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AMERICAN PETROLEUM INSTITUTE
MEDICAL ADVISORY COMMITTEE

SEVENTH MEETING

Minutes of Meeting
April 2, 1948
Hotel Statler
Boston, Massachusetts

MEMBERS PRESENT

M. N. Newquist - Chairman
J. P. Holt - Secretary

W. W. Brooks
Kieffer Davis
T. M. Frank
A. E. Hoag
T. J. Kelly
E. K. Linder
E. P. Luongo
R. C. Page
B. B. Reeve
McIver Woody

ASSOCIATES PRESENT

E. W. Adams
L. C. Beard, Jr.
R. S. Bonsib
R. C. Cole
A. E. Dooley
H. G. M. Fischer
N. J. Gothard
H. P. Lankelma
H. R. Warrick
H. H. Zuidema

GUESTS

M. Clinton
Philip Drinker
J. W. Hammond
R. A. Kehoe
R. C. Page
A. O. Seeler
N. B. Wilson

ADVISOR

D. V. Stroop - API

Total in Attendance - 30

MEMBERS ABSENT

W. O. Armstrong
V. C. Baird
F. F. Boys
D. M. English
H. E. Fraser
W. R. Levis
W. A. Morrison
H. S. Thomson

ASSOCIATES ABSENT

C. R. Brown
R. S. Driver
H. W. Field
E. W. Isom
A. J. Koewing, Jr.
D. W. Larmer
C. R. McKay
R. B. Roeper
G. H. Taber, Jr.
F. M. Watkins
H. D. Wilde

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I

INTRODUCTION OF GUESTS AND NEW MEMBERS

The guests and new members, Marshall Clinton. J. W. Hammond, R. A. Kehoe, E. P. Luongo, Robert Collier Page, A. O. Seeler, and N. B. Wilson, were recognized.

II

MINUTES OF PREVICUS MEETING

Action — The minutes of the previous meeting, November 13, 1947, were approved as circularized.

III

REPORT OF SUBCOMMITTEE ON FLUORIDES - DR. A. E. HOAG, CHAIRMAN

The report of the Subcommittee on Fluorides was presented and is given in full in Appendix A.

The report of the subcommittee stated that arrangements had been made for the University of Cincinnati to supply to the committee copies of all of their data concerning fluorides. A number of such reports have already been distributed.

It was the sense of the meeting that it was desirable to carry out toxicological studies on Boron Trifluoride; Dr. A. E. Hoag will explore the possibilities of having Dr. Robert A. Kehoe carry out such studies and will determine what, if any, additional funds will be necessary to support these studies in the program of research on fluoride that is being sponsored at the University of Cincinnati.

Action — The committee voted unanimously to receive the report of the Subcommittee on Fluorides. In receiving this report the committee recommended that the API continue to support this program at the University of Cincinnati at the cost of $2,500 for the next year.

IV

REPORT OF SUBCOMMITTEE ON CUTTING FLUIDS - DR. B. B. REEVE, CHAIRMAN

The report of the Subcommittee on Cutting Fluids, with an attachment concerning "Safeguarding the Use of Cutting Fluids and Coolants" prepared by Mr. R. S. Bonsib, was presented and is given in Appendix B.

It was the consensus of the meeting that the attached memorandum, entitled "Safeguarding the Use of Cutting Fluids and Coolants," would be distributed by Mr. Stroop to the members and associate members of the Medical Advisory Committee for criticism and for letter ballot as to whether it would or would not be published. If it was voted to publish the report, it would then be referred to the Editorial Committee for final review and then to the API for publication.

A request from an engineering journal for permission to publish part of the review, entitled "Dermatitis from Cutting Fluids - A Critical Review," prepared by Mr. Bertrand C. Kriete of the Harvard School of Public Health, has been received. It was the consensus of the meeting, that in view of the fact that it would be a number of months before Mr. Kriete had modified his paper and published it in a journal such as the Journal of Industrial Hygiene and Toxicology, that such a request for publication should not be granted until Mr. Kriete had published the paper.

Action

1. The committee unanimously approved the report of the Subcommittee on Cutting Fluids.

2. The committee recommended that the report on "Dermatitis from Cutting Oils," prepared by Mr. Kriete of Harvard, be published in the medical literature as soon as practical. After such publication an extract from the paper will be prepared by the American Petroleum Institute for distribution.

V

REPORT OF SUBCOMMITTEE ON CARCINOGENICITY - DR. McIVER WOODY, CHAIRMAN

The report of the Subcommittee on Carcinogenicity was presented by Dr. Woody and received by the committee. It is given in Appendix C.

In the discussion that followed the presentation of the report, the importance of the cancer problem was discussed and it was pointed out that government agencies, the medical profession, and the public had in recent years become very interested in this problem. In addition, a confidential memorandum of information for Mr. W. R. Boyd, Jr., President of American Petroleum Institute, describing the available information in the medical literature concerning cancer as related to petroleum, was presented.

Dr. Robert A. Kehoe of the University of Cincinnati presented a verbal report of the work that his laboratory had carried out to date on several samples of residual and distillate oils. He stated that a written report concerning this work would be submitted to the committee within a few weeks. Dr. Kehoe felt it important for the cancer problem to be studied in the petroleum industry by means of animal experimental studies, epidemiological surveys, and chemical and physical studies of various petroleum products. He felt it desirable for a research program such as that outlined in Appendix C to be established.

In the course of the discussion, the precautionary measures that have been instituted in certain petroleum companies with regard to the handling of high-boiling residual oils from the catalytic cracking process were discussed.

Dr. A. J. Fleming, Assistant Medical Director of the du Pont de Nemours Company, presented a twenty minute talk describing how toxicological problems such as the "Aniline bladder tumor" problem had been handled and is being handled in the chemical industry.

Action

1. The committee voted unanimously to accept the report of the Subcommittee on Carcinogenicity and the personal and confidential memorandum cited above.

2. The committee recommended that:

   A. The American Petroleum Institute be authorized to establish a comprehensive research project for the development of fundamental facts, analytical techniques and related information pertaining to cancer-causing compounde which may occur in petroleum or be produced therefrom.

   B. The American Petroleum Institute be authorized to enter into an agreement with the Kettering Laboratory of Applied Physiology (College of Medicine, University of Cincinnati) to provide or arrange for necessary facilities and services and conduct the work under a program to be established on a continuing basis by the Medical Advisory Committee subject to approval by the Safety Committee of the Board of Directors.

