FILE NAME: Lone Star Industries (LS)

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EXHIBIT A-5

A REGULAR MEETING OF THE BOARD OF DIRECTORS OF JOHNS-MANVILLE CORPORATION was held in the offices of the Corporation on the 4th floor at No. 22 East 40th Street, New York City, on Wednesday, the 15th day of April, 1970, at 9:00 in the forenoon.

The following Directors were present, constituting a quorum:

C. B. Burnett
George C. Dillon
Robert L. Geddes
Joseph A. Grazier
K. V. Lindell
George P. MacNichol, Jr.
F. H. May, Jr.
William F. May
George B. Munroe
John P. Schroeder
A. C. Smith
William C. Stolk

C. B. Burnett, President of the Corporation, acted as Chairman of the meeting and presided thereat and Herbert Morton Ball, Secretary of the Corporation, acted as Secretary of the meeting and kept the minutes thereof.

A notice of the meeting and affidavit of mailing the same to all the Directors of the Corporation were presented to the meeting and, on motion, duly made, seconded, and unanimously carried, were ordered filed with the minutes of the meeting.

The members of the Board of Directors had been furnished in advance of the meeting with most of the material which would be of value in aiding their consideration of the matters appearing in the agenda book.

The Chairman of the meeting advised that at the Annual Meeting of Stockholders held on March 12, 1970, all nominees designated in the Proxy Statement were elected Directors, to serve until the next Annual Meeting. Out of a total of 16,531,325 shares of the Common Stock of the Corporation issued and outstanding on January 26, 1970, 14,038,274 shares (85%) were voted in favor of the slate of Directors and no shares were voted against. The vote ratifying the appointment of Lybrand, Ross Bros. & Montgomery as Auditors for the year 1970 was 13,997,543 shares in favor and 53,987 shares against. The resolution proposed by Mr. Gilbert requesting the Directors to provide for the election of Directors by cumulative voting was defeated by a vote of 12,822,221 shares against the resolution and 284,465 shares in favor of the resolution. Since Mr. Gilbert's resolution received only 2.2% of the total vote cast, the present Proxy Rules prevent his submitting the same or a similar resolution for three years.

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In his Monthly Report, the President informed the meeting that the Celite Division proposed a general overhaul of the #4 production system of the Lompoc powder mills. The production systems were used to calcine crude diatomite and to separate the calcined diatomite into various grades as determined by particle dimension. The output of the system was then sold as filter aids or fillers, as had been described to members of the Board in December, 1969. The Board had been informed in April of 1969, when funds were authorized for the overhaul of production system #3, that major overhauls of all systems were necessary from time to time to maintain production. Kiln shell corrosion and kiln lining deterioration occurred when a system was operated, and the kilns must be given major repairs when the corrosion and lining deterioration approach the point of failure. During the 1930's and '40's, major overhauls of the production systems were performed at three-year intervals, except during World War II when production demands made overhaul impossible. No. 4 system was installed in 1926 and overhauled in 1935, 1941, 1947 and 1950.

As the Board was informed in April, 1968, studies were begun at Lompoc in 1953 to see if, with changes in kiln shell and refractories, ways could be found to lengthen kiln service life. The Division was successful in extending the period between major overhauls. Since 1950, #4 system had been overhauled once - in 1960. Overhauls for the #3, #5 and #6 systems had followed a similar pattern since 1953. Intervals between overhauls now ranged from 8 to 14 years. The Division had established a reserve fund for overhauls to which $13,100 was added monthly from current earnings. This rate of accumulation had provided and would provide funds for the overhauls now scheduled which include #3 system (begun 4th quarter 1969 and now under way), #4 system (4th quarter 1970), and #5 system (4th quarter 1971). No. 6 system, installed in 1952 and partially overhauled in 1955, was not expected to require major overhaul until 1975, and #7 system, which came on-stream in 1969, would not be overhauled for at least 10 years. The Celite filter aid and filler business was a profitable one, and it was desirable to continue the operations of the powder mill production systems. The officers of Johns-Manville Products Corporation proposed to overhaul #4 system at a cost of $180,000.

After discussion, it was the consensus that the proposed expenditure of approximately $180,000 by Johns-Manville Products Corporation was justified and it was recommended that the officers of the subsidiary proceed in accordance with their plans.

The President, in his Report, informed the meeting that Johns-Manville currently owned 15% of Fibras Aislantes S.A. (FASA), and had an option to purchase an additional 50% of the company at a price of $90,000. FASA was a Venezuelan company with offices in Caracas. It operated a fiber glass plant in the town of La Victoria, about 60 miles west of Caracas. Under a technical assistance agreement signed in 1964, Johns-Manville received a 15% stock interest

in exchange for fiber glass know-how. In addition, since 1968, the starting date of commercial production, J-M had been credited with a 5% royalty. The J-M royalty account with FASA now amounted to $80,000. The production facility in La Victoria was financed almost entirely by the Venezuelan Development Corporation, which leased to FASA under an 8-year agreement. Because of mismanagement by representatives of major stockholders, FASA's financial situation deteriorated steadily through 1968. By 1969, the company had depleted its capital and was facing imminent bankruptcy.

