the asbestos report

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Industrial Hygienists' Motto:

Have Trunk; Will Travel

Vowing that no J-M employee will ever be exposed to harmful amounts of airborne asbestos fiber is one thing . . . making sure of it is another. That's the mandate of the Industrial Hygiene section of the Health, Safety & Environment Department.

And, if you have ever complained about how much "stuff" you have to take on a business trip, pity the industrial hygienists. They have to send a trunk full of "stuff" to their destination a week or so in advance. Even then, they are personally carrying many pieces of delicate equipment.

With almost 100 plants spread from coast-to-coast, the task of the industrial hygienists is awesome. To maintain a regular monitoring program throughout J-M, five industrial hygiene laboratories have been established and staffed: The Eastern Lab at Manville, N.J.; Central Lab at Waukegan, Ill.; Rocky Mountain Lab at Denver; Western Lab at Lompoc, Calif.; and the Canadian Lab at Asbestos, Quebec, Canada. The Manville and Denver Lab are staffed with four hygienists, the others have three.



Stella Geburo and Doug Aldinger, Denver Lab hygienists, pack the equipment they will take on a plant survey.

Workplace Samples

One of the primary responsibilities of the IH group is to conduct regular monitoring programs at J-M plants where asbestos is used, sampling the workplace air and analyzing it for fiber content. While gathering evidence to insure employees are not exposed to potentially harmful amounts of asbestos fiber is the primary goal, the measurements taken also are used to determine compliance with government regulations on airborne fiber levels.

But, even in asbestos-using facilities, the job of the hygienist is not limited to fiber counting, it extends to every environmental condition that could present a health, safety or other risk to employees and the surrounding community. Dusts, fumes, odors, noise, heat stress, all fall under their scrutiny.

"At least once a year, every J-M plant gets a complete survey," notes George Swallow, manager of Occupational Environmental Control, who directs the far-flung IH operations from Denver. "These surveys include measurements of everything that is known to be in the plant."

Regular Surveys

Asbestos monitoring is conducted at least twice a year. Government regulations presently limit airborne asbestos to a maximum of 5 fibers per cubic centimeter (5 f/cc) of workplace air, but J-M is accelerating its program to get levels to the 2 f/cc standard that goes into effect in July of 1976.*

Selection of plant stations to be monitored is the difficult first step. Every area where asbestos dust might be present will be scrutinized — either with an area sample of the workplace, or by personal monitoring, wherein the operator actually wears a monitoring device that collects air in his breathing zone.

Preparing for a plant survey is an exacting time-consuming procedure. Each of the small, battery-operated sampling pumps must be checked and calibrated to assure they are accurate. Since every station will be checked at least twice, a sizeable amount of equipment needs to be taken along. At Denison, for instance, about 75 stations need to be monitored (both area and personal samples). This requires 10 to 20 portable pumps, about 150 filter cartridges, a battery charging unit, and extra equipment in case of mechanical failures.

Each sampler is about the size of a transistor radio, connected by a hose to a circular filter monitor. The pump is put on an employee's belt and the monitor hangs over his shoulder.

Once the hygienists are at a plant, have equipped the employees with monitors and have set up area stations elsewhere, they can't just sit back and relax.

"They're on their feet all day," Mr. Swallow notes, "going from station to station, either physically getting the station going, changing filters as required, or observing. Frequently, what is observed is more important than the numbers we get."

Observation is most important since the hygienist must rely on his experience in gauging what his measurements may be. If, for instance, he notes that an operator in a certain

(Continued on page 6)

*The Federal government presently is considering revisions to existing standards that may include a lowering of the permissible exposure limits

Dr. Wright's View

Health Risks Dose-Related

To learn more about the present state of our medical knowledge on the health effects of asbestos, we interviewed Dr. George W. Wright, a leading authority on respiratory disease and asbestos health research.

Q: *In 1969, in an article published in the* **American Review of Respiratory Disease,** *you reviewed the knowledge we had gained up to that time from asbestos and health research. Has there been a great increase in our knowledge since then from additional research?*

GW: A great deal of research has been carried out since 1969 along two lines. First, we have conducted or initiated a number of epidemiological studies of populations occupationally exposed to asbestos. These studies have been conducted throughout the world and from them we have gained valuable knowledge about occupational exposures and biological responses.

Second, we have been attempting through animal research to learn more about the geometry of fibers and whatever biological response occurs. There also has been some effort to use animals to look at the normal way in which humans are exposed — in contrast to putting materials into the pleura or peritoneal space, which is not comparable to human exposures.

I would say that we are in a far better position to look at the whole problem in a more rational way than we were in 1969. This isn't to say that everything has been done, since there still are some areas where we would like additional information.

Q: *It is generally acknowledged that asbestos exposure can lead to increased risks of developing asbestosis, bronchogenic cancer, and possibly, mesothelioma. Have other health problems related to asbestos exposure been identified or brought under suspicion in recent years?*

(Continued on page 8)

commentary



Employee Protection Is Corporate Policy

We know that asbestos can cause human health problems when improperly handled. We also know that when properly handled, asbestos can be used without risk. Whenever a potential problem was identified, J-M was among the first to put its money where its corporate conscience was. Over the last half-century, J-M has sponsored and participated in medical and scientific research designed to define problems and find solutions.

The disease being seen today among some long-time asbestos workers is not a result of present-day exposures. Rather, it is the result of a lack of knowledge about the potential health risks posed by inhalation of asbestos fiber. This lack of knowledge existed not alone in industry, but in the scientific, medical, academic, government and labor communities as well.

As soon as there were indications of a potential health problem, Johns-Manville acted by initiating research and sponsoring independent studies. Whenever a problem was identified, we acted to correct it.

Over the years, J-M has supported asbestos health research with such respected institutions as the Trudeau Foundation, McGill University and Mount Sinai Hospital — where we were one of the original supporters of the continuing Insulation Industry Hygiene Research Program. Through the Institute for Occupational and Environmental Health we are continuing to fund independent medical investigations and research. The knowledge we have gained from these many studies is used to improve safeguards in our mines, mills and manufacturing facilities.

Today, while J-M can claim the largest open-pit asbestos mine in the free world, we also can boast of having the world's largest fabric filter dust collection system. We have five industrial hygiene laboratories in the U.S. and Canada staffed by trained techniciana who regularly monitor our operations for environmental hazards posed by dust, fumes, noise, heat and other conditions.