   C. The Safety Committee be authorized to solicit contributions to a special research fund, outside of the API Maintenance Fund, in the amount of $110,000 to meet the costs for the first year which will include $50,000 for non-recurring capital expenditures for construction of extraordinary experimental facilities at the laboratory.

   D. Responsibility for the continuation of the program of research be delegated to the Safety Committee of the Board of Directors which is hereby authorized to approve and underwrite future annual budgets and to solicit contributions to the special research fund as may be necessary to meet approved budgets.

3. The committee recommended that Dr. Robert A. Kehoe and his associates collaborate with the Chairman of the Subcommittee on Carcinogenicity and as many members as is necessary in the preparation of a plan of collecting statistical medical information on cancer in the petroleum industry versus the country at large; and if possible versus other industries. The committee also recommended that a definite proposal be made for implementing the collection and coalition of such information (every effort should be made to separate any cancers caused by contact with known products from those arising from other causes).

VI

REPORT OF SUBCOMMITTEE ON PERMISSIBLE CONCENTRATIONS - DR. T. M. FRANK, ACTING CHAIRMAN

The report of the Subcommittee on Permissible Concentrations was presented and was received by the committee.

The report, the letter of March 23, 1948 from Dr. A. O. Seeler to Mr. D. V. Stroop with an outline for toxicological screening tests as modified by the committee, and the letter of March 10, 1948 from Professor Drinker to Dr. V. C. Baird describing the progress of the work at Harvard are given in Appendix D. In the course of the discussion of the outline for toxicological screening tests prepared by Dr. A. O. Seeler on March 23, it was agreed by the committee and Dr. Seeler that the toxicological screening tests program be modified as indicated in Appendix D.

In the discussion of toxicological research that might be carried out on equilibrium catalyst, Professor Drinker stated that the estimated cost of a detailed study would be $15,000 per year for approximately three years. It was the consensus of the committee that such a detailed study should not be inaugurated at the present time, but that a similar program involving intraperitoneal injection studies be carried out on guinea pigs or other animals. It was estimated that the cost of these studies would be less than $1,000.

Action

1. The report of the subcommittee as presented in Appendix D was adopted by the committee.

2. The following summarizes the pertinent action taken on this report:

   A. That the Manufacturing Chemists' Association Medical Advisory Committee members be made consulting members of the Subcommittee on Permissible Concentrations of the API Medical Advisory Committee and that they receive copies of tentative and final drafts of toxicological reviews.

   B. That in cases where a literature search, carried out at Harvard University, reveals that little or no toxicity data are available on certain compounds or products, no toxicological review will be published. Instead of publishing reviews on these materials, a list of such substances with a list of pertinent references will be published by the API with a statement as to the inadequacy of the available information.

   C. That the toxicological screening tests program given in Appendix D will serve as a general outline for screening tests, but each particular study will have to be modified depending upon the nature and uses of the compound or product.

   D. That Dr. T. M. Frank, subject to the approval of the American Refining Corporation, submit to Professor Drinker a progress report on the results of studies sponsored by that company on the toxicity of fresh catalyst. After reviewing this information, Professor Drinker and associates will recommend to the committee what, if any, additional work should be carried out on fresh catalyst.

3. It was voted that, in order to carry out the experimental work outlined by the Subcommittee on Permissible Concentrations, $10,000 be allocated from the general fund on balance in the API to be used by the Subcommittee on Permissible Concentrations for toxicological studies indicated above.

VII

REPORT OF SUBCOMMITTEE ON MEDICAL POLICIES AND PRACTICES-DR. T. M. FRANK, CHAIRMAN

The report of the Subcommittee on Medical Policies and Practices was presented by Dr. T. M. Frank and consisted of the following recommendations which were unanimously approved:

Action

1. That the committee favors the adoption of an international certificate of innoculation and vaccination such as that sponsored by the World Health Organization subject to their simplification from a practical operation point of view in keeping with the suggestions made at the first meeting of the Expert Committee on Quarantine, Geneva, 1947.

2. That we request Dr. M. N. Newquist and Dr. E. K. Linder to approach the Interim Commission of the World Health Organization to see what can be worked out in line with the above recommendation.

VIII

REPORT OF EDITORIAL COMMITTEE - DR. J. P. HOLT, CHAIRMAN

The report of the Editorial Committee was presented and is given in full in Appendix E. The committee unanimously approved the report which included the following recommendations:

Action

1. That the toxicological reviews on the following compounds that have been approved by the Editorial Committee be published by the API:

Acrylonitrile	Methyl Ethyl Ketone
Alkyl Disulfides	Morpholine
Alkyl Mercaptans	Naphthenic Acids
Diethylene Glycol	N-Butyl Para Amino Phenol
Dowtherm A	Phosphorus Pentasulfide
Kerosine	Sulfur Dioxide
Mercury	Thiophene and Derivatives

2. That the toxicological publications on the following compounds be deferred until some future date:

Acetone	Maleic Anhydride
Carbon Monoxide	Phosphoric Acids
Ditertiary Butyl Para Cresol	Silica
Hydrogen Fluoride	Thiophenol and the Aromatic Mercaptans

IX

COMMUNICATION FROM BASIN O'CONNOR

The communication from Basil O'Connor to D. V. Stroop of February 2, 1948, requested that the members of the API be informed of the activities of the Fourth International Congresses on Tropical Medicine and Malaria. The desirability of giving financial support to this enterprise was discussed by the committee.

It was the sense of the meeting that this matter should be handled by individual members of the committee and it was suggested that they bring this question to the attention of the appropriate individuals in their respective companies. It was felt that no definite action by the committee was required.

X

NEW BUSINESS

Mr. D. V. Stroop presented to the committee a statement concerning receipts and disbursements of funds of the API medical research fund, a copy of which is attached in Appendix F.

Mr. Stroop requested that the Chairman of the Medical Advisory Committee and the Chairmen of the respective subcommittees meet together prior to the meeting of the Committee on November 12, 1948, and arrive at a recommendation as to how much money the committee will need during the year 1949.

XI

NEXT MEETING

It was unanimously agreed that the next meeting of the API Medical Advisory Committee would be held on November 12, 1948, and the meetings of the subcommittees would be held on November 11, 1948, in Chicago at the time of the regular API meeting.

