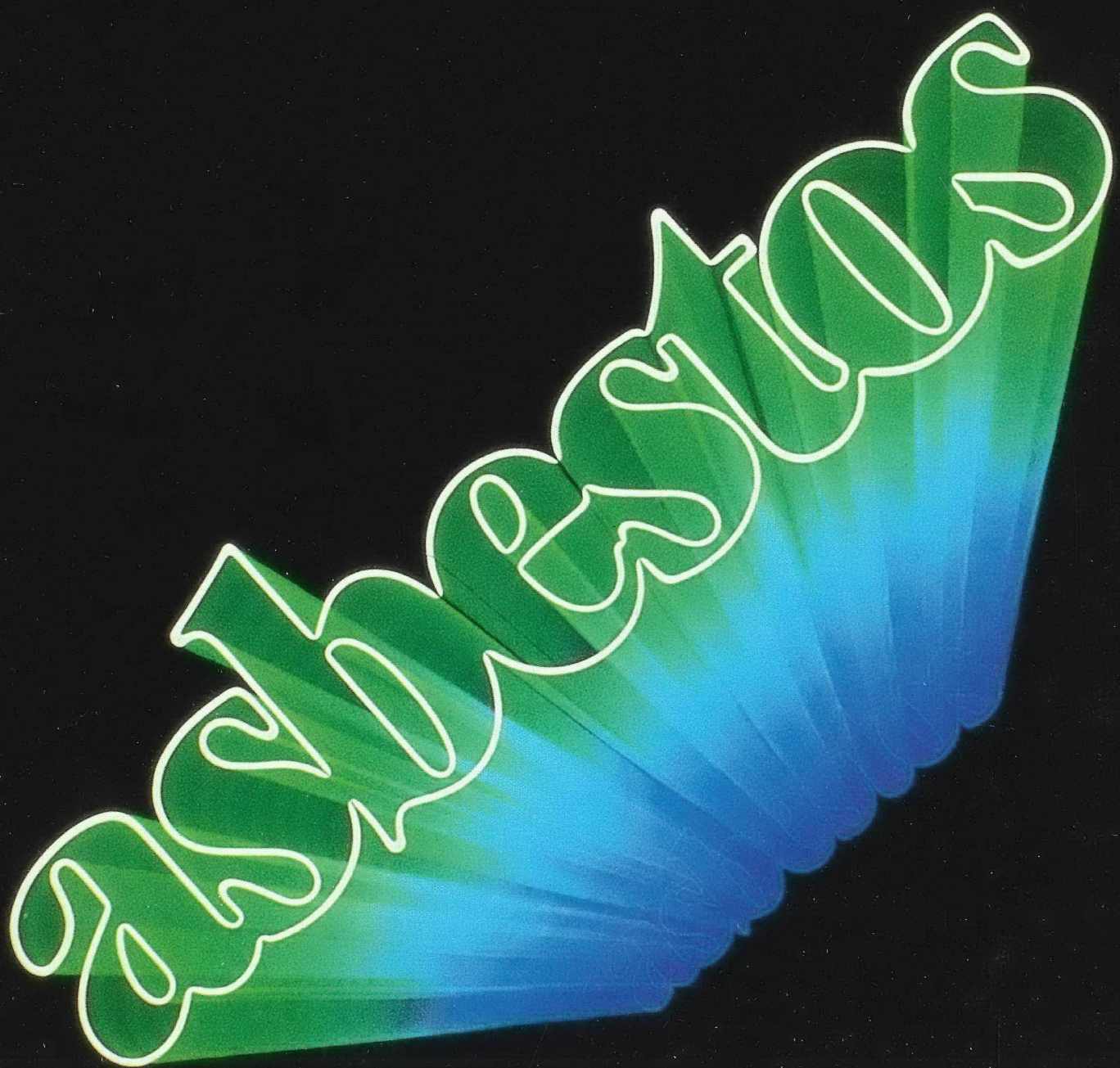
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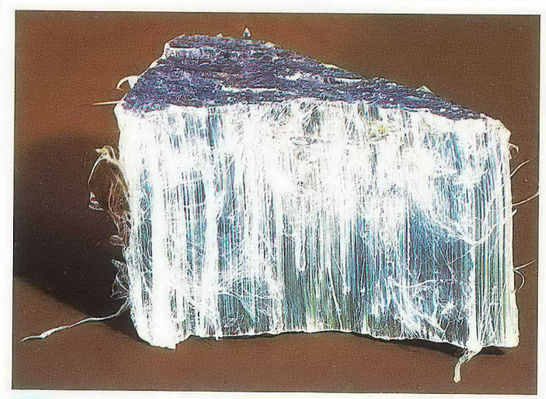
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Chrysotile Asbestos Fibers

A Natural Product for Modern Needs



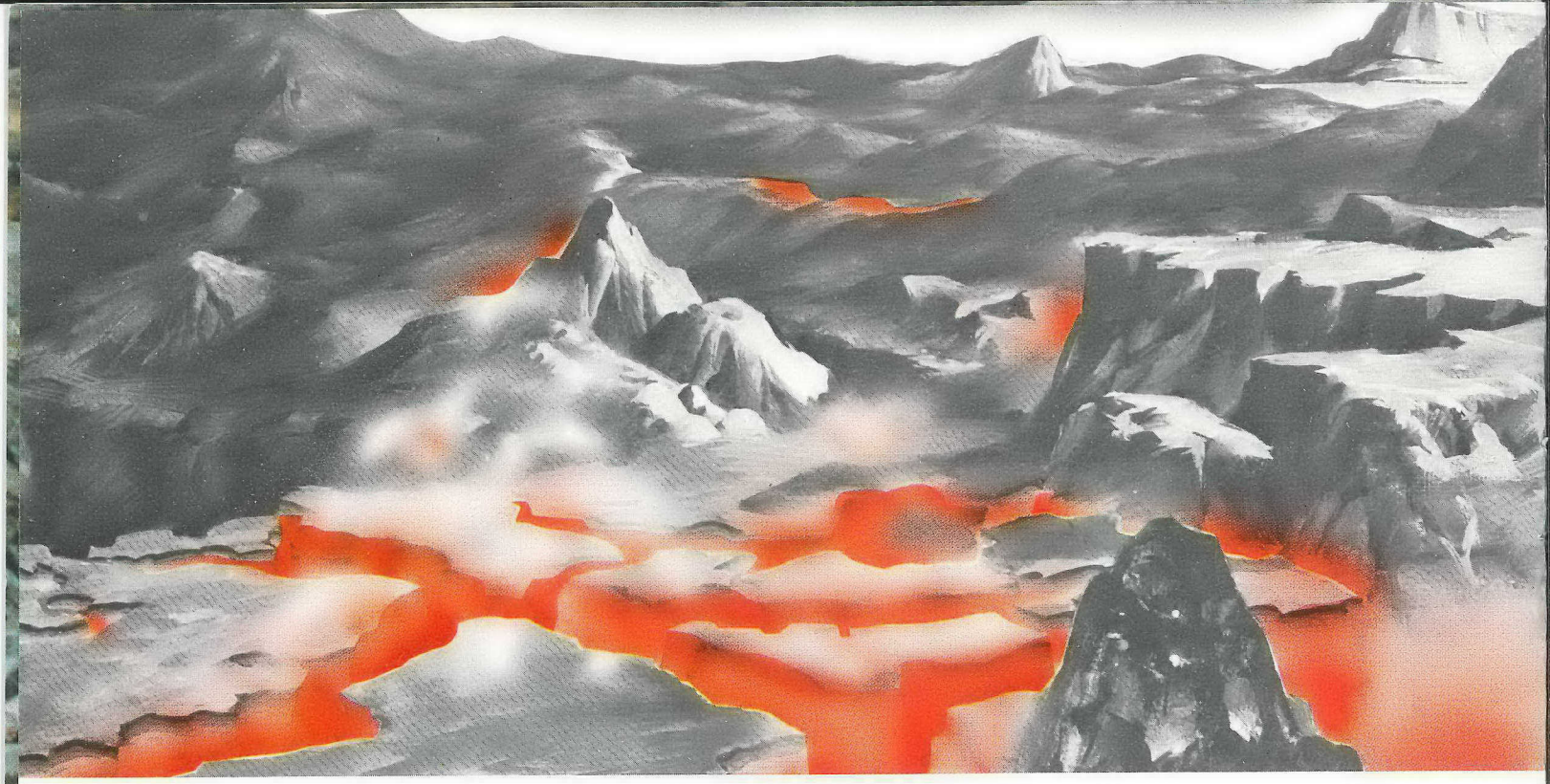
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Contents:

Chrysotile—Origin, Properties and Location 2-4
Chrysotile—Mining and Milling 5-7
Chrysotile—Testing and Standards 8-9
Chrysotile—Technical Service Research and Development 10
Chrysotile—Packaging and Handling 11-12
Chrysotile—Fiber Uses 13-15
Chrysotile and Health 16

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Chrysotile Asbestos Fiber... Strong, Durable and Pliable

Chrysotile asbestos is the best known member of a family of fibrous, silicate minerals generically referred to as asbestos which have one common attribute, the ability to be separated into relatively soft, silky fibers. Chrysotile occurs most commonly in vein form but may occur as a "slip" or mass fiber form in serpentine "host" rock which has the same basic chemical composition.

