

MINUTES of the General Meeting of the Asbestos Textile Institute held March 10, 1955 in Philadelphia, Pa.

IN ATTENDANCE:

F. J. Waken, President
JOHNS-MANVILLE CORP.

AMERICAN ASBESTOS TEXTILE CORP.
A. J. Scanlan

ASBESTOS CORPORATION LTD.
Paul LeClere

BELL ASBESTOS MINES
F. Parker Smith

CAPE ASBESTOS COMPANY LTD.
R. Z. Cryor

CASTLAR ASBESTOS CORP.
T. T. Tigert

JOHNS-MANVILLE CORP.
L. R. Hoff
K. Q. Beyard
L. Beale
W. G. Hoffer
E. A. Schuman
H. M. Jackson

KEASBEY & MATTISON CO.
A. E. Whitfield
C. R. Frederick

RAYBESTOS-MANHATTAN, INC.
J. A. Brown
J. A. Bettes
M. W. Oliver
R. B. Smith
G. W. Marshall, Jr.

SOUTHERN ASBESTOS COMPANY
J. D. Beatty
O. C. Fehrens
J. D. McCluer
O. S. Fabel
O. J. Harris
J. T. Griffis

UNION ASBESTOS & RUBBER CO.
W. H. Fehrs

CADWALADER, WICKERSHAM & TAFT
H. I. Ruddock

ASBESTOS TEXTILE INSTITUTE
H. C. Shaw

1. The meeting was called to order by President F. J. Waken and an address of welcome extended to all those in attendance. Following the opening remarks each member introduced himself and identified his company affiliation.

2. As the first order of business, President Waken called for a reading of the Minutes of the last meeting. However, since all members had received copies of these transactions and were familiar with them, it was moved by Mr. Bettes, seconded by Mr. Fabel and unanimously agreed that the reading at this time be dispensed with.

3. The Treasurer's Report was presented by the Assistant Treasurer, in the absence of Treasurer Scheopf. Following a discussion of this report, it was moved by Mr. Fabel, seconded by Mr. Bettes and unanimously agreed that the report be approved. Copy attached.

4. The Secretary's report was presented and a copy of these remarks are attached as a part of these minutes.

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5. President [redacted] next called upon legal counsel, M. I. Raddock, for his report covering legal points of interest which may be currently important. Mr. Raddock reported on several bills pending in Congress which affected trade and business, particularly Senate Bill 11 which would amend the Robinson Patman Act. He also discussed Export Control of Technical Data and Current Export Bulletin No. 741 of the Department of Commerce.

6. The next segment of the meeting was devoted to the reports by the chairmen of the several active committees of the Institute.

The first report was presented by Mr. H. M. Jackson, Chairman of the Air Hygiene Committee and a copy of this report is attached as a part of the minutes of this meeting. This committee is currently engaged in reviewing contemplated studies to be undertaken by professional authorities covering problems related to the role asbestos may play in promoting diseases of the heart and lungs. Further considerations in these regards are to be held before any recommendations can be presented to the Institute for action. Also, being reviewed by this committee are the measures which can and are being taken in the various asbestos mills to control air contamination by asbestos dust and fine particles.

The second report was presented by Mr. J. D. McCluer, Chairman of the Technical Committee and a copy of this report and the Minutes of the Technical Committee meeting are attached as a part of the minutes of this meeting. The work of this committee covers a wide range of subjects and definite progress on all of these subjects was reported. The standard cloth list tensile strengths were revised at this meeting and efforts to develop standard lists for tape and braid constructions shows progress. Many other fields of interest are covered in the report as submitted by Mr. McCluer.

The third committee report was presented by Mr. A. E. Whitfield, Chairman of the Sales Promotion Committee and a copy of this report is attached as a part of the Minutes of this meeting. Included among the discussions pursued were those related to the promotion of activities in the proscenium curtain field, the evaluation of properties of asbestos textiles manufactured by others than members of the Institute and the desirability of directing efforts to have asbestos textiles tested by the Atomic Energy Commission or some other agency under conditions of atomic bomb tests which are currently under way.

As a part of the report for this committee, J. A. Bettes, introduced the new Raybestos-Manhattan, Inc., Bulletin T-55, titled "R/M Products for Reinforced Plastic Laminates", and discussed some of the materials therein presented.