J. P. Holt, M.D.
Secretary

Approved:
M. N. Newquist, M.D.
Chairman

5-18-48

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APPENDIX A

REPORT TO THE API MEDICAL ADVISORY COMMITTEE

BY THE SUBCOMMITTEE ON FLUORIDES

Dr. A. E. Hoag - Chairman

April 2, 1948

At the Subcommittee meeting held on November 12, 1947, the Report of the Subcommittee on Fluorides to the API Medical Advisory Committee was accepted. In regard to the matter of reports, Dr. H. F. Heyroth of the Kettering Laboratory agreed to supply the Chairman (for distribution to the Subcommittee members) with 10 copies of reprints of previous publications on their work on Fluorides; also to supply 10 copies of their next (and first) Annual Report to the "Industrial Group." It was the sense of the meeting that the Chairman should receive and distribute all reports and technical communications.

Dr. A. E. Hoag, Chairman, Subcommittee on Fluorides, is the member of the API Medical Advisory Committee to whom all correspondence concerning the group project should be directed. If possible it will be helpful to have copies of such correspondence sent to Dr. L. C. Beard, Jr., as Dr. Hoag's alternate on the subcommittee. Both are on the staff of Socony-Vacuum Oil Company, Inc., at 26 Broadway, New York 4, N.Y.

The following reprints were received and sent to the members of the Fluorides Committee: "Fluorides as an Industrial Health Problem" by E. J. Largent; "Normal Urinary Fluorine Excretion and the Problem of Mottled Enamel" by Willard F. Machle; "Exposure to Fluorine in Industry" by Willard Machle and E. E. Evans; "The Urinary Fluoride Excretion Among Men Employed in Alkylation Plants Using the Hydrogen Fluoride Process" by Edward J. Largent; "The Effects of the Inhalation of Hydrogen Fluoride" by Willard Machle, Karl Kitzmiller and E. W. Scott; "Exposure to Fluorides in Magnesium Founding" by E. J. Largent and I. F. Ferneau; "Fluoride Ingestion and Bone Changes in Experimental Animals" by E. J. Largent, Willard Machle and I. F. Ferneau; "The Absorption and Excretion of Fluorides" by Willard Machle, E. W. Scott and E. J. Largent; "Normal Urinary Fluorine Excretion and the Fluorine Content of Food and Water" by Willard Machle, E. W. Scott and Joseph Treon; "Magnesium Acetate as an Ashing Agent in Fluorine Analysis" by William E. Crutchfield, Jr.; and "Titration of Fluorine in Biological Materials" by Eugene W. Scott and Albert L. Henne.

At the beginning of this year we received copies of the "Annual Report on Investigations of the Storage of Fluorides in the Tissues of Human Experimental Subjects and by Dogs, in Relation to the Amounts Ingested by Them." Extra copies were obtained so that not only members of the Fluorides Committee received them, but all the members of the Medical Advisory Committee, as well.

The Monsanto Chemical Company requested membership in the "Industrial Group" sponsoring the Fluoride project at the Kettering Laboratory and were accepted. However, on February 19, 1948, Monsanto withdrew because they felt that the study of Fluorides on human subjects did not appear to bear on any of their problems.

On November 28, 1947 we received notification from Mr. D. V. Stroop that a check for $2,500 had been sent to the University of Cincinnati as a contribution toward the development of information on Fluorine and Fluorine Compounds. The Committee feels that it can report progress and that the project should continue. This will entail the annual expenditure of $2,500.

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APPENDIX B

REPORT TO THE API MEDICAL ADVISORY COMMITTEE

BY THE SUBCOMMITTEE ON CUTTING FLUIDS

Dr. B. B. Reeve - Chairman

April 2, 1948

At the meeting of the API Medical Advisory Committee in November 1947, it was proposed that a bulletin be prepared and put out by the API Medical Advisory Committee on "SAFEGUARDING THE USE OF CUTTING FLUIDS AND COOLANTS." This assignment was given to Mr. Roy S. Bonsib, Industrial Hygienist, Standard Oil Company (New Jersey) for preparation. This bulletin has been prepared and has been circulated among the members of the API Medical Advisory Committee and it is now being presented. We feel that Mr. Bonsib has done an excellent job in preparing this bulletin, and we wish to present it to the API Medical Advisory Committee for its acceptance, subject to change.

We also hoped to present at this time the review on "DERMATITIS FROM CUTTING OILS" which is being prepared by the Harvard University School of Public Health. However, I have been informed by Dr. Albert O. Seeler, Assistant Professor of Industrial Hygiene, that this work has been delayed and will not be available until a later date.

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D R A F T

As Revised by Subcommittee on Cutting Fluids
at Meeting Held in Boston on April 1, 1948.

SAFEGUARDING THE USE OF CUTTING FLUIDS AND COOLANTS

April 7, 1948

PROPOSED DRAFT

SAFEGUARDING THE USE OF CUTTING FLUIDS AND COOLANTS

The tremendous increase in the use of cutting fluids or coolants and the general lack of understanding concerning them among new and partly trained workers suggest that a recapitulation of the hazards involved and the necessary precautionary measures may be of assistance in safeguarding their use.

INTRODUCTION - A cutting fluid does no actual cutting; a grinding compound, no grinding; but each vastly improves cutting and grinding operations. Cutting oils are divided into two large groups, the INSOLUBLE and the SOLUBLE, the latter actually representing an emulsion of cutting oil base in water. The soluble cutting oils (emulsions) are used mainly as cooling agents to remove heat generated by the action of the cutting (or milling, grinding, honing, etc.) tool on the work piece. They also serve as rust preventives on the finished work and as a means, particularly in grinding operations, for removal and settling of chips. The insoluble cutting compounds, on the other hand are used as coolants and lubricants, aiding the tools in the cutting operation by reducing friction between the cutting tool and the work piece and reducing the adhesion and friction between the chip and the tool face. They also improve the finish and increase tool or wheel life.

Machine tool operators who work with cutting oils and compounds may be troubled with eruptions (rash, pimples, or boils) of the skin of the hands, forearms and thighs which come in contact with cutting fluids and permit hair follicles of the skin to become plugged with dirt and oil, and cause the condition sometimes referred to as "Cutting Oil Dermatitis." With the exception of certain types of chlorinated-aromatic compounds which some authorities state occasionally produce chloracne, no specific chemical compounds in cutting fluids have been identified as causal agents for oil acne, whose incidence is the highest among the cutting oil dermatoses.

