Castleman File: American Petroleum Institute
w/c = with cover letter or memo If DATE = 0, undated
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___ published article from trade journal

___ published advertisements

___ newspaper article

___ published government report

___ government inspection results

___ unpublished or internal report

___ unpublished presentation from conference

___ letter

___ memorandum

___ industry warning labels

___ industry sales literature

___ industry recommended practices

✓ meeting minutes (with attachments) Spot

___ membership list

___ BC notes

A G E N D A

SIXTEENTH MEETING
MEDICAL ADVISORY COMMITTEE
AMERICAN PETROLEUM INSTITUTE

Chicago, Illinois
Conrad Hilton Hotel
West Ball Room (3rd Floor)
September 25, 1952

9:00 A.M. Central Daylight Time

I. Introduction of new members and guests

II. Approval of minutes of Fifteenth Meeting

III. Report of Subcommittee on Carcinogenicity
Dr. M. N. Newquist - Chairman

IV. Report of Subcommittee on Medical Policies and Practices
Dr. L. E. Curtis - Chairman
Dr. Kenneth R. Fourcher - Vice Chairman

V. Report of Subcommittee on Atmospheric Pollutants
Dr. E. P. Luongo - Chairman
Dr. John C. Ruddock - Vice Chairman

VI. Report of Consultant - Professor Philip Drinker

VII. Report of Subcommittee on Toxicological Reviews
Dr. Marshall Clinton - Chairman

VIII. Reports on ASA Committee activities
Allan E. Dooley - API representative on Z4 and Z37

IX. Reports for inactive committees
NOTE: Chairmen of the following inactive subcommittees will be recognized if they wish to present information of interest:

a. Subcommittee on Cutting Fluids
Dr. F. F. Boys - Chairman

b. Subcommittee on Economic Poisons
Dr. T. J. Kelly - Chairman

c. Subcommittee on Eye Hazards
Dr. Kieffer Davis - Chairman

d. Subcommittee on First Aid
Dr. T. M. Frank - Chairman

e. Subcommittee on Fluorides
Dr. George M. Saunders - Chairman

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AMERICAN PETROLEUM INSTITUTE
MEDICAL ADVISORY COMMITTEE

SIXTEENTH MEETING

Minutes of Meeting
September 25, 1952
Conrad Hilton Hotel
Chicago, Illinois

MEMBERS PRESENT

E. Kern Linder - Chairman
T. M. Frank - Vice Chairman
Marshall Clinton - Secretary

F. F. Boys
J. William Crookshank
L. E. Curtis
Kieffer Davis
Robert E. Eckardt
Kenneth R. Fourcher
M. N. Newquist
James W. Osborn
B. B. Reeve
John C. Ruddock
Leo J. Wade
E. Richmond Ware

ASSOCIATES PRESENT

E. W. Adams
W. H. Barcus
L. C. Beard, Jr.
R. D. Bent
L. C. Burroughs
R. C. Cole
Allan E. Dooley
L. M. Henderson
R. M. Landon
K. G. Mackenzie
R. C. Mithoff
C. A. Neilson
F. J. Sanders represented by W. E. Scovill
R. M. Shepardson
F. M. Watkins

OTHERS PRESENT

Philip Drinker - Harvard University
H. W. Gerardi - Standard Oil Development Company
A. W. Horton - University of Cincinnati
E. O. Mattocks - American Petroleum Institute
A. C. Pabst - Socony Vacuum Oil Company, Inc.
John J. Phair - University of Cincinnati
D. V. Stroop - American Petroleum Institute

Total in Attendance - 37

MEMBERS ABSENT

W. O. Armstrong
V. C. Baird
D. M. English
C. H. Hine
Warren F. Kahle
T. J. Kelly
W. R. Levis
E. P. Luongo
Robert Bell Lynn
Clark R. Miller
R. C. Page
George M. Saunders

ASSOCIATES ABSENT

W. R. Argyle
J. S. Boylan
C. L. Brown
C. R. Brown
L. O. Crockett
R. S. Driver
Nelson J. Gothard
L. N. Haugen
James E. Hill
E. W. Isom
D. W. Larmer
C. R. McKay
J. R. Morrison
W. H. Price
R. B. Roaper
H. D. Wilde

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I

INTRODUCTION OF MEMBERS AND GUESTS

In opening the meeting the chairman welcomed and introduced those who had not attended previous meetings of the committee.

II

MINUTES OF FIFTEENTH MEETING

ACTION The committee voted to approve the minutes of the Fifteenth Meeting as circularized.

III

REPORT OF SUBCOMMITTEE ON MEDICAL POLICIES AND PRACTICES - DR. L. E. CURTIS, CHAIRMAN

Doctor Curtis expressed his appreciation and thanks to Doctor Kenneth R. Fourcher, Vice Chairman, for the excellent report which had been transmitted by letter dated September 5, 1952. He stated he was tendering his resignation as chairman and suggested that Doctor Fourcher should present the subcommittee report and should be appointed chairman.

f. Subcommittee on Physiology of the Skin
Dr. Robert E. Eckardt - Chairman

X. Aromatic Hydrocarbons - Report on letter ballot

XI. New Business

a. Resolution adopted by the General Committee, API Division of Refining, May 15, 1952

"That the Medical Advisory Committee be requested to prepare and recommend the following to the General Committee of the Division of Refining:

"1. Suggested minimum standards for physical examination of employees.

"2. Suggested qualifications for medical directors and plant doctors.

"3. Suggested uniform methods of preparation and maintenance of medical records of employees."

b. Hygiene Panel - API Committee on Lubricantion

(Interrelationship of work by panel and Subcommittee on Cutting Fluids.)

XII. Staff report on committee finances - D. V. Stroop

XIII. Time and place of Seventeenth (1953 Annual) Meeting

XIV. Adjournment

Doctor Fourcher reviewed the material which had been circularized to members with other subcommittee reports by letter dated September 11, 1952.

ACTION The committee voted to accept the report and requested the addition of a set of the new forms to the circulating library of medical department forms maintained in API headquarters.

IV

REPORT OF SUBCOMMITTEE ON CARCINOGENICITY - DR. M. N. NEWQUIST, CHAIRMAN

Doctor Newquist, with the assistance of Doctor A. Wesley Horton and Doctor John J. Phair, presented and discussed reports as follows:

1. Report of Subcommittee on Carcinogenicity - Sept. 25, 1952 (copies were mailed to all members and associates on September 11, 1952).

2. Tabular Summary of Current and Completed Biological Experiments (34 pages, undated, with 3 data sheets issued September 1, 1952). (Copies were mailed to all members and associates on September 10, 1952.)

3. Memorandum from Kettering Laboratory - September 24, 1952 (12-page report by Doctor A. Wesley Horton). (Copies were distributed to those in attendance and copies are attached to these minutes for those who did not attend Sixteenth Meeting.)

4. Memorandum from Kettering Laboratory - September 24, 1952 (22-page report on Epidemiological Studies). (Copies were distributed to those in attendance and copies are attached to these minutes for those who did not attend Sixteenth Meeting.)

On behalf of the Subcommittee on Carcinogenicity, Doctor Newquist recommended the continuation of Project MC-1 at Kettering Laboratory during the fiscal year ending June 30, 1954 at a reduced budget of $78,283.

ACTION The Medical Advisory Committee accepted the subcommittee report and the recommendation to continue the project for the fiscal year 1953-1954 at a cost not to exceed $78,283.

V

REPORT OF SUBCOMMITTEE ON TOXICOLOGICAL REVIEWS - DR. MARSHALL CLINTON, CHAIRMAN

Doctor Clinton reported on two matters as follows:

1. The publication of reviews which have been accepted by the Medical Advisory Committee prior to the Sixteenth Meeting.

2. The two new reviews recently submitted by Professor Drinker on:

   a) Oil Mists
   b) Lead Compounds in Cutting Oils

He recommended:

1. That the 32 accepted but unpublished reviews should be reproduced by varitype-planograph method in limited number of copies to supply members' requirements and public sale.

2. That the two new reviews should be mimeographed for distribution only to Medical Advisory Committee members and associates for information and comment (see Appendices A and B).

ACTION The committee accepted the report and recommendations presented by Doctor Clinton.

VI

REPORT OF CONSULTANT - PROFESSOR PHILIP DRINKER

The committee received from Professor Drinker a brief report relating to the work on toxicological reviews and to the Saranac Symposium on Occupational Chest Diseases.

VII

REPORTS ON ASA COMMITTEE ACTIVITIES - ALLAN E DOOLEY, REPRESENTATIVE

The committee received brief reports from Mr. Dooley summarizing the scope and activities of ASA sectional committees Z4 and Z37.

ACTION The committee accepted the report and requested copies of the third draft of Z4 as soon as it becomes available.

VIII

REPORT OF SUBCOMMITTEE ON ATMOSPHERIC POLLUTANTS - DR. E. P. LUONGO, CHAIRMAN

In the unavoidable absence of Doctor Luongo, the subcommittee report was read by Doctor Ruddock, Vice Chairman. The complete report is appended to these minutes as Appendix C.

ACTION The Medical Advisory Committee accepted the report and its recommendation in principle with the understanding that it will be appended to the minutes and that members will be requested to submit their comments or criticisms on its wording within 30 days and before the text of the report is released to other committees.

Note: Chairman Linder requested each member and associate to send news items and other pertinent information on physiological aspects of atmospheric pollution to D. V. Stroop for reproduction and distribution to Medical Advisory Committee members.

IX

REPORTS FOR INACTIVE SUBCOMMITTEES

The committee received brief informative statements of interest to subcommittees as follows:

1. Subcommittee on Cutting Fluids - Dr. F. F. Boys, Chairman. (See Appendix D for excerpt from minutes of meeting of Lubrication Committee, Division of Marketing, held September 10, 1952).

2. Subcommittee on Physiology of the Skin - Dr. Robert E. Eckardt, Chairman. Doctor Eckardt stated he had a report which would be reproduced and distributed to members.

X

AROMATIC HYDROCARBONS - (SEE ITEM IX, PAGE 5, MINUTES OF FIFTEENTH MEETING)

The committee received the tally on the letter ballot of August 29 reflecting the interest of 27 Medical Advisory Committee members as follows:

Actively interested	8
Tacitly interested	3
Not interested	3
Opposed to proposal	-
No letter ballot returned	13

Note: Doctor Eckardt, who had suggested reconsideration of this subject, invited interested members to communicate with him in the thought that a cooperative group, independent of the Institute, may be organized to sponsor research work on toxicology of aromatic hydrocarbons.

XI

NEW BUSINESS

A. Resolution Adopted by the General Committee, Division of Refining, May 15, 1952

The chairman read the resolution as follows:

"That the Medical Advisory Committee be requested to prepare and recommend the following to the General Committee of the Division of Refining:

1. Suggested minimum standards for physical examination of employees.

2. Suggested qualifications for medical directors and plant doctors.

3. Suggested uniform methods of preparation and maintenance of medical records of employees."

ACTION The committee voted to accept the assignment, to request the Chairman of the Medical Advisory Committee to inform the Chairman of the General Committee of the acceptance, and to refer the assignment to the Subcommittee on Medical Policies and Practices for study and recommendation.

B. Hygiene Panel - API Committee on Lubrication

As a record of inquiry, the committee received an excerpt from letter of a Medical Advisory Committee member as follows:

"It seems very strange to me that this group (Hygiene Panel) was not composed of doctors of medicine. Actually, the Medical Advisory Committee of the API has already established subcommittees on carcinogenicity, cutting fluids and eye hazards. It seems to me that this is a definite duplication of effort, and I wonder why the Medical Advisory Committee could not perform the functions now being done by the Hygiene Panel."

XII

BUDGET FOR FISCAL YEAR 1953-1954

In executive session the committee reviewed subcommittee reports and recommendations and voted to recommend a 1953-1954

budget as follows:

University of Cincinnati

Carcinogenicity	$78,283	
Fluorine Study	2,500	
Physiology of Skin	5,000	
		$85,783
Philip Drinker		2,500
Total		$88,283

Based upon an estimated unobligated balance of $31,000 on deposit as of June 30, 1953, the committee voted to recommend a decrease of $25,000 from the staff estimate of $100,000, or $75,000 to be solicited in 1953 to provide funds for the 1953-1954 budget.

