

Inquiry has established the fact that this tank was cleaned by methods which were in gross disregard of the regulations issued to Orange State Oil Company by Ethyl Gasoline Corporation, despite the fact that the tank in question was equipped with a warning sign directing attention to the regulations which had been posted in the office at the terminal. It has developed that attention had been called repeatedly by a Safety Engineer of Ethyl Gasoline Corporation to the necessity for carrying out the prescribed precautionary measures, and that the responsible representatives of Orange State Oil Company had been apprised of the dangers associated with the cleaning of such tanks. They had also been requested repeatedly to inform representatives of Ethyl Gasoline Corporation in advance of their plan to clean their storage tanks so that a Safety Engineer could be present and supervise such cleaning procedures. In all of these respects Orange State Oil Company agents failed to avail themselves of the assistance and information which was available to them. This point is stressed, not for the purpose of recrimination, but to emphasize the necessity for taking such steps as will prevent future tragic accidents of this type.

Report on Case of [REDACTED] Deceased Employee of Orange State
Oil Company

On January 5, 1960, the undersigned, Dr. Robert A. Kehoe, received a letter of inquiry from Dr. Sullivan C. Bedell of Jacksonville, Florida, concerning the nature of the illness of a patient, Mr. [REDACTED], whom he had seen in consultation on December 31st, 1959. This letter, sent originally to J. A. Costello of Ethyl Gasoline Corporation, was forwarded. Correspondence with Dr. Bedell elicited the entire case history and the record of the necropsy of Hubbard, who had died on December 31st following a brief acute intoxication which in its type and course was strongly suggestive of tetraethyl lead poisoning. The occupational history of the deceased revealed the possibility of serious exposure to one or more of several toxic materials, such as gasoline vapors, hydrogen sulfide, and organic lead compounds, although the latter was only a matter of conjecture.

With the idea of determining the significance or insignificance of the lead exposure, as a preliminary measure, Dr. Bedell was requested to obtain, if possible, portions of the tissues of the deceased man for chemical analysis. Such samples were received at the Kettering Laboratory of Applied Physiology in Cincinnati, Ohio on February 15th and the results of their analysis were reported by telephone on February 19th to Dr. Kehoe, who at this time was in Miami, Florida. These results, given in detail below, were such as to justify the diagnosis of acute lead poisoning, in view of the case history, and, therefore, they provided the starting point for a thorough investigation of the opportunities afforded to the deceased for hazardous lead exposure. Through the Atlanta office of Ethyl Gasoline Corporation, information was obtained which led to an

interview between Dr. Kehoe and Mr. E. W. Van Brunt, Secretary of Orange State Oil Company, at Miami, and Mr. Carter of the same company. At this conference it developed that G. C. Hubbard and others, under the supervision of E. W. Glover of Orange State Oil Company, had been engaged in cleaning certain gasoline storage tanks, up to the date of onset of his illness. Further inquiry elicited the fact that a number of storage tanks, at Jacksonville, Miami and Tampa, had been employed for special blends of loaded gasoline early in 1934, these blends having been made by Mr. John Murphy, a former employee of Ethyl Gasoline Corporation. In a later interview with Mr. Van Brunt, and Mr. J. E. Kille, representing the Maryland Casualty Company, Dr. Kehoe outlined his intention of investigating all of the circumstances connected with the case, and requested that no action of any kind be taken by representatives of the Orange State Oil Company or the Maryland Casualty Company until such investigation could be completed and reported.

On the following day, Dr. Kehoe met Mr. W. H. Shippy of Ethyl Gasoline Corporation in Jacksonville and in his company conferred with Drs. W. E. McCallagh and S. C. Rodell, and in the absence of Dr. L. Y. Byrenforth, pathologist of St. Luke's Hospital, visited the pathological laboratory to obtain information from the technical staff and to examine the microscopic sections of the tissues of the deceased. Information was required also as to the mode of embalming, since the body of the deceased had been embalmed before the necropsy. The undertaker was visited therefore and samples of the embalming fluids were obtained for analysis to determine the possibilities of error from this source in relation to the lead content of the tissues of the deceased as determined by analysis at Hotterling Laboratory. Subsequently, Dr. Frederick Oetgen, consultant

of Maryland Casualty Company in Jacksonville was visited and informed of the status of the case, in so far as the facts were then available.

Later John Murphy was located and consulted as to the places and dates involved in his special blends of leaded gasoline on behalf of Orange State Oil Company.

Further investigation of the details of the employment of the deceased during the period of two weeks immediately preceding his death, was entrusted to Mr. Phipps. From the fact that hazardous lead exposure in cleaning tanks has, in our experience, been limited to tanks to which concentrated fluid has been added, from the knowledge of the work schedule of the deceased, and from the information given by Mr. Murphy, it seemed virtually certain that a "spiked" tank at Tampa had been the source of the lead exposure of the deceased. Mr. Phipps planned to locate the tank or tanks involved, to obtain samples of sludge for analysis and to round out the information required to establish the facts.

All of the pertinent facts are now available as to the origin of the lead exposure, the course of the illness, and the cause of the death of the deceased. Indeed all of the associated facts are known except as to the occurrence or lack of occurrence of illness in the men working with the deceased at the time his illness was contracted. The facts are detailed below in the sequence of their occurrence, together with the evidence on which the diagnosis of fatal tetraethyl lead poisoning rests.