The fourth report was presented by Dr. H. C. Shaw and covered the Fellowship activities during the past quarter. The full report is attached as a part of the minutes of this meeting and covers the following subjects. 1) The Influence of Wet Weaving vs Dry Weaving upon the Properties of Asbestos Textiles, 2) Metallic Cloth Studies, 3) A Progress Report on the Significance of Total Iron Content vs Magnetic Iron Content in Chrysotile Asbestos, and 4) Elevated Temperature Service Guide.

The fellow also appraised the members concerning action taken by the Board of Governors in session on March 9th, regarding a new policy regarding

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MINUTES OF THE AIR HYGIENE COMMITTEE MEETING

IN ATTENDANCE WERE: J. W. Weber
R. B. Smith
J. D. Beatty
D. R. Holmes
H. M. Jackson

1. The research proposal received from Saranac Laboratory pertaining to the relationship of pulmonary cancer to asbestosis was reviewed in detail.

There is increasing publicity both in the professional and popular literature concerning the relationship of asbestosis to cancer. Several articles tying the two together were cited by the committee. For example, in the Consumers' Reports, a popular publication of national distribution, one of the member companies reported that they currently have a workmen's compensation case claiming that pulmonary cancer was caused by exposure to asbestosis.

It is obvious from the Saranac proposal that research into this field is exceedingly complex; that the techniques are difficult; and that a considerable length of time and a large number of experimental animals are required. The Saranac proposal covered a three year period.

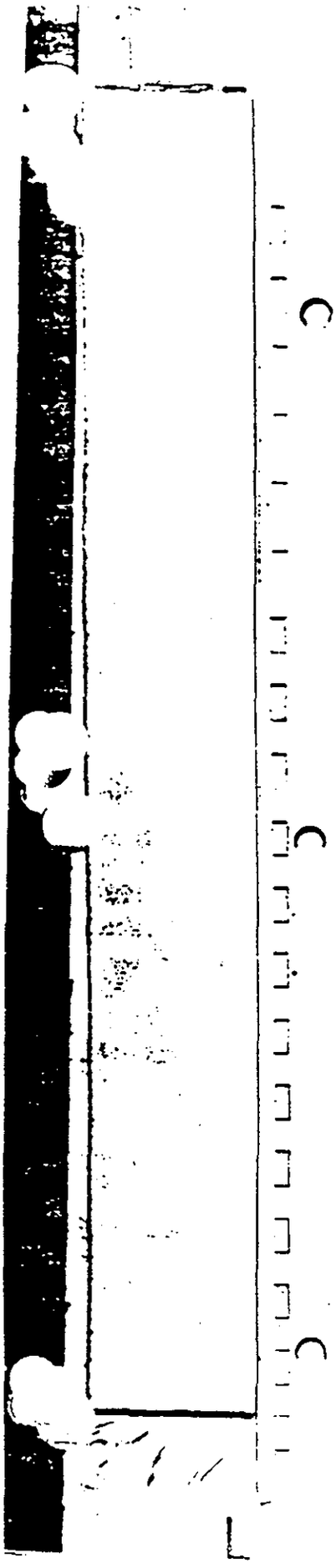
It was the consensus of the committee that an additional proposal be obtained from another research agency and reviewed before making a definite recommendation to the Board of Governors. It was also suggested that when our thinking became crystallized, other asbestos industries, such as the asbestos cement, the insulation and asphalt tile groups, be approached to cooperate in the financing of the research

2. It was recalled that in Dr. Schepers' visit to the committee, mention had been made of the carcinogenic properties of certain oils and lubricating products that might be involved in the fibre conditioners. Recommendation was made that further information concerning this potential hazard be obtained and forwarded to each committee member. Toxicological information pertinent to other materials commonly used in member plants (solvents, degreasers, etc.) would also be obtained and disseminated.

3. The Committee reviewed the practices and methods of maintenance and operation of dust control systems. Since the standard dust survey methods are lengthy and costly procedures, it was the consensus that assurance of the effective operation of a ventilation control system could be obtained through frequent and regular checks of air flow and pressures.

It was recommended that an initial relationship between satisfactory dust counts and operating pressures of the system be established. Subsequent

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checks of the system with the manometer would indicate whether the system was operating as designed. Such a test procedure is both simple and rapid.

The techniques of systematic inspection were reviewed and it was unanimously agreed that regularly scheduled, periodic inspection was an essential element in maintaining the efficiency of the system. A corollary of this was the preventive maintenance approach to bag, hood and pipe replacement.

