APPENDIX A.

THIRTY-NINTH ANNUAL MEETING OF AMERICAN SOCIETY FOR TESTING MATERIALS, ATLANTIC CITY, JUNE 29-JULY 3, 1936.

Opening Session and Marburg Lecture

At the first session, held at 10:30 a.m. on June 30, 1936, the Secretary-Treasurer presented the Report of the Executive Committee, and the President, H.S.Vassar, delivered an address entitled: "The Testing of Non-Materials". Reprints of these are available.

H. P. Parmalee, Editor, Engineering and Mining Journal, read a paper on "Relationship of A.S.T.M. to Modern Developments in Chemical Engineering". This was a very general review dealing mainly with plastics which were dividedinto three groups: (1) cellulose derivatives, (2) synthetic resins, and (3) rubber derivatives and rubber-like compounds. Mention was also made of carbon as a material of construction, of the new detergents, and of metals and alloys. In discussing the latter, particular mention was made of tellurium lead, for which there was claimed greater tensile strength and more resistance to fatigue and corrosion than was found in other chemical leads. The paper is printed in full in the July Bulletin of A.S.T.M.

The Marburg Lecture was delivered by Dr. Arthur L. Day, Director, Geophysical Laboratory, Carnegie Institution of Washington, on July 1st. The subject was: "Developing American Glass". In outlining the history of the development of the glass industry in the United States, Dr. Day used many personal experiences to illustrate the various stages in this development. It was the war of 1914-1918 which stimulated American research which led to most important advances. Particular mention was made of the development of Pyrex glass and glass-making machinery. The pouring of the 200-inch mirror for the Mount Wilson Observatory was discussed. Several reels of motion pictures and numerous slides were shown.

Interviews - A.S.T.M. Annual Meeting, 1936.

1. Mr. Bradley Dewey, President, Dewey and Almy Chemical Company, Cambridge, Mass.

I had an opportunity to talk to Mr. Dewey after the meeting of Committee C-1 on Cement. His company used to own the Multibestos Co., which they recently sold to the Raybestos-Manhattan group, and considerable work on asbestos has been done in their laboratories, which, I was given to understand, are well equipped and have a staff of about 60. They have been specializing in colloidal phenomena with particular regard to dispersion and wetting. Mr. Dewey mentioned that they were doing some work for Johns-Manville, and it was his opinion that the subject of dust would soon be one of the most important problems in the asbestos industry. He thought that this dust was definitely harmful, the Russian asbestos being perhaps the worst in this respect. For the present this information (or opinion) should be kept confidential. A cordial invitation to visit their laboratories was extended.

2. Mr. H.W. Greider, Director of Research, Philip Carey Manufacturing Co., Lookland, Ohio.

Mr. Greider gave a paper (with G.A. Fasold): "Comparison of Abrasion Test Methods for embedding of granular mineral surfacing on Asphalt Roofing", at the session devoted to Bituminous Materials. After the session I had a short chat with him, during which he told me that their work consisted mainly of testing and investigations relative to the products they manufacture. There was practically no research on fibre. Mr. Greider stated that the reports which we issue to the Producers find their way to his office via Mr. Spafford.

3. Mr. G.A. Albert, Phenolite Division, National Vulcanized Fibre Co., Kenneth Square, Penn.

Had a talk with this man while waiting for one of the subcommittee meetings to begin. His company uses considerable asbestos, but would like to use more because of its resistance to heat and deterioration in general. The electrical insulation properties would have to be improved, however. They would be glad to discuss this problem at any time.

4. Mr. J.H. Adams, Bakelite Corporation, Bound Brook, N.J.

His company, Mr. Adams stated, was very much interested in the use of asbestos as a filler. He suggested that a visit to their plant and an interview with Mr. W.W. Zeinian would be mutually advantageous.

NATIONAL RESEARCH COUNCIL

P R O C E E D I N G S

of the

First Meeting

of the

ASSOCIATE COMMITTEE ON ASBESTOS RESEARCH
Held in the Office of the Asbestos Corporation, Thetford Mines, Quebec, Saturday, June 28, 1930, at 11.00 a.m.

Present: Dr. H. M. Tory, Chairman, Capt. J. G. Ross, Mr. L. L. Bolton, Mr. A. C. Halferdahl, Mr. E. Larochelle, Mr. A. S. Johnson, Jr., Dr. G. S. Whitby and Mr. F. E. Lathe, Secretary.

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In opening the meeting the chairman read a brief report which had been prepared of the conference on asbestos problems held in Thetford Mines on June 2, 1930. This appears in full in Appendix "A".

The secretary stated that a letter had been received from Mr. Spafford expressing his regret that an important business engagement prevented him from being present. Capt. Ross stated that Mr. O. C. Smith was out of town and would likewise not be present. He had, however, invited Mr. E. Larochelle, Inspector of Mines.

In view of the fact that Mr. Larochelle was stationed at Thetford Mines it was agreed that the National Research Council should be asked to appoint him to the committee.

The chairman stated that Mr. L. L. Bolton was representing Dr. Camsell since the latter was in

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Europe. He expressed the hope that Dr. Camsell would feel free at any time to send experts from his staff to meetings of the committee.

At the chairman's request the secretary outlined to the committee the action which had been taken since the previous meeting. The industry had been circularized in order to find out whether they were prepared to undertake co-operative research and from the replies received it was evident that practically the whole industry would be prepared to co-operate with the National Research Council in this work. Capt. Ross had made available to the committee the reports of the Mellon Institute investigation, which had been financed by their company. This was being studied by Mr. A. C. Halferdahl. Through the courtesy of the Dominion Department of Mines a copy of Capt. Ross' monograph on asbestos had been secured and was being duplicated in part for study by the committee. This would shortly be published as a bulletin of the Dominion Department of Mines. The literature on asbestos was being studied in detail by Mr. Halferdahl and some one hundred and fifty patents and numerous books and pamphlets had been ordered.

Capt. Ross mentioned that there was another company which might be interested in the work of the committee, the Russell Manufacturing Company, St. Johns, Quebec. Asbestenos at St. Lambert was an independent company engaged in asbestos manufacture, but Capt. Ross understood that they had no technical man whom they would wish to have placed on the committee. It was decided to ask the Russell Manufacturing Company to name a technical man as their representative on the committee. Capt. Ross pointed out that with the exception of Asbestenos all the Canadian manufacturing companies were branches of American firms.

Suggested Research Problems

1. The Development of an Assay Method for Asbestos

The secretary explained that he had visited the district about four years previous and discussed this problem with the managers of several of the asbestos companies. Not very much interest was taken in the development of an assay method, but he felt that this was probably due to a lack of appreciation of the great value of assay methods in controlling mining and milling operations. He was not, however,

APPENDIX "A"

P R O C E E D I N G S

of a

CONFERENCE ON ASBESTOS PROBLEMS

Held in Thetford Mines, Quebec,
Monday, June 2, 1930,
at 2.00 p.m.

Present:

Capt. J. G. Ross, Mines Manager, Asbestos Corporation, Ltd., Thetford Mines, Chairman.

Dr. H. M. Tory) Representing the National
Mr. F. E. Lathe) Research Council.

Mr. C. H. Shoemaker, Manager)Canadian Johns-
Mr. Morrison and Mr. Van Winsen,)Manville Corpn.,
Research Engineers)Asbestos, Que.

Mr. A. S. Johnson, Jr., Manager, Johnson's Company, Thetford Mines, Que.

Mr. E. Larochelle, Provincial Mine Inspector.

In opening the meeting the chairman stated that several of the managers who had been invited to attend were absent, due in part at least to other business engagement. One or two had not been heard from.

The chairman explained that he had written the National Research Council asking that officials confer with the managers of the asbestos companies regarding the advisability of having an investigation undertaken of the problems of the industry. Problems specifically mentioned were those of improved grading methods and the finding of new uses for short fibre.

Dr. Tory explained that the usual procedure in helping an industry was for the initial expense to be borne by the National Research Council and for the support of the co-operating companies to be called for only when results of value had been obtained.

He cited the magnesite investigation as one in which this method had been followed.

Mr. Shoemaker stated that the Johns-Manville Company had been engaged in research work for many years. Their largest laboratory was in the United States, but the Canadian laboratory employed nine technical men as well as a number of assistants and were spending several thousand dollars per month. The company had certain manufacturing secrets which it felt it could not divulge, but it would nevertheless be glad to co-operate with the other companies as far as it reasonably could. It was agreed that the Johns-Manville Co. should notify the committee in case any research was proposed which the company already had under way. This would enable the committee to avoid duplicating the company's work.

Mr. Johnson expressed his personal wish to co-operate in an investigation, which he believed would be of real value to the industry.

The chairman explained that although the Asbestos Corporation was not a manufacturing company it had had considerable work done with a view to finding new uses for short asbestos fibre. It had for a time supported an investigation at the Mellon Institute and the reports of that investigation would be placed at the disposal of the National Research Council, if an investigation was decided upon. Work had also been done with the Canada Gypsum and Alabastine Company.

After considerable discussion it was unanimously agreed to ask the National Research Council to form an Associate Committee on Asbestos Research on which all the important producing companies should be represented, that research on behalf of the industry should be undertaken as soon as possible. It was suggested that if the Council formed such a committee the industry should be circularized in order to determine to what extent the co-operation of the various companies could be counted upon.

The meeting adjourned at 4.00 p.m.

NATIONAL RESEARCH COUNCIL

P R O C E E D I N G S

of the

Eighth Meeting

of the

ASSOCIATED COMMITTEE ON ASBESTOS

Held in Ottawa, June 10, 1935,
at 10.00 a.m.

