

ATMOSPHERIC POLLUTION IN SPECIAL ENVIRONMENTS

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It is a well known fact that atmospheric pollution has certain effects on the human being.

In order to systematize thinking it is proposed that that atmosphere be divided into a macro- and micro-environment.

The macro-environment will encompass all that is generally regarded as air pollution. There is however another form of atmospheric pollution which is not always considered, and that is the pollution that takes place in the micro-environment of factories, workshops, work places, mines, quarries; in fact wherever workmen are found going about their daily tasks.

Because of the rapid industrial development, which is seen in this country, there is an alarming amount of potentially dangerous materials which are being handled daily. Someone has estimated that about 400 new chemical compounds become available annually on the world market. The toxic effects of these substances on man are often unknown.

All these, as well as the well documented known toxic materials, pollute the micro-environment in which the worker must perform his daily duties.

Chrome is mined extensively in South Africa. It is used amongst others in the metal, paint, printing and leather industries.

Exposure to certain of its salts can cause dermatitis

of exposed parts, ulcers of hands and feet, perforations of nasal septae and cancer of the lung. by some of our big concerns as a by-product.

Recently there was consultation by an organisation at one of the country's seaports. They wanted for good reasons, to spray ships with bichromate. This happens to be one of the more dangerous forms of chrome.

It was necessary to point out the toxic hazards of the product which they proposed working with, but by utilising certain basic principles, it was possible to advise on measures to protect their workmen.

However, in order to prepare similar surfaces, for spraying it is often necessary to sandblast the particular surface. Because of the possible high free silica content of the sand, workers associated with this type of procedure are very prone to silicosis or, as it is more generally known, miners' phthisis. Today this disease is found much more outside the mining industry than within, which is of course good testimony to the efficacy of the preventive measures adopted by that industry. 1956 this reached epidemic proportions.

Silicosis is frequently also found in the steel industry. This includes the full spectrum from the industrial giants to the small grey foundries. In some well organised concerns the disease is probably well controlled by preventive measures. However size of a particular undertaking is not necessarily indicative of a progressive view on the part of management. 1956 this reached epidemic proportions.

Allied to silicosis and falling within the group of diseases called pneumoconioses, asbestosis bears investigation. As the name implies it is caused by the exposure to certain types of asbestos fibres in the ambient air. It produces diffuse fibrosis of the lungs with resultant gross functional impairment. This is probably the most dangerous of all pneumoconioses.

And to add insult to injury, it is also the causative agent of a very malignant form of cancer, the so-called mesothelioma of the pleura.

Benzol or benzene, which should not be confused with benzine, is produced in great quantities by some of our big concerns as a by-product.

It is used extensively in the paint, varnish, plastics and linoleum industries, as well as in printers' ink, thinners, etc.

Besides acute poisoning, the real danger lies in the insidious way in which exposure to this substance results in changes in the blood-forming tissues of the body even to the point of total destruction.

There is also a high incidence of leukaemia in people who handle this substance. The tragedy is that the majority of people do not know its dangers. Very often it is also marketed under a variety of popular trade names which give no indication of its true nature.

During 1953 a mysterious disease started affecting poorer fishermen and villagers of a small town on Minamata Bay, situated along one of the Japanese islands. By 1956 this reached epidemic proportions.

People of all ages and sexes were affected and the disease was characterised by pains in the limbs, or a feeling of "pins and needles". In others again there was a loss of sensation of the periphery.

Cerebellar ataxia as manifested by lack of muscular coordination, as well as slurring of speech, deafness, visual disturbances and often severe emotional outbursts characterised the disease.

Animals were also affected; mostly cats. They had unsteady movements, ataxic gait, frequent convulsions and dashed round in circles. Forced running often occurred, sometimes into the sea, with subsequent drowning. Five pigs and one dog, as well as certain sea birds in the bay had signs of unsteadiness.

Investigation seemed to show that the common denominator was fish and shell fish from the bay.

To make a long story short, the disease proved to be due to mercury poisoning. The source of the mercury was a factory on the opposite side of the Bay, which manufactured vinyl chloride. Mercuric chloride was used as a catalyst.