Chrysotile asbestos was formed during remote geologic ages at times of tremendous subterranean upheavals which resulted in masses of molten basic rocks being spewed upward into the earth's crust by the irresistible forces of terrific heat and pressure. Slowly, over a long period of time these rocks hardened and were altered by hot mineral bearing solutions.

At some later period further great disturbances occurred and the basic rocks were fractured and sheared. The hot mineral bearing solutions entered and filled these fractures and dissolved some of the rock constituents adjacent to the fractures. As temperatures and pressures diminished, the magnesium silicate solutions became super saturated and crystallization of chrysotile commenced. Eventually the fractures along which the hot solutions had circulated became a network of fibrous crystalline veins in an irregular pattern throughout the mass of basic rock.

So the geologist theorizes, was asbestos created in nature's underground laboratory—a miracle of heat, pressure, and time.

The history of asbestos can be traced back to the early Greeks whose literature tells of fireproof cloth and lamp wicks that were not consumed by flame. Pliny made reference to its use in "cremation cloth" as the funeral dress of kings. The emperor Charlemagne is said to have so mystified his rude warrior guests by throwing an asbestos tablecloth into the fire and withdrawing it unharmed that they returned to their rival kingdom and warned their ruler not to make war against so powerful a magician.

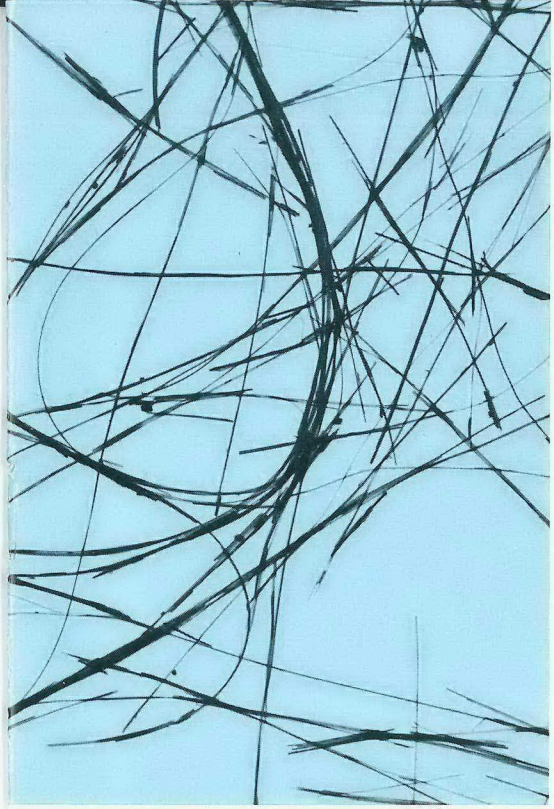
Today asbestos serves many essential functions in construction, in industry, and in transportation. Over the years fire-resistant asbestos has saved thousands of lives and much valuable property. For safety, fire prevention and durability, products containing asbestos are used in schools, houses, theaters, office and other public buildings, spacecraft, furnaces, boilers and firefighting equipment. The brakes on automobiles, trucks, buses and trains are dependable because asbestos is a prime component of brake linings.

The major end use markets for asbestos are shown in the accompanying chart.

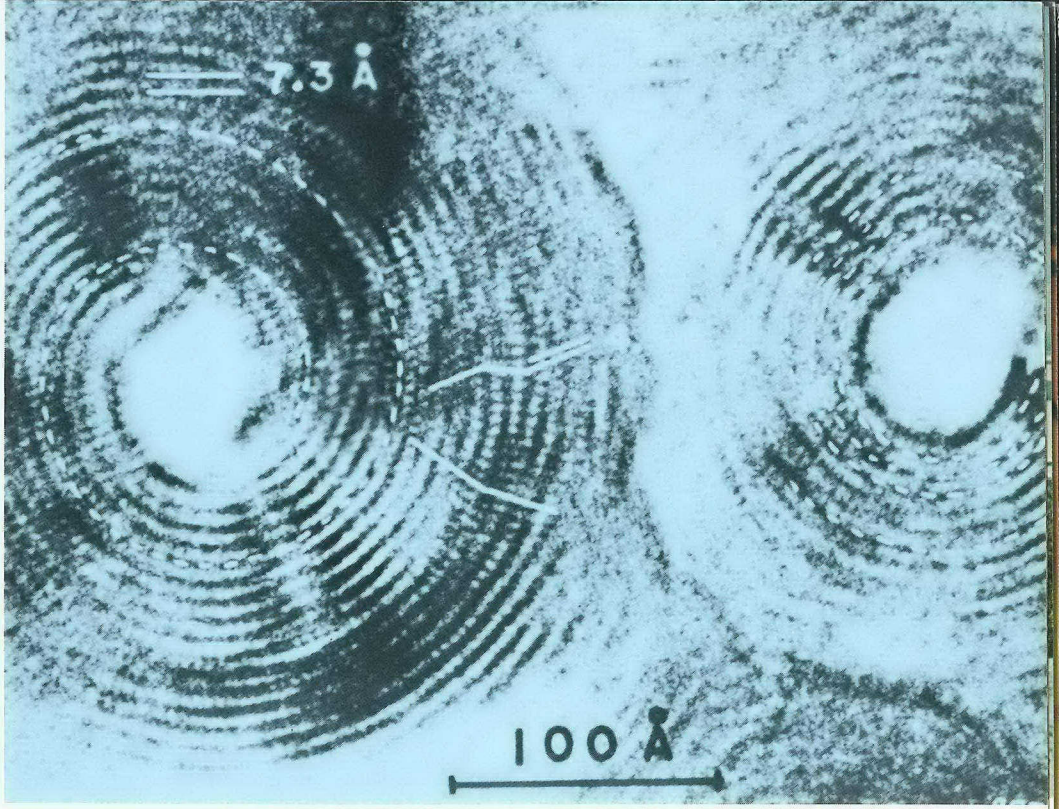
CONSUMPTION OF ASBESTOS BY END USE

Asbestos Cement Materials	65%
Flooring Products	10%
Friction Materials	7%
Asbestos Papers	4%
Gaskets and Packings	3%
Coatings	2%
Textiles	1%
Others—Plastics, Caulks, Sealants, etc.	8%
	100%

Johns-Manville, Chrysotile Asbestos Fibers: A Natural Product for Modern Needs (1981)
ACL Doc 24533 · Page 3 of 19
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A. *Electron Micrograph of Jeffrey Chrysotile. (8000X)*



B. *Cross-sectional View of Chrysotile. (K. Yada)*

To the scientist chrysotile asbestos fiber is a hydrous magnesium silicate having the chemical composition $Mg_3(Si_2O_5)(OH)_4$. As seen from a typical chemical analysis, impurities such as iron and aluminum are common in varying degrees.

APPROXIMATE CHEMICAL ANALYSIS

SiO_2	36-42	Fe_2O_3	Tr-5
MgO	38-42	Al_2O_3	Tr-3
H_2O	12-15	Cao	Tr-1
FeO	Tr-6		

The soft, silky chrysotile fibers exhibit excellent flexibility and tensile strengths well above 250,000 psi which make them highly suitable as a reinforcing material. Electron micrographs of chrysotile fiber from Johns-Manville's Jeffrey Mine show these fibers magnified 8000X. (See A)

The structure of chrysotile asbestos as shown in the accompanying electron micrograph by K. Yada appears to be a multispiral arrangement of crystal lattice planes with a hollow core. (See B) Measurements indicate that individual fibrils of chrysotile have average fibril diameters in the range of 200°A. Present fiber processing techniques however cannot achieve separation of the majority of fiber bundles into single fibrils.

Chrysotile asbestos exhibits excellent resistance to attack by most chemical reagents. It is, however, susceptible to attack by concentrated caustics at their boiling point and by mineral acids.