CAUSE OF DERMATITIS - As a result of long skin contact with cutting oils, the opening of some of the sebaceous glands may become occluded (plugged). This mechanical blocking prevents escape of the gland secretions, which consequently accumulate, harden and eventually cause local irritation. Infection may also play a part, but the germs causing the infection come almost entirely from the workers' own skin, rather than from the oil. More than fifty distinct and different types of harmful bacteria have been found on the arms and hands of the average clean healthy individual. These bacteria are perhaps the most important source of infections, the cutting oil itself acting merely as a carrier of the germs from the surface of the skin where they are quite harmless, into the pores where they germinate and produce pimples, sores and rashes. Cutting fluids of petroleum derivation are sterile and will remain that way if not contaminated from outside sources. Most antiseptics added to cutting fluids in an effort to prevent infections have proven ineffective. Some antiseptics may corrode the metal being worked, or may in themselves irritate the skin after prolonged use. If the oil becomes contaminated in use, heat has been found the best means of sterilization.

Another cause to which dermatitis may be attributed is the presence of small chips, splinters or particles formed in working metal -- grinding, cutting, polishing -- which accumulate in the cutting fluid and are brought into contact with the skin of the worker, and by their abrasive action may cause slight cuts or scratches affording entrance of germs. These particles of metal readily accumulate on the skin and on cotton waste used by workers to wipe the oil from their arms. Germs present on the skin may enter the scratches caused by this

practice and lead to infection. Various devices for extracting these metal particles from the oil are on the market, but it should be remembered that such extraction alone will not prevent the dermatitis.

Another contributing factor to dermatitis is the defatting properties of solvents, such as gasoline, naphthas, etc., used for removal of cutting fluids, resulting in drying and cracking of the skin. Dry skins and senile skins are most likely to be affected in this manner because the skin glands are not sufficiently active to replace the fat extracted from the skin by the solvents. Defatting of the skin is often times further aggravated by the use of abrasive or highly alkaline soaps. Even bleaching powder sometimes is used to clean up after work. Skins that are naturally dry will not stand such cleaners without at least becoming chapped or fissured. These cleaners also abrade the skin, irritate it and reduce its resistivity to dermatitis and infection.

Constituents of cutting fluids other than the mineral oil may also play a part in promoting skin irritations. Certain chlorine compounds used in cutting oils may irritate the skin. The phenols, cresols, and other additives are usually not present in sufficient amounts to be primary irritants, but they may act as skin sensitizers to allergic individuals.

It should be borne in mind that dermatitis from soluble oils is much less frequent than from non-soluble cutting oils. Soluble cutting oils are more readily and more completely washed from the skin. However, many cases of dermatitis are caused by emulsions.

The severity and frequency of the dermatitis depend on individual idiosyncrasy. Oil acne shows a tendency to occur in hirsute (hairy) workers, presumably because of the numerous and well-developed hair follicles. Workers with fair complexion (blondes) seem to be more susceptible than the dark-skinned type (oil acne is practically absent among negroes). Workers with dry skins are more susceptible than oily individuals. Persons with a previous history of recurring skin eruptions are much more susceptible than those who have no such history. Oil acne may have an increased incidence in summer or hot weather.

The primary factor is lack of PERSONAL HYGIENE. Clean, experienced workmen who do not permit their clothes to become soaked with the spray of cutting fluid or emulsion and who change their clothing frequently are much less likely to be affected. The fundamental cause of the dermatitis is an irritation from the oil. A secondary infection, resulting from bacterial action, may set in if the proper hygienic precautions are neglected. The handling of such cases usually is quite simple. Seriously affected persons should be removed from the exposure, whereupon they usually recover rapidly.

TREATMENT FOR DERMATITIS - According to Public Health Reports 56:1947-53, blackheads, pimples, and boils caused by cutting oils can be successfully treated by cleanliness and antiseptics. Cleanliness consists in a daily change of work clothes and frequent washing of the parts affected. Individuals with blackheads, pimples, or boils should not irritate them by squeezing but should see a physician. It is advisable to remove persons with dermatitis from contact with cutting fluids.

For dry, defatted skins an ointment consisting of vegetable or animal fat should be given the worker to rub into his hands before and after work.

PREVENTIVE MEASURES - The prevention of dermatitis from cutting fluids or emulsions lies in the adoption of an adequate proper hygienic program; cleanliness of the person, of the machines, and of the oil. In the latter connection, spitting into cutting fluids or contaminating them with other bodily secretions is PROHIBITED! Timely dressing of wounds (cuts, scratches, abrasions, etc.) and

infections and excluding infected workers from the cutting fluids used by others are also important preventive measures.

Personal cleanliness involves the formation of a good habit in the worker and the provision, on the part of the management, of adequate washing facilities. Plenty of warm water, good soap and ample space must be provided for the worker because the regular and thorough removal of films of oil adhering to his skin is the worker's first line of defense against infection. Since thorough drying of the arms and hands is important, individual towels should be provided by the management. Cloth towels are preferred because of their better absorbing qualities, but to insure their cleanliness, proper laundering facilities should be furnished. The towels should be so laundered that all slivers are removed.

Approved toilet, powdered, or liquids soaps and cleaners which will not defat or irritate the skin should also be provided and placed in convenient locations in the washroom. A cleaner has been devised which consists of a neutral sulfonated castor oil, to which 2 per cent of a wetting agent is added (Pub. Health Repts. 56:1788-90). The use of kerosine, gasoline, or other fat solvents and strong soaps should be prohibited for skin cleansing. The Massachusetts Division of Occupational Hygiene (Bulletin #259, April 1942) recommends either of these two mixtures for removing cutting oils from the skin: A - Equal parts of pure liquid or powdered soap and fine hardwood sawdust, free from splinters. B - Equal parts of white cornmeal and this cleaning solution: Sulfonated Neats-Foot Oil 45 parts, Light Liquid Petrolatum 45 parts, and Gelatin 10 parts of a 25 per cent Aqueous Solution.

Clean work clothes should be provided and the body and arms should be protected by aprons and sleeves made of impermeable material, such as the new synthetic plastics or elastomers. Detachable sleeves and aprons in this new material and more convenient designs are being made available. Protective clothing must be properly serviced at a central station where it is returned by the worker at the end of the day. Before reissue to another worker, the equipment should be repaired, if necessary, and thoroughly cleaned and disinfected. It is suggested that manufacturers' instructions be obtained and followed for the cleansing and disinfection of clothing and equipment as the makers will know which cleansing methods and solutions will least affect the durability of their products.