XIII

TIME AND PLACE OF SEVENTEENTH (1953 ANNUAL) MEETING

The chairman presented an invitation from Doctor V. C. Baird to hold the Seventeenth (1953 Annual) Meeting in Houston, Texas just prior to or immediately after the meeting of the Annual Gulf Coast Regional Conference of Industrial Health which usually is held during the last week in September or first week in October.

ACTION The committee voted to accept the invitation tendered by Doctor Baird and left the details of the meeting to be arranged by the chairman and Doctor Baird.

XIV

REPORT TO SAFETY COMMITTEE OF THE BOARD

ACTION The committee voted to authorize and request the chairman to prepare a report summarizing the work and accomplishments of the Medical Advisory Committee 1945-1952 and to submit the report to the Chairman, Safety Committee of the API Board of Directors.

Note: In accepting this assignment the chairman requested each subcommittee chairman to send him a summary of his subcommittee's assignments and their accomplishments.

XV

ADJOURNMENT

By acclamation the members and associates expressed their appreciation and thanks for the outstanding services rendered by

Chairman Linder during 1952.

.....

The meeting was adjourned.

.....

Marshall Clinton, M.D.
Secretary

Approved:
E. Kern Linder, M.D.
Chairman

Note

Upon adjournment Chairman Linder introduced Doctor T. M. Frank who will serve as Chairman of the Medical Advisory Committee for the year beginning January 1, 1953.

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APPENDIX A

To the Minutes of 16th Meeting of Medical Advisory Committee

REPORT TO THE API MEDICAL ADVISORY COMMITTEE

OIL MISTS - A Review

Donald P. MacDonald, M.D.
Philip Drinker
Harvard School of Public Health
Boston 15, Massachusetts

September 2, 1952

If one atomizes a low boiling compound like ethyl ether the stream of liquid emerging from the tip of the nozzle evaporates promptly with a resultant cooling. Unless the air is saturated with ether no visible mist remains. If the same atomization is done with gasoline, as in a plumber's torch, a mixture of mist and of vapor results. Using fuel oil a substantial percentage of the mixture is true mist and with still higher boilers the percentage of mist, as contrasted to true gas, increases.

The stability or permanence of these mists in ordinary air is greatest then with the high boilers. For screening the movement of troops on land or for hiding ships at sea very stable smokes are made from oil. They work best on still muggy days when air movement is at a minimum and there is little or no turbulence.

One of the quickest ways of clearing up smoke of oil, tobacco, or even metallurgical fume is to stir it violently. The result is that the particles collide and flocculate often with such adhesive force that it is hard to disperse them again. Usually they cannot be dispersed in air but only by wetting with various liquids, many of them products of the petroleum industry.

The Aerosol Handbook (1) gives a very full discussion of the physical properties of aerosols, especially of mists and fogs. It includes methods for measuring their concentration in air, their production for testing masks and filters of various sorts, and studies on their penetration through all kinds of protective equipment.

Inhalation

If one breathes aerosols containing particles of various size most of the large ones, say 5 μ, are retained in the upper respiratory passages and do not penetrate to the alveoli. Maximum alveolar penetration (and retention) occurs at about 1 μ. At 0.25 μ they behave, to all intents and purposes, as a part of the transporting gas, they become very difficult to catch with any sort of filter and their stability in air is greatest. Curves illustrating nicely the fundamentals of retention by man and the effects of particle size are given by Brown et al (2) and confirmed by Davies (3). For the sake of brevity we do not give further details but it happens to be a subject of special interest to us and we would be glad to enlarge on it in this report or by correspondence with any interested member of the Medical Committee.

For practical purposes we can assume that upper respiratory retention of 5 μ particles is high, that extremely few reach the alveoli, that alveolar retention reaches a peak value around 1 μ and falls off each side of 1 μ. This is not precise but is near enough for practical purposes. Landahl (4), Dautrebande (5,6) and Rooth (7) attempted to determine the particulate size maximally retained within the lung alveoli. Results were not consistent but, in general, the size indicated lay below 1-3 μ. Davies (3) in his article points out

the fact that . . . . . "Liquids ---- may reach alveoli irrespective of the location of their first contact with the walls of the breathing system: this fact, associated with impairment of ciliary motion, may explain the occasional deaths reported from exposure to high concentrations of mists which are not highly toxic". . . .

It is assumed -- and there is considerable evidence to support us -- that pneumonic type of affection (from mists) results only from alveolar penetration. Should the inhaled mist be of such a nature that body heat volatilizes 5 μ droplets, caught in the upper respiratory passages, then alveolar penetration by the vapor, as distinguished from the mist, would follow. Whether such a hypothetical mist, of moderately volatility, would be more or less likely to cause pneumonia than would a higher boiler is simply guess work.

Exhalation

Soluble vapors of substances like ethyl alcohol and acetone, when breathed and absorbed, are eliminated very largely by metabolism and by excretion in the urine. Exhalation is of very minor importance. Intoxicating or mildly anesthetizing effects follow when a certain degree of blood saturation is reached. When the substance is as soluble as alcohol it is impossible to achieve blood saturation because intoxication or anesthesia occurs long before saturation, in the physico-chemical sense, is reached.

Insoluble vapors, like ethyl ether, behave quite differently. Blood saturation or equilibrium, at the concentration breathed, is achieved quickly and virtually none is metabolized or excreted in urine. It is eliminated as it is taken in -- by breath.

Men who are intoxicated by alcohol or overcome by gasoline vapors often can be helped by breathing mixtures of 5 to 7 per cent

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Men who are intoxicated by alcohol or overcome by gasoline vapors often can be helped by breathing mixtures of 5 to 7 per cent

CO_2 in O_2 simply because the CO_2 causes increased breathing and thus helps get rid of the alcohol or ether in the blood.

Anyone interested in the physiological and physical chemistry of these matters will find a nice discussion in the Henderson and Haggard book (8) on noxious gas, now getting a little out of date, but still good reading.

Toxic Effects

We shall not discuss the basic toxicology of the common solvents such as benzene, toluene, xylene, the chlorinated hydrocarbons, the various alcohols, ketones, etc. Their toxic effects have been described in the literature (9,10,11,12,13) and in our own Toxicological Reviews.

We will confine our attention to exposures resulting from some sort of atomization of the following classes of substances:

A. Fuel oils, gasoline
B. Lubricating oils
C. Mineral oil
D. Shale oil
E. Paints, lacquers, varnishes, shellacs
F. Petroleum distillates -- as vehicles for spraying insecticides

A. Fuel Oils and Gasoline. In 1941 Machle (14) published an article dealing with the etiology and pathology of gasoline intoxication. Although this is concerned chiefly with inhalation of gasoline vapors, most of the pathological changes involved might result from the use of gasoline as a thinner in spray painting.

Machle states that . . . ."The usual mode of absorption of gasoline is through the respiratory tract". . . . . The lungs may be similarly involved in excretion of ingested gasoline, since a high percentage of ingested gasoline is eliminated through the lungs.

The most common lung findings include hyperemia, hemorrhages, estravasations, bronchitis and pneumonitis.

There are reports of damage to other organs, such as liver, kidney and spleen, based chiefly on destruction of the vascular endothelium with subsequent hemorrhage.

Reports of central nervous system damage from acute intoxication are comparatively rare, but edema of brain and meninges, early demyelinization, and peripheral neuritis have been reported.

To illustrate the difference in response due to actual aspiration of liquid petroleum, we cite the following two cases of Kurtz (15) and Zucker (16). In the first, a 44 year old man accidentally aspirated an unknown amount of light fuel oil and died 72 hours after hospital admission. During the brief course of his illness he developed cough, hemoptysis, pyrexia, orthopnea and evidence of consolidation at both lung bases. Post-mortem examination showed bronchial and peri-bronchial necrosis with edema and round-cell infiltration. In addition, there was evidence of toxic hemolysis in vessels of the lungs, liver and spleen.

Zucker's case involved a 19 year old soldier who, after aspirating "a mouthful of gasoline", quickly developed cough, unconsciousness, fever, leukocytosis, pneumonitis and pleurisy -- with complete recovery in one month. There was a transient period of first degree heartblock, raising the question of a toxic myocarditis.

Finally, there is a report by Sterner (17) on the hazards of spray-painting, using gasoline as a "thinner" or diluent. Analysis of gasoline samples used in his study indicated an aromatic hydrocarbon content ranging from 5 to 10 per cent, with a high of 30 per cent.

Workmen were found to be working in concentrations ranging from 300 to 800 ppm, well above safety limits set for xylene or toluene -- two principal components of the aromatic content. Although wearing cartridge-type respirators, painters complained of headache, nausea, weakness, depression and anorexia. One patient showed tremors, weakness, muscular fibrillation and depression associated with suicidal intent. Laboratory studies revealed generally a decrease in hemoglobin and hematocrit and an increase in mean corpuscular hemoglobin, mean corpuscular volume and reticulocyte count, the changes being, for the most part, slight to moderate.

B. Lubricating Oils. The recent heightening of interest in the ultimate fate of oil particles taken into the body is reflected in the careful studies cited in the following paragraphs.

The first is a series of experiments conducted by Lushbaugh (18) in Chicago. The object of these studies was to determine the potential effects upon troops in combat of a smoke-screen produced by two types of lubricating oil. One type of oil was a diesel lubricant, S.G.F. #1, already in use by the U. S. Army Chemical Corps for smoke-screening purposes. The other was an ordinary automobile lubricant, Penn oil,(R)S.A.E. #10.

By submitting mice, rats, rabbits and monkeys to oil fog concentrations approximately equivalent to those expected under combat conditions, Lushbaugh was able to show that all animals, with the exception of the monkeys, tolerated the experiment surprisingly well. They showed little symptomatic response to prolonged exposure over a period of many days and histological reaction was confined to evidence of macrophage activity and persistence of oil particles within the connective tissue stroma.

The group of monkeys, however, proved to be peculiarly susceptible to the oil fog. Within a few days after the start of the experiment they began to shed fur, lose weight and refuse food. Several died during the course of the experiment. At post-mortem, 6 of the 7 monkeys in the original group were found to have a peculiar hyperplastic gastritis, with polyp-formation and a neoplastic-like penetration of the sub-mucosa by epithelial growths. The seventh monkey, sacrificed one and a half years later, showed a typical atrophic gastritis, even though not exposed to further oil during this period. These results were published in an earlier paper by the same author (18).

Although chemical studies revealed that only a small fraction of the oil inhaled had been retained by any of the animals, the monkey's lungs showed greater oil retention and marked increase in focal pneumonitis. Since oil concentrations did not seem to be related to the degree of pneumonitis present, the author speculated that the role of oil particles may be (a) to aid in breaking down the barrier of local defense mechanisms or (b) to serve as a vehicle for bacterial contamination. Although this latter refers to bacteria derived from the nasopharynx primarily, it is interesting that the bacteriological studies of Ernst (19) on lubricating oils revealed the presence of staphylococcus and streptococcus, as well as several Gram-negative bacteria, in oils being used in industry.

The work of Shoskes (20), in which he studied the effect of inhalation of various oil particles, including corn and peanut oil, cod liver oil, mineral oil and motor oil, on the lungs of mice revealed that these animals at least are able to handle brief (two-hour)

exposures quite successfully. Sections of lung taken from mice sacrificed 96 hours after exposure showed almost complete phagocytosis of edible oil particles, while the concentrations of mineral and motor oil particles in the lung were practically unchanged. There was only minimal reaction to these foreign particles in all cases. With prolonged exposure over a two-week period, similar animals showed moderately severe foreign body reaction to the petroleum products, moderate response to cod-liver oil and virtually no response to the other edible oils.