Widely used in high temperature applications because of its thermal stability, significant weight loss in chrysotile fiber does not occur until temperatures exceed 540°C. Some strength loss is experienced at lower temperatures but many asbestos containing products are useful and retain their shape even beyond this temperature. Beyond 540°C the water of hydration is driven off accompanied by a loss in strength and an embrittlement of the fiber. At about 800°C the chrysotile is converted to a refractory silicate.

EFFECT OF TEMPERATURE ON WEIGHT LOSS OF CHRYSOTILE

(Elapsed time—one hour)

°F	°C	% Loss in Weight
400	205	0.30
600	315	0.86
700	370	1.78
800	425	2.17
900	480	2.83
1,000	540	3.99
1,100	595	10.38
1,200	650	12.75
1,400	760	13.43
1,600	870	13.62
1,800	980	13.77

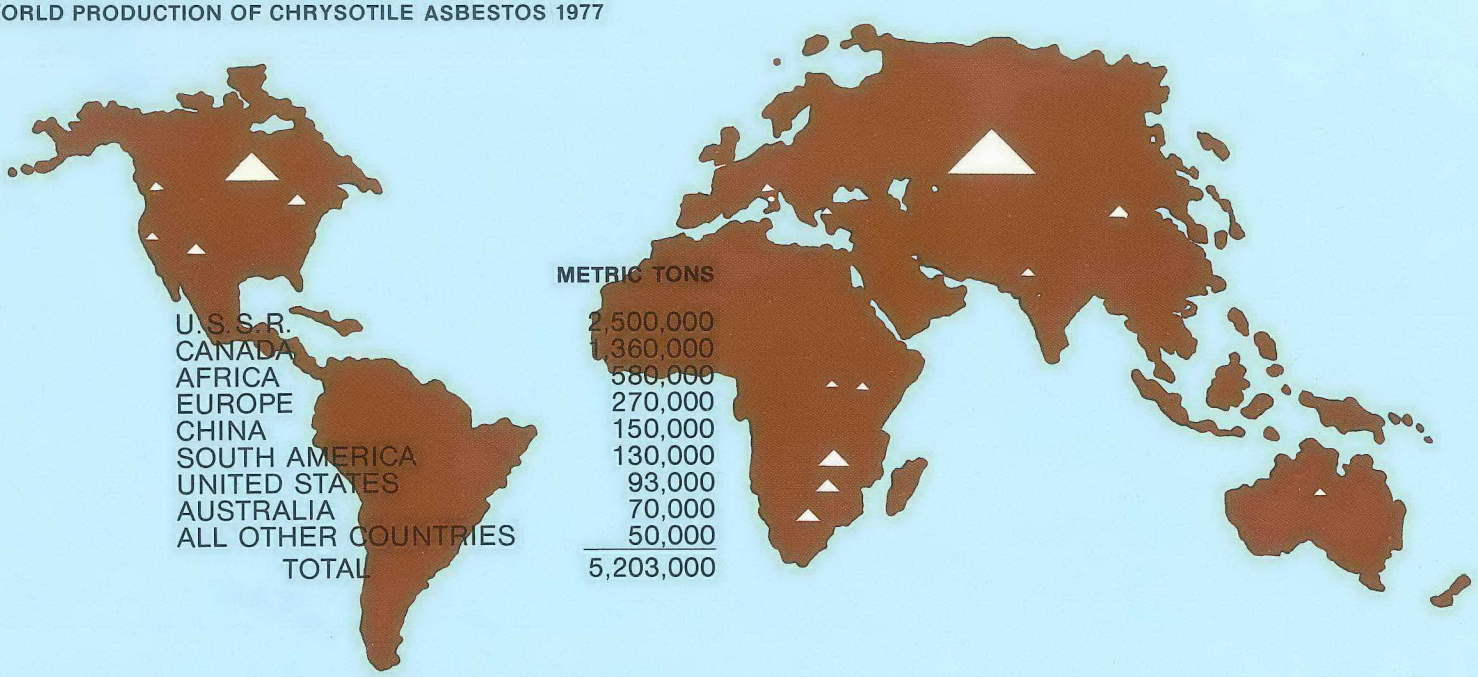
Because of its fibrous nature, thermal stability, high tensile strength, flexibility, and incombustibility chrysotile asbestos finds wide use in industry as a reinforcing fiber and filler that contributes to dimensional stability, durability, and resistance to the effects of time, weather, and fire. These properties are imparted to a variety of products including paper, textiles, plastics, cement products, friction materials, and flooring and building materials.

PHYSICAL PROPERTIES OF CHRYSOTILE

Color	White to gray
Tensile strength, psi	280,000—436,000
Modulus of elasticity, psi	23.2×10^6
Hardness, mohs	2.5—4
Flexibility	good
Specific heat, Btu/lb/°F	0.266
Specific gravity	2.4—2.6
pH	10.3
Refractive index	1.50—1.55
Fibril diameter, A	160—300
Surface area, BET, m^2/gram	1.7—60
Coeff. of cubical exp, °F	5×10^{-5}
Charge in water	positive
Isoelectric point	11.3—11.8
Resistance to acids	poor
Resistance to bases	good
Magnetite Content	0—5.2

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WORLD PRODUCTION OF CHRYSOTILE ASBESTOS 1977



The map indicates the major areas where asbestos is found. Size of symbols indicates relative importance of deposits

Asbestos...The World Over

The major occurrences of chrysotile asbestos are in the Province of Quebec, British Columbia and the Yukon Territory in Canada; the Ural Mountain area of Russia; and southern Africa. Lesser deposits are found in Ontario and Newfoundland in Canada; California, Vermont, and Arizona in the United States; Italy; Cyprus; Australia, Brazil and Greece.

Chrysotile asbestos accounts for 95% of the world's production of asbestos. Current estimates indicate existing supplies are sufficient to meet industry's needs for the next several decades and although consumption is forecasted to increase in the future, expansion of existing facilities, discovery of new deposits, and development of techniques to mine previously uneconomic deposits are expected to insure a continued supply far beyond that date.

As the western hemisphere's largest asbestos producer, Johns-Manville has continued for the past half-century to perfect the techniques of mining and milling chrysotile asbestos fiber in an effort to keep modern industry supplied in ever increasing quantities.

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Aerial View of Jeffrey Mine.

A Huge Mine...

The Jeffrey Mine of Johns-Manville Canada Inc., located at Asbestos, Quebec, some 100 miles east of Montreal, produces approximately 38% of the current Canadian production and approximately 11% of the world production of chrysotile asbestos.

Asbestos was first recognized in this area in the early 1880's. In 1881 a wealthy farmer W. A. Jeffrey provided the needed capital to develop the asbestos deposit located on the old Charlie Webb farm.

Jeffrey operated the mine in a primitive fashion for 14 years during which production increased to an annual tonnage of 2,300 tons. In 1895 a group led by Feodor Boas purchased the mine and backed by English capital formed the Asbestos and Asbestic Company in 1897. Against formidable odds the company struggled to increase production over the next 19 years.

In 1916 the Manville Asbestos Company acquired control of the Asbestos and Asbestic Company and two years later formed Canadian Johns-Manville Company Limited, (now Johns-Manville Canada Inc.) who have operated the property since that date.

Today the huge Jeffrey Mine is over 1¼ miles (2 km) in diameter and 1050 feet (310m) deep. Annual production capacity from this mine has increased to over 600,000 metric tons.