Present: Dr. G. S. Whitby, acting chairman
Mr. C. S. Bell
Mr. G. M. Boyd
Mr. R. A. Donovan
Mr. A. O. Dufresne
Mr. A. C. Halferdahl
Mr. E. Larochelle
Mr. L. C. Phero
Capt. J. G. Ross
Mr. C. H. Shoemaker
Mr. H. A. Smith
Mr. O. C. Smith
Mr. A. van Winsen
Dr. A. W. G. Wilson
Mr. D. Wolochow
Mr. F. E. Lathe, secretary.

1. Minutes

The minutes of the seventh meeting of the committee were outlined by the chairman and adopted.

2. Serpentine and Plant Growth

Mr. Shoemaker explained that Dr. Brittain had suggested to the industry that they should finance work at Macdonald College on applications of serpentine to the soil. The industry had given them no encouragement but he understood that Dr. Brittain had arranged to have the work done on a limited scale and that he would eventually report to them upon it.

Mr. Wolochow reported that he had visited Macdonald College in this connection and had obtained some information on the work under way. They had already found that the application of magnesium oxide and carbonate had increased the biological

The chairman suggested that a few tests should be carried out to determine whether there was any encouragement for the application of Canadian asbestos in this field.

14. Other Business

(a) Silicosis

Dr. Wilson called attention to the problem of silicosis in Ontario. This was a matter in which the Ontario Board of Health was deeply interested. He understood Dr. Wiley of Kingston had written to a number of people asking for samples of asbestos, presumably for test in connection with this problem. He felt that the problem was a national one and that the National Research Council should therefore be urged to form a committee to investigate it.

He referred also to the excellent bibliography on silicosis issued by the Metropolitan Life Insurance Company.

Capt. Ross felt that silicosis was not a problem of great interest to the asbestos industry since no cases of this disease had been observed in Thetford Mines.

Mr. Halfordahl reported having read an article on lung fibrosis, apparently caused by dust in asbestos factories. This appeared to be similar to silicosis.

The secretary reported that this question had been raised by Dr. Klotz, Professor of Pathology and Bacteriology at the University of Toronto, at the last meeting of the Associate Committee on Tuberculosis. Dr. Wodehouse, Deputy Minister of the Department of Pensions and National Health, had stated that his department had the matter under consideration and had suggested that no action be taken by the Council for a short time, since he believed that the matter would be satisfactorily taken care of by parties co-operating with his department. The interest of Dr. Klotz in this problem was probably due in large part to the discovery made in his laboratory that silica in almost any form stimulated the growth of tubercle bacilli. It was also a matter of concern that silicosis was not one of the diseases covered by the Workmen's Compensation Act in Ontario. As a result many of the companies faced suits for heavy damages.

Dr. Wilson reported that the head of the Sanatorium Lake Hospital regarded silica as a poison.

Mr. Wolochow stated that silicosis was being placed under compensation laws in many parts of the United States.

Dr. Wilson emphasized his point that this was really a national problem. He felt that the people in Ontario were not taking it up except from a provincial point of view.

Mr. O.C. Smith stated that the Quebec Asbestos Producers Association had a committee charged with the duty of keeping in touch with the situation in regard to silicosis. They were co-operating with the Metropolitan Life Insurance Company and had something of interest to the National Research Council if the latter should decide to investigate the problem. Two of the asbestos companies had covered their employees by a group life insurance policy with the Metropolitan.

The question of literature on silicosis was discussed at some length. Dr. Wilson stated that he maintained a card index of recent literature. It was also understood that the Quebec Asbestos Producers Association was doing the same.

Mr. Dufresne felt that this was a very controversial question. It was impossible to differentiate between fibrosis and asbestosis. He also urged that the National Research Council keep in touch with the situation and felt that the committee should bring the matter to the attention of the Council.

The chairman suggested that the secretary should be instructed to bring this matter to the attention of Dr. Kloth with a view to securing information about the activities of Dr. Wiley and others. It was also suggested that he should consult with Dr. Wilson in the matter in view of the fact that the Mines Branch had accumulated considerable information on the subject.

It was moved by Dr. Wilson, seconded by Mr. Dufresne and unanimously agreed to draw the attention of the National Research Council to this problem and to suggest that it consider the advisability of inquiring into the general question of industrial dust hazards.

(b) Fillers

Dr. Wilson stated that representatives of the Department of Mines would in the summer of 1935 visit manufacturers in various parts of Canada and inquire as to filler

DOMINION OF CANADA

FOURTEENTH ANNUAL REPORT

OF THE

NATIONAL RESEARCH COUNCIL

1930 - 1931

OTTAWA, CANADA

THE COMMITTEE OF THE PRIVY COUNCIL ON SCIENTIFIC AND INDUSTRIAL RESEARCH

Minister of Trade and Commerce, Chairman
Minister of Finance
Minister of Mines
Minister of Agriculture
Minister of Pensions and National Health
Minister of Labour
Minister of National Defence

NATIONAL RESEARCH COUNCIL
1930-1931

President:
H. M. Tory, M.A., D.Sc., LL.D., F.R.S.C., F.R.H.S., Ottawa, Ont.

Secretary-Treasurer:
S. P. Eagleson, Esq., Ottawa, Ont.

Members:

Charles L. Burton, Esq., President, Robert Simpson Company, Limited, Toronto, Ont.

Charles Camsell, B.Sc., LL.D., F.R.S.C., Deputy Minister, Department of Mines, Ottawa, Ont.

A. L. Clark, B.Sc., Ph.D., F.R.S.C., Hon. M.E.I.C., Dean, Faculty of Applied Science, Queen's University, Kingston, Ont.

Hume Cronyn, *B.A., LL.D., General Manager, Huron and Erie Mortgage Corp.*, London, Ont.

J. T. Foster, Esq., Vice-president, Trades and Labor Congress of Canada and President of the Montreal Trades and Labor Council, 747 Stuart Ave., Outremont, Ont.

A. Frigon, B.Sc., D.Sc., A.M.A.I.E.E., A.M.E.I.C., Dean, Ecole Polytechnique and General Director for Technical Education in the Province of Quebec, 1430 St. Denis Street, Montreal, Que.

Sir George Garneau, B.A.Sc., LL.D., 71 St. Peter Street, Quebec, Que.

J. H. Grisdale, *B.Agr., D.Sc.Agr., Deputy Minister, Department of Agriculture*, Ottawa, Ont.

*H. M. MacKay, B.A., B.A.Sc., M.Am.Soc.C.E., Dean of the Faculty of Applied Science and Professor of Civil Engineering, McGill University, Montreal, Que.

A. S. Mackenzie, Ph.D., D.C.L., LL.D., F.R.S.C., President, Dalhousie University, Halifax, N.S.

J. C. McLennan, O.B.E., Ph.D., D.Sc., LL.D., F.R.S., Professor of Physics and Director of the Physics Laboratory, University of Toronto, Toronto, Ont.

W. C. Murray, M.A., LL.D., F.R.S.C., President, University of Saskatchewan, Saskatoon, Sask.

J. W. Shipley, B.A., A.M., Ph.D., F.C.I.C., F.R.S.C., Professor of Chemistry, University of Alberta, Edmonton, Alta.

Julian C. Smith, M.E., LL.D., M.E.I.C., Shawinigan Water and Power Company, Montreal, Que.

* Died—October 25, 1930.

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to delays incident in the installation of special pieces of equipment, work on many of these subjects did not get under way until relatively late in the year.

Asbestos

D. Wolochow

After several meetings with representatives of the Canadian producers, at which the technical problems of the industry were discussed, it was decided to undertake work with the object of, (a) standardizing the present method of testing asbestos grades, (b) developing new methods of testing such as will take into account all the various properties of the fibre which are of significance in manufacture, (c) developing new uses for asbestos, especially for the shorter fibred grades.

Work was started in November, 1930. The producing mills and a number of asbestos manufacturing plants were first visited and data were secured on the results of testing the various grades of fibre in the Quebec Standard Testing Machine and also on Ro-tap screens.

Work has also been done on the influence of drying, on testing, on the determination of the moisture and water-soluble content in asbestos, and on the absorption of water by asbestos. A new method of testing, based on the apparent density of the fibre, is being studied. Washing tests have been made. Asbestos of foreign origin has also been examined for comparative purposes.

Some studies have been made on the properties of asbestos of various grades bonded with Portland cement and other binders, and this work is leading to the production of some new asbestos cement and moulded compositions which, it is hoped, will prove to be of commercial value.

The activities of the Associate Committee on Asbestos are briefly described under that heading, beginning on page 54 of this report.

Plastic Magnesia

A. F. Gill, N. P. Pitt, C. W. Davis

Laboratory work on behalf of the magnesite companies has been directed towards improvement of the properties and methods of utilization of the plastic magnesia and the development of new uses.

A study was made of the effect of the factors of time and temperature in calcination subsequent to the carbonate decomposition. It was found that the physical properties of a plastic magnesia could be modified by heat treatment to give the desired setting time, high water resistance and diminished linear change. It was possible to take advantage of these results in the commercial production of plastic magnesia in spite of the limiting temperature below which Canadian magnesian rock must be calcined to avoid production of free lime. This was accomplished by close sizing of kiln feed, careful control of the burning period and improved technique in temperature measurement and control.

Further laboratory experimentation on the expansion and contraction of plastic magnesia cements, together with observations of existing installations, had indicated that climatic conditions in eastern Canada are a major

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paralyzed birds were given different treatments, such as ultra-violet light, special diet or the widely advertised iodine vermicide, but all were ineffective. The disease is surmised to be due to a neurotrophic virus.

(Investigation under the direction of Dr. H. W. Hill.)

