PLAINTIFF'S EXHIBIT

API-94

API MISCELLANEOUS CORRESPONDENCE
1953 through 1956

32,500
27,237.20

ESSO RESEARCH AND ENGINEERING COMPANY

(FORMERLY STANDARD OIL DEVELOPMENT COMPANY)

P. O. BOX 121, LINDEN, N. J.

MEDICAL RESEARCH DIVISION
ROBERT E. ECKARDT, PH.D., M.D.
DIRECTOR
NATHAN V. HENDRICKS, CH.E.
HEAD INDUSTRIAL HYGIENIST
HORACE W. GERARDE, PH.D., M.D.
HEAD TOXICOLOGIST
BERTRAND E. BENNISON, M.D.
CHIEF CLINICAL RESEARCH PHYSICIAN

March 15, 1956

Dr. A. Wesley Horton
University of Cincinnati
College of Medicine
The Kettering Laboratory
Eden Avenue
Cincinnati 19, Ohio

Dear Dr. Horton:

As the basis for discussions at the coming meeting of the Subcommittee on Carcinogenicity, I am sending you several comments which I have concerning your Interim Report of the API Research Project MC-1, dated October 1, 1955 and the data tables which accompanied this report.

My first comment concerns your suggested correction on page 3 of the phrase "a satisfactory correlation". You will remember that you proposed a one-to-one correlation be substituted here, and I would simply like to point out that there is no such thing as a correlation, one-to-one or otherwise, based on one point. In order to obtain correlations it is necessary to obtain a minimum of two data points which can be correlated. Each data point must be determined by at least two pieces of data, since a point is always defined with a minimum of at least two coordinates. For this reason, a one-to-one correlation as used just has no meaning whatsoever.

We made an attempt to confirm the P_{MC}'s recorded in the various tables which accompanied this report. It appears that you must have developed a new standard curve of P_{MC} values, since many of the average latent periods recorded in your tables do not correspond with the P_{MC} which would be determined from your previous standard curve. If this is the case, I believe it is essential that the members of the Subcommittee be informed of any change in the standard curve so that they might adjust their own records accordingly.

At the top of page 4 it is implied that there is not a significant increase in the carcinogenic potency of an oil after it has been subjected to thermal cracking. However, 6 of the 9 aromatic oils which were thermally cracked and then

tested for carcinogenic potency did show an increase in their P_{MC} after thermal cracking. I am wondering if this is consistent with the paragraph at the top of page 4 of this written report.

On page 5 in discussing the relative area of spread of various solvents on the skin of the mouse, I am wondering what significance this may have when the mouse is painted by a brush stroke, rather than by simply placing a drop on his skin. It would seem that the relative spread of a material placed dropwise on the shaven skin of a mouse is quite a different thing from the spread of this material placed on the unshaven skin of the mouse with the stroke of a brush. This question was raised previously with you, and to date the Subcommittee has never received a satisfactory answer to it.

On page 6 at the bottom of the middle paragraph, the following statement is made: "It soon became apparent that these materials are derived from the crude petroleum, that they may increase in concentration to some extent under the conditions of catalytic cracking, and that they may eventually be reduced significantly by very drastic cracking". Are there data to support this statement, or has this statement simply been made on the basis of the knowledge of the general chemical character of accelerators and what would happen to them under the various cracking conditions? In reviewing the biological data given on page 1 and 2 of Table I there is a suggestion that this statement may not be true. In other words, your own biological data suggest that the conclusion that you have reached is invalid. The Subcommittee must know what basis you have for contradicting your own data.

At the bottom of page 7 the statement was made that "In the case of API-8, approximately 40 per cent of the carcinogenic material (in terms of methylcholanthrene equivalents) may be separated from the oil by this technique." Where are the data that support this statement? We assume that this statement has been deducted from the results obtained with API-8 as given on page 6 of Table I, minus the results with API-8-23g and 8-23h as given on page 15 of Table I.

We wonder why the results in Table XII are not given in terms of P_{MC} values, since then it might be possible to determine exactly what is happening as a result of the washing of the animals. For instance, you imply in your written statements that a rinse with certain materials may accelerate the activity of a particular oil under washing conditions. The data actually show that this is not an acceleration from the rinse, but rather a loss of the inhibiting effect produced by the wash if a rinse is used first.

In Table XII on page 2 in experiments 305, 306, 307, 308, 312 and 313 it is our feeling that the variations in results obtained simply represent the experimental variation which one would anticipate in an experiment of this type, and do not show any real difference in effect. It would be our conclusions from this type of experiment that neither the rinsing of an animal before washing with either oils which you used, nor the use of a barrier cream improves on the results which can be achieved with washing alone. This we feel is of itself a significant observation, without an attempt to interpret into the data something which is not apparent.

On page 10 it should be remembered that only two rinse solutions have been used in your experiments, namely kerosene and white oil. Is it valid, therefore, to conclude that rinsing offers no benefits for this type of work? Certainly it can be concluded that no benefits can be anticipated with these two types of materials but they are limited in number, and it is necessary, I believe, to point out that they are limited experiments.

We have tried to distinguish between API-95 and API-80, and have concluded that they represent an identical material, with the exception that in one experiment it was used on CFW rather than on C_3H mice. Is this the case?

All of the rinses used are presumably non-accelerating solvents so that we wonder whether it should be intimated that such non-accelerating solvents when used as a rinse have an accelerating activity.

We would suggest that on page 11, the next to the last paragraph, beginning with the last sentence of this paragraph be changed to read: "One experiment (Table IX) has demonstrated that the accelerator DDB can elicit tumors in skin previously subjected to single applications of catalytically cracked oil. Similar experiments with pure carcinogens show that the accelerators DDB and dodecane can elicit tumors from a single application of a pure carcinogen."

I was extremely interested in the fact that painting with distilled water produced tumors in your animals. This is indicated as experiment 241 in Table II. If your animals are so sensitive that distilled water will elicit tumors, then it appears that much of the fine interpretations of the data is open to considerable question. Also in Table II, experiment 221a, it would appear to me that this fraction would make an ideal material to paint on rabbits.

In Table III, experiment 625 and 624, it appears to me that the difference reported, simply represents the error of the experiment and no really significant difference in the results. Is this a correct interpretation?

In experiment 218 is it to be assumed that the crude residuum API-5 has had an inhibiting effect upon the carcinogenicity of methylcholanthrene? It is not indicated that this is a bad experiment, and it appears that this is as much of a drop in P_{MC} as one could anticipate with a decent inhibitor.

In at least three experiments represented in Table III, namely API-293, API-291 and API-235 the concentration of methylcholanthrene was so high that one would not anticipate that one would be able to detect all of the P_{MC} of the sample. I make this statement since you told me that any concentration of methylcholanthrene above .35% by weight is too high to permit complete biological detection of its effect. If this statement which you made to me in the bar of the Terrace Plaza Hotel is correct, then all experiments conducted with concentrations of methylcholanthrene in excess of .35%, and all experiments conducted with benzpyrene in concentrations in excess of .17% should be eliminated from the tabular data, since they are inaccurate experiments. It is important, I think, that this be pointed out to each of the members of the Subcommittee, since I am not sure that all members were present at our discussion at the Terrace Plaza.

In experiments 223, 222 and 234 listed in Table III, I find it difficult to explain the results obtained. I presume that the lowered carcinogenicity of these materials is due to the previously mentioned spreading effect in the secondary amylbenzene.

The experiments with benzpyrene in benzene included in Table IV indicate that at a concentration of 0.08%, a higher relative effect is obtained than when 0.17% is used. I assume, of course, that the 0.32% is too high a concentration to permit detection of the full effect, in keeping with the discussions above on concentration. However, I do find it difficult to explain the difference in the amount of benzpyrene detected in the two lower concentrations.

We have plotted the data represented in Table VI in the attached graph in which the P_{MC} of methylcholanthrene solutions in dodecyl benzene was plotted along one ordinate and the concentration of methylcholanthrene in the dodecyl benzene along the other ordinate. The theoretical line is shown as a dotted line. One might interpret these data as indicating an accelerating effect of dodecyl benzene which appears to be limited by the concentration of the carcinogen. At very low concentrations of methylcholanthrene, dodecyl benzene apparently has no accelerating effect, and at the highest concentration it likewise seems to have no effect. Intermediate concentrations do seem to have an effect on the activity. In attempting to apply this information to experimental samples, the concentration of the carcinogen present appears to be extremely important in the end result obtained and also in whether or not the effect of accelerators can be detected.

In attempting to interpret Table VII it would be helpful, I believe, to have a column which indicates the $P_{BP}°$ of BP. The data then might be a little more understandable, since any figure less than 100 would suggest an inhibition and any figure greater than 100 would suggest an acceleration in such determinations. Of course, it is necessary to know the equivalents of benzpyrene in terms of methylcholanthrene. Previously you had suggested to the Subcommittee that this was approximately 60%. At the present time you suggest that it may be closer to 50%; your data would suggest that it probably is in the range of 40-65%. Therefore, I would interpret your data to say that any $P_{MC}°$ of BP of less than 40 suggests inhibition, and of greater than 65 suggests acceleration. How much above the 65 would represent actual acceleration rather than simply variations in the experimental results would have to be determined.

On page 2 of Table VII it would appear that in experiments 277-3 and 277-4 there is an error either in the per cent boiling over, or in the boiling range of these two fractions. The boiling range of 277-3 is indicated as 550-565, whereas the boiling range of 277-4 is indicated as 580-600. Therefore, the boiling range of 565-580 is missing; yet the percentages are continuous.

In reviewing the experiments encompassed with API-260, 259, 633, 637, 636 and 638, on benzpyrene in white oil-accelerator mixtures, we plotted the data in two ways in the accompanying graphs: In terms of the P_{MC} versus the concentration of benzpyrene and in terms of the $P_{BP}°$ of BP versus the concentration of benzpyrene. It would appear to us in looking at these data that the effect of accelerators is, in part, dependent upon the frequency of application, the concentration of the accelerator and the concentration of the carcinogen. In other words, it would appear that there are three independent variables acting in the determination of these results. This is,

perhaps, shown best in the plot which compares the effect of accelerator concentration on acceleration for two different concentrations of benzpyrene, in which the curves are not parallel.

In the remaining graph we have attempted to show the variation of acceleration with experimental technique by plotting P_{MC} versus the number of applications per week. It would appear that if the number of applications per week is increased, the accelerating effect diminishes. This appears as an important observation which may influence the interpretation of the data.

I am looking forward to discuss these comments with you at the next meeting of the Subcommittee.

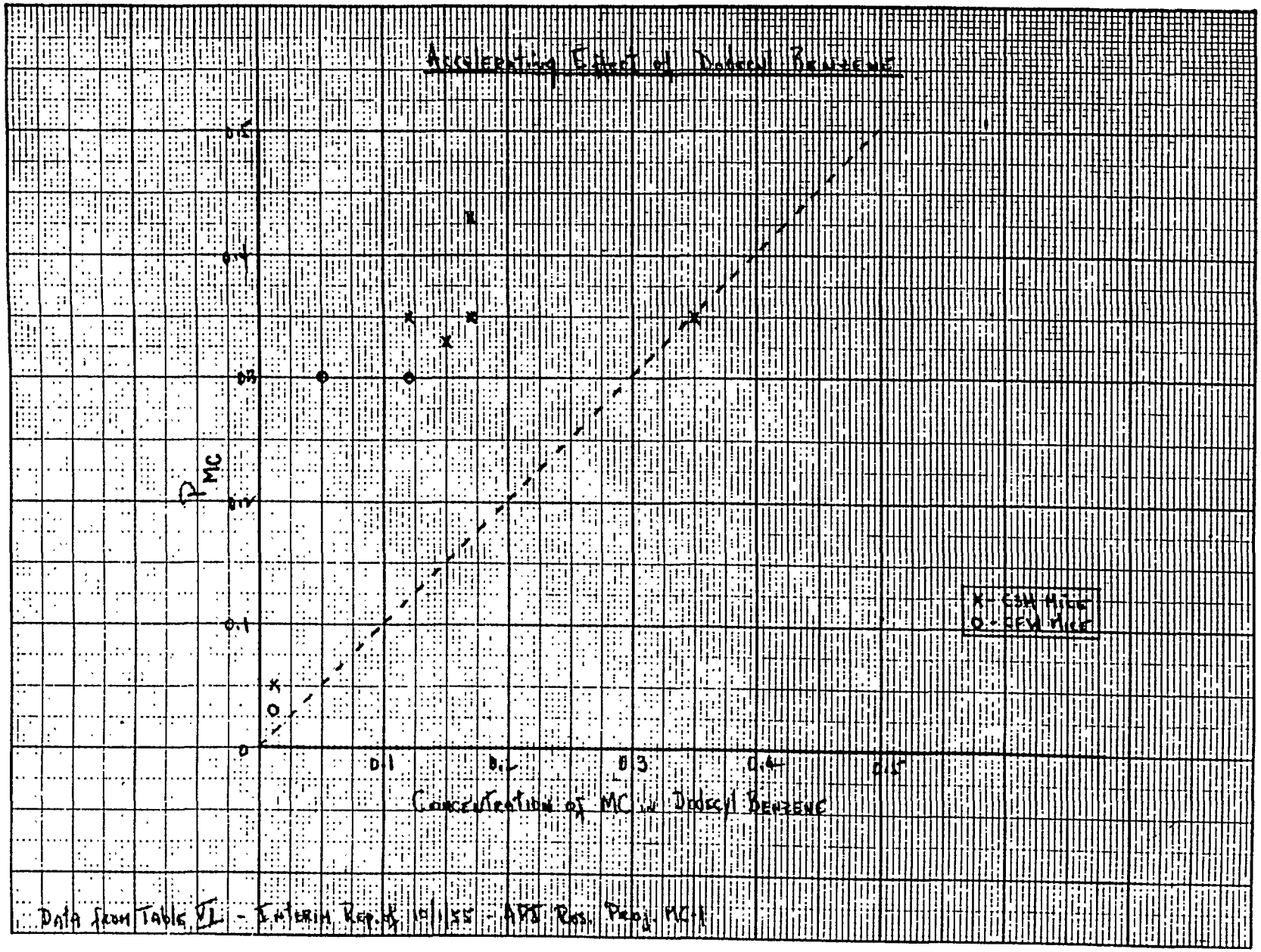
Very truly yours,

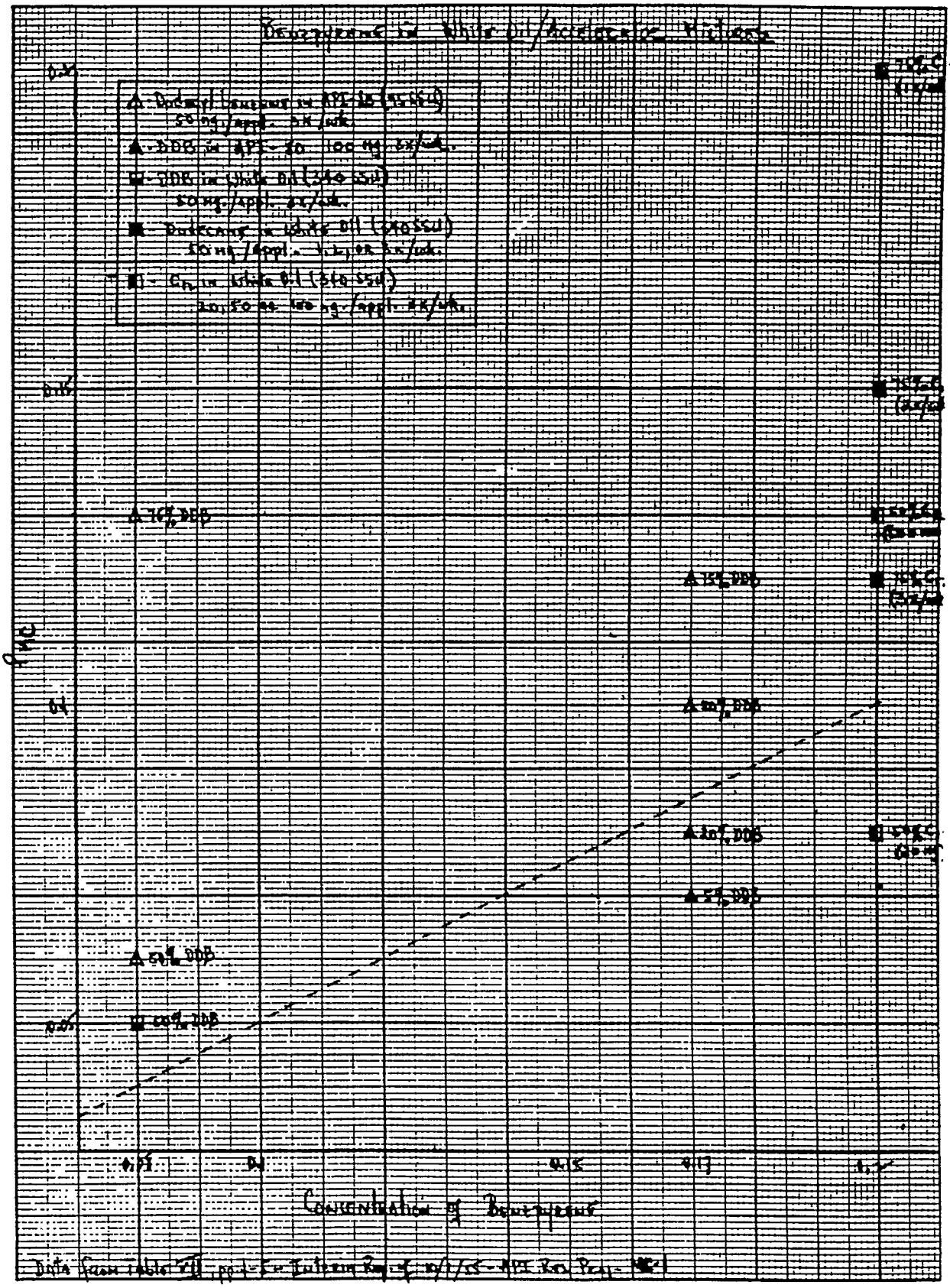
R. E. Eckardt

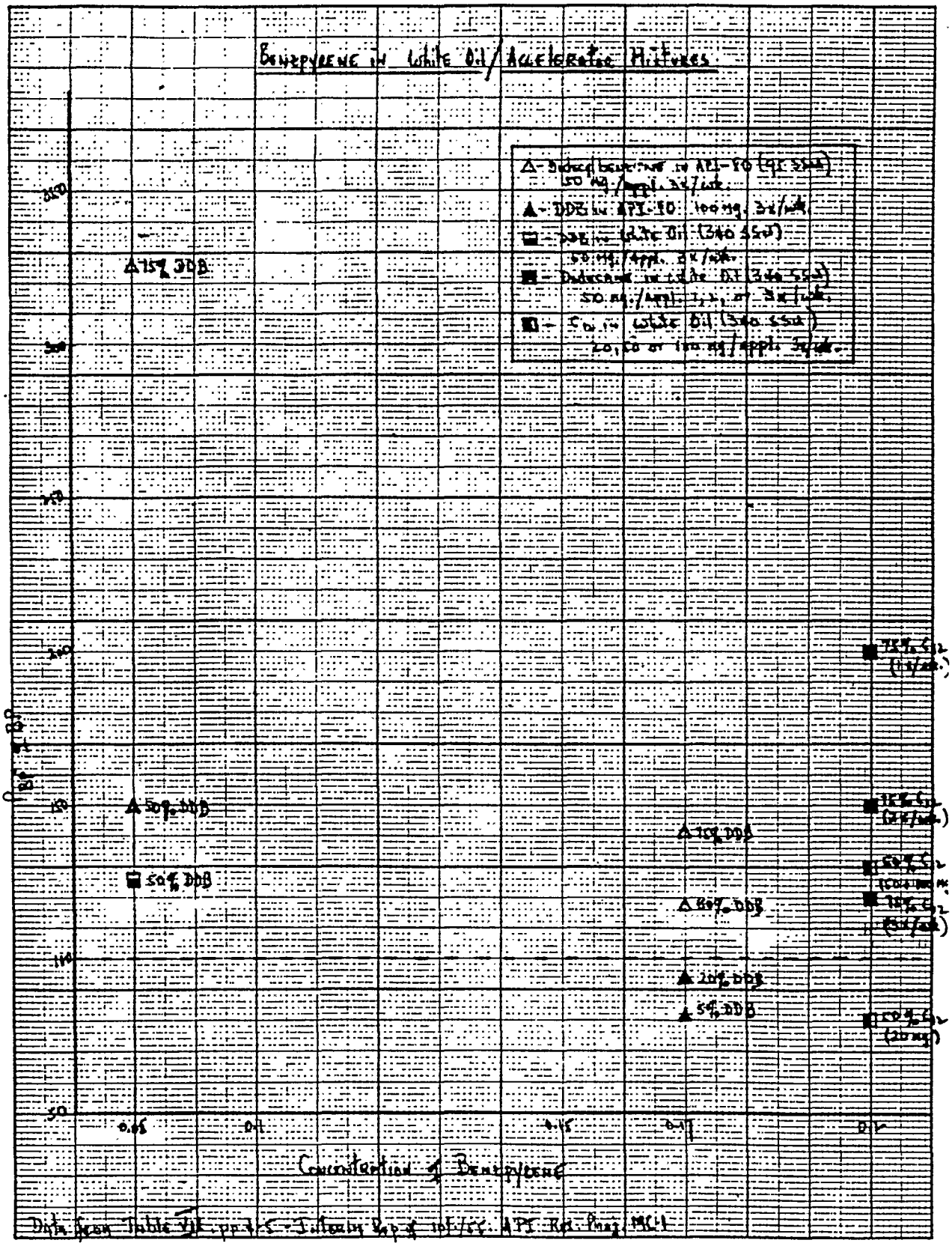
R. E. ECKARDT, M. D.

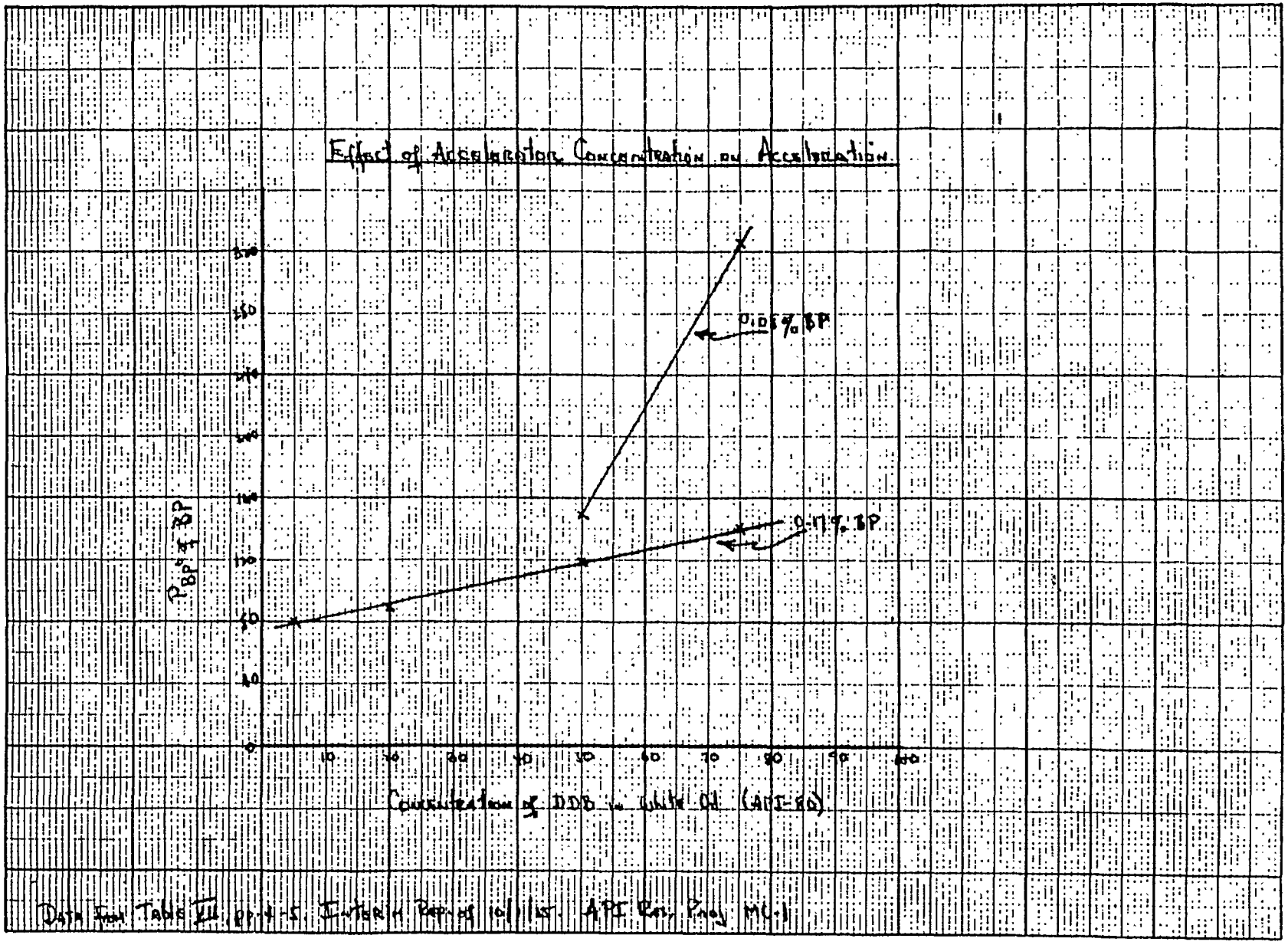
REE:mak
Encs. - 5 graphs

cc w/encs: Messrs. R. A. Kehoe
E. W. Adams
C. H. Hine
E. K. Linder
M. M. Marisic
R. C. Mithoff
M. N. Newquist
A. C. Pabst

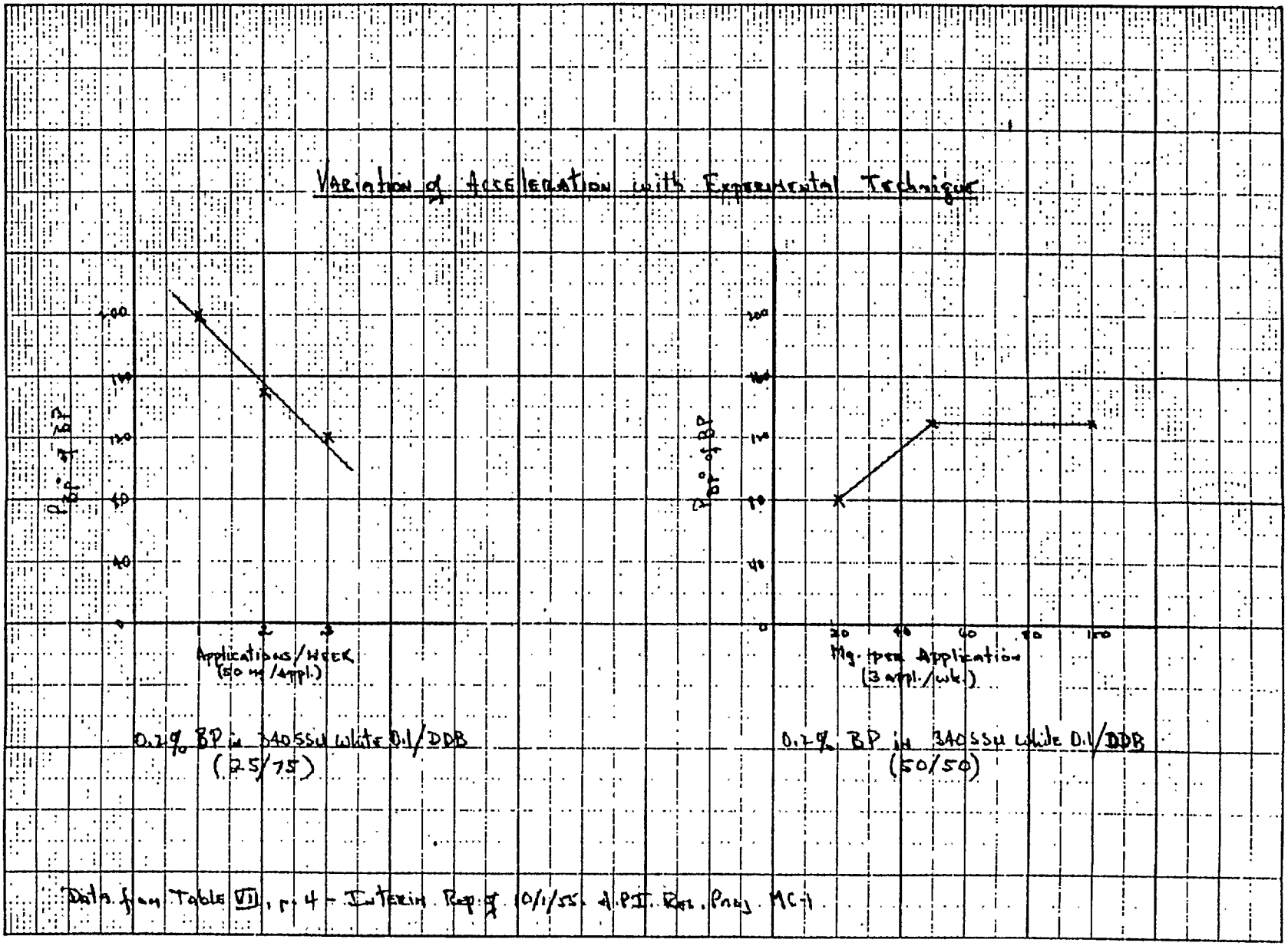








Data from Table VII, pp. 4-5, Interim Report of 10/1/57 API Res. Proj. MC-1



Data from Table VII, p. 4 - Interim Rep. of 10/1/55 - PII. Rec. Proj. MC-1

AMERICAN PETROLEUM INSTITUTE
50 WEST 50TH STREET
NEW YORK 20, N. Y.

DEPARTMENT OF TECHNICAL SERVICES
DAVID V. STROOP, DIRECTOR

November 1, 1956

To Members
Medical Advisory Committee and
Technical Advisors

Gentlemen:

The enclosed Tentative Agenda has been prepared for your general information prior to the 22nd Medical Advisory Committee. You will note it is subject to change.

Very truly yours,

W V Stroop

DVS:js
Enclosure

ESSO RESEARCH AND ENGINEERING COMPANY

(FORMERLY STANDARD OIL DEVELOPMENT COMPANY)

P. O. BOX 121, LINDEN, N. J.

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CHIEF CLINICAL RESEARCH PHYSICIAN

August 22, 1956

Mr. David V. Stroop
American Petroleum Institute
50 West 50th Street
New York 20, New York

Dear Mr. Stroop:

The attached article appeared in the NEW YORK TIMES on the morning of August 21, 1956. reprint file

Of particular interest to the petroleum industry is the section underlined in red. Although I do not agree with the report when it says that paraffines on milk cartons have produced cancer in man and experimental animals, nonetheless, it is likely that the various petroleum companies may receive inquiries as a result of this news item. In order to prepare them for this, I believe that the attached article should be circulated to all members of the Medical Advisory Committee of the API. Dr. Horton should be asked to prepare some data which provides information on this particular subject.

Very truly yours,

R. E. Eckardt

R. E. ECKARDT, M. D.

REE:cjh
Attach. - Article in THE NEW YORK TIMES, Tuesday, August 21, 1956. Cancer is Traced to Food Additives.

Copy From D. V. Stroop For Information Of Members Of Medical Advisory Committee and Technical Advisors
8/23/56

ESSO RESEARCH AND ENGINEERING COMPANY

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Copy From D. V. Stroop
For Information Of Members Of
Medical Advisory Committee
9/5/56

August 31, 1956

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

Dear Mr. Stroop:

I am attaching the original publication of TIME MAGAZINE, which is a sequel to THE NEW YORK TIMES article of August 21, 1956, which I sent to you for distribution to the Medical Advisory Committee. I believe that this warrants distribution to the members of the MAC and/or its associates.

reprint file

I am also enclosing the original publication of CANCER RESEARCH, in which there is a review article entitled, "The Role of Atmospheric Pollution in the Pathogenesis of Pulmonary Cancer," written by Dr. Paul Kotin of the University of Southern California, School of Medicine. This article, I believe, should be distributed to all members of the MAC. You may also wish to give consideration to distributing it to members of the Smoke and Fumes Committee of the API, who in turn may wish to bring it to the attention of the CRC, who, I understand, is interested in this problem.

Inasmuch as we are sending you the original journals, we would appreciate your returning them to us as soon as you have had them duplicated.

Very truly yours,

R. E. Eckardt cjh

R. E. ECKARDT, M. D.

REE:cjh
Attach. - Cancer Suspects. TIME MAGAZINE 68:70 (August 27, 1956)
- Kotin, Paul. The Role of Atmospheric Pollution in the Pathogenesis of Pulmonary Cancer: A Review. CANCER RESEARCH 16:375-393 (June 1956)

Dictated, but not read

Copy From D. V. Stroop For Information Of Members Of Medical Advisory Committee 2/15/56

ESSO RESEARCH AND ENGINEERING COMPANY

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February 14, 1956

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

Dear Mr. Stroop:

I have just received the attached letter and handout from Dr. A. Bradley Soule, Jr. I believe that this would be of interest to all the members of the Medical Advisory Committee of the API. Here is a genuine opportunity for this committee to indicate that it really believes what it sees about the kerosene situation, by offering it an opportunity to make a constructive contribution to attempt to control it. I would like to emphasize that Dr. Soule is in no way blaming the petroleum industry for what happens. He is convinced that the problem is not so much with the petroleum industry which produces the kerosene, but in the ignorance and low economic status of those who continuously use kerosene and therefore have it available for their children to consume. He is convinced, as I am sure we all are, that labeling is not the only answer, but that educational efforts will also have to be undertaken. I am not sure how much money Dr. Soule is talking about, but I believe that a total amount of approximately $2,000 a year over the next several years would make a staunch ally of Dr. Soule and also many other physicians who have brought this problem to the attention of the API, only to be ignored in their efforts.

I would like to reintroduce this topic for discussion again at the time of the Medical Advisory Committee meeting in Philadelphia, since I am convinced that it is an important one that we should take some action on.

Very truly yours,

R. E. Eckardt/mak

R. E. ECKARDT, M. D.

REE:mak
Enc. - Ltr. of 2/4/56 to REE
from A. Bradley Soule, Jr.,M.D.
w/att. information on "Kerosene
Poisoning in Young Children".

Dictated, but not read

ASSOCIATES IN RADIOLOGY

A. BRADLEY SOULE, JR., M.D.
OSCAR S. PETERSON, JR., M.D.
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BISHOP de GOESBRIAND HOSPITAL
BURLINGTON, VERMONT

W. HERBERT JOHNSTON, M.D.
HEATON HOSPITAL
MONTPELIER, VERMONT

February 4, 1956

Dr. Robert E. Eckardt, Director,
Medical Research Division,
Esso Laboratories,
P.O.Box 51,
Linden, N.J.

MEDICAL RESEARCH DIVISION
REE X
BEB
NVH
HWG
FWC
ARJ
JDY
LCM
CH
MK

FEB 7 1956

Dear Doctor Eckardt:

You may recall our exchange of letters in September 1954 relating to the problem of publicizing the dangers of certain petroleum products, especially kerosene, to young children. I have a few more thoughts on the matter and would like to ask your advice regarding them.

First of all, to bring you up to date, we have now seen approximately 150 children who have accidentally ingested or aspirated kerosene or allied products. Of these three have died.

At the Clinical Session of the American Medical Association held in Boston several months ago, we put on an exhibit which was most successful, from the point of view of attendance. Between 700 and 800 physicians, many of them general practitioners, stopped in and talked with us about the problem. These men came from all parts of the country and as a result of our conversations, we came back convinced that there is a great deal of kerosene poisoning seen in many parts of the country, most of which has not been reported in the medical literature. We have had requests for reprints from all parts of the world; some of these have been accompanied or followed by notes from physicians who have stated that they were seeing a number of children who have drunk kerosene. We have had several requests to show our exhibit at meetings,- one from the American Academy of Pediatrics; one from the North Carolina Medical Society. I believe that there

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may be a number of other medical societies who would use an exhibit if one were available. At the request of the California State Medical Society, I made a tape recording for use in their post-graduate program. Another tape recording was made by the Extension Service of the University of Vermont and this has been broadcast over small radio stations in Vermont and Connecticut. We have had numerous articles in the local newspapers and a few articles in such magazines as the New England Homestead and in The Country Gentleman.

But we are still seeing children with kerosene poisoning. Part of it is because we are not reaching the right people. I do believe, however, that if we continue to reiterate our story about the dangers of kerosene to small children, it may eventually become enough of a well-known fact so that even the poorer and more ignorant may learn of it.

