

ETHYL GASOLINE

Dr. Robert A. Kehoe and his associates in the Kettering Laboratory of Applied Physiology, University of Cincinnati, published an article in the March 1934 issue of The Journal of Industrial Hygiene entitled "An Appraisal of the Lead Hazards Associated with the Distribution and Use of Gasoline Containing Tetraethyl Lead". For the present purposes, the article may be summarized as follows:

Tetraethyl lead is a heavy, colorless, oil liquid. It is insoluble in hot or cold water, but may be dissolved in gasoline. Small amounts of tetraethyl lead are used in some automobile fuels; the amount of tetraethyl lead in gasoline is so small that the solution lacks the toxicological properties of tetraethyl lead. The vapors rising from tanks containing leaded gasoline do not contain appreciable amounts of lead. However, this does not mean that no tetraethyl lead may be evaporated under any of the practical conditions of handling and use or spillage of lead-containing gasoline.

A distinction must be made between the actual hazards of the manufacturing process and the problematical dangers in the handling and distribution of the finished product -- a so-called leaded gasoline. Leaded gasoline is handled at refineries, bulk storage plants, filling stations, and garages. It is transported from the bulk depot or storage plant in tank trucks to filling stations. Large numbers of persons come in contact with the gasoline in its distribution. They inhale vapors from tanks, hose lines and surfaces on which the gasoline is spilled. At loading racks, at filling stations and at other points where gasoline is handled regularly, the repeated spillage of gasoline containing lead may bring about the accumulation of small amounts of tetraethyl lead, by reason of their absorption into wooden platforms, or other surface materials such as concrete, asphalt, gravel, cinders or earth. Under such conditions some portion of the tetraethyl lead is

KE 0004699

evaporated slowly and the remainder undergoes decomposition. In either case opportunity for inhalation of lead on the part of persons in the vicinity may be provided, though, no doubt, most of the accumulations are dissipated by frequent hosing, or by rainfall.

Tank-truck handlers of such gasoline are in a different category from either filling station attendants and garage mechanics. A number of tank wagon handlers were selected for study on the basis of their length of exposure to leaded gasoline on separate occasions. About one-half of the tank wagon handlers had been exposed for about five years or more. No case of lead intoxication was found among the subjects. No clinical evidence of lead absorption or lead intoxication were found in any individual, and no indication of lead absorption, as a consequence of the exposure, was detected when the subjects were compared as to their lead excretion with corresponding groups of unexposed persons who had been studied. In fact, no combination of symptoms and physical findings were suggestive of lead intoxication. Evidences of lead absorption, which are common among lead workers, were conspicuously absent. There is no substantiated case of lead intoxication in the distribution and use of such gasoline after years of continuous use.

The analytical results of experimental findings serve to classify tank wagon handlers as distinctly outside the hazardous lead trades. In view of the negative evidence obtained in this study of persons exposed to leaded gasoline, there is no reason to fear the existence of danger to their health of tank wagon drivers distributing leaded gasoline.

A subsequent article (18 Journ. Industrial Hygiene and Toxicology) published in January, 1936, likewise entitled, may be very briefly summarized:

Under controlled experimental conditions, no indication of occupational lead absorption was given by filling station attendants dispensing gasoline and

KE 0004700

leaded gasoline. Filling station attendants who had handled large quantities of leaded gasoline over periods of 3.5 and 6 years, respectively, when abruptly removed from employment and studied under laboratory conditions for months, failed to show any evidence of occupational lead absorption. Likewise, men studied for months before employment as garage mechanics developed no evidence of occupational lead absorption.

Lead exposure associated with the handling and dispensing of gasoline containing tetraethyl lead at filling stations is negligible.

Dr. Louis J. Moorman, F.A.C.S., Oklahoma City, and former Dean of the Medical School of the University of Oklahoma, has written an article concerning industrial gas hazards arising through the consumption of petroleum products. It may be briefly summarized as follows:

Acute poisoning may result in sudden and immediate asphyxia* with paralysis of respiration and heart failure and death. In cases recovering from the immediate effects of acute poisoning, pulmonary edema may develop.

