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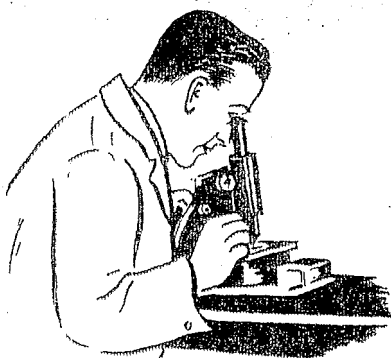
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Health Hazards

Under the Microscope



INSSTALLATION of a new industrial hygiene laboratory is an important development in Bethlehem Steel Company's industrial hygiene program. It will add to the effectiveness of the company's long established plan of seeking out and attacking occupational hazards in its far-flung operations. This activity, a division of the company's medical organization, is under the direction of an industrial hygiene engineer, Dr. Allen D. Brandt, who reports to the company's medical director, Dr. Loyal A. Shoudy.

Located at Bethlehem, Pa., the new laboratory serves the company's steel plants, mines, shipyards and fabricating works. Here, men with backgrounds of training and experience which qualify them for the work are engaged in the important work of taking special and routine samples of atmospheric contaminants where hazards are suspected. Generally, these men are from the medical or safety staffs.

The major function of the industrial hygiene division is to detect and

evaluate the health hazards and sources of discomfort which may exist throughout a plant. They assist in the development of corrective or control measures that will permit the eradication of such conditions or keep them within unobjectionable bounds.

While the medical staff is dealing largely with the worker himself, the industrial hygiene division deals mainly with his environment. Its members are concerned not only with direct health hazards but with conditions which cause discomfort. This work of preventing occupational ills—chronic or acute—is already proving highly beneficial to the health and comfort of the workers. And many indirect benefits, such as higher morale and increased efficiency, are also invariably gained through an adequate and efficiently conducted industrial hygiene program.

Atmospheric Contaminants

The control of atmospheric contaminants is by far the most important part in this work. These contaminants include, dusts, fumes, smokes, mists, vapors and gases. Other environmental factors of importance are proper heating (or cooling), ventilation, illumination and noise abatement. Protection against radiant energy must also be provided in some locations.

Dust is probably the major atmospheric contaminant of industrial hygiene significance in a steel plant. Sometimes the conditions at certain operation are so similar in plants of the company that the results of a study in any one plant can be applied elsewhere. However, in most cases each plant presents distinct problems requiring a method of attack.

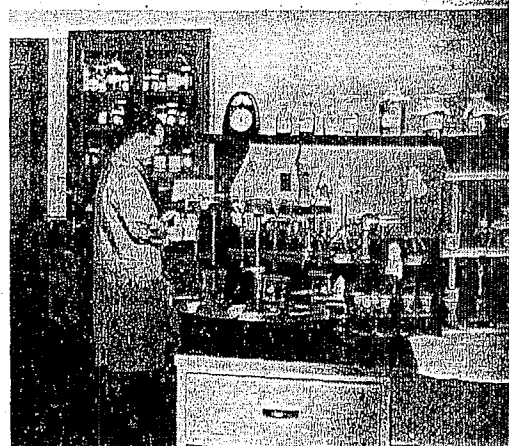
In making the present comprehensive re-survey of the plants, an incidental laboratory work, a "thing-first" approach has been adopted. Due to their long experience in this type of work, the men in charge are quickly able to recognize processes or operations which present major potential hazards to objectionable conditions. These are dealt with first, while less severe conditions are taken in order of importance. Taking a long-range view, this method offers the advantage of eliminating the most objectionable features as quickly as possible.

Three distinct phases are involved in the technical work of the industrial hygiene staff. They are: (1) collection of samples and study of conditions in the plant; (2) analytical work in the laboratory; and (3) termination and selection of control and correction measures, generally.

