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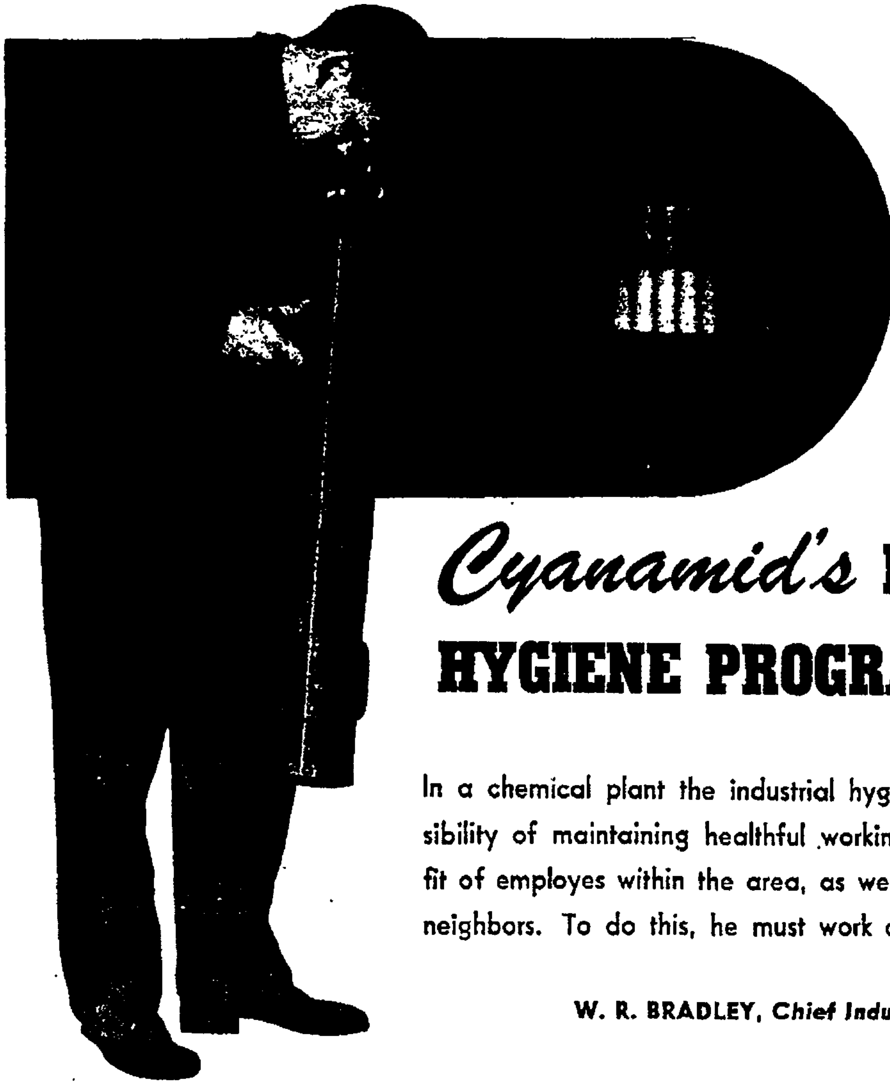

Using the interferometer for the determination of solvent vapor in the atmosphere. The golf bag serves as carrying case for easy portability

EXHIBIT

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Cyanamid's INDUSTRIAL HYGIENE PROGRAM

In a chemical plant the industrial hygienist shoulders the responsibility of maintaining healthful working conditions for the benefit of employes within the area, as well as the comfort of nearby neighbors. To do this, he must work closely with all departments

W. R. BRADLEY, ***Chief Industrial Hygienist***

THE CENTRAL Industrial Hygiene staff consists of four industrial hygienists each having considerable training and experience in one or more fields of toxicology, chemistry and engineering. These men pool their knowledge to improve working conditions, plant environment and atmospheric conditions.

Their efforts are directed chiefly toward maintaining the health and well being of employes within the plant and comfort of surrounding neighbors. In addition to this staff, the Calco Chemical Division employs three engineers for industrial hygiene engineering. A few other subsidiaries have engineers assigned to industrial hygiene problems on a part-time basis. These men work closely with the Central Industrial Hygiene Staff.

