

Some Industrial Hygiene Problems in the Petroleum Industry

N. V. HENDRICKS

Industrial Hygiene Engineer, Standard Oil Company (N. J.)

OBVIOUSLY all of the various industrial hygiene problems associated with the activities of the petroleum industry can not be included in the scope of this discussion; however, an attempt will be made to describe certain typical problems that are associated with selected refinery and other procedures.

Before any crude oil reaches a refinery for processing, it must be removed from the ground and transported to refinery locations by various methods. There are a number of health problems which arise in the course of producing crude oil. In many areas where oil fields or refineries are located, housing and similar facilities for workers are either inadequate or totally

may be required for the handling of such problems.

In the drilling of wells, servicing and maintenance of equipment, and in connection with pumping and pipeline operations, employees may be exposed to certain toxic materials. These might include such things as radioactive compounds, hydrogen sulfide, mercaptans, anti-oxidants, special inhibitors, solvents, tars, carbonyl sulfide, and others. Such exposures may be either acute or chronic, depending on the nature of the job at hand.

Processing Procedure Problems

THE GREATEST number of industrial hygiene problems are associated with processing procedures. Only a few of those that are found in certain refinery activities will be confined to certain of the more specific about how exposures occur and

TABLE I
SOME INDUSTRIAL HYGIENE PROBLEMS AS
RELATED TO PRODUCING CRUDE OIL

1. Camps
 - a. Water Supply
 - b. Sewage Disposal
 - c. Insect Control
 - d. Garbage Disposal
2. Exposure or Hazard
 - a. Radioactive Materials
 - b. Hydrogen Sulfide
 - c. Mercaptans
 - d. Anti-oxidants
 - e. Special Inhibitors
 - f. Solvents
 - g. Tars
 - h. Dermatitis
 - i. Carbonyl Sulfide
 - j. Others

lacking. This applies to both domestic and foreign areas; therefore, in some cases, it becomes necessary to develop such items as housing, water supplies, sewage disposal, insect control, garbage disposal, and other features of general community sanitation. This problem may vary widely in its extent from a situation involving a half dozen houses up to construction, operation, and maintenance of facilities necessary for a population of several thousand. In developing such facilities, naturally, certain public health aspects are involved; and these must be given due emphasis in order to insure the proper protection of the employee health. In some cases, particularly in foreign areas, a staff of sanitary engineers



Fig. 1

Acid treating area in this area crude oil is treated with acid to reduce the impurities in the crude. The workers in the foreground are emptying a vat.

PLAINTIFF'S
EXHIBIT

500600 Exco

agriculture chemicals, clays, acids, plastics, waxes, and others. It is not necessary to go into details as to the type problems associated with the manufacture of the above products, as they are fairly well known. However, a brief list does serve to point out the variety of materials produced by the petroleum industry and the general nature of the industrial hygiene problems incident thereto.

All of the environmental exposures are not associated directly with refining. Many of these come from maintenance and repair operations on various types of refining and manufacturing equipment. Some of the maintenance operations involving exposures include welding, pipe fitting, insulating, brick laying, painting, instrument repair, lead burning, foundry work, ship repairs, machine shops, tin shops, boiler making, and the like. From the standpoint of the total number of employees exposed to either toxic materials or deleterious physical conditions, probably the greatest single group in a refinery is found in the maintenance and repair work. In many cases such individuals are not only exposed to process materials, but also to toxic substances which arise as a part of maintenance or repair work, such as is the case with instrument repair men.

TABLE IV
SOME MAINTENANCE AND REPAIR OPERATIONS
WHICH PRESENT EXPOSURES

Operation	General Exposure
Welding	Metal Fume Fever, Fluorides,
Pipe Fitting	Heat, etc.
Insulating	Dermatitis, Solvents, Heat,
Brick Laying	etc.
Painting	Asbestos, Heat
Instrument Repair	Silica Dust, Heat
Lead Burning	Solvents, Thinners, Lead,
Foundry	etc.
Ship Repairs (Drydock)	Mercury, Solvents
Machine Shops	Lead
Others	Silica Dusts, Lead, Brass
	Fumes, etc.
	Welding, Burning, Painting,
	etc.
	Degreasing, Dermatitis,
	Metalizing, etc.

Research and Laboratory Activities

THERE ARE many industrial hygiene problems associated with research, development, and laboratory activities. A great number of experimental materials are used, both on a laboratory and pilot plant scale.



COURTESY OF STANDARD OIL COMPANY (NEW JERSEY)

Fig. 3.

A general view in a refinery showing the light ends unit in background

Of the overall materials used many would include such things as toxic hydrocarbon dusts, metals, catalysts, gases, mists, and the like. In many cases, very little is known concerning the toxicity of such material and it becomes highly desirable and even necessary to develop a certain amount of toxicological data for research operation.

Frequently the use of toxic materials considered where such compound may have certain properties which could well be incorporated into products of manufacture.

TABLE V
SOME INDUSTRIAL HYGIENE PROBLEMS
ASSOCIATED WITH:
RESEARCH, DEVELOPMENT & LABORATORY

1. Exposures (Laboratory and Pilot Plants)
 - a. Hydrocarbon Vapors (Aromatic and others)
 - b. Dusts
 - c. Toxic Metals (Pb, Hg, etc.)
 - d. Catalysts
 - e. Gases
 - f. Others
2. Assist with problems involving use of toxic materials in products considered for manufacture.
3. Development of Toxicological Data
 - a. Literature Searches
 - b. Animal Studies
 - c. Other