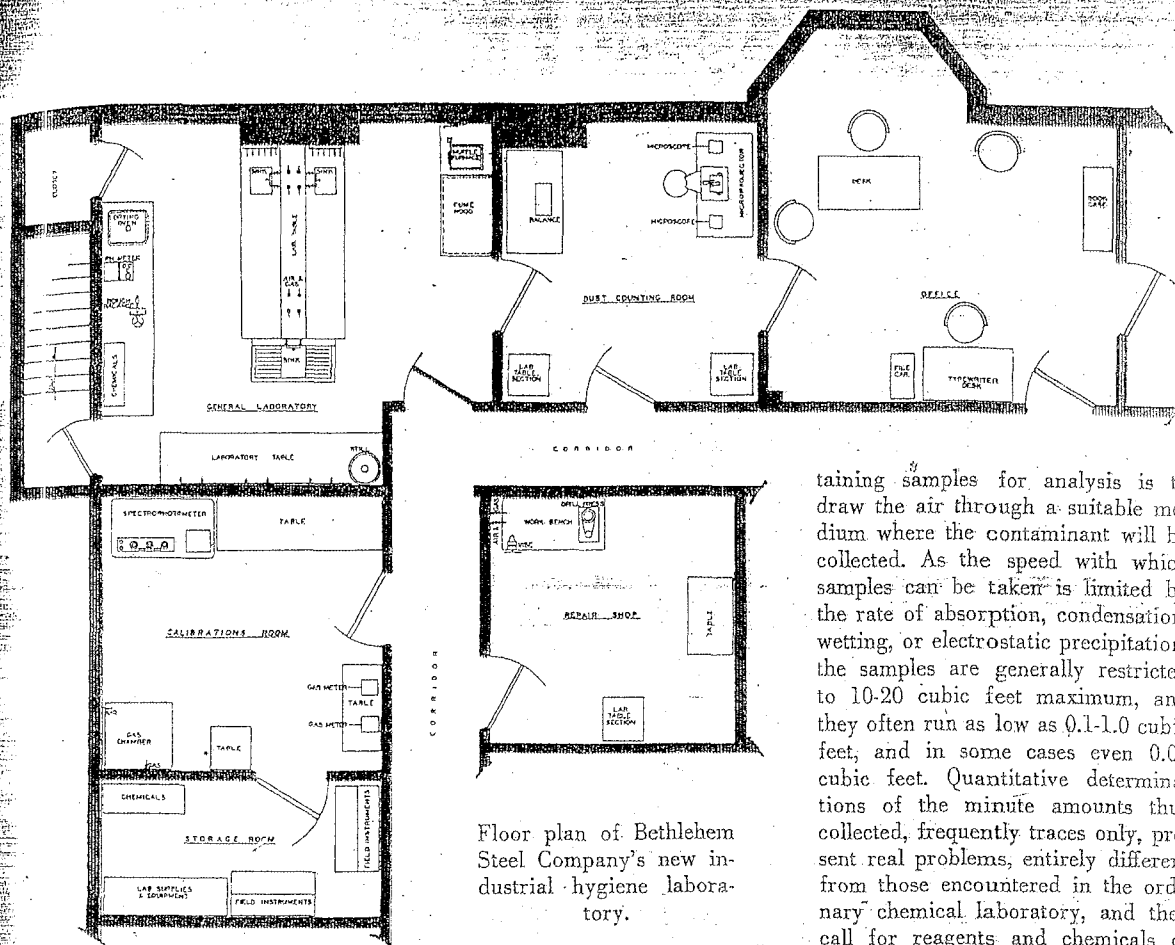
Making dust count with microprojector. Image under the microscope is transferred to screen.



Analytical workroom in industrial hygiene laboratory.



for an industrial steel plant at a car in other at the plant. However, presents of g spect comprehensive its, and k, a "f as bae experie ne men o recogn which pr ords or of These in severe color of in range view advantage one side re involve the ind are (1) eudy of (2) analysis and (3) of con general



Floor plan of Bethlehem Steel Company's new industrial hygiene laboratory.

collaboration with the engineering, purchasing, operating or safety departments.