Associate Committee on Asbestos

Co-operating organizations:

Canadian Asbestos Producers and Manufacturers
Dominion Department of Mines
Quebec Bureau of Mines

A preliminary study of the asbestos industry was made in 1926 by the technical staff of the National Research Council, at the suggestion of the Associate Committee on Physics and Engineering Physics, whose members had enumerated a large number of problems. In the report covering this preliminary survey it was recommended that work be done on certain problems of the industry, but as the asbestos producers did not at that time feel any special need of government assistance, the Council decided to take no further action.

In the spring of 1930, however, the asbestos producers after consultation among themselves made a formal request for assistance to the National Research Council. The President accordingly arranged a conference with the producers, which was held at Thetford Mines on June 2, 1930. The situation was reviewed at that meeting, and it was recommended that the National Research Council form a committee to make a systematic study of the problems of the industry and to undertake such laboratory investigations as might appear to be warranted.

Until a few years ago Canada was in the happy position of being the world's chief producer of asbestos, which was readily sold at a good profit. Prices during the war rose to a high level and remained high for some time subsequently, but this proved an incentive to other countries to utilize their asbestos reserves. Important advances took place in the Union of South Africa, Rhodesia, Russia, and the state of Arizona. With increasing quantities of asbestos being offered, the price fell rapidly, this movement being greatly accentuated by the severe depression which began in 1929 and has continued to date. It was a particularly severe blow to Arizona and Canada where labor costs are high and the deposits in general of a comparatively low grade. In South Africa, Rhodesia and Russia, however, the grade of rock is high and labor costs are low. These countries consequently made important advances, chiefly at the expense of Canada. In 1918 Canada produced about 80% of the world's tonnage of asbestos and 71% of its dollar value, whereas in 1929 the tonnage had fallen to 71% and its value to 53%. The relative position of Canada was still further weakened in 1930, although it is to be noted that in the latter year the dollar value of asbestos products manufactured in Canada reached a new high record.

Realizing the urgency of the situation, the National Research Council immediately appointed an asbestos committee with representatives of the asbestos producers and manufacturers and the Dominion and Quebec de-

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partments of mines. The first meeting of this committee was held in Thetford Mines on June 28, 1930.

One of the chief technical problems of the industry arises from the fact that there is no easy assay or analytical method for asbestos, such as exists for gold, silver, copper, or any other single element obtainable from mineral deposits. Chemically, asbestos is almost identical with the rock in which it occurs; its value depends chiefly on its peculiar physical structure and properties. The case is still further complicated by the fact that fibres of different lengths vary greatly in value. The asbestos grading method in common use consists in screening under controlled conditions on screens of standard dimensions. No matter how carefully this operation is carried out, however, the results vary. Compressing asbestos for shipment results in compacting the material to such an extent that the buyer, upon screening it after shipment, obtains a lower test than did the seller. As a result the purchaser finds it necessary to "sweeten" his shipments with long fibre asbestos to ensure that they will be up to the desired grade upon reaching their destination. Some dependable tests are urgently required, and the committee accordingly agreed to undertake as one of their first problems, an investigation of possible methods of standardization of tests.

Another problem is the utilization of asbestos of intermediate and short fibre, especially the latter, of which large additional quantities could be recovered by the mills if there were a demand for this grade. Certain uses for the short fibre asbestos have already been developed where its unique properties make it of value, but most of these applications involve the utilization of only small tonnages. What is required is the large scale application of asbestos in important industries.

Problems in milling were also discussed by the committee, but it was agreed that these should be left to the industry for the present, since important improvements in milling practice have already been made.

At the second meeting of the committee held in Ottawa on March 4, 1931, the President of the National Research Council reported that Mr. D. Wolochow, who had had extensive experience in scientific research on cement, had been secured to work under the direction of Dr. G. S. Whitby in the National Research Laboratories and he had already been some months at his task. Tests were being made on standardization and new uses of asbestos, and leads being obtained might prove of commercial importance.

In connection with standardization it was reported that there had been formed under the auspices of the Quebec Bureau of Mines a Committee on Uniform Classification and Grading of Asbestos Mines Products. It was agreed that this committee should be represented on the Associate Committee on Asbestos and that an exchange of minutes should be made in order that each committee might be fully informed of the other's work.

The committee considered the situation in regard to asbestos being brought into America from Russia. It was agreed that it was essential to secure a comparison of asbestos from Russia and Canada, and it was suggested that this be done by having authoritative tests carried out in commercial manufacturing plants under the supervision of the staff of the

National Research Council. It was decided to make arrangements for these tests as soon as possible.

Associate Committee on Biophysics

As previously reported a conference on biophysics was held in Toronto in February, 1930, at which there was a general discussion of important problems awaiting investigation in the field of radiology, especially in relation to the treatment of disease. At this conference a subcommittee was appointed to go over the whole list of problems suggested, consider the advisability of research, and report back to the main committee.

A meeting of this subcommittee was held in Toronto on October 18, 1930. In the absence of Dr. Tory, chairman, Dr. Boyle, Director of the Division of Physics in the National Research Laboratories, presided.

In view of the fact that in the therapeutical use of radiology, which is rapidly increasing, there is little precise knowledge as to the proper wavelengths to use or the optimum time and intensity of treatment, it was agreed that standardization in dosage is of fundamental importance. After a full discussion the committee recommended to the National Research Council that provision be made as soon as possible in the National Research Laboratories for the standardization of measurements of radium, X-rays, ultra-violet and other light, high frequency radiation, and heat radiation. Steps to that end are now being taken.

It was recognized that this meeting of the subcommittee was only a preliminary discussion, and that a very large field exists for research in biophysical problems. It is anticipated that provision will be made for this in due course, although at present the work which can be undertaken is seriously limited by the inadequacy of the funds available.

While not carried out under the committee, it is of interest to note that work on high frequency radiation in relation to chemical reactions and selective heating of animal tissues is under way by Dr. J. C. McLennan in the Physical Laboratory of the University of Toronto. The progress of this investigation to date is summarized on page 114 of this report.

Associate Committee of Chemists

Two meetings of the committee have been held during the year under review, both in Ottawa, on January 4 and May 29, 1930. Dr. G. S. Whitby, Director of the Division of Chemistry in the National Research Laboratories, presided at both these meetings, having succeeded to the chairmanship previously held since the organization of the committee by Dr. R. F. Ruttan, now deceased.

At the earlier meeting Dr. Tory briefly reviewed the work of the National Research Council and outlined the plans for the National Research Laboratories. The committee discussed in particular the arrangements being made for researches in pure and industrial chemistry.

The question of the production of artificial fertilizers in Canada was considered at some length. Messrs. B. L. Emslie and R. J. Walley presented

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George Hilton, V.S.	Veterinary Director General, Department of Agriculture, Ottawa, Ont.
O. Klotz, M.D., C.M.	Department of Pathology and Bacteriology, University of Toronto, Toronto, Ont.
Rev. Father Leopold, D.S.A.	Director, Oka Agricultural Institute, La Trappe, Que.
José M. Rosell, M.D.	Chief, Department of Bacteriology, Oka Agricultural Institute, La Trappe, Que.
C. D. McGilvray, M.D.D., D.V.Sc.	Principal, Ontario Veterinary College, Guelph, Ont.
A. Savage, B.S.A., D.V.M., M.R.C.V.S.	Professor of Animal Pathology, Manitoba Agricultural College, Winnipeg, Man.
P. R. Talbot, V.S., D.V.M.	Provincial Veterinarian, Department of Agriculture, Edmonton, Alta.
E. A. Watson, V.S.	Chief Pathologist, Department of Agriculture, Ottawa, Ont.
F. E. Lathe, M.Sc., Secretary	Director, Division of Research Information, National Research Council, Ottawa, Ont.

Associate Committee on Apple Slacks

J. H. Grisdale, B.Agr., D.Sc., A., Chairman	Deputy Minister, Department of Agriculture, Ottawa, Ont.
H. M. Tory, M.A., D.Sc., LL.D., F.R.S.C., F.R.H.S.	President, National Research Council, (Executive), Ottawa, Ont.
W. S. Blair, Esq.	Superintendent, Experimental Farm, Kentville, N.S.
A. S. Mackenzie, Ph.D., D.C.L., LL.D., F.R.S.C.	President, Dalhousie University, Halifax, N.S.
G. E. McIntosh, Esq.	Commissioner, Fruit Branch, Department of Agriculture, Ottawa, Ont.
W. A. Middleton, Esq.	Provincial Horticulturist, Department of Natural Resources, Halifax, N.S.
F. E. Lathe, M.Sc., Secretary	Director, Division of Research Information, National Research Council, Ottawa, Ont.

Associate Committee on Asbestos Research

H. M. Tory, M.A., D.Sc., LL.D., F.R.S.C., F.R.H.S., Chairman	President, National Research Council, Ottawa, Ont.
R. W. Boyle, B.Sc., M.Sc., Ph.D., F.R.S.C.	Director, Division of Physics, National Research Council, Ottawa, Ont.
Chas. Camsell, B.Sc., LL.D., F.R.S.C.	Deputy Minister, Department of Mines, Ottawa, Ont.
A. C. Halferdahl, M.A.Sc.	Research Investigator, National Research Council, Ottawa, Ont.
A. S. Johnson, Jr., Esq.	Managing Director, Johnson's Company, Thetford Mines, Que.
Eugene Larochelle, B.A., C.E.	Inspector of Mines, Province of Quebec, Thetford Mines, Que.
J. G. Ross, Esq.	Mine Manager, Asbestos Corporation, Ltd., Thetford Mines, Que.
C. H. Shoemaker, Esq.	Canadian Johns-Manville Corporation, Asbestos, Que.
O. C. Smith, Esq.	Manager, Bell Asbestos Mines, Incorporated, Thetford Mines, Que.
E. E. Spafford, Esq.	Quebec Asbestos Corporation, East Broughton, Que.
G. S. Whitby, M.Sc., Ph.D., A.R.C.Sc., F.R.S.C.	Director, Division of Chemistry, National Research Council, Ottawa, Ont.
F. E. Lathe, M.Sc., Secretary	Director, Division of Research Information, National Research Council, Ottawa, Ont.