We have no individual resources available other than our interest and what time we can give to it. I am now writing you to ask if you believe it might be possible to interest the American Petroleum Institute (or some other agency) in under-writing, through a grant to the University of Vermont College of Medicine who is our sponsor, the construction of several traveling exhibits and the cost of sending them to various meetings together with travel expense of someone to go with them. We found that the principal value of our exhibit at the A.M.A. was the fact that it was constantly attended by one of our group who could answer questions and could discuss the problem with reasonable intelligence. We would like to be able to construct a well-made exhibit which could be packed up and shipped to a medical meeting, but we would also like to be able to send someone along with it. We would also like to have made up one or more exhibits of a different type which would be suitable for display at lay gatherings, such as county fairs, health meetings, teachers' conventions, etc. and which would not need to be attended.

Obviously, this would cost quite a lot. I presume that we might easily have to spend several hundred dollars or more to construct a semi-permanent exhibit and packing cases for it. Travel expenses would run into hundreds

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of dollars.

If there is any likelihood that the American Petroleum Institute might look with interest on making a grant for this purpose, I would like to have the opportunity of submitting to them in proper form a more completely worked-out plan designed to publicize kerosene poisoning to the medical profession and to the lay public. In view of the amount of work involved, I would not want to do it unless I were assured of enough financial backing so that we could build good exhibits and show them to at least six medical conventions annually for a period of several years. The exhibits for the general public could reach many more groups, depending on the number of exhibits made up, the distribution list, etc.

Dr. George M. Wheatley, Chairman of the Committee on Accident Prevention of the American Academy of Pediatrics, and Frederick S. Kent, Chief of the Home Accident Prevention Activities of the Department of Health, Education and Welfare of the U.S.Public Health Service, have both been interested in what we were trying to do and have been most helpful to us in publicizing kerosene poisoning.

I apologize for the length of this letter, but hope that you may be able to suggest something which may allow us to continue our work on a larger scale. I believe I sent you a reprint of our original paper in RADIOLOGY, June 1954. I am enclosing a folder which we had printed to pass out at the A.N.A. convention. I should also like to make reference to an editorial on Kerosene Poisoning, with especial reference to our work which appeared in the J.A.M.A. on June 29, 1955.

Thank you for your help and interest.

Sincerely,

A. Bradley Soule, Jr., M.D.

ABS:S

KEROSENE POISONING IN YOUNG CHILDREN

A. BRADLEY SOULE, Jr., M.D.

JOSEPH C. FOLEY, M.D.

From the Division of Radiology
University of Vermont College of Medicine
Burlington, Vermont

In a study made in northwestern Vermont, 151 children were admitted to five hospitals during the past ten years following the accidental ingestion or aspiration of kerosene. Three of these children died, thus giving a mortality rate of approximately 2%. None of the children were younger than 8 months nor older than 24 months. In other words, they were old enough to be creeping or walking about the floor; they appeared to reach the age of discretion (as regards swallowing of kerosene) at the age of two years.

In this area, it was the commonest type of poisoning encountered in young children. Reports from other parts of the world indicate that kerosene poisoning is commonly seen among people using fuel oil for cooking or heating, - especially in rural areas. It has been reported extensively in southern and mid-western sections of this country and in portions of South America and South Africa.

In our series, most of the children drank from glasses, cans or bottles left on the floor to catch drippings from leaky fuel lines or oil-stoves. One child sniffed kerosene from a drum from which the top was missing; another drank from a can containing kerosene used for soaking paint brushes; another drank from a cup of kerosene left on the kitchen table by the mother who had been using it in treating the child for nits.

Most of the children were found on the floor, choking, coughing, gagging or vomiting. Many became dyspneic within minutes; a number were drowsy or stuporous within an hour's time. About a quarter of them became cyanotic.

After arriving at the hospital, most of the children had gastric lavage. Attempts were made to prevent aspiration of gastric contents during the procedure but this was not always successful. X-ray examinations of the chest showed evidence of clouding in one or both lungs, especially near the bases, within minutes or a few hours of exposure in more than half of the children. These pulmonary changes, pneumonic in type, were more commonly seen in the children who vomited or who had gastric lavage than in those who did not vomit and who did not have gastric lavage, - thus suggesting that aspiration of vomitus contributed to the production of pneumonitis.

For treatment, oxygen was especially useful and was used routinely when cyanosis or dyspnea was present. Antibiotics were used to combat infection.

In the three fatal cases, death ensued as a result largely of extensive pneumonic changes in both lungs. "Asphyxial membranes" consisting of fibrin, leukocytes and red blood cells lined the alveolar walls while the air-spaces were filled with a sero-sanguinous exudate. Small bronchial subdivisions were extensively involved with a broncho-pneumonic process.

In the non-fatal cases, all children showed maximum changes within eight hours after the accident. All who survived the initial eight hour period without alarming symptoms or findings ultimately recovered. Some of them showed residual clouding of lung fields by x-ray for a week or more, however. Most of them were well or nearly well within forty-eight hours.

Follow-up examinations of children made one to ten years later showed no serious sequelae. Parents of many of the children felt that they had had more serious "chest colds" and other bouts of respiratory infection than other children of the same age. X-rays of the chests of these children showed either no abnormalities or slightly equivocal prominence of broncho-vascular markings.

Experimental studies, using rabbits and cats, indicated that intratracheal administration of even minute quantities of kerosene produced marked pulmonary irritation followed by rapid development of a fulminating and severe bronchopneumonia with "asphyxial membranes". Intragastric administration of kerosene failed to produce pneumonitis; however, if relatively large quantities were introduced into the stomach, this was followed by general systemic and cerebral depression and death.

It is the impression of the authors that pneumonitis is rarely, if ever, produced by absorption of kerosene from the alimentary tract but is usually the result of direct aspiration during a choking attack or from aspiration of gastric contents (including kerosene) during vomiting or during gastric lavage. It seems doubtful that the average child will swallow enough kerosene to produce fatal effects from absorption of toxic substances alone; however, kerosene is a crude substance of highly variable composition and it is possible that in certain cases it may contain impurities which may in themselves be poisonous.

This poses the dilemma as to whether gastric lavage should be performed or not. The authors believe that each case must be considered individually when this decision is made. It seems probable that in most cases it is safer not to perform lavage than to do it.

Education of the public as to the dangers of kerosene to young children is of paramount importance. Since this is largely an accident occurring to people in the low-income bracket, the conventional instruments for dissemination of information have unfortunately not been overly effective to date. Newspaper and magazine articles, radio and television programs and talks by agricultural extension workers and others have been rather widely used.

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10. Editorial: Kerosene Poisoning. J.A.M.A. 157: 448-449, January 29, 1955.

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SOCONY MOBIL OIL COMPANY, INC.
26 Broadway, New York 4, N. Y.

10 January 1956

Mr. David V. Stroop
American Petroleum Institute
50 West 50th Street
New York, New York

Dear Mr. Stroop:

Will you please reproduce the attached correspondence to and from Mr. R. Hitchcock, Jr., of the Rand Development Corporation and distribute it to the members of the Medical Advisory Committee.

After it has served your purpose, will you please return the original correspondence to me.

Sincerely yours,

George M. Saunders, M.D.
Medical Director

ar
Attch.

Copy From D. V. Stroop For Information Of Members of Medical Advisory Committee and Technical Advisors
1/11/56

SOCONY MOBIL OIL COMPANY, INC.
26 Broadway, New York 4, N. Y.

10 January 1956

Mr. R. Hitchcock, Jr., Vice President
Rand Development Corporation
13600 Deise Avenue
Cleveland 10, Ohio

Dear Mr. Hitchcock:

Thank you for your letter of 6 January 1956 referring to your proposed studies on the possible occurrence of 3,4 benzpyrene in exhaust gases from internal combustion engines. This proposal which was made originally to the Smoke and Fumes Committee of the American Petroleum Institute was referred to the Medical Advisory Committee of the A.P.I. and to its Subcommittee on Atmospheric Pollutants. After study by that Subcommittee, it was decided at the last meeting of the Committee not to endorse the study.

Sincerely yours,

George M. Saunders, M.D.
Medical Director

GMS:ar

RAND DEVELOPMENT CORPORATION
13600 DEISE AVENUE
Mail Address — P.O. Box 3851
CLEVELAND 10, OHIO

CABLE ADDRESS
RANDEV-CLEVELAND

TELEPHONE
ULMER 1-6300

6 January 1956

Dr. George M. Saunders
Medical Advisory Committee
American Petroleum Institute
Socony Mobile Oil Company
26 Broadway
New York 4, New York

Dear Dr. Saunders:

Early last year, we at the Rand Development Corporation proposed to the Smoke and Fumes Committee of the American Petroleum Institute a study into the problem of carcinogenic constituents, if any, in gasoline and diesel motor exhaust fumes and if they prove to be present, means of eliminating them. This work is in line with experience we have had in separating and identifying 3,4 benzpyrene in the smoke of cigarettes, cigarette paper, and tobacco. After separating and identifying this carcinogen in the smoke, we discovered that the addition of ammonium salts to the paper or to the tobacco markedly reduced the production of 3,4 benzpyrene when the paper or the tobacco was subsequently burned. Two of our people, Dr. S. Z. Cardon and E. T. Alvord, recently reported results of this work to an annual meeting of the American Association for the Advancement of Science in Atlanta, Georgia on December 27, 1955.

Our specific proposal to the Smoke and Fumes Committee was to determine whether 3,4 benzpyrene is present in exhaust gases; if so, to determine the quantities formed under different running conditions, and to then attempt to inhibit the formation by the use of additives. Our experience with cellulose materials, suggests nitrogen heterocyclic compounds rather than hydrocarbons are formed in the presence of nitrogen compounds, especially ammonia, in organic reactions at high temperatures. The initial additive approach would therefore follow this line.

The Smoke and Fumes Committee, as reported to us by Dr. Claussen, considered the proposal sound but felt the problem was more in the province of the Medical Advisory Committee and suggested you be contacted. The press of rounding out the cigarette picture kept us from pursuing this equally interesting phase until now. With the near completion of the cigarette project, we are again exploring the possibilities of research in the similar problem applied to exhaust gases. In this regard, we would like to submit to your committee the formal proposal originally submitted to the Smoke and Fumes Committee through Dr. Claussen.

Very truly yours,

R. Hitchcock, Jr.
Vice President

RH/h

JAN 9 1956

ESSO RESEARCH AND ENGINEERING COMPANY

(FORMERLY STANDARD OIL DEVELOPMENT COMPANY)

P. O. Box 51, LINDEN, N. J.

MEDICAL RESEARCH DIVISION
ROBERT E. ECKARDT, PH.D., M.D.
DIRECTOR
NATHAN V. MENDRICKS, CH E.
HEAD INDUSTRIAL HYGIENIST
HORACE W. GERARDE, PH.D., M.D.
HEAD TOXICOLOGIST
BERTRAND E. BENNISON, M.D.
CHIEF CLINICAL RESEARCH PHYSICIAN

November 7, 1955

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

Dear Mr. Stroop:

At the suggestion of Professor Philip Drinker I am sending you a negative photostat of an article entitled "The Identification of a Carcinogenic Compound in Coal-Tar" by E. Kennaway in the British Medical Journal for September 24. It might be helpful if this report were distributed to all members of the Medical Advisory Committee and to the Kettering Laboratory group.

Very truly yours,

R. E. Eckardt

R. E. ECKARDT, M. D.

REE/jbm
Enc.

Copy From D. V. Stroop For Information Of Members Of Medical Advisory Committee 11/22/55

ESSO RESEARCH AND ENGINEERING COMPANY

(FORMERLY STANDARD OIL DEVELOPMENT COMPANY)

P. O. BOX 51, LINDEN, N. J.

MEDICAL RESEARCH DIVISION
ROBERT E. ECKARDT, PH.D., M.D.
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BERTRAND E. BENNISON, M.D.
CHIEF CLINICAL RESEARCH PHYSICIAN

October 18, 1955

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

Dear Mr. Stroop:

If the attached two articles have not been brought to the attention of the members of the Medical Advisory Committee of the API, it would probably be advantageous to see that they are circulated at least to the medical members of the committee.

Sincerely yours,

R. E. Eckardt

R. E. ECKARDT, M.D.

RKE:mak

Encs. - Cancer of the Respiratory Tract-
Recent Trends in Mortality, Edward
A. Lew, J. of the International
College of Surgeons, Vol. 24, No.1,
July, 1955.

Accident Prevention in Childhood—
The Kerosene Hazard, H. A. Carithers,
J.A.M.A., Vol. 159, No. 2, Sept. 10, 1955.

Copy From D. V. Stroop For Information Of Members Of Medical Advisory Committee 10/28/55

SHELL DEVELOPMENT COMPANY
EMERYVILLE, CALIFORNIA
TELEPHONE OLYMPIC 3-2100

January 10, 1956

AIR-MAIL

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

Dear Mr. Stroop:

An article entitled "Procedures for the Appraisal of the Toxicity of Chemicals in Foods, Drugs and Cosmetics" has recently been published by a member of the staff of the Food and Drug Administration. This article appeared in the Food, Drug and Cosmetic Law Journal for October, 1955.

I would appreciate your calling this publication to the attention of the members of the Medical Advisory Committee since it reflects the official attitude of that branch of our government service which is responsible for passing on the safety of many substances of importance to the petroleum industry.

I inquired of Dr. Lehman, author of the article, whether it would be possible to obtain copies for distribution, and he advised that because of a limited budget he could not distribute these reprints gratis. Individual copies may be obtained by the medical directors by writing directly to Dr. Lehman, or alternatively, copies may be purchased for $1.25 each from the Commerce Clearing House, Inc., Chicago 1, Illinois.

Very truly yours,

C. H. Hine

C. H. Hine, M.D., Ph.D.
Consulting Toxicologist

CHH/jck

Copy From D. V. Stroop For Information Of Members Of Medical Advisory Committee and Technical Advisors
1/12/56

ESSO RESEARCH AND ENGINEERING COMPANY

(FORMERLY STANDARD OIL DEVELOPMENT COMPANY)

P. O. BOX 51, LINDEN, N. J.

MEDICAL RESEARCH DIVISION
ROBERT E. ECKARDT, PH.D., M.D.
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BERTRAND E. BENNISON, M.D.
CHIEF CLINICAL RESEARCH PHYSICIAN

April 11, 1955

Messrs. E. W. Adams
L. C. Beard, Jr.
Allan E. Dooley
F. D. Gassaway
L. H. Henderson
C. H. Hine
E. K. Linder
R. C. Mithoff
M. N. Newquist
James W. Osborn
F. J. Sanders

Gentlemen:

I thought each of you would be interested in the attached abstracts of papers to be delivered at the coming meeting of the American Association for Cancer Research. These, I believe, are the ones pertinent to us in our thinking about carcinogenicity, from the great number of papers to be delivered at that meeting.

Sincerely yours,

R. E. ECKARDT, M. D.

REE:ilk

Attachments

cc: Messrs. A. Wesley Horton ✓
R. A. Kehoe
D. V. Stroop

see A.A.C.R. file

ESSO LABORATORIES
STANDARD OIL DEVELOPMENT COMPANY
P. O. BOX 51, LINDEN, N.J.

MEDICAL RESEARCH DIVISION
ROBERT E. ECKARDT, PH.D., M.D.
DIRECTOR
HORACE W. GERARDE, PH.D., M.D.
HEAD TOXICOLOGIST

INDUSTRIAL HYGIENE SECTION
NATHAN V. HENDRICKS, CH.E.
HEAD OF SECTION
FRANKLIN W. CHURCH, M.S.
GEORGE M. WILKENING, M.S.
INDUSTRIAL HYGIENISTS

December 29, 1954

TO: MEMBERS OF THE MEDICAL ADVISORY COMMITTEE

Gentlemen:

On page 1075 of the December 24, 1954 issue of SCIENCE is a most interesting paper by Setala, Setala and Holsti dealing with the cocarcinogenic action of various agents for mouse skin. If you have not seen this paper, I am sure that it will be of interest to all of you.

Very truly yours,

R. E. ECKARDT, M. D.

REE:ilk

cc: Messrs. A. Wesley Horton
R. A. Kehoe
D. V. Stroop

AMERICAN PETROLEUM INSTITUTE
50 WEST 50TH STREET
NEW YORK 20, N. Y.

May 21, 1954

To the Enrolled Members of the
Division of Refining:

Gentlemen:

Enclosed for your information is a reprint of a special section of the May 1954 issue of Petroleum Processing. This section reports on Division of Refining activities and personnel.

This section was available in reprint form to all who attended the 19th Midyear Meeting in Houston May 10-13, 1954.

Yours very truly,

W. T. Gunn

WTG:mb
Enclosure

Petroleum Processing Special Section on ---

Division of Refining

- Complete Program, 19th Mid-Year Meeting
- Special Reports on Technical Projects
- Annual Reviews of Committee Activities
- Abstracts of Analytical Research Papers

JOHN W. NEWTON
Vice President for Refining

WILLIAM T. GUNN
Director, Refining Division

The API Is "People"

THE Division of Refining of the API is far more than a mass of committees, important though these are in any organization.

The work of the Division is actually the total of all the effort expended by the men of the oil industry. For them, the Division is a forum in which they can discuss those technical facts and opinions that affect the industry's progress but not the vitality of its competition.

Not committees, not a company or group of companies, not the Division itself, but people form the prime mover. The lone individual in his laboratory, at his desk, in the field, who pries into the unexpected or hunts for a door in the wall of knowledge—he is the industry, and, in a very real sense, the API.

Our people work voluntarily with the belief that rapid spreading of information, coupled with competition, has helped make us great and will make us greater. They make room on crowded schedules for the extra task. They are encouraged by the managements of hundreds of companies, big and little, who recognize the value of contributing toward that over-all body of technological knowledge from which their individual companies can fashion their own improvements.

So, as one who believes in the purpose of the API and in its merit, I salute all those other "ones" who, on their own, work on committees, prepare their papers, and do all the other tasks that must be done.

The people of the industry are truly great people.

J. W. NEWTON
API Vice President for Refining

Reprinted from PETROLEUM PROCESSING, May 1954

API Division of Refining

• What's on the mid-year meeting program

PETROLEUM processing technologists and executives from all over the country will assemble in Houston, Texas, in a few days for the 19th mid-year meeting of the American Petroleum Institute's Division of Refining. The meeting will take place at the Rice Hotel, Monday through Thursday, May 10-13.

A total of 52 technical papers will be given during the 12 group sessions. In addition, a panel discussion has been scheduled on the subject: "Planning for Major Unit Turnarounds," as part of the two sessions on refinery maintenance.

Reports of the results of studies on two important refining problems are included among the technical papers. One is a report on the results of the survey of the study group on oil-storage tank failures, to be given by Carl H. Samans, Standard Oil Co. (Indiana), chairman of the study group.

The other is a status report on the research program of the Smoke and Fumes Committee, to be given by Vance N. Jenkins, Union Oil Co. of California, executive secretary of the committee.

A current controversial problem with widespread interest among all refiners—motor fuel and preignition—is also the subject of one session.

Another subject of wide general interest—petrochemicals—will be covered by four technical papers by authors from Standard Oil Co. (Ohio), Standard Oil Development Co., Continental Oil Co., and Gulf Oil Corp.

ANALYTICAL RESEARCH

Monday, May 10, 9:00 a.m., Ball Room.
Presiding: C. E. Headington, Atlantic Refining Co. (Session developed by Mr. Headington).

Coordinating the Operations of a Petroleum-Research Analytical Group, W. C. Schaefermeyer and E. S. Smith, Union Oil Co. of California.

A Simplified Amperometric Method for Determining Mercaptan Sulfur in Liquid and Gaseous Hydrocarbons, M. D. Grimes, J. E. Puckett, B. J. Newby, and B. J. Heinrich, Phillips Petroleum Co.

Analytical Distillation in Miniature Columns—I: Equipment and Operation, J. C. Winters and R. A. Dinerstein, Standard Oil Co. (Indiana).

New Techniques for Analyzing Mixtures of Trace Metals, R. M. Sherwood and F. W. Chapman, Jr., Atlantic Refining Co.

An Analyzer-Recorder for Measuring Hydrogen Sulfide in Air, E. B. Offutt, American Thermometer Division of Robertshaw-Fulton Controls Co., and L. V. Sorg, Standard Oil Co. (Indiana).

Micro Distillation Methods for the Analysis of Petroleum, A. R. Javes, C. Liddell, and W. H. Thomas, Anglo-Iranian Oil Co., Ltd.

A Reduced-Scale Reid Vapor Pressure Apparatus, R. L. LeTourneau, Julian F. Johnson, and W. H. Ellis, California Research Corp.

The Determination of Water in Acetaldehyde by Infrared Spectroscopy, J. A. Favre, J. P. Butler, and B. J. Heinrich, Phillips Petroleum Co.

CORROSION

Monday, May 10, 9:00 a.m., South American Room 1.
Presiding: L. W. Robbie, Republic Oil Refining Co. (Session developed by C. F. Pogacar, Atlantic Refining Co.).

Corrosion and Prevention — Heat Exchangers in Cooling-Water Service, J. D. Munro, Standard Oil Development Co.

Selection of Paints and Application in Combatting Atmospheric Corrosion, F. T. Radecke, Shell Oil Co.

Hydrogen-Chloride Evolution from Crude Oils as a Function of Salt Concentration, G. J. Samuelson, Petrolite Corp.

ANALYTICAL RESEARCH

Monday, May 10, 2:00 p.m., South American Room 1.
Presiding: R. J. Askevold, Pure Oil Co. (Session developed by C. E. Headington, Atlantic Refining Co.).

Methods for the Determination of Tetraethyl lead in Gasoline—A Review, C. M. Cambrill and Sue A. Gendernalik, Ethyl Corp.

Determination of Phenyl alpha-naphthylamine (PAN) in New and Used Oils (A Colorimetric Method), W. S. Levine and W. A. Marshall, Socony-Vacuum Laboratories.

Spectrochemical Determination of Copper in Crankcase Drainings, C. R. Hodgkins and John Hansen, Esso Laboratories Research Division, Standard Oil Development Co.

The Determination of Trace Amounts of Iron, Nickel, and Vanadium on Catalysts by X-ray Fluorescence, G. V. Dyroff and P. Skiba, Esso Laboratories Research Division, Standard Oil Development Co.

Non-Metal Analysis of Micro Quantities of Solids by Means of the Emission Spectrum, E. L. Gunn, Humble Oil & Refining Co.

Spectrographic Method for Analyzing Lubricating Greases, C. W. Key and G. D. Hoggan, Richfield Oil Corp.

Spectrographic Analysis of Petroleum Products and Related Materials, L. L. Gent, C. P. Miller, and R. C. Pomatti, The Texas Co.

Application of the Logarithmic Sector to Quantitative Spectrographic Analysis of Petroleum-Ash Residues, E. B. Childs and J. A. Kanehann, Socony-Vacuum Laboratories.

TRAINING

Monday, May 10, 2:00 p.m., Ball Room.
Presiding: G. R. Bryant, The Texas Co. (Session developed by R. B. McHenry, Gulf Oil Corp.).

Basic Management Training for Hourly Employes, W. E. Bennett, Cities Service Refining Corp.

How to Train Your Subordinates, Richard E. Crow, Continental Oil Co.

How Far to Harmonious Relationships? L. R. Boulware, General Electric Co.

REFINERY MAINTENANCE

Tuesday, May 11, 9:00 a.m., Ball Room.
Presiding: Bonner H. Barnes, Gulf Oil Corp. (Session developed by H. W. Ferguson, Humble Oil & Refining Co.).

Minimizing the Refinery-Maintenance Crew, F. C. King, General Petroleum Corp.

Use of Technically Trained Men in Refinery-Maintenance Work, D. G. Debo and J. G. Housman, Standard Oil Co. (Indiana).

Correlation of Manpower Requirements, Maintenance Requirements, and Equipment Selection, Michael A. Pappas and James S. Dalton, Standard Oil Co. (Ohio).

Effective Control of Stores Operations, J. H. Anderson, Humble Oil & Refining Co.

REFINERY MAINTENANCE

Tuesday, May 11, 2:00 p.m., Ball Room.
Presiding: Clarence H. Thayer, Sun Oil Co. (Session developed by H. W. Ferguson, Humble Oil & Refining Co.).

The Area-Supervisor System as Applied to the Baton Rouge Refinery, O. R. Menton, Esso Standard Oil Co.

PANEL SESSION: Planning for Major-Unit Turnarounds; panel members: C. H. Trotter, Phillips Petroleum Co.; E. C. Newton, Atlantic Refining Co.; J. T. Tippit, The Texas Co., and A. C. Collins, Shell Oil Co.

OIL STORAGE TANK FAILURES

Tuesday, May 11, 7:00 p.m., Ball Room.
Presiding: R. G. Sanders, Magnolia Petroleum Co. (Session developed by Carl H. Samans, Standard Oil Co.—Indiana).

Brittle Failure of Steel Structures—A General Engineering Problem, Prof.

DATE	9:00 A.M.	2:00 P.M.
FRI. MAY 7	Corrosion Subcommittee, French Room	Corrosion Subcommittee, French Room
SAT. MAY 8	Analytical Research Comm., Hunt Room Corrosion Subcommittee, French Room Pressure-relieving Systems Subcomm., Room E	Analytical Research Comm., Hunt Room Corrosion Subcommittee, French Room Pressure-relieving Systems Subcomm., Room E
SUN. MAY 9	Joint Meeting: Mechanical Equipt. Subcomm. & Mfgrs. Centrifugal Pumps Subcomm., French Room Safety & Relief Valves Mfgrs. Subcomm., Hunt Room Joint Meeting: Inspection Supervisors Subcomm. & Designers' Subcomm. on Inspections, Jade Room Oil-Water Separation Subcomm., Room E (10:00 a.m.)	Joint Meeting: Mechanical Equipt. Subcomm. & Mfgrs. Centrifugal Pumps Subcomm., French Room Safety & Relief Valves Mfgrs. Subcomm., Hunt Room Joint Meeting: Inspection Supervisors Subcomm. & Designers' Subcomm. on Inspections, Jade Room Tank Accessories & Cleanouts Subcomm., Room E
MON. MAY 10	**Analytical Research Session, Ball Room** **Corrosion Session, So. American Room 1** Training Committee, Reception Room Valves, Mfgrs. Subcommittee, Hunt Room Joint Meeting: Low-Pressure Storage Tanks Subcomm. & Mfgrs. Subcomm. on Low-Pressure Storage Tanks, French Room Chemical Wastes Subcommittee, Room E Automotive Research Committee, Jade Room	**Analytical Research Session, So. American Room 1** **Training Session, Ball Room** Petroleum Products Committee, Jade Room Electrical Equipment Subcomm., Reception Room Corrosion Subcommittee, Hunt Room Waste Gases & Dusts Subcommittee, Room E Joint Meeting: Low-Pressure Storage Tanks Subcomm. & Mfgrs. Subcomm. on Low-Pressure Storage Tanks, French Room
TUES. MAY 11	**Refinery Maintenance Session, Ball Room** Analytical Research Committee, French Room Training Committee, Jade Room Smoke & Fumes Technical Advisory Comm., Room E Sampling & Testing Subcommittee, Hunt Room Sludges & Clays Subcommittee, Reception Room	**Refinery Maintenance Session, Ball Room** Analytical Research Committee, French Room Training Committee, Jade Room Sampling & Testing Subcommittee, Hunt Room Program Committee, Reception Room Pump Manuals Mfgrs. Subcommittee, Room E
WED. MAY 12	**Waste Disposal Session, So. American Room 1** **Motor Fuels Session, Ball Room (9:30 a.m.)** Analytical Research Committee, French Room Training Committee, Jade Room Advisory Committee, Room 336 Valves Subcommittee, Room E Unfired Pressure Vessels Subcommittee, Hunt Room Instruments Subcommittee, Western Room Electrical Equipment Subcommittee, Room 927	**Petrochemicals Session, Ball Room (2:30 p.m.)** Analytical Research Committee, French Room Training Committee, Jade Room General Committee, Reception Room (1:30 p.m.) Disposal of Refinery Wastes Committee, Hunt Room Refinery Equipment Committee, So. American Room A Joint Meeting: Pump Manuals Subcommittee & Mfgrs. Subcommittee, Room 336
THURS. MAY 13	**Processes Session, Ball Room** Disposal of Refinery Wastes Committee, Jade Room Refinery Equipment Committee, French Room Smoke & Fumes Committee, Hunt Room	**Fractionation Session, Ball Room** General Committee Meeting, So. American Room A (1:30 p.m.)

TUES. MAY 11 AT 7:00 P.M.	Oil-Storage Tank Failures Session, Ball Room	Heavy Type—Group Sessions
WED. MAY 12 AT 7:00 P.M.	Open Dinner Session, Ball Room	Light Type—Committee Meetings
THURS. MAY 13 AT NOON	General Committee Luncheon, So. American Room 1	

M. E. Shank, Massachusetts Institute of Technology.

Results of the Survey of the Study Group on Oil Storage-Tank Failures, reporting for the members of the Study Group: Carl H. Samans (chairman), Standard Oil Co. (Indiana).

Some Economic Aspects of the Oil Storage-Tank Failure Problem, F. A. Gitzendanner, Standard Oil Co. (Indiana).

The Standard Oil Development Co. Study of Brittle Failure of Tank Steels, F. J. Feely, Jr., and M. S. Northup, Standard Oil Development Co.

WASTE DISPOSAL

Wednesday, May 12, 9:00 a.m., South American Room 1.

Presiding: C. C. Tate, Phillips Petroleum Co. (Session developed by W. C. Douce, Phillips Petroleum Co.).

New Oil-Reclamation and Waste-Disposal Facilities, W. L. Pursell and T. W. Ferguson, Skelly Oil Co.

Preferential Withdrawal of Catalyst Fines to Reduce FCC Stack Losses, C. A. Seibert, Jr., and D. L. Cleveland, Shell Oil Co.

New Developments in the Disposal of Refinery Waste Gases, D. B. Ardern, Houdry Process Corp., and Raymond C. Lassiatt, Sun Oil Co.

Chemical Flocculation of Refinery Wastes, R. F. Weston, Atlantic Refining Co.

Planning and Execution of a Refinery Waste-Stream Survey, A. P. Dennis, Jr., Esso Standard Oil Co.

Status Report on the Research Program of the Smoke and Fumes Committee, Vance N. Jenkins, Union Oil Co. of California (executive secretary, API Smoke and Fumes Committee).

MOTOR FUELS

Wednesday, May 12, 9:30 a.m., Ball Room.

Presiding: Bruce K. Brown, Pan-Am Southern Corp. (Session developed by F. J. Sanders, Standard Oil Co.—Ohio).

The Contribution of Surface Combustion of the Fuel to Preignition, R. E. Wilson, F. W. Bowditch, and G. J. Nebel, General Motors Research Laboratories.

The Preignition Resistance of Fuels, B. M. Sturgis, E. N. Cantwell, W. E. Morris, and D. L. Schultz, E. I. du Pont de Nemours & Co., Inc.

The Study of Fuel Additives to Reduce Preignition, F. C. Burk, L. J. Test, and H. R. Jackson, Atlantic Refining Co.

The Measurement and Chemical Control of Preignition in Engines, J. B. Hinkamp, H. A. Toulmin, Jr., and J. S. Wintringham, Ethyl Corp.

PETROCHEMICALS

Wednesday, May 12, 2:30 p.m., Ball Room.

Presiding: Harold G. Osborn, Continental

● Here's a Guide to Help You Find Committee Meetings . . .

Subject	Chairman	Date	Time*	Place
Advisory Committee	E. B. McConnell	Wed., May 12	9:00 a.m.	Room 336
Analytical Research Committee	C. E. Headington	Sat., May 8	9:00 a.m.	Hunt Room
	C. E. Headington	Tues., May 11	9:00 a.m.	French Room
	C. E. Headington	Wed., May 12	9:00 a.m.	French Room
Automotive Research Committee	C. E. Davis	Mon., May 10	9:00 a.m.	Jade Room
Chemical Wastes Subcommittee	R. J. Austin	Mon., May 10	9:00 a.m.	Room E
Corrosion Subcommittee	H. G. Mangelsdorf	Fri., May 7	9:00 a.m.	French Room
	H. G. Mangelsdorf	Sat., May 8	9:00 a.m.	French Room
	H. G. Mangelsdorf	Mon., May 10	2:00 p.m.	Hunt Room
Disposal of Refinery Wastes Committee	J. H. Easthagen	Wed., May 12	2:00 p.m.	Hunt Room
	J. H. Easthagen	Thurs., May 13	9:00 a.m.	Jade Room
Electrical Equipment Subcommittee	L. M. Goldsmith	Mon., May 10	2:00 p.m.	Reception Room
	L. M. Goldsmith	Wed., May 12	9:00 a.m.	Room 927
General Committee	J. W. Newton	Wed., May 12	1:30 p.m.	Reception Room
	J. W. Newton	Thurs., May 13	12:00 noon	So. American Room 1
	J. W. Newton	Thurs., May 13	1:30 p.m.	So. American Room A
Inspection Supervisors Subcommittee, joint with: Inspections, Designers' Subcommittee	W. K. Brown / J. H. Rickerman	Sun., May 9	9:00 a.m.	Jade Room
Instruments Subcommittee	G. N. Ehly	Wed., May 12	9:00 a.m.	Western Room
Low-Pressure Storage Tanks Subcommittee: joint with: Low-Pressure Storage Tanks Mfgrs. Subcommittee	W. L. Bowler / H. C. Boardman	Mon., May 10	9:00 a.m.	French Room
Mechanical Equipment Subcomm. (joint with Mfgrs. Subcomm. on Centrifugal Pumps)	E. F. Voss	Sun., May 9	9:00 a.m.	French Room
Oil-Water Separation Subcommittee	R. C. Adam	Sun., May 9	10:00 a.m.	Room E
Petroleum Products Committee	R. C. Alden	Mon., May 10	2:00 p.m.	Jade Room
Pressure-relieving Systems Subcommittee	J. C. Souder	Sat., May 8	9:00 a.m.	Room E
Program Committee	C. M. Ridgway	Tues., May 11	2:00 p.m.	Reception Room
Pump Manuals Mfgrs. Subcommittee	G. V. Shaw	Tues., May 11	2:00 p.m.	Room E
Pump Manuals, Mfgrs. Subcommittee joint with: Pump Manuals Subcommittee	G. V. Shaw / J. J. Stadtherr	Wed., May 12	2:00 p.m.	Room 336
Pumps, Centrifugal, Mfgrs. Subcommittee (joint with Mechanical Equipment Subcommittee)	Lynn Sawyer	Sun., May 9	9:00 a.m.	French Room
Refinery Equipment Committee	R. H. Venn	Wed., May 12	2:00 p.m.	So. American Room A
	R. H. Venn	Thurs., May 13	9:00 a.m.	French Room
Safety & Relief Valves, Mfgrs. Subcommittee	L. P. Stillman	Sun., May 9	9:00 a.m.	Hunt Room
Sampling & Testing Subcommittee	L. Mittelman	Tues., May 11	9:00 a.m.	Hunt Room
Sludges & Clays Subcommittee	J. A. Fowler	Tues., May 11	9:00 a.m.	Reception Room
Smoke and Fumes Committee	W. L. Stewart, Jr.	Thurs., May 13	9:00 a.m.	Hunt Room
Smoke and Fumes Technical Advisory Committee	H. G. Vesper	Tues., May 11	2:00 p.m.	Room E
Tank Accessories & Cleanouts Subcommittee	E. E. Kerns	Sun., May 9	2:00 a.m.	Room E
Training Committee	D. S. Turner	Mon., May 10	9:00 a.m.	Reception Room
	D. S. Turner	Tues., May 11	9:00 a.m.	Jade Room
	D. S. Turner	Wed., May 12	9:00 a.m.	Jade Room
Unfired Pressure Vessels Subcommittee	N. J. Rees	Wed., May 12	9:00 a.m.	Hunt Room
Valves, Mfgrs. Subcommittee	W. P. Kliment	Mon., May 10	9:00 a.m.	Hunt Room
Valves Subcommittee	R. H. Bungay	Wed., May 12	9:00 a.m.	Room E
Waste Gases & Dusts Subcommittee	W. C. Douce	Mon., May 10	2:00 p.m.	Room E

* Times shown are starting times: some meetings run all day.

Oil Co. (Session developed by L. O. Crockett, Gulf Oil Corp.).

Petrochemicals—Glamour Girl or Problem Child? G. B. Ryan and V. A. Brietenbach, Standard Oil Co. (Ohio), and H. K. Nieuwenhius, consultant, New York City.

Isobutylene Manufacture Using the Sulfuric-Acid Process, G. P. Baumann and M. R. Smith, Standard Oil Development Co.

Simultaneous Extraction of Benzene and Toluene by the Sulfur-Dioxide Process, R. A. Ratliff and W. B. Strobel, Continental Oil Co.