Many of the dust control systems and equipment developed to protect J-M people have become models for other industries, such as bag-opening stations and air filtration systems.

Our environmental engineers are often consulted by companies seeking solutions to dust control needs. Our information booklets, special reports, material handling information, audio-visual programs and medical reference services are in constant demand by customers and other interested parties. Teams of J-M people have traveled across the country conducting seminars on asbestos and health concerns to provide others with the advantage of the knowledge we have gained.

In the last few years, J-M began consolidating its occupational and environmental health and safety programs in one department. The new Health, Safety and Environment Department, directed by Dr. Paul Kotin, a Senior Vice President, has been endowed with full enforcement power to maintain healthy and safe working conditions in our plants and to preserve the environmental integrity of the communities in which we operate. This concentrated effort will assure adherence to J-M policy of placing the health and safety of our employees and neighbors ahead of economic factors and production expediencies.

We could not learn about asbestos hazards fast enough to prevent some of our co-workers from suffering ill health, but, we can be proud of the energy, enthusiasm, talent, and innovation applied by J-M people in meeting and overcoming this very serious challenge.

I am firmly convinced that our continued concern for our employees, our total commitment to environmental and occupational health, and the expertise and dedication of our people will soon eliminate asbestos-related health concerns.

This not only is our goal, it is our corporate policy.

W R Goodwin

W. R. Goodwin
President and Chief Executive Officer

the asbestos report

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The Man From OSHA

The U.S. Government also has expressed its concern for the health of asbestos-exposed workers.

On June 7, 1972, the Occupational Safety and Health Administration (OSHA) of the U.S. Department of Labor, set a standard limiting worker exposure to airborne asbestos to five fibers per cubic centimeter of air (5 f/cc) on an eight-hour time-weighted average. A maximum ceiling concentration was set at 10 fibers per cubic centimeter.

This regulation means that each company must conduct regular monitoring programs to assure that no worker is breathing air con-



taining more than 5 fibers of a size greater than 5 micrometers in length for every cubic centimeter of air. Measurements taken over the normal 8-hour work day must average out to 5 f/cc or less, and there should be no peak concentration greater than 10 f/cc.

On July 1, 1976, the OSHA standard is scheduled to be lowered to 2 fibers per cubic centimeter on the same time-weighted average basis, with no change in ceiling concentration. (Additional revisions to the standard are being considered by OSHA.)

No Adverse Effect

These and other similar standards are generally referred to as Threshold Limit Values or TLV's. TLV's refer to airborne concentrations of substances and "represent conditions under which it is believed that nearly all workers may be repeatedly exposed, day after day, without adverse effect.

At present, about 80% of the asbestos fiber work stations in the U.S. plants of J-M are at or below the 2 f/cc standard. Almost 100% are at or below the present 5 f/cc level. Personal protective equipment is used in those areas that are not yet in compliance with the fiber exposure limits.

Aside from setting exposure levels, the OSHA regulations also require that each company establish a regular program of monitoring in order to determine employee exposure to asbestos fiber. Industrial hygienists from J-M's five regional laboratories conduct these monitoring programs, sampling both individual workers and work areas.

The government also requires that "engineering controls, such as, but not limited to, isolation, enclosure, exhaust ventilation and dust collection be used" to maintain compliance with the standards. This responsibility rests with the J-M Environmental Engineering Department.

Exams Specified

Also specified in the regulations are the frequency and types of medical examinations for employees and required caution labels and signs.

While OSHA is concerned mainly with in-plant environmental conditions, another Federal unit, the Environmental Protection Agency (EPA), is concerned with possible asbestos emissions into the atmosphere.

The EPA standard for asbestos is unique because it contains no emission standards or numbers. Instead the regulations are written around "No Visible Emissions".

This simple rule means that any asbestos-using facility that has no visible emissions is automatically in compliance. Any operation that has visible emissions but which do not contain asbestos particulate also is in compliance. However, any plant that does have asbestos-containing visible emissions must install control devices. In these cases, the standard requires that a fabric bag filter, such as those in use in J-M facilities, be used in all cases except where the character of the emissions would render such a filter unsuitable. Should that be the case, a high-energy wet scrubber must be used.

W. A. Cooper to Dr. Paul Kotin on the History of J-M's Employee Education About Asbestos (1977), J-M newsletter… Published by AsbestosClaims.Law
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Demand for Asbestos Fiber Exceeding Production Rate

Last year, more than 5 million tons of asbestos were produced in the world . . . but that still wasn't enough to match the demand. Despite major expansion projects in the asbestos mining industry, demand probably will exceed production for the next three years or longer.

As of 1974, the U.S.S.R. and Canada were nose-to-nose as leading world miners of asbestos, each producing close to 2 million tons annually. South African production ranks third with approximately 390,000 tons annually.

On the other end of the spectrum, the United States continues to be the leading consumer of asbestos — most of which is obtained from Canada. The United Kingdom, France, West Germany and Japan are other leading consumers. In 1974, the U.S. market for asbestos was about 850,000 tons. The accompanying chart shows major U.S. product uses for asbestos.

Unique Product

Asbestos-cement pipe manufacturers consume about 145,000 tons of asbestos, which represents 17% of total consumption. This unique product, which makes use of asbestos for increased strength, has found widespread use not only in the U.S. but throughout the world. Although some substitute materials for asbestos in cement pipe have been tried, so far none have been found to be suitable.

Another product ranked high in U.S. consumption (134,000 tons) is asbestos-latex sheet, which is used as an underlay for sheet flooring. There is no satisfactory substitute for the fiber in this product, which is almost 85% asbestos. Asbestos is used in this product to add strength and durability.

A third major U.S. use of asbestos is in floor tile, to which it adds strength and dimensional stability.

Other major uses for asbestos include asbestos paper — roofing felt, pipeline felt, and electrical and insulation papers — which continue to show promising growth. The use of asbestos in friction materials that must withstand high temperatures continues to be a good market for fiber. Asbestos fiber also is used for fireproof bulkheads on ships and as fill in cooling towers; in roof coatings for resistance to weathering; in textiles for insulation and fire proofing; and in plastics as a reinforcing agent and low cost filler. Other common uses of asbestos are in acetylene cylinders, packings and gaskets, asphalt paving, welding rod coatings, caulking compounds, sealants, sound deadeners, automobile undercoatings, oil well drilling muds, filters, acoustical plaster and ceiling tile.