Guards should be installed on the machines to prevent splashing or spraying and there should be floor boards to prevent prolonged contact of workers' feet with the oil. A recently developed mist collector, when suspended directly over a machine draws all oil mist up directly from the source to a collector where even the smallest particles of oil are removed from the air by combination mechanical and electronic filtering processes. The machine should be kept as free from old oil grease, oil and dirt as possible by washing daily. Clean towels should be provided for the worker at his machine and dirty waste used for wiping oil from the hands should be eliminated.

In brief, preventive measures are intended to accomplish one purpose; the prevention of prolonged contact between the cutting compound and the worker.

Care of the skin: The following routine is recommended by the Massachusetts Division of Occupational Hygiene:

"(a) Before starting work, wash hands and arms in warm water using a sawdust and liquid soap preparation and dry the skin with an individual cloth towel. Apply a lanolin ointment to replace the natural fat of the skin. An ointment composed of 70 per cent Lanolin, 28 per cont Olive Oil or Castor Oil and

2 per cent of a wetting agent (one of the fatty alcohol sulfates) is recommended.

"(b) Before lunch, wash oil and lanolin coating from arms and hands, using one of the cleansing mixtures described above.

"(c) Before starting work in the afternoon, wash as in the morning and apply lanolin ointment.

"(d) At the end of work day, thoroughly wash oil and lanolin coating from the skin with one of the above cleansing mixtures.

"(e) Use care in wiping the forearms and hands during the day.

"(f) Report promptly to the shop physician or dispensary all cases of skin abrasion, redness, itching, pimples, or other irritation."

Educational Talks By Plant Physician: It is necessary to educate the workers to recognize and report the initial stages of oil acne. Frequent inspection of the employees is recommended. The physician in charge of the medical service of the plant should give occasional talks to the workers as to the hazards of dermatitis from cutting fluids and make them acquainted with the methods of prevention.

Preplacement Examinations are recommended. Workers with acne, dry skins, history of skin disease, liver disorders, alcoholism, or history of previous trouble following exposure to chlorinated aromatics or heavy metals should not be assigned to such work. If an operator is known to be allergic or particularly susceptible to skin troubles, he should be assigned to other types of work where he will not come in contact with cutting fluids.

The United States Public Health Service in its study of cutting oils found that those who developed skin trouble invariably had either a noticeably dry skin or the solutions they were using had a tendency to dry out the natural oil of the skin. Operators with a naturally oily skin did not suffer from this affection.

Reconditioning Used Cutting Fluids: The cutting fluid should be changed frequently, at least every two weeks, and either discarded, or, if it is to be reused, it should be screened to remove metal particles, and sterilized to remove bacteria. Such sterilization can best be done by a central sterilizing system, connected with each of the machines and recirculating the oil, or if this is not possible, the oil may be removed from each individual machine and carried to the central sterilizing system. Additional antiseptic should not be added to used or rancid oils. Such a practice increases the irritating properties of the oil and is not necessary if the oil is filtered and heat sterilized.

Sterilization of the oils by heat is generally recommended; 140°F. to 160°F. for 30 to 45 minutes seems to be the usual method. While the destruction of the bacteria may not prevent oil acne, it does avoid spreading other disease organisms, particularly in soluble cutting oils: and it avoids rancidity and the development of an objectionable odor. The change and sterilization of the insoluble cutting oils is recommended every 10 days to two weeks, and the soluble cutting oils every two weeks, the machines being thoroughly cleaned with steam and light oil during the change. The use of disinfectants is strongly discouraged although a few authors have argued for their use on the grounds that heat

sterilization is only a temporary effect and because the oil contained in the line leading to and from the sterilizer remains contaminated. Workers should be prohibited from expectorating into the oil, or from contaminating it in any other way.

Protective Ointments: Since the most frequent type of occupational dermatitis caused by cutting fluids is pimples and boils, cleanliness is much more important in the prevention of dermatitis than are protective ointments. The United States Public Health Service recommends that when protective ointments are used, they should be of the type that will fill the pores of the skin with an innocuous vegetable or animal fat to prevent the entrance of mineral oil. Such a protective ointment should also contain a small percentage of a wetting or emulsifying agent such as the fatty alcohol sulphates, in order to make it easily removable from the skin with water. A small percentage of a harmless preservative, such as sodium perborate, is also desirable in order to prevent fat in the ointment from becoming rancid. Protective ointments which form films soluble in oil are not desirable because the cutting oil washes them off. The sulfonated oils will wash away both types of films. Films will crack when the hands and fingers are flexed and leave areas of the skin unprotected. These are the main requirements of a satisfactory protective ointment:

1. Easily applied and provide a thin, uniform and invisible film on the skin.
2. Easily removed by soap and water.
3. Non-irritating of itself.
4. Insoluble in, or impervious to, the potentially harmful substances it is supposed to exclude.

There are many preparations on the market which meet these requirements and the combinations of ingredients are too numerous to list in this bulletin. Omitting special types to meet particular needs, lanolin is the base of most standard ointments. Lanolin is bland and tends to conserve the natural oils of the skin. Some manufacturers add olive oil or castor oil, especially the latter, to increase the shedding property of the ointment and its insolubility in the paraffin series of cutting fluids.

.....

(The recommendations outlined in this bulletin should be considered of general application; they are of value chiefly as a good approach to a specific problem.)

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CONFIDENTIAL

APPENDIX C

REPORT TO THE API MEDICAL ADVISORY COMMITTEE

BY THE SUBCOMMITTEE ON CARCINOGENICITY

Dr. McIver Woody - Chairman

April 2, 1948

I On behalf of the Subcommittee on Carcinogenicity, I recommend to Medical Advisory Committee for transmittal to the Safety Committee of the Board of Directors and for adoption by the Executive Committee of the Board of Directors a resolution authorizing the establishment of a comprehensive research project on cancer-causing hydrocarbons as follows:

RESOLUTION

WHEREAS, in recent months there has been widespread publication of general statements to the effect that men working around gasoline, tars, and lubricating oils are exposed to cancer-causing compounds: and

WHEREAS, such general statements appear to be without foundation but there are correlated results of experimental research work which indicate the presence of cancer-causing compounds in some fractions derived from the catalytic processing of petroleum; and there are references in the medical literature to cases of cancer caused by certain petroleum crudes and fractions; and

WHEREAS, the situation is such that the industry is in need of authoritative information on all phases of the subject and that need may best be met through the establishment of an industry-wide research project; NOW, THEREFORE BE IT

RESOLVED BY THE EXECUTIVE COMMITTEE OF THE BOARD OF DIRECTORS THAT:

1. The Institute is authorized to establish a comprehensive research project for the development of fundamental facts, analytical techniques and related information pertaining to cancer-causing compounds which may occur in petroleum or be produced therefrom.

