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SHELL OIL COMPANY
INCORPORATED

50 WEST 50TH STREET

NEW YORK 20

June 26, 1946

Dr. Willard Machle
610 Park Avenue
New York 21, New York

My dear Dr. Machle: Re: [redacted] v. Shell

This will acknowledge receipt of your letter dated June 20,1946, returning the tentative outline of your testimony, with the various changes or alterations thereon in pencil. The outline statement has been retyped, giving due effect to your changes and alterations; and, in accordance with * your request, I am enclosing herewith such revision.

I recognize that the enclosed draft statement contains a number of extraneous statements; i.e., observations which are not particularly relevant to the instant case. However, I feel that, from a practical standpoint, they are helpful in differentiating, in most instances, the complaints of Miller from the usual and customary cases. In my opinion, such references should be helpful to the referee and the members of the Commission. And, unless I am mistaken, they will be of material assistance to us in maintaining the position that the claimant's case is an exceptional one. In other words, [redacted] is not suffering from respiratory, gastro-intestinal or physiological nerve and eye disorders due to contact with petroleum products and their fumes, which is evidently the occupational disease relied upon by the claimant, pursuant to the provisions of paragraph 24 of Section 8(2) of the Workmen's Compensation Law.

While I realize that the enclosed statement is tentative and incomplete, nevertheless I feel that it is beneficial to have your views reduced to writing at this juncture. I am taking the liberty of forwarding a copy thereof to Dr. Holcomb and to Shell's local trial attorney, Mr. MacAffer.

* I am returning herewith the list of publications, having retained a copy for our file.

Very truly yours,

Philip M. Payne

Philip M. Payne,
Attorney.

PMP:FE
Enclosures *

PMP:FE-6/24/46

Dr. Willard Machle will testify substantially as follows:

I am a physician duly licensed to practice medicine within the State of New York. I specialize in Internal Medicine and Occupational Medicine. I am a Fellow of the American College of Physicians. I studied at the Harvard Medical School and am a graduate of the University of Cincinnati, College of Medicine. I did postgraduate work at Northwestern University School of Medicine, the Massachusetts General Hospital, the Ohio State College of Medicine and the New York Postgraduate Medical School. I was Associate Professor of Research Physiology and Associate Director of the Kettering Laboratory at the University of Cincinnati, College of Medicine, where I was engaged in studies in occupational physiology and toxicology. I have had fifteen years of experience in clinical and laboratory research in occupational toxicology and medicine. I have acted as a consultant on various occupational medicine and hygienic problems in Europe and South American countries.

I am the co-author (with Dr. Laurence B. Chenoweth) of a text book on Industrial Hygiene, which was printed in 1945; and I have contributed numerous articles dealing with occupational medicine, toxicology and physiology, which have been published in the medical journals. I am an associate editor of the Journal of Occupational Medicine, which is published by the American Medical Association. I contributed an article entitled "Tetra-Ethyl Lead Intoxication and Poisoning by Related Compounds of Lead" to the Journal of the American Medical Association. I am shown an issue of the Journal under date of August 2[illegible], 1935, and the article in that Journal on Lead Poisoning was written by me. In this article, I discuss the history, pharmacology, etiology, pathology, symptoms and signs, diagnosis and treatment of poisoning produced in the manufacture or handling of concentrated tetra-ethyl lead. The published article is based on the personal experience I had then had with seventy-eight cases

and my study of reported writings and observations of others in this field. References to the published writings of various authorities are contained in my article.

I also contributed an article entitled "Gasoline Intoxication" to the Journal of the American Medical Association. I am shown an issue of the Journal under date of December 6, 1941, and the article in that Journal on Gasoline Intoxication was written by me. In this article, I discuss the physiologic and toxicologic effects of exposure to gasoline of men employed in its production, distribution and marketing. Before writing this article for the medical journal, I examined numerous books and published articles on gasoline poisoning; and I made references to such studies in my article.

For nearly four years during World War II, I was a Colonel in the United States Army stationed at Fort Knox, Kentucky, where I was the Director of Research of the Armored Medical Research Laboratory, and engaged in research on physiological and toxicological problems of military personnel, such as ventilation of combat tanks, etc.