Industrial hygiene is a function of the Central Medical Department and, therefore, is a part of the over-all employe health program. Through this association, all questions pertaining to industrial health are properly evaluated

INDUSTRIAL HYGIENE, in a very practical sense, is a program directed toward preserving health through maintaining healthful conditions of work in industry. Through studies of working environments, it is possible to recognize, evaluate and control environmental causes of illness.

As a result, employes are not exposed to the raw materials, intermediates, or finished products that may be toxic—whether gases, mists, vapors, dusts, or fumes—or to excessive heat, noise, or radioactive energy that might otherwise present a nuisance or serious health problem.

Through frequent surveys and observations, and through the use of specially-designed equipment, techniques, air sampling and analytical procedures, the hygienist keeps watch on the environment of industrial employes, and is able to point out what control measures may be needed.

In the chemical industry, the responsibility of industrial hygiene is perhaps put to its greatest test. New chemicals and chemical products must be used and handled long before they are offered on the market. Some of them may exhibit toxic properties that might present a hazard in use.

The industrial hygienist must prohibit any opportunity for exposure to exist. In this effort, he works closely with the medical staff, research, engineering department, production, plant management and employes, because it is teamwork that brings results.

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and assigned for investigation, and all pertinent information of a toxicological nature is discussed. This background of information, augmented by related data obtained in field investigations, places the industrial hygienists in an excellent position to interpret toxicological information for plant managers and personnel engaged in putting through control measures.

The service rendered within the plants consists of making periodic surveys and studies. The surveys consist of (1) investigating working conditions and environments with regard to what beneficial effects have accrued and (2) to ascertain whether further improvements are necessary. Studies consist of augmenting data obtained by observation of working places, supplemented with data obtained by physical measurements and chemical determinations.

Physical measurements include temperature and relative humidity recordings, sound intensity and vibration frequency, radiation measurements, interferometer measurements, dust counts, etc. Chemical determinations include air sampling and analysis for air borne contaminants to determine their nature and representative concentration in the workroom atmosphere.

Such findings are discussed with the medical departments of the respective plants and with plant management so recommendations can fit in with contemplated plans for improvement and expansion. On the other hand, atmospheric sampling often helps dispel misgivings concerning whether or not a health hazard exists.

While the previous statements reveal what industrial hygiene does with existing plant processes, there is just as much effort expended in making plans in advance for the prevention of employe contact with, and exposure to, toxic chemicals. Consequently, blueprints for new processes and plant design come to the attention of hygienists so prevention can be inaugurated in the blueprint stage.

Because of this constant contact with process development engineering, a vent on a blueprint is no longer indicated by an arrow pointing upward or a discharge to the sewer by an arrow pointing downward. Instead, vent lines in many instances lead to outlines of cyclones, condensers, scrubbers, incinerators, or other devices, which control air borne material formerly released to the outside atmosphere.

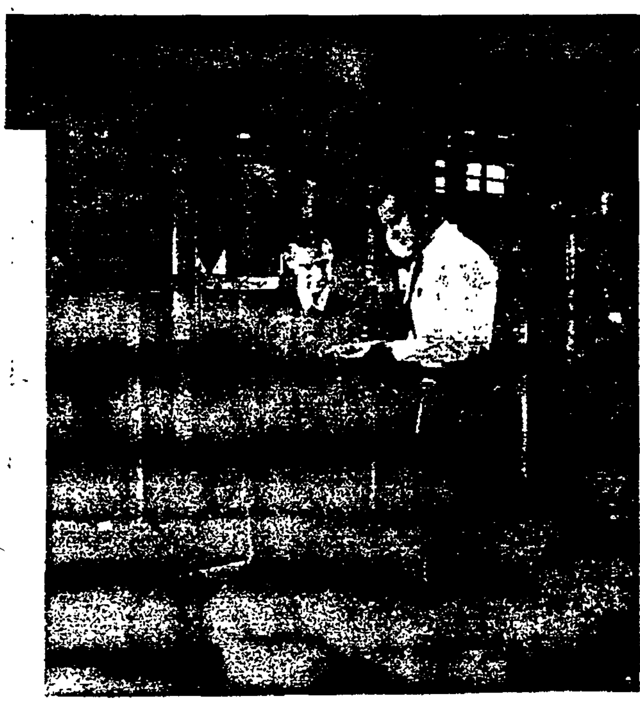
Designs of well-ventilated hood enclosures now appear in drawings depicting bag packing and drum filling of dusty material. Dust collectors and scrubbers, and outlines of both hooded and slot type local exhaust systems over kettle manholes are mute evidence of the hygienist's contribution to plant design.