2. The Institute is authorized to enter into an agreement with the Kettering Laboratory of Applied Physiology (College of Medicine, University of Cincinnati) to provide or arrange for necessary facilities and services and conduct the work under a program to be established on a continuing basis by the Medical Advisory Committee subject to approval by the Safety Committee of the Board of Directors.

3. The Safety Committee is authorized to solicit contributions to a special research fund, outside of the API Maintenance Fund, in the amount of $110,000 to meet the costs for the

first year which will include $50,000 for non-recurring capital expenditures for construction of extraordinary experimental facilities at the laboratory.

4. Responsibility for the continuation of the program of research is delegated to the Safety Committee of the Board of Directors which is hereby authorized to approve and underwrite future annual budgets and to solicit contributions to the special research fund as may be necessary to meet approved budgets.

II In support of the resolution, I append a confidential subcommittee memorandum pertaining to the need for this research project.

McIver Woody, M.D.
Chairman

MEMORANDUM

RE: THE NEED FOR THE PROPOSED RESEARCH PROJECT.

It is well recognized that certain coal tars cause the development of skin cancer in man. In numerous foreign countries and in several states in this country this is recognized as a compensable disease.

During the past fifty years there have been more than 1,500 cases of skin cancer caused by exposure to shale oils in England. Laws have been passed requiring all such cases to be reported to the government in England. In contrast, few cases of skin cancer in the United States have been reported to have been caused by petroleum or petroleum products. Actually, about fifty cases of skin cancer caused by exposure to petroleum hydrocarbons during the processing of paraffin wax and a few cases of skin cancer in oil field workers have been reported in the United States. There are more than thirteen states that have laws in effect at the present time making cancer caused by petroleum products a compensable disease.

During the last four or five years various catalytic processes, such as catalytic cracking, have been put into extensive use in the petroleum industry. In the catalytic treatment of oil, relatively large quantities of high-boiling fractions can be produced. This high-boiling material has been shown to cause cancer in experimental animals. Animal experimental studies have been carried out in three well-known hospitals and universities on three different samples of this material from three different petroleum companies. All three samples were shown to produce tumors when applied to the skin of experimental animals in up to 100 per cent of the animals. These tumors became malignant in most cases. Only a very small amount of the material is necessary to produce cancer in an experimental animal such as the mouse; for example, 15 milligrams applied to the skin of a mouse once a week for twenty-six weeks produced cancer.

Individuals within and outside the petroleum industry, including doctors and chemists who have studied the problem, are reasonably certain that condensed ring compounds, such as 3, 4-benzpyrene and related compounds, known to cause cancer are present in the high-boiling oil fractions from the catalytic cracking operations. It is therefore felt that this oil is capable of causing cancer in man, although no cases in man have been reported to date. It is felt that one of the reasons for this is that it generally takes ten or more years of exposure to a carcinogenic material for a cancer to develop in man, and since this oil has only been in production for about four years, the period of exposure to this material has been short.

Field studies in the petroleum industry show that several thousand employees have daily or frequent contact with this material or blends of this material; while it is estimated that tens of thousands of customers are petentially exposed to blends of this material.

The above evidence indicates that the petroleum industry is faced with a serious potential cancer problem. There are many unanswered questions concerning the nature of this hazard and how it might be prevented or controlled. These questions can only be answered by carrying out a program of medical research along the lines which the Medical Advisory Committee is recommending.

In case more detailed information is desired, it can be arranged for a member of the Medical Advisory Committee to discuss this question with members of the Safety Committee or Executive Committee of the Board of Directors.

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APPENDIX D

REPORT TO THE API MEDICAL ADVISORY COMMITTEE

BY THE SUBCOMMITTEE ON PERMISSIBLE CONCENTRATIONS

Dr. T. M. Frank - Acting Chairman

April 2, 1948

At its meeting in Boston on April 1, 1948, your subcommittee voted to report information and recommendations to the Medical Advisory Committee as follows:

I Cooperation with the Medical Advisory Committee of the Manufacturing Chemists Association.

In conference with Doctors J. M. Carlisle, A. G. Cranch and D. O. Hamblin, representing the M.C.A. Medical Advisory Committee, Dr. Cranch expressed the opinion that there was no objection to the issuance of API Toxicological Reviews on substances which are or may be included in the Chemical Safety Data Sheets of the Manufacturing Chemists Association even though there might be inconsistent statements in such publications.

Following a discussion of ways and means to facilitate the exchange of information during the formulation of API Toxicological Reviews it was agreed that the members of the MCA Medical Advisory Committee should be made consulting members of the Subcommittee on Permissible Concentrations of the API Medical Advisory Committee.

II Work at Harvard University School of Public Health.

A. M.A.C. Values for 1948.

Professor Drinker reported a number of changes adopted by the committee of government hygienists for publication in the 1948 M.A.C. Values. He stated that the new values will be made available promptly to all members of the API Committee.

B. Basis for Future Changes in M.A.C. Values.

Professor Drinker stated there was definite need for the gathering and publication of quantitative data which would contradict the current theoretical M.A.C. Values on many substances.

C. Report on Status of Harvard Work.

The subcommittee reviewed and accepted the report dated March 10th from Professor Drinker to Dr. Baird (see copy attached).

D. Toxicological Reviews.

The subcommittee recommends that no toxicological reviews should be published on substances for which literature surveys by Professor Drinker and associates reveal little or no available toxicological information, but instead that every six months

a list of such substances should be published by API with a statement of the inadequacy of available information. Any pertinent literature references available on such substances should be cited in the report with an indication as to the character of the information.

E. Screening Tests.

The subcommittee reviewed and recommends the adoption of the outline presented with Dr. Seeler's letter of March 23rd subject to a consideration of modifications and other matters discussed with Dr. Seeler at the meeting.

F. Powdered Silica-Alumina Catalyst.

Following an extended discussion on the need for work on the toxicology of powdered silica-alumina catalyst, the subcommittee voted for two recommendations as follows:

1. Fresh Catalyst

Subject to the approval of the Pan American Refining Corporation, Dr. Frank was requested to supply to Professor Drinker a detailed progress report on the results of that company's research work on fresh catalyst. After reviewing the report Professor Drinker and associates will inform the subcommittee as to what, if any, additional work should be carried out.