An industrial hygiene laboratory must be equipped to collect and analyze quantitatively a wide variety of atmospheric contaminants, both solids

and gases, in extremely small amounts and in very high dilutions. Determinations of concentrations as low as a millionth of a gram per cubic foot of air are not unusual (1 ounce = approximately 30 grams).

The most common method of ob-

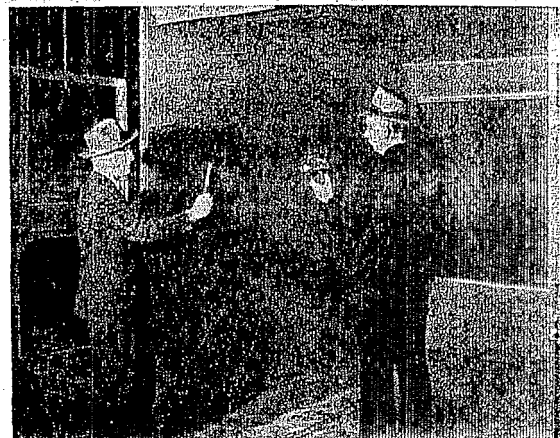
taining samples for analysis is to draw the air through a suitable medium where the contaminant will be collected. As the speed with which samples can be taken is limited by the rate of absorption, condensation, wetting, or electrostatic precipitation, the samples are generally restricted to 10-20 cubic feet maximum, and they often run as low as 0.1-1.0 cubic feet, and in some cases even 0.01 cubic feet. Quantitative determinations of the minute amounts thus collected, frequently traces only, present real problems, entirely different from those encountered in the ordinary chemical laboratory, and they call for reagents and chemicals of exceptional purity.

The new laboratory is located on the second floor of a building near the main office, and consists of six rooms, with a combined floor area of approximately 1,100 square feet. These rooms include an office, dust —To page 61

Calibrating room. Operator is making colorimetric analysis with spectrophotometer.



Measuring the flow of air in a spray-painting booth to check ventilation.



Health Hazards

From page 23

counting room, general laboratory, calibrating room, storage room, and repair shop.

The main analytical room is equipped with a large central work bench with the customary connections for vacuum, compressed air, gas, and electricity, and with a sink and a drying rack at either end. Facing this bench is a hood with electric hot plates. A drying oven and a muffle furnace, both electrically heated, a pH meter for hydrogen ion determination, a still, and the regular chemical apparatus and glassware make up the principal equipment in this room.

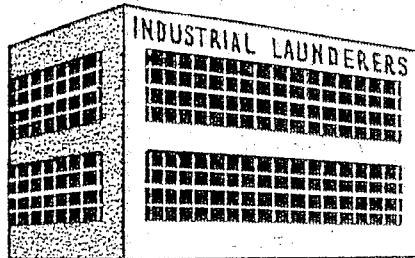
In the method most commonly used in determining the dust content of an atmosphere, a definite quantity of the dust-laden air is drawn through an impinger. This is a specially constructed bottle, in which the dust is arrested by making it strike, at very high velocity, against a plate placed in the stream of air. The dust is then collected in a suitable liquid.

Most of the dust thus collected is analyzed chemically for its content of contaminants under investigation. However, in the case of nuisance dust and fibrosis-producing dust, an actual count of the number of particles is required. To accomplish this, a small sample of the liquid containing the collected dust particles is allowed to settle in a specially designed glass cell which is then placed under a microscope. Here definite areas representing 1 cubic millimeter are blocked out, and the actual number of dust particles in several of these areas is determined by regular counting. To facilitate and speed up the counting, the image on the stage of the microscope is transferred to a large screen by means of a micro projector.

In an industrial city atmosphere the number of dust particles is generally in the order of one-half to two millions per cubic foot of air. For plant atmospheres, however, the dust content varies considerably.

