effort is organized through passage of an ordinance that identifies objectives and air sanitation control requirements.

It is recommended that the city of Medford consider the adoption of an appropriate ordinance which will require correction of existing air pollution sources and prevent new problems.

In general the ordinance should provide for control of smoke from combustion sources, particulate matter from industrial processes and control of other air contaminants that may create a nuisance or effect public health.

Outside Boundaries

The largest industrial sources of pollution are outside of the municipal boundaries of Medford. Agricultural activities such as orchard heating is also beyond the legal jurisdiction of the city. Therefore, it is recommended that the initial local program be organized as a Medford-Jackson county operation.

At present the existing state statutes regarding pollution of air do not enable a county to organize a separate program. However, it is anticipated that such enabling legislation will be considered during the 1961 Oregon legislature.

In the meantime the current air sanitation problems from lumber and wood products mills, orchard heating and the open burning of refuse appear to jutify county participation. In 1959 the Jackson county court held several air pollution meetings to stimulate voluntary cooperative action.

Future Role

The future role of the state sanitary authority's air pollution operations in Medford-Jackson county should be to provide technical and administrative assistance towards the prevention and control of air pollution. This would include loan of specialized air sampling equipment, analyses of samples, training of the local air pollution control officer and related duties.

The prevention of new sources of atmospheric discharge should require approval of the plans before construction is started. This practice can be met in Medford through administrative cooperation of the existing building permit granting activity.

Information Obtained

The information obtained through this study and field surveys shows that there is enough corrective work needed in the Medford-Jackson county suburbs to require the services of an air pollution control officer. Usually a function of this position would require the employment of an engineer equipped with specialized knowledge of air pollution.

Probably a qualified applicant could be employed for a salary of about $500 to $600 a month.