NATIONAL RESEARCH COUNCIL

Minutes of the 114th Meeting

Ottawa, 14 August, 1936.

Present: Major-General A.G.L. McNaughton, President; Dr. Frank Allen; Dr. E.E. Bigelow; Dean A.L. Clark; Dean F.M.G. Johnson; Dr. A.S. Mackenzie; Dean C.J. Mackenzie; Mr. Tom Moore; Dr. Julian C. Smith; Abbé A. Vachon; Mr. Lathe, Director of the Division of Research Information; Mr. S.P. Eagleson, Secretary.

The Council met at 9 a.m.

1. Minutes — The minutes of the 113th meeting, which had previously been distributed, were taken as read and approved.

2. Financial statement — The Secretary submitted a statement of the receipts and expenditures of the Council for the period 1 April to 31 July, 1936. (Exhibit "7")

3. Selection Committee — The President reported that the Selection Committee had met on the preceding day to consider a vacancy of Assistant Research Biologist in the Division of Biology and Agriculture, but had deferred final decision until further information had been secured and considered at the next meeting of the committee.

4. Estimates — The President reported that an additional vote of $10,000 had been provided in the supplementary estimates. The distribution of this in detail to the several services is given on page 8 of Exhibit "7".

He stated that so far as can be estimated at present, after providing for present commitments, there would be available for allocation by Council approximately $25,000 from Special Fund revenue, which it is estimated will be received during the current year, but that all grants authorized by Council would have to be provided from the Special Fund.

EXHIBIT "L"

Associate Committee on Asbestos

The ninth meeting of the Associate Committee on Asbestos was held in Montreal, June 23, 1936, with the secretary of the committee in the chair. Thirteen persons were in attendance.

The committee discussed the problem of open and crudy fibres and the inconclusive results in tests made upon them. It was agreed that an outline for the conduct of future spinning tests and for a series of tests on the laboratory carding machine should be drawn up and circulated for criticism. An effort will be made to secure information from England regarding manufacturing practices in that country.

The National Research Council staff reported the results of preliminary spinning tests on washed asbestos fibre. Washing removed a large amount of dust and produced a fibre which could be spun without heavy losses, the net result being similar to that with unwashed fibre. It was considered worth while to carry out preliminary tests on the impregnation of washed and unwashed fibre.

The committee discussed the question of magnetic iron in asbestos, one of considerable importance when asbestos is to be used for electrical insulating purposes. In studying this question the National Research Council is co-operating with the American Society for Testing Materials.

The effect of various milling machines on fibre was reported by the laboratory staff, which has been studying this question by microscopic methods. Various changes in commercial practice were suggested.

Additional work is to be done on the fundamental character of Canadian and foreign fibres, with chemical analyses of washed and unwashed asbestos. The advice of geologists and petrologists is to be sought in mineralogical studies.

It was reported that certain German investigators had experimented with Canadian fibre and had discovered that certain corrosive effects were associated with sulphur content. This led to a study of the sulphur problem, in which it was indicated that sulphur might be introduced from the coal used in the drying operation. This was regarded as important in view of the possible influence on both corrosive effect and

electrical conductivity. This study will be continued, as well as other experiments on the corrosion of metals in contact with asbestos fibre.

The committee discussed at length the possibility of utilizing tailings from the asbestos mills. Preliminary laboratory experiments had indicated that a considerable quantity of short fibre could be recovered by wet methods. It was agreed that the laboratory should test tailings from each of the mills and report results to the operators. Other utilization possibilities discussed included the production of active silica and magnesium salts, the application of tailings to soils deficient in magnesia, the production of fillers and the manufacture of cheap, fire-proof wall board.

The chairman requested criticism by the committee of the work being done in the laboratories of the National Research Council, and advice as to how the usefulness of the work could be increased. He suggested that closer contact between the research staff and industry be provided. Mr. C.H.Shoemaker, general manager of the Johns-Manville Company, thought the work could be made more practical in character if a steering committee of representatives of the industry and the Council were appointed to supervise the work. After some discussion it was decided to recommend such action to the President, who has since approved of it and asked the producers to name their representatives. The practice of sending a representative from the laboratories to each meeting of the Quebec Asbestos Producers Association will be continued.

The problem of silicosis and asbestosis was briefly discussed. The question is one in which the producers are keenly interested, and it was agreed to keep it on the agenda for future meetings.

Arrangements were made to secure a laboratory assistant for a period of three months at $75 per month, the salary to be paid by the Quebec Asbestos Producers Association.

August 11, 1936.

F.E.Lathe, Secretary,
Associate Committee on Asbestos

EXHIBIT "D"

Associate Committee on Tuberculosis

The seventh meeting of the Associate Committee on Tuberculosis was held in Ottawa on June 17, 1936, with 16 persons in attendance. Dr. Oskar Klotz was chairman of the meeting.

Dr. E.A. Watson presented a report covering tuberculosis research carried out by the Health of Animals Branch of the Dominion Department of Agriculture. The work had chiefly to do with tuberculin used for testing cattle under the department's tuberculosis eradication plan. Dr. Hilton reported that the department was now testing about one million cattle per year.

Dr. R.G. Ferguson, Head of the Qu'Appelle Indian Health Unit in Saskatchewan, outlined to the committee his work on the control of tuberculosis amongst Indian children attending boarding schools and on the vaccination of Indian children with B.C.G. (Bacillus Calmette-Guérin), which was undertaken on the recommendation of the committee. Tuberculosis amongst the Indians has been radically reduced by the isolation of active cases, especially those among the school children. Vaccination with B.C.G. has not yet progressed far enough to do more than confirm the innocuity of this vaccine. The committee considers, however, that Dr. Ferguson has a unique opportunity to carry out a scientific test of the value of B.C.G., since (a) the Indian race is unusually susceptible to tuberculosis, (b) the situation in the Qu'Appelle Indian Health Unit is such that Dr. Ferguson can make his vaccinated and control groups exactly alike, and (c) he is able to secure post-mortem examinations and thus definitely determine the cause of death. A period of some years will be required to determine what degree of resistance is conferred by B.C.G.

Tuberculosis research at Queen's University, not now supported financially by the committee, was reported on by Dr. G.B. Reed. No work is at present being done on B.C.G., but an effort is being made to check, by means of the complement fixation test, tuberculin tests which have been carried out on Indian children in Saskatchewan and similar tests on vaccinated cattle at the University of Alberta. Positive results were obtained on the sera from 11 Indian children and negative results on the sera from 40 vaccinated cattle, in both cases closely checking the results of tuberculin testing.

Large-scale experiments on the vaccination of cattle with B.C.G. at the University of Alberta were reported by Dean A. Rankin as practically complete. He had found that B.C.G. was entirely innocuous and that it conferred a substantial degree of resistance but not complete immunity to tuberculosis in cattle. There remained for completion histological studies of vaccinated animals which had been exposed to tuberculosis and subsequently slaughtered, and also observations on one small group of vaccinated animals in a

tuberculous herd. Dean Rankin is also endeavoring to eliminate tuberculosis from two tuberculous herds by the vaccination with B.C.G. of all animals introduced into these herds. Good progress is being made but it is still uncertain whether tuberculosis can be completely eliminated in this way.

Dr. J.A. Baudouin, of the University of Montreal, reported upon the vaccination of children with B.C.G., an experiment which has now been under way for about ten years. Recent results have fully confirmed the previous indications, (a) that B.C.G. was harmless to children, (b) that vaccination reduced general mortality, (c) that vaccination reduced morbidity (state of illness), and (d) that it reduced to a major extent the number of deaths from tuberculosis amongst children exposed to open cases of the disease. Recently Dr. Baudouin's work has been improved by a special study of vaccinated and unvaccinated children in the same families, and by expressing the results of vaccination on the basis of child years of life. While very substantial results have already been obtained, in line with results in France and elsewhere, there is still not full agreement as to the degree of resistance conferred by B.C.G. and it is therefore important that the work be continued with, if possible, even closer control, until it has passed definitely beyond the experimental stage. Revaccination and tuberculin testing of vaccinated children are also regarded as necessary.

The preparation of all B.C.G. used in Canada is carried out at the University of Montreal by Dr. A. Frappier, who is following methods developed at the Pasteur Institute in France. Dr. Frappier described his methods to the committee, members of which expressed themselves as fully satisfied with the precautions being taken.

Dr. Klotz reported on tuberculosis research carried out at the University of Toronto without financial assistance from the committee. An attempt was being made to develop cultural methods to supplant tests on guinea pigs for primary isolations. This work was successful and it was proposed to apply in Toronto hospitals the methods developed.

Dr. H. MacL. Harris, of the Department of Pensions and National Health, outlined the Spahlinger method of treating tuberculosis. The committee did not propose to undertake any work on this method of treatment.

The question of silicosis and asbestosis, previously discussed by the committee in relation to tuberculosis, was reviewed by Dr. Klotz, who reported that he was co-operating with the Banting Institute in their investigations, but that he was not yet satisfied that this important question was receiving the attention which its seriousness justified. No definite action was taken by the committee in this matter.

In view of the Council's expressed opinion that the work of the Associate Committee on Tuberculosis should not be extended into new fields and that steps should be taken to complete the researches under way as soon as possible, the committee considered at length proposals for future work. While recognising the necessity for the strictest economy in the use of funds, the committee nevertheless unanimously decided to recommend to Council the completion of the project under way by Dean Rankin and the continuation of those of Drs. Ferguson, Baudouin and Frappier.