Large-Scale Manufacture and Distribution of Ethylene, P. W. Cornell, W. H. Litchfield, and H. M. Vaughan, Gulf Oil Corp.

OPEN DINNER SESSION

Wednesday, May 12, 7:00 p.m., Ball Room.

Presiding: John W. Newton, Magnolia Petroleum Co., and Vice-President for Refining, American Petroleum Institute. (Session developed by H. D. Wilde, Humble Oil & Refining Co.).

Opening Remarks, John W. Newton, Vice-President for Refining.

Recognition of Executive Ability in Yourself and Others, Robert F. Pearse, Worthington Associates, Chicago.

PROCESSES

Thursday, May 13, 9:00 a.m., Ball Room.

Presiding: H. D. Wilde, Humble Oil & Refining Co. (Session developed by F. W. Schumacher, Standard Oil Development Co.).

Dualayer Distillate Fuel-Oil Treating Process, C. A. Duval, R. T. Malin, and V. A. Kalichevsky, Magnolia Petroleum Co.

Factors in Selecting a Catalytic Reforming Process, J. A. Boch, W. R. Hertwig, L. W. Russum, and R. A. Steel, Standard Oil Co. (Indiana).

A Model II Fluid Hydroformer and Its Application, E. W. Nicholson, Esso Standard Oil Co.

Hyperforming, Clyde Berg, Union Oil Co. of California.

FRACTIONATION

Thursday, May 13, 2:00 p.m., Ball Room.

Presiding: C. P. Baker, Socony-Vacuum Oil Co., Inc. (Session developed by R. C. Adam, Magnolia Petroleum Co.).

Fractionation-Equipment Sizes for Refinery Feed Stocks, G. T. Atkins and G. W. Wilson, Humble Oil & Refining Co.

Effective Use of the Fractionating Ability of Continuous-Distillation Columns, Norman Kirk, General Electric Research Laboratory, and Merrell R. Fenske, The Pennsylvania State College.

The Performance of Catalytic Cracking-Unit Fractionating Towers, G. S. Houghland, E. J. Lemieux, and W. C. Schreiner, M. W. Kellogg Co.

Hydraulics of Tray Design, Prof. R. L. Huntingdon, University of Oklahoma.

OVERALL AND PER-BARREL REFINING CORROSION COSTS

Cost Factor	Per Bbl. Crude Run	Industry Total, Approx.
1—Anti-Corrosion Built-In	$0.021	$50,000,000
2—Maintenance	0.071	168,000,000
3—Lost Production on Scheduled Shutdowns	0.018	43,000,000
4—Tool Stocks, Inventory	0.0025	6,000,000
	$0.1125	$267,000,000

In the table at the left, it assumed that 2,370,400,000 bbl. of crude were charged to stills in 344 days during 1951, a total of 21 days being allowed for scheduled shutdowns.

On the basis of $0.1125 per bbl., the actual total loss would be $267,000,000. The figure of $270,000,000 was taken as an approximation of the total refining industry loss.

This method was used by the API panel for estimating overall refining industry costs, and is tentatively proposed as a standard.

Measuring Plant Corrosion Costs

New technique for analyzing costs proposed by API Refining Division's cost study group

By V. B. GUTHRIE
Associate Editor

TWO part-way goals have been reached in the program of the API Refining Division for developing means to help oil companies reduce the present high corrosion costs encountered in processing petroleum.

1—An estimate has been worked out of the yearly direct cost to the refining industry of combating the deterioration of metals through corrosion occurring in their plants. This approximation is $270,000,000, or $0.1125 per barrel of crude run to stills (see table above).

2—The methods of analysis used by an API cost study panel in setting up this overall industry figure have been proposed for use by oil companies and plants in setting up their own individual corrosion costs.

Although the estimate for the industry and the methods used in setting it up are tentative; refining companies representing nearly 70% of the crude charged to stills in this country agree in general with the panel's work.

What has been accomplished so far is only the first phase of the API program. Having established the extent of the overall corrosion cost, and suggested a means for individual companies to approximate their own costs, it is proposed to show how these expenses in refining can be reduced 15-20% by greater application of the present known methods for corrosion protection. It is also planned to develop new techniques for protection.

The API program is under the direction of a Subcommittee on Corrosion of the Committee on Refinery Equipment of the Refining Division. E. Q. Camp, Houston, Humble Oil and Refining Co., is chairman of the subcommittee. The corrosion cost studies have been carried on by a panel of the subcommittee, of which F. C. Braun, Pittsburgh, Gulf Oil Corp., is chairman.

The cost studies were started in 1953 and it was then thought that $200,000,000 would be a high corrosion cost for the refining industry. As data was gathered from the oil companies and better methods of cost estimation were developed, the higher the overall figure has gone.

Members of the panel believe the present per-barrel cost figure ($0.1125) for the corrosion cost for the industry is considerably under the actual cost for some individual plants where corrosive crudes are being processed.

The present tentative technique for corrosion cost estimation is to a considerable extent based on actual cost figures for building and maintaining processing units. The direct corrosion costs are considered to be of four types: (1) Built-in, anti-corrosion costs for processing units; (2) maintenance costs chargeable to corrosion; (3) costs of loss in production due to corrosion, at regular shutdowns; (4) costs of special tools and labor required for corrosion repairs, and interest on money tied up in replacements and inventory because of corrosion.

Following is a discussion of the panel's tentatively proposed technique for estimating direct corrosion costs and also summaries of comment from oil companies to whom the panel's data was submitted.

1—Built-In Corrosion Protection

In order to determine the cost level of corrosion-suppressing equipment originally built into an average manufacturing unit designed for a crude oil of average corrosivity, a 32,000 bsd atmospheric crude still and outlying appurtenances was selected for analysis.

The unit selected was designed with a normal amount of anti-corrosion material in heaters, vessels and lines to withstand a crude of average corrosivity. Cost data covered the still proper, additional steam and electrical utilities, cooling tower and water facilities, field oil lines and running and storage tanks required for the unit.

Cost records and design drawings were used in estimating total anti-corrosion investment in fired heaters; towers, drums and storage tanks; heat exchangers; pumps, compressors and drivers; piping (alloy and carbon steel); structural steel; painting, etc.

At the same time, an estimate of useful life, converted to dollars cost per year, was made for anti-corrosion material, and corrosion allowance in each category.

On the 32,000-bbl. unit and outlying accessories, the anti-corrosion investment was estimated as 13% of the total cost of the complete job. The equivalent life of the built-in, anti-corrosion investment, weighted on the the basis of cost per year, was taken as 7 years. The factor for converting 1947 construction and materials costs to a 1953 basis was taken as 1.35. The originally built-in investment cost to the company was based on the concept of capital recovery (earning power interest compounded annually).

From the study of these factors, the unit cost of the originally built-in anti-corrosion investment was set at $0.021 per bbl. of crude processed. On the volume of 2,370,400,000 barrels processed in 344 days in 1951 (see table), the total annual cost to the refining industry was estimated at approximately $50,000,000.

The per barrel estimate resulting from the detailed investigation of the actual costs of the 32,000-bbl. atmospheric-vacuum crude unit, to the panel's surprise, tallied closely with the theoretical estimate of this corrosion cost factor which the committee had made earlier.

The oil companies to whom the API corrosion cost data has been submitted, have suggested from their experience that the factor of 13% of the cost of the total job as representing the cost of originally built-in anti-corrosion equipment, is too high. They expressed a preference for a 10-13% factor.

Information received was not specific enough, the panel stated, to warrant changing the 7-year average life figure for built-in equipment. One company thinks the estimate is too low. The replies varied considerably on the figure of $0.021 as the per-barrel corrosion cost for built-in protection. The range was from 50 to 300% of the committee's estimate.

This variance was believed to come about through a difference in the processing units studied by the reporting oil companies, in their estimates of useful life, and natural differences in the methods of analyzing cost data.

2—Maintenance Costs Chargeable to Corrosion

Investigations of maintenance costs made independently by two large refineries, showed 70 and 73% chargeable to corrosion. For each refinery, on a per barrel basis, the maintenance cost due to corrosion was $0.071.

Comment from oil companies on this factor in refinery corrosion costs showed a spread of from 50 to 90% in the percentage of maintenance cost chargeable to corrosion. The estimate of 70 to 73% used by the panel in setting up its tentative corrosion yardstick for refineries, is to be continued as a satisfactory base until more detailed maintenance cost accounting is available.

The unit maintenance cost of $0.071 per bbl. tentatively set up, is considered an acceptable figure, in view of the range of 7 to 11 cents a barrel given in the comment from oil companies.

3—Lost Production Due to Corrosion

This corrosion cost factor includes inspection, special maintenance, and interest on money tied up in replacements and inventory.

In setting up the $0.018 cost per barrel of this factor, the API group assumed that an average processing unit has three weeks of scheduled shutdown per year, and that an average of five days of this period are required for corrosion tasks, such as inspections and calibration of metal thickness.

On the basis of 1951 operations, if the five days of shutdown due to corrosion could have been avoided, an additional 34,500,000 barrels of crude would have been processed. It is further assumed that processing operations increase the value of each barrel of crude by $1.25. Thus $43,000,000 a year is lost to the oil companies because of corrosion tasks on scheduled shutdowns, or $0.018 per barrel of the total 2,347,400,000 barrels of crude charged.

Replies from the oil companies were not clearly drawn on this corrosion item. One suggested an estimate of $0.0125 per bbl.

4—Tool Stocks and Inventories

Corrosion factors here are (a) costs of tool stocks used for corrosion inspection and maintenance, and field operators and users of these tools, and (b) interest on money tied up in replacement and inventory because of corrosion. It was assumed that costs in both cases are $6,000,000 per year for the industry, and the per barrel cost was $0.0025.

Indirect Corrosion Costs

These result from such causes as accident and fire losses, lost production on unscheduled shutdowns, evaporation through deteriorated tank roofs, leaks through openings caused by corrosion, above-normal insurance rates, civic responsibilities in regard to stream pollution where corrosion is a factor, and others.

The panel as yet has found no way to approximate the indirect corrosion costs, except possibly as a percentage of direct cost. It has asked the oil companies to submit suggestions on this point.

Summary of Cost Work

Opinion in the refining industry, the API Subcommittee on Corrosion Costs believes, is in favor of the method of cost estimation represented in the present tentative schedule. Said one member, "It may be that approval so far has stemmed from the fact that companies not represented on the committee have not yet set to work to analyze their own costs on this same basis. The one detailed reply received followed the pattern fairly well, the differences in results stemming from differences in methods of analysis and estimation.

"While there is no cut-and-dried answer, the subcommittee feels it has already accomplished one valuable result in revealing a considerable overall corrosion cost in the refining industry, the approximate level of which is at least logical and has been of great interest to the oil companies.

"With such an awakening of interest at the management level, as is evidenced by statements that maintenance costs attributable to corrosion will be isolated in the future, the subcommittee feels that the first phase of the API Corrosion Protection Program is reaching a conclusion.

"The next phase should be a review of corrosion costs to determine to what extent they may be controlled on the basis of the refineries' experience with corrosion protection methods."

Report on Tank Failures

THE first public report on the problem of oil storage tank failures will be made at the Houston meeting of the API Refining Division at a group session, Tuesday evening, May 11.

Four aspects of the problem to be covered in as many papers are:

1—A broad historical survey of failures of this type.

2—The extent of the problem throughout the refining industry, the results of a survey on large oil storage tank failures made by the special Study

Committee appointed to the task by the Committee on Refining Equipment.

3—The cost figures which must be kept in mind in looking at the results of the special Study Committee survey.

4—Latest results in an experimental study of ways for decreasing further the chance of brittle failure of steel as built into an API standard oil storage tank.

The reports presented are fact finding. Later on, recommendations will be made to the Committee on Refinery Equipment, after due consideration has been given by all concerned to the facts available.

That the problem is not new will be brought out in a paper reviewing past history, by M. E. Shank, Massachusetts Institute of Technology. Such failures have been occurring from time to time, usually with little or no warning, ever since steel has been used for engineering structures, a period of about 75 years, according to Dr. Shank.

Several of the more striking failures of this type will be described. Generally, several factors, some not clearly known even now, have been needed to explain some of these failures. These factors vary, and not always the same ones seem to be most important in the different cases. The problem is particularly puzzling because, in most cases, the cracks look as though the steel was extremely brittle. However, the usual tests all show the steel to have its normal good engineering properties; and designing has been done on that basis.

The loss of about 250 welded steel ships in a similar manner of failure, and the cracking in service of about 1200 more during the period 1942-52 focussed a great deal of attention on the problem, and some of the world's outstanding scientists and engineers have studied it with only moderate success towards solving it. Dr. Shank points out that tests of samples show that the steel only acts as though it were brittle when it is cooled below some critical temperature, and that this seems to be different for each plate. The age of the structure or of the steel is not important.

When a crack occurs in the steel, under tensile loading, it progresses nearly with the speed of sound in steel. Although many seem to think that welded structures are more apt to crack than do riveted structures, there is no real evidence to support this view. In fact, cracks usually run through the parent steel rather than along the welded seams. However, defects of design or due to fabrication procedure usually are important, although sometimes these details are so small that they cannot readily be found.

Over the years, the ingenuity of engineers and the experience they have gained from earlier failures have led to many methods for lessening the major causes of cracking in steel structures. In general, as long as the recommendations of existing design standards are followed, the chance of failure probably is small. However, as long as, in any failure, we know neither all of the factors involved nor their relative importance, there always will be some chance of failure occurring, no matter how small.

The extent of failures in the refining industry will be indicated by the report of the chairman of the special Study Committee, Dr. Carl H. Samans, associate director of engineering research for Standard Oil Co. (Indiana).

There are about 6000 large tanks in service today, each of which can hold 55,000 bbl. or more. There have been 32 failures in the past 35 years of such tanks in this country. They have failed either partially, by a crack or split of limited extent, or completely.

Although there have been over twice as many partial failures as complete failures, there is no reason to think that any of the partial failures would not have been complete if conditions had been as adverse as they might have been. No way of predicting whether or not a failure might occur is known. Some of the tanks failed when first filled. Others gave satisfactory service for as long as forty years before anything happened. Still others, after failing partially relatively early in their life, were repaired and then have given over twenty years of service without any further trouble.

Cases also are known in which fairly large partial cracks must have existed partway through the tank wall for a sizable time before a number of new and different adverse factors happened to coincide, and a crack to failure appeared. Oil storage tanks, like all other structures, are built with plenty of extra material in their wall thickness, and it takes some unexpected and powerful forces really to harm them.

The economic slant to these failures will be explained by Fred A. Gitzendanner, also an associate director engineering research for Indiana Standard.

He will point out that the loss from a single tank failure has ranged from about $5000—when only minor repairs were made and most of the tank's contents recovered—to as much as $500,000—when there was a complete loss of tank and contents.

The average loss was $90,000 per failure. On this basis, an annual insurance premium of $60 per tank could cover the risk for this type of sudden tank failures. Actually, this figure is low when compared to the corresponding fire insurance premium of $220 per tank per year on the average being paid by refiners.

Mr. Gitzendanner also will discuss the relative costs of other things that might be done to decrease the chance of such failures, and show how all of them have to be looked at as a calculated risk, as against the soundness and cost of the methods proposed for reducing failures.

New methods to decrease the chances of brittle failure will be described by Frank J. Feely, Jr., and Maynard S. Northup, Standard Oil Development Co. In their special test, the latest and most promising approach to the problem, pieces of steel plate up to 16 ft. long and 40 in. wide are being tested in a manner approaching service conditions more closely than is possible with the customary small test pieces.

Cracks of known length, and varying degrees of fineness that are almost impossible to see even under a microscope, down to those produced at liquid nitrogen temperature, are first produced by a specially controlled method.

The specimen next is cooled to the desired test temperature and is stretched by a known load. A gun is then used to drive a wedge into the crack very rapidly. If the temperature is too high, or if the stretching load is too small, either nothing will happen or the crack will lengthen a small amount only. However, if the temperature is low enough and the stretching load is high enough the crack will jump very rapidly entirely across the test plate.

The effects of such factors are being studied as width of test pieces, their length and thickness, the size of the initial (made) crack, the test temperature, and the type of steel. Although, in this special test method, the ordinary carbon steels that are now made for the shipbuilding industry seem to give uniform results, those made for general structural purposes, including the usual tank steels, vary a great deal. Some plates will resist cracking, even when the temperatures are relatively low and the stretching loads are relatively high; others bought to the same specification will crack readily even when the temperatures are relatively high and the stretching loads are relatively low. Thus far the reasons for these differences are not known, and no other simpler test has been found which shows them so clearly.

More Economic Pressure Vessels

That is goal of engineering research studies to which API gives considerable financial aid

By **WILLIAM C. UHL**
Associate Editor—Equipment

THE petroleum processing industries today spend an estimated 15 to 20% of the new construction dollar every year for pressure vessels. Based on last year's total capital investment by refiners of some $1,056,250,000, this means that pressure vessels are probably costing the refiner around $150,000,000 to $200,000,000 annually.

An important current research activity is directed at an ultimate goal of reducing some of this cost—through more careful design, more efficient use of the newer metals, and at higher design stresses and an increase in the true factor of safety.

This activity is receiving considerable financial support by the American Petroleum Institute as well as active participation by interested API members. It is being conducted by the Pressure Vessel Research Committee of the Welding Research Council and has received API support since its inception in 1945. PVRC operates on an approximate annual budget of $80,000, of which the API contributes about one-third.

Including this direct support of pressure vessel research, API is responsible for 12% of the cost of all research projects conducted by the Welding Research Council itself.

As pointed out by PVRC Chairman Perry R. Cassidy, of Babcock & Wilcox Co., "A 1% reduction in the cost of pressure vessels will represent savings equal to many times the total cost of the research program to date."

Principal goal of the PVRC work is to arrive at factual data needed by code making groups, by designers in the manufacturing field, and by all other engineers who are concerned with the design of pressure vessels, using the newer, higher strength steels.

These steels, ranging in yield strength from 70,000 to 90,000 psi. and in tensile strength from 100,000 to 120,000 psi., cannot be used economically today, because of certain restrictions in stress allowances. PVRC proposes to show that higher strength steels are not susceptible to failure any more than the medium strength steels presently employed in pressure vessel construction, but may be used—safely and economically—with much higher design stresses, under certain limitations of service.

Organization of PVRC itself was at the original request of the Boiler Code Committee and the Welding Research Council. The main committee comprises about 100 engineers and technologists from such segments of industry as steel makers, fabricators, boiler and vessel builders, engineering construction firms, the petroleum and chemical industry, as well as research organizations, universities, government agencies, and associations who are concerned with the problem—like the API.

Three principal divisions make up the group—materials, design, and fabrication. In addition, there are a number of important subcommittees directly concerned with specific projects. These include: research on high-strength steels, stress corrosion cracking, inspection and testing, tests on low-alloy high-strength steels in pressure vessels, materials for high-temperature service, increased design stresses, and many others.

Some 40 reports have already been published by PVRC, reflecting the results of work and projects carried out by the various subcommittees.

Information already available to industry, through these published reports, includes:

1—Effects of different deoxidation practices on the behavior of steels.

2—Deleterious effects of the straining of steels associated with temperature or time, and how these effects may be overcome.

3—The manner in which steels which are ductile at ordinary room temperatures become brittle at low temperatures.

4—How brittle failure may be avoided by the selection of suitable steels, together with utilizing better design and workmanship.

5—Heat treatment effects covering preheating of vessels before welding.

6—Amelioration treatments by postheating.

7—The influence of corrosive environments on cracking of steel and how they may be controlled.

8—Proof testing of vessels.

9—The possible use of carbon steel plates of structural quality in pressure vessels during times of material shortages.

Information now being developed in current projects will augment the data already accumulated to prove out the major premise of the PVRC goal—that pressure vessels can, and must eventually, be made at lower cost yet with increased strength and safety.

Among them are many projects of considerable significance to the petroleum processing industries, while all of them are of high value to pressure vessel users and builders. For example:

The Fabrication Division is sponsoring, among others, three closely correlated projects concerned with the mechanical properties of high tensile steels which are being considered for use in pressure vessels in order to permit higher design stresses.

The Design Division's work has resulted in two reports soon to be published, which are seen as important and helpful contributions to the problems caused by local loads on vessels applied through nozzles, lugs, clips, supports, etc. Analytical and experimental data has been, up to this time, extremely scarce and entirely inadequate for this type of loading to which vessels are regularly subjected in service.

Another project being considered is aimed at developing design rules for size, location, buckling strength, circularity, etc., of the reinforcement at the intersection of conical and cylindrical shells.

The Materials Division likewise is contributing much to the overall goals of PVRC. Among projects of interest to the petroleum processor are: 1) a research investigation of stress corrosion cracking, and 2) compilation of the basic properties of six high tensile steels.

The stress corrosion cracking project has been assigned to the National Bureau of Standards. The first part of the program is to devise an accelerated laboratory test to obtain satisfactorily reproducible results—in 250 hours or less—of the transcrystalline stress-corrosion cracking of Type 304 stainless steels. The overall problem is to determine the conditions under which austenitic stainless steels are subject to this phenomenon.

Do You Need Training Materials?

Here's an API service to help you get them

By STUART BOYNTON
Editorial Assistant

A CENTRAL lending library for material on training refinery personnel is one of the most successful recent innovations of the API Refining Division. Organized as part of the main library at New York headquarters, the project is expected to go a long way toward meeting the need for knowledge in the industry about the latest methods and aids being used for training personnel in refining jobs and skills.

The idea has made a big hit. Although the library has existed officially since May, 1952, it came into its own only last January, when the API circulated the first index of material accumulated since it opened. After the industry had a look at the index, the respectable trickle of requests widened into a river. Out of 59 items on the first index (with three copies of most of them) all had been borrowed by April 1, and there was a large backlog of requests for the more popular works.

The collection in the new library is composed of contributions from industry, universities and individuals. It consists of almost anything touching on refinery training that contributors want to send—company manuals, papers read at university or association symposiums, or research developed by university extension departments.

The library lends to all comers, firms or individuals, API members or not. A large part of its appeal probably stems from its policy of permitting reproduction of any of the circulating literature. This has several advantages: 1) a firm can build a permanent file of training literature for possible future use; 2) it can review and improve its established training programs by considering the methods employed by other companies; and 3) a course for training a specific skill can be set up more efficiently by utilizing the experience, as far as it fits the situation, of other firms that have built successful programs.

Trade secrets are safe because each company decides for itself what material should be contributed to the library and, therefore, might be used by others. Cost of reproduction is met by the borrower.

How does the system work? The experience of a Canadian refinery which had a difficult training problem is an illustration.

The firm's management had decided

Here's What You Can Get from the Library

BOILERMAKERS

The Texas Co.
Basic training course in boiler shop layout practices

CARPENTRY

Atlantic Refining Co.
Carpentry training program for job and zone foreman instructors

The Texas Co.
Basic training courses in:
Bill of material interpreation and blueprint reading
Construction materials and their properties
Hand and power tools and their uses
Mechanics of the steel square

CRAFTSMEN, GENERAL

The Texas Co.
Blueprint reading and interpretation

ELECTRICIANS

Sinclair Refining Co.
Electrical trainees' on the job manual
Training course for electricians and linemen

MACHINISTS

McKee, Arthur G. & Co.
Technical training program—centrifugal pumps, by Frank Drahos, Byron Jackson Co.

The Texas Co.
Basic training courses in:
Bearings—designs and uses for machinists
Blueprint reading and interpretation
Centrifugal pumps
Care and operation of compressors
Machine shop layout
Materials—standards, properties and uses
Mechanical seals for centrifugal pumps
Power units (steam turbines)
Reciprocating pumps
Rotary pumps

MANAGEMENT

Cities Service Refining Corp.
Basic management training program, 1952
Management development program leaders program, 1950
Esso Standard Oil Co.
Conference leadership. A text and reference to assist in the development of conference leaders for training programs, 1952
Humble Oil & Refining Co.
Foundations in Management, 1947, 1948 and 1950. A series of lectures delivered before management groups
McKee, Arthur G. and Co.
Orientation and indoctrination series, 1953
Shell Oil Co.
Conference chairman and instructors manual, by G. P. Koch, 1949
Conference leader's background information on day to day written communications, 1950
Conference leader's guide for 1952, Shell's 40th year
Conference outlines. What makes people tick:
The behavior pattern, 1949
The grouch, the daydreamer, the know-it-all, 1949
The troublemaker, the timid soul, the worrier, 1949
Program for security, 1953
Socony-Vacuum Oil Co.
Tips on talking
Standard Oil Co. of California
The management guide—an organization and administrative aid in the California Standard Co., 1948
Management teamwork—pamphlet outlining the objectives of management teamwork of California Standard, 1949

REFINERY PRACTICES AND PROCESSES

Chu, Ju Chin
How to train refinery engineers in distillation
McKee, Arthur G. & Co.

to set up a petrochemical branch in Alberta and was going to have to hire operating personnel with little experience of refining. The company hoped to be able to set up an intensive program for training the new men during their first few months of employment.

Training aids were needed covering both general refining practices and the operation of specific pieces of equipment—centrifugal and reciprocating pumps, compressors, fractionation columns, heat exchangers, etc.

The company's training supervisor could find only a small part of the needed texts in the firm's own files. He sent a letter stating the problem to the API library. The inquiry was answered promptly with a list of works on these topics in the library—this was before the recent index was published.

From this list the training supervisor chose and requested a number of items. After examining them he decided to reproduce the contents of several of the most useful. As will usually be the case, the texts had to be modified in some respects so as to fit the plans and organization of the company. Also, the supervisor was not able to find material on every job for which training was necessary. Nevertheless, using the library's resources offset a substantial part of the time and cost involved in organizing such a program, and it's likely that the final plan was better for having been developed out of the experience of many firms.

The library can be useful in many other ways. For instance there was the professor at a well-known college of engineering who had to organize and give a course on the internal combustion engine. He requested and was sent material on the functions of these engines in the refinery and their construction, fuels and lubricants.

Another man, an official of a small, independent refinery, evaluated the service as an aid to the new firm which is dealing with operating and training problems for the first time or with problems that are peculiar to the area. Management at this company hopes to utilize some of the techniques other refineries may have worked out while operating under similar conditions.

Consideration of the project began as early as 1951, when the committee on training of the API Refining Division decided that a system should be set up to inform the industry about the training aids in use. A subcommittee on training literature was established. It came up with the recommendation for a source library of these materials. The final decision was for a central collection in New York at the API headquarters.

How to Use the API Training Library

Contributions to the API Library of Training Materials must meet only one requirement; they must be of a size to fit on a standard library shelf (12 x 18 in.). In addition, it is requested that three copies of each item be furnished, if possible.

Both contributions and requests for material to be borrowed should be addressed to the Librarian of the American Petroleum Institute, 50 West 50th St., New York 20, N. Y.

Revised codes and code interpretations for unfired pressure vessels and pressure piping, by Frank G. Williams, Taylor Forge and Pipe Works

Magnolia Petroleum Co.
Fundamentals of refining, 1953

Pan American Refining Corp.
Basic training manual—operating departments
Training activities 1951-52

Standard Oil Co. (Ohio)
Refinery crude unit operating manual, 1952

Texas A. & M. College
Vocational training, fundamentals of general refining practices
1 An over-all picture of a refinery and the processes involved
2 Crude oil—the primary charge stock to the refinery
3 Distillation
4 Processing and disposition of light hydrocarbons
5 Polymerization
6 Cracking, thermal and catalytic
7 Treatment of petroleum stocks lighter than lube oils
8 Lubricating oil evaluation and non-solvent treating
9 Dewaxing and solvent treating processes
10 Petrochemical and other processes
11 Heavier products, fuels and certain by-products
12 Refrigeration in the refinery
13 Metallurgy and corrosion in the refinery
14 Personnel and auxiliaries required to operated a refinery

MISCELLANEOUS

Correspondence

Standard Oil Co. of California
Correspondence handbook—basic principles of good letter writing and their application to company requirements, 1949

Corrosion

Bridgeport Brass Co.
Technical handbook, revised 1952
Condenser and heat exchange tube handbook, 1953

Driving

Esso Standard Oil Co.
Driver testing and training, 1951
Manual for safety training of lift truck operators

Films and Audio-Visual Aids

Socony-Vacuum Oil Co.
Audio-visual aids Buere's guide
Film catalog
Practical use of audio-visual aids in industrial training, 1949
The what and why of audio-visual aids

Personnel Relations

Standard Oil Co. of California
Company's personnel relations program—a summary of talks, 1949
Here's your opinion—results of 1951 employee opinion poll

Piping and Tubing

Babcock & Wilcox
Properties and methods of working seamless and welded tubes and pipes of the B&W stainless Croloys
Methods of working seamless tubes and pipes of the intermediate B&W Croloys
Properties and methods of working seamless tubes and pipes of the B&W Nicloys
Properties of carbon and alloy seamless steel tubing for high-temperature and high-pressure service

Supervisors

Esso Standard Oil Co.
Basics of supervision
Supervisor training, 1949

Humble Oil & Refining Co.
Fundamentals of supervision, Vols. 1 and 2

The Texas Co.
Procedure manual, supervisory program

Safety

McKee, Arthur G. & Co.
(See under Refinery Practices and Processes)

Technical

Esso Standard Oil Co.
Technical training program, Baltimore refinery

Welding

Socony-Vacuum Co.
Trainers guide for electric arc-welding programs, 1950

Work Sheets

Socony-Vacuum Oil Co.
Job methods work sheet

API Catalyzes Refining Progress

By JOHN W. NEWTON
Vice President for Refining
American Petroleum Institute

LIKE the catalysts the oil companies use in processing, the American Petroleum Institute Refining Division functions to enlarge and speed up the flow of essential technical information and data to the petroleum refiners. This swift dissemination of fact and opinion has put the refining industry in the forefront of the quick adaptation of better equipment and improved techniques.

The Producing and Marketing Divisions of the API operate along the same lines as Refining. The constant assembling of fundamental knowledge in all branches of the petroleum industry under the sponsorship of the API in effect spreads the work of solving common technical problems. This achievement has made the API unique among industry associations in the country.

It is not the Refining Division's purpose nor practice to discuss competitive problems or information; rather, the work of the Division offers every refiner solid facts from which he individually can find ways to improve his products' quality, increase his operating efficiency, better his public relations and accomplish many other objectives.

The current and recently completed work of the Division will receive continued interest as additions are made to this existing reservoir of technological fact. A review of these projects will show some of the directions in which they are most likely to benefit refiners and, through them, the U.S. public.

Automotive Fuels: For many years, in cooperation with the auto makers, the Division has sponsored research projects dealing with equipment, lubricants, and fuels. These have resulted in direct gains for the motoring public through advanced engine design and more effective petroleum fuels. They have permitted refiners to plan production of higher quality fuels and carry these production changes out efficiently and economically. In addition to the civilian effort, a large segment of this research has been devoted to defense activities, which even more vitally affect the essential public interest.

The Division, working through the Southwest Research Institute in San Antonio, Texas, has investigated some 190 individual cars covering 19 makes and yearly models ranging from 1946 to 1952. Eight oil companies furnished fuels with widely varying characteristics.

Vapor Lock and Cold Starting: Of basic importance have been the recent investigations into vapor lock and cold-starting characteristics of military vehicles. In the summer of 1951 and winter of 1951-52, exhaustive tests were made on 12 different types of military vehicles. Using a great many commercial petroleum fuels, the tests gave direct results in the form of improvements in the fuel injection systems and in a description of the gasoline properties that would give best performance. These were carried on under various conditions.

Diesel Fuels and Lubes: Research activities on diesel problems have extended to military aircraft engine design, fuels and lubrication. Combat vehicles of all types have been placed under various studies as the Division of Refining has extended its cooperative efforts with various segments of the Armed Forces.

An example of this continuing program is the current work of establishing, with U.S. Army Ordnance, the proper engine-lubricating oil relationship in air-cooled tank engines.

Other projects have looked into the storage stability of diesel fuels, gasolines and jet fuels—work which has resulted in vast savings of product and energy.

Public Relations: The API's Oil Industry Information Committee, itself not a part of the Division of Refining, has done some notable work in educating both the public and the oil industry.

This educational program has already had some distinct benefits in improving the industry's relations with the public. It is not, however, the only way in which the API has had influence in gaining public confidence and appreciation for the refiner. Many segments of the various research programs have dealt with problems of direct concern with these relations.

Refinery Waste Disposal: One of the most important of these has been the continuing program of investigation into the technical problems of refinery waste disposal.

While the major portion of the nation's refining capacity is concentrated in relatively few areas, the nation as a whole is becoming increasingly conscious of the over-all task of maintaining cleanliness of streams and air at high levels of purity. The oil industry shares with all others this responsibility. Anyone familiar at all with the steps taken in recent years can attest to the sincerity and aggressiveness with which the oil companies, individually and jointly, have accepted their portion of the task.

The development of technical information dealing with the treatment of refinery waste products has been one of the longest established goals of the Division of Refining.

The Committee on Disposal of Refinery Wastes, through its support of research projects in leading research institutions and by free exchange of industry "know-how," has helped keep the refining branch abreast of modern technology in both water and air pollution abatement.

Product Testing: Almost at the opposite extreme, in so far as public attention is concerned, is the Division of Refining's work in the measurement, sampling and testing of petroleum and its products.

Of particular importance, as an example, is the work done on pressure-temperature relations of petroleum mixtures, a project undertaken in 1949 at Northwestern University. When completed — perhaps in 1954 — this study will undoubtedly have yielded information of extreme value to design engineers in many industries.

Central Abstracting: Another endeavor initiated by the Division is the Central Abstracting Service. Culminating a cooperative study by oil technologists, the API has started a service aimed at furnishing weekly abstracts of 100 leading U.S. and foreign technical publications to subscribers.

Employee Training: In employee training, the Division of Refining has accumulated training literature and counseled with the pump manufacturers and other suppliers on making their training literature more effective.

The list of such contributions can also include providing the industry with viscosity sampling materials, and with engineering techniques for greater safety.

The fundamental knowledge constantly being assembled under API sponsorship has immediate and direct meaning in the refiner's search for technological improvement. Its importance can be recognized only by its use and by furtherance of its continued gathering through wholehearted support of the API program.

API Committee Activities—1953

Annual progress reports on programs under way by Refining Division technical committees

One of the most important activities of the American Petroleum Institute Division of Refining is to organize and coordinate various technical committees, which carry out studies and projects of mutual interest to the petroleum processing industries. To acquaint the industry more fully with the work of these committees, these progress reports have been prepared for us by the chairmen, with the cooperation of W. T. Gunn, director of the Division.

ELLIOTT B. McCONNELL

Chairman, Advisory Committee

Mr. McConnell, Standard Oil Co. (Ohio), graduated from Cornell University chemical engineering school in 1923 and was employed by Standard Oil Co. (N. J.). In 1928 he joined Standard of Ohio as assistant to the vice president in charge of manufacturing, was made general manager of the manufacturing department in 1945, and in 1946 was appointed vice president and elected a director.

JOHN W. NEWTON

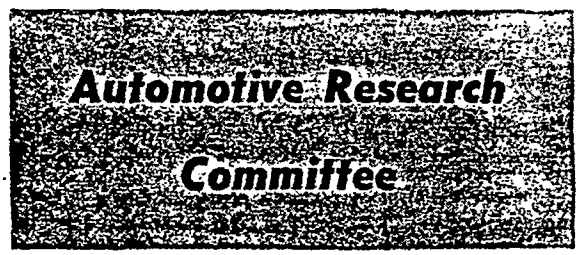
Chairman, General Committee

Mr. Newton, Mongolia Petroleum Co., Beaumont, received a degree in chemical engineering from Texas A&M. He taught chemistry there for 2 years, and then joined Magnolia as a chemist in 1914. After successive promotions, he became a director and vice president of the company in 1938, and is now vice president and manager of refining.

CHARLES M. RIDGEWAY

Chairman, Program Committee

Mr. Ridgeway, Pure Oil Co., Crystal Lake, Ill., received a B.S. in chemical engineering from the University of Michigan. He has been with Pure since 1932, in various capacities at the company's refineries and in the Chicago office. From 1942-43 he served with PAW, returning to Pure as technical assistant for the refining department. Since 1949 he has been manager of the research and development laboratories.



C. E. DAVIS, *Chairman*

Mr. Davis has been with Shell Oil Co. since 1917, starting as a clerk in the Cushing, Okla., refinery. He moved to Wood River, to Houston, to St. Louis, and in 1943 was made general manager of the manufacturing department in New York. He became assistant to the vice president in charge of manufacturing in 1949.

R. C. ALDEN

Chairman, Subcommittee on Fuel Surveys

(see photo, Committee on Petroleum Products)

THE Automotive Research Committee continued to sponsor studies and investigations to promote improvements in fuels and lubricants and their more efficient utilization. Many of the research projects were carried out by the Coordinating Research Council under the joint sponsorship of the American Petroleum Institute and the Society of Automotive Engineers and are of considerable benefit both to the petroleum and automotive industries.