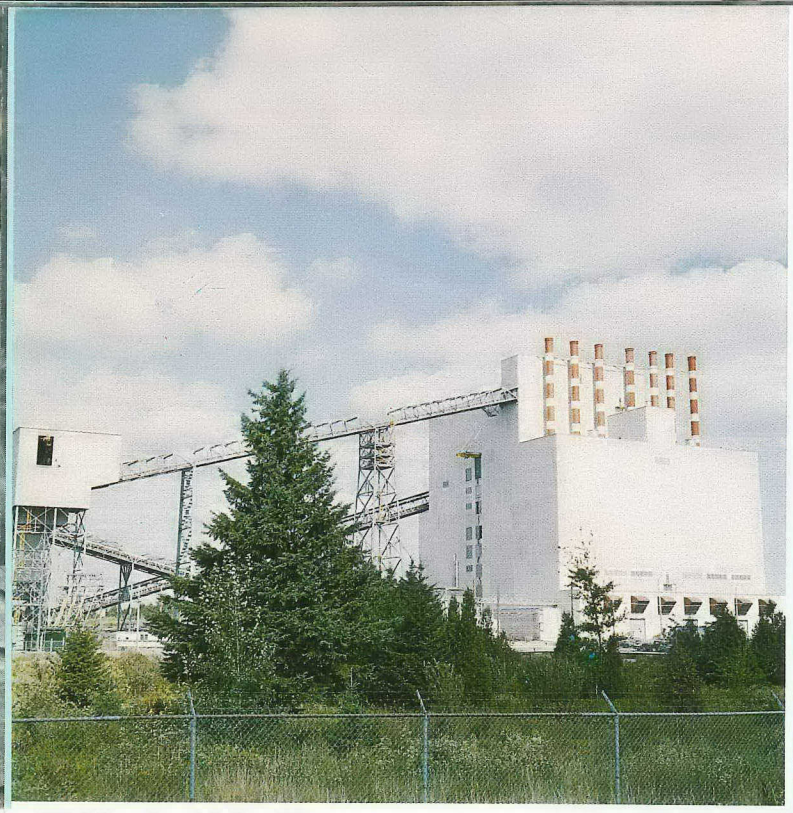
The open pit mining system at Jeffrey is known as spiral benching. The "benches" provide work areas for the trucks and shovels. The serpentine rock, containing veins of fiber, is broken by explosive charges strategically placed in drill holes.

In excess of 130,000 tons of ore, waste, and overburden are mined and hauled out each day with a modern fleet of 100 and 200 ton trucks. The open pit mining techniques utilized at the Jeffrey Mine enable J-M to keep the mill supplied with pre-selected high quality ore from a variety of areas of the pit to produce uniformity and quality. Overburden, barren rock, and poor quality ore are diverted and disposed of at the source and never enter the mill.



A 200 Ton Truck at Jeffrey Mine.

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Mill 6 Complex at Jeffrey Mine.



72" Gyratory Crusher.

A Modern Mill...

While nature was generous when endowing us with chrysotile asbestos, she was also devious. The precious, white silky fibers occur embedded in serpentine rock, having a chemical composition similar to the fiber itself. Tremendous tonnages of rock must be removed to recover relatively small amounts of the fiber. To accomplish this, Johns-Manville operates the western hemisphere's largest mine and largest, most modern asbestos mill. It is here that the crude ore is repeatedly processed to produce fiber grades in a useful form.

In 1973 J-M completed a $75 million expansion at the Jeffrey Mine in Asbestos, Quebec. Included in the expansion was the installation of a 72 inch gyratory crusher weighing more than a million pounds and the construction of a new concentrator dryer complex. The gyratory crusher which can break up blocks of ore as large as 6 feet is fed from two dump pockets each capable of receiving the load from a 200 ton truck.

The crushed ore is conveyed to secondary crushers and further reduced in size. The fibrous fraction goes directly to the dryers while oversize ore is processed through a concentrator plant which further reduces it in size to free the remaining asbestos.

From the crusher dryer complex the ore is transferred by conveyor to the dry rock storage building. During this process the ore is again blended to provide a uniform feed material to the various milling operations.

Separation of the fiber is accomplished in the 12 story mill at Jeffrey by a complex system of crushing, screening, and aspirating operations. As in most mills the operation consists of multiple groupings of these basic recovery cycles. Processing equipment allows production of over 125 different grades of fiber to specific requirements of length, strength, openness, filterability, bulk, or absorption.

The twelfth floor fan room in the mill at Jeffrey contains banks of fans which draw over five million cubic feet of air per minute through fabric bag filters and provide clean working air throughout the mill.

Finished products are bagged and palletized automatically for shipment throughout the world. Continual instrument monitoring has made the Jeffrey mill the world's most highly controlled asbestos production facility.

In 1976, Johns-Manville announced a 3-phase $77 million capital expenditure program to further develop facilities at Asbestos, Quebec. This 5-year program is designed to assure continuation of a high level supply of asbestos from the Jeffrey Mine for many years to come.

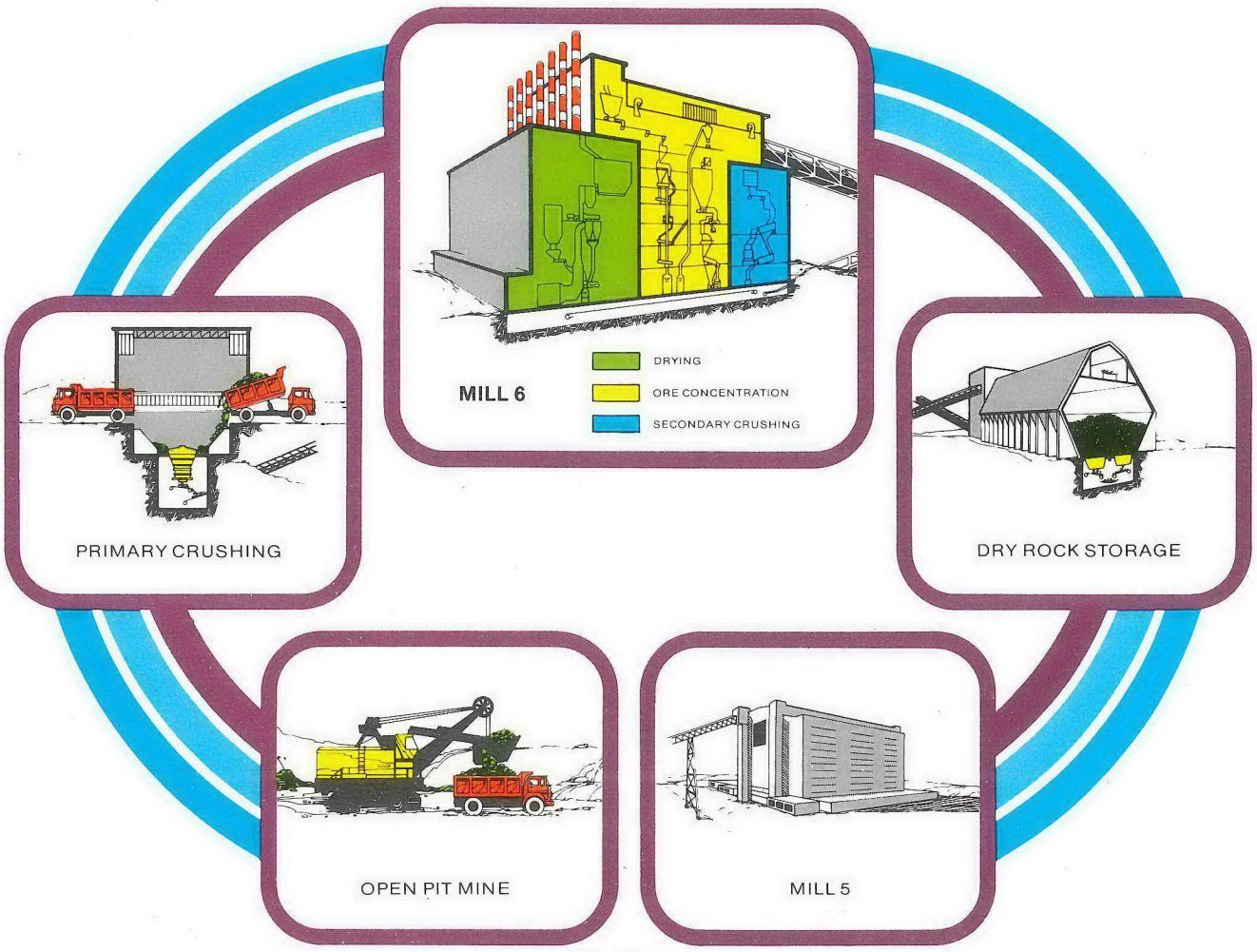
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Interior Fan Room.



Mill 5 at Jeffrey Mine.



Mining and Milling Process of Asbestos

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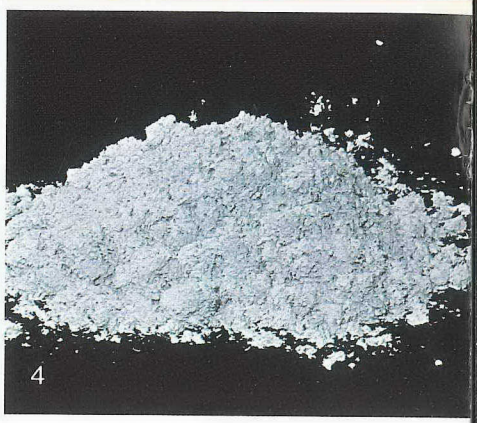


Quebec Standard Screen Test.