Applications for financial assistance were placed before the executive of the Associate Committee on Tuberculosis at a meeting on August 12 and it was recommended that the following grants be made:

	Unexpended balance
Dr. A. Rankin	$2000
Dr. R.C. Ferguson	1265
Dr. A. Frappier	5865
Dr. J.A. Baudouin	

The Council has already appropriated $5000 for the work of this committee, and it is requested that a further appropriation of $4130 be made in order to provide in full for these recommended grants.

F.E. Latchford,
Acting Secretary, Associate Committee on Tuberculosis.

August 13, 1936.

NATIONAL RESEARCH COUNCIL

P R O C E E D I N G S

of the

First Meeting

of the

STEERING SUBCOMMITTEE,

ASSOCIATE COMMITTEE ON ASBESTOS

Held in Montreal, September 12, 1936,

Present: Dr. G. S. Whitby, chairman
Capt. J. G. Ross
Mr. C. H. Shoemaker
Mr. D. Wolochow, secretary.

1. Organization

Officers were elected as indicated above.

2. General

Captain Ross stated that the condition of the market had undergone a radical change so that there was now a very heavy demand for almost all grades of fibre. To meet this situation an effort must be made to reduce the number of grades and to improve processes so as to increase production. In the last few years the quality of the asbestos has in general been improved, so that many grades contained twice the value they had five years ago. Further improvement in the treatment of rock and of fibre was however essential to meet present and prospective demands. It was admitted that the present methods and equipment were as a rule deleterious in their effects on fibre, but the more urgent problem was the development of a really efficient method of opening fibre which has already been separated from the rock. The difficulty lay in the fact that fibre spicules became entangled in the mass and were therefore difficult to reach. The present methods used throughout the industry were therefore too harsh in their action. Greatest returns would be obtained from improvements in this field.

Mr. Shoemaker confirmed the above statements. He felt that the best interests of the industry would be served by the development and maintenance of a balanced demand for all grades, as such a condition would yield the maximum returns over a long period. Experience had shown definitely that the relative demand for the various grades fluctuates, and potential markets for all grades should be explored. At the present time he thought the market for textile grades needed expansion, though the particular grade needing stimulation may vary from one producer to another. Experience had also shown that there had been demands for asbestos which became vigorous for a time, without warning, and then as suddenly became weak and even disappeared. A more intimate knowledge of uses and their trends by the producers would have in many instances been of concrete benefit. He felt that uses for asbestos which are reflected in the purchase of asbestos products by a large number of small users (for example, domestic users) have a stabilizing effect not possessed by uses which are reflected only in purchases by large manufacturers.

Mr. Shoemaker therefore suggested that a thorough survey be made of the industrial applications of all grades of asbestos fibre. This survey should be conducted with a long range point of view, for it was not to be taken for granted that the demand would always be heavy. In this survey all competing commodities should be noted and their nature studied with the object of determining what were the natural outlets for each of these and for asbestos. The results of such a survey could very well serve as a sound basis for future research. It would also provide the industry with knowledge in advance as to likely directions in which new uses for asbestos could be developed if and when the present demand falls off.

It was important not merely to ascertain the past and present uses of asbestos, but to disclose <u>trends</u>, showing the uses which are tending to grow and those which are tending to diminish. From the point of view of future the most important uses are presumably those connected with staple and growing industries, especially when asbestos, because of its special qualities, is naturally in a strong position in comparison with competitive materials.

As an aid to the conduct of the suggested survey it was recommended that a bibliography on asbestos, as complete as possible and kept up to date, should be prepared.

3. Programme for Asbestos Research

Additional discussion established that the following projects should be undertaken:

(1) Survey of Uses of Asbestos with a long range view to the future of the Canadian Asbestos Industry.

This survey should include a study of market trends, past, present, and, if possible, future, and of the applications to which asbestos is being put, so as to aid in the production of the best grade for each particular purpose. The nature of all competing commodities should be ascertained with a view of determining the natural outlets of these and of asbestos. Also, the survey should investigate what changes or improvements in present grades would stimulate demand in present uses and/or create new uses.

(2) Development of Uses for Asbestos.

Because demand for the various grades fluctuates, new uses for all grades would be of benefit. At the present time additional outlets for floats and for textile grades would clearly be advantageous. With respect to the former, the use of asbestos as a grease-filler should be thoroughly canvassed, as this was a big potential outlet, and lubrication specialty manufacturers should be visited. It was stated that spicules may be more abrasive than magnetite. At the same time inquiries should be made regarding the use of asbestos in oil-filtration, and as a filtering medium in general. With respect to textiles, the development of substantial new uses for asbestos fibres is desirable, and the utility of asbestos cloth in the home and in industry should be considered. Further, the use of spinning fibre for electrical insulation should be studied with the object of increasing this use by reduction of magnetic iron content and other means. In connection with the carding of fibre, a study of the crudiness of the drops might be illuminating.

(3) Milling of Asbestos Fibre.

Processes for opening asbestos fibre, first as distinct from rock-milling, should be investigated for the purpose of designing an opener or openers which would completely and so efficiently fluff the fibre out, that no sharp spicules or pencils would remain in the fibre mass and yet this mass would not be damaged in any way but would emerge in the optimum condition for the intended use.

In this connection a study of fibre composition will have to be made as required, and a test or tests for measuring fibre texture is necessary. All available means, such as microscopic and mineralogical examination, physical and chemical analyses are to be employed in this study.

It was considered that, especially if an improved opening procedure can be incorporated into the mill flow sheet, probably the logical thing would be for the producers to supply fully opened fibre and make unnecessary, so far as Canadian fibre is concerned, the use of openers by the users. The practice of opening by the user not only involves the use of machines which are apparently drastic in their action, but, in cases where Canadian fibre is used in combination with Rhodesian and/or Russian, may involve the subjection of Canadian fibre to a longer period of opening treatment than is necessary.

It was observed that the ideal milling procedure, so far as opening is concerned, would be one in which, after separating the fibre from the rock, the spicules are "shaken" out and opened separately, the already-opened fibre suffering no further milling.

(4) Other Projects

With the understanding that, while first place in the research programme should be given to the projects already outlined and to matters which might logically arise from them, the following questions should be given attention as and when opportunity offers.

(a) Milling and utilization of tailings.

Outlets for tailings or products derived therefrom are desirable, and investigations towards that end should be undertaken. The possibility of developing a market should, however, be the first consideration in deciding on the scope of the work to be done. This will apply to such aspects of this problem as the wet grinding of serpentine, the recovery of free fibre, the concentration of metallic constituents (e.g. iron) and the settling of dust.

(b) Clean fibre.

A decision as to what further work should be done on the production of clean fibre depends on consideration of the question as to (a) what are the uses of asbestos for which clean fibre would be truly advantageous, and (b) what are

the uses for which clean fibre is unnecessary or even disadvantageous. (It was stated that the washing of fibre in the winter would be a costly operation.)

(c) Removal of magnetic iron.

This was considered a twofold problem; the removal of magnetic iron from various grades to improve their utility, especially in electrical insulating products, and the concentration of the magnetic iron and associated minerals into a product which may have possibilities in metallurgy.

(d) Dust settling.

Improvement in dust precipitation, over that being accomplished at present, is a worthwhile objective, but the product obtained must be marketable to offset the cost of the process to be used. The questions to be considered are: Can present methods be made more efficient? Could recovery be improved by merely damping the dust slightly and thus avoiding the use of large quantities of water and subsequent drying? Whatever changes may be made should be such as would not involve an increase in back pressure on the fans, as the cost of air is already one of the main items in milling operations.

(e) Substitute for asbestine.

It was stated that asbestine is made by grinding large flake talc, with subsequent acid treatment to improve colour. It was suggested that in considering the possibility of making a similar product, the first step should be to visit the talc producers in Southern Vermont. These producers have lately, thanks to work of the U.S. Bureau of Mines, doubled the value of their products.

(f) Corrosion due to asbestos.

Present study to be followed up.

4. Co-operation of the Quebec Asbestos Producers' Association.

The full co-operation of the members of the Q.A.P.A. will be required in order to carry out the suggested programme most speedily and efficiently. In addition, the Association is to be approached for such financial assistance as will be required in connection with the survey and the increased laboratory personnel which will be required to co-ordinate properly all aspects of the research programme.

NATIONAL RESEARCH COUNCIL

P R O C E E D I N G S

of the

Second Meeting

of the

STEERING SUBCOMMITTEE,

ASSOCIATE COMMITTEE ON ASBESTOS

Held in Montreal, April 24, 1937.

Present: Dr. G.S. Whitby, chairman
Capt. J.G. Ross
Mr. C.H. Shoemaker
Mr. D. Wolochow, secretary

1. Proceedings

The proceedings of the first meeting were approved.

2. Survey of the Asbestos Manufacturing Industry of the U.S.A.

The secretary presented a progress report on a preliminary survey of the asbestos manufacturing industry of the United States of America. See Appendix "A".

In the discussion of this report the following points were brought out:

(1) The percentage recovery of crude fibre, on the basis of rock mined has been very uniform during the past ten years or more, and with the increased tonnage of rock mined, the production of crudes has increased proportionately. The present inability of the mines to fully meet the demand is therefore due neither to lower recovery, nor to smaller production, but to the increased demand. There was no likelihood, however, that prices would go to the high levels they had reached on previous occasions due to factors which were to a certain extent beyond control. The mines would do their utmost to prevent a recurrence of such conditions.

As to the possibility of increasing the percentage of crude recovered it was stated that attempts which had already been made to do this showed that though it may be possible to increase recovery, it could not be done economically.

