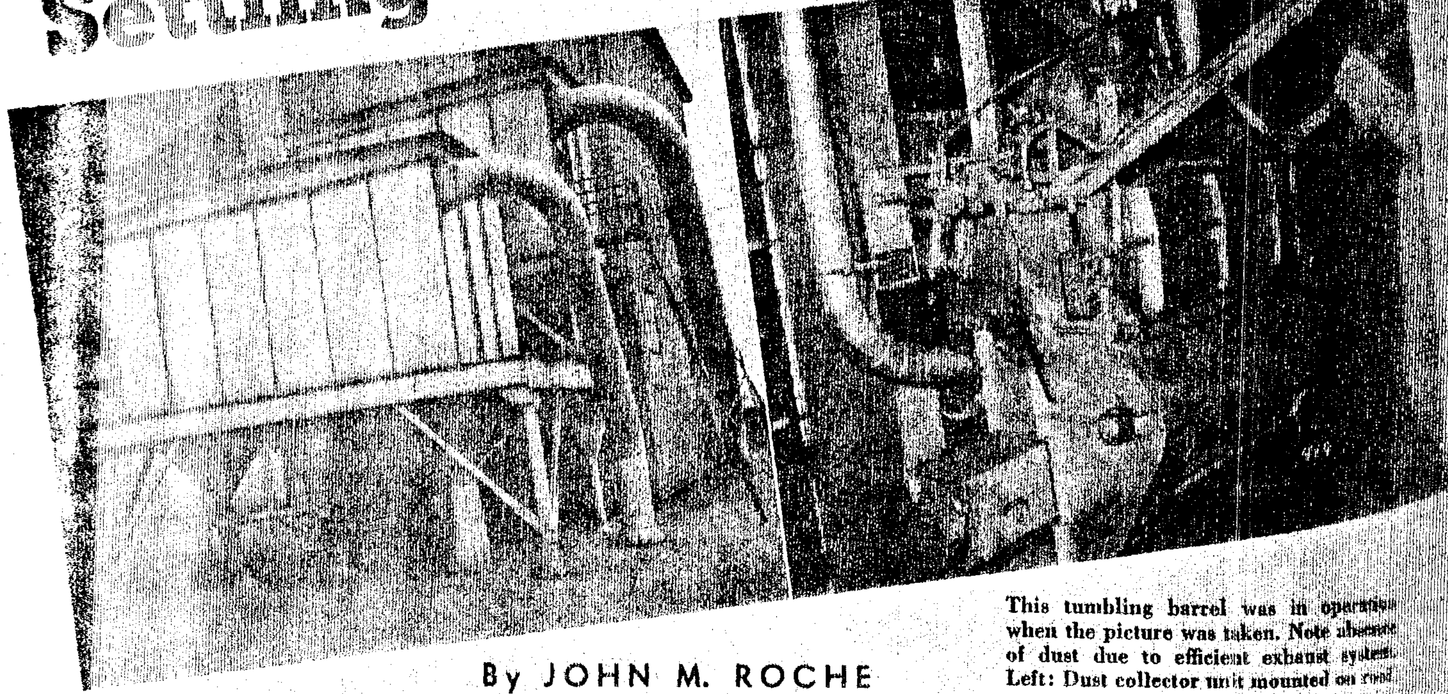
FILE NAME: National Safety Council (NSC)

DATE: 1939 May

DOC#: NSC219

DOCUMENT DESCRIPTION: NSC - National Safety News - Settling the Dust Problem

Settling the Dust Problem



This tumbling barrel was in operation when the picture was taken. Note absence of dust due to efficient exhaust system. Left: Dust collector unit mounted on roof

By JOHN M. ROCHE
Safety Engineer, Industrial Division, National Safety Council

THE inclusion of occupational disease claims in the compensation laws of several states, a few years ago, caused an almost hysterical response from plant operators and their insurance carriers. Because of the threat of retroactive compensation payments for past cases, visions of ruin seemed all too real. Happily, the fears proved groundless, for in every case the laws were modified so that the burden was equitably distributed between the employer, the carrier and the state, with just provision being made for the affected workers.