Surveys of commercial motor and aviation gasoline properties, diesel fuels and turbine fuels are made annually by the U. S. Bureau of Mines with the cooperation of the Automotive Research Committee and distributed to the automotive and petroleum industries. The desirability of including residual fuels in future surveys is being considered.

Vapor lock studies conducted by the Southwestern Research Institute were concluded during the year and a final report is in preparation. A new volatility project which will include studies on vapor lock, stalling and hot starting has been inaugurated by CRC.

Among the more important CRC projects is a study of the storage stability of motor gasolines, turbine fuels, and diesel fuels. This study was initiated primarily at the request of the military services, but is yielding information of considerable interest commercially. Other fundamental fuel studies include projects at the Massachusetts Institute of Technology and the University of Wisconsin for developing techniques and apparatus for the instantaneous measurement of gas temperatures inside the combustion chambers of internal combustion engines. In cooperation with the U. S. Bureau of Mines, fundamental investigation of ignition quality of diesel fuels is being continued using a constant volume bomb procedure.

In motor gasolines major emphasis has been placed on the phenomenon of preignition and its relation to octane requirement. Investigation of turbine fuels covers high temperature volatility characteristics and the relationship between combustion characteristics and turbine efficiency, including depositing tendency. In the Diesel fuel field the full scale tests on railroad Diesel engines has entered the final phase and a progress report on the first phase has been issued to the participants.

Lubrication projects currently in progress include a study of engine lubricant relationships and a new project on gear lubricants. A design for a new test engine for evaluating the performance of engine lubricants has been finalized and a supplier has been selected on the basis of price and ability to conform with the committees' requirements.

Smoke and Fumes Committee

W. L. STEWART, Jr., *Chairman*
Mr. Stewart, Union Oil Co. of California, Los Angeles, attended Stanford University and was graduated by M.I.T. in 1923. He began with Union Oil the same year and worked as a research assistant until 1925, when he became secretary of the manufacturing committee. In 1927 he was promoted to executive assistant and elected a director. He became a director of manufacturing a year later, a vice-president in 1930 and, in 1942, the company's executive vice-president.

THE Smoke and Fumes Committee was formed in 1952 for the purpose of sponsoring research on the growing problem of air pollution. The research program adopted by the committee was designed to develop basic information on the causes of air pollution in urban areas and to obtain reliable data concerning the contributions to the problem of both the petroleum industry and its customers.

The funds for use in financing the Committee's program were made available on January 1, 1953. Some three weeks later, the Executive Committee met with the Director, Division of Refining, and the Executive Secretary and appointed an *ad hoc* five-man Technical Advisory Committee to assist the Executive Secretary in selecting the research institutions best qualified to conduct research on the projects it was proposed to establish. The Technical Advisory Committee held its first meeting in February, with the Director, Division of Refining, and the Executive Secretary in attendance. It was recommended that several additional institutions be contacted in regard to certain projects before final decisions regarding their placement were made.

These recommendations were followed and, at the second meeting of the Executive Committee in April, final recommendations were made concerning the location and proposed cost of 11 research projects.

The recommendations presented to the Executive Committee were accepted by it, and the task of negotiating contracts covering the projects was begun with the institutions selected. Research work under the first contract signed began on May 1, 1953.

Research projects were placed at seven institutions.

1—The Industrial Hygiene Foundation of America, Inc. was chosen as the site of a project for the selection and demonstration of the method most suitable to the determination of the path of gases after emission from a given source.

In setting up this project, it was soon discovered that no suitable method of tracing emissions was available and research would have to be carried out to develop a suitable method. At present two lines of attack are being followed. One of these involves the dispersal of mercury vapor from a given source and the development of sensitive methods for the detection of the vapor after subsequent dilution by diffusion and convection. The other possible and promising method of tracing emissions being studied involves introducing a finely-divided metallic compound into the given source. Minute amounts of the compound carried to distinct locations are then recovered by drawing measured quantities of the contaminated air through filter paper. The metal in the samples is then made radioactive by exposure to neutrons in the Oak Ridge pile. By allowing appropriate time to elapse between activation and counting, the radioactivity of interfering elements will have disappeared by normal decay. Hence, the amount of the tracer metal, and its concentration in the air volume sampled, may be determined by a count of its remaining radioactivity.

2—The Armour Research Foundation was selected for two projects.

One of these projects has for its objective the development of an analytical method for the determination of small amounts of ozone in polluted industrial atmospheres. The stipulation was made that the method developed should depend, if possible, upon physical rather than chemical properties of ozone and thus be specific for ozone.

The other project has for its objective the determination of the quantity and types of partially oxidized, thermally cracked and unchanged hydrocarbons present in the effluent gases from various types of domestic and industrial devices burning petroleum products. It appears that research on this project will be completed at the end of one year's time. The results of the study indicate that air pollution resulting from unburned hydrocarbons, cracked hydrocarbons and partially oxidized hydrocarbons from the burning of petroleum fuel is insignificant in cities of more than one million population which use petroleum products exclusively as domestic and industrial fuel.

3—The Kettering Laboratory of the University of Cincinnati was selected as the site of a project involving a survey of the ozone content and ozone forming capacities of the atmospheres of selected industrial cities.

Ten cities were selected for survey and the work in five of these cities has been completed. The preliminary results indicate that, contrary to what has been believed in the past, Los Angeles may not be unique in respect to the high ozone content of its atmosphere.

4—The Engineering Experiment Station of the University of Illinois was chosen as the location of a project for a study of the effect of nitrogen oxides, nitric acid and various particulate matter upon the sulfur dioxide-sulfur trioxide equilibrium in an atmosphere irradiated by sunlight.

Exceptionally good progress has been made on this project, the first portion of the study already having been completed. The preliminary results indicate that in sunlight, in the presence of water vapor and nitrogen oxides in concentrations which may exist in polluted atmospheres, the oxidation of sulfur dioxide to sulfur trioxide is a very slow reaction, only about 0.1% of the amount of sulfur dioxide present being oxidized to sulfur trioxide during each hour of reaction time.

5—The Franklin Institute was chosen to study the reactions occurring in sunlight between nitrogen dioxide and hydrocarbons of the various types present in gasoline, as well as the reactions occurring between ozone and hydrocarbons of the same type.

These studies are being carried out by the aid of infrared spectroscopy. Preliminary results indicate that the reaction products of the nitrogen dioxide hydrocarbon systems are quite easily identifiable. However, at the present time some uncertainty remains concerning the identity of some of the products formed in the reaction between ozone and certain types of hydrocarbons.

6—The University of Wisconsin also was selected as an additional site for the study of the reactions occurring between nitrogen dioxide and hydrocarbons.

WILLIAM NADEN, *Vice Chairman*
Mr. Naden, Esso Standard Oil Co., New York, joined the company over 20 years ago. His first post with Esso was as a chemist in the Everett, Mass., refinery. Between 1934 and 1944 he was general superintendent of the Everett and Baltimore refineries, and in 1944 was made manager of employee relations. Two years later he became a director, and in 1949 was named a vice-president in the manufacturing department. He was appointed general manager of the department in 1950.

H. G. VESPER
Chairman, Technical Advisory Committee
Mr. Vesper, California Research Corp., San Francisco, was graduated by California Institute of Technology in 1922 and has been with Standard Oil Co. of California since. In 1931 he was transferred from manager of the El Segundo branch of Standard's research and development department to San Francisco, as assistant to the general manager of the department. He was elected president of California Research Corp., Standard's research affiliate, in 1945.

B. A. FRIES
Chairman, Project Advisory Committee No. II
Mr. Fries, California Research Corp., Richmond, Calif., received a B.S. and Ph.D. from the University of California, Berkeley. In 1943 he was employed by the Manhattan Project, for which he conducted research in plutonium separation processes at the University of Chicago, Oak Ridge and Hanford. In 1945 he joined California Research Corp. as a research chemist.

R. N. GILES
Chairman, Project Advisory Committee No. VIII
Mr. Giles, Standard Oil Co. (Ind.), Chicago, received his B.S. from the South Dakota School of Mines, and his Ph.D. from Ohio State University in 1930. He then joined Standard of Indiana as a chemist at Casper, Wyo. He was transferred in 1934 to the Whiting laboratory, and in 1945 was placed in charge of all technical service activities at the Whiting refinery. In 1947 he became director of technical service for all of Indiana Standard's refineries.

VANCE N. JENKINS, *Executive Secretary*
Mr. Jenkins, Union Oil Co., of California, Brea, Calif., was graduated in 1918 from Southwestern University, Georgetown, Texas, with a B.A. in chemistry. After brief periods with The Texas Co. he left to teach and study at Emory University during 1920-21, and to attend the graduate school of chemistry at the University of California during 1921-22. From 1922 to 1930 he was again employed by The Texas Co. He began to work for Union Oil in 1932, and is now supervisor of the research division.

R. M. SHEPARDSON
Chairman, Project Advisory Committee No. I
Mr. Shepardson, Esso Laboratories, received a C.E. degree from Rensselaer Polytechnic Institute in 1930, and immediately thereafter joined Esso Standard Oil Co. at the Bayway, N.J. refinery. In 1935 he was transferred to the Esso Laboratories (process division), and in 1947 was appointed director of these laboratories.

W. J. COPPOC
Chairman, Project Advisory Committee No. VI
Mr. Coppoc, The Texas Co., New York, received a B.S. from Ottawa University, Ottawa, Kans. in 1935 and his M.A. and Ph.D. degrees from Rice Institute in 1937 and 1939. He began work with The Texas Co. in 1938 while attending college. In 1944 he was appointed assistant to the assistant chief chemist at Port Arthur, was transferred in 1949 to the Beacon, N. J., laboratories as assistant research director, became associate director in 1951, director in 1953.

HARRY LEVIN
Chairman, Project Advisory Committees Nos. IV and V
(see photo, Analytical Research Committee)

K. M. WATSON
Chairman, Project Advisory Committee No. VII
(see photo, Petroleum Products Committee)

Because of the fact that nitric acid is a more probable constituent of the amosphere than nitrogen dioxide when ozone is present, the work at the University of Wisconsin will be concerned chiefly with nitric acid reactions. This project was the last one to be activated and, hence, no preliminary results of great importance are yet available.

7—Stanford Research Institute was selected as the site of two projects.

Because this institution already had laboratory facilities in the Los Angeles area, it was given the problem of determining the mechanism of the formation of ozone in polluted industrial atmospheres. Its second assignment was the development of a method for the determination of the amount of total organic substances in polluted industrial atmospheres.

Considerable progress has been made on both phases of this project. Preliminary data indicate that contrary to published statements and popular belief, nitrogen dioxide and saturated branched chain hydrocarbons play no part in the formation of ozone. A method of isolating the substance or substances which form ozone on irradiation by sunlight has been developed, and it is believed there is a distinct possibility of the substance or substances responsible being identified within the near future.

It was found possible to modify an infrared analyzer for use in the determination of total organic substances in the atmosphere. The construction of an instrument embodying the necessary modifications will be begun within a short time.

Ever since the original postulation of the theory that smog is caused by reactions in the atmosphere between oxidizing substances and hydrocarbons derived from petroleum, there has been sharp disagreement concerning the degree to which this theory represents fact. In particular, there has been much argument concerning the relative amounts of hydrocarbons derived from petroleum and from other sources, such as rubbish burning, in the atmospheres over our cities. This point can be settled by a determination of the amount of radioactive carbon contained in the organic material in a given atmosphere. It is proposed to initiate a project of this kind within the near future.

There also has been a large amount of contradictory data presented on the subject of visibility reduction caused by aerosols resulting from the reaction of unsaturated hydrocarbons with ozone. Some authorities claim such reactions in the atmosphere are the cause of most of the reduced visibility over cities using petroleum products as the chief fuel. It is proposed to establish a project to study the conditions under which aerosols are formed by reaction of unsaturated hydrocarbons and ozone, as well as the rate of visibility reduction if such aerosols are found to form.

Committee on Refinery Equipment

R. H. VENN, *Chairman*
Mr. Venn, Humble Oil and Refining Co., Houston, received a B.S. from Wayne University and an M.S. from M.I.T., the latter in 1934, and started with Humble Oil as a junior chemical engineer at the Baytown refinery. In 1938 he became section head of the technical service division, was promoted to senior project engineer in 1942, and in 1945 was named technical assistant to the director in charge of refining. In 1950 he was named manager of refining operations.

THE Committee on Refinery Equipment is concerned with matters pertaining to the design, construction, inspection and repair of refinery equipment. It fosters the API program of standardization in these fields where standards do not exist, or where the standards developed by other bodies do not meet adequately the needs of the refining industry. It formulates recommended practices for industry-wide use in the promotion of efficiency and safety in refining operations. Through its representatives in other organizations, it attempts to insure that standards developed by those organizations are acceptable to the petroleum refiner.

The Subcommittee on Electrical Equipment, under the chairmanship of L. M. Goldsmith, continued its study of the design of refinery electrical installations. Its purpose is the development of recommendations which can be accepted by the petroleum industry as well as the manufacturers of equipment and the process plant contractors. It is expected that this work will culminate in a manual of recommended practices for electrical installations in refineries.

The Subcommittee on Mechanical Equipment, E. F. Voss, chairman, worked in cooperation with the Manufacturers Subcommittee on Centrifugal Pumps, Lynn Sawyer, chairman, on Specifications for Centrifugal Pumps for General Refinery Service. The specification is complete and is now in the process of being printed.

The Subcommittee on Pressure-Relieving Systems, under the chairmanship of J. C. Souder, continued in its effort to formulate a workable recommended practice for the design and construction of refinery pressure-relieving systems. At present, the greatest effort is being expended toward obtaining agreement on certain controversial design data relative to heat input to vessels involved in fires.

The Subcommittee on Unfired Pressure Vessels, N. J. Rees, chairman, has been considering certain proposed supplements to the API-ASME Code for Unfired Pressure Vessels having to do with materials, nozzle reinforcement, and inspection rule changes. Study groups are considering the general subject of welding quality, the design of alloy-clad vessels, and the fabrication of low chrome-moly vessels. The subcommittee also is working toward the development of a specification for graphitization-resistant steel.

The Subcommittee on Low-Pressure Storage Tanks, under the chairmanship of W. L. Bowler, in cooperation with a Manufacturer's Subcommittee, H. C. Boardman, chairman, is reviewing a final draft of recommended rules for the design, construction, and inspection of large, low-pressure welded storage vessels for service at pressures above the limitation of API Standard 12C, but below the range of the API-ASME Code

C. C. TATE, *Sponsor*
Mr. Tate, Phillips Petroleum Co., Bartlesville, received a B.S. in electrical and mechanical engineering from Kansas State College, and in 1932 joined Phillips as an engineer. His experience in refining operations includes 12 years in Borger, Texas, and Okmulgee, Okla., refineries. From 1945-48 he was Phillips' special representative in Mexico. He returned to Bartlesville in 1949 to take his present position as manager of the refining department.

H. G. MANGELSDORF
Chairman, Subcommittee on Corrosion
Mr. Mangelsdorf, Esso Standard Oil Co., New York, a graduate of Kansas State College, has an M.S. in fuel and gas engineering from M.I.T. He joined Esso in 1934 at Baton Rouge, where he subsequently became manager of the chemical products division and later general superintendent of the petroleum products division. In 1950 he was appointed general superintendent of the Bayway refinery. He was named manager of east coast manufacturing in 1952.

L. M. GOLDSMITH
Chairman, Subcommittee on Electrical Equipment
Mr. Goldsmith, Atlantic Refining Co., Philadelphia, was graduated from Drexel Institute of Technology, which later bestowed on him the honorary degree of doctor of science. He pioneered the adaptation of the diesel-electric drive to tow-boats and medium-size ocean-going vessels in 1923 and was an early advocate of electric welding for pipe lines. He is Atlantic's chief engineer and vice president of manufacturing.

G. N. EHLY
Chairman, Subcommittee on Instruments
Mr. Ehly, Atlantic Refining Co., Philadelphia, received a diploma in mechanical engineering from Drexel Institute of Technology in 1933 and completed a 3 yr. course in petroleum refining at Pennsylvania State College in 1943. He was employed by Atlantic in 1933 at the Philadelphia refinery, and in 1939 became senior test engineer of the mechanical laboratory section, mechanical department. In 1946 he was made the department's instrument section supervisor.

E. F. VOSS
Chairman, Subcommittee on Mechanical Equipment
Mr. Voss, Humble Oil and Refining Co., Houston, attended Technical University of Aachen, Germany, in 1913-14, before coming to the U.S. in 1916. He was graduated from M.I.T. with a B.S. in 1918, and the University of Paris awarded him a doctorate in physical chemistry in 1923. He returned to the U.S. as an instructor at M.I.T. during 1923-24, then joined Humble. In 1927 he became chief refinery engineer.

LYNN SAWYER
Chairman, Manufacturers' Subcommittee Centrifugal Pumps
Mr. Sawyer, Byron Jackson Co., Los Angeles, secured his electrical and mechanical engineering education via extension courses. In 1929 he was employed by Byron Jackson as sales engineer. He was promoted to branch manager in 1933, and in 1938 was transferred in this capacity to New York. He became general manager of the pump division in 1943, a vice president in 1945, and board member in 1952.

J. C. SOUDER
Chairman, Subcommittee on Pressure-Relieving Systems
Mr. Souder, Standard Oil Development Co., Linden, N.J., was graduated by Virginia Polytechnic Institute with an M.E. in 1929. He joined Standard Oil Co. (N.J.), and was assigned to the development company. After three years as an inspector with the refinery equipment group he transferred to the Aruba, N.W.I., refinery. Since 1946 he has been with SOD as an engineering consultant.

W. L. BOWLER
Chairman, Subcommittee on Low-Pressure Storage Tanks
Mr. Bowler, Pure Oil Co., Chicago, was graduated from Lehigh University in 1922. For two years he was with the Chile Exploration Co., and from 1926 to 1930 in the inspection department of Jersey Standard. After three years with the Taylor Forge and Pipe Works he joined Pure, and since then has been concerned with general refinery problems and plant maintenance.

L. P. STILLMAN
Chairman, Manufacturers' Subcommittee on Safety and Relief Valves
Mr. Stillman, Manning, Maxwell and Moore, Tulsa, holds a B.S. from Iowa State College. He spent five years as an operator of pressure stills for the Cities Service refinery in East Chicago, Ind., and two more years in the company's Tulsa office. After two years with an engineering firm, he joined Manning, Maxwell and Moore as a sales engineer and became manager of the products division.

H. C. BOARDMAN
Chairman, Manufacturers' Subcommittee on Low-Pressure Storage Tanks
Mr. Boardman, Chicago Bridge and Iron Co., Chicago, received a B.S. degree in civil engineering in 1910 and a C.E. degree in 1926 from the University of Illinois. He worked for Chicago Bridge and Iron from 1910 to 1916 and from 1926 until the present. During the latter period he served as research engineer and, since 1945, as the director of research.

for Unfired Pressure Vessels.

The Subcommittee on Corrosion, H. G. Mangelsdorf, chairman, fosters the study of corrosion of refinery equipment.

The Subcommittee of Refinery Inspection Supervisors, W. K. Brown, chairman, is concerned with the writing of Recommended Practices for Refinery Inspections. Parts I through V have been completed. A Designer's Subcommittee, under the chairmanship of J. H. Rickerman, is working with Mr. Brown's group.

A study group under the chairmanship of C. H. Samans is gathering information on storage tank failures by brittle fracture.

The Subcommittee on Valves, R. H. Bungay, chairman, cooperates with the Manufacturer's Subcommittee, under the chairmanship of W. P. Kliment, to perpetuate the valve standards which are considered acceptable to the petroleum industry.

The Subcommittee on Tank Accessories and Cleanouts, E. E. Kerns, chairman, has as its objective the formulation of recommendations relative to the standardization of tank appurtenances and openings. Last year, it recommended that provision be made on cone-roof tanks for attachment of cables for painters, inspectors and maintenance men's scaffolds and that the number, size and location of manholes and cleanout openings be referred to the Committee on Tank Cleaning.

The Subcommittee on Instruments has completed its work in the preparation of Part V, Instruments, of the Recommended Practices for Refinery Inspections. Copies of this Part were scheduled to be available May 1.

W. K. BROWN
Chairman, Subcommittee on Refinery Inspection Supervisors
Mr. Brown, Standard Oil Co. (Ind.), Whiting, is a graduate of the University of Texas, where he received his B.S. in 1925, and of the University of Illinois, with a M.S. in 1927. Except for two years with a firm of consulting engineers, he has been in the engineering division of Indiana Standard's Whiting refinery. He has been assistant chief engineer in charge of the plant engineering department since 1945.

E. E. KERNS
Chairman, Subcommittee on Tank Accessories and Cleanouts
Mr. Kerns, Standard Oil Co. (Ohio), Cleveland, received his M.E. degree from Carnegie Institute of Technology in 1925. In 1928 he joined the Louisiana Oil Refining Corp., eventually becoming mechanical superintendent of the Bossier City refinery. In 1934 he was employed by Standard, of Ohio. He is presently in charge of the materials and equipment section of general engineering.

R. H. BUNGAY
Chairman, Subcommittee on Valves
Mr. Bungay, Union Oil Co. of California, Los Angeles, graduated in 1930 with a B.S. from the California Institute of Technology. He was employed by Standard Oil of California from 1930-40, was with the Army from 1940-46 and joined Union Oil upon his discharge. At present he is supervisor of engineering and construction in the manufacturing department, and is in charge of design and construction of major refinery expansion programs.

J. H. RICKERMAN
Chairman, Designers' Subcommittee on Refinery Inspections
Mr. Rickerman, M. W. Kellogg Co., New York, received a B.S. in mechanical engineering from the University of Illinois and was first employed as a steam engineer for Commercial Solvents Corp. He joined M. W. Kellogg in 1936, and became its chief standards engineer in 1949. He has also been a part-time instructor of graduate courses in petroleum engineering design at Columbia and New York Universities.

N. J. REES
Chairman, Subcommittee on Unfired Pressure Vessels
Mr. Rees, Socony-Vacuum Oil Co., New York, received a B.S. in 1931 and an M.E. in 1932 from the College of the City of New York. For six years he worked with the U.S. Navy Department, then in the power industry, and for three years with the M.W. Kellogg Co. He joined Socony-Vacuum in 1944 and is now design engineer in the refinery engineering division.

W. P. KLIMENT
Chairman, Manufacturers' Subcommittee on Refinery Valves
Mr. Kliment, Crane Co., Chicago, started working for the Crane Co. in 1924, at the age of 23, and is now engineer of standards in charge of the application of codes, specifications, and correlative standardization data pertaining to the valve and fittings industry.

Committee on Training

D. S. TURNER, *Chairman*
Mr. Turner, Standard Oil Co. (Ohio), Cleveland, attended Westminster College and Youngstown College and majored in social science and metallurgy, taking his B.S. in the latter. He was employed by Carnegie Illinois Steel Corp. for 13 years, serving as assistant to the superintendent of the personnel division, and as director of training in the Youngstown district. He joined Sohio in 1946 as staff assistant in the industrial relations division of the manufacturing department training activities.

THE Committee on Training is responsible for developing and improving training methods, techniques and training aids in the refining industry. It is also interested in keeping the men responsible for refinery training informed on the latest developments, and offers assistance in organizing and promoting training. The sponsor for the Committee on Training is Mr. George V. Dunham, Vice-President of Socony-Vacuum Oil Co.

The Subcommittee on Pump Manuals has prepared specifications for training manuals. Mr. John Stadtherr and his subcommitte have worked with a subcommittee of representatives of pump manufacturers headed up by Mr. George V. Shaw. The specifications have been very well received by the pump manufacturing industry and the Hydraulic Institute. These Subcommittees are now preparing general training manuals on:

1—Centrifugal Pumps
2—Rotary Pumps
3—Reciprocating Pumps

Mr. Ray Faller and his Subcommittee on Training Literature have announced to all members of the Refining Division, the start of the Training Library as a part of the regular library of the API. The training material currently housed in the Training Library is available to anyone in the Refining Industry who is interested in training. (A detailed story on this material appears in this issue, pg. 712.)

Mr. W. W. McMullen, Jr., is chairman of a Subcommittee on Economics, which is making a study of what training has been done in the refining industry in the field of economics.

The Subcommittee on Committee Work, headed up by Mr. Taylor Rushing, submitted the final draft of a booklet entitled, "The Three R's for Committeemen." The Refining Division felt its members needed a clear picture of their responsibilities. This booklet was prepared to meet this nced. The three R's referred to in the title of the booklet are Responsibilities, Relationships, Rewards. Copies of the booklet have been sent to all members of the API.

A major project undertaken by the Committee on Training in Refining is the formation of area subcommittees. The Committee feels that such subcommittees can do a lot to advance refinery training throughout the United States. The membership of these subcommittees would be composed largely of the men who are organizing, coordinating, and conducting training programs at the refinery levels. These subcommittees will be patterned after the Gulf Coast Subcommittee, which has been operating for a number of years. The service they have performed in their area has proved the value of area subcommittees. The chairmen in charge of organizing these area Subcommittees are:

Mr. W. O. Barnes—San Francisco and Los Angeles areas.

Mr. E. R. Laminack—New York-Philadelphia area.

Mr. M. L. Mullins—Great Lakes area.

Mr. R. H. Gould—Mid-Continent area.

The Committee on Training felt there was a definite void of "Case Studies" for use in supervisory training. The committee agreed to make a compilation of problems that have occurred in the field of human relations in the refining industry. Mr. Stadtherr is in charge of collecting these cases.

Committee on Analytical Research

C. E. HEADINGTON, Chairman
Mr. Headington has been with Atlantic Refining Co. in Philadelphia since 1929—in the research and development department—and was made division research director in 1944. He received his B.A. from Upper Iowa University in 1927, and his M.S. in chemistry from Iowa State College in 1929, studying during 1927-28 as an industrial research fellow.

THE Committee on Analytical Research is a relatively young activity in the API being an outgrowth of the cooperative program between the government and the petroleum industry during World War II. Its function is to promote analytical research in the petroleum industry and to develop new analytical techniques which will aid petroleum refining operations.

The results of its analytical research programs are made available to the industry through group sessions on this subject, which are held annually at the API midyear meetings; and through *Analytical Chemistry*, where the papers presented at the group sessions are ultimately published.

Most of the research programs of the committee are carried out by means of discussion and cooperative work in nine subcommittees, which are currently engaged in the following programs:

1—The Subcommittee on Trace Elements in Crude Oils and Catalytic Charge Stocks, headed by Harry Levin of The Texas Co., is developing quick and reliable methods for determining minute amounts of metals such as vanadium, nickel, iron and sodium and others in oil fractions that are charged to units employing catalytic processes.

2—The Subcommittee on Analysis of Cracking Catalysts, headed by R. O. Clark of Gulf Research, is developing methods for determining

G. S. DUNHAM, *Sponsor*

Mr. Dunham, Socony-Vacuum Oil Co., New York, is a Cornell University graduate of 1922. He was employed by the White Eagle Oil Corp. (now part of Socony-Vacuum) at its Augusta, Kans., refinery in 1925, later becoming superintendent of the firm's Ft. Worth, Texas, plant. In 1936 he became manager of Socony-Vacuum's refinery engineering division and later vice chairman of the manufacturing committee in charge of refineries in the eastern and central states.

R. R. FALLER

Chairman, Subcommittee on Training Literature

Mr. Faller, Ethyl Corp., New York, received his B.S. from New York University and his M.S. from Yale. Ethyl employed him in 1931 as an automotive engineer in the Dayton, Ohio, office. Five years later he became assistant division manager at Dayton, and in 1939 was assigned to the Detroit laboratories as director of training. In 1945 he became manager of personnel and employee relations at the laboratories, and was made director of training in 1948.

TAYLOR M. RUSHING

Chairman, Subcommittee on Committee Work

Mr. Rushing, The Texas Co., New York, was graduated from Southwestern University in 1925. He took his graduate work at the University of Texas and the University of Southern California, and was a public school principal for 17 years. In 1943 he became associated with Lamar College, Beaumont, Texas, remaining there until 1945, when he accepted the job of supervisor of training for The Texas Co. refining department.

J. J. STADTHERR

Chairman, Subcommittee on Pump Manuals

Mr. Stadtherr, Pure Oil Co., Chicago, was graduated from the University of Missouri with a B.S. and took post-graduate work in chemical engineering at Ohio State University. From 1927-37 he was a chemist for Sinclair Refining Co. He then joined Pure as a resident chemist for the Heath, Ohio, refinery, and was subsequently assistant general operating foreman, and training supervisor. Since 1949 he has been training director for the refining division.

W. W. McMULLEN

Chairman, Subcommittee on Economics Training

Mr. McMullen, Magnolia Petroleum Co., Beaumont, Texas, was graduated with a B.S. in mechanical engineering from Texas A. & M. College. He has been with Magnolia at the Beaumont refinery since 1947 and was in the engineering department until 1952, at which time he was promoted to training director. With the engineering department he performed maintenance and design engineering and field inspection work.

W. W. HITCHCOCK

Chairman, Subcommittee on Case Studies

Mr. Hitchcock, Sinclair Refining Co., Houston, entered the oil industry in 1920 as a "roughneck" in oil field production. In 1921, Sinclair employed him as a stillman in its lube oil operations, transferring him in 1924 to light oil operations. He was made a foreman of various refinery operating divisions in 1929 and promoted to industrial engineer in 1948. In 1950 he was appointed manager of refinery training and safety for the company.

W. E. BENNETT

Chairman, Gulf Coast Subcommittee

Mr. Bennett is supervisor of personnel training, Cities Service Refining Corp., Lake Charles, La. Prior to joining Cities Service in 1944, he attended Louisiana State University, served in the merchant marine, and worked in the construction field. After moving through several mechanical department posts at Lake Charles, he took on his current responsibilities. He has also served in union contract negotiations for the firm.

GEORGE V. SHAW

Chairman, Manufacturers' Subcommittee on Pump Manuals

Mr. Shaw, Ingersoll-Rand Co., New York, received his technical education at the Polytechnic Institute of Brooklyn. He worked up through the ranks in engineering with the Newburgh Ice Machine and Engine Co. and the Alberger Pump and Condenser Co. He has been with Ingersoll-Rand for 35 years and chief engineer of its pump sales division since 1938.

H. Y. HYDE, *Sponsor*

Mr. Hyde, Tide Water Associated Oil Co., San Francisco, graduated from the University of California in 1926 with a B.S. in chemical engineering, and received an M.S. from M.I.T. two years later. From 1929 to 1946 he was general supervisor of the research and development department of the Associated Division of Tide Water. Since 1946 he has been vice president in charge of manufacturing.

R. J. ASKEVOLD

Chairman, Advisory Subcommittee

Mr. Askevold, Pure Oil Co., Crystal Lake, Ill., is also secretary of the Committee on Analytical Research. He was graduated from the University of Chicago in 1934, where he was elected to Phi Beta Kappa. After graduation he joined Pure Oil's research and development laboratories as a research chemist. For the past eight years he has been director of the analytical research and service division of the laboratories.

these same elements in trace amounts on the catalysts. Obviously, both of these programs are aimed at an ultimate understanding of which of these elements act as poisons to the catalysts used in the industry and will be invaluable in studies aimed at removal of the offenders.

3—The Subcommittee on Measurement of Physical Properties of Cracking Catalysts, headed by L. Mittelman of Tide Water Associated Oil Co., is studying the various methods used for measuring catalyst properties with the aim of selecting the best methods that are available for this purpose. This work is being conducted with the full cooperation of the companies who are manufacturing these catalysts.

4—The Subcommittee on Refinery Effluent Water Analytical Methods, headed by J. B. Rather, Jr., of Socony-Vacuum, is concerned with the development of new analytical techniques for determining minute amounts of oil, phenol and other refinery products in waste waters. This activity is a part of an intensive industry wide program aimed at the prevention of stream pollution. To date this group has developed a number of new methods for determining oil and phenols in very low concentrations.

5—The Subcommittee on Analytical Methods for Atmosphere, headed by G. R. Lake of Union Oil, is giving aid to the Committee on Disposal of Refinery Wastes in the field of de-

G. R. LAKE
Chairman, Subcommittees on Group Session Papers, and on Analytical Methods for Atmosphere

Mr. Lake, Union Oil Co. of California, Brea, Calif., holds a B.S. in chemical engineering (1929) and an M.A. in chemistry (1933) from the University of Texas. He was employed by Union Oil in 1933 as an analyst, and has also been a research chemist for the firm. He is now supervisor of the research division.

R. O. CLARK
Chairman, Subcommittee on Analysis of Cracking Catalysts

Mr. Clark, Gulf Research and Development Co., Pittsburgh, received his B.S. and M.S. degrees at the University of Nebraska, the latter in 1935. Two years later he joined Gulf to direct its microanalytical laboratory. In 1943 he was appointed head of Gulf's analytical methods section, and was promoted to head of the analytical laboratory in 1949.

termining hydrocarbons in air and expects to be useful in the activities of the API Smoke and Fumes Committee.

6—The Subcommittee on Determination of Sulfur and Sulfur Types, headed by B. J. Heinrich of Phillips Petroleum, is doing some excellent work on the determination of carbonyl sulfide, mercaptans, sulfides, disulfides, thiophenes, and other sulfur compound types. This work is being carefully coordinated with the work of API Project 48 on Sulfur Compounds.

7—The Subcommittee on Determination of Naphthenic Hydrocarbons, headed by S. S. Kurtz, Jr. of Sun Oil, has been comparing methods used in individual laboratories for determining cyclohexane and methylcyclopentane. The program is now being extended to include C_7 naphthenic hydrocarbons where agreement between laboratories and methods is not expected to be as satisfactory as was the case with the C_6 hydrocarbons.

8—The Subcommittee on Analysis of Oxygenated Compounds, headed by W. H. Jones of Esso Standard Oil, has been working on improved methods for the direct determination of oxygen. The group is now turning its attention to the determination of functional groups containing oxygen. The quantities of oxygen involved here are, in all cases, small.

9—The Subcommittee on Naphthene Hydrocarbon Type Analysis, headed by C. W. Key of Richfield Oil, will hold its first meeting in Houston in May. It is expected that they will be interested in developing analytical methods for pyrolles, pyridines, etc. in hydrocarbon mixtures.

In addition to the above, a Subcommittee on Group Session Papers, headed by G. R. Lake of Union Oil who is also Vice Chairman of the Committee on Analytical Research, has organized a Group Session on Analytical Research for the Midyear API meeting to be held in Houston, May 11 of this year. This program will include 16 papers on a variety of subjects of analytical interest. (Abstracts of all of these papers appear in this issue, beginning on pg. 725—Ed.)

Information on the activities of the committee may be obtained from either the chairman or from R. J. Askevold of Pure Oil Co. in Chicago, who is secretary of the committee.

Committee on Petroleum Products

R. C. ALDEN, *Chairman*

Mr. Alden, Phillips Petroleum Co., Bartlesville, Okla., is also chairman of the Subcommittee on Fuel Surveys of the Automotive Research Committee. He is a graduate of Lehigh University, and has been in the petroleum industry since 1920. He started with Phillips in 1925 as a senior chemist on the research staff, and was made assistant director of research in 1930, and director in 1933. He is now chairman of Phillips' research planning board.

THE Committee on Petroleum Products is concerned principally with matters pertaining to specifications, methods of test and methods of measurement for petroleum products. The Committee will serve as an advisory committee to other committees of the API and also upon request to duly authorized government agencies on matters coming within its title with particular reference to quality.

A "Glossary of Terms Used in Petroleum Refining" was published in August, 1953. This represented six years' work on the part of the Committee. The Glossary has had good reception, its sales to date having reached 1100. It is fulfilling a long felt need in this field.

Another activity of this Committee which came to fruition in 1953 was the API Technical Abstracting Service. An office and staff was set up at the API headquarters under Mr. L. C. Stork. The first issue appeared January 8, 1954. The Service abstracts about 100 chemical journals and oil periodicals. It appears weekly and covers items of interest to petroleum technologists. The abstracts are grouped by subjects rather broadly. Each issue shows some improvement in the Service so that those now appearing are very satisfactory and a great credit to Mr. Stork, his staff and the API. In spite of the high basic subscription price of $3000/year, there are now 22 subscriptions and it is indicated that this will be a successful venture.

Considerable valuable data has been accumulated during the last five years from a fellowship maintained at the Technological Institute, Northwestern University, Evanston, Illinois on the Vapor Pressure-Temperature Data sponsored by the Committee on Petroleum Products.

One of the functions of the Committee is to select API representatives on Sectional Committee Z11 on Petroleum Products and Lubricants of the American Standards Association.

This Committee has for some time been organizing a symposium on petrochemicals. This symposium will be held at the Spring meeting of the Refining Division of the API at Houston.

The Committee on Petroleum Products also has been working closely with the Diesel Engine Manufacturers' Association on mutual problems.