(2) With regard to uniformity and texture, it was considered important to determine definitely if possible, what the variable characteristics are which should be controlled and kept uniform, and what proportion of the users preferred thoroughly opened fibre.

(3) Inasmuch as the asbestos was not considered to be responsible for "bloom" formation, it was not seen how the responsibility rested on the Producers. The larger manufacturers had their own research and testing laboratories, and in collaboration with the cement manufacturers were the logical people to investigate this problem. Was there more "bloom" in some districts, than in others, due to differences in cement and/or water? It was decided to get into closer touch with the asbestos-cement industry and to ascertain whether a cooperative research project on the problem of "bloom" could be initiated. It was also recommended that the research staff should make it its business to secure as much detailed information on the manufacture of asbestos-Portland cement products and as full an understanding as possible of the problems of such manufacture. It was thought that it was likely to be desirable to install in the Laboratories some small-scale equipment for the production and testing of such materials.

As to the development of siding material, it was felt that this had already been achieved, some new factories for the sole purpose of making such materials having been recently constructed.

(4) It was requested that more information be obtained regarding the use of asbestos as a grease filler as this was considered to be an important potential use.

On the other hand, it was not though that the spraying of asbestos was important as yet, but it was suggested that this development be watched.

(5) Capt. Ross was of the opinion that some Canadian fibre was being used in filtration, but he did not think that this was an important use, as the quantities involved were small. Mr. Shoemaker felt, however, that the sale of a suitable material would be a good business because, though the tonnage was small, prices were high, and as far as he knew, the bulk of the asbestos used in filtration was imported.

(6) It was decided that a comprehensive study of the heat resistance of asbestos be undertaken, foreign fibres to be included.

In studying asbestos textiles of varying cotton content, an effort should be made to obtain yarns made from the same lot of fibre, and Mr. Shoemaker suggested that his company might be able to cooperate on this.

(7) With respect to the utilization of tailings it was thought that the most logical use would be in road construction, but practically no headway had been made so far, though several attempts had been made to induce engineers to try this material.

The chairman thought that the shorter grades of fibre should be valuable in asphalt pavement, and he pointed out that if it would ever be considered advisable to have tests made, the cooperation of the Imperial Oil Company who had recently installed a road-testing machine, might possibly be secured.

The secretary was instructed to present his report to the Quebec Asbestos Producers' Association.

3. Statistics in the Asbestos Industry

The secretary suggested that it might be advisable to make a detailed study of production and sales statistics, past and present, with a view of discovering if there have been any definite trends, and detecting new developments in the uses of asbestos.

The producer representatives though that from a practical viewpoint such a study would be of doubtful value.

4. Blasting Wire in Fibre

The secretary reported that at a recent meeting of the Q.A.P.A. it had been stated that the removal of small pieces of copper blasting wire, especially from spinning fibre, was a serious problem. Capt. Ross and Mr. Shoemaker stated that this problem had received considerable attention in the past, and the cooperation of the explosives manufacturers had been enlisted. But no solution had been found as yet, and removal of the wire was being done manually at considerable cost. Any suggestion which would result in a saving would therefore be welcome.

5. The Problem of Backfilling

This matter had also been brought up recently at a Q.A.P.A. meeting.

Capt. Ross stated that the method used in backfilling depends entirely on the system of mining, and that therefore the one could not be considered apart from the other. In the system used at the King Mine no consolidation of tailings was required, in fact it was undesirable. There was thus no urgent problem, at least not before the system of mining had been selected definitely.

The meeting adjourned at 1:30 p.m. to reconvene at 2:30 p.m.

6. Microscopic Studies of Asbestos Fibre

A large number of photomicrogaphs together with explanatory notes prepared by Mr. A. van Winsen were presented to the meeting.

The material was found very interesting and it was decided that the studies be continued.

7. Associate Committee Meeting

It was suggested that a meeting be called early in June, if the asbestos survey could be completed by that time. Dr. Whitby suggested that the meeting be held in Ottawa.

The meeting adjourned at 4 p.m.

Survey of the Asbestos Manufacturing Industry of the United States

Introduction

In accordance with the recommendation made at the ninth meeting of the Associate Committee on Asbestos, and approved by the Quebec Asbestos Producers' Association, a survey of the asbestos manufacturing industry has been undertaken. To date, about forty men, associated with the industry in various capacities, have been interviewed. In most instances, the men interviewed appeared eager to cooperate and spoke freely about their problems; a few did not seem to appreciate, at first, that the sole purpose of the interchange of ideas was to discover what problems there were in connection with the use of asbestos and thus possibly to promote the use of asbestos and its products; only one party refused to discuss any aspect of the applications for which he was using asbestos.

General conditions

As is no doubt known to all, a spirit of optimism was found to prevail in the asbestos industry. The majority of users of asbestos fibre were, in general, well pleased with the various grades of material being supplied by the Canadian mills; they felt that quality had improved and they therefore had no serious complaints to make.

Among the users of crude fibre there was some concern regarding the future availability of this grade of fibre, it being the general impression that the supply was falling behind the demand and that a serious shortage was in the offing.

Lack of Uniformity

Nevertheless, some very definite statements, relative to the present shortcomings of the various grades being produced, were made by some men in the industry. The first complaint is that milled fibre lacked uniformity in practically all grades. Not only did the standard grades vary from mill to mill, but what was more serious, in that it caused more difficulties in manufacturing processes, was the variation, from shipment to shipment, of the same grade from any one mill.

In this connection, one user, interested primarily in spinning fibre, lodged a strong protest: Spinning fibres were not properly prepared and contained too much nonspinnable material. His firm was working on some new developments which should create outlets for considerable additional tonnages of spinning fibre, but had received very little cooperation from the Producers whom

he had approached. His study, he said, which included a visit to the Canadian mines and mills, had convinced him that there was not nearly a sufficient degree of control exercised in the production of fibre, and that the industry had not devoted as much effort to research in the production and utilization of asbestos as they should have, and could profitably have done.

The lack of uniformity was in part ascribed by some, to the use of the Quebec Standard Testing Machine, which, they felt, gave only meagre information about the quality and the condition of the asbestos. Thus, in spinning fibre, it was stated that there was no definitely established relation between the Q.S. Test and the carding value of a fibre, or the yield which it would give in the textile process. The suggestion was made in one quarter that spinning fibres be evaluated by a carding test, supplemented by an opening test. Further, in short fibres, very frequently it was the pan fraction which was most important in determining the suitability of a fibre, and yet the Q.S. test gave no information about this material except its amount.

Insufficient Preparation

The second complaint is that, in general, asbestos fibre is not sufficiently free from fibre pencils, bundles or spicules, due to insufficient preparation. In the last analysis, asbestos is purchased and used, aside from other considerations, because of its fibrous nature. The fibre bundles thus should be milled, opened up or teased out, into a truly fibrous condition, before the asbestos can be utilized to the fullest advantage. This is true not only of the spinning fibres, in which perhaps the greatest variations in texture have been found, but practically of all grades. In the course of the survey cases were found in which even floats were being given additional milling in order to bring them to the optimum condition for the purpose for which they were being used. All users of asbestos may not have the same ideas as to what is the most desirable fibre or condition of fibre for the various applications, but on the whole it seems that well opened fibre, or fibre opened up as fully as possible with the minimum of disintegration, would be the answer to the asbestos products manufacturers' prayers. The producers of asbestos fibre may never be able to offer a set of standard grades, so finished that they would meet completely the requirements of all the users, but the present situation could be materially improved by the production of asbestos which is in the maximum fibrous condition, free from pencils or spicules.

The problem is mainly one of design of the proper type of machine or machines which will enable the producers to achieve this goal. The users of asbestos are very much interested in the possibilities of improvements in this direction, and a number of them enquired regarding the most suitable types of opening equipment for the particular grades of fibre which they were using and if such equipment was available. As information on this subject

could not be supplied, they were referred to the producer from whom they were purchasing their requirements.

Asbestos-Cement Products

The greatest activity was found in the asbestos-cement products industry, where new plants were being contemplated and constructed, and the capacity of some of the present plants was being increased. This expansion is of course due to the revival of the building industry, and it was the opinion of some that it was long overdue. It was claimed that the American industry had lagged behind the developments in Europe, where a much greater variety of asbestos-cement products was finding wide public acceptance. Arguing on these lines, some people foresaw a possible shortage of the grades of fibre being used in these products (presumably grades in group 4 and 5 of the standard classification). Others, on the contrary, were apprehensive lest the rapid increase in plant capacity should result in overproduction, especially in the event of a recession in building activity.

Whatever the future may bring with regard to volume of production, there was a definite technical problem with which practically all asbestos-cement shingle manufacturers were faced, due to the phenomenon of "bloom" formation. It was particularly serious in the case of colored products in which the appearance of "bloom" and the consequent staining or discoloration, was the more noticeable and unsightly. And as the trend was towards more and lighter and brighter color in those products, the problem was indeed an urgent one.

In the opinion of some of the manufacturers, it was almost the duty of the asbestos producers to assist in the solution of this problem. Information obtained through the Portland Cement Association indicated that a number of cement manufacturers were keenly interested in the asbestos-cement industry because of its considerable consumption of their product, and their cooperation could possibly be obtained. The problem should be attacked, it was suggested, in a fully cooperative manner by all the parties concerned as the complete elimination of "bloom" would benefit the entire industry. On the other hand, the production and sale of materials on which "bloom" appears, would eventually do much harm to the industry.