4. John Beatty reported an effective design of dust control at the locas. Drawings and pictures will be distributed when received.

H. M. Jackson
Chairman
Air Hygiene Committee

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X EV

CONFIDENTIAL

PROPOSAL

EXPERIMENTAL INVESTIGATION

OF THE

POTENTIAL CARCINOGENICITY OF ASBESTOS FIBERS

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to

Air Hygiene Committee
Asbestos Textile Institute
Philadelphia, Pa.

by

The Saranac Laboratory
7 Church Street
Saranac Lake, New York

Submitted by:

G W.H. Schepers, M.D., D.Sc.
Director and Executive Vice-President
The Saranac Laboratory

February 15, 1955

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The Saranac Laboratory
Air Hygiene Committee
Asbestos Textile Institute
Proposal - 2/15/55

I. INTRODUCTION

The growing lung cancer problem is today a matter of common knowledge. Though some have ventured to blame cigarette smoking, there is strong support for the theory that the diversity of environmental hazards attendant on civilized activities constitute a composite co-carcinogenic factor. Chief among these agents are the noxious dusts of various kinds to which industrial workers all over the world are constantly being exposed. Some of these dusts are known to be and others suspected of being carcinogenic. Asbestos dust is a typical example of a material suspected of having carcinogenic properties and, in view of the large numbers of individuals concerned with processing asbestos products, deserves investigation. Several authors already have unhesitatingly incriminated asbestos. The strongest claims concerning the carcinogenicity of asbestos are based on official British governmental statistics. However, in at least certain geographic localities, particularly in Canada where some of the world's largest asbestos mines are to be found, reliable observers have failed to demonstrate a comparable menacing increase in the lung cancer rate among industrial workers exposed to asbestos dust, though lung cancer does occur here also. Perhaps these differences can be accounted for by the fact that in England the main asbestos product handled is African crocidolite and amosite, whereas in Canada chrysotile is more extensively produced. Crocidolite and amosite are, however, also used extensively in various textile and industrial processes in the United States.

While asbestos is thus suspected of contributing to the growing quota of lung cancers, it is by no means yet known in what way asbestos may be instrumental as a carcinogen. It may also be that some or other substance, occurring naturally in association with asbestos, is the real cause, thereby accounting for geographic differences in cancer incidence.

A study has already been carried out at The Saranac Laboratory by means of which it was proved that the inhalation of Canadian chrysotile dust produced significantly increased occurrence of neoplasms in mice with a high spontaneous pulmonary tumor propensity (strain C) whereas the same chrysotile had no such influence on mice with a low natural tumor incidence (strain C 57). However, such experiments with mice can serve as a mere pilot study only and as these mice are tumor-prone, it must be clear that the asbestos has not yet been shown to be a specific carcinogen. The chrysotile in these experiments acted as a non-specific co-carcinogen. It is obviously important also to conduct further experiments of the same kind to probe the possibility that other specific varieties of asbestos, particularly the very much suspected African crocidolite and amosite, will have an enhanced influence on the rate of lung tumor production in these mice. Support is sought herewith for such a study.

Exhaustive studies by The Saranac Laboratory have led to the elaboration of techniques whereby lung cancer can be successfully induced in rats by causing them to inhale beryllium sulphate dust. The Laboratory has extended this study to explore the problem of co-carcinogenicity by exposing rats, which have been caused to breathe beryllium sulphate dust for a

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period of 6 months, to other industrial substances (i.e., iron and quartz). Variations in the anticipated response of the rats to beryllium under these circumstances may serve as an index of the co- or anti-carcinogenicity of the substance under test. Support is now sought for the application of this method to the potential activity o. asbestos dust.

II. PLAN OF PROPOSED EXPERIMENTS

It is proposed to study this problem in four phases over a three-year period as follows:

A. An investigation of the potential co-carcinogenicity of asbestos dust in tumor susceptible mice (strain C)

In this proposed study each of three groups of 75 strain C mice (male and female represented in equal proportions) will be exposed by inhalation to crocidolite, amosite and chrysotile asbestos dust for periods up to 18 months, half in each group to short fiber and the other half to long fiber asbestos. A fourth group of 75 strain C mice will serve as a control.

At regular intervals sample batches of animals from each group, sufficiently large to have statistical significance, will be sacrificed and a histological search will be made for evidence of asbestos reaction and tumors in the lungs and other organs.