2. Equilibrium Catalyst

Subject to the preparation of a program and estimate of cost by Professor Drinker and associates and to the approval of both by the subcommittee, it is recommended that the Medical Advisory Committee should authorize the immediate initiation of tests at Harvard to establish the toxicology of powdered equilibrium silica-alumina catalyst.

G. C9 Aromatics

Subject to the preparation of a program and estimate of cost by Professor Drinker and associates and to the approval of both by the subcommittee, it is recommended that the Medical Advisory Committee should authorize the immediate initiation of tests to establish the toxicology of C9 aromatics including cumene and mezytelene.

H. C10, C11, and C12 Aromatics

The subcommittee requested Professor Drinker and associates to review the question of toxicity of C10, C11, and C12 aromatics and to report to the subcommittee what toxicological studies, if any, are practicable.

I. Antidote for Kerosine Poisoning

The subcommittee recommends that Professor Drinker and associates should be requested to make toxicological studies to determine whether U.S.P. White Mineral Oil, given by mouth, is a worthwhile antidote for kerosine poisoning.

III Priority in Screening Tests.

In concluding the meeting there was a consensus among those present that the chairman of the subcommittee should take steps necessary to establish the order of priority to be followed in the making of screening tests on substances for which there is insufficient toxicological information available including those substances listed in Dr. Clinton's progress report dated April 7, 1947.

HARVARD UNIVERSITY

School of Public Health

Department of Industrial Hygiene

55 Shattuck Street
Boston 15, Massachusetts

March 23, 1948

Mr. D. V. Stroop
American Petroleum Institute
50 West 50th Street
New York 20, N. Y.

Dear Mr. Stroop:

I am enclosing an outline of preliminary toxicity studies designed to serve as a guide in establishing tentative precautionary measures for the handling of new compounds. This outline follows closely the range finding procedures described by Henry F. Smyth Jr. and Charles P. Carpenter (J. Ind. Hyg. and Tox. : 26, 269, 1944 and 30, 63, 1948).

We realize that medical men differ widely in their views as to the amount of animal toxicity data necessary for preliminary evaluation of hazards to the human. In view of the many new compounds that are being introduced into the petroleum industry, it is necessary, however, to have a working plan for the preliminary evaluation of the hazards of a new compound.

This outline should be considered only as a preliminary draft. We are very anxious to have comments from the Medical Advisory Committee on this problem as we regard it an urgent one.

Very truly yours,

/s/ Albert O. Seeler
Albert O. Seeler, M. D.

AOS/s

P. S. Since we would like to discuss the matter at next week's meeting, we are preparing some copies to distribute at the time of the meeting.

TOXICITY STUDIES

The studies outlined below are designed only to give sufficient information concerning the toxic properties of a new compound to permit a tentative comparison of its toxicity with the toxicity of compounds in general use. For this purpose it is essential to know the approximate lethal dose when the material is administered by mouth or by inhalation. It is also important to know whether the compound is absorbed through the skin. Furthermore, some information as to possible damage to the eyes and to the skin is necessary.

Acute oral toxicity: The general range of toxicity is determined by administering graded doses of the compound to rats, using three rats for each dose level. The compound is dissolved or dispersed in water and given by stomach tube in doses of 0.01, 0.05, 0.1, etc. gm. per kgm. These animals are observed for a week. Once the general order of toxicity is known dose levels can be selected to give a toxicity curve from which the LD-50 can be calculated with reasonable accuracy. (The oral acute toxicity testing will require about 100 rats.)

It was agreed by the committee that the above studies would be carried out on rats, guinea pigs, rabbits or possibly other species instead of on the first only. Considerably less than 100 animals of each species will be used.

Subacute oral toxicity: A four week chronic toxicity test may reveal toxic properties which are not apparent in the acute experiments. Depending on the nature of the compound it may be given by stomach tube, or by incorporation in the diet. Four groups of ten rats are used, three groups to receive daily doses of 1/2, 1/4 and 1/8 the acute LD 50, respectively, and the fourth group to serve as a control. About 40 rats will be needed for this experiment.

It was agreed by the Committee that gross microscopic pathological examinations would be carriod out on these animals.

Acute inhalation toxicity: An initial experiment is conducted in which 10 rats are exposed to saturated vapor for about seven hours. If these animals are still living a week after the exposure, no further preliminary experiments need be performed. If, however, this exposure proves lethal, a preliminary range-finding test will have to be conducted exposing groups of three rats to widely spaced concentrations of the vapor. Once the approximate lethal range has been determined, rats in groups of ten are exposed to vapor concentrations so chosen as to give data from which an approximate LD 50 can be calculated. If exposure to saturated vapor reveals toxicity, the further evaluation of the hazard as outlined above will require about 100 rats.

It was agreed in the Committee that the type and concentration of vapor exposure would depend on the material under study and the uses of that material. In each particular case the type of vapor inhalation study would be decided on the basis of the compound under investigation instead of having a specific rule concerning all such experiments.

Skin absorption: The toxic effects following skin absorption are determined by applying graded doses of the compound to the skin of rabbits for a 24-hour period. Because of the expense of the animals involved, these experiments are limited and are only designed to show whether or not skin absorption can occur. Fifteen rabbits will be needed for this experiment.

Skin irritation: Some information as to skin irritation will be obtained from the skin absorption experiments. This information is supplemented by observing the irritation produced on rabbits' skin by exposuresof varying duration. Five rabbits are needed for this experiment. Skin irritation studies in animals are notoriously unreliable as an aid in evaluating hazard to human skin and serve merely to eliminate those compounds which are very irritating.

It was agreed by the Committee that the above studies would be carried out on guinea pigs in place of rabbits and in addition, patch tests would be carried out on 20 human subjects. Where practical, repeated patch tests would be carried out in order to determine whether sensitization developed.

Damage to the eye: If the compound to be studied is a fluid, various amounts of the undiluted liquid are instilled into the conjunctival sacs of rabbits. The eyes are carefully observed for a week both for immediate damage and evidence of repair. If the material to be studied is a solid, various amounts of powder are applied to the eye and the resulting irritation compared with that produced by equivalent amounts of a relatively inert agent of approximately the same particle size. Twelve rabbits are needed for this experiment.

It must be emphasized that these studies will yield only tentative information as to the toxic properties of a new compound. An accurate evaluation of the toxicity of a new compound is a major undertaking involving detailed acute and chronic toxicity studies in several animal species using various routes of administration. Changes in the blood picture and in kidney and liver function must be studied and tissues of animals dying or sacrificed during the experiment must be examined by a pathologist. Such a program is obviously only justified for compounds which will be used extensively.