The turmoil of the period before adjustment, however, focused attention upon the causative factors of occupational diseases and the needed corrective action. Much that was done in haste was ill considered and worthless. On the other hand, safety engineers and later management, because of the experience gained through this forced action, came to the realization that occupational diseases could be prevented and that the cost was not prohibitive. In many cases, operation under the improved conditions showed increased profits.

Dust is one of the important causative agents in the occupational disease picture. Not only are certain types of dust involved in occupational diseases that are potentially most costly, but dust in general has a direct effect on efficient operation. Excessive wear of moving machine parts, spoilage of material, and sometimes damage to the finished product are part of the dust costs that can be eliminated by effective control. Another hidden factor is the lessened efficiency of men who must work in a dusty atmosphere, even when the dust is not toxic.

The effective control of industrial dust is an engineering problem in which many factors must be considered. Some of the most important factors are the type and fineness of dust involved and its physiological effect upon the worker. Other points which command serious attention are the type of building in which the operation is carried on, the specific operations conducted, the machines used, and the physical condition of the worker.

Where a new plant is to be erected to fit a definite process, the job of controlling dust is relatively more simple than where the existing structure may not have been designed for the present operation. In the latter case, the engineer must rely more on mechanical control devices since structural difficulties frequently make impossible isolation of processes, rearrangement of machines or the introduction of improved methods.

From the standpoint of physiological effect upon the worker's health, dust may be divided into three classes:

1. Those that are quickly poisonous through breathing, ingestion, or bodily contact.

2. Those which result in systemic damage over longer periods of time.

3. Nuisance dusts which may be harmless or which may possibly cause slight respiratory inflammation, colds, or even pneumonia. In this latter class are included those which cause reactions, allergic in nature, and which affect only individuals who are peculiarly susceptible to the particular substance.

4. Flammable dusts, whose removal is extremely important from the standpoint of fire or explosion. This latter class includes many which are also members of the other three.

Dusts which are instantly poisonous are rarely met with in industry

5/1939

Isolated cases have appeared from time to time in chemical and pharmaceutical plants and laboratories where such materials are elements in the production scheme. Their hazards, however, are so well known that adequate protection has long been in effect. The second class, however, is very common and consists of the pneumoconiosis-producing dusts such as silica and asbestos; the poisonous dusts such as lead, radium, manganese and cadmium, which cause systemic poisonings; and the fume dusts such as zinc oxide, which give rise to a temporary condition known as metal fume fever.

The nuisance dusts consist of any dust which does not fall under the first two classifications but which for reasons of cleanliness, possible respiratory troubles, and the effect on worker morale, should be removed. Where workers are found to be allergic to dusts in this class, the only recourse so far found to be effective is to remove the men from exposure. Since this grouping includes dusts which are explosive if mixed in the proper proportions with air, control is all the more important.

In the case of silica and asbestos, the particle size of the dust and its concentration with respect to the innocuous ingredients of the mass to be moved, are important. Equipment must be selected which will first remove from the worker's breathing zone the harmful particles and then trap them so that they cannot be recirculated through the plant. No attempt is made in this article in discussing equipment to specify the type to be used for specific exposures. Each dust problem must be studied as a separate case, and equipment chosen which will effectively do the work.

The most important element in the control of dust diseases is to keep dust out of the worker's breathing zone and to furnish him a plentiful supply of clean air. Certain operations, such as stone cutting and rock drilling, are inherently dusty and can be controlled only by local exhaust systems applied as close as possible to the area where the work is being done. Small exhaust fans are used in stone cutting and polishing work with effective results, while rock drillers are now protected with an exhaust cup-like arrangement which entirely surrounds the drill and covers the hole so that the dust is drawn through a flexible rubber tubing to a point away from his breathing zone.

In England, a device employing a suction hose attached to a special glove, worn on the hand holding the tube, is used to remove the dust when silica-bearing rock is being cut or dressed. This, while effective in removing the dust, hampers the worker somewhat in his movements.

Other forms of exhaust equipment employed for "spot" dust control use flexible tubing equipped at the en-

(Please turn to page 72)

Top: View in iron foundry showing bench grinders with exhaust hoods.

Middle: A method of receiving dust into trucks on auxiliary dust-collecting equipment.