B. An investigation of the potential co-carcinogenicity of asbestos dust in beryllium-prepared rats

In conducting this study 400 rats (half of them male and the other half female) will first be rendered lung cancer susceptible by exposing them for 6 months to a beryllium sulphate aerosol for 8 hours per day, 5 days per week. Previous Saranac Laboratory experiments have shown that an exposure of this kind constitutes a stimulus sufficient to cause single or several adenocarcinomata to develop in the lungs at periods ranging from 5 to 10 months after the cessation of the beryllium exposure. About 14 to 15 months from the commencement of exposure there is a sudden peak production of neoplasmata which is uninfluenced by the duration of exposure to the beryllium beyond 6 months. These tumors are true cancers of a type which do not occur naturally in rats and it has proved possible to transplant them satisfactorily to other rats of the same species.

After a rest period of one week, during which excessive beryllium is allowed to be excreted, one-seventh of the surviving rats will be transferred to residence in normal air. It must be mentioned that, as found in previous experiments, a variable proportion of unduly susceptible rats (usually about 10 to 15 per cent) may be expected to succumb to acute beryllium intoxication during the initial phases of the experiment and certain others may be eliminated from time to time through causes beyond the immediate scope of laboratory control. It is hoped that 350 will survive the preparation.

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As mentioned in the preceding paragraph, one-seventh of the surviving rats will be transferred to normal air where they will be allowed to remain for a period of two years as a control. The remaining six-sevenths of the surviving rats will be divided into 6 equal groups and transferred to 6 separate chambers where they will be exposed respectively to long-fiber and to short-fiber of each of three dusts: chrysotile, crocidolite and amosite. At regular monthly intervals the rats will be subjected to x-ray examination. At the same time statistically significant batches, including all those showing x-ray indications of lung tumors, will be sacrificed and subjected to histological study for neoplasm and asbestos reaction, biochemical analysis for beryllium in various organs and quantitative chemical recovery of the asbestos. The statistical results of this proposed study will be compared with data already accumulated in The Saranac Laboratory and may be anticipated to assist materially in elucidating the question of the relative carcinogenicity of different types of asbestos fibers.

C. An investigation of the carcinogenic influence of beryllium sulphate dust on rats and guinea pigs previously exposed to asbestos fibers by injection

Previous experiments by The Saranac Laboratory have shown that a characteristic lesion may be induced in guinea pigs through the intratracheal injection of measured doses of long-fiber asbestos dust. This reaction led inter alia to a marked bronchiectasis with papilloma production and some adenomatosis of the bronchi and bronchioles. No malignant neoplasia was induced. The study was however interrupted too soon to be conclusive.

It is now proposed to introduce long-fiber crocidolite, amosite and chrysotile, respectively, into each of 3 separate batches of 50 guinea pigs and 50 rats. After a period of 6 months it is planned to place half of each surviving batch of guinea pigs and rats into the beryllium sulphate chambers for 6 months while leaving the other half in fresh air. At the end of 6 months the animals in the beryllium chambers will be transferred to fresh air.

Cancer has not been previously induced in the guinea pig by means of beryllium but asbestosis has been provoked in that species. It is hoped by these sets of experiments to show whether the asbestos fibers have any influence whatsoever on the rate of cancer production.

D. An experimental investigation of the co-carcinogenic influence of asbestos fibers and beryllium sulphate on monkeys

All previous research on asbestos fibers has been conducted on animals several orders removed from man in the phylogenetic scale. It has been tacitly assumed that the effects produced on these animals may be safely extrapolated to man. It is obviously most important to probe this theory by the study of the effects of these substances on members of the primate family.

The Saranac Laboratory has recently started such a program of study using the Macacus rhesus monkey as the experimental subject. It is now proposed to expose at least 30 such monkeys in pairs to the combined

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effects of the three different types of asbestos fibers and to beryllium salts, varying the order of exposure and also the time of exposure, either to the beryllium dust or to the asbestos dust. Even if no results are achievable with respect to carcinogenesis, it is believed that such an experiment will materially elucidate the problem of human asbestosis.