Curtailed Uses

According to Noel W. Hendry, Vice President and General Sales Manager for J-M's Asbestos Fiber Division, some product uses have been curtailed because of concern over adequate environmental controls.

1974
U.S. & WORLD CONSUMPTION OF ASBESTOS

	U.S. Tons	U.S. Percentage	Total World Tons	Total World Percentage
Asbestos Cement Products (pipe, sheets, siding, shingles)	181,000	21.8%	3,780,000	69.0%
Friction Materials (automotive linings & disc components blocks, clutch facings)	85,000	6.3	120,000	2.2
Asbestos Paper (asbestos felt, latex sheet underlayment, electrical & commercial paper)	320,000	37.7	400,000	7.4
Floor Tile	110,000	12.8	210,000	3.9
Paints, Roof Coatings, Caulks, Sealants, Adhesives & Undercoatings	65,000	7.4	65,000	1.6
Asbestos Textiles	12,000	1.4	37,000	.7
Plastics	16,000	2.0	26,000	.5
Joint Cements	10,000	1.6	10,000	.3
Packings & Gaskets	20,000	2.3	65,000	1.0
Miscellaneous	20,000	2.6	725,749	13.4
TOTAL	870,000	100.0%	5,488,749	100.0%



A 100-ton truck is loaded with asbestos ore at the J-M Jeffrey mine in Canada while a tank truck sprays water over the roadway to suppress dust.

"Sprayed asbestos fireproof coatings for steel superstructures were phased out of the industry in late 1972 because of the complexity of environmental controls necessary to prevent exposure at construction sites," Mr. Hendry notes. "In its place, fabricated asbestos coverings and asbestos-free spray mixtures are being used to provide the all-important fireproofing needed in high-rise structures."

The same is the case for certain types of asbestos insulation products, such as pipe coverings. In this case, decreased usage of fiber in such products is due to the problems inherent in demolition and removal of old material.

"We have learned a lot not only about the potential health effects of asbestos exposure, but also about how to eliminate or control them," Mr. Hendry explains. "Customers who need the advantages of asbestos in their products are finding that we can help to eliminate potential exposure problems. When we weigh what we have learned about how to safely use asbestos without endangering anyone's health against what little is known about the thousands of other potentially harmful materials we are just beginning to identify, let alone learn how to control, asbestos becomes even more attractive in its many uses."

"We fully expect that the demand for asbestos will continue to exceed production capabilities for a few more years," Mr. Hendry says. "It's still the indispensable mineral in many of its 3,000 everyday uses."

What Are the Hazards?

Three human diseases are associated with excessive inhalation of asbestos fiber. They are asbestosis and an increased risk of bronchogenic (lung) cancer and mesothelioma. It is possible that there also is an associated excess risk of developing gastrointestinal (GI) cancer.

Asbestosis is a non-cancerous lung condition that can be caused by excessive inhalation of asbestos fiber over many years. It is one of several diseases classified as pneumoconioses, each of which is caused by inhaling a specific foreign material into the lungs. Other diseases in this category include siderosis, caused by iron dust particles; silicosis, caused by free crystalline silica, and coal workers pneumoconiosis, caused by coal dust.

A person with asbestosis may experience unusual breathlessness after periods of physical exertion. This occurs because an excess of dust in the lungs causes a generalized thickening of the delicate lung tissue. The result is that the lung cannot do the job it is supposed to — provide oxygen to the body.

Asbestosis can be detected through the regular medical exams provided by the Company. Since modern environmental controls have greatly reduced the amount of airborne asbestos fiber workers could be exposed to, most experts believe asbestosis will cease to be a significant health risk in the future.

The cause of **bronchogenic (lung) cancer**, like many other human cancers, remains a medical mystery. This form of cancer is identical to that prevalent among heavy cigarette smokers.

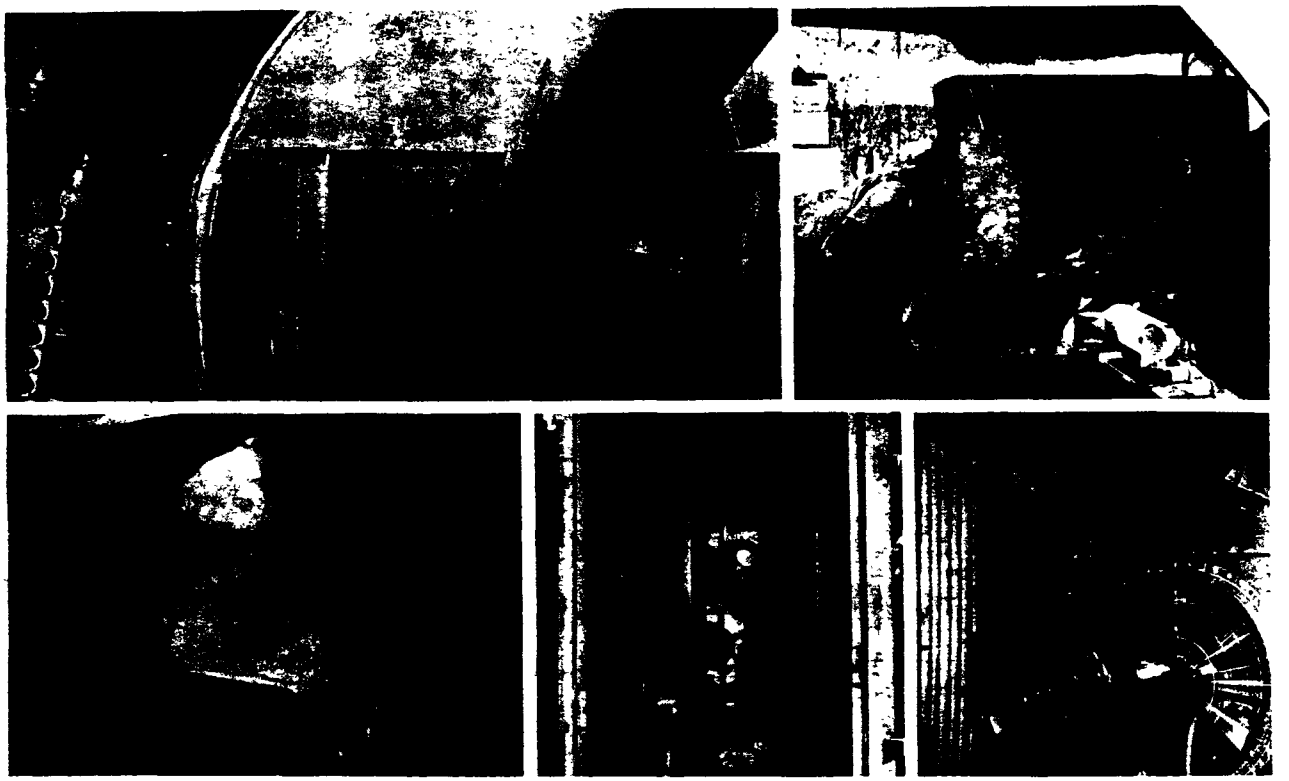
With only one or two exceptions, bronchogenic cancer has been found only in asbestos exposed workers who also smoke cigarettes. Many researchers believe that if an asbestos exposed worker does not smoke cigarettes, he has no greater chance of getting this disease than any other person who does not smoke.