Sante's article (21) on the fate of oil particles in the lung is a clinico-pathological study illustrating the types of tissue reactions evoked in the lung by various oils, and pointing up the possible relationship between petroleum oil aspiration (or inhalation) and production of bronchiogenic carcinoma. He stresses the importance of a high fatty-acid content as a causative factor in the vigorous inflammatory reaction occasionally seen with accidental cod-liver oil aspiration. The droplets of mineral oil, being unsaponifiable, remain undigested within the lung parenchyma. Nearly always, however, a proliferative fibrotic reaction occurs, particularly at the hilum, resulting in the formation of a "paraffinoma", a lesion which may be indistinguishable radiologically from pulmonary carcinoma. It is from this fibrotic mass that the author postulates a neoplasm may arise. To support his contention he cites two cases, personally observed, where bronchiogenic carcinoma has appeared, coexistent with a chronic lipoid reaction. There was a long history of mineral oil intake in both cases.

Reports supporting the relationship between oil inhalation and pulmonary carcinoma have become increasingly common in recent

years. Hugenin (22) produces a statistical study involving metal workers, chauffeurs, mechanics, engineers and others involved in occupations calling for frequent exposure to oil sprays or vapors. From 144 cases of pulmonary carcinoma, 32 cases (or 28.5%) are found to have been exposed to oil for long periods while engaged in one of the above occupations.

Roffo (23) is quoted as having produced pulmonary tumors in mice through inhalation of combustion gases from fuel oil. Despite these and other bits of suggestive evidence, there is as yet no established relationship between petroleum products and pulmonary carcinoma. As expressed by Smith (24) in a recent article. . . ."In reviewing experimental studies, an outstanding fact is that cancer of the lung (other than adenoma) has never been conclusively produced in any animal by any material to which the animal was exposed by inhalation". . . .

C. Mineral Oil. In addition to the role of mineral oil in the production of "paraffinomas", and its suspected involvement in the development of neoplasms, as mentioned above, there have been many reports concerning the production of acute and chronic lipoid pneumonias following accidental aspiration of mineral oil. Proudfit (25), in his article, reports what is believed to be the first case of its kind concerning the production of a chronic lipoid pneumonia from industrial inhalation of mineral oil spray.

Proudfit's patient was a 40 year old man who, for the past 17 years, had been employed in servicing cash registers, spraying them with a naphtha cleaning solvent, followed by a light mineral oil spray for lubrication. Principal complaints when first seen consisted of

weight loss, productive cough, exertional dyspnea, fatigue, abdominal distention and vomiting. X-rays showed extensive shadows radiating outward from the hila and following the general directions of the bronchi. Sputum examination revealed many fatty globules, which took the Sudan stain but refused osmic acid stain -- an indication that the oil was mineral in nature. Three years later, with no further exposure, the patient was somewhat improved, but x-rays showed little change. On the basis of this lack of change, the positive sputum and the history of exposure to mineral oil, a diagnosis of "chronic lipoid pneumonia due to mineral oil" was made.

D. Shale Oil. The toxicity of Scottish shale oil has been studied by various investigators, particularly concerning its propensity for forming skin cancers in those constantly exposed to it -- notably among mule-spinners in the British Cotton textile industry. In a review recently published by Bonsib (26) on this subject, the question as to whether shale oil is capable of producing gastric or pulmonary malignancies through ingestion or inhalation again arose. He quotes Scott (27) as saying that he had observed no such malignancies in shale oil refinery workers, and counters with a reference to Southam (28), in which he states that he had observed such malignancies "from time to time" among mule-spinners. Hueper (29) states . . . ."The effect of shale oil upon the incidence of pulmonary tumors in mice is similar to that produced by tar, according to the investigations of Schabad". . . .

E. Paints, Lacquers, Varnishes, Shellacs. The role of gasoline in paint solutions has been referred to above, in the article by Sterner (17). Several years ago Chapman (30) wrote a careful

review on the proposed relationship of turpentine as a paint solvent, and the appearance of renal disease. Although turpentine has been suspected as a noxious agent with a direct effect on the kidneys, and although many seemingly authentic reports have appeared, corroborating this belief, Chapman was unable to substantiate clearly this relationship. After careful perusal of case-records over a period of many years, and with added experimental evidence, exposing rats to turpentine vapors for prolonged periods, he reported that there was no clearcut evidence incriminating turpentine as the offender in cases of renal disease appearing in painters, and others similarly exposed to this agent.

To cite just two more instances of toxicity appearing in those engaged in spray-painting or its many variants, Sessa (31) in 1947 published a report on physical findings in 20 female workers engaged in spraying varnish on household articles. Of these, 15 were found to be anemic, 12 complained of dysmenorrhea and 7 were found to have enlarged livers. Additional symptoms included weakness, headache, gastritis and pharyngitis. The toxic effects here were attributed by the author to the acetone and to acetic acid compounds present in the varnish solvent -- an explanation we consider inadequate and unacceptable.

Hirsch (32) reports a case of a fatal exudative and indurative pneumonia developing in an elderly man who had worked for many years in close proximity to shellac spray. Lung changes were said to resemble those seen with mineral oil intake. However, there were more neutrophils and less lipophages and mononuclear cells, a reaction also consistent with the presence of fatty acids in the resin, plus those

found in the turpentine or linseed oil solvent.

F. Petroleum Distillates -- Use as Insecticide Vehicles. Interest in this subject began in the early years of the last decade, with the first appearance of DDT as a useful insecticide. The earlier reports concerned themselves, however, with toxicity studies of DDT itself, with little or no regard for the possible effects of the materials used as vehicles. In 1945, Neal et al (33), under the auspices of the U. S. Public Health Service, published the report of an investigation of two DDT-aerosol solutions, differing only in the amount of DDT present. The vehicle used to dissolve the insecticide powder consisted of a primary solvent, a secondary oil solvent and a small amount of pyrethrins. Exhaustive studies were carried out on mice, rats, guinea pigs, dogs and monkeys, using inhalation, percutaneous, subcutaneous and installation routes. Only the inhalation route concerns us here.

It was clearly shown that, apart from the question of DDT toxicity, all species were able to tolerate massive exposures to these solutions, provided they were repeated only once daily and for a relatively short time. When exposure periods were stepped up to three times daily, with only a two-hour interval, the group of dogs being subjected to this experiment failed rapidly and died during the course of exposures. The same result obtained when aerosol solution, minus the DDT, was substituted. At post-mortem, the lungs showed atelectasis, broncho pneumonia, and diffuse pneumonitis, with oil-laden macrophages scattered throughout the alveoli and peribronchial connective tissue. The livers appeared slightly to moderately fatty and there were some casts and other abnormal deposits in the kidney tubules.

It should be reiterated here that these animals were subjected to concentrations of solvent far in excess of that anticipated under ordinary conditions.

The last two references are concerned with the possible toxic role of kerosene as a DDT solvent. In 1946 Gordon (34), conducting an investigation on a small group of African sprayers, carried out careful laboratory and physical measurements which showed that the only detectable effects of the kerosene was the production of a moderate dermatitis. Anderson and Khorram (35) two years later in Iran conducted a similar investigation, with essentially the same findings. Both sets of investigators recommended the use of a less toxic solvent.

Preventive Measures

The use of petroleum products as vehicles for various kinds of sprays is increasing in importance very rapidly. The original suppliers of these liquids may or may not have any "products liability" or legal responsibility for possible ill effects from the sprays but it certainly does the industry no good to have them used carelessly or misused. We would place education, in the form of good labelling, on the containers high in the list of preventive measures. From our experience in questioning users such labels are read and the directions usually heeded. But often we have found them in such small print, for lack of space on a small container, that they were hard to read.

One can rent small spray guns which are handy for home painting of things like shutters or even picket fences. Sometimes precautionary directions are given but it is more than likely no

warning appears on either the spray outfit or the paint can.

The toxicities of some of the pesticidal sprays have been greatly increased in recent years. The warnings on the containers for the poisons are given clearly, as the hazard is very real, but the vehicles get less attention. If the risk merits the wearing of protective equipment. the reasons for doing so had best be explicit and very well told or they may not be heeded.

We have seen -- as have most of you -- the sanitary department of towns spraying DDT very effectively from a large outfit carried around on a truck. A simple DDT sprayer can be attached to gasoline-driven lawn mowers and let the operator spray against mosquitoes while he is mowing the lawn. Our host did this while we were visiting in Key West. He have seen very few sprayers really take account of the possible health risks of such work in any part of the country.

Air masks (and sometimes respirators) for spraying are not unpleasant to wear. It is not hard to get men to wear them, once the reason is explained. If worn intelligently the principal risk from possible harm by any of these mists is reduced or even eliminated.

There are plenty of jobs in industry where men wear special clothing to avoid contact with some particular substance. Admittedly skin absorption of these various mists is much less important than their inhalation but it should not be ignored. If special clothing is needed for any of this work, over which you have no control, the reasons ought to be given interestingly and readily -- or they may not be heeded.

Indoor spraying is more or less limited to production lines where the object is placed suitably in a booth and ventilation is

applied so that the man spraying from the front of the booth is adequately protected. There are plenty of good engineering data now available for design of spray booths. It is assumed that such data are outside the scope of this report but we would be glad to give suitable references to members interested.

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APPENDIX B

To the Minutes of 16th Meeting of Medical Advisory Committee

REPORT TO THE API MEDICAL ADVISORY COMMITTEE

POTENTIAL HEALTH HAZARDS ASSOCIATED WITH USE OF LEAD COMPOUNDS IN CUTTING OILS

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September 2, 1952

To date, a review of the literature concerning the potential health hazards resulting from the inclusion of lead soaps in cutting oils is of necessity an indication of a field of toxicology where work is lacking rather than an evaluation of work done. A thorough search of available literature yields only one refereene, appearing last year in France, dealing specifically with this subject. Correspondence with French workers indicates that they have previously given consideration to the matter though specific literature references are lacking.

This review will give first a brief idea of the various uses of lead soaps in lubricants since this may perhaps serve as a guide to indicate where possible health hazards would be encountered. Secondly the specific toxicological information available will be presented, and thirdly a few references which deal with skin absorption of lead salts of the higher fatty acids will be noted.

Uses of Lead Compaunds in Lubricants

In special cases, molten lead as such is used as a lubricant. Soda and Miyagawa (1) have reported on its lubricating properties. In this instance the health hazards involved would

obviously be those typical of the handling of elemental lead and are beyond our concern here.

Lead soaps may appear as contaminants or impurities in lubricating grease and oils. Piper et al (2) in an investigation of dielectric losses in insulating oils due to service degradation found that soaps were formed through the interaction of insulating oils with metals used in the construction of high voltage cables.

Elliott (3) has reviewed the chemistry of metallic soap - hydrocarbon systems. Of the heavy metals, lead alone imposes special problems in lubricating compounds when the metal soaps are used. Lead is a rather effective polymerization catalyst so that unsaturated fatty acids are usually eliminated from compositions involving lead soaps. The lead soaps are still used in substantial amounts for various applications where mild extreme pressure conditions are encountered. Under such circumstances they function as a source of lead rather than as thickeners.

The lead salts of naphthenic acids, the carboxylic derivatives of cyclo-paraffin hydrocarbons, are widely used as these acids are saturated and stable to oxidation. The high solubility of the cyclic structure makes these compounds soluble in the wide range of hydrocarbons. A mixture of lead mono- and di- naphthenate is usually manufactured. The presence of the mono-naphthenate gives a more easily handled substance of lower viscosity and the di-naphthenate gives increased hydrocarbon solubility.

Swenson (4) patented a lubricating oil used with an admixture of a complex soap of lead and an alkali or alkali earth metal such as may be prepared by the reaction of lead oxide and a fatty oil such as fish oil and subsequent treatment of the product with

the hydroxide of an alkali or alkaline earth metal. The compound was for use under high pressures as on gears.

Holfenbach and O'Halloran (5) patented a combination of calcium and lead acetates with alkaline earth sulfonates to improve the properties of lubricating greases over those obtained from lead acetate alone. The resulting greases have extreme pressure properties and show good performance on the B.E.C. machine. The use of the lead salt alone results in a resinous precipitate which separates from the oil.