In February, 1969, the International Division assumed management of FASA when the majority stockholders agreed to transfer to J-M 50% of the total shares, assuring to J-M 65% of the voting control, and to grant to J-M the option, to be exercised within two years, to purchase the transferred 50% interest at a price of $90,000 or to return the stock to its owners. Johns-Manville, upon assumption of control and designation of new management, guaranteed a $112,000 Chase Manhattan Bank loan to FASA. This was used to pay some of the badly overdue lease installments. The leasing company agreed to wait for its balance due, as did several major suppliers. FASA losses were stopped within two months. At the end of the fiscal year, operating results were at a break-even point as audited by Coopers, Lybrand & Co. FASA's net worth rose from negative $83,000 in February, 1969, to $57,000 at fiscal year end (September, 1969). For the current fiscal year, first five months' sales (10/1/69 to 2/28/70) were $332,000. Net earnings were $49,000. Earnings for the full fiscal year were expected to exceed $100,000.

The International Division proposed to exercise the option for purchase of 50% of the shares at $90,000. In addition, the Division proposed to attempt to buy the remaining 35% of the shares outstanding for up to $120,000. Total additional investment to expand equity would be $210,000. The International Division further proposed to expand the productive capacity of FASA at La Victoria, by the installation of curing equipment to produce SPANACOUSTIC (fiber glass acoustical ceiling panels) and MICRO-AIRE Duct Board, at a cost of $300,000.

Earnings were estimated at $100,000 per year without plant expansion. Earnings added by new facilities would be $100,000. Total annual earnings would thus be $200,000. In addition, J-M would receive royalties at a rate of $40,000 per year after taxes. DCF yield would exceed 20%.

The total proposed investment is $510,000, of which $210,000 is for acquisition of full ownership and $300,000 for the expansion of production facilities.

After discussion, the proposals as presented to the meeting were unanimously approved.

The Board suggested that where possible long range plans should be adopted to secure local capital up to a one-third interest

in any South American project. The Board also suggested that this policy be utilized in any Argentine manufacturing expenditure.

At the request of the Chairman, A. C. Smith, Vice President for Corporate Growth and Development, presented to the Board a status report on the Allan-Deane Corporation. Mr. Smith informed the Board that as approved by the Executive Committee at its meeting of September 17, 1969 and ratified by the Board of Directors on October 15, 1969, the Allan-Deane Corporation (a wholly-owned subsidiary) had acquired title to 1,360 acres of land in Somerset County, New Jersey. Five million dollars was approved, and up to and including April 4, 1970, $5,003,308.37 had been expended for property, commissions, closing expenses, mortgage cancellations, transfer fees, recording fees, legal fees, title insurance, interest, taxes, surveying and mortgages. The balance owed on mortgages was $132,994.50.

The funds required to operate during 1970, from April 2 through December 31, totaled $245,845. This included $75,000 for the planning and land use survey; $95,000 for the 1970 and 1971 taxes; mortgage payments of $14,767; legal fees of $25,000; and a miscellaneous contingency to cover unexpected expenses which might occur. $8,250 in rents and leases on the property would be collected.

Robert Catlin and Associates had been employed as the master planner, who in turn had employed Larry Smith and Company, Inc. to prepare the land use survey. These men were employed because it was believed that their employment enhanced the possibility of obtaining zoning changes. Catlin was the present Planning Adviser of the Bernards Township planning board. He would sever his official relationship with the Township to avoid a conflict of interest. Catlin and Smith estimated that there was a 50% chance of obtaining the desired zoning changes. One year ago their prediction would have been a 0-to-10% chance of a change.

The present timetable for action on the planning would result in a final answer on proposed zoning changes in November of 1970. It was the opinion of these men that a zoning change as anticipated would immediately increase the value of the property to more than 10 millions dollars, with no further development or expenditure.

An interesting offer had been received for 100 acres of the Allan-Deane land near Pluckemin. The land would be used by the prospective buyer for an office complex. The planner had assured that a change to permit such use would have nearly a 100% chance of approval. This offer was being followed but the outcome could not be predicted.

Since 1967 land in this area had sold for as little as $3,000 per acre and as much as $22,500 per acre, in plots ranging in size from 3 acres to 100 acres. One-acre house lots had been

sold for a minimum of $14,000 and a maximum of $20,000 per acre. The 1,360 acres purchased by Allan-Deane ranged in price from $2,500 to $6,000 per acre for the various plots. Land now was being offered in the immediate vicinity of the property for a low of $2,700 an acre and a known high price of $19,500 per acre. The land for which the tentative offer had been made was purchased by the Allan-Deane Corporation for $6,000 per acre.

Mid-America Appraisal and Research Corporation (MARC) had been employed to appraise Mr. Robert Trent Jones's Ipswich development, which included town houses, homes, and a golf course; and to appraise Allan-Deane's Somerset County property, to determine relative values of these properties. This would aid negotiations with Mr. Jones so that full value for the 10% purchase of Allan-Deane stock by Mr. Jones could be received. This appriasal was promised for completion on May 9.

Attached to the report as presented by Mr. Smith was a summary of the expenditures and an estimate of the funds required during 1970, April 2 - December 31. A map was also presented by Mr. Smith showing the location of the 100 acres for which a tentative offer was made.

The Chairman reminded the meeting that at the Board meeting on January 15, 1969 a report had been presented giving the status of the asbestos/health situation. The fourth such report to the Board was sent to the members in advance of the meeting. The Chairman pointed out to the Board that the Threshold Limit Value, or standard of allowable dust in asbestos mining, milling and manufacturing operations in the United States, was revised in 1968 from 5 million particles per cubic foot of air to 2 million particles per cubic foot, or 12 fibers (over 5 microns in lenght) per cubic centimeter. He stated that it appeared highly likely that the standard would be reduced even further in 1970 to 5 fibers per cubic centimeter. Dr. Irving Selikoff was recommending 2 fibers per cubic centimeter. There was also the possibility that the definition of what is a fiber would be redefined which would make compliance more difficult. He also noted that all asbestos fiber bags shipped in the United States and Canada now carried a caution label urging careful handling of the fiber to avoid unnecessary exposure to asbestos dust. The addition of caution labels to overseas shipments had aroused customer opposition and had not been accomplished so far.