W. H. JONES

Chairman, Subcommittee on Analysis of Oxygenated Compounds

Mr. Jones, Esso Laboratories, Baton Rouge, La., was graduated from Alabama Polytechnic Institute in 1928 with a B.S., and received his M.S. from Louisiana State University in 1929. He was employed as a chemist by the Esso Standard Oil Co. (Louisiana Division) in Baton Rouge in 1939.

L. L. MITTELMAN

Chairman, Subcommittee on Physical Properties of Cracking Catalysts

Mr. Mittelman has been with Tide Water Associated Oil Co., Associated, Calif., for 32 years. He is a 1919 graduate of Cornell University, and joined Tide Water shortly after leaving college. He now holds the position of chief chemist with the company.

S. S. KURTZ, Jr.

Chairman, Subcommittee on Naphthene Analysis

Mr. Kurtz, Sun Oil Co., Marcus Hook, Pa., completed his B.A. studies at Harvard University in 1921, and his M.A. work in 1922. He was with Atlantic Refining Co. from 1928-35, and then joined Sun Oil as manager of the development division's chemical section. For 10 years he was manager of Sun's research laboratory at Norwood, Pa., and since 1952 has been a technical associate in the research and development department.

HARRY LEVIN

Chairman, Subcommittee on Trace Elements in Crude Oils and Catalytic Charge Stocks

Mr. Levin, The Texas Co., Beacon, N.Y., studied chemistry at Cooper Union Institute of Technology, being graduated in 1921; obtained a law degree from New Jersey Law School; and studied microchemistry at New York University in 1935-36. He is supervisor of the analytical and testing department at Texaco's Beacon Research Laboratories, and chairman of its committee on test methods.

J. B. RATHER, Jr.

Chairman, Subcommittee on Refinery Effluent Water Analytical Methods

Mr. Rather, Socony-Vacuum Oil Co., received a B.S. in chemical engineering from Lehigh University in 1932. He joined Magnolia Petroleum Co., a Socony-Vacuum affiliate, in 1935, and was transferred in 1937 to Socony's laboratories in Brooklyn, N.Y. He is assistant director of the technical service department, and supervisor of the inspection and fuels section.

B. J. HEINRICH

Chairman, Subcommittee on Determination of Sulfur and Sulfur Types

Mr. Heinrich, Phillips Petroleum Co., Bartlesville, Okla., received an M.S. in analytical chemistry from the University of Oklahoma in 1930. From 1937 until he was employed by Phillips in 1943 he taught chemistry. He has done work toward a Ph.D. at both Oklahoma and the University of Michigan, and since 1945 has been chief of the analytical section of Phillips' research department.

W. R. ARGYLE, *Sponsor*

Mr. Argyle, Sinclair Refining Co., New York, was graduated from the University of Utah. When he joined Sinclair he was put in charge of fuel and utilities for all of the company's refineries. In 1924 he became superintendent of the Marcus Hook, Pa., refinery and remained there until 1943. From then until 1945 he served in Washington with the PAW. Upon returning to Sinclair he became assistant manager of refining, and is now vice president for refining and a director of the company.

A. E. MILLER

Chairman, Glossary Subcommittee

Mr. Miller, Sinclair Refining Co., New York, is also chairman of the Advisory Committe's Information Subcommittee. He received his B.S. in Chemistry from Pennsylvania State College in 1912, and then joined Gulf Refining Co. He has been with Sinclair since 1918, and assistant to the vice president, research and development, since 1942. He has spent a number of years in Europe for Sinclair, gathering technical data.

J. C. GENIESSE

Chairman, Subcommittee on Viscosity Standards

Mr. Geniesse started with The Atlantic Refining Co., Philadelphia, after obtaining a Ph.D. in chemical engineering at the University of Michigan. For a time he was concerned with fuel and lubricant tests and fuel production from heavy petroleum products. Subsequently he became divisional director of research in heavy oils in the research and development department, and later was made director of the application research division of the department.

H. W. FIELD

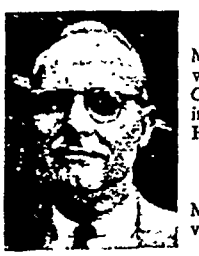
Chairman, Subcommittee on Central Abstracting Service

Mr. Field, Atlantic Refining Co., Philadelphia, received his B.S. in 1928 from the U. of Pennsylvania. He started with Atlantic as a junior engineer, and after a series of promotions became assistant manager in the research and development department in 1940. He was elected a director in 1946, appointed general manager of the department in 1947 and vice president in charge of research and development in 1949.

K. M. WATSON

Chairman, Subcommittee on Vapor Temperature-Pressure Relationships

Mr. Watson, Pure Oil Co., Crystal Lake, Ill., is also chairman of Project Advisory Committee No. VII of the Smoke and Fumes Committee. He received his B.S., M.S. and Ph.D. (1929) from the U. of Wisconsin, joined UOP in 1931, was research director there from 1935-41, spent a year with Gulf Oil, and returned to his alma mater in 1942 as a research professor. In 1952 he joined Pure as director of research.



J. G. RAYMOND

Chairman, Study Group on Mechanics

Mr. Raymond, Sinclair Refining Co., New York, was graduated with a B.S. from Michigan State College in 1928, and in 1931 received a degree in library science from Columbia University. He has been Sinclair's Librarian since 1946.

B. R. SIEGEL (not shown)

Chairman, Subcommittee on Octane Precision

Mr. Siegel is with Sinclair Refining Co., Harvey, Ill. No photograph available.

Committee on Disposal of Refinery Wastes

J. H. EASTHAGEN, *Chairman*
Mr. Easthagen is also chairman of his committee's Coordinating Subcommittee. He was graduated by the Colorado School of Mines in 1928 with a degree in petroleum engineering. Next he was employed by Standard Oil Co. of California at the El Segundo refinery. In 1944 he transferred to the California Research Corp. when it was formed, and in 1945 he moved to the Richmond Laboratories to take charge of technical services, research and certain development work. He is now senior research engineer.

THE Committee on Disposal of Refinery Wastes has the responsibility of collecting, summarizing, and publishing in manual form technical information that will be of assistance to refiners in selecting efficient and effective methods for handling and disposing of waste materials.

Since 1951 the committee has been engaged in a complete revision and reorganization of the Manual on Disposal of Refinery Wastes. The manual has been divided into five volumes, and since 1951 four of the five volumes have been revised, expanded, and published. The five volumes and their status are as follows:

Volume I—"Waste Water Containing Oil"—The fifth edition of this volume was published in March 1953.

Volume II—"Waste Gases and Particular Matter"—The fourth edition of this volume was issued in May 1952.

Volume III—"Chemical Wastes"—The second edition of this volume was published in 1951.

Volume IV—"Sampling and Analysis of Waste Water"—The first edition of this volume was published in 1953.

Volume V—"Sampling and Analysis of Waste Gases and Particular Matter"—The first edition of this volume is nearing completion and should be published in 1954.

The committee is currently actively engaged in preparing material for the revision and expansion of Volumes I, II, and III.

The committee is currently sponsoring four research projects. One research project, contracted to the Academy of Natural Sciences in Philadelphia, concerns the applicability of a certain bio-assay method to natural bodies of water typical of those into which petroleum refineries discharge waste. Work under this contract was initiated in the Spring of 1953 and will probably cover about three years.

A second project, contracted to the Boyce Thompson Institute, is a cooperative project sponsored by a group of industries interested in determining the effects of long time exposure to extremely low concentration of fluorides in the atmosphere on vegetation. This project was initiated in 1951 and will probably run for an additional two years.

In 1953 two additional projects were initiated by the committee. The first of these is a project to evaluate critically the currently available data on the acute and chronic toxicity for man and animals of selected chemical pollutants found in waste streams from petroleum refineries. A new subcommittee has recently been formed to act as project advisory group in establishing and carrying out the project.

The second new research project concerns the collection, evaluation, and assembly in a comprehensive and publishable form of available information on the subject of Removal of Dust and Particular Matter from Waste Gases. A new subcommittee has recently been set up and assigned to act as an advisory group in establishing and carrying out the details of this project.

The various subcommittees of the committee are currently giving attention to the following subjects:

1—The evaluation of gas flotation as a means of removing oil from waste waters.

2—The investigation of economical methods for handling and disposing of oily sludges and clays.

3—A study of the relative merits of circular and rectangular oil-water separators.

4—The development of the design of an all-purpose incinerator.

5—The biological treatment of wastes.

6—Treatments for phenolic-type wastes.

7—Chemical oxidation of organic-type wastes.

The results from the activities of these various subcommittees will be used in the expansion of appropriate volumes of the Manual on the Disposal of Refinery Waste.

G. A. DAVIDSON, *Sponsor*
Mr. Davidson, Standard Oil Co. of Calif., San Francisco, received his B.S. from the University of California in 1921 and was then employed by California Standard as a chemist in research and development. He became superintendent of the refinery at El Segundo in 1933. In 1937 he was assigned to the home office as assistant to the general manager of the manufacturing department, becoming assistant general manager in 1943, then assistant vice president. The company elected him vice president in 1944.

W. C. DOUCE
Chairman, Subcommittee on Waste Gases and Dusts
Mr. Douce was employed by Phillips Petroleum Co., Bartlesville, after his graduation from the University of Kansas in 1942, and worked in plant operations and refinery process engineering. In 1945 he was made technical adviser in the patent department. After three years he returned to refining, as staff administrator, and in 1950 became coordinator of pollution abatement and product-los. control work.

R. J. AUSTIN
Chairman, Subcommittee on Chemical Wastes
Mr. Austin, Standard Oil Co. (Ind.), Whiting, received his bachelor's degree from the University of Kentucky in 1933, and a year later his M.S. in physical chemistry. In 1936 he joined the research department of Indiana Standard. He is currently working in the technical service division of the research department as a group leader on problems relating to refinery waste disposal and atmospheric pollution.

L. C. BURROUGHS
Chairman, Biological Project Subcommittee
L. C. Burroughs, Shell Oil Co., New York, is a graduate of the University of Illinois. He joined Shell in 1925 as a chemist at the Wood River, Ill., refinery. Later he worked in the manufacturing department of the company's head office. In 1942 he became assistant superintendent of the Houston refinery and held that position until he returned to Shell's head office in 1946 as assistant to the vice president.

W. H. BARCUS
Chairman, Fluoride Project Subcommittee
Mr. Barcus, Sun Oil Co., Marcus Hook, Pa., was graduated from Swarthmore College in 1927. Shortly afterward he was employed by Sun as a chemist, and two years later became a chemist and chemical engineer in the development laboratory. In 1936 he was appointed chief of the chemical engineering section of the development division, and since 1948 he has been manager of the development laboratory of the research and development department.

RANDLOW SMITH
Chairman, Dust Collector Project Subcommittee
Mr. Smith, The Texas Co., New York, was graduated from the California Institute of Technology with an M.S. in 1941 and joined The Texas Co. in New York City shortly afterward. He became a senior engineer before leaving for military service in 1944. Returning to the company in 1946, he continued his work in the design of waste disposal works, alkylation units and miscellaneous stabilizers.

J. A. FOWLER
Chairman, Sludge and Spent Clay Disposal Project Subcommittee
Mr. Fowler, Sinclair Refining Co., East Chicago, Ind., is a 1935 graduate of the University of Texas, where he received a B.S. in chemical engineering. He was employed by Gulf Oil Corp. in various laboratories and grease plants until he entered military service in 1942. In 1945 he joined Sinclair in the laboratory department and was later transferred to the technical department.

D. G. STEVENS
Chairman, Water Quality Criteria Project Subcommittee
Mr. Stevens, Standard Oil Co., (Ohio), Cleveland, was graduated as a chemical engineer by Syracuse University in 1938. He spent four years with Standard of New Jersey at Aruba, N.W.I. as a process engineer before joining Ohio Standard in 1941. During the past several years he has been active in process engineering and operation of waste disposal facilities. Currently he is chief of technical service.

W. H. LANG
Chairman, Incinerator Design Project Subcommittee
Mr. Lang, Standard Oil Development Co., received a B.S. from Washington and Jefferson College in 1934, an M.S. from Iowa State University in 1938, and a Ph.D. from the University of Iowa in 1940. He has been a sanitary engineer for Pennsylvania, chief chemist and bacteriologist for Newport News, and an associate edito rof *Water Works Engineering*. He is currently a consultant on pollution for SOD.

RAY C. ADAMS
Chairman, Subcommittee on Oil-Water Separation
Mr. Adams is with Magnolia Petroleum Co., Beaumont, Texas. No photograph or biographical data available.

L. MITTELMAN
Chairman, Subcommittee on Sampling and Testing
(see photo, Committee on Analytical Research)

Analytical Research Sessions

Here are the abstracts of 16 papers on a wide range of newly developed methods of testing

As in the past, the broad scope of activities of the API Refining Division's Committee on Analytical Research is reflected in the two technical sessions on that subject at this year's mid-year meeting.

The 16 papers scheduled for presentation represent one means whereby the work of the Committee and its sub-committees is brought to the attention of the industry. Topics to be covered in the discussions include the following:

Micro techniques for distillation and for trace quantities of metals and non-metals; several spectographic procedures; tests for mercaptan sulfurs and for hydrogen sulfide in the air; procedures for testing gasoline, grease, crankcase drainings, and other products.

A detailed report on the activities of the Analytic Research Committee itself appears in this section on p. 720. The complete program for the two sessions on Analytical Research, both of which will be held Monday, May 10, appears on p. 705.

C. E. Headington, Atlantic Refining Co., Philadelphia, and chairman of the Analytical Research Committee, will preside over the morning session; and R. J. Askevold, Pure Oil Co., Crystal Lake, Ill., and secretary of the committee, will preside over the afternoon session.

Abstracts of each of the 16 papers follow.

COORDINATING GROUP OPERATIONS

"Coordinating the Operations of a Petroleum Research Analytical Group," by W. C. Schaefermeyer and E. S. Smith, Union Oil Co. of California, research and process department, Brea, Calif.

• Petroleum research progress and costs depend heavily upon the efficiency of the analytical services available. The analytical group at the Union Oil Co. of California Research Center has found that many devices and practices developed originally to increase the efficiency of business offices may be used profitably for the coordination of laboratory operations. Punched cards, high-speed accounting machines, and a duplicator which uses a beam of infrared energy are only a few of the devices which now relieve scientists and technicians of paper work and supply supervisory personnel with information they need to direct laboratory operations efficiently.

MERCAPTAN SULFUR IN GAS AND LIQUID HYDROCARBONS

"A Simplified Amperometric Method for Determining Mercaptan Sulfur in Liquid and Gaseous Hydrocarbons," by M. D. Grimes, J. E. Puckett, B. J. Newby, and B. J. Heinrich, Phillips Petroleum Co., research division, Bartlesville, Okla.

• Often it is important to know the concentration of the various types of sulfur compounds in refinery streams and petroleum products.

The work reported in this paper was undertaken as a result of the need for an accurate, fast method for the determination of mercaptan sulfur in all kinds of refinery streams and in finished petroleum products. A method is described for its determination in either liquid or gaseous hydrocarbons. The amperometric apparatus is inexpensive and portable. Data presented indicate that the method is satisfactory for specification

Mr. Schaefermeyer

Mr. Smith

testing. An analysis for the mercaptan content of a sample of jet fuel can be made in less than 10 min. The analysis of a sample of liquefied petroleum gas requires a slightly longer period because of the processing of the sample before the amperometric titration.

MINIATURE COLUMN DISTILLATION

"Analytical Distillation in Miniature Columns—I: Equipment and Operation," by J. C. Winters and R. A. Dinerstein, Standard Oil Co. (Indiana), research department, Whiting, Ind.

• A fraction of an ounce of liquid can be separated into dozens of individual components in new miniature distillation equipment. Many research experiments produce as little as a tablespoonful of material. Such tiny quantities must be further separated by distillation into many smaller fractions, each containing only a few drops. These fractions can then be identified by modern microanalytical methods, such as spectroscopy.

To distill such small samples, special controls and instruments are needed so that materials which boil at almost the same temperature can be separated. For example, the electric power which supplies the heat must be controlled within a few thousandths of a volt. It may take as long as a week to distill 2 oz. in continuous routine operation.

TRACE METAL TECHNIQUES

"New Techniques for Analyzing Mixtures of Trace Metals," by R. M. Sherwood and F. W. Chapman, Atlantic Refining Co., Philadelphia, Penna.

• Today's high-octane gasoline, as well as many chemicals derived from petroleum, is made by catalytic processes. In such cases the catalyst is introduced into the process to steer the chemical reactions in the direction of making the desired product. However, the minute quantities of metals which are in petroleum frequently poison this catalyst, and make it unable to do its job. This paper describes methods for measuring the amounts of many of these metals in petroleum when they are present in concentrations of only a few parts of metal per million parts of oil. The use of such methods

Mr. Grimes

Mr. Puckett

should help the petroleum refiner to discover which of the many metals present poison his catalyst, and should also help him to solve the problem of how to remove them from the oil.

HYDROGEN SULFIDE IN AIR

"An Analyzer-Recorder for Measuring Hydrogen Sulfide in Air," by E. B. Offutt, American Thermometer Division of Robertshaw-Fulton Controls Co., St. Louis, Mo., and L. V. Sorg, Standard Oil Co. (Indiana), Sugar Creek, Mo.

• Hazards in the petroleum industry have been overcome one by one. Science and engineering have pitted their "know-how" against the inherent hazards of refinery operations. Hydrogen sulfide, a deadly gas, is one such hazard. It is one of the ingredients of crude oil, and it also arises in refining operations by the breakdown of sulfur compounds. Recognizing the need for an instrument which would detect and record the presence of this deadly gas, a team of Standard Oil (Indiana) researchers developed such a machine. It also sounds an alarm when the amount is above the safe limits of 20 ppm. The machine already has proved its worthiness in field tests made at several of Standard's refineries. Unsuspected hazardous areas have been revealed, and corrective measures have been taken.

Although the first models of the machine operate in the range from 0 ppm to 100 ppm of hydrogen sulfide in air, it is versatile enough to be adapted for control of gas streams in sulfur-recovery systems. The instrument uses a special film prepared by coating blank 16-mm. motion-picture film with a chemical which becomes black in the presence of hydrogen sulfide. A sample from the air under test is pumped continuously through an exposure hood. The hydrogen sulfide reacts with the film coating to form a stain. A light beam through the stained film falls on a photoelectric cell which generates an electrical current. The current operates a conventional electronic recording device.

MICRO-DISTILLATION

"Micro Distillation Methods for the Analysis of Petroleum," by A. R. Javes, C. Liddell, and W. H. Thomas, Anglo-Iranian Oil Co. Ltd., Sunbury-on-Thames, Middlesex, England.

Mr. Newby

Mr. Heinrich

• Minute quantities of crude oil, extracted by solvent from cores removed during drilling, give the first indications of the quality of oil in new structures being penetrated. The sample of crude oil obtained is usually too small to fractionate and, as a result, it is not possible to obtain full analytical details on the crude. Consequently, it was found necessary to devise an apparatus which would do the job. This paper describes a piece of equipment which can operate at atmospheric pressure or under vacuum, and fractionate a quantity as small as 0.8 ml.

SMALL SCALE RVP DEVICE

"A Reduced-Scale Reid Vapor-Pressure Apparatus," by R. L. LeTourneau, Julian F. Johnson, and W. H. Ellis, California Research Corp., Richmond, Calif.

• The volatility of gasolines is an important property, and one which frequently is measured in connection with studies of the vapor-lock and starting characteristics of gasolines. Normally about a pint of sample is required to make this measurement. California Research Corporation has developed an apparatus which requires only 3 ml. of sample. This is about 1% of the regular sample. This will permit measurements to be made on samples withdrawn directly from the carburetor or fuel lines of engines. Information so obtained will be useful for tailoring gasolines for specific climates and for design of fuel systems.

WATER IN ACETALDEHYDE

"The Determination of Water in Acetaldehyde by Infrared Spectroscopy," by J. A. Favre, James P. Butler, and B. J. Heinrich, Phillips Petroleum Co., research division, Bartlesville, Okla.

• The amount of water in acetaldehyde is a critical factor for the control of the reaction rates of chemical processes which use acetaldehyde. Standard methods, such as Karl Fischer's, are not suitable for this analysis. An infrared method is presented which covers the concentration range of 0.1 to 0.4 wt.-% of water in acetaldehyde. Acetalydehyde boils at room temperature, and readily absorbs water from the atmosphere. This paper presents special handling and blending instructions for the preparation of synthetic blends used in the calibration of the

Mr. Winters

Mr. Dinerstein

Mr. Sherwood

Mr. Chapman

Mr. Offutt

Mr. Sorg


Mr. Javes


Miss Liddell


Mr. Thomas


Dr. LeTourneau


Mr. Johnson


Mr. Ellis

infrared instrument. The accuracy of this method is plus or minus 0.01 wt.-% in the range covered.

REVIEW OF TEL TESTS

"Methods for the Determination of Tetraethyllead in Gasoline—A Review," by C. M. Gambrill and Sue A. Gendernalik, Ethyl Corp., Research Laboratories, Detroit, Mich.

• The increasing importance of tetraethyllead to the petroleum industry has prompted considerable research aimed at the development of more accurate and less time-consuming analytical methods. The numerous methods reported in the literature for the determination of tetraethyllead in gasoline are reviewed. Obviously it is impossible to expect one method to serve the needs of all the various laboratories required to make the analysis. The advantages and disadvantages of the various methods are discussed in an attempt to acquaint the reader with their overall application.

With the introduction of instrumental methods, it has been possible to reduce the elapsed time for an analysis from 7 hrs. to a matter of minutes without sacrificing accuracy. This paper presents in one source all the references to methods, for the analyses of gasolines for tetraethyllead, which have been published to the present time.

PAN IN NEW AND USED OILS

"Determination of Phenylalpha-naphthylamine (PAN) in New and Used Oils (A Colorimetric Method)," by W. S. Levine and W. A. Marshall, Socony-Vacuum Laboratories, Brooklyn, N. Y.

• In use, oils tend to oxidize. Hence special compounds are added to them to retard oxidation. One such compound is phenyl-alpha-naphthylamine (PAN), an aromatic amine. To test its effectiveness in oils in the laboratory and for plant use, a method to determine the presence and concentration of PAN is needed. This paper describes such a qualitative and quantitative procedure. Results are accurate enough for control of oil blending, and for examining used oils.

A small amount of oil is dispersed in acetone, and a reagent is added. The reagent forms a bluish-purple solution with the PAN, and the intensity of the color is measured with a colorimeter. The PAN content of an oil is read off a graph which relates the color intensity to PAN concentration. Also described are the factors which affect the intensity and stability of the color. The precision of the method for samples which contain up to 0.1% of PAN is estimated to be approximately plus or minus 10%. The procedure is rapid. One sample can be analyzed in 18 to 20 min., and approximately 25 analyses can be made in an 8-hr. period. If other aromatic amines are present, they may cause high results.

COPPER IN CRANKCASE DRAININGS

"Spectrochemical Determination of Copper in Crankcase Drainings," by C. R. Hodgkins and John Hansen, Esso Laboratories Research Division, Standard Oil Development Co., Linden, N. J.

• The copper in a single penny dispersed in about 700 qt of oil, illustrates the 5 parts of copper in a million parts of oil which it is possible to determine by the spectrographic method described. The analysis can be made on as little as one thirtieth of an ounce of used lubricant, and can be completed in less than 1 hour after the sample has been taken.

The copper content of the oil in the crankcase of laboratory engines used to evaluate lubricants can be related to the loss in weight of the copper-lead bearing in the test engine. By analyzing samples taken at fixed time intervals during the test, the engineer can calculate the amount of bearing weight loss, and can establish when the loss occurs, without the necessity of taking the engine apart to remove the bearing for weighing.

TRACE METALS ON CATALYSTS

"The Determination of Trace Amounts of Iron, Nickel, and Vanadium on Catalysts by X-Ray Fluorescence," by G. V. Dyroff and P. Skiba, Esso Laboratories Research Division, Standard Oil Development Co., Linden, N. J.

• Everyone is familiar with the use of X-rays by physicians for diagnosing various bodily ills. Scientists at the Esso Laboratories of the Standard Oil Development Co. are utilizing these same X-rays to diagnose some "ills" of a giant "cat cracker."

By combining new "high-powered" tools such as X-rays and Geiger tubes with common table salt (in the form of a large single crystal), very rapid and precise determinations of minute amounts (as little as 20 particles in a million) of iron, nickel, and vanadium can be made.

Inasmuch as small amounts of these metals on the catalyst have a marked effect on the processing of oils in a catalytic cracking unit, rapid methods of analyses are almost a necessity. Accurate analyses of these catalyst samples by means of X-rays can be carried out in 15 min as compared to several hours by usual methods.

MICRO QUANTITIES OF NON-METALS

"Non-metal Analysis of Micro Quantities of Solids by Means of the Emission Spectrum," by E. L. Gunn, Humble Oil and Refining Co., refining technical and research divisions, Baytown, Texas.

• In present-day manufacturing technology the role which minute amounts of substances play in influencing the course of chemical reactions is becoming of increasing importance. In petroleum processing, for example, the occurrence of trace elements may have a profound effect upon the course taken by a specific reaction—thus influencing the amount of valuable product recovered in the process. The detection and identification of minute micro quantities of solids often provides a valuable clue to the researcher for ferreting out reasons for the course taken by a process which he is investigating. For rapid and precise detection of these traces the best analytical tools available are required. This paper describes a technique whereby certain non-metals such as sulfur and chlorine can be determined in micro amounts of solids by means of an emission spectrograph.

In principle, the detection of a non-metal in a material by the emission spectrum consists in subjecting the material to the impact of a powerful high-voltage spark discharge which causes light of a characteristic nature to be emitted. By measuring this light, the identity of the non-metal, as well as its amount in the material, is determined. The production of the light spectrum in non-metals has its points of difficulty, and some of these are considered.

The emission spectrum has been used to determine as little as 1% of sulfur and


Mr. Favre


Mr. Butler


Mr. Gambrill


Miss Gendernalik


Dr. Levine


Mr. Marshall


Mr. Hodgkins


Mr. Hanson


Mr. Dyroff


Mr. Skiba


Mr. Gunn


Mr. Key

chlorine in micro solids which weigh 0.0003-ounce. This sample amount would be very difficult and time-consuming to analyze by other methods; but the analysis may be performed in approximately 2 hr. by the spectrum method. Thus the method is especially useful in case the sample amount is extremely small. It is applicable to ash matter, deposits, surface films, paints, erosion products, precipitates, and similar solids which often require identification in the refinery laboratory.

SPECTRO METHOD FOR GREASES

"Spectrographic Method for Analyzing Lubricating Greases," by C. W. Key and G. D. Hoggan, Richfield Oil Corp., Wilmington, Calif.

• This direct spectrographic method for analyzing lubricating greases was developed in order to provide a rapid and accurate method by which the metallic elements in these petroleum products could be determined. Chemical and spectrographic methods based on prior ashing of such samples require excessive periods of time. Because of the length of time required to complete these analyses, they do not provide the necessary controls for the production and handling of such materials. Therefore, it was believed that a rapid spectrographic method would enable the processors and developers of lubricating grease to maintain better control over the product.

For many years the manufacture of grease has been considered an art rather than a science; however, recent developments which require that lubricating greases meet more severe operating conditions demand that the compounding material be controlled with more scientific knowledge. The additions of metallic soaps to lubricating oils so as to produce greases with waterproof, extreme-pressure, high-temperature, antifoam, anti-corrosion, and other characteristics are common practice. Because of the special characteristics which metallic soaps impart to lubricating greases, it is highly desirable that the addition of such compounds be precisely controlled; otherwise uniformity of product will not be obtained, nor will the desired characteristics be imparted to the final grease.

Spectrographic methods for determining metallic constituents in lubricating oils have been reported by several investigators. It was believed that the same principle could be utilized in the determination of similar metals in greases, provided the greases could be taken into and maintained in solution. An investigation of several solvents for greases disclosed that the greases could be taken into solution, and could be delivered to the arc spark stand of an emission spectrograph. Operating variables of the spectrograph were determined; and it was found that, by employing a high-voltage spark discharge, the metallic elements could be sufficiently energized to create spectral lines which could be recorded on 35-mm film, and could then be compared with similar lines deposited from known concentrations of internal standards. This method then provided an accurate and reliable means of determining the metallic constituents in lubricating greases. By using this method, research and development laboratories and lubricating-grease plant engineers have a means whereby metallic elements may be determined as a process is under way. From these data modifications may be made, when necessary, during the processing and compounding operations—thus enabling the production of scientifically controlled and developed grease.

This method requires between 50 and 60 min. to complete the analyses of a single sample; whereas to obtain the same data by conventional chemical analyses may require as long as 40 hours. In this way modern scientific instrumental analyses make possible the scientific production of superior lubricants for high speeds and pressures, close tolerances, high and low temperatures, and other severe requirements of present-day machines.

SPECTRO ANALYSIS OF PRODUCTS

"Spectrographic Analysis of Petroleum Products and Related Materials," by L. L. Gent, C. P. Miller, and R. C. Pomatti, The Texas Co., Beacon, N. Y.

• In recent years many of the slower chemical methods for quantitative analysis of metals have been replaced by instrumental spectrographic methods. The principle of these latter procedures is that the intensity of light emitted by metals when they are burned in an electrical arc is proportional to their concentration in the sample.

The unique technique described by these authors is the sample preparation whereby the sample to be analyzed is weighted onto a relatively large amount of graphite powder contained in a crucible. If it is an oil or grease, the sample is burned, and the residue is mixed thoroughly. Portions of this are placed in cratered graphite electrodes and burned in an electrical arc. The light rays from the arc, in both quality and quantity, are characteristic of the various metals, and are measured by use of a photographic plate and a densitometer.

The method is applicable to a wide variety of samples such as oils, greases, additive concentrates, engine materials, and antifreeze. It can also be applied advantageously to relatively small samples, as for example, the few milligrams of grease remaining in a used ball bearing.

SPECTRO ANALYSIS OF ASH RESIDUES

"Application of the Logarithmic Sector to Quantitative Spectrographic Analysis of Petroleum-Ash Residues," by E. B. Childs and J. A. Kanehann, Socony-Vacuum Laboratories, Brooklyn, N. Y.

• One of the most interesting tools used by chemists is the emission spectrograph. This instrument makes possible quantitative analysis of many elements in a sample at the same time. This results in a considerable saving of time and expense. Usually the amount of an element present is determined by measuring line intensities on a photographic plate with an expensive densitometer.

This paper shows that quantitative spectrographic analyses of petroleum-ash residues may be done without a densitometer. A logarithmic-sector disc is rotated in the light beam from the burning sample. Line intensities are estimated by measuring line lengths with a simple hand magnifier. Other spectrographic techniques remain the same, including the use of an internal standard (indium).

Precision generally is not quite so good as when the densitometer is used. However, in many cases, precise analysis is unnecessary. The application of this method will save about one-half of the time usually spent on quantitative spectrographic analyses. Because a densitometer is not needed, the procedure may be attractive to smaller laboratories.


Mr. Hoggan


Mr. Gent


Mr. Miller


Mr. Pomatti


Mr. Childs


Mr. Kanehann

Copy From D. V. Stroop for Information of Members of Medical Advisory Committee January 12, 1954

UNITED STATES COAST GUARD
WASHINGTON

August 20, 1953

Dear Mr. Moss:

In accordance with recent conversation, there are forwarded photostatic copies of correspondence and reports relative to vanadium poisoning in boiler cleaning operations.

Very truly yours,

/s/ R. A. Smyth

R. A. SMYTH
Captain, USCG

Mr. James E. Moss
Director, Division of Transportation
American Petroleum Institute
1625 K Street, N. W.
Washington, D. C.

ESSO LABORATORIES
STANDARD OIL DEVELOPMENT COMPANY
P.O. BOX 51, LINDEN, N.J.

MEDICAL RESEARCH DIVISION
ROBERT E. ECKARDT, PH.D., M.D.
DIRECTOR
HORACE W. GERARDE, PH.D., M.D.
HEAD TOXICOLOGIST

August 4, 1953

INDUSTRIAL HYGIENE SECTION
NATHAN V. HENDRICKS, CH.E.
HEAD OF SECTION
FRANKLIN W. CHURCH, M.S.
GEORGE M. WILKENING, M.S.
INDUSTRIAL HYGIENISTS

COMMANDANT
U. S. Coast Guard
Headquarters
Washington 25, D. C.

Attention: Captain R. A. Smyth, Assistant Chief, Office of Merchant Marine Safety

Dear Captain Smyth:

In response to your letter of July 29, 1953, let me say that we have done little work ourselves on vanadium toxicity. However we were alerted to the possible existence of vanadium poisoning from cleaning oil fire burners by an article which appeared in the British Journal of Industrial Medicine, Volume 9, page 50, 1952 by N. Williams entitled, "Vanadium Poisoning from Cleaning Oil-Fired Boilers". A photostatic copy of this article is attached for your information.

In addition, one of the most complete studies of vanadium pentoxide toxicity following inhalation is contained in a monograph entitled, "Vanadium Pentoxide Dust - A Clinical and Experimental Investigation on its Effect after Inhalation", by Sven-Gösta Sjöberg. Unfortunately we do not have an extra copy of Dr. Sjöberg's monograph, but I am sure that if you were to write to him at the Department of Occupational Hygiene at the State Institute for Public Health, Tomteboda, Sweden, that he would be very happy to forward you a copy of this monograph. Since it was reprinted privately, I believe he asked the nominal charge for the copy, which in my recollection, is about $1.00 or $1.50. However, this monograph was also published as supplement 238 to Acta Med. Scandinav., Volume 138, 1950, and it would probably be possible for you to obtain this monograph from the Army Medical Library.

In our own work we conducted an industrial hygiene survey in one of our affiliated companies in the early part of 1952. At this installation there were a lot of tankers which needed to have their boilers cleaned. Analysis of the ash obtained from the boilers of these tankers indicated that it contained from 70 to 82.2% vanadium pentoxide. Measurements of the vanadium concentration of the air in the breathing zone in the men who were doing the boiler cleaning indicated an average vanadium pentoxide concentration of 99.6 milligrams per cubic meter of air. This group of men do not work

continuously at this operation but have long periods when they are not engaged in boiler cleaning. Therefore, it has been difficult for us to evaluate the significance of these exposures. However, these men have been subjected to a very thorough clinical evaluation with no significant consistent findings. Nonetheless, it has been our feeling that this represents an unsatisfactory level of exposures and we have therefore devised a vacuum cleaner which can be used to clean these boilers prior to the time that the men will have to enter the boiler for cleaning it. Much of the dust inside the boiler resulted from the deposited material on the tubes being put into the air when the knockers were used to clean out the inside of the tubes. With the use of this vacuum cleaner prior to the use of the knockers, it has been possible to reduce markedly the dust to which these men are being exposed. It is our intention to restudy this operation at a future date in order to determine the effectiveness of this vacuum cleaner in reducing the vanadium pentoxide dust, but due to the pressure of other work, it has not yet been possible for us to make these repeat studies. Those concerned in the supervision of this work, however, have informed us that there has been a marked reduction in the dustiness of this operation since the installation of this vacuum cleaning equipment. It would be my suggestion that your group give consideration to the development of a suitable vacuum cleaner which could be used in boilers of your ships to reduce or eliminate the hazards. It was our observation that it is impossible to provide sufficient general ventilation to the boilers to eliminate the exposure, whereas the vacuum cleaner would provide a great deal of reduction of the exposure.

I trust that this information will assist you in formulating your own ideas concerning your own workers. I may say that in cooperation with Dr. Stokinger at the Occupational Health Field Headquarters of the Public Health Service in Cincinnati, we are now arranging to have the finger nails of some of these exposed people analyzed for their cystine content in order to determine whether or not their exposure has been excessive, since Dr. Stokinger feels that there is evidence that all cystine content of the finger nails diminishes on exposure to vanadium pentoxide. As yet these analyses have not been completed so I am not able to give you the results at this time. If there is anything further that we can do to assist you with the problem, please do not hesitate to contact us again.

Very truly yours,

R. E. Eckardt.

R. E. ECKARDT, M. D.

REE:gch
Encl:

Brit. J. industr. Med., 1952, 9, 50.

VANADIUM POISONING FROM CLEANING OIL-FIRED BOILERS

BY

N. WILLIAMS

From the London Transport Executive

(RECEIVED FOR PUBLICATION MAY 1, 1951)

The vanadium content of crude oil ash varies considerably according to its source. It may be as high as 45% in Venezuelian and 14% in Iranian crude oil or as low as a trace in Wyoming crude oil and none in the Pennsylvanian product (Dunstan, 1938). As fuel oils are residual oils left after the distillation of the more volatile hydrocarbons, they will contain a higher proportion of vanadium than the corresponding crude oils. Thus an oil with an ash content of 0·1% containing 40% of vanadium as V_2O_5 would produce 1 lb. of vanadium pentoxide for 11 tons of oil burnt. A significant proportion of the vanadium accumulates in the gas passages of boilers. This paper describes the symptoms and clinical findings in men cleaning oil-fired boilers, and sets out evidence that vanadium was responsible.