Zweifel (6) has patented a thread sealing and lubricating compound consisting of finely divided copper, powdered lead, amorphous graphite and a viscous, semi-solid or non-viscous petroleum vehicle.

Altamura (7) has a patent stating that the inclusion of from 0.01 to 1.0% of certain trialkyl lead salts of an aliphatic acid in mineral oil gives the mixture both rust and emulsion inhibiting properties. This additive is particularly valuable in turbine oils and may be used in conjunction with other additives.

The use of white lead as a cutting compound for cutting jack screw threads gave the highest instantaneous atmospheric lead exposure reported in the USPHS-Utah State Health Department joint study of lead smelters and lead mines. (8)

Toxicological Information

The exposure of workmen to cutting oils can arise from two main sources, inhalation and skin contact. The rapidly moving metal parts and the heat generated can cause formation of an aerosol of the oil in the atmosphere of the workroom unless ventilation is adequate

to remove the aerosol. Since it is well known that inhalation is the easiest route by which lead can enter the body, the presence of lead compounds in the oil aerosol must certainly represent a potential health hazard. Skin contact occurs as the oil flows continuously over the work. The subject of dermatoses arising from such skin contact with cutting oils has been covered in a previous toxicological review (9), but no mention is made of effects due to the presence of lead compounds in the cutting oils. Skin absorption of lead, especially if skin lesions are already present, cannot be ignored as a possible hazardous exposure though it is probably less important than breathing the aerosol.

Consideration of these facts led to a recent investigation of the toxicology of a lead containing cutting oil by DeSoille, DeRobert, LaBreton, and Martin (10). No specific cases of intoxication of workmen from this source is described but mention is made of the dense aerosols of the lead containing cutting oil in the workrooms of badly ventilated factories. Tests were made of the effect on guinea pigs of inhalation of the cutting oil as well as tests of skin penetration and oral toxicity. The mineral oil used was the same as that supplied to the factories in question. Lead analysis showed it to contain 0.8 g Pb per 100 cc.

For the inhalation experiments five guinea pigs were exposed to an aerosol of cutting oil giving a lead concentration of 0.08 mg. per cu. m. The inhalation lasted seven weeks with the duration of the daily exposure increasing progressively according to the tolerance of the animals -- ½hr. for 5 days, 1 hr. for 16 days, 1½ hrs. for 13 days, and finally 2½ hrs. for 15 days.

The first inhalation of the aerosol was objectionable to the animals and one of them was found dead following the second exposure. The others showed a transient loss of weight during the first two weeks but otherwise withstood the inhalations well.

Periodic counts of basophilic granulation of the erythrocytes showed that a rise did not appear until the end of the sixth week. By this time, the number of stippled cells had risen from a control value of 0-6 up to 46-138 per 100 leucocytes.

The analysis of lead fixation in the liver showed 26-32 mg. Pb per 100 g. of liver. Histological study of the hepatic parenchyma showed recent periportal hemorrhages with intratrabecular filtration of erythrocytes. The hepatic cells showed no mitochondrial, cytoplasmic, or nuclear alteration.

Pathological changes in the kidney were also observed. The general picture consisted of diffuse and abundant hemorrhage of recent origin, especially in the intertubular spaces but present also in the intraglobular spaces. The renal vascular system also showed a certain cellular edema with partial disappearance of the intercellular space. The epithelial element showed the most imporant lesions. The ureters showed a narrowing of conjunctive tissue enclosing the vessels. The epithelium was desquamated.

The pulmonary parenchyma, with the exception of one animal, showed lesions typical of pneumonia. The alveolar parenchyma was considerably modified though the normal alveolar texture was conserved. The walls, were considerably thinned and intraperietal edema and proliferation of lymphocytes produced the typical lesions of a reactionary state. These lesions were maximal in the perivascular regions. Abundant deposits of fatty material, blackish in color,

were found around the bronchial orifices especially at the periphery of the alveolar parenchyma under the parietal pleaura. Large macrophage cells enclosing fatty particles were seen.

For studies of skin absorption of lead from the cutting oil, 10 drops daily were applied to the skin of the neck or back. Cutaneous application produced a rise in stippled cell count to 20-85 per 100 leucocytes. The increase was irregular, however, and varied greatly for d'fferent animals. Inflammatory lesions were produced and a rapid and appreciable loss of weight occurred.

Chemical analysis showed that the liver of these animals at the end of the six week experiment contained 8-24 mg. Pb per 100g.

For the sake of completeness, studies of oral toxicity were included. Daily ingestion of 1 ml. of the oil caused the death of three out of four animals in a week. Daily ingestion of 0.25 ml. of the oil caused the death of four out of five animals in a month. The appearance of basophilic granulation was rapid and the final values reached stippled cell counts of 22-159 per 100 leucoyctes. The lead content of the livers was 4-8 mg. per 100 g.

This study shows very clearly that the inclusion of lead in cutting oils involves lead exposure. The main interest lies in the results obtained with the inhalation of the oil mist. Although the total quantities of lead introduced into the system were much smaller by this route than by the oral route, the fixation of lead in the liver was much greater. This is not surprising as the finely divided aerosol combined with the absorptive properties of the respiratory membranes for lead should promote absorption. The authors strongly recommend that the cinlusion of lead salts in cutting oils be forbidden both because of the danger from inhalation and the demcnstrated penetration of lead when the oil was applied to the skin.

Following this paper is a brief discussion in which the fact is mentioned that the Commission of Industrial Hygiene of the French Ministry of Labor had given consideration prevously to this problem. Correspondence with Professor Truhaut has obtained a slight amount of further information from Dr. S. Tara. An incident of saturnism suspected to be caused by lead oleate in cutting oils apparently occurred at Hispano-Suiza, a French firm manufacturing automobile engines. DeRobert at the time made an investigation of the matter but no literature reference is available here. The Commission of Industrial Hygiene also made a study at some time of cutting oil dermatoses and attention was called at that time to the role of lead in its etiology. Here again specific information is lacking beyond the mere statement that the investigation was made. These things indicate that the French workers have given the problem consideration and perhaps in the future more needed work will come from them. A checking of the Journal Officiel de la Republique Francaise indicates that to date at least no laws have been passed forbidding the inclusion of lead compounds in cutting oils though the idea has obviously been considered.

Skin Absorption of Lead Salts

While not concerned with cutting oils directly, a few reports in the literature on skin absorption of the lead salts of the higher fatty acids are pertinent to the problem of dangers from lead in cutting oils.

Cronin in 1925 (11) reports a case of lead poisoning attributed to lead stearate. Nine workers in a rubber plant contacted subacute dermatitis followed by deposits of lead in the skin

caused by an intracutaneous reaction of the chemicals. The causitive agent was lead oxide in loose chemical combination with stearic acid and sulfur. The heat of the mill turned the stearic acid into an oily liquid that flowed over the workers hands so that the exposure is not dissimilar to that from cutting oils. There were no constitutional symptoms of lead poisoning. The use of the mixture was, however, discontinued and the men put on other employment temporarily.

Matz (12) states that cases of lead poisoning from the use of plasters of lead oleate (diachylon) on the skin have been very rare, only three having been found in a rather complete search of the literature.

Laug and Kunze (13) investigated the penetration of lead compounds through the skin of rats. Penetration of non-volatile lead compounds is slight so that the analysis of urinary lead is not sensitive enough to detect it with any accuracy. Chemical analyses of the kidney, however, show that the lead concentration is significantly increased 24 hours after skin exposure, and may thus be used as a measure of the amount of lead that has entered the body. When 148 mg. of lead aleate was applied to the skin of a rat in petrolatum or oleic acid, the lead content of the kidney rose from a control value of 0.47 mg. per g. to 1.5 in 24 hours. If the skin was broken the value rose to 4.2 mg. per g. While this penetration is extremely small still it does occur and the fact that it increases markedly with skin damage is an important factor.

Summary and Conclusions

As was indicated earlier specific work is lacking on the hazards of inclusion of lead in cutting oils. From the work of

DeSoille and others, however, some information of value can be drawn. They demonstrated pathological changes of lung and other tissues as well as absorption of lead by the body resulting from inhalation of aerosols of lead containing oils. Presumably these changes were caused by the oil mist rather than the lead. Their oil contained 8 mg. Pb per ml. and their aerosol contained 0.08 mg. per cu. m. This means that only 0.01 ml. of oil was dispersed in a cubic meter. This must certainly be concentration far lower than the "dense fog" described by them in the workroom, yet it caused damage to the animals and absorption of lead. From their work they make the very strong recommendation that the use of lead in cutting oils be forbidden. It is certainly clear that adequate ventilation to remove the lead containing oils from the atmosphere of the workroom is very necessary. Both they and other workers have shown that some penetration, though slight, can occur through the skin. Even though this is the lesser of the two problems, some means of protecting the workers' hands from continual contact with such oils should be provided, especially if any skin lesions are present.

Recommendations

It would seem that some simple experiments are advisable first, to determine actual concentrations of lead in air during typical, full scale cutting operations and secondly, to follow lead absorption on humans whose skin is rubbed with small but known amounts of the cutting oils containing lead soaps.

We can do the first job but probably no better than several of the laboratories of member companies of API. We can also do the second job but again no better than others. We will be glad to

discuss both suggestions at the Chicago Meeting on the 25th of September.

Drinker does not subscribe to the French recommendation that use of the lead soaps in cutting oils be abolished. He suggests rather that we get data to define the risk in common sense terms and then see if it is not entirely practicable to control it.

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APPENDIX C

To the Minutes of 16th Meeting of Medical Advisory Committee

REPORT TO THE API MEDICAL ADVISORY COMMITTEE

BY THE SUBCOMMITTEE ON ATMOSPHERIC POLLUTANTS

September 10, 1952

Atmospheric pollution has today become a major challenge to scientists; to administrative officials and to the public. Important meetings have been held and more are scheduled. These include scientific meetings, industrial conferences, public gatherings, and official agency sessions offering information about air pollution, its sources, effect and control.

Universities, foundations and industrial centers of research are devoting more time to fundamental investigations - meteorological studies and comparable research is adding knowledge of the characteristics of atmosphere. Scientific investigations overlap and points of difference occur when professional and technical viewpoints are multiple. Investigations involve engineers, chemists, toxicologists, biologists, meteorologists, bacteriologists, physicists, botanists, physiologists, economists and physicians.

One of the finest engineering investigations has been made under the auspices of The Western Oil and Gas Association, and quoting from the 3rd Interim Report by the Stanford Research Institute a pertinent paragraph as follows:

> "Little is known about the exact effect of smog on human health. Reported experience of medical men in the area indicates that smog is detrimental to well-being. How serious a threat this may be has not been established. If it could be demonstrated by medical research that some ingredients of smog are harmful, a great impetus would be given to research leading to their specific elimination and, possibly, to further basic discoveries."

We are primarily interested in air pollution in <u>its relation to the petroleum industry</u>. The petroleum industry has been responsible for certain of the elements that have to do with air pollution. These substances have their origin in the refining processes or in the use and combustion of the finished product. The petroleum industry has not been responsible for the air pollution nuisance in its entirety. This is a local problem and occurs only locally in relation to the amount of waste material from industrial and manufacturing plants as well as the waste material that is released into the air in communities where there is a concentration of population, -- (garbage, refuse, incinerators, etc.).

As physicians and members of the Medical Advisory Committee and further, as members of the sub-committee on air pollution of the Medical Advisory Committee, it is apropos and pertinent at this time that an evaluation be made with regard to what approach should be made by the medical group concerning this problem of air pollution as it effects the oil industry. I have listed these as follows:

1. Medical science deals with physiological and toxicological effects on living human beings, or agricultural effects that might relate directly or indirectly to human health. This is in opposition to the exact science of chemistry, physics, and other types of technical groups. The effect of a substance on an inanimate object can be definitely measured. Whereas the same effect of that substance upon a human being is modified by many physiological laws and actions. One must not forget that in the living human being nature repairs damages that might occur. We, therefore, have two types of approaches from the medical standpoint.