Mesothelioma is a very rare cancer of the lining of the lung or abdomen cavities. Little is known about the biological factors involved with development of this disease. Recent research appears to indicate that asbestos is not the only material — if indeed it is one of many — that might cause this disease. There are numerous reported cases of mesothelioma among people who appear never to have been exposed to asbestos fiber. Other studies also seem to indicate that other agents or co-factors (co-carcinogens) are necessary before mesothelioma can develop.

All of the asbestos-related diseases have long latent periods between the onset of continued exposure and the time of development of the disease. These latent periods range in time from 8 or 10 to 20 years for asbestosis to 20 to 40 years for mesothelioma.

Medical scientists presently are investigating the possibility that asbestos workers face an increased risk of developing gastrointestinal cancer (cancer of the digestive tract). Medical evidence of any increased risk from these additional afflictions still is inconclusive, and it is believed by most experts that efforts to control other known risks will protect against these forms of cancer.

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Dust control is engineered into operations in many ways. Clockwise from left, a bag of asbestos is opened and dumped in an automatic bag opener . . . a cutting operation is completely enclosed to prevent dust in the workplace . . . a vacuum system draws dust away from the

The Dust Fighters

Has your vacuum cleaner ever clogged up on you?

If so, you are familiar with one of the problems that plague dust fighters everywhere. Dust collection just isn't that simple, whether you're trying to remove lint from a sofa cushion or diverting airborne asbestos fiber away from the operator of a pipe finishing machine.

In Johns-Manville operations, dust control is a must, especially where asbestos fiber is involved. Too much airborne asbestos fiber might be hazardous to those who inhale it.

Anywhere dust is generated, something has to be done and doing something usually involves the dust fighters in the Environmental Engineering Department.

Identifying Needs

As medical research began to better define the potential health risks from excessive exposure to asbestos fiber, the need for better and more efficient methods of dust control in J-M asbestos operations became clear. A multitude of engineers, designers and draftsmen have applied their expertise over the years in meeting those needs. As many as 30 people can be enlisted to tackle a problem. Many of the techniques and equipment now being used by J-M were developed by J-M people, simply because it was rare that our needs could be filled with something out of an equipment catalog.



Some dust control systems are unique to the asbestos industry, such as this exhaust system on a pipe cutting machine

Dust control needs are identified in a number of ways. Regular monitoring surveys by J-M industrial hygienists may pinpoint a piece of equipment or operation in need of dust control. Other times common sense based on experience is the key.

The next step is for the plant management to decide what steps can be taken to eliminate the dust problem. In some cases, dust control might not be the most economical answer. Deciding to work with a material in a wet state rather than dry is another way of eliminating dust woes.

Finding a "Cure"

If it is decided that some mechanical means of controlling dust in an operation is necessary, then Environmental Engineering steps in. Deciding what is best is the most difficult since there are no standard rules to apply to every job.

"In almost all cases, we must design dust control to fit the job," says Donald E. Hillier, Director of Environmental Engineering. "J-M has developed specialized, yet simple, dust control systems for many different operations, from machining of Transite asbestos-cement pipe, to fiber bag opening, to machining of heavy-duty brake blocks."

An example of how custom-tailored dust control solutions must be is designing dust control for a saw. Each of the following types of saws requires a different treatment:

- An ordinary table saw
- A saw that cuts through the work but not through a table
- A saw that cuts through the work but has a space between the piece and the table
- A saw that does not cut through the work
- A "swing" saw
- A "DeWalt" saw
- Multiple saws, such as trim saws used in board plants.

When the best approach has been identified, the dust fighters then can do a detailed design and prepare the job specifications.

There are standard rules to follow for certain conventional pieces of equipment, such as grinding wheels and table saws. Various technical manuals are referred to by the environmental engineers. Still, even tried and proven recommendations must be tempered with experience.

"Experience in our own plants has been the most important teacher," Don Hillier notes "For example, dust control in pipe plants at finishing ends, and in wet ends, and dust control in textile plants and mines use standard rules as guides, but experience developed over many years is the key."

Close Supervision

Actual installation of dust control systems may be done by the plants or by outside contractors, all under the watchful eye of Environmental Engineering.

Some of the more dramatic examples of dust control systems can be found at J-M's Jeffrey Mine in Asbestos, Quebec, Canada Dust extraction systems have been designed for drilling rigs, conveyor belts, crushers, screeners, aspirators, and many other pieces of equipment, some unique to J-M operations.

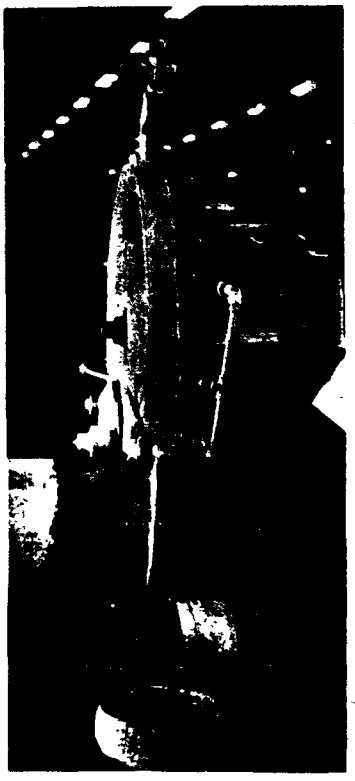
One mill at Jeffrey, No. 5, houses the largest dust collector in the world This depository for dust collected in milling operations is similar to a household vacuum cleaner in principle only, since the statistics on this dust control system are staggering.