He also noted for the Board that J-M was presently defending a number of law suits relating to asbestos/health. In addition to the potential cost, any one of these suits might trigger publicity about asbestos/health related hazards. He explained to the Board that strong sampling in New York had not shown any hazard to the general public but that further sampling would be secured in the United States and at plant locations in an effort to determine that there was no threat to the general public. Mr. Burnett further

commented on the tests that had revealed the infinitesimal fiber concentration in municipal water samples and commented on the Transite pipe test loop experiments being run at Research Center. He further commented on the beer contamination studies also being conducted at the Research Center. The Chairman invited the Board's attention to pages 1 and 2 of Appendix B of the Report and commented on the potential liability of Workmen's Compensation claims, most of which had resulted from extensive mass filings at the Manville Plant, and an increase of Workmen's Compensation statutory benefits in most of the states in which J-M operated.

Included in the President's Report were a summary on the status of appropriations expenditures, April 1, 1970, for plants and properties in the United States and Canada with supporting data to be presented quarterly; status of expenditures, April 1, 1970, for investments in other companies showing the amounts approved, the amounts advanced by J-M, and the amounts expended locally; and the April 1 report of projects completed in February 1970.

Under the heading of "Other Matters" the President's Report noted that securements in March were 16% higher than in February but 9% lower than in March, 1969. On a daily basis, March securements were 6% higher than February but 14% lower than March, 1969.

The report also noted that in accordance with the provisions of contracts previously negotiated, wage rates were increased 3% at Long Beach (11¢/hr.), and 3-4.5% at Toronto (10-16¢/hr.). Prepaid prescription drug plans were granted at both locations and cost-of-living wage adjustment continued at both. At Penbryn, operations commenced on one machine for two 12-hour shifts, five days per week. By the week ending March 15, one machine operated for seven days. A petition had been filed by the Glass Bottle Blowers Association to represent the employees. The unfair labor charge had been withdrawn by the United Electrical, Radio and Machine Workers of America, whose contract had expired.

The report also informed the meeting that as of March 31, 1970, 398,582 shares had been purchased under the Incentive Stock Option Plan by 151 participants at prices ranging from $13.91 to $28.50. As of March 31, 1970, 3,077 employees had subscribed to 647,092 shares of stock under the Employees' Stock Purchase Plans, of which 642,469 shares had been paid for in full and delivered. On the stock remaining under pledge, subscribers had paid $44,310 and owed $98,470. The average subscription price was $20.425.

F. H. May, Jr., Vice President for Finance, reported for the month of March, 1970, showing the trend of Johns-Manville business and earnings for the month of March, 1970. The report showed that March net sales of $43.5 million were 8% less than sales in March 1969 of $47.2 million. In the first quarter, Company

sales were $115.1 million compared with $122.7 million in the same period a year ago. Selling prices in both the month and the quarter were about 2.0% above prices in the comparable 1969 periods. He noted all divisions except Pipe had higher prices so far in 1970 than a year ago. The Company cost ratio was 70.2% in March, well below the February ratio of 73.7% but above the ratio in March 1969 of 69.3%. Although selling prices in March were higher than a year ago, the lower sales volume together with higher fixed expenses at plants and mines caused the cost ratio to rise above the March 1969 level.

He noted that with lower volume, salesmen's expense in March was slightly less than 1969, but sales office and warehouse expenses were higher this year, and total district expenses were up 3%. Total general and administrative expenses of $4.5 million were $300,000 lower than in March 1969. Engineering and technical projects expenses were down by $160,000 primarily due to smaller expenditures for asbestos fibre exploration. General company administrative expense was $0.3 million lower than in March 1969 mostly due to lower contributions expense this year. Miscellaneous income was approximately half as much as a year ago. The 1969 higher income was essentially in a dividend from Advocate and technical assistance payments from Flintkote. No income was received from these sources in March 1970. Company net earnings in March were 17¢ per share vs. 22¢ per share a year ago. For the quarter, earnings were 32¢ per share vs. 43¢ per share last year.

The report contained financials on earnings and sales and earnings by division together with financial supporting comments on investment items. He called attention to an increase in receivables in March which were $87.2 million at month-end. Inventories rose $662,000 in March and were $79.8 million at the end of the month. March ending inventories were equal to 87 days cost of sales vs. 79 days a year ago.

As a part of the proceeds from the sale of the Dutch Brand tape business, the Company received a note for $4.9 million. The note, which was received in March, was the cause of an increase in deferred charges and other assets from $8.6 million in March 1969 to $12.0 million this year.

Mr. May noted that cash and marketable securities declined by $7.3 million in March to $48.8 million. The decline was primarily due to payment of the quarterly dividend, the increase in receivables mentioned above and a decrease in accounts payable (from $58.5 million in February to $56.1 million) in March. Cash at the end of March was $14.7 million lower than at the end of March 1969.

Mr. May informed the Board that on or before May 1 his analysis of the first quarter and forecast for the next nine months would be mailed to each director.

A form of press release was submitted in connection with the first quarter earnings statement forming a part of the President's Report. This release was unanimously approved in the form presented to the meeting.