(a) Accute effect. When the physician knows the amount of the substance that a human being has been exposed to, then he can tell you what immediate effect it would have upon that human being and whether or not there would be any persisting residuals of the effect.

(b) Chronic effect. It is only by exposure of an animal over a long period of time to minute quantities of substance "X" that the medical man may state what that effect may be. Is it harmful or is it not? Does it produce disease? Is it carcinogenic? What physiological changes occur in the animal to offset the continued exposure to such an element?

2. To determine physiological effect on an animal of any substance "X" there are basic factors which must be known.

(a) The medium of exposure, - air, liquid or solid.

(b) Is exposure made by inhalation, ingestion or contact?

(c) The nature of the substance, namely, chemical formula and physical properties. I refer you again to the 3rd Interim Report of the Stanford Research Institute wherein the conclusion and recommendations are made with regard to improvement of methods of identifying constituents of air pollutants. The Smoke and Fumes Committee has already proposed certain projects toward the development of analytical and identification methods, and any basic medical research might have to await the outcome of further investigation along the lines recommended in such projects.

IN SUMMARY, the sub-committee on air pollutants of the Medical Advisory Committee feels that they should be kept continuously advised of all research work which have to do with the human physiological effects of air pollutants in relation to the community problem. The pharmacology of these substances, along with the physiological properties if requested may then be worked out by medical investigation.

At the present time the sub-committee feels that no medical research under the auspices of the petroleum industry should be instigated by them at this time. The sub-committee feels they should await the final outcome of such projects and investigations that have been proposed or are already in the process of investigation before undertaking any projects of their own.

As stated in the minutes of the 15th meeting of the A.P.I. Medical Advisory Committee, "The subcommittee stands ready, if necessary, to render whatever service and assistance it can in those matters related to the physiologic effects of atmospheric pollution which it may be specifically requested to consider."

(1) Nuisance values as concerns eye smarting, coughing and odors would be considered physiological effects.

(2) Research has been underway for sometime concerning the effects of air pollutants on plant life. It is conceivable that the effects of plants and animals, - especially that are used for human consumption, - may be direct or indirect upon the human health. When such a problem arises the Medical Advisory Committee stands ready to advise, counsel, or continue any research investigations along these lines.

To investigate the harmful effects of air pollutants can be very definitely summarized in the following:

(1) How much quanitatively of substance "X" is in the atmosphere?

(2) What are the physiological effects immediate and after long time exposure?

(3) What can be done medically to counteract immediate exposures or long time exposures by the medical profession?

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APPENDIX D

To Minutes of 16th Meeting of Medical Advisory Committee

EXCERPT FROM MINUTES OF API LUBRICATION
COMMITTEE MEETING HELD ON SEPTEMBER 10, 1952
AT ATLANTIC CITY, NEW JERSEY

V. "REPORT OF THE HYGIENE PANEL

"Dr. O. Bridgeman reported as follows:

"The Sub-Panel on Eye Hygiene (N. J. Gothard, leader) were not able to hold a meeting since the last meeting of the Lubrication Committee, and hence there is no report on this activity at the present time.

"The Sub-Panel on Lubricants and Process Products Hygiene (M. D. Gjerde, leader) held a meeting in New York on September 8. They report that they have been assembling the available pamphlets and literature on the use of cutting oils and lubricants in relation to possible dermatitis in the absence of adequate hygiene. A number of such pamphlets have been prepared by various oil companies and other organizations, and the plan is to make a critical review of this literature with the objective of selecting one which is in suitable form for use by all interested organizations, or of drafting a new one possibly with the assistance of the Industrial Hygiene Foundation.

"A study has been made of the records on reported cases of dermatitis during service use of cutting oils and lubricants, which indicates that the incidence is very small. However, the matter is of sufficient importance that the Sub-Panel on Lubricants and Process Products Hygiene felt that an independent and authoritative survey should be made. Accordingly, the Sub-Panel recommends that the Industrial Hygiene Foundation be requested to undertake a comprehensive survey of the incidence of dermatitis through use of cutting oils and lubricants and that appropriate steps be taken through API channels to raise the sum of $40,000 to conduct this survey.

"ACTION: Accepted unanimously.

"Mr. K. G. Mackenzie then moved as follows:

"That the Lubrication Committee recommend to the Division of Marketing that approval be given to collect $40,000 for a critical study of dermatoses by the Industrial Hygiene Foundation of Pittsburgh.

"ACTION: Seconded and unanimously approved."

For Information Only - Not For Publication

AMERICAN PETROLEUM INSTITUTE

MEDICAL ADVISORY COMMITTEE

Seventeenth Meeting
September 30, 1953

Shamrock Hotel
Houston, Texas

Registration

Members Present or Represented:

T. M. Frank - Chairman
George M. Saunders - Vice Chairman

W. O. Armstrong
V. C. Baird
F. F. Boys
J. W. Crookshank
L. E. Curtis
Kieffer Davis
R. E. Eckardt
K. R. Fourcher
F. D. Gassoway
C. H. Hine
W. F. Kahle
T. J. Kelly
E. K. Linder
E. P. Luongo
C. R. Miller
M. N. Newquist
J. W. Osborn
R. C. Page by T. E. Allen
B. B. Reeve
J. C. Ruddock
L. J. Wade

Associates Present or Represented:

E. W. Adams
W. H. Barcus
Clyde Berry
R. C. Cole
A. E. Dooley
N. J. Gothard
J. W. Hammond
J. D. Haney
L. M. Henderson
C. K. Hewes
L. C. Kemp, Jr.
R. M. Landon
C. A. Neilson
A. C. Pabst
F. J. Sanders by D. G. Stevens

Members of Medical Committee of Board of Directors Represented:

R. M. Bartlett represented by R. M. Landon
J. W. Newton represented by L. B. Gough
J. G. Pew represented by E. Porter Johnson
M. J. Rathbone represented by L. B. Gough

Others Present:

Philip Drinker	-	Harvard University
Robert R. Dugan	-	Continental Oil Company
A. W. Horton	-	University of Cincinnati
D. R. McConnohie	-	Cities Service Oil Company
John J. Phair	-	University of Cincinnati

Members not Registered

Marshall Clinton
D. M. English
W. R. Levis
R. B. Lynn
E. Richmond Ware

Associates not Registered:

W. R. Argyle
L. C. Beard, Jr.
R. D. Bent
J. S. Boylan
C. R. Brown
L. C. Burroughs
R. S. Driver
L. N. Haugen
J. E. Hill
E. W. Isom
D. W. Larmer
C. R. McKay
R. C. Mithoff
J. R. Morrison
R. B. Roaper
R. M. Shepardson
F. M. Watkins
H. D. Wilde

- - -

I

INTRODUCTION OF MEMBERS AND GUESTS

Those who had not attended previous meetings were introduced.

II

MINUTES OF SIXTEENTH MEETING

ACTION: The Committee voted to approve the minutes of the Sixteenth Meeting as circularized.

III

REPORT OF SUBCOMMITTEE ON CARCINOGENICITY

Dr. Kieffer Davis, Chairman, presented the subcommittee's report.

ACTION: The Medical Advisory Committee voted to amend the report and to adopt the amended report as follows:

"The Subcommittee on Carcinogenicity convened at 9:30 on Tuesday, September 29, 1953 at the Shamrock Hotel, Houston. The minutes of the preceding meeting were reviewed and accepted. A report of the RPA Committee, which held its last meeting at Kettering Laboratory on September 11, 1953, was received. Brief progress reports of the work of the Kettering Laboratory were given by Dr. Horton and Dr. Phair. Copies of these progress reports were distributed to those members and associates present. The budget of the Kettering Laboratory was reviewed. Dr. Eckardt briefly reviewed the work of Dr. Paul Kotin of the University of Southern California and the recent meeting of the National Lung Cancer Committee. Dr. Curtis presented some interesting statistics on cancer death prevalence among company workers which indicate no higher prevalence of cancer deaths in company workers than among the general population of California.

"The Subcommittee recommends:

1. That the proposed budget of the Kettering Laboratory for July 1, 1954 - June 30, 1955 be approved by the Medical Advisory Committee and the funds solicited for this work.

2. That the report of the RPA Committee be forwarded in part or in whole to the API group to which the Medical Advisory Committee reports."

IV

REPORTS OF SUBCOMMITTEE ON CUTTING FLUIDS

Dr. Leo J. Wade, Chairman, reported as follows:

"The Subcommittee on Cutting Fluids, after due consideration, recommends to the Medical Advisory Committee that it give approval to the proposed request that the General Committee of the Division of Marketing obtain funds to:

1. Conduct a critical analysis of available information pertaining to the character, incidence, and problems in relation to cutting fluids on dermatoses.

2. Formulate a report setting forth results and conclusions and make appropriate recommendations for prevention.

3. Make recommendations for further studies or continuation of the project.

4. (a) The work to be planned and supervised by a joint committee consisting of eight members, four from the Medical Advisory Committee and four from the sub-panel on Lubricants and Process Products of the Hygiene Panel of the Lubrication Committee. The chairman of the Lubrications Committee of the Division of Marketing to be chairman of the joint committee.

   (b) The findings shall be solely the property of the API.

"While it is agreed that the cost of this project shall not exceed $20,000, it is further recognized that the goals can probably be achieved with a lesser expenditure of funds.

"Attention is called to the fact that the Hygiene Panel requests that the words 'cutting fluids' (section 1 above) be replaced by the words 'petroleum products'."

ACTION: The Committee voted to adopt the report and to authorize the Subcommittee to extend the scope of the project to include products other than cutting fluids if such extension is deemed to be practicable.

V

REPORT OF SUBCOMMITTEE ON MEDICAL POLICIES AND PRACTICES

Dr. Kenneth R. Fourcher, Chairman, reviewed the assignment which had been made to the Subcommittee for study and recommendation on suggested minimum standards for physical examinations of employees and suggested qualifications for medical directors and plant doctors. He read drafts which had not yet been circularized to the Medical Advisory Committee.

ACTION: The committee voted to table the report.

VI

REPORT OF SUBCOMMITTEE ON FLUORIDES

Dr. George M. Saunders, Chairman, reported as follows:

"The American Petroleum Institute is one of nine sponsors of a fluoride investigating program at the Kettering Laboratories, University of Cincinnati. Sponsors of the program for the year 1952 and their contributions were as follows:

Aluminum Co. of America	$4000.00
Aluminum Laboratories Ltd.	2000.00
American Petroleum Institute	2500.00
Kaiser Aluminum & Chemical Corp.	4000.00
Minnesota Mining & Mfg. Co.	1000.00
Pennsylvania Salt Co.	3000.00
Reynolds Metals Co.	4000.00
Tennessee Valley Authority	4000.00
Universal Oil Products Co.	500.00
	$25,000.00

"One phase of the work has been the compilation of an extensive literature survey, abstracting all known references to the subject of fluorine. Part I on 'Inorganic Fluorides' was issued in 1950, Part II on

'Organic Fluorides' in 1952, and a supplement to Part I was issued in early 1953, a volume of 500 pages of references. Several other publications have been made including:

1. An annual report of observations on fluorides.

2. Fluorides in water -- maximum physiological safe limit for continued human consumption.

3. Supplement to report on legal treatment of fluorines.

4. Toxicological evidence for the safety of the fluoridation of public water supplies.

"In summary, it is believed the American Petroleum Institute through the Subcommittee on Fluorides has been fortunate in participating in extensive investigations on fluorides through cooperation with other industrial companies interested in the problem. Because it has and will continue to receive by this means benefit of a study far more comprehensive than it could possibly undertake itself at a fraction of the cost of the work, the chairman on behalf of the Subcommittee, recommended that support of this work at the Kettering Laboratories should be continued for 1954-55."

ACTION: The report was adopted by the Medical Advisory Committee.

VII

REPORT OF SUBCOMMITTEE ON ATMOSPHERIC POLLUTANTS

Dr. John C. Ruddock, Chairman, presented an informal information report.