- —The entire floor is under negative pressure accessible only through air locks.
- — There are 31 motors — each 350 hp — driving fans that circulate almost 6 million cubic feet of air every minute.
- — There are 80,000 cloth bags in the system, with a surface area equivalent to 32 acres.
- — Dust control piping in the mill totals 4 miles, with about 4,000 dust enclosures.
- — The control wiring in the dust systems totals about 12 miles.

While the Jeffrey dust collection system is uniquely large, the principles involved have been scaled down to meet the needs of other J-M operations. Cloth collectors — or baghouses as they are commonly called — can be found in a number of J-M plants where dust collection is a must.

Additionally, specially designed exhaust ventilation systems have been developed for

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or of a pipe cutting machine. . . water is o suppress dust in a larger pipe cutting on . . . and one of the huge fans in the largest dust collector, at the Jeffrey Mine ida, draws air into some of the 80,000 filter hile a mechanic enters the area through the air locks sealing off the collector.

y operations, such as drills, saws, grinders, even portable hand tools.

olved in Design

Today, even when new plants and rations are in design stages, environmental neers are involved from the beginning, ing sure that the working environment is as n as humanly possible.

In the area of community environmental rol, the environmental engineers also play important role. Their experience and abilities have been incorporated into many ems at J-M plants, including liquid effluent ems, recycling systems for plant water, te water treatment systems, solid waste osal, noise and propane gas standby fuel ities.

Some equipment developed by the en- mental engineers finds practical applica- in other industries. The search for an nomical and practical way to filter out liquid te particles from air streams before releas- them to the atmosphere resulted in elopment of HEAF units (High Efficiency Filtration) This system has proven so ctive that for some time J-M sold them to r industries. Recently, the HEAF licenses technology were sold to another firm ch is marketing them with success.

Principles involved in a Moving Bed Filter em for filtration of liquid effluents also have id their way into the pollution control ems of other industries.

Additionally, if a customer has a problem lar to one previously conquered by J-M, environmental engineers are always willing ive advice on how to proceed in identifying then overcoming a dust control problem.

"Sometimes," Don Hillier says, "a com- y that is planning to use asbestos in a ain manufacturing operation will contact ind ask if asbestos can be safely handled, if so, how?"

"Our answer is a definite 'Yes'. Asbestos r can be safely handled and used in the kplace if proper work practices are follow- ind adherence to normal practices of dust trol is maintained."

Obviously that is a statement the En- nmental Engineering group can back up experience.

Enviable Medical Care Provided J-M Employees

Johns-Manville employs more medical doctors than could be found on the staff of most metropolitan hospitals — more than a hundred worldwide.

Medical personnel are assigned to care for the health needs of employees at each of the Company's 129 plants or mines. Complete on-site medical facilities, staffed by full-time physicians, are provided at major facilities such as the Manville plant and Jeffrey Mine. The Waukegan plant and other large operations also have on-site medical facilities, directed part-time by licensed physicians. All other J-M plants or mines have contracts with physicians who spend varying amounts of time tending to the needs of J-M people. A large team of industrial health nurses and other qualified medical personnel complement the quality medical care provided by the Company.

J-M's medical staff does more than tend to cuts, bumps and upset stomachs. In some instances, physicians provide comprehensive medical examinations for employees. At least once a year, every employee who is potentially exposed to asbestos in his work for J-M will receive a free medical examination. These comprehensive examinations, stipulated by the Federal government, include X-rays and pulmonary function tests to detect early signs of any health problem associated with asbestos exposure.



Medical exams are provided at company expense.

X-rays are one of the most important diagnostic tools used to keep a constant check on the health of asbestos-exposed employees. They are read by qualified radiologists, also employed by J-M, and periodically are rechecked by other qualified radiologists to assure accurate readings and/or diagnosis.

If a health problem is detected in a medical examination, either the employee or the employee's personal physician will be alerted, whether the problem was occupational in nature or not. If additional testing is required as a result of the Company-provided exam, this also is provided free to employees.



Pulmonary function tests and x-rays are part of the medical exams provided for asbestos-exposed employees.

Don't Take Dust Home

It's been one of those days.

You work with asbestos and you just put in a hard shift. You can't wait to get home, take off your shoes, and just relax until dinner is on the table. What the heck. You'll just go home in your work clothes today, and clean up there. Nothing wrong with that, right?

WRONG!

There is something wrong with that attitude, a far too frequent one among workers who may come into contact with asbestos on the job.

While the Company is doing everything it can to maintain a clean workplace, it is almost impossible to prevent some contact with asbestos fiber in many operations. That's why work clothes and other items that might possibly have collected asbestos fiber should not be taken home. Rather, workers should change clothes at the plant, and then periodically take their work clothes home for cleaning separately.

Asbestos fiber on clothes, shoes and equipment miss the normal maintenance procedures in J-M operations. Therefore, going home in work clothes poses a risk that other persons might unknowingly be exposed to airborne asbestos.

Although the cases are very rare, there have been reported incidents of family members being unnecessarily exposed to fiber brought home on work clothes, shoes and other items. For the health of all concerned, employees should change from work clothes to street clothes at day's end. And, washing work clothes separately from other items will prevent any transfer of dust from garment to garment.

Sounds like a lot of trouble. But, then, isn't the health of family members and friends worth it?

Need More Information?

If you haven't found the answer in this publication for any question you may have about asbestos — its production, applications, health concerns or environmental control measures — don't give up. Contact the Health, Safety and Environment Department of Johns-Manville.

Write or call:

Walter A. Cooper
Health, Safety & Environment Department
Johns-Manville Corporation
Greenwood Plaza
Denver, CO 80217
Tel: 303/770-1000, Extension 2969

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Have Trunk . . .

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area does not seem to be following good work practices and thus may be creating more dust than is necessary, he will make a note of this with the sample number in case the readings are higher than they should be. If that is the case, a recommendation will be made to plant management to correct the situation.