There was next presented to the meeting a report on foreign loan guarantees at April 1, 1970 showing an increase of $19,000 during March.

There was then presented to the meeting a report showing changes in selling prices percentagewise by Divisions.

The Chairman stated that at the Board meeting held in Atlanta on March 12, 1970 the question was raised as to the right of the Executive Committee to declare or pay dividends. The Executive Committee now had this right. It was the consensus of the Board that the Executive Committee should exercise this right only in emergencies or when specifically authorized by the Board.

Thereupon, on motion, duly made and seconded, the following resolution was unanimously adopted.

> RESOLVED that it is the judgment of this Board that action by the Executive Committee relative to the declaration or payment of dividends should properly be limited to emergency situations rendering the convening of the Board impossible or to dividend actions specifically authorized from time to time by the Board.

The Chairman once more presented the proposed restatement of responsibilities of the Board of Directors, together with a chart showing the five Committees of the Board, and separate statements of their responsibilities. This material had been sent to the Directors in advance of the meeting. After discussion, the restatement was unanimously approved with one change under "B. Financial Matters", which as amended would read "Approving individual capital expenditures exceeding $150,000 - maximum $200,000 total expenditure including expenses".

The Chairman informed the meeting that the trucking strike had affected business in the Midwest, particularly in Ohio, and on the West Coast. He stated that he expected increased costs of transportation. Management would attempt to raise prices to absorb the increased costs whenever shipments were made F.O.B. destination.

The Board was informed by the Chairman that an informal offer had been made to purchase J-M's interest in German Eternit

which was carried as a $2 million investment. The Swiss offer for the J-M interest was $4.5 million. The Chairman expected that the offer might be increased to as much as $6 million.

He informed the Board also that he would report at next month's meeting on all foreign investments. He also noted that he had been unable to complete negotiations with the Congoleum company for the flooring business. This company was unwilling to make the required investment.

He further informed the Board that the Flintkote company was interested in the purchase of the Chillicothe flooring plant. He stated that he had an offer for the purchase of the Hayward plant and the possibility of the sale of the manufacturing equipment located in the plant to Colonial Sugar of Australia. Both of these matters were still in the process of negotiation.

The Chairman stated that he would entertain a motion with respect to the minutes of the regular Board meeting, of the Executive Committee meeting, and of the First Meeting of the Board Following the Annual Meeting of Stockholders, all held March 12, 1970, copies of which had been provided each of the Directors at the commencement of the meeting.

Thereupon, on motion, duly made and seconded, the minutes as submitted were unanimously approved as recorded.

Whereupon, on motion, duly made and seconded, it was unanimously resolved that the meeting adjourn.

Secretary

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REPORT TO THE BOARD OF DIRECTORS ON

ASBESTOS/HEALTH
April, 1970

JOHNS-MANVILLE
JM
PRODUCTS

FORM 36-2
PRINTED IN U.S.A.

CRMC-Asb&Health-BODMin-000159

1970

ASBESTOS/HEALTH

At the January 15, 1969, meeting of the Board a report was presented giving the status of the asbestos/health situation. A revised report reflecting developments since that time will be discussed. This, the fourth such report to the Board, is attached in a blue folder.

REPORT TO THE BOARD OF DIRECTORS

ON ASBESTOS/HEALTH

April, 1970

- FACTS
- PROGRESS REPORT
  - Environmental Control
  - Working with Others in the Industry
  - Health Research
  - Public Relations
  - Workmen's Compensation

FACTS

(Note: Information in the "Facts" section of the report that has been changed or added since January, 1969 is underlined.)

Asbestos is recognized as a health hazard under certain conditions.

Asbestos is recognized as causing asbestosis, a non-malignant fibrosis of the lung, among some workers occupationally exposed to large quantities of asbestos dust over long periods of time.

Asbestos fiber is not known to be a carcinogen (cancer causing agent) but is probably a co-carcinogen (co-cancer causing agent) among people industrially exposed to it. To date, the principal medical study of asbestos insulation workers has not shown a higher than normal rate of lung cancer among non-cigarette smokers.

Asbestos does not affect, to the same degree, all those who are occupationally exposed to it.

The effects of excessive inhalation of asbestos are both time-related and dose-related.

The amounts of asbestos dust that can be fully tolerated by the human are presently unknown.

It has been shown that all so-called "asbestos bodies" found in human lungs do not contain asbestos. (The term "asbestos body" has for years been loosely applied to describe a tiny body of tissue in the lung containing a core of some inhaled particle -- asbestos, talc, man-made fibers or other common substances. Because the over-growth tissue contains some iron, a better term -- being used by many specialists today -- is "ferruginous body.")

The effect of asbestos on human health is probably limited to those who mine, mill, fabricate and apply asbestos or asbestos related products.

There still is no evidence of any risk to the general public from the use of finished asbestos products.

Crocidolite asbestos fiber appears to be more hazardous to humans than either chrysotile or amosite asbestos fiber. New British regulations governing the handling of asbestos impose stricter controls on crocidolite than on other forms of asbestos.

The Threshold Limit Value -- or standard of allowable dust in asbestos mining, milling and manufacturing operations in the United States -- was revised in 1968 from 5 million particles per cubic foot of air to 2 million particles per cubic foot, or 12 fibers (over 5 microns in length) per cubic centimeter. It appears highly likely that this standard will be reduced even further in 1970.

PROGRESS REPORT

Environmental Control

Environmental Control activities, including air and water pollution abatement as well as asbestos dust control, continued to hold a high priority at Johns-Manville in 1969.