1. Crude Asbestos. 2. Milled Asbestos Long.
3. Milled Asbestos Medium. 4. Milled Asbestos Short.

Fiber Testing...the Key to Quality

Chrysotile asbestos is available from Johns-Manville in over 100 standard and special grades. Each designation defines a distinct grade that is suitable for certain industrial applications. These grades are further defined as to textural characteristics. Such specialization provides fiber grades which meet the requirements of most existing products. It also gives the Research and Development Engineer the confidence that he can depend on Johns-Manville to provide a uniform supply of fiber to meet his requirements for new products.

QUALITY CONTROL. The maintenance of quality and uniformity play a major role in the J-M operation. Samples are automatically collected during the production of the fiber, permitting preliminary on-the-spot tests to be made concurrently with production. Minor adjustments can then be made, while processing continues, in order to ensure that quality is maintained within prescribed limits. Subsequently, representative samples are thoroughly tested to assure that each lot meets required specifications before being released for shipment.

QUEBEC STANDARD TESTING METHOD. In the Quebec Standard Screen Test used for the classification of Jeffrey Mine products, a measure of the length distribution of the fiber is obtained by subjecting a 16 oz. sample to a dry screening operation. The equipment required for this purpose is the Quebec Standard Asbestos Testing Machine which consists essentially of a nest of 4 screen boxes measuring 24½" × 14¾" clamped to a motor driven shaker table. The bottoms of the three upper boxes are made from brass screen wire having openings of .500," .187" (4 mesh) and .053" (10 mesh) respectively, while the lowest box is a receptacle for fines which fall through the other three.

To make a test, the prepared sample is placed in the uppermost box, the lid is clamped in position and the machine is set in motion. At the end of 600 revolutions at 327 r.p.m. the motor stops automatically and the quantity of fiber retained on each screen is weighed and recorded in ounces.

The identification of fiber grades by this system employs the use of a number followed by a letter e.g. 3T or 4T, or 5R, or 6D, or 7M, etc. The *number* classifies the fiber into broad groups with "3" representing the longest fibers, progressing to "7" representing the shortest fibers. The *letter* is used to more precisely classify fiber length within each numbered group. The letter "A" represents the longest grade progressing to "Z" which represents the shortest grade within each numbered group.

For example a 3T designation indicates a grade with a minimum Q.S. value of 2-8-4-2, or 2 oz. retained on the ½" screen, 8 oz. on the 4 mesh, 4 oz. on the 10 mesh, and 2 oz. passing through to the bottom box or pan.

Hence, it is known by this system that all group 3 fiber grades are longer than all group 4 fibers, and a grade 4A is longer than a grade 4T, etc.

This test instituted by the Quebec Asbestos Mining Association (QAMA), has gained worldwide acceptance as a standard for the classification and evaluation of asbestos fiber.

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ACL Doc 24533 · Page 9 of 19
Published by AsbestosClaims.Law
asbestosclaims.law/library/24533/9

QUEBEC STANDARD GRADE CLASSIFICATION	Q.S. VALUE (OZ.)	REGULAR AVAILABLE GRADES					
		VERY CRUDY	CRUDY	SEMI-CRUDY	OPEN	WELL OPEN	VERY WELL OPEN
4D	0-7-6-3				4D12		
4K	0-4-9-3	4K30			4K12	4K04	
4T	0-2-10-4	4T30			4T12	4T04	
5D	0-0.5-10.5-5				5D12	5D04	
5K	0-0-12-4	5K30				5K04	5K02
5M	0-0-11-5	5M30					
5R	0-0-10-6	5R28		5R21	5R12	5R04	
6D	0-0-7-9	6D30	6D24	6D20	6D12	6D04	6D02
		LOW BULK	MEDIUM BULK	HIGH BULK	VERY HIGH BULK		
7D	0-0-5-11	7D15		7D04	7D02		
7F	0-0-4-12	7F19		7F04			
7H	0-0-3-13	7H19	7H05				
7K	0-0-2-14	7K15	7K05				
7M	0-0-1-15	7M15	7M05	7MF5			
7R	0-0-0-16	7R15	7R05	7RS5			
7T	0-0-0-16	7T15	7TS6	7T05			
7RF	0-0-0-16	7RF3	7RF1		7RF02		
7TF Floats	0-0-0-16	7TF1			7TF02		

Johns-Manville Standard Grades

Johns-Manville identifies texture by adding a two digit numerical suffix to the standard grade length designation explained earlier.

The textural numbers start at "30" meaning very crudy decreasing to "02" which means very well opened. For example, in the 6D grade length, Johns-Manville provides fibers having the following texture differences.

6D30	very crudy
6D24	crudy
6D20	semi-crudy
6D12	open
6D04	well open
6D02	very well opened

In the case of the group 7 fiber grades, the textural numbers are used to express the bulk and absorption properties. The high numbers such as "19" and "15" indicate grades having low bulk and absorption, and the numbers decrease to "02" which represents grades having very high bulk and absorption.

The table above lists the variety of grades which Johns-Manville produces on a regular basis.

CHRYSOTILE FIBER TESTING. Several other characteristics have been identified which also effect the suitability of an asbestos for any given application. The QAMA in conjunction with other relevant organizations has adopted a series of test procedures designed to measure these properties as outlined hereunder. Copies of the test procedures are available on request.

PROPERTY TO BE MEASURED	TEST PROCEDURE
A. Length Distribution	Quebec Standard Test Rotap Screen Analysis Bauer McNett Classifier
B. Flexural Strength in Asbestos/Cement products	Strength Unit
C. Water Drainage Rate	Freeness
D. Surface Area	Dyckerhoff Air Permeability
E. Viscosity Building	Penetration Index
F. Buoyancy in Water	Wet Volume
G. Unopened Fiber Bundles	Crudy Content

Johns-Manville uses all of these tests regularly to monitor the quality of the grades being produced for specific applications.

SPECIAL GRADES. In addition to the Standard Grades shown in the table, Johns-Manville produces a variety of Special Grades each of which has been developed for use in a specific application.

These include **Chlorbestos® and Paperbestos®** fibers for use in chlorine cell diaphragms and paper respectively. Certain grades can be surface treated to provide faster release of water. These are designated by the prefix "S" for fast drainage and "SP" for super fast drainage.

If the Standard Grades do not fill your needs, the possibility for custom blending exists.

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Fiber Development Laboratory.



Johns-Manville Research Center, Denver, Colorado.

Technical Services... J-M is the Leader

FIBER DEVELOPMENT. The Fiber Development Department at the Jeffrey Mine comprises some 35 skilled specialists and technicians who continually test new equipment and evaluate new and improved milling techniques. In accordance with their recommendations new machinery is installed and a continuous program of modernization is maintained. This Department operates a pilot plant within the Mill duplicating the essential items of equipment utilized *in the full scale mill* thus enabling bulk samples and small orders of special grades to be prepared under close supervision.

RESEARCH. The new J-M Research Center in Denver, Colo., houses laboratories and staff devoted to basic research on the properties of chrysotile fiber and applied research into the use of chrysotile asbestos to meet industrial needs. Many innovations, ranging from routine products for better homes to exotic aerospace discoveries, are a direct result of this extensive research program.

The aid of the Research Center specialists is frequently enlisted in the resolution of difficult customer problems and in the development of fiber grades suitable for applications where standard materials are not satisfactory.