No Time To Rest

When the hygienists are not setting up, changing filters or observing, they have other chores. Initially, photos are taken of each sampling station for permanent records. A complete walk-through of the plant is required to check for safety hazards, such as fire extinguishers in need of recharging or blocked by stacked material; unguarded machinery; lack of warning signs; and general housekeeping procedures. Noise readings also are taken, along with measurements of fumes and vapors. Then there is a check outside or on the roof of the plant to be made, to check air and water effluents, condition of landfill areas and storing of materials. Measurements also are taken of air flow through dust collection systems to check on their efficiency.

When you add all the chores together, one normal-size plant is enough to keep a hygienist going for a week, and some larger plants require two or more hygienists in order to complete the job in a reasonable amount of time.

Equipment Rechecked

Back at the lab, each pump is recalibrated to make sure it was functioning correctly. If a pump was just slightly off — those pulling air into the filter at a rate of 1.9 liters per minute instead of 2 — then an adjustment will have to be made in final calculations.

Next, the filters are treated with a solution that will make it easier to see the fibers under a microscope. Using a specially-equipped microscope, the hygienist places a section of the filter under the lens and counts the number of fibers in a certain grid. He'll look at about 20 different areas of the small pie-shaped piece of filter, counting all the fibers he can see. Those fibers greater than 5 microns long are reported, in accordance with Federal regulations.

Once the fibers on a filter have been counted, a series of mathematical steps and calculations will show how many fibers per cubic centimeter of air were present at the work station.

"All stations over the maximum level — whether they were or were not before — are specifically spelled out as locations where respirators will be required until the situation is corrected," notes Mr. Swallow.

Seekers, Not Speakers

Although the industrial hygienists are problem finders not solvers, very often their experience can be valuable in determining what engineering or housekeeping steps are necessary to correct a condition that does not live up to J-M standards.

At times, the hygienists may be called on for special monitoring trips, either to check out a new operation or to determine if corrective measures taken in an area have been effective.

The hygienist can recommend immediate measures to be taken when a certain operation appears to need correction.

There are many cross-checks of work among the regional team members themselves, and by the government and headquarters as well.

Three times a year, the National Institute for Occupational Safety and Health will send each industrial hygiene lab samples of asbestos and other materials to check our analysis procedures. Since the government knows what is on the sample filters sent, they are able to check the proficiency of each laboratory. In addition, J-M conducts its own proficiency tests in the same way to assure accuracy. At times, outside laboratories may be asked to analyze the same samples, again to be sure every procedure and person is up to par.

A Changing Science

As with most scientific professions, the efficiency of an industrial hygienist depends on keeping up to date with new developments. There are special training schools run by the government to attend, specialized publications to read, practice exercises, and more.

Still, despite all the tedious procedures — the problem of getting equipment to a plant a thousand miles away, the constant checking and rechecking of calculations, the numerous reports to be filed and so on — there are those moments that make it all worthwhile: Like when your calculations, checked and rechecked, show there is no place in the plant you just visited where an employee is being exposed to asbestos fiber levels above our very strict standards.

That sort of makes packing the trunk again for the next plant survey just a little less of a hassle.













There are many steps in an industrial hygiene survey. At left, Doug Aldinger charges the batteries on a row of asbestos pumps, while Stella Gaburo, above left, calibrates a pump by having it draw a soap bubble up a glass tower. Center, an operator wears a personal sampler during his work, and Canadian hygienist Yvon L'Archeveque sets up an area monitor. At right, Ken Williams prepares a piece of filter for examination and then counts the fibers he can see under a microscope.

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Good Neighbor Policy Given Special Attention

Almost no one wants a plant for a neighbor.

Ask most people how they would feel about a new manufacturing plant being built in their area and they will probably say something like: "Great, we could use the tax revenues and jobs, but why don't you put it in some other neighborhood. Plants are so noisy, dirty and ugly, I just don't want to live next to one."

Unfortunately, such reservations are more often true than not — manufacturing plants rarely are quiet, clean and beautiful. That's why community environmental preservation programs are so important in J-M plants.

Each year, J-M spends millions of dollars for community environmental control, ranging from plant beautification projects to closed-loop waste water treatment systems. A myriad of Federal, state and local regulations govern J-M plant operations.

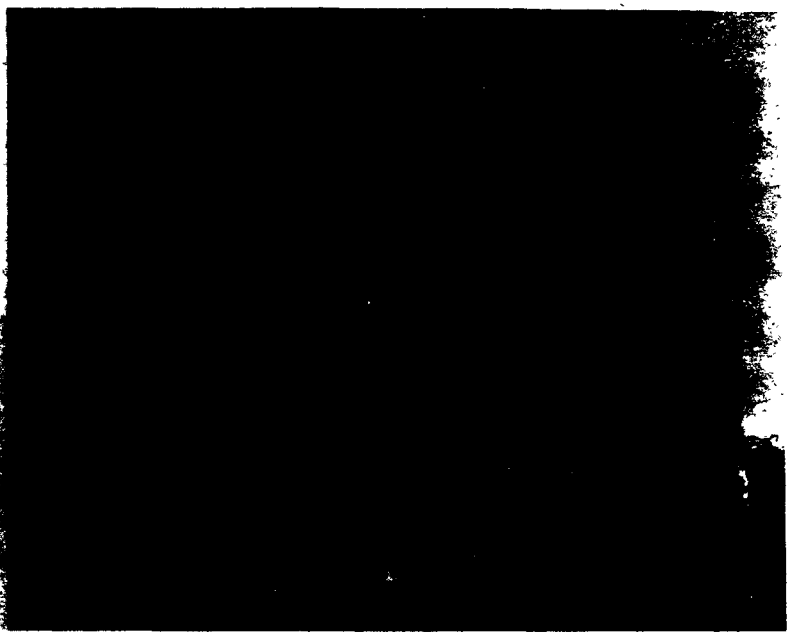
"Very often, Federal, state and local codes differ on what is required of a plant operating in one area," notes James Siegfried, Chief of Community Environmental Control in the Health, Safety and Environment Department. "Our objective is to satisfy all of the codes, as long as they don't conflict with each other."

In asbestos-using operations, control efforts are directed toward preventing fiber from reaching the outside environment. To accomplish this, J-M has incorporated into its plants and operations many environmental control systems designed to filter out asbestos fiber from air and water released to the environment.