Gasoline is a mixture of petroleum hydrocarbons. The usual mode of absorption of gasoline is through the respiratory tract. Gasoline vapor is heavier than air. In tanks, excavations and poorly ventilated enclosures, the displacement of air by the heavier gasoline vapors may prove fatal within a few minutes or hours. Acute poisoning may result when exposure is to very high concentrations of gasoline vapor in air, such as may occur in tanks; and, in such instances, there is little difficulty in diagnosis. If death does not ensue, recovery is usually without serious after-effects. Asphyxia from gasoline fumes is due to lack of oxygen; and is somewhat like drowning. If the person does not die, there are usually no serious consequences.

Greater difficulty in differential diagnosis occurs in cases of chronic poisoning. Any one of the manifestations of chronic gasoline poisoning

may occur in infectious or degenerative diseases, but cessation of exposure in chronic cases should result in amelioration of symptoms.

Exposure to lead poisoning by those engaged in the manufacture or handling of the ethyl fluid and those engaged in the mixing or blending of the tetra-ethyl lead-containing fluid into gasoline is quite different from the exposure by those regularly engaged in handling or distributing leaded gasoline in commercial quantities. In other words, the handling and use of gasoline containing tetra-ethyl lead differs from the manufacture of the ethyl fluid and its blending with gasoline at refineries and bulk mixing plants. Consequently, it is necessary to differentiate between actual poisoning that occurs as a result of exposure to concentrated tetra-ethyl lead and the theoretical dangers which some have assumed may accompany the use of leaded gasoline. A relatively small industrial group is potentially exposed to the hazards of the concentrated ethyl fluid in its manufacture or in the maintenance operations on the equipment in the plants where it is manufactured. A somewhat larger group of men is engaged in blending the tetra-ethyl lead containing fluid into gasolines in various refineries in the United States, but no cases of lead poisoning have been reported.

Tetra-ethyl lead is a colorless oily liquid (specific gravity 1.659) with a sweetish odor. It is insoluble in water, but soluble in alcohol and acetone. Tetra-ethyl lead is introduced or mixed into gasoline in amounts so small that the finished product lacks the essential toxicological properties of tetra-ethyl lead. The maximum proportion of the tetra-ethyl lead compound added to gasoline is approximately 1:1,260. Vapors arising from tanks holding leaded gasoline do not contain appreciable amounts of lead. The difference between the volatility of tetra-ethyl lead and the gasoline base with which it is mixed, is so great that approximately half the gasoline may be evaporated before lead can be found in the vapors. After long standing in storage tanks

tetra-ethyl lead in commercial gasoline may undergo partial decomposition, with the formation of a variety of compounds, such as triethyl lead bromide or hydroxide and diethyl lead salts. These compounds may be dispersed as fine dust when dry storage tanks are cleaned. The decomposition products of tetra-ethyl lead, which may occur upon long standing in the storage tanks, can produce acute tetra-ethyl lead poisoning. But this risk is incurred only by men entering the tanks for the purpose of cleaning. This hazard does not exist with tank wagon or truck drivers. However, the dilution of tetra-ethyl lead with gasoline eliminates the danger of lead inhalation, except in cleaning dry scaly storage tanks without proper precautions.

My experience indicates that chronic intoxication or poisoning from gasoline is extremely rare in the petroleum industry. Chronic intoxication resulting from exposure to tetra-ethyl lead has not been seen. By "chronic intoxication" I mean poisoning which results from exposure to gasoline vapor for long periods of time. I have had more than 2300 refinery workers under observation, in some instances for as long as ten to twenty years, and I found no signs of chronic gasoline poisoning in any case. Negative results in respect to signs of chronic gasoline intoxication or poisoning were also obtained in studies of large numbers of filling station attendants, tank wagon drivers and garage mechanics. On the other hand, I found that increased exposure of workers to concentrations of gasoline vapor in poorly or inadequately ventilated places, such as dry cleaning plants, might result in chronic gasoline poisoning.