ACTION: The Committee voted in favor of a symposium to be arranged by the Subcommittee at a suitable future date with a program of speakers to include investigators such as Dr. Paul Kotin.

VIII

REPORT OF CONSULTANT

Professor Philip Drinker reported informally on a number of matters of interest to the Committee.

IX

REPORT OF SUBCOMMITTEE ON AWARDS

Dr. George M. Saunders, Chairman, reported that during the year three names were received and submitted to the Safety Committee of the Board of Directors. These names were unanimously approved for the

Certificate of Appreciation. They were:

Dr. Mc Iver Woody
Dr. Joseph P. Holt
Dr. Arthur E. Hoag

These individuals have the distinction of being the first physicians to receive the award.

X

REPORT OF SUBCOMMITTEE ON ECONOMIC POISONS

Dr. T. J. Kelly, Chairman, stated that he had no report except to recommend the continuation of the Committee on a standby basis.

XI

REPORT OF SUBCOMMITTEE ON PHYSIOLOGY OF THE SKIN

Dr. Robert E. Eckardt, Chairman, recommended continued support of the Kettering project to the extent of $5,000 for the fiscal year 1954-1955.

ACTION: The Committee voted to adopt the recommendation.

XII

REPORT OF SUBCOMMITTEE ON TOXICOLOGICAL REVIEWS

In the absence of Dr. Marshall Clinton, Chairman, Mr. Stroop mentioned for the record that the Institute had printed for sale the third series of tocicological reviews which had been approved for publication.

XIII

REPORT ON ASA COMMITTEE ACTIVITIES

As API representative on ASA committees Z4 and Z37, Allan E. Dooley reported on the status of work under these committees.

XIV

NEW BUSINESS

A. American Foundation of Occupational Health

A member suggested that consideration should be given to the standards on physical examinations issued by the American Foundation of Occupational Health.

ACTION: The Committee voted to submit the suggestion to its membership for a letter ballot.

B. Aromatic Hydrocarbons

This subject was reopened to see if there had been any increase in interest during the year.

ACTION: Upon a showing of increased interest the Committee voted for the appointment of a subcommittee to study and report recommendations.

C. California Cancer Mortality Data

Dr. Curtis submitted data which had been obtained for the State of California in comparison with data for the Standard Oil Company of California.

ACTION: The Committee expressed its interest in these data and requested Dr. Curtis if possible to supplement the information and to report results at the Eighteenth Meeting.

D. Annual vs. Semi-Annual Meetings

By a show of hands a majority of members expressed a preference for two meetings each year.

- - - - - - - -

RECESS FOR LUNCHEON SESSION

- - - - - - - -

LUNCHEON SESSION

Forty-seven members, associates, and guests attended the committee luncheon and heard Leo J. Wade, M. D. present illustrated discussion on "A Clinical Approach to the Alleged Cancer-Producing Properties of High-Boiling Catalytically Cracked Oil".

(A copy of Dr. Wade's discussion is attached as a part of these minutes.)

BUSINESS SESSION

A. Budget for 1954-1955

Mr. Stroop stated that a staff estimate of $75,000 had been submitted to and tentatively approved by the Institute's Program and Budget Review Committee as the amount to be solicited in 1954 to continue the medical

program until June 30, 1955. He said this estimate would provide for a 1954-1955 budget estimate of $83,750 as follows:

To University of Cincinnati	
Carcinogenicity Project	$72,250
Fluorine Project	2,500
Skin Project	5,000
To Professor Drinker	3,000
Miscellaneous expense	1,000

It was estimated that $75,000 added to the unobligated balance on deposit on June 30, 1953 would provide a total of $104,225 or $20,475 more than the estimated budget.

ACTION: The committee voted to adopt the staff estimate of $75,000 which was the same amount that had been solicited in 1953.

B. Organization

Members discussed a number of suggested modifications in the committee organization which had been proposed in the interest of expediting and facilitating the transaction of business at meetings. They also discussed the need for a small advisory group to provide continuity and to recommend prompt action on matters arising between meetings.

ACTION: The Committee voted to authorize the appointment of a small "Committee on Committees" to work with the officers of the Medical Advisory Committee on matters requiring action between meetings.

C. Eighteenth Meeting

The Chairman was empowered to fix the time and place of the Eighteenth Meeting.

D. Adjournment

There being no further business to be acted upon the meeting was adjourned.

D. V. Stroop, Acting Secretary

Approved:

T. M. Frank, Chairman

A CLINICAL APPROACH

TO THE ALLEGED CANCER-PRODUCING PROPERTIES

OF HIGH-BOILING CATALYTICALLY CRACKED OIL

Leo Wade, M. D.
Medical Director
Esso Standard Oil Company

A confidential report to the members of the Medical Advisory Committee,
of the American Petroleum Institute, Houston, Texas, September 30, 1953

My boys, eight and ten, delight in finding new meanings for my M. D. degree. One of these is "Mouse Doctor". Had they known about the activities of the API Medical Advisory Committee, perhaps they would have taken this more seriously than they apparently did.

For some time my confreres and I have been concerned about the meaning of the accumulated "mouse data" for the workmen in Esso refineries. Are the cancer-producing properties for mice reliable indices of cancer production in man? Are the conditions of the experiment comparable to the conditions encountered by workmen in refineries?

An obvious approach is to determine the relative incidence of skin cancer among refinery employees and other persons not associated with the petroleum industry. Careful consideration, however, will reveal many difficulties in this approach.

(1) No reliable information is available concerning the incidence of skin cancer. Many are treated by general practitioners by fulguration, thus preventing the establishment of a histological diagnosis. The dermatologist or the dermatological out-patient department is dealing with a fraction of the total number of cases and probably with a "select" fraction, the members of which are not comparable to average industrial workers. The situation is such that any reported incidence must invariably err on the "low side". We in the petroleum industry, being "skin cancer conscious", may very well err on the "high side".

(2) Any comparison of refinery workers with non-refinery workers will not "pinpoint" the problem to contact with high-boiling fractions. It will not even "pinpoint" the problem to petroleum fractions or products since it is a well-known fact that many people in many occupations (even housewives) may have more extensive contact with petroleum products than refinery workers have.

(3) Many factors other than contact with "slurry oil" will probably be an important as "slurry oil" itself in determining whether a skin cancer will develop in an exposed worker. The situation is not unlike that encountered in a consideration of tuberculosis. The tubercle bacillus, certainly a specific and recognizable cause of disease, produces active infection in a human host only under certain circumstances. The roles of nutrition, housing, genetic constitution, etc., are well known. There are undoubtedly equally numerous and complex extraneous factors which determine whether a given "slurry oil" worker will develop a skin cancer, even if it were known that "slurry oil" is carcinogenic for man.

With these and other considerations in mind, we have concluded that an epidemiologic approach to the problem confronting us is the only method whereby a satisfactory answer can be reached. Only by "canceling out" insofar as is possible other causative factors than "slurry oil" for the appearance of a skin cancer can we arrive at any reasonable conclusion as to the importance of this single factor.

The members of an employee population in any given refinery have much more in common with one another than with persons working elsewhere. They have a remarkably similar background so far as economic status, housing, nutrition, exposure to the elements, and possibly exposure to thus far unrecognized factors in the working environment. We believe by the "case-matching" technique we can secure some valuable clues, if not the answer, to our problem.

Beginning the first of the current year, at each of the refineries having "cat crackers", a McBee card has been filled out on each employee receiving a periodic examination. (See Figure 1.) You will note that much of the information can be filled in by clerical help. It remains for the doctor to check complexion, hair coloring, hair texture, personal hygiene, and any clinical data concerning skin cancer in the particular worker.

The accumulated cards are submitted to my office at the end of each month. A clerk punches the various appropriate notches for sorting purposes. The cards are then arranged according to sex and color. Thus far we have excluded female employees (since they are relatively few in number and, so far as I know, not exposed to "slurry oil") and "colored" (since they are less likely to give a definite clue to our problem.) The cards for white males are separated into two groups, "exposed" and "control". Those having had any possible contact with high-boiling catalytically cracked fractions are considered "exposed". All others are considered to be "controls". Each group of cards is then arranged according to age and years of service.

We attempt to "match" each employee with potential exposure to "slurry oil" with another employee having no known potential exposure to "slurry oil". Attempts at "matching" must involve certain compromises. The following is the basis for our effort:

(1) Employees of the same age are chosen as the basis of the first comparison;
(2) Employees of approximately the same service are chosen (as the length of services increases, greater latitude in the "matching" seems justifiable);
(3) The family history of cancer must be the same;
(4) Likewise, sunlight exposure must be qualitatively the same;
(5) Hair color must be the same;
(6) A difference of one grade has been permitted with reference to skin color, hair texture, and personal hygiene, preferably in not more than one instance in any given case; and
(7) Process and mechanical are matched if possible.

The cards are then numbered in duplicate so that each card of any given pair bears the same number. They are returned to the local refinery doctor for a critical review. He may know reasons which make some of the "matches" unrealistic.

It would be desirable to provide a second complete set of "controls". Such a large percentage of the employees in each of the refineries has had potential "exposure" to catalytically cracked materials that this goal may be difficult to achieve. Nonetheless, we hope to accumulate enough examination records on "controls" within the next 12 to 15 months to at least approach the goal.

Figure 2 indicates the sort of list which is being compiled from these "matching" efforts. We visualize that this list can be utilized on repeated occasions (possibly annually) to compare the incidence of various types of skin cancers in the two groups of employees. The findings may, of course, change as time goes on. Considering analogous experiences, one might reasonably expect that a period of ten to twenty years from the onset of catalytic cracking might have to elapse before a conclusive answer is apparent.

If a comparison of the two groups of workers reveals no statistically significant difference in the incidence of skin cancer, the results do not, unfortunately, exclude the possibility of a real cancer problem for several reasons:

(1) As mentioned above, the "incubation period" may have been inadequate;

(2) The protective program may have been so effective as to exclude actual exposure to "slurry oil" or so to minimize contact as to make it innocuous.

The latter is not probable. Recent studies by the Baton Rouge staff ("Operation Longjohn") have revealed conclusive evidence that skin contamination is occurring among some workers.

Whatever the first analysis may reveal, further refinements are necessary for a conclusive answer. We can separate the "exposed" group into several subgroups with varying degrees of probable skin contact. We can study the anatomical distribution and the cytological characteristics of skin tumors in the "exposed" and "control" groups. Possibly other procedures will occur to you. We undoubtedly will think of some as more data are obtained.

I have two purposes in mind in presenting this to you today: First, I hope I can interest some of you in a similar study so as to extend and confirm whatever findings we may make. Second, I am eager to have your comments and suggestions so that we may proceed with an optimal chance of attaining our goal.

This project was planned with and is being carried on with the assistance of John J. Thorpe, M. D.; Howard Hansen, M. D.; Thomas F. Nevins, Jr., M. D.; and Joseph Ecker, M. D.