Turning to another aspect of this industry one manufacturer was not certain that the current popularity of asbestos-cement shingles would not wane, for it was his experience that there were modes and even fads in building materials as well as in other phases of human endeavor. These shingles, he contended, were usually sold on the argument that they do not need any protective covering to preserve their original appearance. Would time corroborate this argument, or prove it false? He knew of a number of jobs which were losing their freshness. This was due to the high water absorption and the tendency, because of surface characteristics,

to retain dust and soot. There was thus room for improvement. Further, asbestos-cement products have not been popular for siding, and if a satisfactory product for this purpose were developed, the market for asbestos would be increased considerably.

Several manufacturers complained that Canadian fibre was too dark for the lighter colored asbestos-cement products, and inquired about the possibility of overcoming this difficulty.

Asbestos Cements

It was very interesting to learn, while visiting a laboratory which tested practically all the various types of insulating materials on the market, that of the numerous samples of asbestos cements which have been submitted for test, only an occasional one contained asbestos fibre as produced by the mills. This matter was followed up, and it has been found that the addition of other materials such as clay, ground limestone and slate and factory waste, was a common practice. These materials lowered the covering capacity and the insulating value of the asbestos cement. This practice, in the opinion of some, was really an abuse as far as the asbestos industry is concerned, for it had a very repressing effect on the sale of asbestos cements. It was also stated that the Producers could put an end to this undesirable situation if they took concerted action, and the results would be very beneficial to the industry.

Asbestos Fillers

Short asbestos fibre and floats are being used in steadily increasing amounts as fillers for synthetic resins and other molding compounds. The chief property of asbestos which limits its wider use in this application is its high specific gravity as compared to organic fillers such as wood flour. Aside from this, the more common complaints against asbestos as a filler for molded articles are:

1. Gritty, causing trouble in machining and drilling.
2. Contains sticks or bundles of undivided fibre which show up on the surface of moldings.
3. Excessive magnetic material, causing defective electrical insulation.

It was stated that it was not certain that the lower electrical properties are caused by the presence of the magnetic particles, but improvement in the electrical properties is desired.

Regarding the use of asbestos as a filler in lubricating greases, the only information which seems to be available is that the fibre must be free from grit.

Sprayed Asbestos Insulation

The spraying of asbestos insulation, methods and machines for which have recently been patented by several parties, is developing slowly. While it seems to be the general opinion that Canadian fibre is not suitable for this purpose, it has also been stated that relatively long fibre works well, but is too costly.

Waste newspaper, shredded in a suitable manner, is being sprayed, but of course it is not fireproof insulation.

Very Clean Fibre

As a result of some of the conversations with men in the industry, the impression was gained that if very clean fibre, free from all non-fibrous contamination, were made available, it is very probable that a market could be developed for it. In addition to a high degree of cleanliness, the other requirements would be uniformity, thorough openness and good homogeneity.

As an example of the possible applications where such fibre could be used to advantage, there may be cited the use of asbestos as a filtering medium.

Asbestos Textiles

As the manufacture of woven brake lining accounts for such a large proportion of the asbestos textiles made, it would be valuable to know the future trend of the brake lining industry. But a safe forecast cannot be made. A suggestion was heard that if the producers are desirous of maintaining, if not increasing, the consumption of spinning fibres, they should encourage the manufacture of woven, as opposed to molded, brake lining. Just how they could do this was not made clear, but is a thought.

Canadian fibre is not considered suitable for the manufacture of asbestos textiles for electrical insulation, due to its magnetic iron content. Improvement in the electrical properties, presumably by the elimination of this impurity, is therefore desired. Because of the apparent scarcity of long fibre of good electrical properties, at least one party have expressed their readiness to undertake the processing of Canadian fibre as soon as a commercial method for removing the magnetic iron becomes available.

The Heat Resistance of Asbestos

There was found a considerable interest in what might be termed the heat resistance of asbestos. This includes the temperature of dehydration, the rate of dehydration at different temperatures and the effects of these factors on the properties of asbestos fibre and products made with asbestos. Practically all grades of fibre are involved, for interest in this subject was

found among the users of short as well as long fibre. Apparently the data available in the literature are not considered to be sufficiently comprehensive or reliable to answer definitely all the questions which have from time to time arisen in the minds of the users of asbestos. The results of a thorough investigation of the properties of asbestos as related to temperature and water content would therefore be welcomed enthusiastically by the industry.

Glass Fibre

Glass fibre was first developed commercially in Germany during the War, to take the place of asbestos, the supply of which had been cut off by blockades. It was not until about five years ago, however, that mass production methods were initiated by the Corning Glass Works and the Owens-Illinois Glass Company, who have been carrying on research on the subject jointly. Uses for the textile and insulating materials made from glass fibre are being actively investigated, and the possibility of substituting these materials for asbestos materials is being studied.

It has been stated by several people that glass fibre is still too brittle for many purposes and that the wetting properties are unsatisfactory. Because of this and the relatively high cost of glass fibre materials, it is forecast by some that glass fibre will not be able to successfully replace asbestos fibre in most applications. Nevertheless, some inroads will probably be made, and the challenge can be best met by continued improvements in the quality of asbestos fibre.

Fundamental studies of the properties and characteristics of the two materials may be also of value in this connection.

Uses of Asbestos

It is common knowledge among those in the industry, that asbestos has found its way into very many products and compositions. At the same time, the larger units of the industry maintain laboratories whose function it is, in part, to develop new products containing asbestos and to extend the use of products already being marketed, by constant improvement of quality and design. There were found a number of applications wherein asbestos was used only to a limited extent, mainly because it was considered too costly and the advantages obtained through its use did not warrant the added cost which it entails. The problem is therefore primarily economic in nature.

It is generally conceded, therefore, that to find new uses for asbestos is a difficult task, but at the same time the prevalent feeling seemed to be that the use of asbestos will grow. To expedite this growth, several suggestions have been gleaned from the various interviews:

1. Asbestos, the basic material, should be publicized by the producers acting jointly, as through the Q.A.P.A., for example.

2. Asbestos products, especially those in which asbestos is one of the major constituents, should be publicized by the producers and manufacturers, acting co-operatively. In some cases the producers of one or more of the other constituents might be willing to participate in such an effort. (e.g. Portland Cement Association, in the case of asbestos-cement shingles, etc.)

3. Maintain a technical service for the purpose of supplying reliable information to present and prospective users of asbestos, also assist in the solution of some of the manufacturers' problems. This would supplement what is already being done by some of the manufacturers relative to their own products.

4. Obtain the co-operation of some of the other industries in discovering ways in which asbestos could be made to serve these industries. This was suggested more or less as a follow-up for suggestion 1.

Utilization of By-products

Several men stated that, in their opinion, research should be concentrated on finding uses for mill tailings or by-products obtained therefrom. They considered this to be the most legitimate field for the producers to investigate, and suggested that though this may involve considerable effort, it would eventually pay good dividends.

PROGRESS REPORT

DIVISION OF Chemistry

AUTHOR: D. Wolochow

PERIOD COVERED June, 1937

INVESTIGATION: Asbestos

DATE July 6, 1937 -- Typed July 26, 1937

TOPICS: 1. Tests for Bell Asbestos Mines Ltd.
2. Asbestos for Filtration Purposes.
3. Survey of Asbestos Industry.
4. A.S.T.M. Meeting and Exhibit.

1. Tests for Bell Asbestos Mines Ltd.

Three samples of mill fibre were received from the Bell Asbestos Mines Ltd., with the request that they be wet screened and tested for dye adsorption.

The tests have been made and the results reported. The dye tests were made by Mr. van Winsen.

2. Asbestos for Filtration Purposes

The tests which were to have been made in Toronto have been postponed owing to the absence of one of the wine chemists. These tests will be made in the near future.

A visit was made to the plant of the American Leitz Filter Corporation at Paterson, N. J. where they have tried to process Canadian fibre but have so far been unsuccessful. A sample prepared here was tried in the filtration of wine and was found to work satisfactorily. Mr. Hunziker, the superintendent was away, but his assistant was very well pleased with our fibre and said that they would be very much interested in the process of preparation. He intimated that new developments promised an expansion of the use of asbestos for filtration purposes.

3. Survey of Asbestos Industry

(1) While in New York, I got in touch with Mr. Roff, of Whittaker, Clark and Daniels, who are the sales agents for Asbestos Corporation Limited. Unfortunately, Mr. Roff was just leaving for out of town and we had no time to discuss matters fully. He did say that he had one very definite problem put up to him by a customer who uses asbestos in paint and he promised to take me to interview this party next time I was in the vicinity.

(2) A visit was made to the Amtorg Trading Corporation where I interviewed Mr. Seidenbond, who is in charge of ore imports, including asbestos fibre, and Mr. Gertzenberg, vice-president. They told me that very little Russian asbestos was coming into the United States both because the home demand was increasing and because Europe was a better market for whatever fibre Russia had for sale.

They are very eager to co-operate and to exchange information with the Canadian producers as they feel that such action will be mutually advantageous.

Incidentally, the Soviet mines have very much the sameproblem as have the Canadian mines with respect to the utilization of tailings.

(3) Through a contact made at one of the A.S.T.M. meetings it was learned that the Bell Telephone Research Laboratories had been measuring the electrical conductivity (or resistance) of various fibres. I had an interview with Mr. E. J. Murphy who has been doing this work, and at his request a sample of crude fibre has been sent him for conductivity measurements.

(4) Through the kindness of Mr. Mapes, chairman of the A.S.T.M. Subcommittee on Asbestos Textiles, I was able to interview Mr. R. E. Car purchasing agent for the General Electric Company, at Schenectady, New York.

Mr. Carter said that his company was not having any difficulties with short asbestos fibre, but that it was becoming increasingly difficult to obtain asbestos roving, yarn and tape for electrical insulation, and that prices of these materials were advancing. On the other hand, the manufacturers of glass textiles have been able to improve quality and lower prices so that their products would soon compete effectively with asbestos products.