I read a passage from my article in the medical journal you have just shown me and put in my hands:

> "Investigations and reports over a span of years have demonstrated that lead poisoning will not result from the use of leaded gasoline as it is usually handled in commerce. The hazard is limited to the manufacture of tetraethyl lead and antiknock mixtures, the mixture of these materials with

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gasoline and the cleaning of tanks in which the leaded gasoline is stored" (p.1966).

That statement reflects my opinion then and my opinion now.

I now read from page 1971:

> "Sequelae usually do not follow chronic exposure; consequently amelioration of symptoms may be expected to follow cessation of exposure in chronic cases, and this may be the best expedient in establishing the diagnosis. Hysteria or psychoneurotic symptoms in a person with chronic exposure to gasoline should suggest the possibility of intoxication, and relief from these symptoms should follow soon after removal from exposure."

That statement reflects my opinion when my article was published and it is also my present opinion.

I now read a passage from my book, entitled "Industrial Hygiene", concerning occupational intoxication or poisoning due to inhaling of tetraethyl lead gasoline:

> "The alkyl compounds of lead are the most extensively used members of this class. Their use as an anti-detonant in motor fuels has resulted in the manufacture and distribution of large quantities of these materials in the petroleum industry. Poisoning by the alkyl compounds of lead is characterized by variable intervals between exposure and onset of illness and by pronounced mental symptoms. Commercial gasolines containing tetraethyl lead present no hazard when used as a motor fuel. Cases of poisoning, which are rare, have so far been limited to men engaged in the manufacture and mixing of tetraethyl lead or to men engaged in the cleaning of gasoline tanks used for the blending or storage of leaded gasoline. In these cases the exposure was to tetraethyl lead or to its decomposition products." (p.150)

That statement reflected my opinion when my book was originally published in 1938, and reprinted in 1945; and it is likewise my present opinion.

I have made a personal investigation of the working conditions in Milton, New York, under which this claimant performed his services for the Shell Oil Company in order to establish the extent of his exposure to gasoline fumes. The loading rack, which I was advised was the alleged source of claimant's exposure to gasoline, is a small four or five pump, roofed unit with open sides,

situated over an earthen sump, on a large concrete area within the bulk plant. Ventilation is excellent, the rack being situated in the open, not less than forty feet from the nearest buildings, which are low. The twelve to fourteen foot high roof of the structure is flat and sloaping, offering no opportunity for pocketing of vapors. The platform and sump were clean, with no odors or staining to suggest excessive spillage of gasoline. I was advised by the Superintendent of the bulk plant that the area is washed once each week. Through-put from the entire rack is at a maximum of approximately 600,000 gallons per month. The loading frequency is a maximum of fourteen to fifteen times per day, when working on a 24-hour basis. Fuel is delivered at the rate of about 85 gallons per minute, requiring about thirty-five minutes to load a motor transport truck. I was informed by said Superintendent that loading is usually done by yardmen; only rarely done by tank wagon drivers.

I was further informed by the Superintendent of the Shell bulk plant at Milton, New York, that, during the claimant's period of employment, fuel delivered from the storage depot was approximately 80% regular gasoline and 20% Ethyl; no 100 octane gasoline being handled from the loading rack. In the entire time since the plant has been in operation, there is no history of yardmen or tank wagon drivers becoming dizzy, faint, or confused from the vapors of gasoline during loading operations. Based upon my experience and my personal inspection of the circumstances of claimant's employment, I can say that he experienced less exposure to gasoline vapor than is customary or usual with most tank truck drivers.

On June 3, 1946, I personally examined the claimant and records of his previous medical condition have been made available for my study and consideration. Claimant has none of the several types of mental symptoms or manifestations which are present in tetra-ethyl lead poisoning cases. Claimant gave me no history of hallucinations or delusions, which are characteristic of

such cases. He has no amnesia for recent events, which is uniform in tetra-ethyl lead poisoning. Nor does he have periods of confusion with misidentification of persons and places, which I have found is usual in cases of tetra-ethyl lead poisoning.