According to Mr. Murphy, concurred in by Mr. Carter, and subsequently by Mr. H. C. McGranig, one tank at the Tampa terminal of Orange State Oil Company, was used for the mixing of leaded gasoline in January of 1934. No other tank at this terminal was so dealt with.

Two drums of Fluid were introduced into this tank, by tapping the gasoline line on the dock, connecting an eductor and drawing the Fluid into gasoline entering the tank from a ship. The ship's pumps supplied the educting stream and propelled this stream into the terminal tank. No recirculation was possible. Other similar operations were carried out at Miami, (one tank only) and at Jacksonville(4 or 5 tanks), but at no other locations.

By reason of certain projected changes in equipment, it became necessary for Orange State Oil Company, to clean a series of tanks at its terminals. Employment records show that D. C. Hubbard and others were engaged in this and other work in various locations. The following dates and locations refer only to the period which is significant from the viewpoint of the possibility of dangerous lead exposure in the work.

<u>Dates</u>	<u>Location</u>
December 1 to 3 Inclusive	West Palm Beach
December 6 to 12 "	Tampa
December 13 to 18 "	West Palm Beach

Of these places, Tampa only would seem to be open to the suspicion of having provided serious lead exposure, since it is the only place at which a dangerous tank appears to have been in existence. Investigation revealed that a tank now designated as # 201, used for blending early in 1934, was cleaned by Hubbard and his associates, under the supervision and with the assistance of Mr. E. H. Glover, over a period between December 3rd and December 11th inclusive, it having gone uncleaned in the interim between 1934 and December 1939.

Sludge which had been removed from this tank in the process of cleaning was obtained and sent by Mr. Shipps for analysis. Such

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analysis revealed in the inspissated material 0.063% of organic lead, and 1.80% of inorganic lead. Experimental tests on this material revealed the presence of significant and toxic quantities of volatile lead, thereby establishing the potential significance of the exposure occasioned by its presence in the tank.

The illness of [REDACTED], according to information obtained by his physicians in Jacksonville, appears to have begun in prodromal form on December 11th or 12th, but was brought to light or possibly accentuated on December 18th by a report, received just before his hurried departure from Tampa, that his wife, in Jacksonville, was acutely ill. He became highly excited and behaved irrationally. When he arrived at his home in Jacksonville, he was in a state of partial confusion. By the evening of December 20th he was having hallucinations, was definitely disoriented and had to be restrained. After unsuccessful medical treatment at home, he was admitted to St. Luke's Hospital on December 23rd in an irrational state, later became wildly excited and violent, developed convulsive-like muscular twitchings, and died in this state on the same day, December 25rd. The character of the illness was so unusual that it was not identified by the attending and consulting physicians, and a necropsy, performed some hours later, after the body had been embalmed, failed to reveal the cause of death to the satisfaction of the physicians and the pathologist.

One point, a positive serologic reaction on blood obtained shortly before death, suggested a possible diagnosis of fulminating syphilis as the background of the fatal illness. The significance of this diagnostic test, which has been found to be positive in at least two other cases of known tetraethyl lead intoxication, can be

discounted in view of a negative history and previous negative serologic tests, as well as the character and course of the illness which were bizarre indeed as manifestations of syphilis, but quite typical of tetraethyl lead poisoning.

Analysis of the tissues of the deceased disclosed concentrations of lead compatible with the diagnosis of fatal lead poisoning, and in keeping with the type of lead exposure. In fact the lead concentrations in the liver and brain (the most important tissues from a diagnostic point of view) were of the same order of magnitude as those found in two other fatal cases of tetraethyl lead poisoning. Opportunities for chance contamination of these tissues with lead from extraneous sources were found to have been non-existent. Thus a determination of the lead content of the fluids used by the embalmer in Jacksonville disclosed the presence of only the most minute and insignificant traces of lead therein, while an inquiry into the manner of handling the tissues by the pathologist (Dr. Lyrenforth) preparatory to sending them to the Kettering Laboratory, has shown that no significant contamination could have occurred.

In summary, it can now be said that the source of the hazardous lead exposure of the deceased has been identified, that the onset and clinical course of this illness were typical of acute tetraethyl lead poisoning as previously seen and described in medical literature, that the pathological findings were in keeping with the diagnosis of tetraethyl lead poisoning, and finally that the analytical results obtained on the tissues have demonstrated the presence of quantities of lead sufficient to cause death. No evidence of the existence of other mortal disease processes has been disclosed in connection with the case.

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On the basis of these conclusions, which are supported by adequate and incontestable medico-legal evidence, the management of Orange State Oil Company is strongly urged to accept G. C. Hubbard's death as due directly to the effects of tetraethyl lead poisoning and to initiate such steps as will provide equitable compensation to the family of the deceased without resort to litigation.

It is further recommended that all measures for the prevention of future similar accidents, be put into effect at once through the co-operative efforts of their representatives and those of Ethyl Gasoline Corporation.

Signed: Robert A. Kehoe
Medical Director
Ethyl Gasoline Corporation

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