After the recent war a generating station was partly converted to burning fuel oil owing to shortage of coal. After cleaning the oil-fired boilers the men noticed symptoms which they associated with the work. Before this conversion there had been no complaints from the boiler-cleaners of any harmful effect on their health.

The boilers are probably the largest oil-fired land installations in this country, each boiler consuming about 150 tons of fuel oil per week. The lower part of the boiler, into which is sprayed the atomized oil, is known as the combustion chamber, which is lined by refractory fire-bricks, and on its rear and side walls are the vertical generating tubes. In the upper part of the boiler are more generating tubes interspersed between which are the superheater tubes. Considerable quantities of petroleum soot are deposited in both the combustion and superheater chambers.

Each boiler requires cleaning once a year in order to maintain its efficiency, and it has been found necessary at these times to renew the fire-brick lining. It takes a gang of eight men about five days to clean a boiler, after which the bricklayers enter to dismantle the fire-brick walls and build new ones.

The boiler cleaning methods in use when the investigation began produced large quantities of dust. The combustion chamber was cleaned by brushing the soot off the walls, and the boiler tubes by tapping with a rod, the soot falling off as a result of the vibration. In the superheater chamber the banks of tubes had to be cleaned by a compressed air jet from a nozzle, as it was difficult to reach them by other means (Fig. 1). Dismantling the fire-brick walls also produced dust, and the bricklayers complained of similar, though less severe, symptoms than those described by the boiler-cleaners (Fig. 2). The scaffolders, who are the first to enter the boiler in order to erect the platforms from which the cleaners work, have had symptoms similar to those of the bricklayers, but the cases reported in this paper are all boiler-cleaners.

Methods of Analysis

The vanadium content of the urine samples was determined by a colorimetric method described by Sandell (1950) in which sodium tungstate is used. The method was checked by estimating vanadium in the urines of men not exposed to petroleum soot, none being detected in these samples, and urines to which known quantities of ammonium metavanadate were added. It was found that the method was accurate in determining quantities as low as 0·02 mg. per specimen. Samples of dust were collected from different parts of the boilers during cleaning operations. Measured volumes of dust-laden air were drawn through distilled water contained in an aspirator packed with Lessing rings, a guard aspirator also being fitted as a precaution. Three separate samples of 3·7, 4·5, and 6·8 cu. m. were collected, the air being passed at about 7·1 cu.

FIG. 1. Boiler-cleaners demonstrating methods of dislodging soot from generator and superheater tubes. The one on the left is using a compressed air lance, and on the right the cleaner is tapping the tubes with a rod.

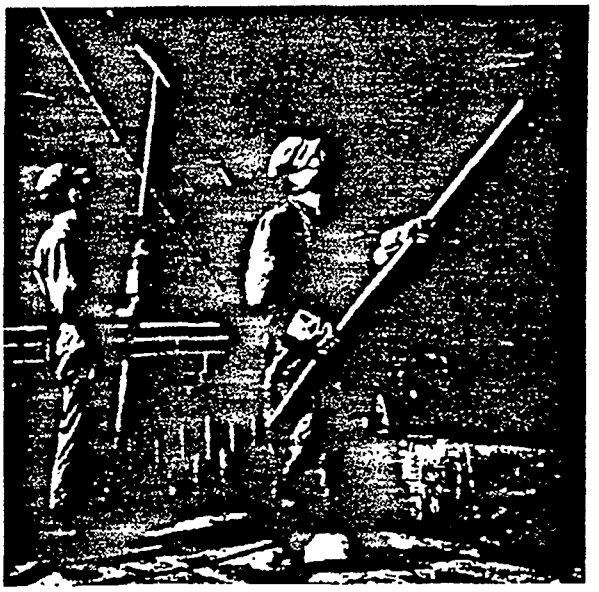


FIG. 1

FIG. 2.--Bricklayers dismantling a fire-brick wall. The man on the right is spraying the bricks with water.

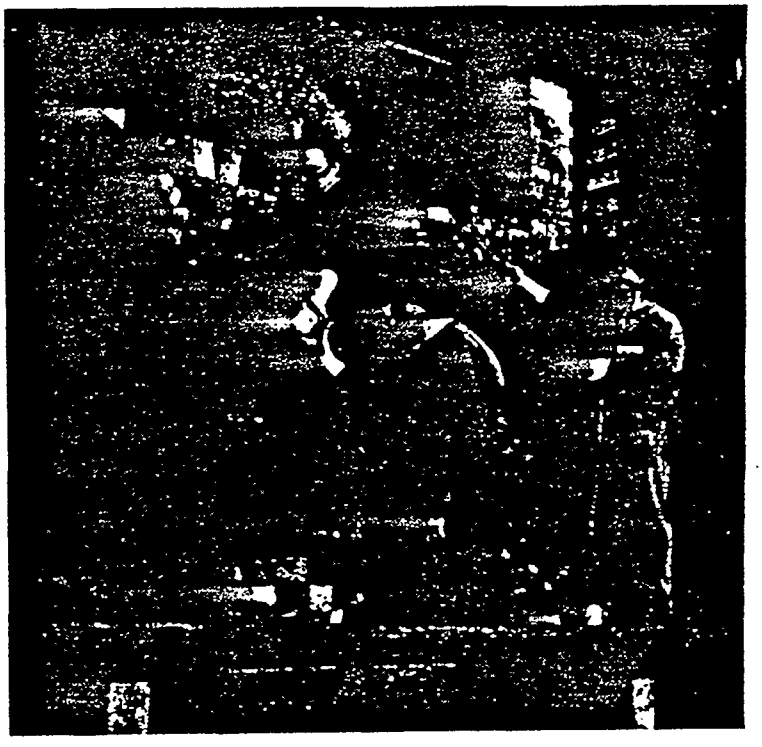


FIG. 2

m. per hour. Vanadium was estimated both in the resultant solution and suspended solids. Thermal precipitator samples were used to estimate particle size and concentration. The microscope technique involved the use of both 4 mm. and 2 mm. objectives. Particles counted ranged from 11 to 0·44 microns with the 4 mm. objective, and 4 to 0·15 microns using the 2 mm. objective.

Symptomatology

Boiler-Cleaners' Complaints.—All the eight men engaged on this work complained of symptoms associated with cleaning oil-fired boilers. The first symptoms usually occurred between half and one hour after starting work, but in some cases were delayed for 12 hours. They consisted of rhinorrhoea, sneezing, watering of the eyes, soreness of the throat and behind the sternum. This group of symptoms can be described as the primary symptoms, the secondary ones appearing after a period of six to 24 hours. They were dry cough, wheezing, severe dyspnoea causing the man to rest after climbing a 20-foot ladder, lassitude, and depression with a disinclination to follow the usual evening activities. A greenish-black coating developed on the tongue which faded two or three days after contact with petroleum soot was over. Some of the men noted that the cough became paroxysmal and productive.

These symptoms continued while at work and only became less severe three days after ceasing work. In one man the wheezing and dyspnoea persisted for over a week, but none noticed any permanent ill-effects.

Personal Observations.—I entered one of the oil-fired boilers while it was being cleaned and remained there for about one hour to obtain first-hand experience of the symptoms. Rhinorrhoea, sneezing, and watering of the eyes occurred within 15 minutes. Three hours later the secondary symptoms began to develop: dry cough, wheezing, dyspnoea, and soreness behind the sternum. Cough and wheezing continued throughout the night disturbing sleep. During the next day dyspnoea became more intense, it being impossible to walk at even a moderately brisk pace on the level. Climbing 30 stairs necessitated a short period of rest before continuing. There was a general feeling of depression, and it was difficult to take the usual interest in work. Cough became productive after the second day. The bronchospasm was not relieved by "benadryl" but ephedrine and stramonium gave some relief. The dyspnoea had disappeared by the end of one week, but the cough persisted for a further week. It had at one time been suggested that the symptoms were due to sulphur dioxide, but the absence of the characteristic smell and the delay in the onset of the symptoms excluded this possibility.

Clinical Reports

All eight boiler-cleaners were examined before and after work, that is after exposures lasting approximately one week. It was obvious from a knowledge of the men's previous personalities that they were in low spirits, looked tired, listless, and pale. One man complained that coughing had been sufficiently severe to produce vomiting. Another noticed that the tips of his cigarettes turned green.

Examination of the tongue revealed a coating on the dorsum varying from greenish-black to greenish-yellow. It was not possible to remove the discoloration by scraping. In two of the men there were signs of generalized bronchospasm and bronchitis. Two other men had developed râles in the right axillary region. Cardiac examination revealed no abnormality. In two men slight tremor of the hands developed.

X-ray films of the chest, electrocardiograms, and routine examination of the urine for albumin, sugar, and blood revealed no abnormality.

Case Reports

Case 1.—This man, aged 38, had been a boiler-cleaner from 1947 to 1949. He was examined after five days' cleaning on an oil-fired boiler. He complained of sneezing within two hours of starting work and developed a cough the same evening. He was dyspnoeic the next day on ladder climbing, was depressed, and felt tired. He noticed that cigarette tips turned green. Examination revealed a greenish-black coating on the tongue, many high-pitched rhonchi throughout the chest, and râles in the right axillary region. Blood pressure was 110/70 (pre-exposure 138/65). A radiograph of the chest revealed no abnormality. Urine analysis showed 0·08 mg. vanadium in 210 ml. urine passed during the day and 0·02 mg. vanadium in an early morning specimen of 297 ml.

Case 2.—Aged 40, he had been a boiler-cleaner from 1946 to 1949. He was examined after two days' exposure. He developed rhinorrhoea and sneezing within three hours of starting work and a dry cough the same evening. He felt drowsy, and was dyspnoeic on climbing stairs. Examination revealed a yellowish-green coating on the tongue, scattered rhonchi over both lungs with râles at both bases. Blood pressure was 110/75 (pre-exposure 140/95). A radiograph of the chest was normal. No vanadium was detected in the urine.

Case 3.—This man, aged 32, had been a boiler-cleaner from 1947 to 1949. He was examined two days after ceasing two days' work in an oil-fired boiler. He developed rhinorrhoea and sneezing half an hour after starting work. He noticed tightness of the chest the same evening, and felt depressed. Next day dry cough began

and he became dyspnoeic and orthopnoeic. He had to sit down after climbing a flight of stairs. Examination revealed a yellowish-green coating on the tongue. A fine tremor of the hands was evident. No physical signs were detected in the chest. Blood pressure was 120/82 (pre-exposure 145/90). A radiograph of the chest was normal. No vanadium was detected in the urine.

Case 4.—Aged 43, he had been a boiler-cleaner from 1946 to 1949. He was examined after five days' exposure. He developed rhinorrhoea and sneezing within half an hour of starting work and later soreness of the throat and chest. Dry cough started later the same day. Next day he became dyspnoeic and had to rest after climbing a ladder. He felt depressed. By the fifth day cough had become paroxysmal and induced vomiting. Examination revealed a pale green coating on the tongue. No physical signs were detected in the chest. Blood pressure was 105 70 (pre-exposure 128 80). A day sample of 230 ml. urine contained a trace of vanadium.

Case 5.—This man, aged 39, had been a charge hand boiler-cleaner from 1946 to 1949. He was examined after five days' exposure. No symptoms appeared on the first day, but rhinorrhoea and cough developed on the second day, with some wheezing and a tight feeling across the chest. Cough was productive on the third day. The patient was dyspnoeic on climbing stairs, and felt listless. Examination revealed that he was paler than normal; the tongue was light green posteriorly. No physical signs were detected in the chest. Blood pressure was 110 65 (pre-exposure 125 80). A radiograph of the chest was normal. No vanadium was detected in the urine.

Case 6.—The patient was aged 35 and had been a boiler-cleaner from 1948 to 1949. He was examined four days after ceasing boiler-cleaning, an operation lasting three days. He developed rhinorrhoea and cough towards the end of the first day, but had no wheezing. He lacked concentration. Cough ceased two days after exposure ended. Examination showed a pale yellow coating over the tongue and a few râles in the right axilla. Blood pressure was 110 70 (pre-exposure 150, 80). A radiograph of the chest was normal. The urine, 152 ml., contained a trace of vanadium.

Case 7.—This man, aged 39, had been a boiler-cleaner from 1948 to 1949. He was examined after five days' exposure. He developed sneezing and rhinorrhoea within six hours of starting work. Cough began next day and soon became productive. He was dyspnoeic on climbing a ladder and had to rest at the top. Examination showed a greenish-black coating on the tongue, and a fine tremor of the hands. No physical signs were detected in the chest. Blood pressure was 150 90 (pre-exposure 150 90). A radiograph of the chest was normal. No vanadium was detected in the urine.

Case 8.—The last patient, aged 26, had been a boiler-cleaner from 1947 to 1949. He had had occasional cough cleaning coal-fired boilers. He was examined after five days' exposure. He developed rhinorrhoea, sore throat, and cough within one hour of starting work, and felt a tightness of the chest the same evening. He was dyspnoeic next day and had to rest after climbing a ladder. He noticed a bitter taste in the mouth, and felt depressed. Examination showed a thick, dark green coating on the tongue. No physical signs in the chest were detected. Blood pressure was 120/75 (pre-exposure 130 90). A radiograph of the chest was normal. No vanadium was detected in the urine.

Vanadium in Urine

Specimens over a period of 24 hours, on the last day of working at boiler cleaning, were collected from each man, precautions being taken to prevent contamination by dust from the clothes and hands.

The largest amounts of vanadium were detected in the urine samples from Case 1 (0·4 mg. and 0·07 mg. per litre). It is interesting to note that this man was regarded clinically as being the most severely affected.

Traces were found in the specimens of Cases 4 and 6, one of whom had severe symptoms and the other mild. Vanadium was not detected in the urine of the remaining cases.

Atmospheric Dust

Table 1 gives the average results obtained from two thermal precipitator samples taken in the superheater. On the average the numerical concentration of dust particles not exceeding 11 microns in diameter was 3,526 particles per 1 ml. of air, and of these 93·6% did not exceed 1 micron in size. Although there was such a numerical preponderance of fine particles these accounted for only a small proportion of the weight of dust in the air. The weight concentration of particles within different size ranges has been computed on the assumptions that the particles are spherical in shape, and that the dust has a specific gravity of 2. The results of these calculations are shown in the fourth column of Table 1, where it is seen that the mass concentration of dust below 1 micron in size was only 0·36 mg. per cu. m. In the last column of Table 1 the weight concentrations of particles of various sizes are shown as percentages of the total estimated weight concentration of particles not greater than 11 microns. It should be remembered, however, that the estimate of the total weight concentration (12·3 mg. per cu. m.) of particles of this range of size can give no indication of the weight concentration of the whole dust when there are present many particles greatly exceeding 11 microns in diameter. That is made clear by comparing the weight concentrations in Table 1 with those in Table 2 which gives the results of the three samples taken from boilers during cleaning operations, by aspirating air through distilled water (Table 2). The range of particle size of the vanadium dust is not known but

TABLE 1

THERMAL PRECIPITATOR SAMPLES TAKEN FROM SUPERHEATER DURING CLEANING OPERATION

Diameter of Particles (μ)	Number of Particles (per 1 ml. air)	Numerical Concentration of Particles (%)	Weight Concentration of Particles (mg. per cu. m.)	Weight Concentration of Particles (%)
0·15–1·0	3,300	93·6	0·36	2·9
1·0–5·5	217	6·14	4·09	33·3
5·5–11	9	0·26	7·85	63·8

TABLE 2

ANALYSIS OF DUST FROM BOILER DURING CLEANING

Sampling Point	Dust (mg./cu. m. air)	Vanadium (as % of dust)	Vanadium (mg./cu. m. air)
Superheater chamber	659	6·1	40·2
Superheater chamber	239	7·2	17·2
Combustion chamber	489	12·7	58·6

when advising on the use of suitable respirators it is safer to assume that the smallest dust particles contain vanadium.

Preventive Measures

Efforts were made to prevent or reduce the amount of the dust produced, but the main problem was to prevent the inhalation of the dust by the boiler-cleaners.

It was found that a large part of the boiler could be cleaned by an operator standing outside the boiler at the manhole using a lance several feet long, from which a jet of compressed air boosted to a very high pressure was ejected. The soot was drawn away from the operator and up the flue to the outside atmosphere by the induced draught fan. As certain parts of the boiler could not be reached by this method, men wearing dust respirators (Mark IV, Siebe Gorman), a type approved for use where there is a silicosis hazard, entered the boiler itself in order to complete the cleaning. When the induced draught fan could be used to advantage this was switched on.

Much soot dust was produced when the fire-brick walls were dismantled and a water spray was therefore used on the bricks as they were being dislodged. A tarpaulin was stretched over the top of the combustion chamber to prevent soot particles, dislodged from the boiler tubes by vibration, falling from the superheater chamber into the combustion chamber where men were working.

Two boilers have been cleaned using these methods without a single complaint of symptoms from the boiler-cleaners, scaffolders, or bricklayers.

More recently, two boiler-makers and two bricklayers have been engaged on repairs in a boiler which had not been previously cleaned. They wore their respirators only when it appeared to them that there was dust in the atmosphere and it is not surprising that they developed minor symptoms of vanadium intoxication. The vibration of the repair work must have caused a small amount of soot to get into the air of the combustion chamber. It has therefore been recommended that all men entering boilers which have not previously been completely cleaned should wear suitable respirators.

Discussion

A search of the literature has failed to disclose any reference to symptoms caused by this type of work, although it has been known for many years that petroleum and petroleum soot contained vanadium in varying proportions. Respiratory symptoms of vanadium poisoning among workers extracting vanadium from petroleum soot, obtained from the boilers of oil-fired liners, were described by Wyers (1946). Information obtained from a boiler-cleaning company revealed that they have paid increased wages since 1924 for men cleaning oil-fired boilers. The reasons for this have been obscured by time, but it would appear that there were two possible reasons: the dirtier nature of the petroleum soot and the unpleasant respiratory symptoms experienced. The management stated that the men still complained of a wheezing of the chest, but medical advice on this, as an industrial problem, had never been sought. They had, however, provided the men with a light mask with a cotton wool filter.

Sjöberg (1949) recorded four cases of broncho-pneumonia, one of lobar pneumonia, and one of pleurisy among workers exposed to vanadium dust. The sick records of the boiler-cleaners over the last two years were examined, but they revealed no significant increase in sickness absence from any cause. This would appear to be in accordance with the views of Symanski (1939) who, in a very full account of vanadium poisoning, concluded that the work should be intermittent in order to allow recovery from adverse effects. In the present series of cases the system of working had, in fact, produced these conditions as the men work on oil-fired boilers for only about two weeks in every three months.

The blood pressure of the boiler-cleaners taken after exposure were in no case higher than the pre-exposure readings as might have been expected from the experience of Wyers (1946). In fact they were lower. No explanation is offered for these findings but possibly the men had become accustomed to medical examination by the time the later readings were taken.

Dutton (1911) described vanadium poisoning with symptoms and signs referable to disorders of the gastro-intestinal and renal systems. These were anorexia, nausea, and vomiting, and albumin, blood, and casts in the urine. He also observed anaemia, with a reduction both in the number of cells and of haemoglobin. No cases in the present series had symptoms or signs referable to these systems, though one man did develop a degree of pallor. Symanski (1939) also failed to observe any of these changes. However, two of the boiler-cleaners developed a fine tremor of the hands, a sign which Dutton and subsequent writers have observed.

In view of the risks of vanadium intoxication involved in cleaning oil-fired boilers, it is suggested that methods of cleaning these boilers should be reviewed and means devised which do not involve exposure to the harmful effects of the petroleum soot. Even intermittent exposures may lead to bronchitis or pneumonia. Men working on these boilers should be under medical supervision. It is probable that much respiratory disease occurs among boiler-cleaners, the true cause of which is not recognized. Finally, it is hoped that this paper may be of some value in drawing attention to the existence of the hazard.

Summary

Vanadium intoxication in eight men cleaning oil-fired boilers is described.

The method of investigation of the original complaint, the preventive measures instituted, and the results achieved are discussed.

It is suggested that methods of cleaning oil-fired boilers should be reviewed, and that men working on these boilers should be medically supervised.

I am indebted to Mr. A. T. Wilford, the late superintendent of laboratories, and to Mr. H. E. Styles, present superintendent of laboratories, and their staff for the analyses of the dust and urine; to Mr. H. Branton, Generating Station Superintendent, for his help and cooperation; and to Dr. L. G. Norman, the Chief Medical Officer, for his advice in the preparation of this paper. The thermal precipitator estimations were carried out by the Fuel Research Station, Department of Scientific and Industrial Research.

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DEPARTMENT OF
HEALTH, EDUCATION AND WELFARE
PUBLIC HEALTH SERVICE
Occupational Health Field Headquarters
1014 Broadway, Cincinnati 2, Ohio

IN REPLYING, ADDRESS THE

July 21, 1953

Commandant
U. S. Coast Guard Headquarters
Washington 25, D. C.

Attn: Capt. C. P. Murphy
Chief, Merchant Marine Technical Division

Dear Sir:

Your letter directed to this office regarding the possibility of vanadium poisoning in boiler-cleaning operations is herewith acknowledged.

Oils from certain areas of the world, notably Venezuela, Curacao, and certain parts of the Middle East, contain appreciable amounts of vanadium, nickel, and traces of many other metallic constituents; U. S. oils, in general, do not contain appreciable quantities of vanadium.

According to information obtained from Dr. Robert Eckardt, of Esso Laboratories whose operations extend into the Venezualian area, workers cleaning boilers using such oil get into respiratory difficulties from the vanadium left as an ash of pentoxide. As much as 40 to 50 per cent of the ash may be in the form of V_2O_5.

To my knowledge, I have not heard of anyone attributing any pulmonary or other effects to the nickel or cobalt components of any oils to date; although from our work with these elements, this possibility should be considered.

The symptoms of the respiratory distress caused by the contact with vanadium from such sources has been described by Sjoberg(1). The chief symptoms consisted of severe irritation of the respiratory tract, dryness and pain in the throat, a bothersome cough and wheezing sounds in the chest, shortness of breath upon exertion, accompanied by weakness and fatigue. A few individuals developed bronchopneumonia. Others had nasal catarrh, and irritation of the conjunctivae. Prominent also were dermal lesions of the face, hands, legs, and the dorsum of the feet, consisting of papular eruptions. An occasional case of allergy was believed demonstrated by patch test with sodium vanadate. The upper respiratory distress caused by vanadium was

difficult to differentiate from other infections of the upper respiratory tract.

In five cases acute changes occurred in the lungs (pneumonic in one, bronchopneumonic in four), three of which latter were known to have had heavy exposure to dust. Myers reported four similar cases. Thus, it appears probable that V_2O_5 dust may cause pneumonitis. The finding of several types of pathogenic bacteria indicated that the vanadium pneumonitis may be of a mixed chemical and bacterial character. Moreover, an allergic factor may possibly be present; one of these cases with acute lung changes had not only an eczematous lesion, but also demonstrated a positive patch test to vanadium.

Although these cases arose in a plant manufacturing V_2O_5, I feel reasonably certain such description is typical of responses to vanadium pentoxide that may be expected in cleaning burners of oil containing vanadium.

Vanadium has yet to be shown to be a producer of chronic pulmonary injury, (i.e., progressive injury from cumulative effects after exposure has ceased) but the response is chronic in the sense that the acute effects may be repeated over and over again.

Over the past two years, these laboratories have done exhaustive studies with vanadium in animals; unfortunately our inhalation toxicity work is only about to start. We have found, however, it possible to treat successfully with ascorbic acid (vitamin C) animals that had received a lethal dose of vanadium; 125 mg/kg body weight ascorbic acid was sufficient to save the life of severely poisoned dogs, rats, and mice.

With the lack of even a tentative maximal allowable concentration for vanadium pentoxide in the air, I would suggest maintaining dust concentrations of V_2O_5 as low as possible, less than 1 mg/m^3, by adequate ventilation. Where this is not possible, I would suggest the use of air-supplied masks or a suitable respirator containing a U. S. Bureau of Mines approved dust and fume filter. I would suggest also the use of protective clothing on exposed parts. The pH of V_2O_5-saturated solution is approximately 3, an irritant in itself, irrespective of the toxicity of vanadium. We have not determined as yet whether vanadium compounds may penetrate the unbroken skin.

Further help on the practical aspects of your problem may be obtained by communicating with the following:

Director of Public Health
District of Columbia Health Dept.
Washington 1, D. C.

Sincerely yours,

Herbert E. Stokinger

Herbert E. Stokinger
Chief Toxicologist

Reference:

(1) Sjöberg, S. Health Hazards Associated with V_2O_5, Arch. Hyg., 3, 631, 1951.

AMERICAN PETROLEUM INSTITUTE
50 WEST 50TH STREET
NEW YORK 20, N. Y.

DEPARTMENT OF TECHNICAL SERVICES
DAVID V. STROOP, DIRECTOR

December 4, 1953

Professor Philip Drinker
Harvard University
School of Public Health
55 Shattuck Street
Boston 15, Massachusetts

Dear Phil:

In response to the circularization of your letter dated October 21, 1953, we have received suggestions as follows:

1. October 26, 1953

"We would like to recommend that the following be looked at:

1) Tri-cresyl Phosphate
2) C_9 Aromatics
3) Gasoline

"We have suggested the first chemical because apparently it is being used more and more by industry, one of the latest uses being a gasoline additive.

"We also think the toxicity of gasoline should be reviewed because since the original investigations established the MAC value at 500 parts per million, gasoline has become more and more aromatic in nature due to newer types of processing."

2. November 2, 1953

"Please transmit the following to Dr. Drinker.

"In accordance with Dr. Stokinger's letter in which he states they are considering establishing tentative levels as guides for compounds on which there is insufficient experience and experimental data to fix a firm value, we would like to see his Committee give consideration to the following compounds or elements in this light.

1. Iron carbonyl
2. Cobalt carbonyl
3. Vanadium
4. Molybdenum
5. DDT
6. Chlordane
7. Lindane
8. Aliphatic mercaptans (methyl, ethyl and propyl)
9. Coal tar fumes (bitumastic coatings, such as Water Works Enamel)

2. November 2, 1953 letter continued -

"If Dr. Stokinger's Committee will consent to include physical agents, we would suggest noise for his consideration.

"We do not have supportive data to assist Dr. Stokinger's Committee in the establishment of tentative levels for the above materials; however, we are familiar with one or more publications, which are standard references, that describe toxicity and hazard of these materials. We have had to make an evaluation of the problem associated with exposure to these materials or conditions at some time in our work."

3. November 25, 1953

"I gather that what you actually would like to have are new values or new data that can be considered for inclusion in the tables for this Group. We have no such data to contribute but are wondering if consideration should be given to attempting to get new values for sulfur trioxide. General Chemical Company is now marketing this under the trade name "Sulfan". Presumably it is going to find increased use in industry and could therefore become more of a problem than sulfur trioxide has been in the past.

"It would be logical to assume that its toxicity would approximate that of sulfuric acid mist which has a published threshold limit of 1 mg. per cu. meter or about 1 part per million. We somewhat question whether the threshold limit of sulfuric acid or sulfur trioxide should be set as low as chlorine, nitrobenzene, or phosgene (also published as 1 ppm.)"

---ooOoo---

If, as, and when additional suggestions are received they will be forwarded to you.

Sincerely,

DVS:js
mc: Members
Medical Advisory Committee

AMERICAN PETROLEUM INSTITUTE
50 WEST 50TH STREET
NEW YORK 20, N. Y.

DEPARTMENT OF TECHNICAL SERVICES
DAVID V. STROOP, DIRECTOR

November 20, 1953

To Members
Medical Advisory Committee

Gentlemen:

For your information we attach a copy of the report which Mr. Rathbone presented to the Institute's Board of Directors at its meeting held in Chicago on November 11, 1953.

The Board accepted the report and approved the recommendations stated therein.

Very truly yours,

DVS:js
Attachment
mc: Members
Medical and Health Committee of Board
J. W. Frey
W. T. Gunn
J. E. Moss
W. H. Strang

REPORT OF MEDICAL COMMITTEE

To the A.P.I. Board of Directors:

This special Committee was appointed by the Executive Committee on September 16, 1953, to study the Medical Advisory Committee and directed to report to the Board at this meeting. The committee was appointed since it was believed that the Medical Advisory Committee was not properly organized or was not functioning effectively or possibly both.

A considerable number of individual conferences have been held by members of the special committee with various doctors and technical advisors of the Medical Advisory Committee and past records and correspondence have been reviewed. It appears that the Board's recent action in appointing this committee was both timely and justified, since it is apparent that the Medical Advisory Committee has not been functioning as effectively as it should.

The principal difficulties have been as follows:

1. There has not been a clear-cut understanding of the purpose, objectives, and scope of activity of the Medical Advisory Committee and its place in the American Petroleum Institute organization.

2. There has not been agreement on the proper method of selection of problems for the committee to work on.

3. There has not been understanding or agreement on the reporting, approval, or dissemination of information of the results of the committee's work.

4. These conditions have, somewhat naturally, led to a lack of interest in the Medical Advisory Committee's work by a number of the members and have also, on occasions, resulted in some conflict of opinion between the medical members and the technical advisors. The end result has been that the work of the Medical Advisory Committee has been less effective and less generally available to American Petroleum Institute membership than should be the case.

The organizational and functional problems of the Medical Advisory Committee are not simple and some are fairly controversial. Within the time available, your special committee has not been able to explore all aspects and reconcile all views. This report must then be viewed as a progress report. However, your committee does wish to make the following recommendations:

(Continued)

1. That a Medical and Health Committee be constituted as a regular API committee and that it report directly to the Board and the Executive Committee. A majority of the committee should be Board members.

2. That the Medical Advisory Committee be continued in existence and that it report to the Medical and Health Committee. The membership of the Medical Advisory Committee should be entirely of medical men, but the use of technical advisors to the Medical Advisory Committee should be continued.

3. That all medical and health problems arising in any API divisions be referred to the Medical and Health Committee. That committee would then either -

   a) undertake work on the problem through the Medical Advisory Committee, or

   b) suggest that the referring division undertake work on the problem, using the advice and facilities of the Medical Advisory Committee to the extent it feels necessary, or

   c) advise the referring division that it did not believe that any work on the problem was appropriate or desirable.

In the first case (a), the Medical Advisory Committee would justify the expenditure involved in its budget. In the second case (b), the referring division would justify the expenditure.

4. That the Medical and Health Committee study further the details of organization, objectives, functioning, and reporting of results of the Medical Advisory Committee, and report to the next meeting of the Board a specific plan of organization and functioning for that Committee.

5. That pending such report the requested budget of $75,000 for the Medical Advisory Committee's work for the coming fiscal year be approved. It is suggested that the Board may wish to refer the requests for funds for medical research now pending in other divisions to the Medical and Health Committee if it approves the establishment of such committee.

--oooOooo--

js
November 13, 1953

Copy from D. V. Stroop for information of members and associates of Medical Advisory Committee 11-17-53

ESSO STANDARD OIL COMPANY

15 West 51st Street
New York 19, N. Y.

Leo Wade, M. D.
Medical Director

November 11, 1953

Re: Dermatitis due to petroleum products

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

Dear Mr. Stroop:

Dr. Hine has sent me the attached resume of a report on occupational disease in the state of California. I think this report would be of unusual interest to members of the Medical Advisory Committee and also to members of the Lubrication Hygiene Panel. May I suggest that you have this duplicated for such distribution.

If for any reason you do not plan to have the material duplicated, please return the enclosed copy since it is the only one I have.

Yours very truly,

/s/ Leo Wade

LEO WADE, M. D.

LW:hh

Enc.

SUMMARY OF REPORTED OCCUPATIONAL DISEASES IN THE STATE OF CALIFORNIA

WITH SPECIAL REFERENCE TO PETROLEUM PRODUCTS

Year	Total No. of Occupational Diseases	Total No. of Cases of Diseases of the Skin	Occupational Dermatitis Due to Oil, Grease, Solvents and Chemicals	Occupational Disease Due to Petroleum Products*	Total Occupational Diseases Encountered in the Manufacture of Petroleum Products
1949	12,536	6,838	2,727	Not reported in this way.	249
1950	12,245	6,615	2,723	262	215
1951	14,777	7,945	3,619	464	170
1952	20,482	10,388	4,803	694	243

* Exclusive of injuries classified under the headings: "Organic Solvents, Organic Chemicals, Oils, Fats and Waxes, Paints and Varnishes".

NUMBER OF CASES OF OCCUPATIONAL DERMATITIS DUE TO OILS, GREASES, SOLVENTS

AND CHEMICALS, ACCORDING TO MAJOR INDUSTRIES

Year	Agriculture	Mining and Quarrying	Construction	Manufacturing	Transportation & Communication	Trade	Finance & Real Estate	Service	Govmnt.	Not Stated
1949	265	12	180	1,211	80	286	9	295	95	294
1950	408	4	221	1,205	65	367	11	246	87	109
1951	414	15	282	1,876	59	387	9	276	104	197
1952	255	12	352	2,696	96	493	37	375	150	337

Summarized November 2, 1953
C. H. Hine, M. D.

Copy from D. V. Stroop
American Petroleum Institute
for your information

Article From N. Y. Times - May 14, 1953

TOBACCO SMOKE AND 'GAS' FUMES STUDIED AS POSSIBLE CANCER LINKS

Two of the day's leading health questions -- the relation between tobacco and cancer of the lung and the role in cancer of exhaust fumes from gasoline, oil and coal engines -- are being investigated at the Institute of Industrial Medicine of the New York University-Bellevue Medical Center, it was reported yesterday.

The institute, now only four years old, has accepted industrial research projects that will cost a total of $250,000 for the year beginning July 1, but an additional $75,000 of "unrestricted" research funds are needed if the group is to continue its pioneering cancer studies, it was explained by Chancellor Henry T. Heald of New York University.

The institute, which conducts experiments in industrial medicine on contracts with leading industries, has already, theoretically at least, prevented the development of cancer in many refinery workmen of the Standard Oil Company (N. J.), according to Dr. Norton Nelson, biochemist in charge of the research.

Oil Development Cited

Standard Oil Company chemists discovered a new catalytic cracking process that increased considerably the production of usable fuel from petroleum. But in one step of the process it involved treating raw crude oil at very high temperatures. This produced strange new chemical compounds, one of them suspected of being capable of causing cancer.

The suspected chemical was tested at the Industrial Medicine Institute in experiments subsidized by Standard Oil and, as predicted, was found to cause cancer in animals. With this knowledge, the Standard Oil Company redesigned its cracking process so the cancer-causing chemicals were used in a part of the production unit in which workmen were not required.

There is a long history of chemical agents used in industry that are known to cause cancer, Dr. Nelson said. The latest suspect is tobacco smoke. Many statistical studies have suggested that a recent rise in the incidence of lung cancers may be attributed to the increased use of tobacco. However, the type of lung cancer that now causes a fourth of all male hospital deaths from malignant disease has not been substantiated in animal tests, it was explained.

New tests are now being projected in which efforts will be made to induce a human-type cancerous lesion with smoke from cigarettes and other forms of tobacco. More important, however, are projected studies to determine the effects of gaseous combustion products inhaled on city streets.

---ooOoo---

AMERICAN PETROLEUM INSTITUTE
50 WEST 50TH STREET
NEW YORK 20, N. Y.

DEPARTMENT OF TECHNICAL SERVICES
DAVID V. STROOP, DIRECTOR

November 2, 1953

Memorandum to Members and Associates
Medical Advisory Committee

For your information on a subject of possible interest, I am quoting from a draft report which has been prepared for presentation to the General Committee - Division of Refining on November 10, 1953 by the Chairman, Committee on Disposal of Refinery Wastes as follows:

"It is proposed to evaluate the available toxicity data on certain chemicals in refinery effluents. Such evaluations will be useful in providing a factual basis for the establishment of water quality criteria. The data studied would be limited to that concerned with man and land animals. The metal finishing and steel industries are conducting similar projects and duplication with these would be avoided. Compounds to be studied would include hydrocarbons, fluorides, inorganic acids, sulfonic acids, amino compounds and organic sulfur compounds.

"The Kettering Laboratory is a leading authority on the evaluation work entailed in this project and this institution probably would be retained for the job. A sum of $12,500 is desired for the first year's work. If satisfactory results are obtained, it is likely that recommendations for the renewal of the project will be made next year. An additional year's work probably could be done for $7,500."

Mr. W. T. Gunn, Director, Division of Refining, informs me that the Committee on Disposal of Refinery Wastes has in mind consulting with the Medical Advisory Committee with respect to information which may be available from Harvard University through Professor Philip Drinker, that may be useful in this compilation.

Very truly yours,

W Stroop

DVS: js
mc: Members, Medical Committee of the Board

AMERICAN PETROLEUM INSTITUTE
50 WEST 50TH STREET
NEW YORK 20, N. Y.