Most industrial air-borne dust has a particle size less than 5 microns (1 inch = 25,000 microns). The equipment used in routine dust counting will take in particle sizes from a little under 1 up to 10 microns. Particles larger than 10 microns will settle out quickly in the immediate vicinity of

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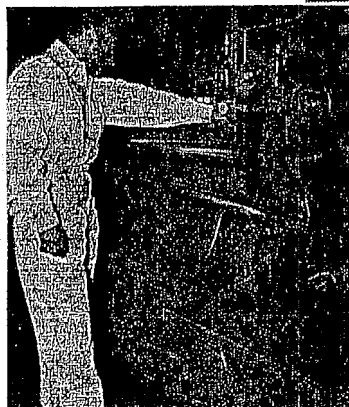
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Washing Service includes all above items and other industrial hard to wash fabrics such as wiping rags, machine covers, drop cloths, filter cloths, buffer cloths, polishing cloths, etc.

INSTITUTE OF INDUSTRIAL LAUNDERERS
Headquarters: SCHLEY STREET, GARFIELD, NEW JERSEY

FOGGED LENSES

SLOW PRODUCTION



Workers who wear corrective glasses or goggles are often slowed up by fogged lenses. Sweat runs down the forehead and streaks the lenses. This means time out for cleaning glasses. There's seldom a dry rag handy, so the quality of work suffers because of impaired vision.

Sweat-fogged lenses mean less production, poorer quality and greater worker discomfort.

KOOLPADS SOLVE THE PROBLEM

Made of highly absorbent cellulose sponge, featherweight KOOLPADS soak up sweat and keep glasses or goggles clear and fog-free. Available with elastic head strap or with snap fasteners for welder's helmets, KOOLPADS should be washed daily. Wear one damp for cool comfort and note production pick up on hot jobs.

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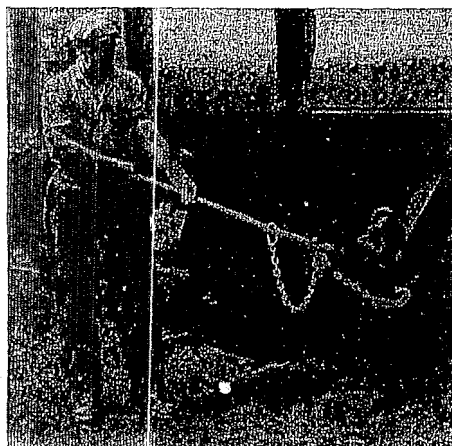
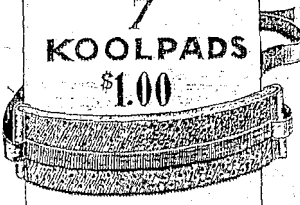
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the point of origin.

Determination of the free silicate content in the dust is of utmost importance and requires special equipment. Most of this work at Bethlehem is done with the petrographic microscope, but the use of X-ray diffraction methods is also being considered.

Colorimetric methods are very effective in determining minute quantities of many chemical compounds and are therefore used extensively in industrial hygiene work. The amount of a colored chemical compound contained in a solution may be quickly and accurately determined by comparing it with a similar solution of known concentration. Such comparisons are frequently carried out by visual observation, but in many cases a spectro photometer is used. In this instrument a photo-electric cell, far more sensitive to color variations than the human eye, is employed in making the comparisons.

The laboratory is also equipped with a gas chamber. The chamber is used in producing known concentrations of various gases and dusts for calibration of field instruments. Gas meters or air-flow meters of several types are used to calibrate or measure the sampling rate of different sampling equipment.

A well-equipped repair shop is provided for the proper maintenance and care of the complex equipment, both in the laboratory and in the field, and for building special equipment not available commercially.

Besides operating the laboratory, the industrial hygiene staff is constantly engaged in studies of technical processes and methods of production. They make recommendations for improving and redesigning equipment wherever this will provide increased comfort and more healthful working conditions. They also make studies of materials used, in order to anticipate possible hazards from that source. And they keep in touch with significant developments in industrial medicine that will aid in safeguarding the health of the company's employees.

Slogans Win Cash U. S. Rubber Co. Safety Contest

"Safety Is Thought and Careful Action" was the slogan that won \$100 first prize in the U. S. Rubber Company's 1948 slogan contest. The prize winner was John C. Stevens.

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