Left: Dumping ground silica onto the apron of a conveyor. Note enclosed conveyor exhaust hood and use of approved respirator by operator.

Awards Show Aviation's Progress in Safety

PASSENGERS on scheduled flights on the airways of the United States were five times as safe last year as in 1930.

This announcement was made March 29 at a dinner in New York City held in conjunction with the Tenth Annual Greater New York Safety Conference at which six U. S. air lines were given certificates of special commendation by the Aviation Safety Award Committee of the National Safety Council for outstanding safety records in the transportation of passengers.

In 1930 the country's air lines flew 4,000,675 passenger miles for every passenger fatality, whereas last year this figure increased to 22,308,771.

The companies who received the certificates of special commendation were American Airlines, Eastern Air Lines, Pennsylvania-Central Airlines, Braniff Airways, Continental Air Lines and Inland Air Lines.

The awards were divided into three groups, according to operating mileage.

In Group A — lines flying more than 50,000,000 passenger miles annually — American Airlines was first with a world record of 410,237,966 passenger miles without a passenger fatality. This record covers a period of more than three years. Eastern Air Lines was second in this group.

Pennsylvania - Central took first honors in Group B — lines flying 2,000,000 or more but less than 50,000,000 passenger miles a year. This company in its 11 years of operation has flown 70,159,498 passenger miles without a passenger or crew casualty.

Braniff, which until late in March had never lost a passenger, was second in Group B with a total of 47,956,588 passenger miles without a fatality through the years 1932-38.

Continental Air Lines and Inland Air Lines won safety honors in the third group — lines flying less than 2,000,000 miles a year.

A special safety award also was presented to United Air Lines in recognition of "outstanding contribution in study of personnel and equipment problems for the advancement of safety in air transport."

For the first time a special safety award was made to a division of an air line. This was won by the Eastern Division of Transcontinental and Western Air, Inc., which as a separate operating unit recorded 151,204,506 passenger miles without a passenger fatality.

The National Safety Council's Aviation Safety Award Committee consists of: Harry F. Guggenheim, chairman; Dr. George W. Lewis, vice-chairman, director of Aeronautical research, National Advisory Committee for Aeronautics; Col. Edgar S. Gorrell, president, Air Transport Association of America; Edward J. Noble, chairman, Civil Aeronautics authority; S. Paul Johnston, editor of *Aviation;* D. D. Fennell, president of the National Safety Council, and Lew R. Palmer, secretary, conservation engineer, The Equitable Life Assurance Society.

Dust

(Continued from page 19)

trance point with various forms of hoods designed for the particular operation. Examples of jobs where this equipment may be encountered are switch point grinding, cleaning castings, grinding dies, or other jobs where portable abrasive wheels or dressing tools are used.

Most engineers are familiar with the great variety of applications of exhaust equipment on machines such as abrasive wheels, grind-stones, polishing heads, buffers, and other similar equipment. Specially designed hoods are frequently applied to tumblers, shake-out machines, sandblasting equipment, screening devices, mixing machines, ball mills, grinders, shredders and filling machines. These devices are mandatory in most states.

Properly designed equipment employed at the point of origin of dust will effectively remove the hazards of the particular operation. It is generally recognized, however, that in addition to local exhaust, a general ventilating system that will keep all the air in the workroom below toxic limits is essential. There are several varieties of this equipment on the market, all of which are efficient for the work which they are designed to do. Manufacturers of these systems will, as a rule, guarantee them as to performance and their ability to meet labor department requirements.

Where the building and process are suitable for their use, exhaust fans, strategically placed, may be used to draw air out of the building, through ducts with conveniently located inlet ports, and discharge it into the atmosphere. Fresh air is drawn in through vents, thus replenishing the pure air supply. If heating or humidity control is not a problem, this method has been found satisfactory.

If, on the other hand, the dust collected from the local exhaust systems and the general ventilating system, are toxic, or large in quantity, they cannot, of course, be discharged into the air but must be trapped. Here, devices employing filters of various designs such as bags, filter packs and screens, are used. These filters trap the dusts and prevent their recirculation in the plant through being drawn into the clean air inlets. Filters are frequently employed to recover valuable industrial dusts which would otherwise be lost.