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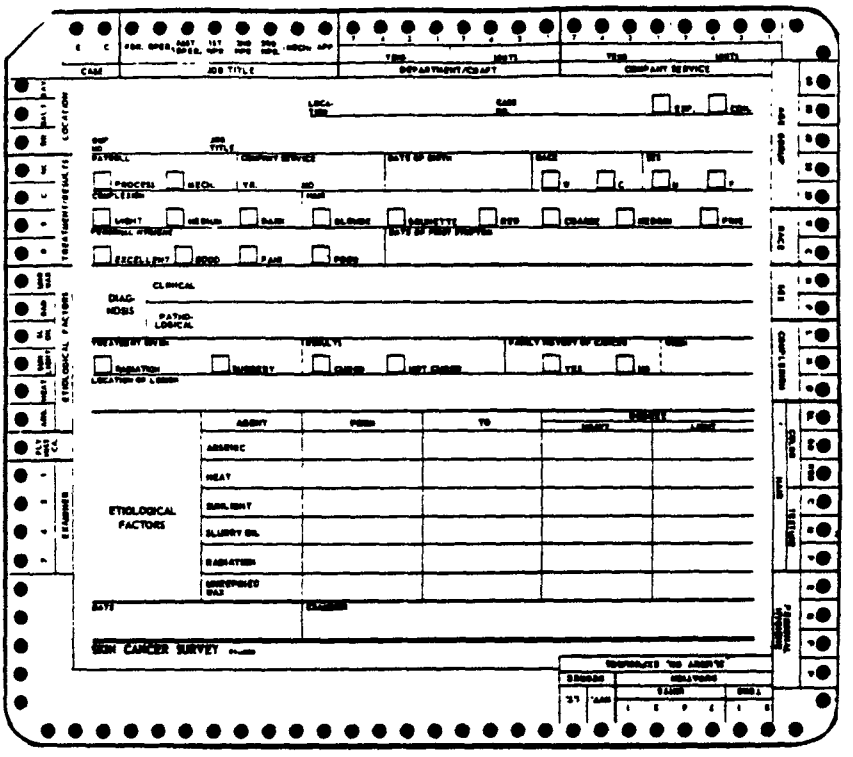

FIGURE 1

BATON ROUGE REFINERY
"SLURRY" OIL STUDY

	EXPOSED (EXPERIMENTAL)	NON-EXPOSED (CONTROL I)	NON-EXPOSED (CONTROL II)
1	14,136	14,239	
2	11,391	12,695	
3	13,384	12,802	
4	13,189	12,806	
5	13,573	13,699	
6	7,720	13,049	
7	11,495	11,473	
8	12,193	12,599	

7/27/53

FIGURE 2

For Information Only - Not For Publication

AMERICAN PETROLEUM INSTITUTE
MEDICAL ADVISORY COMMITTEE

EIGHTEENTH MEETING

September 9, 1954
Conrad Hilton Hotel
Chicago, Illinois

Registration

MEMBERS PRESENT OR REPRESENTED

George M. Saunders, M. D. - Chairman
F. D. Gassaway, M. D. - Secretary

W. O. Armstrong, M. D.
F. F. Boys, M. D.
Marshall Clinton, M. D.
J. Wm. Crookshank, M. D.
L. E. Curtis, M. D.
T. M. Frank, M. D.
C. H. Hine, M. D.
T. J. Kelly, M. D.
E. K. Linder, M. D.
E. P. Luongo, M. D.
C. R. Miller, M. D.
M. N. Newquist, M. D.
J. W. Osborn, M. D.
R. J. Potts, M. D.
B. B. Reeve, M. D.
J. C. Ruddock, M. D.
Leo J. Wade, M. D.
(Rep. by John J. Thorpe, M. D.)
E. R. Ware, M. D.

TECHNICAL ADVISORS PRESENT OR REPRESENTED

E. W. Adams
(Rep. by C. M. Loane)
T. B. Albin
L. C. Beard, Jr.
R. D. Bent
R. C. Cole
Allan E. Dooley
N. J. Gothard
Paul D. Halley
J. W. Hammond
R. M. Landon
R. C. Mithoff
A. C. Pabst

OTHERS REGISTERED

Philip Drinker - Harvard University
Robert R. Dugan, M. D. - Continental Oil Company
D. V. Stroop - American Petroleum Institute

MEMBERS NOT REGISTERED OR REPRESENTED

V. C. Baird, M. D.
Lamson Blaney, M. D.
Kieffer Davis, M. D.
R. E. Eckardt, M. D.
K. R. Fourcher, M. D.
W. F. Kahle, M. D.
R. C. Page, M. D.

I

MINUTES OF SEVENTEENTH MEETING

ACTION: The committee voted to approve the minutes of the Seventeenth Meeting as circularized, with pages 1 and 2 corrected, on November 9, 1953.

II

SUBCOMMITTEE REPORTS

A. Subcommittee on Carcinogenicity - R. E. Eckardt, M.D., Chairman

In absence of chairman, Dr. C. H. Hine presented the subcommittee report as submitted by Dr. Eckardt's letter of July 13 and as supplemented by Dr. Eckardt's letter of August 18.

Dr. Hine reported further that the subcommittee members preferred Dr. Kehoe's alternate page 1 to the original page 1 of the paper entitled "Carcinogenesis of the Skin I."

ACTION: The Medical Advisory Committee accepted the subcommittee report and adopted its recommendation that there should be no objection to the publication of the paper "Carcinogenesis of the Skin I" with alternate page 1 and the other changes submitted by Dr. Eckardt's letter dated August 18.

B. Subcommittee on Fluorides - George M. Saunders, M. D., Chairman

At request of the chairman, Mr. Pabst presented the report as submitted by letter dated July 15 and circularized July 21.

ACTION: The subcommittee report was accepted with a unanimous vote to terminate this activity on June 30, 1955.

C. Subcommittee on Cutting Fluids - Leo J. Wade, M. D., Chairman

In Dr. Wade's absence, Dr. Thorpe reported the inactivity of the subcommittee which was awaiting action by the Lubrication Committee of the Division of Marketing on the dermatoses project of 1953.

ACTION: The committee accepted the progress report and expressed no objection to the draft of Appendix D which had been prepared for attachment to the MAC report to the Medical and Health Committee.

D. Subcommittee on C_9 - C_{12} Aromatics - C. H. Hine, M. D., Chairman

Dr. Hine presented the subcommittee report as submitted by letter dated July 9 and circularized July 16, and made a supplemental report as follows:

"C_9 - C_{12} Aromatics Committee Report. A review was made of the incidence of undue exposure and intoxication allegedly caused by both individual compounds and mixtures of C_9 - C_{12} aromatics. A questionnaire was sent to the medical officers of the petroleum companies in the API and the opinions of experts in the field of industrial health were solicited in order to develop this information.

"On the basis of fragmentary and inconclusive evidence that was obtained, it became necessary to classify the hazard associated with C_9 - C_{12} aromatics as similar to that of benzene.

"However, it is the feeling of the subcommittee that the actual hazard is probably of a lower order than that of benzene, and it is therefore the recommendation of this subcommittee that the Medical Advisory Committee sponsor a research program to establish the magnitude of this hazard in comparison to benzene or n-hexane.

"It is further recommended that monies in the amount of $20,000 be appropriated for support of this program for a period of one year. It is finally recommended that other interested groups be contacted to determine the desirability of entering a joint research program in this matter."

ACTION: The reports were accepted and the recommendations were adopted for transmittal to the Medical and Health Committee.

E. Subcommittee on Economic Poisons - C. H. Hine, M. D., Chairman

Dr. Hine presented the subcommittee report as submitted by letter dated July 9 and circularized on July 16 and requested the addition of the term "insect repellants" to the stated definition of economic poisons.

ACTION: The report was accepted with the additional term as requested.

F. Subcommittee on Atmospheric Pollutants - E. P. Luongo, M. D., Chairman

Dr. Luongo referred to the subcommittee report submitted by letter July 8 and circularized July 12 and the paragraph 3A of the draft report attached to the memorandum of meeting of Operating Subcommittee held August 5, 1954. He then presented an amended report as follows:

"The Subcommittee on Atmospheric Pollutants has met and considered a proposed draft of report to Medical and Health Committee of the Board. While the subcommittee endorses in principle the expressed need for liaison between the MAC and other groups in the API dealing with the subject of Atmospheric Pollutants, we hesitate to endorse the proposal in its present form at this time.

"We, therefore, submit for consideration of the MAC as a whole the following statement amending our report of July 8, 1954 and the proposed draft of the report to the Medical and Health Committee of the API Board to read as follows:

'There is a growing tendency to atrribute various health problems in communities to atmospheric pollutants including emissions from oil industry operations and those produced by combustion of petroleum products.

'This tendency, to date, is based partly on scientific fact and partly on surmise and conclusion. The subcommittee recognizes a definite limit to the oil industry's responsibility in investigating community health problems but also recognizes the need for improved communications on the health aspects of Atmospheric Pollution within the oil industry.

'It is recommended therefore that:

'(1) API should be authorized to utilize suitable technical services to:

a) Collect and abstract existing information on the medical and health aspects of atmospheric pollutants attributable to the petroleum industry.

b) Survey and evaluate medical research now in progress or planned on such pollutants.

c) Study and make recommendations on the need for additional medical research on such pollutants.

'(2) The MAC budget for 1955-1956 should include the sum of $15,000 to cover necessary expenses incidental to this work.'"

ACTION: The amended report was accepted by the Medical Advisory Committee.

G. Subcommittee on Medical Policies and Practices - K. R. Fourcher, M. D., Chairman

In absence of Dr. Fourcher, Dr. Linder presented the subcommittee report as submitted on June 25 and circularized on June 29.

ACTION: The report was accepted in the understanding that its proposals were not advocated as a standardized system of records but were suggested for use in part or in whole where feasible.

H. Subcommittee on Toxicological Reviews - Marshall Clinton, M. D., Chairman

Dr. Clinton presented the report submitted on July 16 and circularized on July 21 and supplemented it by reference to his letter of August 18 and to comments received in response to it. He again expressed the need for guidance from MAC members as to the need for new or revised reviews.

The report was also supplemented by the remarks of Professor Drinker who described several developments of interest and value in the publication of toxicological reviews.

ACTION: The report was accepted with the understanding that Professor Drinker will submit such specific information as may become available on the new developments.

I. Subcommittee on the Physiology of the Skin - R. E. Eckardt, M. D., Chairman

In absence of Dr. Eckardt, Dr. Newquist presented the subcommittee report as submitted July 14 and circularized July 16.

ACTION: The report was accepted.

III

REPORT OF CONSULTANT
Professor Philip Drinker

Professor Drinker reported informally on subjects of interest to the committee.

IV

REPORT ON ASA ACTIVITIES
Allan E. Dooley

As API representative on ASA Committees Z4 and Z37, Mr. Dooley reported on the status of the work under way by these committees.

V

NEW BUSINESS

A. Health Problems from Protective Coatings

The committee received for consideration, a proposal for the appointment of a study group on this subject as presented by J. W. Hammond. (See Appendix A for Mr. Hammond's presentation of the subject.)

B. Meetings of Medical Advisory Committee in 1955

The committee voted in favor of holding two meetings in 1955; the first to be held in Buffalo, New York immediately prior to the April meeting of the Industrial Medical Association, and the second to be held during the 35th Annual Meeting of the American Petroleum Institute at San Francisco in November.

C. Proposal for Public Group Session at San Francisco

The committee discussed a number of subjects which might be suitable for presentation at a public group session to be sponsored by the Medical Advisory Committee at the 35th Annual Meeting of the API.

D. Dermatoses Project Proposed by Division of Marketing

The chairman referred to the committee's action at its Sixteenth Meeting when it voted to adopt the report of its Subcommittee on Cutting Fluids which recommended approval of the project. He also referred to letter dated August 17 from M. J. Rathbone, Chairman, Medical and Health Committee, who requested a review, comment and recommendations of project as it had been referred to him by letter dated August 4 from Robert M. Bartlett, Vice President, Division of Marketing.

ACTION: After an extended discussion of the proposed project, the Medical Advisory Committee requested Chairman Saunders to comply with Mr. Rathbone's request by letter, stating the reasons underlying the committee's action in 1953 and reiterating the consensus of its members that the project as proposed would contribute little or nothing to the industry's fund of knowledge on the medical aspects of the dermatoses problem; however, if the Division of Marketing desires to proceed with the work, the Medical Advisory Committee would prefer not to obstruct the project.

E. Budget for 1955-1956

Reviewing the recommendations of the several subcommittees, the Medical Advisory Committee voted to submit to the Medical and Health Committee, the following recommendations on 1955-1956 budget:

The American Petroleum Institute should be authorized to solicit in 1955 the sum of $90,000 in special contributions from oil companies for expenditures under a 1955-1956 budget as follows:

1) University of Cincinnati	
a) Carcinogenicity - $65,000	
b) Physiology of Skin - 5,000	$ 70,000
2) Professor Philip Drinker	3,000
3) Medical Aspects of Air Pollutants	15,000
4) Toxicity of C_9 - C_{12} Aromatics	20,000
5) Miscellaneous	1,000
	$109,000

NOTE: An estimated unobligated balance of $26,000 on June 30, 1955 together with special contributions of $90,000 will cover the recommended budget.