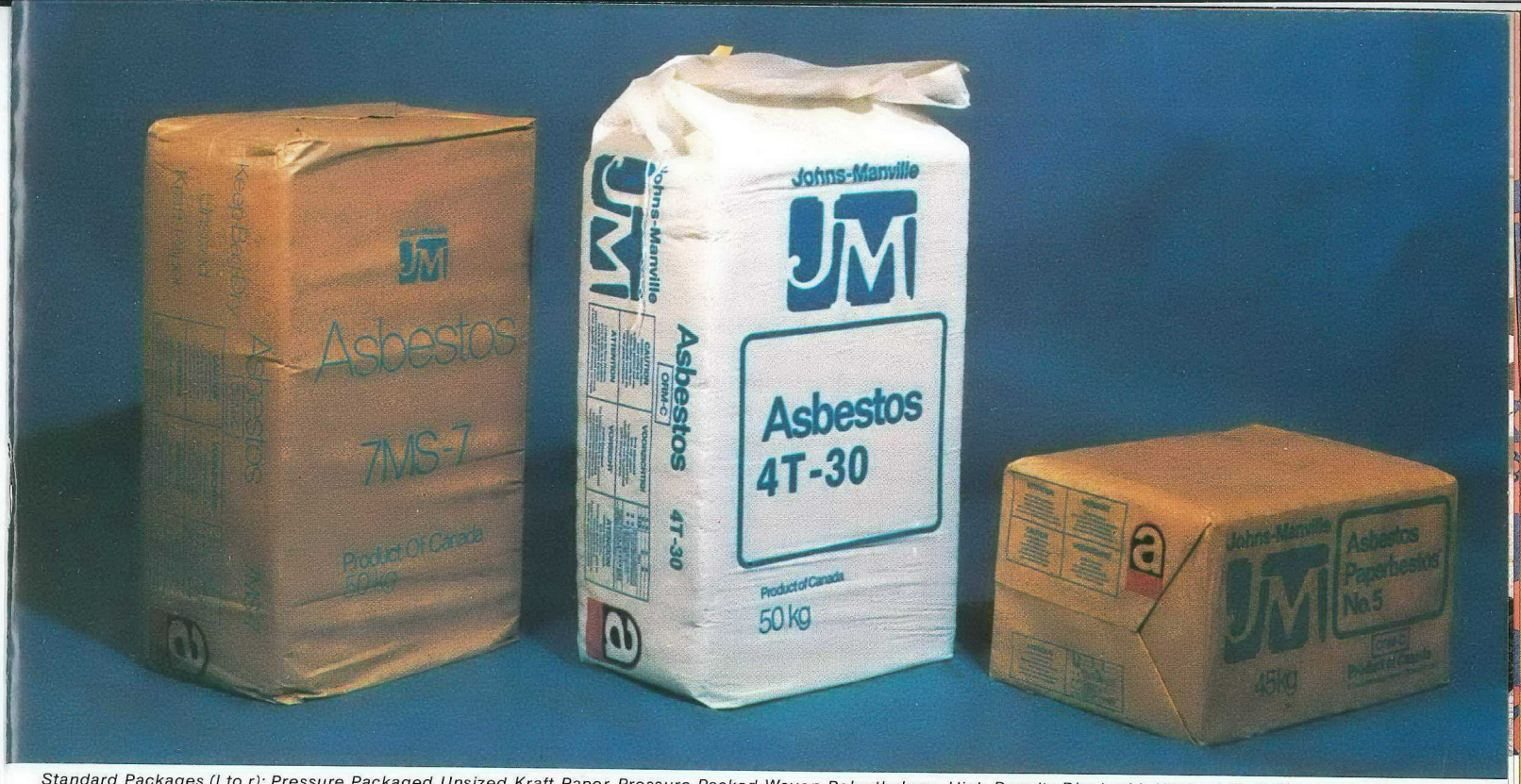
SALES SERVICE. Special Representatives, experienced in the application of asbestos in industry, are available throughout the United States, Canada and a number of international locations. Your representative can assist in the selection of the grade best suited for your product or help resolve problems involving the use or the handling of asbestos.

In addition, J-M engineers and technologists at the Mines and Research Laboratories, trained in every phase of fiber development, production, utilization, and packaging, may be called upon to assist in the resolution of major problems.

While the classification system provides a quick reference which can be used as a general guide in the selection of fiber grades, many users prefer to make their own evaluations and set standards to suit their particular requirements. Frequently, the choice of a fiber grade is the final outcome of an investigation made in the user's plant during which samples have been evaluated in pilot production or laboratory tests.

J-M engineers are available throughout such experimental periods to give advice and assistance. They are prepared to interpret the results of plant production trials, translate them into terms of fiber characteristics and finally to set up asbestos fiber manufacturing specifications as may be required.

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Standard Packages (l to r): Pressure Packaged Unsized Kraft Paper, Pressure Packed Woven Polyethylene, High Density Block with Unsized Kraft Wrapping.

Packaging...the Key to Safe Handling

The type of package used for asbestos fiber is an important factor in improving environmental conditions in your plant. Proper packaging contributes greatly to eliminating damage to fiber during transit and handling. By selecting the right package, you may also be able to reduce your in plant handling and warehousihg costs.

Through years of research and development in conjunction with our suppliers and our own asbestos using facilities, Johns-Manville has developed two types of bags which are particularly well suited for the asbestos industry. Packaging and fiber handling studies are carried out on a continuing basis. If you have a special need, consult with your Johns-Manville representative.

Johns-Manville has completed a program to convert all pressure packaging equipment to provide a standard size package with dimensions of 9″ x 15″ x 22½″ and to convert bagged fiber to 50 kilogram packages. These changes are part of a continuing program designed to assure that shipments of fiber arrive at customers' plants in environmentally sound condition.

PRESSURE PACKED WOVEN POLYETHYLENE. These bags are constructed of woven polyethylene filaments to give exceptional strength and durability. The woven polyethylene material is coated on the outside to make it impervious to dust and moisture. An ultraviolet inhibitor is added to the polyethylene to improve its resistance to sunlight. These bags are recommended in situations where rigorous manual handling is involved such as overseas shipment by the "break bulk" method. Woven polyethylene bags can also be palletized for mechanical handling.

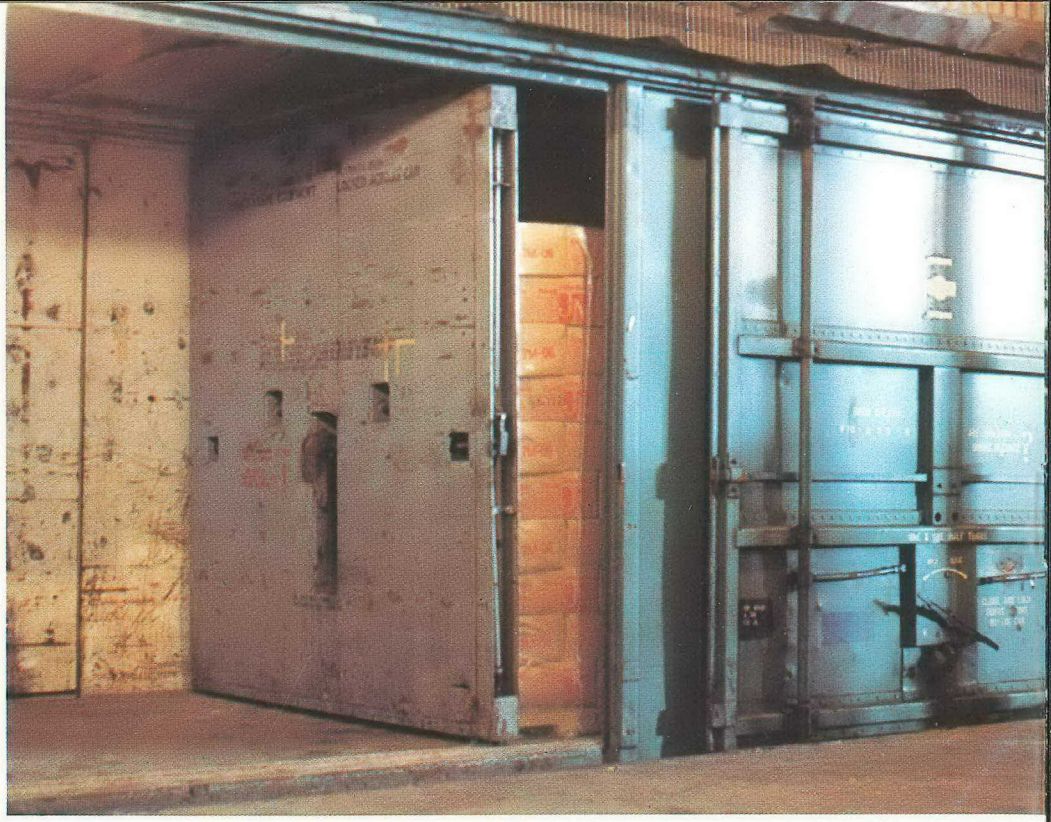
PRESSURE PACKED UNSIZED KRAFT PAPER. This is a special pulpable bag which was developed for use in wet paper making processes. The bags are constructed with multiple plies of unsized natural kraft paper. When dry they are as sturdy as regular paper bags. However, when wet the bag has poor strength and readily disperses in a hydropulper. When packaged in pulpable bags, chrysotile fiber can be introduced into a process without being removed from the bag. This greatly improves the in-plant environment, because the bags do not have to be opened. This method eliminates the need to dispose of empty bags since they are consumed in the end product.