Furthermore, frequent and extensive visits to all company plants provide a background of observations on the beneficial effects of good industrial hygiene practices. This experience is of considerable importance in showing the process design engineer the opportunity for providing in advance some measure of control for a particular process.

A typical example of the success of this type of thinking is the production of millions of pounds of a highly toxic insecticide without any lost time accident due to employe contact with the material or its intermediates. Observations and air sampling data obtained in the pilot stage, together with preliminary toxicological information, showed how to design proper environmental control methods into the new plant. Close follow-up work during production has been of great value.

Likewise the location of any new plant is of considerable interest to the hygiene department. This stems principally from its responsibility in helping to abate conditions causing air pollution. The geographic location is of considerable importance as well as the topography, meteorological and weather conditions. While air-borne material discharged from the new plant may be controlled to such an extent that it constitutes no air-pollution problem by itself, it may, nevertheless, mix with material discharged from neighboring plants and create a new compound, which would be considered a nuisance and undesirable.

Once the results of plant surveys and studies are transmitted to plant management, a plant engineer is usually assigned to carry out the designated design and installation of corrective measures under the direction and advice of the hygiene department.



While other plans have been tried, it has been found that the expediting of engineering plans by means of an annual operating budget works best. Work can be accomplished with more speed, responsibility is centralized, and flexibility is assured for contingencies and emergencies. Execution of recommendations for providing engineering control measures is further aided by a definite allocation of maintenance and construction manhours for whatever installations must be made.

Periodically, plant management is presented with a progress report citing work completed, in progress or contemplated, with the budget requirement for each item.

Since all types of air sampling equipment are employed in our investigations, the burden of handling problems involving air pollution is shared considerably by the industrial hygienists. Their knowledge of what gases, vapors or dusts are emitted from the processes is gained from their intimacy with the various phases of manufacturing.

When this knowledge is not available, they retreat from blackboard conceptions and engage in stack sampling. Stack sampling has proved so successful as the start of any investigation concerning alleged air pollution that it has become a routine procedure.

Maintaining a satisfactory working environment depends on the nature of the raw materials and intermediates as well as the finished product, and how they are to be handled. The diversity of new products the company is always producing keeps the hygiene department men moving fast. It is to be expected that sales personnel get requests for information on the toxicity of various products, how they are to be handled, whether ventilation is required, etc. Since hygienists have dealt with the problem in the manufacturing process, they are in an excellent position to offer fully appreciated advice to customers as a technical service.

The tools an industrial hygienist uses enable him to collect and analyze materials by unique methods. A dark smudge within an aluminum tube represents a "sample" and the findings obtained from such samples may mean the "go ahead" sign for an expenditure of thousands of dollars for ventilating equipment.

Instruments Plus Ingenuity

An instrument called an interferometer measures the difference between the refractive index of pure air and air containing a solvent vapor. The answer is obtained within a minute, and on the spot. The hygiene staff is justifiably proud of the instrument, not only because of this feature but because it is one of only three or four portable types in use in this field.

On the other hand, the industrial hygienist resorts to a certain amount of ingenuity in sampling and analyzing a great many substances. For instance, one of the simplest methods of air sampling is to use a side-arm test tube and calibrated glass syringe as the suction device. Air is drawn through the tube containing a selected reagent in solution, which gives a desired color change when sufficient air-borne material has been introduced. The volume of air required is then read off the syringe, and a calculation made on the spot to give the atmospheric concentration. This simplified method, when applied to stack sampling, has enabled hygienists to follow batch operations, obtain data on peak and minimum loads, and collect hundreds of air samples for subsequent laboratory analysis.

Some of the important instruments we use are: (1) electrostatic precipitators, (2) sound intensity recorders, (3) radiation detecting devices, (4) battery-operated air samplers for collecting samples in orchard studies on the use of insecticides, (5) carbon monoxide detectors, and (6) hand cranked pumps for collecting dusts. A more recent development is that of a windmill air sampler where no other source of power is available. This is for stack sampling and for long-period sampling in the vicinity of plants where certain gases escape in small quantities. It is only by such outside sampling that we can ascertain whether undesirable atmospheric conditions do or could exist in the plant, or neighborhood immediately surrounding it.