DEPARTMENT OF TECHNICAL SERVICES
DAVID V. STROOP, DIRECTOR

November 2, 1953

Subject: ASA Uniform Industrial Hygiene Standards

To Members and Associates
Medical Advisory Committee

Gentlemen:

Supplementing my letter of June 10 and Doctor Wade's letter of June 25, we enclose a copy of Dr. Newquist's letter of July 16 which should have been sent to you previously.

Current developments on the subject are set forth in the enclosed copies of communications as follows:

(1) ASA - CS 311 - October 9, 1953
(With letter ballot CS LB 135)

(2) API letter File 902.Z62 October 27, 1953 transmitting negative vote on CS LB 135.

Very truly yours,

DVS:mr
Enclosures

C O P Y C O P Y C O P Y

July 16, 1953

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

ASA
Uniform Industrial Hygiene Code

Dear Mr. Stroop:

Mr. A. E. Dooley and I have reviewed your letter of June 10, 1953, on the above subject and we offer the following observations and comments:

1. The SCCC of ASA has already voted to go ahead with a project on Uniform Industrial Hygiene Standards.

2. The above project will cut across and duplicate the work of several existing ASA committees. This situation will not be very easy to reconcile; it may involve considerable misunderstanding and it might impede certain aspects of the work if the situation is not reconciled quickly and amicably.

3. The scope of the project seems to be too broad. As presently worded and interpreted, the Z62 project could include shift work, hours of work and even vacations. If this is not specifically limited in scope, the eventual discontinuance of the project by ASA would be a probability.

4. Clarification of the above seems to be more important than representation by API on the Sectional Committee providing, of course, that the committee consists of competent persons and is sufficiently balanced. There are valid reasons for API and other interested party representations on the committee but the committee could also become so large as to be unwieldy.

Very truly yours,

/s/ M. N. Newquist

M. N. Newquist, M. D.

MNN:DMH

C O P Y C O P Y C O P Y

AMERICAN STANDARDS ASSOCIATION, Inc.
70 East Forty-fifth Street
New York 17, N. Y.

CS 311
October 9, 1953

To the Members of the
Safety Standards Board

Uniform Industrial Hygiene Standards, Z62

Gentlemen:

At its meeting on October 7, 1949, the Safety Code Correlating Committee initiated an ASA project on Uniform Industrial Hygiene Standards, Z62. It was agreed that this project should be under the sectional committee method with the American Conference of Governmental Industrial Hygienists and the American Industrial Hygiene Association as co-sponsors. The SCCC also provided for a special committee to study and recommend a proposed scope for this project, and also to make recommendations on the personnel of this sectional committee.

This special committee reported to the SCCC on January 25, 1951 (CS 246). Letter Ballot CS LB 106 was taken on the questions of scope and personnel. This letter ballot was discussed at the meeting of the SCCC on May 7, 1951 (CS 259). This whole situation was further discussed at the meeting of the Safety Standards Board on March 27, 1953 (CS 303, Minute No. 725). At that meeting it was voted that the scope of the Z62 project should be:

> Good practice standards for the prevention and control of those conditions in industry which may deleteriously affect the health or well-being of the employees.

At that meeting the SSB also voted that this project shall be considered of a technical or non-commercial character, and that the personnel of the sectional committee shall be chosen primarily to obtain members competent in the field of industrial hygiene. It was also agreed that the above mentioned special subcommittee, with Dr. Yant as chairman, should now prepare a list of names for the personnel of the Z62 committee.

This special committee met in Pittsburgh on September 15, 1953, and submits the following report and recommendation concerning the organization of the Z62 sectional committee:

The special committee believes that the intent and purpose of this project is as follows:

1. To provide in a single publication the technical information contemplated in the proposed scope. To a considerable extent this will be a compilation of the essential requirements taken from other appropriate available American Standards with the addition of information pertaining to industrial health and hygiene practices which are not as yet covered by existing standards.

2. The Z62 committee should primarily be a planning, integrating, and steering committee with the understanding that if any part of the standard under development by this committee concerns other existing sectional committees, then subcommittees of Z62 should be established for dealing with the respective areas of interest, upon which the sectional committees concerned would have proper representation. It would be the responsibility of such subcommittees to see that technical requirements were consistent with the sectional committee concerned and that the part prepared was consistent with other sections of Z62.

3. If new knowledge not now covered by the scopes of existing sectional committees is needed in the Z62 project, it shall be developed by (a) establishment of subcommittees of Z62 which shall include representation of all parties interested in that area, or (b) such need will be referred to the SSB with a recommendation to establish new sectional committees for dealing with it. The selected procedure shall depend on the extent and importance of the problem.

Keeping the above three principals in mind, and in line with the action taken at the meeting of the SSB on March 27, 1953, the special committee now makes the following recommendation with regard to the personnel of the sectional committee.

The special committee recommends that the American Conference of Governmental Industrial Hygienists and the American Industrial Hygiene Association, as joint sponsors for this project, each be invited to designate one representative to the sectional committee.

The special committee further recommends that in addition to the 2 members representing the sponsor organizations, members-at-large on this sectional committee be invited from the following list:

R. H. Albisser, Safety Dept., Merck & Co, Inc.
E. C. Barnes, Mgr., Industrial Hygiene, Atomic Power Div., Westinghouse Electric Corporation
A. D. Brandt, Industrial Hygienist, Bethlehem Steel Corp.
W. A. Cook, Associate Professor, Industrial Health and Hygiene, University of Michigan, School of Public Health
A. G. Cranch, M. D., Medical Consultant, Union Carbide & Carbon Corporation
Merril Eisenbud, Director, Health & Safety Div., New York Operations Office, U. S. Atomic Energy Commission
J. H. Foulger, M. D., Director, Haskell Laboratory of Industrial Toxicology, E. I. duPont de Nemours & Co., Inc.
Leonard Greenburg, M. D., Commissioner of Air Pollution of the City of New York
T. F. Hatch, Professor of Industrial Health Engg, University of Pittsburgh, School of Public Health
Nathan Van Hendricks, Industrial Hygiene Engr., Standard Oil Development Company
D. D. Irish, Biochemical Research Lab, Dow Chemical Co.
R. A. Kehoe, M. D., Director of Kettering Lab of Applied Physiology, University of Cincinnati, College of Medicine
W. G. Marks, Chief, Safety Standards Division, U. S. Bureau of Labor Standards
L. C. McCabe, Chief, Fuels & Explosives Division, U. S. Bureau of Mines
E. G. Meiter, Employers Mutual Liability Insurance Co.
Lt. Col. A. F. Meyer, U. S. Air Force
Seward Miller, Industrial Hygiene Division, U. S. Public Health Service
K. Z. Morgan, Oak Ridge National Laboratory
G. O. Nelson, M. D., Union Carbide & Carbon Corporation
Norton Nelson, Associate Professor of Industrial Medicine, New York University, College of Medicine
F. A. Patty, General Motors Research Laboratory

L. M. Petrie, M. D., Division of Industrial Hygiene, Georgia Health Department,
W. M. Pierce, Employers' Group
H. H. Schrenk, Director of Research, Industrial Hygiene Foundation of America
Leslie Silberman, Dept. of Industrial Hygiene, Harvard School of Public Health
H. F. Smyth, Jr., Mellon Inst. of Industrial Research
James Sterner, M. D., Associate Medical Dir., Eastman Kodak Co.
I. R. Tabershaw, M. D., Dir., Division of Industrial Hygiene & Safety Standards,
New York State Dept. of Labor
Arvid Tienson, Illinois State Dept of Labor
Norman White, Shell Chemical Co.
C. R. Williams, Chief Industrial Hygienist, Liberty Mutual Ins. Co.
C. D. Yaffe, Sr. Sanitary Engr, U. S. Public Health Service
W. P. Yant, Director of Research, Mine Safety Appliances Co.

Very truly yours,

Henry G. Lamb, Secretary
Safety Standards Board

HGL:NF
Encl: CS LB 135

cc: alternates
organizations

C O P Y C O P Y C O P Y

American Standards Association, Inc.
70 East Forty-fifth Street,
New York 17, New York

LETTER BALLOT

CS LB 135
October 9, 1953

of the
Safety Standards Board

Approval of Organization of Sectional Committee on Uniform Industrial Hygiene Standards, Z62

This letter ballot is taken by authority of the chairman of the Safety Standards Board.

At its meeting on October 11, 1949, the SCCC appointed a special committee to study and recommend a proposed scope and organization for the personnel of this sectional committee. This subject was discussed at the meeting of the SCCC on May 7, 1951, and at the meeting of the SSB on March 27, 1953. The latter meeting requested this special committee to make a further recommendation concerning the organization of the personnel of this committee. The report of this special committee (CS 311) is attached hereto and becomes a part of this letter ballot.

The following question is, therefore, before the Safety Standards Board for action:

Shall the SSB approve the recommendation of the special committee on the personnel of the Z62 committee: that the ACGIH and the AIHA each be invited to have one representative on the Z62 sectional committee; and that members-at-large on this committee be invited from the list shown in CS 311?	I VOTE YES ____ NO X

HGL:NF

/s/ F. G. Wilson

C O P Y C O P Y C O P Y

AMERICAN PETROLEUM INSTITUTE
50 West 50th Street
New York 20, N.Y.

Safety and Fire Protection
Services
F. G. Wilson, Director

October 27, 1953

File: 902.Z62

Mr. Henry G. Lamb
American Standards Association
70 East 45th Street
New York 17, New York

Dear Mr. Lamb:

Returned herewith is CS LB 135 bearing my negative vote against the recommendation of the special committee limiting the membership of sectional committee Z62.

The reasons underlying my negative vote include the following:

1. Regardless of the name given to this project the standards contemplated will be equivalent to a safety code; therefore, the sectional committee membership should meet the requirements of Paragraph 210 of ASA procedure.

2. The appointment of a representative sectional committee would not preclude the organization of one or more small working groups of specialists to draft proposed standards.

3. In at least one instance a similar so-called technical or non-commercial sectional committee (Z37) includes in its membership a number of representatives chosen by interested member bodies.

4. The petroleum industry is keenly interested in the work to be initiated under Z62 and is adequately organized to name a competent member for the committee.

5. Speaking as it does for 172 oil company members of the American Standards Association, the American Petroleum Institute is the best qualified organization to name the industrial hygienist to represent the interests of the petroleum industry.

6. To deny the Institute the right to name a representative on a sectional committee engaged in standardization work of importance to the petroleum industry is to deny the fundamental concept that the American Standards Association is a federation of national associations engaged in the development of American Standards.

Sincerely yours,

/s/ F. G. Wilson

FGW:kn
Attachment
cc: F. M. Porter E. O. Mattocks
D. V. Stroop

Copy From D. V. Stroop for Information of Members and Associates of Medical Advisory Committee June 30, 1953

ESSO STANDARD OIL COMPANY
15 West 51st Street
New York 19, N. Y.

June 25, 1953

Re: Uniform Industrial Hygiene Standard

Mr. D. V. Stroop, Director
Department of Technical Services
American Petroleum Institute
50 West 50th Street
New York 20, New York

Dear Mr. Stroop:

In response to your mimeographed letter of June tenth concerning the Uniform Industrial Hygiene Standard program, I am enclosing a copy of a memorandum which I had asked Dr. Clyde M. Berry to prepare.

I think it might be wise to have this distributed to other members of the Medical Advisory Committee but shall leave this to the judgment of Dr. Frank and yourself.

Sincerely yours,

/s/ Leo Wade

LEO WADE, M. D.

LW:HH

Enclosure

C O P Y

June 17, 1953

M E M O R A N D U M

To: Dr. L. Wade

Re: Position of API re ASA Project on Uniform Industrial Hygiene Standards.

I have had an opportunity to review the material sent out by Mr. Stroop to the members and associates of the Medical Advisory Committee under date of June 10, 1953 relative to the current status of an ASA project on Uniform Industrial Hygiene Standards. I have the feeling that the preparation of a uniform industrial hygiene standard as an activity of the Z-62 Committee has been viewed with some concern by the API. It is my personal feeling that such an attitude, if it exists, may not be the most desirable one. The following observations may be apropos and are offered to you on a personal basis but may be transmitted at your discretion to the API Medical Advisory Committee.

1. The American Standards Association has a reputation for impeccable honesty, and any final standards represent the consensus of all those legitimately concerned with the factual aspects. Pressuring and lobbying is viewed dimly by the ASA. It would seem, therefore, that ASA sponsored standards would be less likely to be arbitrary and capricious than would be standards emanating from groups having special interests.

2. In an organized society, controls are inevitable. It would be far better to have uniform reasonable criteria for workroom exposures than to have a multiplicity of standards, especially by those companies or industries operating in many areas.

3. ASA standards receive periodic revision. Regulations having legal standing can usually be changed only after protracted and cumbersome hearings, etc. The ASA standards would thus more nearly reflect the current knowledge and experience relating to the handling of potentially toxic materials.

4. It would be unwise to assume that standards promulgated under auspices other than the ASA will not receive legal recognition in some form or another. It is my understanding that the maximum allowable concentrations promulgated by the American Conference of Governmental Industrial Hygienists and revised annually were made the legal basis for industrial exposure criteria in one of the provinces of Canada a few years ago. I would suspect that such a legal code will not have been paralleled and industry in this province is probably operating under regulations which are not in keeping with current knowledge in the field of toxicology.

(Continued)

5. It has been amply demonstrated that industry can successfully employ any toxic material, irrespective of degree of toxicity if suitably engineered. The fact that a material is poisonous will not be a deterrent to its use and hygienic standards provide a criterion of performance which are most helpful in industrial design and operation.

6. A negative attitude can sometimes be interpreted as an attempt to hide something or to confuse an issue. It might be better for the API to have industrial hygiene consultation available to their membership and to use an open cooperative approach. This avenue is already being followed by certain organizations such as the Association of Lead Industries and the American Foundrymen's Association.

7. Most of the industrial hygienists in the petroleum industry have had experience in governmental work at various levels and are technically competent. Attached is a list of industrial hygiene personnel in petroleum refining in related areas, with a listing of my understanding of what their past experience has been. It will be noted that all of the members of the American Industrial Hygiene Association have had governmental experience. The three individuals listed as having come from industry have been recently trained at Harvard and would probably not be considered for membership in the American Industrial Hygiene Association until they have had additional experience. Perhaps the thinking of the group listed might be solicited as to the attitude which the API might best take toward the proposed ASA project on Uniform Industrial Hygiene Standards.

I should like to endorse a cooperative approach on such an ASA project. I would concur that the committee should be made up of technically competent personnel. Whether the API has specific representation would be of reduced importance since liaison could be maintained (perhaps as an assigned duty) by individuals in the field of industrial hygiene currently employed in the petroleum industry and who are well acquainted with their professional counterparts in the governmental health areas as well as the over-all industrial hygiene field. I think the project is to the best interests of petroleum industry, and endorsement of and participation in such an activity are in keeping with the established policies of most companies engaged in petroleum refining.

CLYDE M. BERRY
Industrial Hygienist
Medical Department

CMB:ev
Att.

Experience Areas of Industrial Hygiene Personnel in Petroleum Companies

Name	Company	City	State	Federal	Industry	Other
* Lucian Renes	Phillips		Illinois, Utah, Arkansas	P.H.S.		
* J. W. Hammond	Humble		S.C., Mass.	P.H.S.		
Felix Pretsch	Humble	Baltimore				
* N. V. Hendricks	SOD		Tenn., Georgia			
G. Wilkening	SOD		Virginia			
* Frank Church	SOD					Univ. of Colorado
G. Cvejanovich	SOD				Lago	
Allen Jones	SOD				SOD	
Arthur Pabst	Socony				Socony	
* Fred Venable	Esso		Texas			
Geo. Boylen	Esso		Mass.			
* C. M. Berry	Esso		N.C.	P.H.S.		
* Allan Dooley	Texas Co.		Pa.	Army Ind. Hyg.		

* Member, American Industrial Hygiene Association

AMERICAN PETROLEUM INSTITUTE
50 WEST 50TH STREET
NEW YORK 20, N. Y.

DEPARTMENT OF TECHNICAL SERVICES
DAVID V. STROOP, DIRECTOR

June 12, 1953

To Members and Associates
Medical Advisory Committee

Gentlemen:

Under separate cover we are sending each of you a complimentary set of the third series of Toxicological Reviews.

About a year ago, many of you submitted estimates on the number of copies of each of these reviews that you planned to purchase.

It will be appreciated if each of you will confirm your previous estimate by mailing an appropriate purchase order or by instructing me to send the number of copies called for in your previous communication.

You will note that the cost of the individual Reviews and each set are given in the Preface of the Introductory Bulletin.

filed

Very truly yours,

W Stroop

DVS: js

AMERICAN PETROLEUM INSTITUTE
50 WEST 50TH STREET
NEW YORK 20, N. Y.

DEPARTMENT OF TECHNICAL SERVICES
DAVID V. STROOP, DIRECTOR

June 10, 1953

To Members and Associates
Medical Advisory Committee

Gentlemen:

Because of your interest in the proposal of the American Conference of Governmental Industrial Hygienists to establish an American Standards Association "Uniform Industrial Hygiene Standard", I am quoting for your information and future reference three items from ASA Safety Standards Board Minutes as follows:

October 11, 1949.

"699. Uniform Industrial Hygiene Code. The Secretary reported that the American Conference of Governmental Industrial Hygienists had written to the ASA on June 11, 1949, requesting the initiation of a project on Uniform Industrial Hygiene Code. They had presented their 'A Guide for Uniform Industrial Hygiene Codes or Regulations' as a basis for such a project. They also offered to serve as sponsor. This request had been circulated to all members of the SCCC as MC 2822. This meeting had been called to discuss the advisability of initiating such a project and, if so recommended, to further consider the scope for the project, who should be invited to serve as sponsor, and what organizations should be invited to have representation on such a sectional committee.

"At the request of the chairman, Mr. Yaffe outlined the history of the development of 'A Guide for Uniform Industrial Hygiene Codes or Regulations' which had been issued by the ACGIH in April 1949. Mr. Yaffe explained that at the 1946 meeting of the ACGIH it had been decided that there was a need for uniformity of industrial hygiene codes and that organization had appointed a committee of 5 to develop a draft. After two years of work a preliminary draft had been sent out for comment to members of the ACGIH and to other outside groups. In this circulation for comments, copies had been sent to the American Standards Association and many helpful comments had been received. Their committee had considered the comments and had prepared a revised draft, which had been officially adopted by the ACGIH last April and was the code which was now being offered as the basis for ASA consideration.

"Mr. Dickinson reported that he had reviewed the draft by the ACGIH and had come to the conclusion that it cut across the scope of some 17 present American Standard safety projects. He believed it was the function of the ASA to prevent overlapping, and he believed that the draft in question should only refer to other standards rather than to try to copy out their technical requirements. Mr. Bloomfield explained that the ACGIH, in making their request to the ASA, had simply contributed their code as a basis for discussion in the ASA project and that it would be entirely up to the representatives on the sectional committee, if such a project were initiated, to decide such details as suggested by Mr. Dickinson.

"Mr. Blanchard stated that he received the impression from the word 'code' that this referred to a legal document. He believed that there was a considerable use for industrial hygiene standards other than simply as the basis for a legal code. Mr. Bloomfield remarked that at the ACGIH meeting in April 1949, it had been agreed that this should be considered as hygienic standards, rather than as a code.

"Mr. Davis asked what this project would cost. Mr. Ainsworth remarked that the first thing was to be sure that there was agreement that this project could be done and done promptly. In this particular case it was fortunate that a draft was available, to be used as the basis for the work of this project. The ASA would not be in a position to provide secretarial services for this project, due to lack of staff. If the project was initiated and a sponsor chosen, it was hoped that the sponsor, by itself or through its relations with other groups, would be able to take a strong administrative lead and carry the job through to a successful conclusion without any burden on ASA.

"Dr. Greenburg believed that the decision on initiation of such a project required mature consideration because he believed that the development of hygienic standards was a very large undertaking. He believed that this was somewhat different from the regular American Safety Standards and that the problem should be given additional study. He suggested that a committee of three be appointed to study the problem and report to this group.

"Mr. Haller stated that he did not believe there was a need for a uniform industrial hygiene standard at this time. Mr. Yant remarked that through his normal contacts, he had received copies of many state codes on hygienic standards and had been impressed by the variety and lack of uniformity from state to state. He believed there was a real need for some national leadership, in order to obtain more uniformity among the requirements of the various states. He believed that the question to be considered was whether or not this meeting wished to recommend that the ASA should exert such a leadership. He believed that if a document could be developed under ASA procedure, it would be a guide to good practice which would be of value to industry.

"Mr. Higgins agreed with Dr. Greenburg, but suggested that membership on the study committee be increased to five.

"Dr. Greenburg remarked that he believed it might take 5 years to develop an ASA standard on this subject and he was not sure that even then the results would be successful. Mr. Ainsworth commented that the time required to complete a project depended very largely on how fast the members of the committee desired to work. He believed that in general it was much more economical to devote a considerable amount of time to a project and get a job done fast, rather than to hold one or two meetings of a committee a year, in which case it might take a long time to develop a standard.

"Mr. Yaffe explained that the members of his committee that had prepared the ACGIH document had definitely had the intent of preparing a useful guide for industry rather than a legal code.

"After further discussion, upon motion by Mr. Weber, seconded by Mr. Yant, it was

VOTED

that an ASA project on Uniform Industrial Hygiene Standards be initiated under the sectional committee method.

"The Chairman asked what arrangements should be made for developing a scope for this new project.

"Upon motion by Mr. Dickinson, seconded by Mr. Luce, it was

VOTED

that a representative committee of 7 be appointed to prepare a suggested scope.

"After further discussion, it was agreed that this committee of 7 should be considered as a conference committee and would be permitted to consult with other interested groups or organizations. It was agreed that the following 7 organizations should have representation on this special committee:

American Conference of Governmental Industrial Hygienists
American Industrial Hygiene Association
American Association of Industrial Physicians and Surgeons
American Society of Safety Engineers
International Association of Governmental Labor Officials
Manufacturing Chemists Association
National Safety Council

"The Chairman asked for suggestions concerning sponsorship. After discussion, upon motion by Mr. Weber, seconded by Mr. Blanchard, it was

VOTED

that the American Conference of Governmental Industrial Hygienists and the American Industrial Hygiene Association be invited to serve as co-sponsors for this project.

"The Chairman asked for suggestions as to what organizations should have representation on this sectional committee. After a brief discussion, it was agreed that the special committee which had been established to prepare a scope for this new project should also be asked to make suggestions as to what organizations should be invited to participate in this project."

May 7, 1951.

"709. Organization of Sectional Committee on Uniform Industrial Hygiene Standards, Z62 (Min. 699). The secretary recalled that at its last meeting the SCCC had initiated a project on Uniform Industrial Hygiene Standards with the American Conference of Governmental Industrial Hygienists and the American Industrial Hygiene Association, as co-sponsors. The SCCC had also established a small subcommittee to prepare a scope for this project and to recommend the organization of the personnel for this committee. This special committee had reported to the SCCC on January 25, 1951 (CS 246), recommending a scope and organization of the personnel. These recommendations had been submitted to letter ballot of the SCCC (CS LB 106), which had resulted in negative ballots from the Congress of Industrial Organizations and the American Petroleum Institute, on the basis that these two organizations wished to have representation on the sectional committee. Mr. Arthur S. Johnson, representing the National Association of Mutual Casualty Companies wrote in, raising the question as to whether the recommendation of this special committee conformed with ASA procedure. The Bureau of Labor Standards had also requested representation on this sectional committee. All of the negative votes and comments had been referred back to the special committee and had been considered by them in meeting on April 3, 1951. After careful consideration of the comments, the special committee still believed that the scope and method of organization which they had recommended were sound and proper for this project.

"In accordance with ASA By-Laws questions of scope and sponsorship require a two-thirds affirmative vote of the correlating committee. The necessary two-thirds affirmative votes had now been received but because of the question of conformance with ASA procedure, this matter was being placed before the meeting of the SCCC.

"Dr. Yant, as chairman of the special committee which had been appointed by the SCCC, explained that the special committee had studied the question from many different angles before making their recommendation to the SCCC. The Committee believed that work of this project would be largely bringing together the work of other sectional committees. There was apparently a need for technical information concerning the work of other sectional committees, in order to determine if there were any conflicts between sectional committees or if there were important gaps or omissions of important information which was needed. The special committee therefore believed that the Z62 Committee should be kept small and that the members should be technically competent in the field of Industrial Hygiene. He discussed each of the negative ballots and letters in detail. He suggested that certain members at large had been recommended by the special committee, who were considered competent to recognize the point of view of the petroleum industry. He believed that if the CIO or any other labor group had someone familiar with this field in mind, such an individual would certainly be welcome on the Z62 Committee. Mr. Read asked if the special committee had agreed upon a definition of 'industrial hygiene'. He stated that the U. S. Public Health Service had a definition but he did not agree with it. Mr. Yant suggested that probably the Z62 Committee, as soon as it was organized, would want to study this question and possibly develop its own definition of industrial hygiene. Mr. Read stated that the CIO had a very important interest in this project and he believed that they should have representation on this committee. He proposed a motion that the CIO be

accorded representation on the Z62 committee. Mr. Stroop stated that the API wished to have representation on this sectional committee and proposed a motion to that effect. He believed that this sectional committee should be made up of representatives of all of the national organizations which had an interest in this problem and that the general classifications of interest should be balanced in accordance with paragraph 210 of the ASA procedure. Mr. Yaffe remarked that in the work of the special committee they had considered that Z62 would probably be concerned with some of the work of at least 10 sectional committees, which were already organized in the ASA. These 10 sectional committees included in their membership representatives of over 60 national organizations and if each of these organizations should be represented on Z62, he believed that the Z62 Committee would be very unwieldy.

"Mr. Johnson, speaking as an individual member of the SCCC, stated that he understood that there were already some sectional committees of the ASA which included 70 or 80 representatives. These sectional committees, through the use of a steering committee and various subcommittees, were able to work effectively and he believed this system could also be used in Z62. He was also a member of the Board of Review. He realized that the Board of Review had been faced with a very important problem in several cases, which was to find out what action a correlating committee had taken to be sure that a standard represented a consensus of those substantially concerned with the problem, and he believed that this was a paramount question. Mr. Marks stated that the Bureau of Labor Standards wanted representation on this sectional committee. He believed that although the special committee had recommended several experts as members at large that each of those men actually represented some particular group or interest and he believed that the Bureau of Labor Standards was an equally important group which should have representation on this committee. Mr. Yant recalled that he had been a member of certain other committees of a technical nature, where the personnel of the committee had included both technical and non-technical members and where it had been very difficult to make any definite accomplishments because of the organization of the committee.

"After further discussion, upon motion by Mr. Stroop, seconded by Mr. Read, it was

VOTED

> that it was the sense of this meeting that the personnel of Z62 Sectional Committee should include representatives of all of the national organizations substantially concerned with this project and that the personnel should be balanced among the general classifications of interest in accordance with paragraph 210 of the ASA procedure.

Mr. Stroop stated that the API had also objected to the scope of this project in that the last clause, 'supplemental measures designed to further promote the health or well-being of the employees' included too big a field for this sectional committee. Mr. Yaffe stated that the standard prepared by the ACGIH had included many items which were not strictly industrial health, in order to provide a useful guide to industry on some of these items. He believed that this was an important service to industry and should be continued in the Z62 project.

"After further considerable discussion, upon motion by Mr. Stroop, seconded by Mr. Read, it was

VOTED

that it was the sense of this meeting that the scope of the Z62 project should be:

Good practice standards for the prevention and control of those conditions in industry which may deleteriously affect the health or well-being of the employees.

The SCCC then discussed what procedural steps to take in view of the previous letter ballot, CS LB 106.

Upon motion by Mr. Stroop, seconded by Mr. Read, it was

VOTED

that the SCCC reconsider the actions on scope and personnel of the Z62 Committee, as included in CS LB 106, that the discussion at this meeting be prepared, and that a further letter ballot of the SCCC be taken on these two questions.

Mr. Yant expressed his opposition to this motion and asked if these two questions should now be referred back to the special committee for further recommendations. The chairman ruled that because of the complete discussion at this meeting, he did not believe it was necessary to refer this question back to the special committee but he agreed that those in disagreement with the thoughts at this meeting should have an opportunity to prepare a minority report to be circulated to the SCCC in connection with the forthcoming letter ballot."

March 27, 1953.

"725. Uniform Industrial Hygiene Standard, Z62 (Min. 709). The Chairman recalled that at the meeting of the SCCC on October 11, 1949 a project had been initiated on Uniform Industrial Hygiene Standards with the American Conference of Governmental Industrial Hygienists and the American Industrial Hygiene Association as co-sponsors. At that meeting a small subcommittee had been appointed to prepare a scope for this project, and to recommend the organization of the personnel for this sectional committee. The report and recommendations of this subcommittee had been sent to letter ballot of the SCCC (CS LB 106). This ballot included a definite wording of the scope and a list of personnel, composed largely on the basis of members-at-large rather than as representatives of all of the national organizations that might be considered to have an interest in this project. More than the necessary 2/3 affirmative votes had been received on both the scope and the personnel. There had been one negative vote with regard to the scope and two with regard to the personnel. In addition, a letter had been received raising a question as to whether this project could be considered of a scientific and non-commercial character.

This subject was discussed in some detail at the May 7, 1951 meeting, and three motions were passed, indicating the wish of those present that this subject be reconsidered. That meeting had also agreed that the small committee which had studied this subject should be granted an opportunity to prepare a minority report.

"Mr. Yant reported that when his small committee had been considering the organization of the Z62 sectional committee, they had realized that there were many national organizations interested in this project. If each of these organizations designated a representative, they believed that the committee would be entirely too large and unwieldy. Since the May 7 meeting of the SCCC his small committee had met again, but the members were still of the opinion that this project should be considered of a scientific and non-commercial character, and that the members of the sectional committee should be selected primarily because of their competence on the subject. The members of his subcommittee had been willing to accept the modification in the scope which had been voted on at the May 7, 1951 meeting.

"Mr. Read stated that because Mr. Yant had voted in the negative on the motions at the May 7 meeting, he was not in a position to move their reconsideration. Mr. Read, on the other hand, had been one of the proponents of the three motions at the May 7 meeting. Since that time the CIO had been very much impressed by the work now being done in regard to industrial hygiene standards, and he, therefore, believed that these motions should be reconsidered.

"Upon motion by Mr. Read, seconded by Mr. Krueger, it was

VOTED

that the three votes taken at the May 7 meeting concerning the Z62 project should be reconsidered.

"Upon motion by Mr. Read, seconded by Mr. Duffus, it was

VOTED

that it was the sense of this meeting that the scope of the Z62 project should be:

Good practice standards for the prevention and control of those conditions in industry which may deleteriously affect the health or well-being of the employees,

that this project shall be considered of a technical or non-commerical character, and that the personnel of this sectional committee shall be chosen primarily to obtain members with competence in the field of industrial hygiene.

Mr. Wilson voted in the negative.

"Mr. Krueger asked for a clarification of the meaning of 'well-being' in the scope. It was agreed that in this scope the words 'well-being' meant direct physiological response.

"Mr. Ainsworth raised the question as to what was the next step with regard to Z62. It was agreed that Mr. Yant and the small subcommittee previously established should now prepare a list of names for the personnel of the Z62 committee."

---ooOoo---

NOTE: Mr. Wilson represented the American Petroleum Institute.

---ooOoo---

We have no assurance that the American Petroleum Institute will be invited to designate a member to serve on the sectional committee; however, we shall endeavor to secure such representation before the formulation of the standard is undertaken.

Your comments and suggestion on any or all phases of this matter will be helpful.

Very truly yours,

W Stump

DVS: js

Copy From D. V. Stroop for Information of Members and Associates of Medical Advisory Committee with Mimeographed copy of Photostated Article 8-24-53

ESSO LABORATORIES
Standard Oil Development Company
P. O. Box 51
Linden, N. J.

August 14, 1953

Mr. David Stroop
American Petroleum Institute
50 West 50th Street
New York, New York

Dear Mr. Stroop:

I am enclosing a photostatic copy of an article entitled "Air Pollution and Community Health" by Clarence A. Mills, which recently came to my attention. This article is published in the same journal that published Professor Drinker's review of the literature which was distributed to the members of the Medical Advisory Committee about a year ago. Because Dr. Mills is at variance with some of the conclusions presented by Professor Drinker, I believe that this article should be distributed to all the members of the Medical Advisory Committee of the API. I would appreciate it if you could return this copy of this article to me when it has served your purpose, since it is the only copy which we have.

In addition, in the March 1953 issue of the Public Health Reports, volume 68, on page 286, there is an article entitled "Occupational Factors in Lung Cancer", a preliminary report by Lester Breslow. I believe that this article should be brought to the attention of all members of the Medical Advisory Committee.

Very truly yours,

/s/ R. E. Eckardt

R. E. ECKARDT, M.D.

REE:ev
Enc.

AMERICAN PETROLEUM INSTITUTE
50 WEST 50TH STREET
NEW YORK 20, N. Y.

DEPARTMENT OF TECHNICAL SERVICES
DAVID V. STROOP, DIRECTOR

October 21, 1953

To Members and Associates
Medical Advisory Committee

Gentlemen:

For your consideration we attach a copy of a letter dated October 14, 1953 from Professor Philip Drinker with a copy of a letter dated October 9, 1953 from Dr. H. E. Stokinger.

Please send your suggestions to me for consolidation and transmittal to Professor Drinker.

Very truly yours,

DVS: js
Attachments (2)

C
O
P
Y

HARVARD UNIVERSITY
School of Public Health

Department of Industrial Hygiene

55 Shattuck Street
Boston 15, Massachusetts

October 14, 1953

Mr. D. V. Stroop
Department of Technical Services
American Petroleum Institute
50 West 50th Street
New York 20, New York

Dear Dave:

On my return from Houston I received the enclosed dated October 9th from Dr. Stokinger whose name is probably well-known to all of our Medical Advisory Committee. You will remember I reported to the group that Stokinger makes these appeals annually and the submission of such data as he requests is the best possible way for our members to get action on things they may think need action. You may remember I cited that he helped us out on the old limits for acetone and that as a result the limits were raised to about where they ought to be. I think that this matter is of considerable importance to our committee and if any of them wish to write Stokinger direct, I hope they will do so. If not, I am thoroughly ready to act as intermediary.

Sincerely yours,

/s/ Philip Drinker

Philip Drinker

PD:ms
Encl.

C
O
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Y

DEPARTMENT OF
HEALTH, EDUCATION AND WELFARE
PUBLIC HEALTH SERVICE
OCCUPATIONAL HEALTH FIELD HEADQUARTERS
1014 Broadway, Cincinnati 2, Ohio

October 9, 1953

Professor Philip Drinker
Harvard School of Public Health
55 Shattuck Street
Boston 15, Massachusetts

Dear Professor Drinker:

As a member of the Committee on Threshold Limits, I would like to solicit your suggestions for new compounds that you think are desirable additions to the present list. If possible, I would like also suggestions as to the specific value with whatever supportive data for this value you may have, or references to such information.

The committee is also going to give consideration to including in the present list, tentative levels. These would be inserted parenthetically. By tentative level, we would include new substances that are finding increased use and consequently need for some sort of "bench mark." These tentative values presumably would be those on which either only animal data are available or very limited industrial exposure information is available and would be subject to revision at such time that new information is obtained. This line of thinking is similar to that under consideration by the Toxicology Committee of the National Research Council for use by the Armed Forces. The Committee would, accordingly, welcome the opinion of members on this point also, as a means of keeping abreast better of the rapidly growing number of hazardous agents.

Kindest regards.

Sincerely yours,

/s/ Herb

Herbert E. Stokinger, Ph.D.
Chief Toxicologist

AMERICAN PETROLEUM INSTITUTE
50 WEST 50TH STREET
NEW YORK 20, N. Y.

DEPARTMENT OF TECHNICAL SERVICES
DAVID V. STROOP, DIRECTOR

September 9, 1953

To Members and Associates
Medical Advisory Committee

Gentlemen:

You will find enclosed for your personal information prior to the Houston meeting, one copy for each of you of API Research Project MC-1 "Tabular Summary of Current and Completed Biological Experiments" dated September 1, 1953. This Summary was prepared at The Kettering Laboratory, University of Concinnati. Additional copies will be made available on request following the meeting.

Very truly yours,

DVS: js
Enclosure

Copy From D. V. Stroop for Information of Members and Associates of Medical Advisory Committee — April 3, 1953

ESSO LABORATORIES
Standard Oil Development Company

P. O. Box 51, Linden, N. J.

March 18, 1953

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

Dear Mr. Stroop:

The enclosed apparently represents a publication of the data which members of the Subcommittee on Carcinogenicity of the A.P.I. have had an opportunity to review in connection with the exchange of information between the British and our own Subcommittees on Carcinogenicity.