This story is related for two reasons; primarily to illustrate graphically the effects of mercury poisoning. Similar effects are found amongst workers exposed to the micro-environment of the factory. The second reason is that pollution cannot be divided into separate compartments, but that it forms an integrated concept of air, soil and water pollution.

The above are but a few and very sketchy examples of some common pollutants of the micro atmosphere of the factory.

The question arises what lessons can be learned from this.

The first is that industrial diseases are completely preventable in that they are created by man himself.

Furthermore they are the only group of diseases which are completely controllable.

Thomas Legge, the first medical inspector of factories in England, and appointed in 1896 made the following statement -

"Unless and until the employer has done everything, and everything means a good deal, the workman can do next to nothing to protect himself, although he is naturally willing enough to do his share.

All workmen should be told something of the danger of the material with which they come into contact, and not be left to find out for themselves, sometimes at the cost of their lives."

It is submitted that only a relatively few organisations

have a true picture of the state of health of their employees. Provision for the health of workers entails cost. As is so often the case with preventive health measures, there is very little, seemingly, to show for it in some form of tangible or obvious dividend.

However, it is suggested that it will be reflected in decreased absenteeism, decreased labour turnover, increased efficiency and thus increased production.

The health of our workers is essential to our national economy.

There are certain basic principles which may be utilised to protect the worker.

It is a primary requisite that management and workers should be well informed on the dangers associated with a particular industry. This should be done in an intelligent and objective manner. It is surprising how often everyone concerned is totally unaware of the dangers associated with the substances which are handled. In order to advise properly it will be necessary to know what processes take place, the raw materials used, by- and final products produced as well as the nature of waste products.

If certain processes are mechanised the worker is kept at a distance from a health hazard. An example would be mechanical handling of dangerous substances like radio active materials.

There should be an attempt to isolate the process. Toxic materials should be handled in one room only. Benzene was mentioned previously as one of the dangerous solvents used in spray painting. This procedure must then only be done in specially constructed and separate rooms or localities. Adequate devices for purifying the air should be installed.

If exposure to a poisonous substance is absolutely un-

avoidable, then workers should only be exposed thereto for such time as their presence is absolutely necessary. The minimum of workers must be exposed and then only in specially demarcated areas or separate rooms.

Issue of protective clothing and devices is generally regarded as essential. This can however at times be most frustrating, as they are often not worn. It is however the duty of management by making use of all the techniques of practical psychology to get sufficient worker motivation.

Personal hygiene is of prime importance. In some cases it might be necessary to insist on a change of dress prior to going home after completion of the worker's shift. Cases have been recorded where members of the worker's family developed industrial disease.

Provision for adequate washing and shower facilities as well as the insistence on washing of hands prior to eating and smoking removes possible toxic materials which may be absorbed or ingested. Periodic testing of the work environment for dangerous materials such as lead, dust, carbon monoxide, etc., gives a good indication of exposure risk.

It is just as important to keep a factory physically clean as it is to keep one's own home clean. This, together with adequate general and local ventilation, prevents a lot of industrial disease.

Dangerous materials should, where possible, be substituted by those which are less dangerous. Examples are: the use of carborundum grindstones instead of those with high silica content, shot blasting instead of sand blasting, etc.

Pre-employment medical examination of workers ensures correct placement of the worker. A person prone to anaemia will not be allowed to come into contact with lead or benzol. Similarly people with lung complaints or who are prone to chest diseases should be employed in

areas where they are not exposed. In all cases the primary examination serves as a basis of reference for all subsequent periodic re-examinations. Any minor or early deviations from the normal are quickly recognised and corrective measures can then be instituted.

Employment of properly trained nursing and/or medical personnel responsible to top management only cannot be overstressed. Where a concern is not big enough to warrant full-time employment, it should be possible for two or more factories to employ at least a nursing sister jointly.

Finally there are various legislative measures available which can ensure adequate worker protection. However, it is generally regarded that far better results are obtained by getting the co-operation of industry. Legal provisions should only be utilized as a last resort.