F. Report

The committee discussed the draft report to the Medical and Health Committee with revisions necessitated by committee actions taken on September 9. No objections were stated to the character or content of the report with its revisions.

(See copy of revised report attached as Appendix B.)

VI

ADJOURNMENT

There being no further business requiring committee action, the meeting was adjourned.

F. D. Gassaway, M. D.
Secretary

Approved:

George M. Saunders, M. D.
Chairman

9/15/54

APPENDIX A TO MINUTES OF 18TH MEETING OF MEDICAL ADVISORY COMMITTEE

HEALTH PROBLEMS FROM PROTECTIVE COATINGS

A SUMMARY

HISTORY

Before 1929, coal tars (mixture of creosote and pitch) were generally used. Then asphalts were adopted by major pipeline companies. Health problems from eye and skin irritation were eliminated to a large degree by substitution of asphatic coatings. In 1946, bad experience with asphalt due to solubility in petroleum oils and gases led to the return by most users to coal tar coatings. These are insoluble in most petroleum fractions and products.

CURRENT FIELD PRACTICES

Most pipes are machined-wrapper and coated. Large diameter lines are machined-wrapped in the field after the joints are welded; whereas most small pipes are wrapped in plants and them moved to the field to be welded. Welded joints must be hand-wrapped and coated in the field. This operation gives crude oil and gas producers the greatest amount of trouble.

The cold coating or enamel is cut into small pieces and placed in a kerosene-fired tar kettle or pot. This heated pot is generally mounted on trailer wheels.

The fireman in charge of the melt is supposed to stir the tar properly while it melts and hold it at proper temperature of 350°F. - 450°F. as recommended by manufacturers, depending upon ambient temperature of the air while pouring. As currently practiced, the pot temperature is guessed at, whereas, the manufacturers are very specific in warning that overheating may destroy the physical properties of the applied enamel.

The fireman draws the hot enamel into cans from a spigot which is located on the opposite side from the burner. Because, it is usually necessary to turn the burner into the wind for added draft, the draw-off spigot is in the stream of gases and vapors coming off of the tar pot, thereby, exposing the fireman.

The hot coating is poured from buckets or dippers onto a cloth sling which is used to spread it. This application exposes three more men to vapors.

Inasmuch as personal protective equipment and ointments do not give complete protection, a brief discussion of the nature of hazards is in order.

HEALTH HAZARDS

All protective coal tar coatings contain some solvent. The amount depends on service and mode of application. Those coatings which are liquid at normal atmospheric temperature are generally applied by spray methods.

These solvents are chiefly aromatic in nature. The experience of one shipyard with a short term exposure to concentrations ranging from 250 to 450 ppm is significant. Of 20 men exposed to solvent vapors (B.p. range 172°-180°C.), all had a hemolytic anemia of some degree. One patient had a hemoglobin value of 44% and the balance had hemoglobin values ranging from 50% to 60% of normal. Two patients had sternal biopsys and the cellular changes were characteristic of exposure to hemolytic toxins.

Those tars which are applied hot emit light colored vapors of mostly steam and solvent at 350°F. or below. Whenever this temperature is exceeded by 50°F., dense yellow fumes are given off. Reportedly, professional pipe line coaters are "burned" by these yellow fumes. This effect is commonly called "tar erythema" which in most cases includes eye irritation. In addition, inexperienced employees complain of nausea and persistent headaches which do not seem to bother regular workers in the tar and pitch industry.

Protective coatings are generally applied to the bottom of crude oil storage tanks. The problem is present, not only during the pouring, but also on removal of the old coat. For example, workers are frequently irritated on the skin and in the eyes by dust particles from cleaning tanks thus treated.

One field report illustrates the hazard from application of bitumastic coatings to confined surfaces. The report states, "It was found that even the wearing of rubber boots, gloves, suit (coveralls), cap, scarf, and U. S. Regulation Army gas masks, did not completely protect them (employees) from burns to the skin."

Where aromatic type coatings have been applied to shipdecks, the fumes or vapors may arise from the dried surface under conditions of intense sun to burn and blister seamen's skin. The photo-sensitizing problem is worse on vessels when the material is being applied and before it has aged.

This type of problem was first experienced with the handling of creosoted woods. Old pipe lines which were originally coated with a mixture of pitch and creosote still may give trouble when they are removed.

There may be more serious effects of repeated and prolonged exposure to these products. The frequency with which most petroleum and gas company employees come into contact with these materials make these effects unlikely. Employees regularly exposed generally are few in any one place, or the companies, such as those which engage in pipe line coatings, are too small to have either suitable medical supervision or accumulate statistically significant records to detect trends of occupational diseases.

The experience of lung and scrotal cancer among pitch and tar workers in the British and Canadian coke industries seem to be much higher than ours. This is attributed to both personal hygiene practices and to the methods of working, giving the Canadian and English employees greater personal contact and fume exposure. The chemical constituents of the materials, both in the solid and vapor phase, are similar. Investigators have isolated 3,4, benzpyrene from coal tar and probably there are several other carcinogenic materials present.

We believe that the skin irritating compound in vapors from these coatings is acridine. Field samples of vapors collected by absorption contained acridine, benzpyrene and other condensed ring compounds of pyrene nature.

Acridine photo sensitizes one to sunlight. This explains why equal or greater exposure inside and at night is generally not as serious as field exposure. Blondes are more seriously effected.

PROPOSAL AND CONCLUSION

We recommend that a study group, whose objective would be to determine if the potential and actual health problems in its opinion are numerous and serious enough to justify a permanent subcommittee of the Medical Advisory Committee, API, be appointed by the Chairman.

APPENDIX B TO MINUTES OF 18TH MEETING OF MEDICAL ADVISORY COMMITTEE

REVISED REPORT

Mr. M. J. Rathbone, Chairman
API Medical and Health Committee
c/o Standard Oil Company (New Jersey)
30 Rockefeller Plaza
New York 20, New York

Dear Mr. Rathbone:

Supplementing its previous reports the Medical Advisory Committee submits its 1954 report with recommendations as follows:

1. General

The Medical Advisory Committee appreciates the work done by the Medical and Health Committee in establishing the functions, composition, organization and procedures of the advisory committee on April 21, 1954.

2. Budget Projects

A. Carcinogenicity of Petroleum (University of Cincinnati)

Work is being continued (1954-1955) both on the chemical and biological as well as the epidemiology of this study; however, there has been a gradual tapering off of expenditures which should continue during the next few years at an annual cost of about $40,000 - $45,000 after July 1, 1956.

The Medical Advisory Committee has examined the manuscript of the project paper entitled "Carcinogenesis of the Skin I" and finds no objection to its publication with the changes and alternate page 1 as recommended in supplemental letter dated August 18.

See Appendices A-1, A-2, and A-3 for detailed report and submittal and supplemental letters on behalf of project subcommittee.

B. Fluorides (University of Cincinnati)

Participation in this cooperative study is being continued (1954-1955) but the Medical Advisory Committee recommends its termination as of June 30, 1955.

See Appendix B for subcommittee report.

C. Physiology of the Skin (University of Cincinnati)

Financial support of this fundamental research is being continued (1954-1955) and is recommended for 1955-1956 at $5,000 per annum.

See Appendix C for detailed report.

D. Toxicological Reviews

The services of Professor Philip Drinker have been retained for 1954-1955 and are recommended for 1955-1956. He serves as consultant on industrial hygiene problems and as editor in the preparation of toxicological reviews.

3. Subcommittee Studies

A. Atmospheric Pollutants

The Subcommittee on Atmospheric Pollutants has met and considered a proposed draft of report to Medical and Health Committee of the Board. While the subcommittee endorses in principle the expressed need for liaison between the MAC and other groups in the API dealing with the subject of Atmospheric Pollutants, we hesitate to endorse the proposal in its present form at this time.

We, therefore, submit for consideration of the MAC as a whole the following statement amending our report of July 8, 1954 and the proposed draft of the report to the Medical and Health Committee of the API Board to read as follows:

There is a growing tendency to attribute various health problems in communities to atmospheric pollutants including emissions from oil industry operations and those produced by combustion of petroleum products.

This tendency, to date, is based partly on scientific fact and partly on surmise and conclusion. The subcommittee recognizes a definite limit to the oil industry's responsibility in investigating community health problems but also recognizes the need for improved communications on the health aspects of Atmospheric Pollution within the oil industry.

It is recommended therefore that:

(1) API should be authorized to utilize suitable technical services to:

a) Collect and abstract existing information on the medical and health aspects of atmospheric pollutants attributable to the petroleum industry.

b) Survey and evaluate medical research now in progress or planned on such pollutants.

c) Study and make recommendations on the need for additional medical research on such pollutants.

(2) The MAC budget for 1955-1956 should include the sum of $15,000 to cover necessary expenses incidental to this work.

B. Cutting Fluids

The advisory committee, in response to request from Chairman Rathbone, has reviewed, discussed and commented upon the dermatoses project outlined in letter dated August 4 from Robert M. Bartlett, Vice President, Division of Marketing. The committee's consensus is expressed in reply to Mr. Rathbone, a copy of which is attached as Appendix D - 1.

Appendix D - 2 gives a brief review of the subcommittee's studies 1945-1949.

C. Economic Poisons

Information is being compiled and disseminated to members of the Medical Advisory Committee on the toxicological aspects of insecticides and other economic poisons.

D. C_9 - C_{12} Aromatics

The toxicity of C_9 - C_{12} aromatics upon the ultimate users of many different commercial products may concern several industries as well as the petroleum industry. The Medical Advisory Committee recommends a project of fundamental research for initiation by the American Petroleum Institute with or without cooperation of other associations at an estimated cost of $20,000 for the year 1955-1956.

See Appendix E for detailed subcommittee reports.

4. Medical Policies and Practices

Adverse trends in public opinion make it desirable to have available industry-wide data on industrial disease and preventive practices. To be effective such data must be based upon uniform or comparable records.

Your committee is seeking to encourage the establishment of policies and practices which will insure the maintenance of such records.

5. API Medical Activities

The Medical Advisory Committee desires to join with other API committees by participating in Institute annual meetings, specifically by sponsoring a group session at the Thirty-fifth Annual Meeting of the API in 1955.

To that end a Program Subcommittee has been appointed to select appropriate papers and speakers.

6. Summary of Recommendations

API 07192

The Medical and Health Committee is requested to give favorable consideration to the following recommendations:

A. Budget for 1955-1956

To authorize API to solicit $90,000 in contributions from oil companies and to approve expenditure of funds under 1955-1956 budget as follows:

1)	University of Cincinnati		
	a) Carcinogenicity	$65,000	
	b) Physiology of Skin	5,000	
			$ 70,000
2)	Professor Philip Drinker		3,000
3)	Medical Aspects of Air Pollutants		15,000
4)	Toxicity of C_9 - C_{12} Aromatics		20,000
5)	Miscellaneous Expenses		1,000
			$109,000

Note: An estimated unobligated balance of $26,000 on June 30, 1955 together with special contributions of $90,000 will cover the recommended budget.

B. Manuscript of Paper - "Carcinogenesis of the Skin, I"

To approve the Medical Advisory Committee's finding that there is no objection to publication of "Carcinogenesis of the Skin, I" with changes as reported by subcommittee.

C. Fluorides

To approve Medical Advisory Committee recommendation to terminate API participation in fluoride project as of June 30, 1955.

D. Atmospheric Pollutants

To adopt Medical Advisory Committee recommendation for studies on the medical and health aspects of air pollutants attributable to the petroleum industry at a budgeted cost of $15,000.

E. Annual Meetings

To authorize Medical Advisory Committee to hold a public group session at the Thirty-fifth Annual Meeting of the API in November 1955.

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Very truly yours,

SIGNED BY George M. Saunders, M. D.
Chairman
Medical Advisory Committee

2992-12-1

API 07195