III. COMMENT

Facilities available

(1) Four specially constructed dust chambers for the automatic safe exposure of animals to beryllium, a material which is particularly dangerous.
(2) Twelve other chambers for exposing animals to constant aerosols or mineral substances for prolonged periods.
(3) An engineering division to control accurately the levels of dust exposure, design new equipment, control hazards, and identify and quantitate inorganic substances by chemical, petrographic and x-ray diffraction methods.
(4) A pathological division for the histological study of animal organs.
(5) A radiological unit for serial examination of animals.
(6) A biochemistry department specially experienced and fully equipped for the study of beryllium problems.
(7) The archives of the laboratory house the experimental records, tissue slides and preparations and represent seventy years of continuous research on tuberculosis, industrial disease, and lung cancer. In addition, there is a specialized library.

Beryllium chambers

The conduct of a dusting experiment with beryllium compounds is a hazardous procedure because of the high degree of selective toxicity of beryllium for man. The Saranac Laboratory experience in coping with this problem extends over the past 10 years and specially-designed dusting chambers and techniques and well-trained technicians are available to prevent any serious hazard arising. To cope with the large number of animals which will have to be exposed in a composite experiment of this type in order to obtain statistically significant results, an additional dusting unit will have to be constructed, as the existing 4 chambers are designed to house 440 rats only. If, therefore, this proposal is accepted by the Committee it will be appreciated if the funds for constructing such a unit can be made available approximately 3 to 4 months before the anticipated commencement of the experiment.

Macroradiography

For the proper control of an investigation of this kind it is essential to control the development of lung tumors by serial radiography of the animals under exposure. The existing x-ray apparatus available for

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the study is of the conventional type. It will have to be adapted to render possible primary image enlargement up to nine diameters. The radiographic accessories needed for this purpose are available.

IV. DISCUSSION

The primary purpose of this proposed experiment is to probe the very vexed question of the relationship of asbestos dust inhalation to the increasing discovery of lung cancer in man. Should a significant statistical result be obtained from this study on mice, guinea pigs and rats, combined with the results of previous animal studies on asbestos conducted by The Saranac Laboratory, new evidence either for or against the alleged role of asbestos in causing human lung cancer would be produced. No comparable investigation on industrial co-carcinogenesis has previously been attempted anywhere else. The beryllium method, moreover, provides a unique and reliable tool by means of which to study carcinogenesis. Its chief advantage over all other known carcinogens is that the beryllium itself apparently undergoes no change in the animal tissue and can therefore be relied on to produce a constant calculable effect.

Asbestos is used extensively all over the civilized world. Not only are the miners exposed to it, but so also are the thousands of industrial workers, many of whom are in the upper skill brackets, who are concerned with textile, ceramic, constructional, brakeshoe, paper, transite pipe, etc., industries. Even certain cigarette filters are made from asbestos to shield off alleged carcinogens in tobacco tars!

Should it be proven that asbestos can provoke lung cancer, the efforts of industrial hygiene engineers will have to be intensified to ensure ever lower dust levels than are currently considered compatible with the absence of risk of asbestosis. Physicians will have to study their asbestos-exposed patients with greater circumspection and be on guard against neoplasm for longer periods after cessation of the exposure than is currently the practice. Much medico-legal interest also devolves on this issue.

On the other hand, should the contrary finding be obtained, the experimental results will furnish a degree of reassurance to executives and employees in the asbestos industry.

Should asbestos be proven to be a decisive carcinogen or co-carcinogen, this would provide a further avenue by means of which the general problem of cancer can be studied, either with an eye to human prophylaxis or therapy or in an effort to elucidate the histochemical and biological basis of carcinogenesis. Unlike many other noxious agents the asbestos fiber can usually be relied on not to migrate any great distance from its site of implantation and thus can serve as an excellent instrument for focalizing the disease process. Moreover, a great deal is already known concerning the physical and chemical properties of the asbestos fiber and if the fiber proves carcinogenic the search for specific causes of cancer may be narrowed down considerably.

In addition to the study of cancer the proposed investigation will be able to shed new light on the pathogenesis of asbestosis, about which many problems remain unsolved.