Some exhaust systems, instead of using filters for trapping the dusts, scrub the air by passing it through water screens. This method works well on many substances and has the additional merit, where the dust is soluble, of allowing for easy recovery of possible valuable by-products. Here, again, there is no discharge of toxic dusts in the surrounding atmosphere.

Electric precipitators have been found useful, particularly where the dust which must be removed from the air consists of very fine particles. These precipitators while efficient in their own right, may be used in conjunction with other purifying equipment to secure the maximum efficiency for the dust control system.

The common method of removing nuisance dusts, such as sawdust, is the local exhaust duct which feeds into a main duct that in turn empties into baffle type dust collectors. If the collector is cleaned regularly and there is no objection to the finer particles of dust being discharged into the surrounding atmosphere, this system will be found satisfactory. Some of the newer dust collectors of this type are so designed that even fine particles do not escape into the air if the equipment is properly maintained.

In existing buildings, mechanical removal of dust by means of exhaust systems, is probably the most effective means of control, although there are other points of attack which must not be neglected. Housekeeping is extremely important. Much can be done to eliminate a dusty condition by care in handling materials and by establishing and maintaining a thorough housecleaning program. This may entail the brushing down of walls, cleaning of ledges and beams, dusting of machines, and removal of dust from the floors at regular intervals. All of this can be done more efficiently by the use of built-in vacuum cleaning systems or by portable vacuum cleaning outfits. Regardless of the means adopted, the cleaning should be done frequently enough that there is no possibility of vibration shaking the deposited dust, or drafts blowing it, into the workroom air.

The isolation of dusty processes, either in separate buildings or departments, has been found satisfactory. Where this isolation exists, it is possible to reduce the installation costs for exhaust equipment which, of course, means that operating, maintenance and replacement costs are lessened proportionately.

Enclosing dust-producing machines and material-handling equipment offers another means of control that is receiving much attention. Machine manufacturers, realizing the demand, are designing to this end. Tightly fitted covers on mixers and tumblers, dust-proof joints on conveyors, and fully enclosed machines are examples of the good work done in this field. Exhaust systems built into the machines are becoming more common.

Wherever possible, buildings should be designed for the operations to be conducted. This entails the use of enclosed operations wherever possible, provision of ample space to prevent crowding, isolation of dusty equipment, and design of the building to facilitate good housekeeping. Bevelled ledges, rounded corners, enclosure or bevelling of exposed beams, and the installation of built-in vacuum cleaning systems, are possible when the building is properly designed.

Like the housekeeping program, the exhaust equipment must be maintained at a high standard to operate at maximum efficiency. Exhaust ducts reduced in area by heavy deposits of dust, whether harmful or merely nuisance dusts, lose their efficiency. Regular cleaning programs should be in effect, and air velocity readings should be taken at exhaust hood inlets to determine the operating condition of the equipment. Any deviation from standard requirements should be checked at once. It is a sad commentary but true that many thousands of dollars are invested in exhaust equipment that might well have been spent elsewhere since poor maintenance has rendered it practically useless.

Air tests to determine the concentration of harmful dusts should be made at regular intervals by qualified engineers. These tests should be made even though velocity tests of the exhaust equipment indicate that it is operating at maximum efficiency. Leaks in ducts may be pouring dust back into the workroom and sometimes these can be discovered only by careful inspection after high dust concentrations are discovered. New operations may be added, or machines rearranged, so that original velocities of air become insufficient to remove the dust. Air tests will reveal this condition.

Where air tests are made at regular intervals, the expense is often justified by the maintenance of higher employee morale. Also, any indication of toxic limits can be corrected before workers are affected and become subjects for medical treatment and possible compensation.

There are several other methods of dust control that have proved effective in cases where they could be applied. Substitution of innocuous materials for toxic substances, use of wet processes, and the application of binder dusts to "lay" the toxic dusts, are common. In many cases, however, these are not practicable and recourse must be had to the methods already covered.

Or Should Be

Safe drivers are now handsomely rewarded by automobile insurance companies with premium rebates. However, escaping from the coroner represents at least one case where virtue is perfectly willing to be its own reward. —*Advertising Age.*