KRAFT PAPER WRAPPED HIGH DENSITY BLOCKS. Equipment has been developed to produce high density blocks of fiber measuring 9″ x 12″ x 16″. These blocks have a density of 100 lbs. per cubic foot or approximately twice the density of a standard pressure packed bag. The blocks are wrapped with an unsized kraft paper wrapper and can be shipped on pallets and completely covered with polyethylene shrink film. The benefits include a reduction in storage space required, more stable units, and improved environmental conditions during transit and handling.

Johns-Manville engineers constantly evaluate packaging and shipping methods so that orders may be delivered intact and in a form that takes full advantage of fiber handling, technology, current freight rates, and unloading equipment. Contact a J-M fiber representative for assistance in choosing the package best suited for your operation.

Johns-Manville, Chrysotile Asbestos Fibers: A Natural Product for Modern Needs (1981)
ACL Doc 24533 · Page 12 of 19
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UNITIZATION. To meet the need for safer, cleaner shipping methods, you can now purchase your fiber palletized and completely covered in shrink wrapped plastic film.

ASSIGNED CARS. A fleet of rail cars is at your disposal to shuttle between Johns-Manville Jeffrey Mine and your plant. These are special cars with movable interior bulkhead doors which hold the fiber units in place and eliminate shifting and damage.

Fiber Handling Now and in the Future

Rapidly advancing technology continually develops alternative packaging and handling methods. As a pioneer in fiber handling, J-M developed the use of both shrink wrapped and stretch-wrapped palletized units of bagged fiber for cleaner, safer shipments. In shipping, we utilize damage-free bulkhead rail cars to minimize bag damage in transit.

Equipment has been developed to produce high density blocks of fiber measuring 9" X 12" X 16". These blocks have a density of 100 lbs. per cu. ft. or approx. twice the density of a standard pressure packed bag. The blocks can be shipped on pallets and completely covered with polyethylene shrink film. Some of the benefits include a reduction in storage space required, higher stacking, and improved environmental conditions during transport and handling.

Jeffrey engineers are continually developing and evaluating equipment and systems to improve shipping and handling methods for asbestos fiber. Contact your J-M representative for more information and assistance with your fiber handling problems.

SPACE SAVINGS. Comparison of space occupied by two-ton units in high density blocks (left) and standard 100 pound bags.



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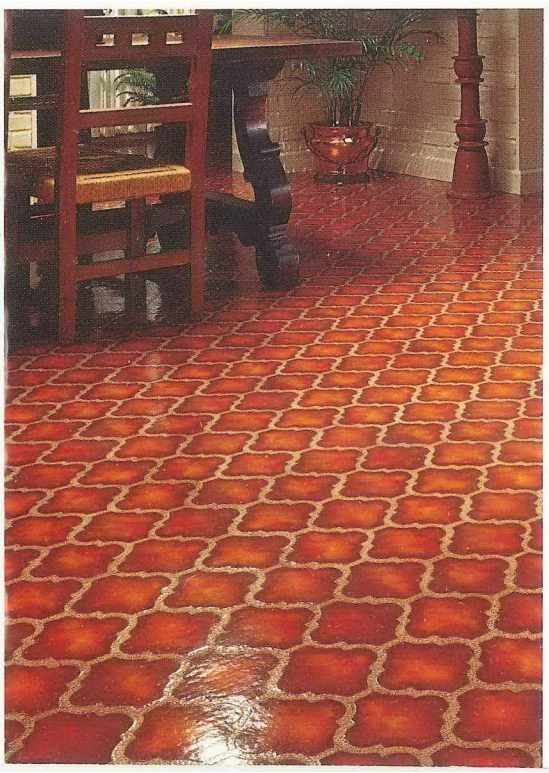
ASBESTOS CEMENT SHEETS. The largest world market for asbestos is the asbestos-cement industry. Lightweight, durable, fire resistant asbestos-cement panels and shingles have found use in residential, commercial, and industrial building since the late 19th century.

ASBESTOS CEMENT PIPE. Asbestos-cement pipe has gained wide acceptance for use in water systems, sewerage pipes, drainage pipes, and conduits. Its lightweight, smooth bore, resistance to corrosion, and versatility have improved water and waste handling systems throughout the world.

Asbestos-cement products require crudy, fast draining grades of fiber such as J-M grades 4T30, 5R28, or 6D30.

VINYL ASBESTOS FLOOR TILE. Vinyl asbestos floor tiles utilize asbestos as a reinforcing filler to improve indentation, strength, and dimensional stability short fiber grades such as 7RS7 and 7TS6 are used.

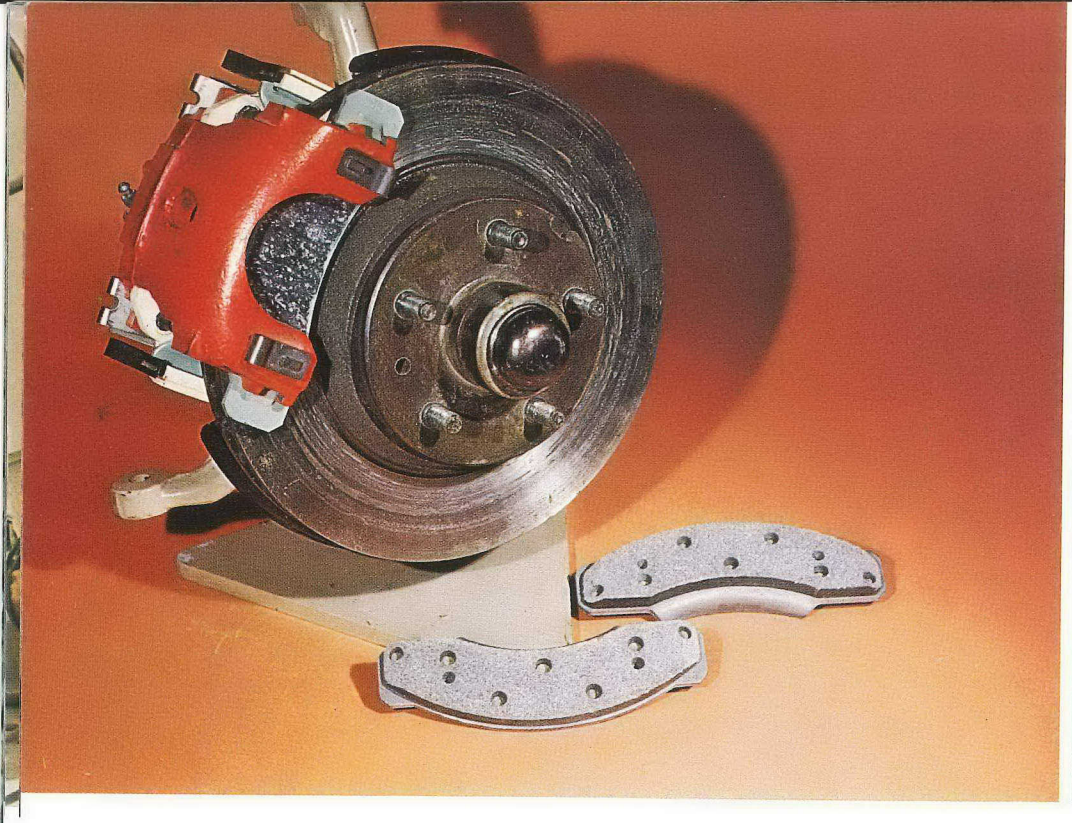
How Chrysotile Fiber is Used



When H. W. Johns made his first roofing out of manila paper, burlap, asphalt and asbestos fiber little did he know that he and a few other pioneers were laying the groundwork for a new industry. From those first applications the list of asbestos-containing products has grown substantially.

SHEET GOODS FLOORING. Resilient vinyl sheet goods flooring has exhibited tremendous growth in the past ten years. An asbestos-latex paper backing is used because of its rot resistance and dimensional stability. J-M Paperbestos® #5 and 7MS7 fibers are well suited for this application.