The Federal Environmental Protection Agency (EPA) prohibits any asbestos-containing visible emissions from plants. Further, under the EPA's National Emissions Standards for Hazardous Air Pollutants (NESHAP), J-M was required to register every asbestos emitting source as a condition of continued operation. At present, all 197 potential asbestos-emitting dust sources in 23 U.S. plants have been registered and meet the prescribed Federal standards.

Fabric bag filter systems, some of which were specially designed for unique J-M operations, are the recognized method of removing asbestos from atmospheric emissions.

Disposing of solid waste created in some asbestos-using operations has been given increased emphasis in recent years. J-M has developed pelletizing units that compress and bind together asbestos waste material into dust-free pellets before disposal. In addition, sanitary landfill types of operations are conducted in such a way as to bury asbestos waste and prevent contamination of air and water. Settling basins, waste-water treatment operations, and complete recycling systems for air and water are used in J-M operations.



No visible emissions can be seen coming from these stacks atop an asbestos mill in Asbestos, Quebec, Canada.

Recently, the Federal EPA approved amendments to its NESHAP regulations that would broaden its control over waste disposal operations. Johns-Manville, because of its expertise in the field, provided practical operating data to the Federal agency to assist in its development of the new codes.

Ugliness is another difficult challenge for J-M. No matter how well kept, any landfill disposing operation is far from attractive. Still, it is the Company's objective to return landfill sites to as close to their natural condition or better after use.

A good example of J-M efforts in this area can be noted in Asbestos, Quebec. Here, huge amounts of rocky overburden must be taken from the Company's Jeffrey Asbestos mine and deposited on the fringes of the open-pit mine. Very little in the way of grass or plants would naturally grow in such high-mineral deposit areas. However, J-M has contracted with a Canadian University and a team of experts to develop a strain of grass and plants that will thrive in the rocky areas. It's been a long, hit-and miss project, but today some of the overburden deposits can hardly be distinguished from the natural rolling hills of the area.

That's just another avenue J-M takes in its continuing "Good Neighbor" efforts.

For the Customer's Sake

Johns-Manville's dust control expertise travels with every bag of asbestos fiber it sells — even when the fiber is not in a bag.

J-M believes that control of asbestos fiber in the workplace is a responsibility that extends beyond our plants into those of customers and other users. Years of research and product development efforts have gone into assuring that asbestos can be safely handled and used once it is sold.

Each year, J-M sells more than 775,000 tons of asbestos from two mines in Canada and each shipment of fiber is designed to create the least amount of handling problems for purchasers.

Customer concern starts with the bags — four different types are available. The standard bags are of strong construction to reduce the chance of breakage. But beyond that, J-M also is shipping fiber in a pulpable paper bag that can be dumped unopened in papermaking operations, and in a polyethelene bag that also can be dropped unopened in certain other manufacturing processes, such as floor tile. Each bag is pressure packed to reduce dust generation in case of broken bags.

Shipments by water routes are made in containerized trailer units, which can be loaded on and off ships without opening the units. Bags of fiber can be shipped either on pallets or cardboard deck sheets to facilitate unloading. Greater use is being made of "assigned" railroad cars with double-wide doors that enable fork lift trucks to load and unload easier.



Inflatable dunnage is inserted between glue-locked pallets of asbestos fiber to prevent shifting and breakage during rail shipment.

Part of this shipping procedure involves inserting inflatable dunnage between the pallets to prevent shifting during transport.

If a customer requests it, entire pallets of bagged fiber can be covered in shrink-wrap polyethelene film as further protection from dust.

Very often, fiber handling systems developed for J-M operations find application in customer plants. Examples of these are in-plant fiber handling systems (J-M will supply schematics and cost estimates) and advances in automatic bag opening equipment. In the latter case, automatic bag openers have been developed by J-M and other manufacturers' systems have been put to practical testing at J-M mines and mills.

Product research by J-M has resulted in the development of pelletized fiber, which now is being shipped to many customers. The pellets use water as a binder and are virtually dust free. Development work also is continuing on high density asbestos fiber blocks, also dust free with the added advantage of consuming less space than pressure-packed bags.

All of these concepts in fiber packaging and shipping are geared toward making control of airborne asbestos fiber in our customers' plants easier or unnecessary.

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Dr. Wright's View

Health Risks Dose-Related

(Continued from page 1)

GW: Among the things that have come to light since 1969 is the information that there may be two other tumors occurring in excess among people who have been exposed to asbestos fiber by inhalation. In occupationally-exposed groups, there does appear to be an excess of the broad category of gastrointestinal (GI) tumors. But studies indicate that if this excess does in fact occur, it is of a very low order. Moreover, it occurs only in those who are the most heavily exposed — the kinds of exposures that simply do not occur at the present time and probably have not occured in the last 10 to 15 years.

The second tumor reported as occurring in excess in workers occupationally exposed to asbestos is cancer of the larynx. This has been reported from a very small scale study. In larger studies, such as those done by Dr. Corbett McDonald in Canada and Dr. Irving J. Selikoff in New York, and large scale studies in Great Britain, an excess of laryngeal tumors has not been noticed. This is a matter that needs more study, and is being studied now.

Q: *In that light, you noted in your 1969 review that the knowledge required to protect all workers was not yet available, and that its development was one of the urgent tasks of the immediate future. Have we made progress in that direction?*

GW: The question of whether we can, in occupational and public exposure settings, set a limit that will protect all people from any possible harm from asbestos is still somewhat up in the air. To develop information along these lines requires not only the ability to recognize the biological effects, for which we are reasonably well-equipped at the moment, but also to reconstruct past exposure histories. While we can measure recent exposure histories with some degree of validity, reconstructing exposures back over 30 or 40 years is quite another matter. We do have the ability to categorize people into light and heavy exposure groups in the past; but we encounter difficulty in the intermediate ranges.

I believe we are in a position now to completely support the view I expressed in 1969 that both asbestosis and bronchogenic cancer are dose-related. In other words, there is a level of exposure where one would anticipate that the risk of getting cancer of the lung or pulmonary fibrosis would be inconsequential. With respect to mesothelioma, there is evidence that this tumor likewise is dose-related . . . and this certainly is new information since 1969.