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V. BUDGETARY REQUIREMENTS

A. Personnel Requirements for the Proposed Investigation

PERSONNEL		SALARIES			
Names	Functions	$-Hourly	1st Yr.	2nd Yr.	3rd Yr
G.W.H. Schepers, M.D., D.Sc.	Principal Investigator	-	-	-	-
L. Klinn	Executive Secretary	-	-	-	-
P. Pratt, M.D.	Pathologist	4.00	1200.	1200.	1600.
O. Dobrogorski, M.D.	Assistant Pathologist	4.00	1200.	1200.	1600.
T. Durkan, M.E.	Chief Chemist	4.00	400.	800.	800.
M. Roberts, M.E., M.S.	Engineer	4.00	400.	400.	-
L. Scheel, Ph.D.	Biochemist	4.00	400.	800.	800.
S. Kaszer, M.E., E.E.	Biostatistician	3.00	300.	600.	600.
A. Delahant	Research Associate	3.00	900.	900.	600.
A. Redlin	Assistant Chemist	2.50	500.	500.	500.
D. Bailey	Petrographer	2.50	500.	500.	-
F. Creedon	Histologist	2.50	500.	500.	1000.
T. Rooney	Radiographer	2.50	500.	500.	1000.
E. Cockeler	Photographer	2.50	500.	500.	500.
R. Clark	Pathology Technician	2.00	600.	600.	600.
H. Moody	Mechanic, Technician	2.00	600.	200.	-
E. Fear	Histology Technician	2.00	600.	600.	800.
W. Gay	Histology Technician	2.00	600.	600.	800.
K. Philipp	Biochemistry Technicica	2.00	600.	1200.	1200.
O. Boula	Animal Caretaker	2.00	400.	200.	200.
R. Whitelaw	Animal Caretaker	2.00	400.	200.	200.
M. MacIntyre	Typist	2.00	200.	200.	200.

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V. BUDGETARY REQUIREMENTS (cont'd.)

B. Material Requirements for the Proposed Investigation

Animals	First Year	Second Year	Third Year
30 monkeys at $40 each	$ 1200.	-	-
300 mice (strain C) at $2 each	600.	-	-
550 rats (Sherman strain) at $2 each	1100.	-	-
150 guinea pigs at $2 each	300.	-	-
Maintenance 5,500 mouse months at $1/3 per animal month	600.	600.	600.
10,000 rat months at $1 per animal month	4000.	3000.	3000.
3,000 guinea pig months at $1 per animal month	1000.	1000.	1000.
1,000 monkey months at $10 per animal month	4000.	3000.	3000.
Dust Chambers			
One new chamber to increase total available from 4 to 5	1000.	-	-
Beryllium disseminator for use with above	200.	-	-
Replacements and readjustments	-	50.	50.
Maintenance of 5 beryllium units at $500 per year	500.	500.	500.
" " 5 asbestos chambers at " " "	500.	500.	500.
Supplies			
General supplies	150.	50.	50.
Glassware	50.	25.	25.
Pulverized asbestos	50.	-	-
Beryllium sulphate - 50 lbs. at $15 per lb.	250.	250.	250.
Radiographic supplies	200.	300.	300.
Histological "	200.	200.	200.
Photographic "	100.	150.	150.
Dust counts "	75.	75.	50.
Equipment			
Radiographic accessories to adapt a human unit for the serial macroradiographic study of small animals (estimated)	1000.	-	-
Petrographic microscope accessories	100.	100.	100.
Microphotographic accessories and replacements	-	100.	100.
Miscellaneous lesser items	100.	100.	100.

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V. BUDGETARY REQUIREMENTS (cont'd.)

C. Summary of Budgetary Requirements

	First Year	Second Year	Third Year	Total
Professional Assistants	$ 4,800.	5,900.	6,000.	16,700.
Technical	6,500.	6,300.	7,000.	19,800.
Animals	12,800.	7,600.	7,600.	28,000.
Dust chambers	2,200.	1,050.	1,050.	4,300.
Supplies	1,075.	1,050.	1,025.	3,150.
Equipment	1,200.	300.	300.	1,800.
Travel	300.	300.	300.	900.
Social Security & Retirement	1,130.	1,220.	1,300.	3,650.
Contingent	500.	500.	500.	1,500.
Sub Total	$ 30,505.	24,220.	25,075.	79,800.
Institutional Overhead - 25%	7,626.	6,055.	6,269.	19,950.
Grand Total	$ 38,131.	30,275.	31,344.	99,750.

D. Financial Support of the Project by the Saranac Laboratory

The Saranac Laboratory will be able to contribute $4,000 per annum from its available research funds during the first year of this study and hopes to continue to make such financial support available during the succeeding years. Please note also that the salaries of the principal investigator and the executive secretary will not be derived from these funds. The total support requested from the Air Hygiene Committee of the Asbestos Textile Institute, therefore, amounts to:

$ 24,131. in the first year
16,275. in the second year
17,344. in the third year

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