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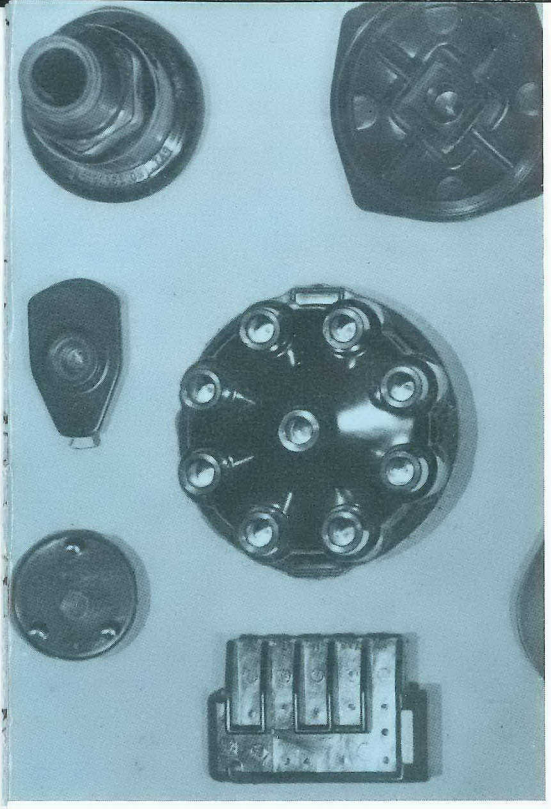


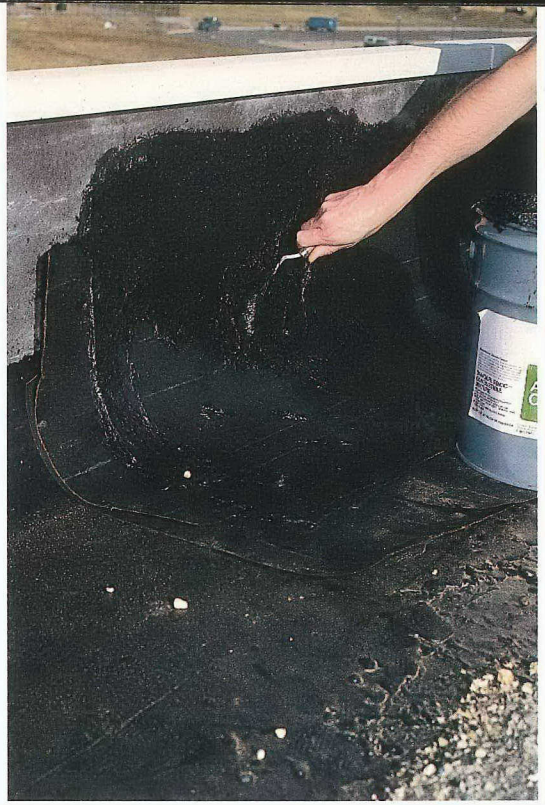
FRICTION MATERIALS. Because of its thermal resistance, reinforcing properties, and contribution to frictional properties, chrysotile asbestos has become a major component of brake linings, brake blocks, and clutch facings. Disc brakes utilize the reinforcing properties of long fibers such as, 5K04, and 5R12. Shorter grades of fiber such as 7F19, 7H19, and 7M05 are used in drum brakes. In heavy duty brake blocks 4T12, 5K04, and 6D04 are used.

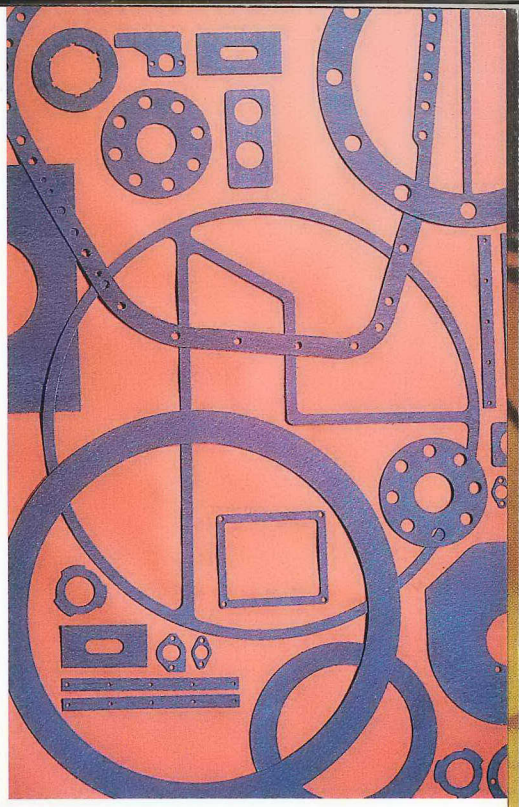
ASBESTOS TEXTILES. Asbestos textiles continue to find use in commercial and industrial applications. Asbestos cloth is used for fire protective clothing in industry and by public fire fighting agencies. Packings and clutch facings make use of asbestos textiles. Standard J-M textile grade fiber 3T12.



Johns-Manville, Chrysotile Asbestos Fibers: A Natural Product for Modern Needs (1981)
ACL Doc 24533 · Page 15 of 19
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PLASTICS. Chrysotile asbestos is used in plastics as both a reinforcing fiber and a low cost filler. Phenolics, polyesters, polypropylene, polyethylene and PVC can all be filled with asbestos. Noticeable improvements in such physical properties as flexural strength, flexural modulus, and resistance to heat distortion are realized with the addition of 10 to 40% of chrysotile fibers. Asbestos can also improve flow control in the mold, surface finish, chemical resistance and dimensional stability of many plastics. Long fibers such as 5K04, and 4K12 and 4T12 are used for reinforcement while shorter grades such as 7TF1, 7RF02, and 7TS6 are used as reinforcing fillers.

ASPHALT COATINGS. The use of asbestos in asphalt coatings to give a thixotropic effect, to improve resistance to high temperature flow and to provide reinforcement is a widely accepted application. Short grades of fiber such as 7M05, 7R05, and 7T05 are used in roof coatings and pavement sealers while extremely fine fibers such as 7TF1, and 7RF02 are used for sprayed automobile underbody coatings.

GASKETING. Gasketing materials made by blending chrysotile asbestos with heat resistant rubber are used in a variety of high temperature, high pressure applications ranging from automotive gaskets to industrial steam lines. Compressed sheet gasketing is manufactured with J-M fiber grades 4T12, 4T04 and 5K02. Beater ad gasketing manufactured on a paper machine can be made using Paperbestos #3 or #5.

ASBESTOS PAPER. The use of specialty papers utilizing Chrysotile asbestos is diverse. In addition to the existing applications such as commercial roofing felt, pipeline wrapping felt, electrical paper, and gasketing, asbestos paper is finding use in cooling tower fill and fireproof barriers for building panels. Fiber grades commonly used in paper include Paperbestos #3, 5, 6D20 and 6D04.

OTHER APPLICATIONS FOR ASBESTOS and typical grades of chrysotile fiber used are listed below:

Acetylene Cylinders—4T30, 6D02
Adhesives—7M05, 7TF1
Chlorine Cells—3T12, 4T12
Chlorbestos #25
Joint Sealers—7TF1, 7M05
Tire Sealants—7RF1, 7TF1

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ACL Doc 24533 · Page 16 of 19
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Chrysotile Asbestos and Health... a Statement of Fact

Chrysotile Asbestos fiber, used since antiquity, has widespread and important applications in our modern technological society. Recent scientific advances and our increased medical knowledge have lent urgency to the need to cope with occupational health problems related to the excessive inhalation of generated dust.

Such problems are not unique to the asbestos fiber industry. Many substances and materials in common use today can be detrimental to the health and safety of industrial workers under uncontrolled conditions. A vital and widely used raw material, chrysotile asbestos fiber, is but one of a number of potentially harmful substances used by industry.

The known medical facts, supported by nearly half a century of international studies and research, are that:

1) Asbestos related health risks are essentially confined to the job setting.

2) Asbestos related diseases develop, only after the inhalation of substantial amounts of resperable asbestos dust usually for a prolonged period of time.

3) There is at present no evidence that exposure to the minute amounts of asbestos that may be present in any community enivornment presents any hazard whatsoever to the general public.

These facts are well recognized by the chrysotile asbestos mining and manufacturing industries, which have made substantial progress over the years in protecting the people who work with these fibers and in eliminating emissions of free fiber into the community air.

It is obvious that good preventative maintenance must go hand in hand with effective dust control measures if the standards relating to asbestos fiber recently announced by OSHA are to be achieved.

Johns-Manville, Chrysotile Asbestos Fibers: A Natural Product for Modern Needs (1981)
ACL Doc 24533 · Page 17 of 19
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Aluminized asbestos suits protect steel workers during hazardous operations

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Johns-Manville

Asbestos Fiber Sales
Ken-Caryl Ranch
Denver, Colorado 80217
(303) 979-1000

Johns-Manville Canada Inc.
Asbestos Fiber Division
P.O. Box 1500
Asbestos, Quebec, Canada JIT 3N2
(819) 879-5433

Canadian Johns-Manville Asbestos Ltd.
Asbestos, Quebec, Canada

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