HARVARD UNIVERISTY
School of Public Health

Department of Industrial Hygiene
55 Shattuck Street
Boston 15, Massachusetts

March 10, 1948

V. C. Baird, M. D.
Humble Oil and Refining Co.
P. O. Box 2180
Houston, Texas

Dear Dr. Baird:

Unfortunately progress on our program has been slowed by a change in personnel. As you know, Dr. Marshall Clinton resigned his position with us last summer. Dr. Albert Seeler, who has taken over Dr. Clinton's responsibilities, began work with us on January 1, 1948. Dr. Seeler will attend your committee meeting with Dr. Clinton and me.

Bibliographic research for the surveys has been continued without interruption, but work on the evaluation of the literature data and drafting of toxicological reviews has necessarily been delayed.

The following tentative reviews have been completed and submitted to your committee for comments:

Beta naphthol
Methyl cyclohexane
Cyclohexane

Considerable bibliographic work has been done on the following compounds, some of which were listed in the previous progress report.

Tricresol phosphate
Barium chloride
Barium hydroxide
Barium nitrate
Benzaldehyde
Calcium chloride
Calcium hypochlorite
Hydrocyanic acid
Pyridine
Di-alkyl sulfates
Nickel carbonyl
Alkyl sulfuric acids
Acetic acid
Amyl acetate
Ammonium acetate
Ammonium nitrate
Anthracene
Bromine
Mesitylene
Alpha naphthol
Tributyl phosphite
Alkyl thioethers
Triphenyl phosphate
Nitroparaffins
Alkyl peroxides
Alkyl nitrates
Amyl alcohol
Carbon Black
Acetylene
Ethylene dichloride
Ammonium chloride
Ammonium hydroxide
Ammonium molybdate
Potassium chromate
Potassium hydroxide
Potassium iodide

Dr. V. C. Baird March 10, 1948

Calcium hydroxide and calcium oxide
Hydroquinone
Naphtalene
Potassium bromide
Trichlorethylene
Potassium nitrate
Potassium permanganate
Sulfur trioxide

Since so many new chemicals of unknown toxicity are being introduced into the petroleum industry it seems desirable to develop a general plan for preliminary toxicity testing. In all probability no two medical men will be in complete agreement as to the extent of information concerning the toxicity of a new compound required to serve as a guide in setting preliminary standards for safe handling. Nevertheless, since it is not practically possible to perform detailed toxicity studies on all new compounds as they are introduced, it is necessary to have an outline of minimum toxicity studies required. A tentative outline for toxicity testing which is designed only to give the minimum information needed for a preliminary estimate of the relative hazard of a new compound has been prepared and will be distributed to your committee in the near future for comments and suggestions.

In the course of the preparation of the toxicological surveys we have become increasingly conscious of the need for uniformity in the publication of toxicological data. Furthermore, from conversation with toxicologists and pharmacologists, it is apparent that a great deal of miscellaneous toxicological data has been accumulated which has not been reported in the literature because of the lack of facilities for publication of such material. While the details remain to be worked out, we believe that the Journal of Industrial Hygiene and Toxicology should make available space for the publication of preliminary toxicological data which would not at present be accepted for publication. If this is done it is probable that, in the course of time, workers throughout the world would become accustomed to submit their toxicological data for recording in the Journal of Industrial Hygiene and Toxicology. In addition to devoting a section to the initial publication of such data, a supplement might be issued periodically which would list the accumulated data in tabular form. We feel that such a project would be of value to the petroleum industry and would expect to support it with some of the funds that you have given us.

Sincerely yours,

S/ Philip Drinker

PD/ew

Philip Drinker

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APPENDIX E

REPORT TO THE API MEDICAL ADVISORY COMMITTEE

BY THE EDITORIAL COMMITTEE

April 2, 1948

Dr. M. N. Newquist, Chairman
API Medical Advisory Committee

Dear Sir:

A meeting of the Editorial Committee of the American Petroleum Institute Medical Advisory Committee was held in the Board Room of the American Petroleum Institute on March 11, 1948, at which time the following toxicological reviews were approved for publication after certain minor editorial changes have been made:

- Acrylonitrile
- Alkyl Disulfides
- Alkyl Mercaptans
- Diethylene Glycol
- Dowtherm A
- Kerosine
- Mercury
- Methyl Ethyl Ketone
- Morpholine
- Naphthenic Acids
- N-Butyl Para Amino Phenol
- Phosphorus Pentasulfide
- Sulfur Dioxide
- Thiophene and Derivatives

Publication of the toxicological reviews given below is being deferred until some future date:

- Ditertiary Butyl Para Cresol
- Maleic Anhydride
- Silica
- Thiophenol and the Aromatic Mercaptans

The Editorial Committee will give consideration to publishing the reviews on ditertiary butyl para cresol and silica after additional information has been obtained. It was recommended that the review on maleic anhydride be redrafted by Professor Drinker and his associates at Harvard University, and that the review on thiophenol and the aromatic mercaptans not be published because of lack of information.

The toxicological reviews given below were not acted on because Mr. D. V. Stroop had requested that these reviews first be discussed with representatives of the Manufacturing Chemists' Association before publication:

- Acetone
- Carbon Monoxide
- Hydrogen Fluoride
- Phosphoric Acids

Respectfully submitted,
J. P. Holt, M. D.
Chairman

Members:
Dr. V. C. Baird
Dr. Marshall Clinton, Jr.
Dr. M. N. Newquist (Ex-officio)
Mr. D. V. Stroop

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APPENDIX F

MEMORANDUM

April 2, 1948

SUBJECT: RECEIPTS AND DISBURSEMENTS - API MEDICAL RESEARCH FUND

Contributions to Fund

1945 Solicitation		$ 28,900.00	
1947 Solicitation		27,800.00	
Total			$ 56,700.00

Disbursements from Fund

Harvard University			
Toxicological Reviews	$ 27,000.00		
Cutting Oil Dermatitis	2,500.00		
		29,500.00	
University of Cincinnati			
Carcinogenicity	6,000.00		
Fluorine Study	2,500.00		
		8,500.00	
Miscellaneous			
Book for Committee Use	57.77	57.77	
Total Disbursements			$ 38,057.77
BALANCE ON DEPOSIT			$ 18,642.23