Based upon such information as I have ascertained concerning this claimant, I am of the definite opinion that he shows no symptoms whatsoever of gasoline poisoning or lead poisoning. There is no evidence, in my opinion, that lead or gasoline intoxication played any role in the production of his illness. I am of the opinion that claimant's diseases are not either by direct causation or by direct aggravation related to prolonged exposure to, or inhalation of, fumes and vapors of leaded gasoline. My diagnosis is predicated on my knowledge of the circumstances under which the complainant worked for the Shell Oil Company, the absence of any history of a significant exposure to organic compounds of lead, my examination of claimant, my examination of the medical and clinical reports of his disability and my own knowledge that similar exposures of tank wagon drivers to fumes and vapors from leaded gasoline have not led to chronic poisoning in other instances.

The claimant has recognized and characteristic diseases, namely: an affection of the heart muscle and an associated disease of the lungs. Their onset, clinical course and present findings in these diseases are characteristic of well-known and often-described clinical entities. The claimant has a non-valvular heart disease - myocardial degeneration with insufficiency with marked limitation of physical activity. He also is suffering from chronic pulmonary emphysema (swelling). This is confirmed by an X-ray report dated June 18, 1946. The presence of these diseases explain all of the claimant's symptoms and disability. There may be differences of opinion as to the relative importance of these two conditions, but I place more emphasis on his heart disease, recognizing, however, that his lung condition contributes to his disability and

symptoms. Be that as it may, I am definitely of the opinion that inhalation of gasoline fumes and lead intoxication do not cause heart disease. The diseases from which the complainant is suffering are not a natural incident of his occupation as a tank wagon driver; and they did not, in my opinion, result from the nature and conditions of his employment, to which all employees of his class are subject and which distinguishes it from the usual run of occupations and which is in excess of the hazard attending employment in general. I am of the further opinion there was nothing in the nature of claimant's duties as a tank wagon driver to account for any "occupational" disease, particularly respiratory or gastro-intestinal disorders due to inhalation of gasoline fumes even though the gasoline handled by him contained tetra-ethyl lead.

By "occupational" disease, I mean one contracted in the usual and ordinary course of a trade, occupation or employment and which is due to causes normally present in such pursuit in excess of the hazards of employment generally. In my opinion, based upon my experience, there is no particular toxic hazard in being employed as a tank wagon driver over an extended period of time, which distinguishes it from the usual run of occupations or exceeding the hazard attending employment in general. In other words, such diseases from which claimant is suffering are not incident to or commonly contracted in the usual and ordinary course of the pursuit of gasoline tank wagon drivers generally; nor have I found claimant's condition to be peculiar to or characteristic of the nature of the work he performed.

Nearly twenty years of experience have not shown the existence of danger to tank wagon drivers employed in the transportation of gasoline containing tetra-ethyl lead. No substantiated case of lead absorption or of lead intoxication by tank wagon drivers has been produced. Series of studies failed to disclose any clinical evidence of occupational lead poisoning, as a

consequence of exposure to leaded gasoline, of tank wagon drivers.

Low grade infections associated with chronic ill health are frequently accompanied with such symptoms as those of which Miller complains. His history does not give a continuity of symptoms. If claimant had been exposed to gasoline fumes, of sufficient magnitude, to cause gasoline intoxication, a disease different from those with which the claimant is afflicted would have resulted, and a different sequence of events would have followed.

(a) There would have been a history of serious poisoning with unconsciousness of considerable duration, perhaps followed by a period of illness from which there would have been gradual recovery from the general disability, with, perhaps, persistent damage or sequels, especially referred to the nervous system, and not to the heart or lungs.

(b) There would have been no progressive disease which continued its advance after the acute attack, and after the cessation of exposure.

Accordingly, I am of the opinion that, based upon my extensive and long experience with problems of gasoline poisoning, had claimant suffered any injurious effects from gasoline or its fumes and vapors, termination of the exposure by discontinuance of his occupation as a tank wagon driver would have resulted in improvements, rather than an increase, in his symptoms and complaints.

In my opinion, claimant's heart and lung condition accounts for his disability. In my opinion, claimant's gastric ulcers may likewise account for certain of his symptoms or complaints. Furthermore, in my opinion, claimant's eye trouble can account for his asserted double vision and dizziness.