Subacute poisoning may lead to irritation of the mucous membranes; such irritation being manifested as conjunctivitis, rhinitis, pharyngitis, laryngitis and bronchitis, ranging from a mild to severe form. These manifestations may not appear until a few hours after exposure. When pneumonia occurs, it is probably due to exposure or to secondary or indirect factors.

From the standpoint of industrial compensation, it is necessary to

* Asphyxia resulting from petroleum gases is of the simple type and due to the exclusion of oxygen from the respiratory tract.

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determine whether or not genuine damage has resulted from the inhalation of gases from petroleum products. In attempting to determine the merits of any particular case, it is well to bear in mind that pre-existing chronic conditions, especially cardio-respiratory affections, may lead to confusion particularly in those who are consciously or unconsciously malingering. He may decline to return to work because of alleged headache, weakness, burning sensation in his lungs, shortness of breath, palpitation of the heart and a feeling of oppression or pain in his chest. Claimant's possible propensity for compensation may lead to spurious symptoms, which have no relation to the alleged condition; or he may erroneously attribute one or more of the following described conditions to gas poisoning:

1. Chronic sinusitis which is common among persons who are able to carry on their daily routine work, might be considered a result of alleged gasing and the consequent irritation of the upper respiratory tract.

2. Chronic non-tuberculous pulmonary infections, giving rise to bronchitis, bronchial asthma, etc, are frequently present without materially affecting earning capacity.

3. Slightly active, latent or arrested pulmonary tuberculosis may be present, without obviously impairing the individual's capacity for work.

4. Chronic heart lesions, especially those involving only the myocardium, may be present for years before they are discovered.

It is well to bear in mind the fact that petroleum gases (excepting hydrogen sulphide) are non-irritating or slightly irritating asphyxiants and do no permanent damage to the respiratory system and that the pathological conditions mentioned above are common in many individuals who are able to work.

If non-tuberculous respiratory conditions previously existed, including

KE 0004702

pulmonary congestion from cardiac weakness, a thorough investigation of ~~all~~ ^{the} person's personal history may establish this fact. While it may or may not be possible to establish the existence of chronic pulmonary tuberculosis, it is safe to say that the inhalation of petroleum gases could not operate as a direct cause of tuberculosis.

Dr. Moorman's testimony in Allen v. Shell Petroleum Corp., 146 Kan. 67, 68 Pac.(2d) 651 (1937), may be briefly summarized as follows: He specializes in diseases of the respiratory tract and of the lungs. He has seen and examined many employees working in the petroleum industry. He has never found a man suffering from pneumoconiosis (lung disease due to inhalation of minute particles) as a result of inhaling petroleum gases or fumes*. Petroleum gases and fumes are not harmful, except when one is exposed to sufficient concentration to get the acute or anesthetic effect, i.e., asphyxiation or unconsciousness. A large amount may cause a person to become unconscious, and even die. But if such person recovers consciousness, he will be merely groggy for two or three hours after which he completely recovers. There is no permanent effect from inhaling petroleum fumes.

Before writing his article for Oxford Medicine, Dr. Moorman examined various medical authorities and did not find a single one which recognized an occupational disease in connection with handling petroleum products.

M. Octavius Spencer, in Reprint 786, Public Health Report September 1922, in discussing the effect of gasoline fumes, shows that exposure to gasoline fumes may cause decreased capacity for work. He states that the following symptoms, in various combinations, may appear:

* Minute particles are not found in gases or fumes.

KE 0004703

"dizziness, irritation of the throat, headache, vertigo, drowsiness, loss of appetite, distaste for food, constipation, pain in the stomach, nausea, vomiting, stupidity and listlessness, loss of strength, insomnia, loss of weight, paleness or loss of color, aching eyes, conjunctivitis, muscular twitching and impairment, and exhaustion." (p.)

The symptoms most commonly observed were headache, smarting and burning of the eyes with a gritty feeling and excessive lachrymation.

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