Capital funding for environmental control projects underway, initiated or authorized during 1969 totaled $8.5 million and covered 52 J-M plant and mine locations.

During the year J-M actually completed and put into operation environmental control projects budgeted at $2.6 million.

In 1969, the membrane filter personal air sampler technique for measuring asbestos dust concentrations was introduced in J-M plants and mines. All locations with asbestos exposure will have been resurveyed by this method by the end of March, 1970.

During the year a program was undertaken to measure asbestos dust concentrations at the J-M property line at Manville and at Jeffrey Mine, and in selected areas of the adjacent communities. All sites tested showed some fiber in the air, but not in significant quantities.

Working with Others in the Industry

During the year Johns-Manville continued to orient other asbestos producers, processors and customers to the potential hazards of asbestos dust and to encourage the adoption of packaging, handling and fabricating practices that will minimize exposure on the part of all who work with asbestos. Some of these activities included:

1. A presentation on the legal aspects of the asbestos/health situation was made at a meeting of the health committee of the Asbestos Cement Products Association.

2. All asbestos fiber bags shipped in the United States and Canada now carry a caution label that urges careful handling of the fiber to avoid unnecessary exposure to asbestos dust.

3. Advice and information on various aspects of the asbestos/health situation was given to numerous customers who inquired on this subject during the year.

4. J-M extended its assistance to an ad-hoc group in New York City which is trying to solve the problem of urban air pollution from the asbestos spraying of new buildings.

5. Exchange plant tours were arranged with Raybestos-Manhattan so that each company could inspect the dust control techniques of the other.

6. Copies of the IIHRP quarterly progress reports were sent to members of the Asbestos Textile Institute, National Insulation Manufacturers Association, Asbestos Cement Products Association and the International Distributor-Contractor National Association.

7. Liaison was maintained with the British asbestos manufacturers who are members of the Asbestos Information Committee. This involved periodic exchange of medical papers and press clippings as well as personal visits by J-M personnel to meetings and plants in the United Kingdom.

Health Research

In 1969, Johns-Manville continued its program of sponsorship and financing of a wide variety of scientific research projects in the asbestos/health area. The current status of these studies is summarized in "Appendix A."

Public Relations

In 1969 the amount of publicity about the asbestos/health problem, while still extensive in scope, was considerably less sensational in tone than in recent years.

Articles on industrial lung disease, including sections on asbestos-related disease, appeared in GOOD HOUSEKEEPING (March, 1969) and in TIME (February 7, 1969). In both cases, Johns-Manville was able to present industry's point of view to the magazines in such a fashion that the resulting articles took a more positive, balanced approach to the subject.

J-M was able to accomplish this primarily because of the availability of new positive material on the subject, including a comprehensive medical paper prepared and delivered by Dr.George W. Wright, consultant to the President of J-M and a leading authority in the asbestos/health field -- and because of the various research and industrial hygiene projects, such as the Insulation Industry Hygiene Research Program which J-M is sponsoring or co-sponsoring. These various projects provided a positive springboard from which to work with publications and writers who are planning articles on asbestos/health.

The new published material and the progress on projects such as IIHRP elicited a favorable reaction, for example, from

U. S. Navy officials who had been assigned to investigate potential hazards in the use of any asbestos-containing material in the construction of naval vessels.

The working relationship established with Dr. Selikoff as a consequence of J-M sponsorship of the IIHRP at Mount Sinai Hospital resulted in extending several invitations for Johns-Manville people to present industry's point of view at scientific meetings. E. M. Fenner spoke on the J-M Environmental Control Department at the Annual Meeting of the New Jersey Medical Association; F. L. Pundsack was a panel member at a symposium on asbestos-related disease held at Cooper Union in New York City; and a joint Pundsack-Selikoff paper was delivered at the American Industrial Hygiene Conference in Denver.

In addition, Dr. Selikoff alerted J-M in advance to editorial interest in asbestos and health, on the part of several publications.

A potentially harmful statement in CIVIL ENGINEERING magazine, which asserted that an official of HEW had linked asbestos-cement water pipe with "asbestos-induced tumors in women" was retracted by the magazine after investigation by J-M cast great doubt as to whether the official had even made such a statement.

Because, in 1969, J-M was faced with fewer time-consuming publicity "crises" than in recent years, the company was able to prepare background position papers on various aspects of asbestos/health and to take positive steps to inform stockholders, employees and others in the industry of what is being done.

New literature completed during the year or nearing completion at year end included:

1. "Recommended Safety Practices for Handling Asbestos Fiber" -- this booklet, completed in 1969, has been sent to all overseas J-M asbestos fiber customers.

2. "Asbestos and Health in 1969" -- 2,000 reprints of this paper by Dr. George W. Wright were made available for science writers, doctors, customers and other interested parties.

3. "Industrial Pneumoconiosis Prevention and Control" -- E. M. Fenner's New Jersey Medical Association speech -- was printed.

4. "History of Johns-Manville Health Research" -- when completed in early 1970, this paper will be printed in booklet form.

5. "Asbestos and Human Health" -- a revised version of this basic position paper (first issued in 1968) has been completed and is in the process of review by interested departments prior to release.

6. "Asbestos-Cement Water Pipe and Human Health" -- this background paper has been revised.

7. "Working Binder" -- a collection of J-M position and background papers, plus code booklets, favorable newspaper and magazine articles, and positive medical papers, has been prepared for use, on short notice, in discussing the asbestos/health question with press representatives, government officials, etc.