I thought you might wish to have this article reproduced and distributed to the members of the Medical Advisory Committee of the American Petroleum Institute.

Very truly yours,

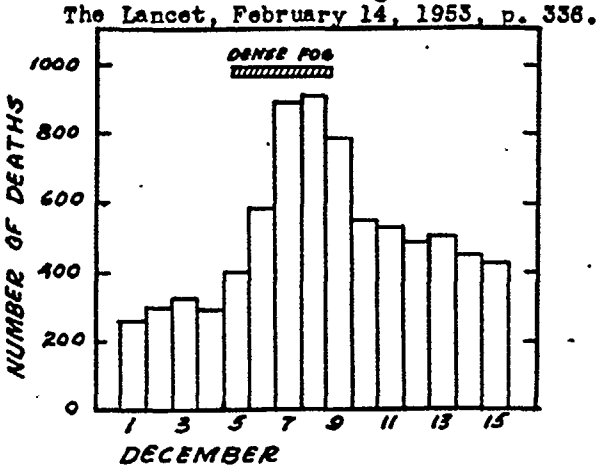
/s/ R. E. Eckardt

R. E. ECKARDT, M.D.

REE/hml

Encl.
(The Value of the Rabbit
For Carcinogenicity Tests
on Petroleum Fractions,
by Hiefer and Woodhouse
Repr. from THE BRITISH JNL.
OF CANCER, 1952, Vol. VI, Pg. 293.) — in reprint file

Mortality in the London Fog
Incident, 1952
W. P. D. Logan
The Lancet, February 14, 1953, p. 336.



SUMMARY

The dense four-day fog in Greater London in December, 1952, was responsible for some 4000 deaths during the two following weeks.

The increased mortality affected persons of all ages, but particularly those aged 45 and over.

Deaths assigned to bronchitis and pneumonia increased eight times and three times respectively in one week.

A considerable increase in numbers of deaths occurred even on the first day of the fog.

Four previous London fogs resulting in a sudden increase in deaths have been noted; but the 1952 incident caused by far the largest increase.

Copy From Philip Drinker for Information of Members and Associates Medical Advisory Committee March 20, 1953

American Petroleum Institute
New York, N. Y.

Copy From D. V. Stroop for Information of Members and Associates of Medical Advisory Committee March 17, 1953

TEXACO DEVELOPMENT CORPORATION
135 East 42nd Street
New York, New York

March 10, 1953

Mr. D. V. Stroop
American Petroleum Institute
50 West 50th Street
New York 19, New York

Dear Sir:

In the accumulated mail, as a result of my European trip, I find American Standards Association communication MC 3142* of December 30, 1952, dealing with the proposed American Standard Specification for an Octave-Band Filter Set for the Analysis of Noise and Other Sounds.

Since the Medical Advisory Committee is contemplating work on the effect of noise, this matter might be brought to the attention of those interested at the proper time.

Very truly yours,

/s/ K. G. Mackenzie

K. G. Mackenzie

KGM:FKL
cc: Dr. T. M. Frank
* Copy is attached

AMERICAN STANDARDS ASSOCIATION
Incorporated
70 East Forty-Fifth Street
New York 17, N. Y.

Duplicated for use of Standards Council,
Officers of Correlating Committees and
the Electrical Standards Committee.

MC 3142
December 30, 1952

ACOUSTICAL SOCIETY OF AMERICA

Office of the Secretary, 57 East 55th Street, New York 22, N. Y.

December 2, 1952

American Standards Association
70 East 45th Street
New York 17, New York

Attention: Mr. H. E. Farrer

Gentlemen:

On behalf of the Acoustical Society of America, sponsor for the ASA Sectional Committee on Acoustical Measurements and Terminology, Z24, we are pleased to submit to the American Standards Association for approval as an American Standard the proposed American Standard Specification for an Octave-Band Filter Set for the Analysis of Noise and Other Sounds, Z24.10/272.

This Standard was approved by the Council of the Society at its meeting on November 12, 1952.

Very truly yours,

/s/ Wallace Waterfall
Secretary

cc Dr. Harry F. Olson
Dr. Leo L. Beranek

ASA Note: This submittal is being referred to the Electrical Standards Committee for its recommendation. The standard referred to is on file at the ASA offices.

/s/ S. David Hoffman
Staff Engineer

J. Clark
Please return to me
when finished
WH

Copy From D. V. Stroop for Information of Members and Associates of Medical Advisory Committee February 27, 1953

HARVARD UNIVERSITY
School of Public Health

Department of Industrial Hygiene

55 Shattuck Street
Boston 15, Massachusetts

February 26, 1953

Mr. D. V. Stroop
Department of Safety
American Petroleum Institute
50 West 50th Street
New York 20, New York

Dear Dave:

I enclose copy of an editorial I have just written for the AMA Archives of Industrial Hygiene and Occupational Medicine on the London fog disaster, December 5-9, 1952.

I think that this will interest the members of our Medical Advisory Committee and if you agree I would ask that you have it multigraphed and send it out in your next letter.

Sincerely yours,

/s/ Philip Drinker

Philip Drinker

PD:ms
Enc.

Deaths during the Severe Fog in London and Environs

December 5 - 9, 1952

In THE LANCET, February 7, 1953, pages 288-9 is the following report: "More details about the effects of the thick fog which covered many parts of the country from December 5 to 9 are given by Dr. J. A. Scott, medical officer of health to the London County Council, in a report to the council's public-health committee. In the week ended December 13, 1952, 2484 deaths were registered in the administrative county of London; the figures for the preceding three weeks were 753, 853, and 945, and for the following three weeks 1523, 1029, and 1372 (the apparent drop to 1029 was due to the usual delay in registration at Christmas). Dr. Scott compares the number of deaths in the week of the fog with the figures for other weeks during the cholera epidemic of 1866, the great fog of 1873, and the influenza epidemic of 1918.

Week ending	Aug.4, 1866 (cholera)	Dec.20, 1873 (fog)	Nov.9, 1918 (influenza)	Dec.13, 1952 (fog)
Deaths registered (per million population)	876	713	1085	745
Normal number of deaths for period and season (per million population)	450	470	300	300
Excess of deaths over normal	426	243	785	445

Though the death-rates in the two fogs were much the same, the increase in 1952 was considerably greater because of the fall in the normal winter death-rate since 1873. The increase is greater than that in the worst week of the cholera epidemic.

An analysis of all the deaths registered in the County of London between November 15 and December 27 shows that the increase was more pronounced among babies and old people, but all ages were affected. The causes of the increase were almost entirely deaths due to circulatory or respiratory diseases: in the week ended December 13 there were 10 times as many deaths from bronchitis as would have been expected from the preceding three weeks' figure; and on this basis deaths from influenza increased sevenfold, from pneumonia nearly fivefold, and from pulmonary tuberculosis over fourfold.

Daily Atmospheric Smoke and Sulphur Dioxide Averages at County Hall, London, S.E.1

Day	Smoke (mg. per c.m.)	Sulphur Dioxide (parts per million by volume)
Dec. 3	0.61	0.220
" 4	0.49	0.144
" 5	2.64	0.751
" 6	3.45	0.855
" 7	4.46	1.339
" 8	4.46	1.339
" 9	1.22	0.472
" 10	1.22	0.472
" 11	0.32	0.224

Smoke is expressed as mg. of black suspended matter per cubic metre of air. The figures for Dec. 7 and 8 and Dec. 9 and 10 are averages for the 48 hours.

The chemical branch of the L.C.C. public health department make daily measurements of the amount of smoke and sulphur dioxide in the atmosphere at County Hall and elsewhere. Some of the results obtained at the time of the fog are shown in the accompanying table. The maximum averages were reached over the week-end ending at 10 A.M. on Monday, December 8. These figures were higher than any that have been traced in the L.C.C. records, which, for sulphur dioxide, date back to 1932.

In a report to the borough's public-health committee, Dr. E. H. R. Smithard, medical officer of health for Lewisham, says that 228 deaths were registered in Lewisham in the fortnight ended December 20, compared with 76 and 95 deaths in the corresponding fortnights, of 1951 and 1950 respectively. Of those who died in this fortnight, 130 were men and 98 women; 104 were over the age of 75, and all but 8 were over 45. A striking feature of the Lewisham figures was the abnormally large number of deaths in the Sydenham registration district, as compared with the other two districts in the borough. Dr. Smithard suggests three possible explanations:

(1) An older population in the Sydenham area.
(2) A denser fog caused by geographical configuration.
(3) A more poisonous fog due to greater atmospheric pollution in that part of the borough.

Further inquiries are being made. Dr. Smithard mentions the new and popular type of slow-burning fire, which is commonly stoked up to keep it going all night, as a likely cause of increased atmospheric pollution."

In neither the Meuse Valley (Belgium) fog disaster of December 1-5, 1930 nor in our own at Donora, Pennsylvania of October 27-November 1, 1948, were concentrations of gaseous or particulate pollutants measured. Competent men went to the sites each time but arrived too late to get samples. These, then, are the first figures which we have seen published.

It is to be noted that there is no attempt to fix the blame upon either the suspended solids (smoke) or upon the sulfur dioxide gas but it is significant that both increased steadily up to the 9th of December when the weather changed. Also, concentrations by the last day were far above those normally occurring.

Philip Drinker

Copy From D. V. Stroop for Information of Members and Associates of
Medical Advisory Committee March 17, 1953

ESSO LABORATORIES
Standard Oil Development Company

P. O. Box 51
Linden, New Jersey

March 12, 1953

Mr. David V. Stroop
American Petroleum Institute
50 West 50th Street
New York 20, New York

Dear Mr. Stroop:

It has recently come to my attention that the Massachusetts Institute of Technology is offering a series of summer courses. One such course is entitled "Management Responsibility for Occupational Health" and will be held during the period June 22nd through June 26th inclusive. A special descriptive folder and application blanks for attendance at this course may be obtained at the following address:

Summer Session Office
Room 3107
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

I would appreciate it if you would bring this course to the attention of all of the Medical Directors and Associates of the Medical Advisory Committee of the API in the event that any company may wish to have a representative in attendance at this course.

Very truly yours,

/s/ R. E. Eckardt

R. E. ECKARDT, M. D.

REE:ilk

Copy From D. V. Stroop for Information of Members and Associates of Medical Advisory Committee — February 16, 1953

HARVARD UNIVERSITY
SCHOOL OF PUBLIC HEALTH
55 Shattuck Street
Boston 15, Massachusetts

Department of Industrial Hygiene

February 9, 1953

Mr. D. V. Stroop
Department of Safety
American Petroleum Institute
50 West 50th Street
New York 20, New York

Dear Mr. Stroop:

The attached review of the Stanford Research Institute's sound film on the Los Angeles Smog problem might interest members of the Medical Advisory Committee. If you agree with me, perhaps you will send them copies. It will appear presently in the Archives of Industrial Hygiene and Occupational Medicine.

Sincerely yours,

/s/ Phil

Philip Drinker

PD:ms
Enc.

THE CITY THAT DISAPPEARS

A sound film, 35 mm., produced by Graphic Films, 1618 N. Las Palmas Avenue, Hollywood 28, California. Running time, 28 minutes.

This film was made under the technical direction of the Stanford Research Institute and was financed by the Western Oil and Gas Association, Los Angeles. The technical details were taken freely from the Third Interim Report of the Institute, "The Smog Problem in Los Angeles County."

There is a nice mixture of animated cartoons, good photography, and technical talks. The Institute's several reports and their symposiums are well known. We borrowed their film on the recommendation of one of our staff who had seen it and then used it ourselves instead of giving a somewhat dull lecture on atmospheric pollution, inversions, and control measures. The lucid and concise account of micrometerological conditions, with very clear animation, was a welcome substitute for the lecturer's efforts.

Anyone interested in seeing the film should write to:

Mr. Paul Magill
Stanford Research Institute
Stanford, California

Philip Drinker

Copy From D. V. Stroop for Information of Members and Associates of Medical Advisory Committee — February 16, 1953

SOCONY-VACUUM OIL COMPANY
Incorporated
26 Broadway, New York 4, N. Y.

February 9, 1953

Mr. David V. Stroop, Director
Department of Technical Services
American Petroleum Institute
50 West 50th Street
New York 20, New York

Re: FLUORIDE PROJECT

Dear Mr. Stroop:

Attached is a communication from Doctor Kehoe on the above subject. If you feel that this is worth distributing to the Medical Advisory Committee members, I would appreciate it if you would have it sent out and return the correspondence to me.

Sincerely yours,

/s/ George M. Saunders

George M. Saunders, M.D.
Medical Director

GMS:ar
Attchs.

UNIVERSITY OF CINCINNATI

Department of Preventive Medicine and Industrial Health

The Kettering Laboratory
College of Medicine-Eden Avenue
Cincinnati 19, Ohio

February 4, 1953

To the Sponsors of the Fluoride Project

Aluminum Company of America
Dr. D. A. Irwin
Dr. Francis C. Frary
American Petroleum Institute
Dr. George M. Saunders
Kaiser Aluminum and Chemical Corp.
Mr. J. R. Thomas
Mr. D. W. Smith
Mr. Paul P. Zeigler
Minnesota Mining and Mfg. Co.
Mr. W. H. Pearlson
Tennessee Valley Authority
Dr. G. H. Collings, Jr.
Universal Oil Products Co.
Dr. A. J. Carlson
Mr. E. M. Matson
Reynolds Metals Company
Mr. Harold Zeh
Pennsylvania Salt Mfg. Co.
Mr. William E. Lee

Gentlemen:

I send herewith a memorandum on proposed work on the fluorides, together with the probable cost of carrying out the work that can be done in 1953. It will be observed, that, at the present rate of conducting the work, the problems ahead will consume time well beyond 1953. The memorandum does not include work to be done under a grant of funds by the U. S. Public Health Service, which, as you will remember, no doubt, relates to the study of individuals who use water supplies in which somewhat elevated concentrations of fluoride are found naturally or are introduced deliberately for the prophylactic purposes related to dental caries.

A draft of the minutes of the November meeting of the sponsors is in preparation (delayed because of my frequent absences from the Laboratory since November, and the priority of other matters at other times), and the statement of the receipts and expenditures for 1952 will be forwarded as soon as the accounts for the year can be checked and summarized.

It is to be reported, regretfully, that Harshaw Chemical Company have felt it necessary to discontinue their contribution in support of the work. Aluminium Laboratories Limited of Kingston, Ontario will contribute $2,000.00 on a year-to-year basis. Other attempts to gain additional sponsors of the program have not, as yet, borne fruit. It is believed that they will do so in the future, and that there is every practical justification for the continuation of the work at the present modest rate.

Cordially yours,

/s/ Robert A. Kehoe

Robert A. Kehoe, M. D.

RAK ef
Enc.

MEMORANDUM ON THE PROPOSED FUTURE
INVESTIGATIONS OF THE BEHAVIOR OF FLUORIDES
IN MAN AND ON THE COSTS OF SUCH INVESTIGATION

A. Information relating to the effects of the inhalation of fluorides by human experimental subjects, and to the fate of such inhaled fluorides in the body, represents the most pressing need at present. The materials that should be dispersed in an inhalation chamber for experiments on human subjects are listed in the order of their importance:

1. HF, 3 to 6 ppm
2. Cryolite dust, 2.5 to 5 mg per M^3
3. Fluorapatite (rock phosphate) dust, 2.5 to 5 mg per M^3

B. Intratracheal injection of measured amounts of particulate fluorides in suspension in saline would yield useful data regarding the rates of absorption of particulate fluoride by the lungs. Dogs would be the most suitable animals for such experiments. Initially, fluorapatite dust, and, at some later time, cryolite, should be used in a series of experiments.

C. The potential effectiveness of various liquid hydrocarbons and/or amines for relief of HF burns of the skin suggests the advisability of conducting a series of experiments in which aqueous HF would be applied to the shorn skin of rabbits. Such applications of HF should be followed (1) by removal of the HF from one part of the treated area with water or an aqueous solution (salts of magnesium or calcium), and (2) by removal of HF from the remaining area of treated skin with one or another organic solvent. The purpose would be to discover how much more effectively organic compounds may remove HF from the skin than is the case when water is used.

Item No. 1 under A above, the experimental inhalation of HF, would probably use up most of the available funds in about eight months. Prediction of the costs for each month in which the inhalation experiment is prosecuted is based (1) on the records of costs during the months (June through August, 1951) when Grant Gangwere inhaled HF, and (2) on present methods of accounting, with respect to the general overhead costs of the Laboratory. For example:

Direct salaries	
Investigator, assistant and subject	$ 500.00
Analysts	385.00
Indirect salaries (cost of all work of other personnel)	715.00
Food for human experimental subject	65.00
Laboratory supplies	150.00
Overhead	500.00
TOTAL	$2,315.00

In all likelihood funds will not be available during 1953 to carry out very much of the remainder of the program listed above.

From the Kettering Laboratory in the Department of Preventive Medicine and Industrial Health, College of Medicine, University of Cincinnati, Cincinnati, Ohio.

Prepared by Edward J. Largent

Approved: Robert A. Kehoe
Robert A. Kehoe, M. D.,
Director

February 4, 1953.

MEETING (API) OF WEST COAST (LOS ANGELES) COMPANIES, March 18, 1953

Points of Discussion:

1. Correlation between man and mouse, stressing non-carcinogenicity to mouse of oils with which men have had no trouble. Need more direct information on British experience with certain types of occupational carcinogens.

2. Analytical tool - definitely yes. Discouragement expressed by small percent of Research Project Advisory Committee due to their own research which concentrated solely on correlations with carcinogen (polycyclic hydrocarbon) concentration.

3. Refinery products presenting greatest potential problems:
   a. Cutting fluids
   b. Diesel fuels with high end point (note high octane number of some accelerators)
   c. High boiling aromatic solvents from catalytic cracking or reforming or thermal cracking of certain feed stocks

4. Propylene in petrochemical operations:
   Ethmoid sinus involvement in isopropyl alcohol manufacture and nickel refining - common carcinogen? Technologic survey started domestically needs continuation at Clydach.

5. Los Angeles Atmospheric pollution - quantitative analysis of tars extracted from atmospheric dust for benzpyrene possible.

AMERICAN PETROLEUM INSTITUTE
50 WEST 50TH STREET
NEW YORK 20, N. Y.

DEPARTMENT OF TECHNICAL SERVICES
DAVID V. STROOP, DIRECTOR

January 9, 1953

To Members and Associates
Medical Advisory Committee

Gentlemen:

At the suggestion of Allan E. Dooley, API representative on ASA Sectional Committee on Safety Code for Industrial Sanitation, there are enclosed for your review and possible comment, two copies of First Draft, 4/30/52, of the Proposed Sanitation Standards for Temporary Labor Camps and Construction Operations (Z4.4).

Your comments should be addressed to Mr. Dooley, c/o The Texas Company, 135 East 42 Street, New York 17, New York. Please send carbon copy to me.

Very truly yours,

V. Stroop

DVS:pd
Enc.

C
O
P
Y

October 29, 1952

Activities Report ASA Sub-Committee Z4.4
Sanitation Standards for Temporary Labor Camps
and Construction Operations

In accordance with the action taken by the ASA Z4 Sectional Committee at the November 14, 1950, New York meeting, work has been started in the preparation of the proposed standard for temporary labor camps and construction operations.

Work has progressed to the point where a preliminary first draft copy of the suggested standard has been prepared. The context of this draft copy has been based largely on Appendix C of Report and Recommendations Federal Inter-Agency Committee on Migrant Labor. This report was published in 1947 and represented the joint participation of the Department of Agriculture, Department of Labor, Federal Security Agency, Interstate Commerce Commission, National Housing Agency, and Railroad Retirement Board.

In addition to the above cited report, reference was made to certain State standards such as the following:

1. Minimum Standards for Wisconsin Industrial Camps - Wisconsin State Board of Health

2. Basic Sanitation Standards for Laborers' Boarding and Lodging Houses or Camps - Connecticut State Department of Health

3. Regulations Governing the Construction, Equipment, and Operation of Temporary Bunk Houses and Tent Camps - Oklahoma State Health Department

4. Desirable Practices in Locating, Constructing, Equipping and Operating Farm or Food Processing Plant Labor Camps in New York State - New York State Health Department

It is believed that the first draft of the proposed standard constitutes a suitable starting point from which to proceed with further development. Further development will require activitation of a formal sub-committee in much the same manner as has been accomplished with the Z4.2 Sub-Committee.

The Chairman will be most grateful for suggestions from the Sectional Committee concerning the proposed text and also suggestions concerning interested individuals or associations that should be invited to membership on the sub-committee.

Attached hereto is a copy of the first draft of Sanitation Standards for Temporary Labor Camps and Construction Operations, ASA Z4.4.

Respectfully submitted,

/s/ Ralph J. Van Derwerker, Chairman
ASA Z4.4 Sub-Committee

FIRST DRAFT: 4/30/52

Z4.4 SANITATION STANDARDS FOR TEMPORARY LABOR CAMPS AND CONSTRUCTION OPERATIONS

Section 1. Scope and Purpose

Article 1. Scope

These standards are applicable to all camps or temporary abode established for the housing and accommodation of working forces engaged in any occupation or work which requires the maintenance of a labor force in temporary quarters.

Article 2. Purpose

The purpose of these standards are to prescribe minimum sanitary requirements which will protect the health of the workers in these camps as well as to protect other such groups or residents from unhealthful or dangerous conditions which might be created.

Section 2. Definitions

The following words, terms, and phrases when used in these standards shall, for the purposes thereof, be defined as follows:

(a) The term "temporary labor camp" shall include one or more tents, vehicles, buildings, or structures, together with the tract of land appertaining thereto, established for the housing accommodation of working forces engaged in the construction, repair or alteration of any railway property, irrigation or drainage works, roads or highways, dams, or other structures, or engaged in preparing land for agricultural uses, or planting or harvesting crops, or engaged in logging or lumbering or engaged in any other occupation or work which requires the maintenance of a labor force in temporary quarters.

(b) The term "camp" shall mean temporary labor camp.

(c) The term "construction operations" shall mean the activity the workers, being housed and accommodated in the temporary labor camp, are engaged in.

(d) The term "shelter" shall mean any single or multiple building of one or more rooms designated for sleeping or living purposes.

(e) The term "toilet room" shall mean any room with solid walls extending from the floor to the ceiling, containing one or more water closets or containing one or more water closets and other toilet fixtures.

(f) The term "water closet" shall mean sanitary facilities for defecation equipped with a hopper or tray and a device for flushing the bowl by water located within the compartment.

(g) The term "privy" shall mean sanitary facilities for disposal of body wastes in a pit located in an outhouse and apart from any building.

(h) The term "urinal" shall mean a sanitary fixture installed for the purpose of urination.

(i) The term "communicable disease" shall mean any of those diseases listed in the rules and regulations of the State and/or local health authorities concerned as coming within the scope of State or local communicable disease laws, ordinances and regulations.

Section 3. Specifications

Article 1. Site

(a) All sites used for temporary labor camps shall be located upon high well-drained ground. They shall not be subject to periodic flooding, or located within 200 yards of swamps, pools, sink

holes or other surface collections of water unless such quiescent water surfaces can be subjected to mosquito control measures. The camp shall be located so the drainage from and through the camp shall not endanger any domestic water supply. All sites shall be graded, ditched and rendered free from depressions in which water may stand.

(b) All sites shall be adequate in size to prevent overcrowding of necessary structures. Stables or corrals existing or provided for maintenance of large animals shall be located at the opposite end of the camp and on the leeward side of kitchen and mess hall facilities.

(c) The grounds and open areas surrounding the shelters shall be maintained in a clean and sanitary condition free from rubbish, debris, waste paper, garbage, etc.

(d) When any labor camp is to be abandoned, all garbage, rubbish, manure and other refuse shall be collected and so disposed of as to prevent nuisance. All privy pits shall be filled in and the grounds and buildings left in a clean and sanitary condition.

Article 2. Shelter

(a) Every building, tent, barracks, or living quarters in the camp shall be constructed in a substantial manner and shall provide shelter to the occupants against the elements and exclude dampness in inclement weather.

(b) In all shelters providing sleeping accommodations not less than 50 square feet of floor area with at least a 7-foot 6-inch ceiling shall be provided for each person.

(c) Beds, cots, or bunks shall be provided in every room used for

sleeping purposes. Every such bed or bunk shall be raised at least 12 inches from the floor. There shall be not less than 20 inches clear space extending from the floor to the ceiling between each bed.

(d) The floors of each building used as living quarters shall be constructed of wood, asphalt, concrete or other material acceptable to the health authorities. Wooden floors shall be constructed of planed tongue-and-groove boards. The floor of all living quarters shall be kept in good repair and if any floor is broken or has such cracks or knot holes that it cannot be kept in a dry and sanitary condition it shall be repaired or replaced by a new floor.

(e) All wooden floors shall be elevated not less than 1 foot above the ground level to permit free circulation of air beneath.

(f) Nothing in these standards shall be construed to prohibit "banking" around the outside walls with earth, straw, or other sanitary bank material in areas subject to low temperatures.

(g) All living quarters shall be provided with windows equal to one-eighth of the floor area, one-half of which shall be so constructed that they may be open for purposes of ventilation.

(h) All exterior openings shall be effectively screened with at least 16-mesh per square inch material. All screen doors shall be outward-opening.

(i) The interior of the shelters shall be maintained in a clean and sanitary manner and shall be neat in appearance. The floors shall be swept at least daily and scrubbed with hot water and soap as often as is necessary to maintain them in a clean and sanitary condition.

(j) In camps where workers are permitted or required to cook in their own shelters, a separate room in each shelter shall be provided for the purpose of storing, preparing and serving food and shall be equipped with facilities for storing, preparing and serving food.

(k) Tents may be used as living quarters when the camp is not occupied more than 30 days during any one year. Where tents are used, the above provisions, except b, g, and h, shall be applicable.

(l) In camps where cooking facilities are used in common, stoves (in ratio of 1 to 10 persons or 1 stove to 2 families) shall be provided in an enclosed and screened shelter. Provision must be made for safe storage of food.

(m) In camps where food or meals are prepared or served by an owner, operator, or concessionaire, a central kitchen and dining room shall be provided separate from sleeping quarters and toilets. The doors and windows of such kitchen and dining room or mess hall shall be adequately screened. The kitchen and dining room shall be adequately equipped for the sanitary storage, preparation and serving of food. Walls, floors, and ceilings of kitchens, dining rooms, or mess halls shall be so constructed as to permit them to be readily cleaned.

Article 3. Water Supply

(a) An adequate and convenient supply of water of quality approved by the State board of health shall be provided in each camp for drinking, culinary, bathing, and laundry purposes.

(b) A water supply shall be deemed adequate if and when it is capable of delivering 35 gallons per person per day to the camp site at

a rate two and one-half times the average hourly demand.

(c) The distribution lines shall be capable of supplying water at normal operating pressures to all fixtures for simultaneous operation and water outlets shall be distributed throughout the camp in such a manner that no shelter is more than 100 feet from a yard hydrant or similar outlet.

(d) In those areas where piped distribution of water is impracticable, every well or spring shall be adequately protected against pollution by reason of surface drainage, drip, or dust. Every well and spring shall be tightly covered and the water shall be removed and conveyed to the point of delivery in closed pipe lines. Water shall not be drawn from wells or springs by buckets or other containers. When it is necessary to haul water, the containers used in transit, at the camp and at the site of construction operations shall be kept clean and disinfected frequently and shall be kept tightly covered. When water is secured from tanks or containers, a spigot for withdrawal therefrom shall be provided and in no case should water be dipped from the tank or container.

(e) Where water under pressure is available at least one drinking fountain shall be provided. The construction of drinking fountains shall comply with A.S.A. Specification Z4.2 as revised 1942. At the site of construction operations, drinking water facilities shall be provided which usually will be of a portable type because of the unavailability of potable water under pressure. Portable pressure type drinking fountains or easily cleanable containers with spigots and individual drinking cups shall be used. Common drinking cups shall not be used. A receptacle

for the disposal of individual drinking cups shall be provided.

Article 4. Toilet Facilities

(a) Separate toilet rooms containing water closets or privies shall be provided for each sex and shall be distinctly marked "for men" and "for women" by signs printed in English and in the native language of the persons occupying the camp. No person shall be allowed to use or frequent a toilet room or water closet assigned to the opposite sex.

(b) Portable or permanent privies shall also be provided at the site of construction operations in the ratio of 1 for every 20 workers and shall be readily accessible to all workers.

(c) In camps two linear feet of urinal trough shall be provided for each 25 men. For a distance not less than 15 inches, measured from the edge of the urinal, the floor in front of all the urinals shall be constructed of materials impervious to moisture. All urinals shall be constructed of smooth material impervious to moisture and where water under pressure is available shall be provided with an adequate water flush unless the water runs continuously over the walls. Urinal troughs in privies shall drain freely into the pit or vault and the construction of this drain shall be such to exclude flies and rodents from the pit.

(d) All toilet rooms and toilet room fixtures shall be constructed and maintained in accordance with standards established by the State board of health. Privies shall be constructed in accordance with specifications for the Sanitary Privy - Z4.3 - 1935 or the latest revision thereof, approved by the American Standards

Association, (Supplement 108 of the U. S. Public Health Service).

(e) Water closets or privies in the camp shall be readily accessible to the living quarters and shall in no case be more than 200 feet distant from any shelter they serve. Privies shall be not less than 100 feet from the nearest source of water supply, kitchen or mess hall.

(f) Each toilet room shall be lighted naturally, or artificially, by a safe type of lighting, at all hours of the day and night. Adequate screened ventilation openings shall be provided.

(g) An adequate supply of toilet paper shall be provided in each privy or water closet compartment.

(h) Privies and water closets shall be inspected and scrubbed daily.

Article 5. Sewage Disposal Facilities

(a) In camps where public sewers are available, all sewer lines and floor drains from buildings shall be connected thereto.

(b) All excreta, sewage or liquid wastes from labor camps not discharged into public sewers shall be disposed of in compliance with the recommendations of the State board of health.

Article 6. Laundry, Handwashing, and Bathing Facilities

(a) Laundry, handwashing, and bathing facilities shall be provided in the following ratio:

1 wash basin for every 6 persons

1 shower head for every 10 persons

1 laundry tray or tub for every 40 persons

1 slop sink in each building

(b) All bath rooms or utility buildings shall be well lighted and ventilated. Floors shall be of smooth finish but not slippery

materials, shall be impervious to moisture, and sloped to drain. Floor drains shall be provided in all shower baths, shower rooms, or laundry rooms to remove waste water and facilitate cleaning. All junctions of the curbing and the floor shall be rounded if possible. The walls and partitions of shower rooms shall be smooth and impervious to the height of splash.

(c) An adequate supply of hot and cold running water shall be provided in all labor camps for bathing and laundry purposes unless otherwise authorized by the State board of health in which case facilities for heating water shall be provided.

(d) Every central utility building shall be provided with equipment capable of maintaining a temperature of at least 70° F. during cold weather unless in the opinion of the State board of health such equipment is not necessary.

(e) Facilities for drying clothes shall be provided.

(f) All bath rooms and utility rooms shall be scrubbed daily.

Article 7. Refuse Disposal for Shelters

(a) Fly-tight metal containers approved by the State department of health shall be provided for the storage of garbage and rubbish. At least one such container shall be located within 100 feet of each shelter on a wooden or concrete stand.

(b) Facilities for washing garbage cans shall be provided at every labor camp.

(c) When garbage receptacles are full, and at least twice a week, these receptacles shall be emptied.

(d) Garbage and rubbish shall be disposed of by incineration or by burial in a pit, or by transportation to a properly maintained

and operated sanitary fill approved by the State board of health or such other methods as they may approve.

Article 8. Construction and Operation of Kitchens, Mess Halls, and Feeding Facilities

The following standards shall be complied with in all camps where a central mess, or multiple family feeding operations are permitted or provided by the owner.

(a) A properly constructed kitchen and mess hall adequate in size, separate from the sleeping quarters of any of the workers, or their families and as far as practicable from all camp toilets, stables and corrals shall be provided. Such facilities shall be adequately ventilated. Hand washing facilities shall be provided in connection with all food handling facilities.

(b) No person who is afflicted with any communicable disease shall be employed or permitted to work in the preparation, cooking, serving or other handling of food, foodstuffs, or materials used therein, in any kitchen or dining room operated in connection with a camp, or regularly used by persons living in a camp.

(c) No person shall be employed in or be permitted to work in the preparation, cooking, serving or handling of food, foodstuffs, or materials used therein in any kitchen or dining room operated in a camp or regularly used by persons in a camp until he has obtained a certificate of health from a licensed physician or the State board of health:[1] Provided: A certificate of health is required by the State board of health. This certificate shall be valid for a period of 6 months from the date of issue and shall

[1] Such persons must meet the food handling requirements of the State board of health.

be kept on file where such person is employed or working.

All cooks and other persons employed in or permitted to work in the preparation, cooking, serving or other handling of food, foodstuffs, or materials used therein, shall thoroughly wash and cleanse their hands after each visit to a toilet or urinal and shall keep their fingernails free from all filth-or foreign matter.

(d) Insanitary personal practices including the use of tobacco, snuff, in any form, promiscuous blowing of the nose, expectorating, wetting the fingers in the mouth, or similar practices shall be prohibited during the time food is being prepared or served.

(e) Notices of the requirements of Article 8 (b), (c), and (d) shall be prepared in large characters and posted in a conspicuous place in each kitchen and mess hall.

(f) The floors, walls, ceilings, tables, and shelves of all kitchens, dining rooms, refrigerators, and food-storage rooms shall be so constructed that they can always be maintained in a clean and sanitary condition. The exterior wall openings of all dining rooms, kitchens, and food-storage rooms shall be screened and rendered fly-tight at all times during the period that the camp is in operation. Screen doors must be self-closing and open outward.

In kitchens and dining rooms all tables, sinks, and shelves shall be scrubbed daily and all floors shall be mopped or scrubbed daily with hot water and soap or its equivalent. All walls and ceilings shall be scrubbed or otherwise cleaned as often as may be necessary to maintain them in a sanitary condition. All refrigerators, ice boxes, or similar food preserving installations shall be thoroughly cleaned and scrubbed at least once each week and as often in addition thereto as may be necessary to maintain them in a

sanitary condition.

(g) All dishes, glasses, tableware, cutlery, kitchen utensils and equipment shall be cleansed after each meal with warm water (temperature 110° F. to 120° F. and an effective soap or detergent, rinsed and sterilized either by immersing in hot water (at least 170° F.) or in chemical solutions approved by the State board of health. Broken or cracked utensils shall not be used.

(h) All garbage shall be kept in tight, non-absorbent, and easily washable receptacles which are covered with close-fitting lids while pending removal.

(i) All garbage and other waste material shall be removed from the premises as frequently as may be necessary to prevent nuisance and unsightliness and are disposed of in a manner approved by the State board of health.

(j) All garbage receptacles shall be washed after emptying and treated with a disinfectant, if necessary, to prevent nuisance.

(k) All kitchens shall be provided with food storage, preparation, and serving equipment and utensils to maintain the food in a clean and wholesome condition. Perishable foods, in addition to being protected against insects and rodents, shall be properly refrigerated at a temperature not greater than 50° F.

(l) All food purchased, sold, or offered for sale or served in a labor-supply center shall be from an approved source and of acceptable quality to the State board of health.

(m) No kitchen or messroom shall be used for sleeping purposes.

Article 9. Insect and Rodent Control

(a) All effective measures shall be taken to control the breeding of

rats, flies, mosquitoes, bedbugs, and other insect vectors or parasites.

(b) Sprays, insecticides, fumigation, and trapping shall be undertaken if necessary to eradicate insects and vermin.

Article 10. Safety

The State board of health or other appropriate State agency shall establish and require compliance with standards which will insure the safety of camp occupants. The responsibility for the safety of all persons housed in a camp shall rest upon the owner and/or operator of such camp.

Article 11. First Aid

(a) Adequate first-aid facilities approved by the State board of health or other appropriate State agency shall be maintained and made available in every labor camp for the emergency treatment of injured persons.

(b) Such facilities shall be in charge of a person trained to administer first aid and shall be readily accessible for use at all times.

Article 12. Reporting Communicable Diseases

It shall be the duty of the person in charge of a camp to report immediately to the local health officer the name and address of any individual in the camp known to have or suspected of having a communicable disease. Until official action in such case has been taken, strict isolation shall be maintained.

Whenever there shall occur in any camp an outbreak of suspected food poisoning or an unusual prevalence of any illness in which fever, diarrhea, sore throat, vomiting, or jaundice is a prominent symptom, it shall be the duty of the person in charge of the camp to report immediately the existence

of such an outbreak or disease prevalence to the county commissioner of health or the local health officer verbally, or by telegram or telephone; such officer shall report by telegram or telephone immediately the existence of such an outbreak to the State commissioner of health or to the district State health officer.