(5) I had a short chat with Dr. Sfeider of the Philip Carey Company. He told me that he had received the copy of the report on the survey of the asbestos industry which had been sent to Mr. Spafford of the Quebec Asbestos Corporation and was very much interested in the various items it covered. It seems that he received the report at a very opportune time, for he was able to use it effectively in persuading the officials of his company to take certain steps toward the improvement of some of their operating processes, as suggested in the report, especially with respect to the opening up of fibre pencils present in mill fibre.

They were finding the calcination test quite useful, but the conditions under which the open fibres were disintegrated after calcination, had to be very carefully standardized.

4. A.S.T.M. Meeting and Exhibit

The samples of crude and spinning fibre, also rock showing vein formation, gathered from the Producers were sent to New York to form part of the exhibit of Committee D-13 on Textiles. A case, illustrating the steps involved in the fabrication of asbestos brake bands, loaned by Mr. Larochelle of the Quebec Bureau of Mines, was also included. The use of asbestos textiles in electrical insulation was shown by a collection of such applications, prepared by the General Electric Compan

Several microphotographs of asbestos fibre taken in our Laboratory were also included in the display.

There was no meeting of the asbestos subcommittee and the only meetings attended were the one of the special subcommittee of the "Water Test" for cement durability, for which see separate report, the formal opening session of the annual meeting, and the round table discussion on "accuracy" and "precision".

This discussion was opened with the three following papers:

(1) Discussion Dealing with the Fundamental Aspects of the Subject, by W. A. Shewhart, Bell Telephone Laboratories, who defined "accuracy" as having to do with differences between two kinds of measurement, and "precision" as referring to reproducibility of some one kind of measurement. He emphasized that it was important to know what to expect in future tests.

(2) Discussion Relating to the Field of Chemical Analysis, by G. E. F. Lundell of the U. S. National Bureau of Standards, who stated that "accuracy" was a measure of the correctness of an analysis, and "precision" its reproducibility. The former could be established by comparing results from several procedures and by the analysis of a known mixture; the latter was a function of the sample, the method and the operator.

(3) Discussion Relating to the Field of Mechanical Testing, by H. F. Moore, of the University of Illinois, who defined "accuracy" as the closeness to truth, "precision" as reproducibility, and "sensitivity" as the amount causing a certain difference in the measurement.

Professor Ball, chairman of Com D-13 on textiles, in the discussic which followed, defined "accuracy" as agreement with absolute truth or accepted standards, and "precision" as conformance of measurements among themselves. His definition for "sensitivity" was the same as that given above.

Dr. Churchill, of the Aluminum Corporation stressed the importance of the practical aspects of all testing methods, and stated that very often the test results were much more "accurate" and "precise" than the operating processes in the plant.

J. L.

D. Wolochow

PROGRESS REPORT

DIVISION OF Chemistry

AUTHOR: D. Wolochow

PERIOD COVERED February, 1938.

INVESTIGATION: Asbestos

DATE 8 February, 1938

Typed 1 April, 1938.

TOPICS:
1. Examination of Asbestos Rock from Hole River, Manitoba
2. Processing of Fibre sent in by "Asbestile", Belgium
3. Paper on the Utilization of Asbestos
4. Q. A. P. A. Meeting

1. Asbestos Rock From Hole River, Manitoba

Several wet and dry milling tests were made on a sample of what was considered to be asbestos rock. A separate report, No. C 315-37S, has been submitted (7 February, 1938).

2. Processing of Fibre sent in by "Asbestile", Belgium

Four bags (gross weight 600 lbs.) of C & G-4 asbestos fibre were received from the above manufacturers of asbestos-portland cement products for processing to improve the colour by removing material which darkens the products made with this fibre. The same amount of Vimy fibre was to have been sent in also, but "Asbestile" stated that they had none of this fibre on hand.

Arrangements were made with the Ore Dressing Laboratory to have this fibre milled and wet screened. Milling was in a pebble mill (4' x 6') with 300 lbs. of pebbles for each bag (about 150 lbs.) of fibre and with as much water as the mill, which has open trunions, would hold. After milling for 30 minutes, the fibre was run over a Hummer screen with 60 mesh cloth, with constant spray of water. The fibre was collected in by filters, dried and put through a fiberizer to break up any lumps. Recovery of fibre was 84%. The wash water containing the minus 60 mesh material was collected in a large tank, the solid material allowed to settle and, after running off the supernatant water, was put through a filter press, dried, and then broken up in a hammer mill with quarter inch discharge.

The two products, - fibre and fines will be returned to Belgium.

3. Paper on the Utilization of Asbestos

The paper to be presented to the Canadian Institute of Mining and Metallurgy has been prepared and draft copies have been sent to all members of the Associate Committee for comments and criticisms.

A popular abstract has been written and copy sent to the Secretary of the Institute.

Copy for the President

4. Q. A. P. A. Meeting

The meeting of the Association held on 28 February, 1938, was attended.

A brief progress report, prepared by Mr. van Winsen, was read to the meeting and fully discussed. In connection with the evaluation of fibre, it was the opinion of the meeting that no further tests, such as spinning tests, be made until a sure method of testing fibre for degree of openness was available. The meeting again requested that the work on the standardization of testing technique be carried on vigorously.

The chairman of the Technical Committee said that the so-called "cake-opener" did not perform the function for which it was designed. A machine is being developed in our laboratory.

The problem of rock drying was again discussed and it was decided that the Technical Committee send out a questionnaire to each member company, and report at the next meeting.

With regard to the approval of the drawings and specifications for the Testing machine, it was reported that these would be ready for the next meeting.

The invitation which had been received from Committee D-13, A.S.T.M. to participate in the exhibit was conveyed to the meeting and it was decided that an exhibit similar to the one displayed at New York in 1937 should be sent to Washington. Four of the producers volunteered to supply 25 lbs. of crude fibre in hand specimens for distribution.

The chairman of the Q.A.P.A. (Capt. Ross) stated that there was now a definite overproduction of shorts and new uses were urgently required.

The Inspector of Mines (Mr. Larochelle) announced that the Quebec Government had established sixty bursaries each of the value of $650.00 per year, and asked that each Company endeavour to give summer employment to a number of the incumbents.

D'Larochelle
5 April 1938

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PROGRESS REPORT

DIVISION OF C H E M I S T R Y

PERIOD COVERED May 1938

AUTHOR: D. WOLOCHOW

INVESTIGATION: ASBESTOS

DATE 3 June, 1938.

Date Typed: 23 June, 1938.

TOPICS: 1. Utilization of Short Fibre.
2. Asbestos Fibre for Filtration Purposes
3. Standard Testing Procedure.
4. Q. A. P. A. Meeting.
5. Tests on Asphalt Floor Tile.
6. Visitors to the Laboratory.

1. Utilization of Short Fibre.

(a) It has been found that if the light materiel is separated from short fibre (7 R) and is then mixed with portland cement, the product obtained is considerably lighter in weight than when the whole fibre is used. Thus, with equal weights of this light fraction and portland cement, the product weighs about 40 lbs/cu.ft. and has considerable strength. Because of the low density this product should also have low thermal conductivity.

Using fibre such as has been prepared for filtration purposes, a product of very low density was obtained - 17 lbs/cu.ft., and the colour is light cream.

(b) The pressure molded specimens mentioned in the previous report, (No. C47-38, p.2, par.f) have been broken and the following figures are representative of the results obtained:

Fibre No. 646 - 1 part Portland Cement 1 part	Tensile Strength	Comp. Strength	Density
No water added	1125 lbs/sq. in.	15,375 lbs/ sq. in.	2.27 gms/cc or 142 lbs/cu.ft.
7.5% water added	1225 " " "	19,875 lbs/ sq. in.	2.40 gms/cc or 150 lbs/cu.ft.
15% water added	1340 " " "	19,000 lbs/ sq. in.	2.27 gms/cc o 142 lbs/cu.ft.

The specimens which were molded with water had a very pleasing appearance, and should be suitable for decorative building purposes.

COPY FOR THE PRESIDENT

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2. Asbestos Fibre for Filtration Purposes.

(a) Tests have been made on opening of fibre with rods in place of pebbles in a small pebble mill, also with hard rubber balls in place of the pebbles. It was found that the rods did not cut the fibre as much as pebbles do, but on the other hand the opening efficiency was somewhat lower. Further study is warranted.

The hard rubber balls did not of course damage the fibre at all, but the efficiency was very low. A metal ball with a rubber covering would perhaps give interesting results.

The possibility of using the J. M. opener for opening fibre for filtration purposes has been investigated, but the results indicated that this type of machine would not be satisfactory. Seven passes through the opener left the fibre with a large number of pencils, and did not release the magnetite to nearly the same degree as the pebble mill does.

(b) At the request of Mr. W. A. Newall a conference was attended at Toronto regarding the proposed arrangements for the production of filtration asbestos on a commercial scale. After a lengthy discussion of the various terms of the agreement, it was suggested to Mr. Newall that he write a letter to the Council, listing items on which he wished to obtain more official information, items he wished amended, deleted or added.

3. Standing Testing Procedure.

Work on the development of a standard testing procedure for the Q. S. test has been continued. In report No. C 6X-383, prepared by A. van Winsen, a tentative procedure consisting of "cake opener - press - cake opener", is suggested, but tests which have been made indicate that the problem has not been entirely solved as variations in test were still obtained.

4. Q. A. P. A. Meeting

The regular meeting of the Association, held on 23 May, 1938 at Sherbrooke, was attended.

Report No. C61-383 (see above) was presented and discussed. It was decided that the Canadian Johns-Manville Company would build a cake opener such as was designed here, and would put it at the disposal of the Technical Committee.