Stockholders and employees were kept abreast of developments during the year via the 1968 Annual Report, the Annual Meeting Report to Stockholders, and through NEWS/PIC. Other asbestos companies were informed of activities in the asbestos/health area -- especially the activities of the IIHRP -- through (1) a series of articles in ASBESTOS magazine, (2) quarterly mailings of the IIHRP Progress Reports, and (3) informational meetings with the various asbestos industry trade associations. An exchange tour of textile plant facilities was also arranged with Raybestos-Manhattan to enable each company to

study and observe the dust control techniques of the other.

J-M continued during the year to monitor selected medical meetings, evaluate and distribute important publicity clippings, medical papers, etc., and, in general, maintain a close watch on all activities -- medical, government and press -- relating to asbestos-related disease.

LOOKING AHEAD

There are certain developing problem areas that we are preparing to deal with in 1970 and the years beyond.

1. Government - there is growing concern at all levels of government -- federal, state and local -- about dangers to our environment from air and water pollution. Asbestos is frequently mentioned as an air pollutant of considerable occupational danger and a possible danger to the general public.

2. In the private sector, it appears that the next target of student activists will be in the area of environmental pollution. Student demonstrators and pickets at industrial plants accused of polluting the air may become a common occurrence in the near future.

HEALTH RESEARCH REPORT

The following is a progress report of health research studies in which Johns-Manville is actively participating:

FIBROUS DUST STUDY
INDUSTRIAL HYGIENE FOUNDATION OF AMERICA

This study involves the investigation of the health hazards of four various types of asbestos: chrysotile, amosite, crocidolite and synthetic. In addition, fibrous glass, mineral wool, and some organic fibers are being studied.

The portion of the study related to determining a comparative pathogenicity of the fibrous dusts has been completed and a report issued.

The study of the inflammatory and oncogenic components of the determination of the locus of pathogenicity of asbestos dust continues in progress since the animals will not be sacrificed but will live out their lives.

EPIDEMIOLOGICAL STUDY OF THE CANADIAN GENERAL POPULATION
INSTITUTE OF OCCUPATIONAL AND ENVIRONMENTAL HEALTH

This study proposed to relate the health status of asbestos-exposed population to the non-exposed population.

In addition to the Johannesburg Conference paper, Dr. MacDonald made a presentation to the QAMA and recently a similar presentation at Thetford to a group of management, labor and press representatives. Copies of this summary will be distributed. Continuation of the study, approved by QAMA, will attempt to develop a basis for a Threshold Limit Value through a more definitive review of individual exposure histories and bronchogenic cancer involvement.

HEALTH RESEARCH REPORT

ESTABLISH LIBRARY OF WORLD-WIDE ASBESTOS
RESEARCH AND HEALTH STUDIES
INSTITUTE OF ENVIRONMENTAL AND OCCUPATIONAL HEALTH

This project is designed to assemble information on world-wide asbestos research and health studies for future reference and distribution upon request.

Gathering, codifying and indexing world-wide asbestos information is being continued by Dr. Pelnar.

ASBESTOS INDUSTRY STUDY
UNITED STATES PUBLIC HEALTH SERVICE

This is a 7 to 10 year environmental, clinical and epidemiological study of workers exposed to asbestos. This study was initiated in January 1963.

Follow-up environmental studies in Asbestos-Cement and Insulation Plants will be conducted in the near future. Work history data has been gathered throughout the Asbestos Textile Industry. Medical studies of the textile personnel were completed at Manville Plant in May, 1969, and at Marshville Plant in October, 1969. Similar studies are currently being completed at other Asbestos Textile plants.

Papers describing the work to-date have been presented.

INSULATION INDUSTRY HYGIENE RESEARCH PROGRAM
MT. SINAI ENVIRONMENTAL SCIENCES LABORATORY

This is a combined industrial hygiene and preventive engineering research program designed to develop improved methods that will minimize exposures of insulation workers to dust and fumes encountered in their jobs.

Newsletters reporting progress of the work to-date have been published and widely distributed to interested employers and contractors associations as well as to the membership of the Heat, Frost Insulation and Asbestos Workers Union. The most recent issue of the Asbestos Worker included both the current newsletter and financial statement of the Insulation Industry Hygiene Research Program.

APPENDIX A

HEALTH RESEARCH REPORT

FIBROUS GLASS AND MINERAL WOOL INDUSTRY STUDY
UNITED STATES PUBLIC HEALTH SERVICE

This is a 7 to 10 year environmental, clinical and epidemiological study of workers exposed to fibrous glass and mineral wool. This study was initiated in March, 1968.

A report of the environmental studies conducted by the United States Public Health Service was presented at the American Industrial Hygiene Association Conference in May, 1969. A paper has been published in the November-December 1969 American Industrial Hygiene Association Journal documenting the verbal report. The paper by Ayres, Johnson and Lynch of the U. S. Bureau of Occupational Safety and Health, Department of Health, Education and Welfare, indicates that the respirable size dust exposure levels of the fibrous glass plants sampled were relatively low and there was no apparent evidence of a health hazard related to glass fiber dust in the insulation manufacturing operation.

BIOEFFECTS OF FIBROUS GLASS STUDY
INDUSTRIAL HYGIENE FOUNDATION OF AMERICA

The purpose of this study is to provide current and definitive knowledge of the bioeffects of fibrous glass on pulmonary function, emphysema, and human pulmonary tissue. It is sponsored by PPG Industries, Owens-Corning Fiberglas Corp., Certain-Teed - St. Gobain, and Johns-Manville.