Q: *Do you believe then that the present proposals by OSHA that would further lower the asbestos standard are necessary and achievable?*

GW: First, it is important to indicate that our ability to control dust emissions in the workplace has been enormously augmented in the past five to six years. What at one time seemed a monumental task — that is achieving a 2 fiber per cc exposure limit — has now been shown to be, in most circumstances, an achievable one. If the proposed standard of 0.5 fibers per cc comes into being, I suppose some could say that the current view that 0.5 cannot be achieved is not very reasonable. On the other hand, I do believe that the effort to get to 2 fibers per cc utilized available methods that perhaps weren't being applied. It would by my judgment that, at this time, currently existing methods that will drop everything to 0.5 fibers or below are not available. They would have to be developed, and in that sense, we are in a very different position than we were in 1972. While I think we can get down to 2 fibers in most manufacturing, although maybe not milling operations, I think we would have to develop new methods to get below that. And, I must emphasize that while we have been learning things on the biological side to indicate that 2 fibers per cc represents a very high probability of protection, we've also gotten indications that this level can be achieved.

Q: *Are you saying that you believe that a 2 fibers per cc standard will protect everyone from asbestos-related health risks?*



Dr. George W. Wright

Now an independent medical consultant, Dr. Wright was Director of the Department of Clinical Physiology at the Saranac Lake, N.Y. laboratories of the Trudeau Foundation, where he was instrumental in developing the pulmonary function test now widely used to measure lung capacity and ability. He also served as head of the Department of Medical Research at St. Lukes Hospital in Cleveland and Professor of Medicine at Case-Western Reserve University in Cleveland. At the present time, he is Chairman of the Scientific Committee of the Institute for Occupational and Environmental Health — which funds many asbestos-related medical studies, and is a member of the Permanent Commission and International Association for Occupational Health. His professional memberships and list of medical papers he has written are numerous.

GW: I say it has a strong probability of protection. The problem of human susceptibility is such that, short of the agent being completely absent, we will have little hope of saying that any level on the low side will protect millions and millions of people who might be exposed. There always will be the one or two individuals out of many millions who might be so susceptible for various reasons that levels that completely protect 99.999 percent of the population might fail with 0.001 percent. This is true no matter what you are doing, whether you are talking about how people live in society, drive cars, swim or eat food. You can't really protect absolutely everybody.

Q: *Are you still convinced that cigarette smoking among people exposed occupationally to asbestos greatly increases the risk of lung cancer?*

GW: Such studies that have been made since 1969 support the concept that smoking cigarettes acts syngergistically with whatever the phenomenon is of asbestos that promotes bronchogenic cancer. Whether or not asbestos is a carcinogenic agent in its own right has been looked at, and I think the consensus at the moment is that it is not. But, it acts in providing a substrate on which smoking can play its role in a more potent way than it does in the absence of asbestos.

Q: *You've stated in the past that much of the disease being seen today is the result of working conditions that existed in the past. Can we expect a leveling off or decline in these cases at some time in the future?*

GW: There's no question about that. There is no evidence of an excess of disease in persons who have been employed in the asbestos industry during the last ten to 15 years. Only when we go back beyond that do we see cases in people who were occupationally exposed 20 to 25 years ago — maybe only for a few years, but with heavy exposures that began 25 years ago.

Here we get into the matter of latent periods. No matter what your exposure, it takes a certain length of time for disease to develop. Also, whether your exposure was light, moderate or heavy plays a role. So the facts are that what we are observing today is disease occurring in people whose initial exposures were years before, when the levels of exposure were much higher than they are today.

I sincerely believe that people exposed today at levels exposures ought to be — let's say 5 fibers per cc or less — will not have any abnormalities at the end of 30 years.

I would think that as far as pulmonary fibrosis and bronchogenic cancer are concerned, we could expect to see an excess of that for another 10 years, maybe a bit longer. My reason for saying that is that the industry really didn't get down to contrastingly low exposure levels until about 15 years ago, and the biggest change has been in the last 10 years. Now, that isn't to say nothing was done before that. We began improving dust controls in the 1930's, and work environments in 1935 were certainly cleaner than in 1925, and by 1950 they were again cleaner than they were in 1940. Beginning about 1965 some intensive efforts were again made, and I would say that from 1965 on we began to get close to the low exposure levels where we are now.

I think that, providing the industry continues to do what it should be doing to reduce exposures, anyone beginning their work in the industry now should have nothing to fear. There still is a danger from the intermittent high exposure due to equipment failure and problems, but we have learned how to control these by requiring protective equipment such as respirators and following other emergency procedures.

Q: *Do you still believe there is no significant threat to the public from ambient exposure to asbestos fiber?*

GW: Although we still do not have a great deal of knowledge about the numbers, lengths and diameters of asbestos fibers in the air and water, what we do have substantiates over and over again that the general air and water contains very small numbers compared to occupational environments. Even the lowest occupational exposure is many times greater than that from the general ambient atmosphere. Furthermore, they are almost solely very short fibers, and therefore, constitute an exposure that animal experiments have shown to be of no significance or an exceedingly minor one. I believe that any new information we have developed in the last 5 to 6 years thoroughly substantiates my belief that there is no threat to the public from ambient asbestos exposure.

Now, I want to make the distinction between public and para-occupational exposures, which is not done too often. There are people in the public who are not employed in the asbestos industry, but are associated very intimately with people who are — either their families, neighbors or they could be do-it-yourself types who don't know they are being exposed. Some of these individuals may experience a substantial exposure to asbestos. If you exclude that group along with the occupational one, then the remainder of the public is at no risk at all, as far as I'm concerned.

There are still those in the public who exaggerate the problem based on the occasional isolated case — which is very difficult to be certain about in terms of exposure. Some people have exposures they don't even know about, or have forgotten. These could be important factors in the occasional cases that are exaggerated.

Q: *One last question. How would you feel today if someone very close to you was considering going to work in the asbestos industry?*

GW: I wouldn't be concerned at all if I knew where he was going. If he was going into a plant where little or no attention is paid to environmental control, I certainly would encourage him not to do that. If I knew he were going into a facility where they were taking the necessary precautions, I'd prefer to see him there than out somewhere in an unknown area. There are other hazards besides asbestos, and some of these are not as well controlled. Also, I would do my best to give him some background information, and I would hope the industry that employs him would do the same. Any man who goes to work under these circumstances should be educated about the possible health risks . . . not so that he can go somewhere else, but so he can do what the industry can never do for him — and this is to work carefully and not do things that lead to a breakdown of all the precautions that are being taken to protect him.

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