Pathological studies are well underway. The pulmonary function studies have been initiated. Interim data was presented to the Threshold Limit Value Committee of the American Conference of Governmental Industrial Hygienists. On the basis of this data, the Committee revised the intended TLV for Fibrous Glass Dust from 5 mg/cc to 15 mg/cc (a nuisance dust value).

Autopsy material of several people with long employment in a fibrous glass manufacturing plant has been obtained. Pathological studies of this material will be included in the final report of this research.

APPENDIX A

HEALTH RESEARCH REPORT

EPIDEMIOLOGICAL STUDY OF J-M RETIRED EMPLOYEES
SCHOOL OF PUBLIC HEALTH
UNIVERSITY OF PITTSBURGH

This is an epidemiological study to determine and analyze the life span, causes of death, and possible causal relationship to work exposures, of J-M retired employees. Comparisons will be made between this group and similar age groups in the general population.

Detailed review of employment, medical and industrial hygiene records for each of the 3,500 retired employees has been forwarded to Dr. Enterline. Death certificate information has been pursued through the Social Security Administration.

Data analysis has been completed and the final study report will be forwarded in April.

OCCUPATIONAL AND OTHER EXPOSURES TO FIBROUS GLASS STUDY
UNIVERSITY OF CALIFORNIA

This is a study to define qualitatively and quantitatively the airborne concentrations of fibrous glass in the breathing zones of workers engaged in fabrication, application, finishing and other operations involved in installation of prefabricated and other fibrous glass insulation materials. Also, to obtain quantitative estimates of amounts of fibrous glass introduced into living and working areas from ventilation or heating ducts lined with fibrous glass.

This study is being coordinated by the NIMA Health and Duct Committees. This two-year project was initiated in January, 1969, and job site work is presently in progress. A report on this study is scheduled during the First Quarter of 1970.

CRMC-Asb&Health-BODMin-000175

HEALTH RESEARCH REPORT

EPIDEMIOLOGICAL STUDY - NEW ORLEANS
TULANE UNIVERSITY

This two year study of the health effects related to asbestos exposure in industry was initiated in December, 1969. The physical examination portion of the program is progressing satisfactorily with the personnel of both National Gyspum and J-M plants in the New Orleans area.

TRACE METALS AS POSSIBLE FACTORS IN THE
PATHOGENICITY OF ASBESTOS
INDUSTRIAL HYGIENE FOUNDATION

A proposal to study the effect on the pathogenesis of asbestos fibres by Trace Metals found in conjunction with the fibres, has been prepared by the Industrial Hygiene Foundation.

The QAMA Scientific Advisory Committee has reviewed this proposal and further discussions with the Industrial Hygiene Foundation will be scheduled.

GENERAL POPULATION HUMAN PULMONARY TISSUE STUDY
INDUSTRIAL HYGIENE FOUNDATION

The Industrial Hygiene Foundation has submitted a proposal to the QAMA Scientific Advisory Committee concerning the central core identification of ferruginous bodies found in general population autopsies.

The QAMA Scientific Advisory Committee has made initial review of the proposal and further discussions will be scheduled with the Industrial Hygiene Foundation.

RESPIRATOR DEVELOPMENT
JOHNS-MANVILLE RESEARCH

Work is continuing in our cooperative development program with the Willson Products Company. A problem of filter efficiency in high humidity conditions has been encountered and is being worked on. An experimental pilot unit has been built and an air cycling testing apparatus has been developed to evaluate filter element efficiency.

HEALTH RESEARCH REPORT

BIOLOGICAL EFFECTS OF MODIFIED INORGANIC
FIBROUS MICROPARTICULATES
MT. SINAI ENVIRONMENTAL SCIENCES LABORATORY

This two year program, initiated in October, 1969, will investigate significant variations of biological effects of fibrous microparticulates that may occur following alterations on their surface and other physical-chemical properties. In vitro test systems will be used to identify the effect of modifications of several materials including chrysotile, crocidolite, glass-MICRO-FIBERS, MICRO-QUARTZ.

WATER CONTAMINATION STUDIES
JOHNS-MANVILLE RESEARCH CENTER

Filter residues are being received, processed and counted from both Malvern, Pennsylvania (soft water) and Glendale, Arizona (hard water). Both the well and domestic site (two miles downline) filtration units at Glendale were put in operation in September 1969. The well filtration unit at Malvern was put in operation in June 1969, while the one-half mile downline unit was installed in December, 1969. The following table summarizes the results to date. The Glendale sites indicate an increased fiber concentration between the well and domestic site.

(Table on next page)

CRMC-Asb&Health-BODMin-000177

FIBER CONCENTRATION IN MUNICIPAL WATER SAMPLES

Sample No.	Date Sampled	Fiber Concentration (u g/gal) Well Site	Domestic Site
Glendale 1	9/10/69	0.088	0.214
2	9/17/69	---	0.0089
3	9/23/69	0.0073	0.076
4	10/1/69	0.0021	0.0058
5	10/7/69	0.0042	0.020
6	10/20/69	0.0046	0.285
Malvern 2	6/18/69	0.035	--
3	9/4/69	0.663	--
4	9/10/69	0.038	--
5	9/17/69	0.120	--
6	9/30/69	0.074	--
7	10/2/69	0.139	--
8	10/9/69	0.133	--
9	10/17/69	0.271	--
10	10/25/69	0.281	--

A large number of accumulated samples are currently being processed and counted; analysis of these has been delayed due to emphasis on analysis of other samples associated with the environmental and health program.

The TRANSITE pipe test loop experiments run at pH 7 and a water hardness of 100, have been completed. The fiber content in the water was found to be approximately 10^{-4} u g/gal. A new water softening unit was installed and a new test series, employing water of pH 7 and a hardness of 50, was started on January 17, 1970. The initial samples from this new series are currently being analyzed.

BEER CONTAMINATION STUDIES
JOHNS-MANVILLE RESEARCH CENTER

Detailed comparison of J-M and Turner Brothers Asbestos (TBA) analyses for fiber in beer revealed that J-M was reporting 50 to 100 times more fiber in beer than TBA. Subsequent studies have shown several possible sources of error in the TBA method and a probably overstatement of fiber and particle volumes in the J-M method. Correcting for these factors, the discrepancy between J-M and TBA values would be reduced to a 3 to 5 fold difference. Further investigation is currently being made useing radioisotope "tagging" techniques.

CRMC-Asb&Health-BODMin-000178

OCCUPATIONAL DISEASE - WORKMEN'S COMPENSATION

BACKGROUND

In the mid-1930's, with Dr. A. J. Lanza as consultant, Johns-Manville sponsored both animal and human research on the effects of asbestos at Saranac Laboratory, New York, under the direction of Dr. LeRoy Gardner. The results obtained in the mid-1940's established that prolonged and heavy exposure to asbestos fiber did produce a unique and identifiable pulmonary fibrosis.

Subsequent to Dr. Gardner's death, Dr. Arthur Vorwald completed the investigation, and it was his opinion that the "long" fibers (5-50 microns in length) were responsible for the production of fibrosis. He suggested that a threshold limit of 1.0 million fibers per cubic foot of air would be appropriate. Accordingly, this standard was used for a number of years to evaluate Johns-Manville work environments, in addition to the ACGIH threshold limit of 5.0 million particles per cubic foot.

The relationship of bronchogenic cancer to asbestosis was reported from British experience in the mid-1950's. The association has been accepted as statistically substantiated, even though the precise physiological and pathological mechanics involved are as yet unknown (this is also the status of the relationship of smoking).

BACKGROUND (continued)

In 1965, at the American Academy of Sciences Symposium on Asbestos, concern regarding the possible relationship of asbestos fiber (not asbestosis) to mesothelioma was brought into focus.

It is obvious that although in the mid-1940's it was thought that a good deal was known about the biological effects of asbestos, subsequent developments have created a totally new spectrum of questions, the answers to which are presently being explored through further and extensive research.

WORKMEN'S COMPENSATION

Our Workmen's Compensation claims and costs for occupational disease cases have increased from 94 cases and estimated liability of $500,000 in 1965 to 681 cases and estimated liability of $1,772,500 in 1969.

The increase of claims and liability for 1969 has resulted from some valid disability claims, extensive "mass" filing at the Manville location, and an increase in Workmen's Compensation statutory benefits in most of the states in which we operate.

WORKMEN'S COMPENSATION (Continued)

The estimated cost of occupational disease cases initiated in 1969 is as follows:

DIVISION	CASES	$ COST
Dutch Brand	1	$ 1,980
Fiber Glass	2	300
Celite	5	29,517
Pipe	137	379,825
Building & Flooring	213	528,602
Packings & Friction Matls.	141	211,159
Industrial Insulations	84	224,256
Research & Engineering	85	201,928
Asbestos Fibre	10	150,000
Canadian Products	3	45,000
TOTAL	681	$1,772,567

The low average cost of approximately $2,300 per occupational disease case is contributed to by the very large number of awards at Manville-Finderne locations of 10% or less disability. These claims are adjudicated in New Jersey on the basis of subjective complaints and history of exposure with little consideration for expert medical disability evaluations. The Manville-Finderne locations accounted for 96% of the 1969 cases.

WORKMEN'S COMPENSATION (Continued)

PLANT	CASES	$ COST
Manville Pipe	135	$ 349,289
Manville BFM	212	525,502
Manville PFM	140	210,159
Manville II	83	208,506
Finderne REC	85	201,928
TOTAL	655	$1,495,384

During 1969 there were major state Workmen's Compensation legislative changes in 13 of the states in which we have manufacturing operations. Weekly benefit amounts increased for partial and total disabilities and dependency death claims. These changes represent a 10-15% cost increase for cases filed subsequent to the change.

The chest x-ray study to evaluate pulmonary involvement at all locations, undertaken by Dr. L. J. Bristol in 1968, is progressing on schedule. Dr. Bristol is a member of a committee of the International Cancer Commission (UICC) that has recently established new standard criteria for the interpretation of chest x-rays.

WORKMEN'S COMPENSATION (Continued)

The radiological findings, to-date, of pulmonary involvements ranging from early to advanced, are as follows:

LOCATION	NO. OF CASES
Manville	264
Pittsburg	21
Marrero	40
Long Beach	32
Nashua	18
Waukegan	112
Cleburne	1
Lompoc	8
Parkersburg	1
Zelienople	6
TOTAL	503

Dr. Bristol's studies are providing essential valid medical data which enables us to more accurately estimate future pulmonary disease disabilities.

HEARING LOSS

Hearing loss claims continue to increase, especially at Manville. During 1969, there were 81 loss of hearing cases filed. New Jersey has no specific hearing loss statute. These cases are being adjudicated under the Occupational Disease Act. Awards for disability, therefore, are extremely liberal.