4.1.5,3

PLAINTIFF'S EXHIBIT

UC-5444

ASBESTOS TOXICOLOGY

STATUS SUMMARY

October 1972

Union Carbide trial exhibit UC-5444: Union Carbide, Asbestos Toxicology Status Summary for Calidria Asbestos Us... Published by AsbestosClaims.Law
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ASBESTOS TOXICOLOGY

October, 1972

Introduction

Many people have become justifiably uneasy about the toxicological aspects of asbestos and recent federal regulations regarding its use. Unfortunately, the publicity given to this governmental activity has tended to be of a sensational nature and has done little to place the question of asbestos toxicology in logical perspective. We take this opportunity, therefore, to state our firm belief that Union Carbide Corporation can comply with the regulations. Installation of additional dust control equipment at our plant to achieve compliance is substantially complete. Moreover, we believe that our customers can, without undue burden, comply with these regulations as they apply to their operations.

With regard to the toxicity of asbestos, it is important to note that asbestosis and statistical excess occurrences of bronchogenic carcinoma have occurred only in connection with massive long term exposures to asbestos dust. The risk of this type of exposure is usually in asbestos mines and mills and in manufacturing operations such as floor tile plants where asbestos usage may vary from 15,000 to 30,000 tons per year. The risk of long term massive exposure is generally not typical of operations utilizing the specialty type "Calidria" Asbestos products.

The purpose of this short report, therefore, is to provide the "Calidria" Asbestos user and potential user with a reasonable picture of the toxicology situation and a copy of the final OSHA regulations on asbestos usage. Some limited information on handling procedures and control of dust generated by cutting and grinding that may be of particular interest for the small user is also included.

It would be impractical and redundant for us to attempt to interpret, in a short report, the great mass of published matter, scientific and otherwise, that has appeared on both sides of the asbestos question. Instead, a small number of relevant articles have been selected and arranged by subject. It includes:

Toxicology Information

1. Asbestos and Your Health

   Some direct answers to toxicology questions. Published by the Quebec Asbestos Information Service.

2. Airborne Asbestos

   The Summary and Conclusions section of a comprehensive study on asbestos toxicology by the National Academy of Sciences. The key conclusion is that the general public is in no immediate danger from asbestos which is in sharp contract with much of what appears in the popular press. The complete report is available on request.

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3. Response to Article in Wall Street Journal

When the OSHA regulations were published, the Wall Street Journal chose to attack them in an article that presented a very distorted picture of the facts, typical of much of the newspaper coverage of the question. This is the response to the article.

4. Several reprints from recent newspaper articles. Coverage is more objective.

5. The testimony of Dr. Wright before OSHA at the hearings on the proposed regulations.

This is included for those seriously interested in the background of the toxicology questions.

OSHA Regulations

1. Report Series on OSHA - June 26, 1972

Industry comment on the regulations and a brief summary of the main features.

2. Safety and Health Reporter - July 17, 1972

Plans and progress on regulations similar to asbestos on other substances.

3. OSHA Regulations on Asbestos

4. "Calidria" Asbestos Material Safety Data Sheet

Dust Control

1. Transfer Devices

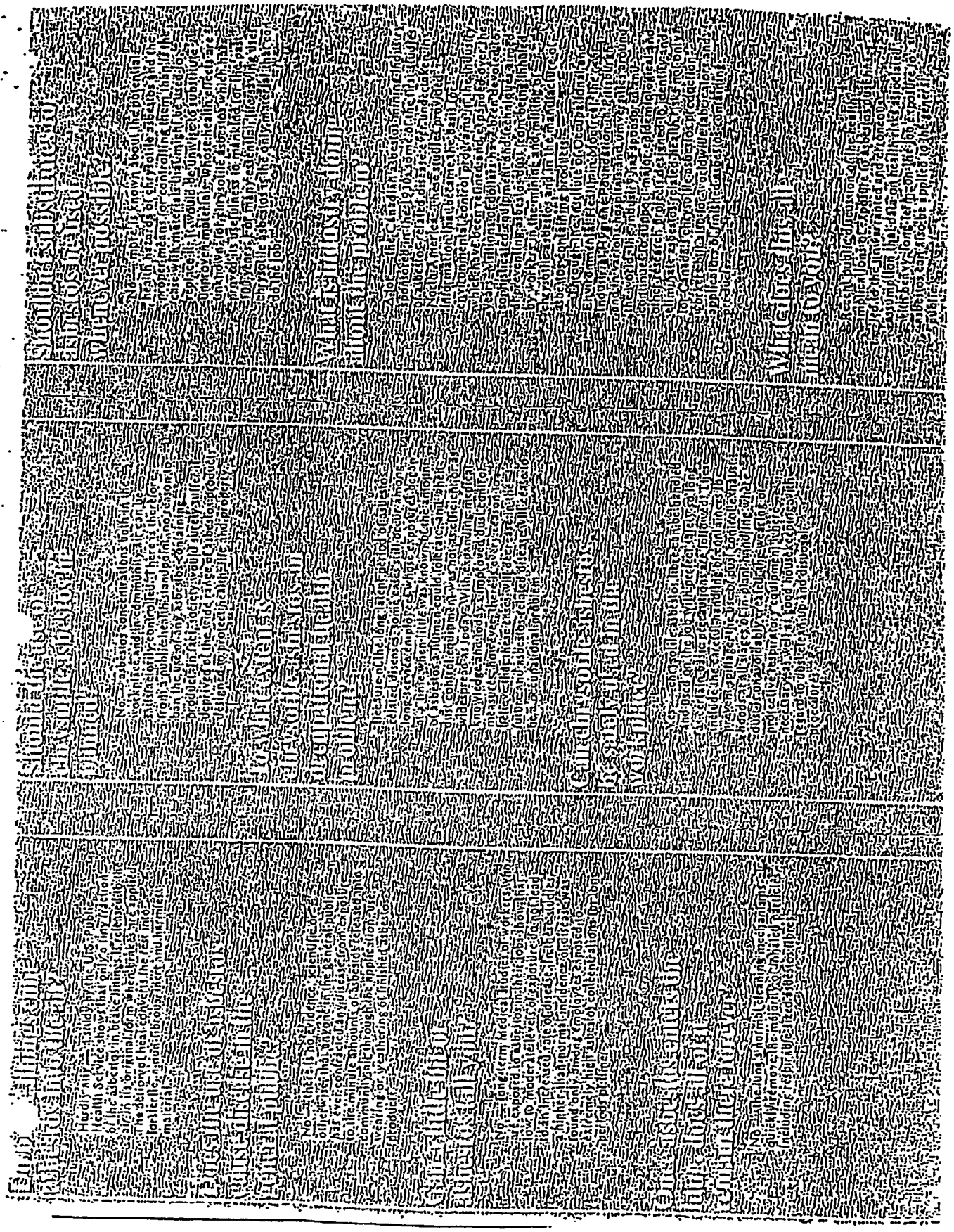
Two apparatus arrangements developed by Dow Chemical to transfer their light Saran Microballoons. Similar devices have been successful for several small "Calidria" Asbestos users.

2. Vacuum Grinding Equipment

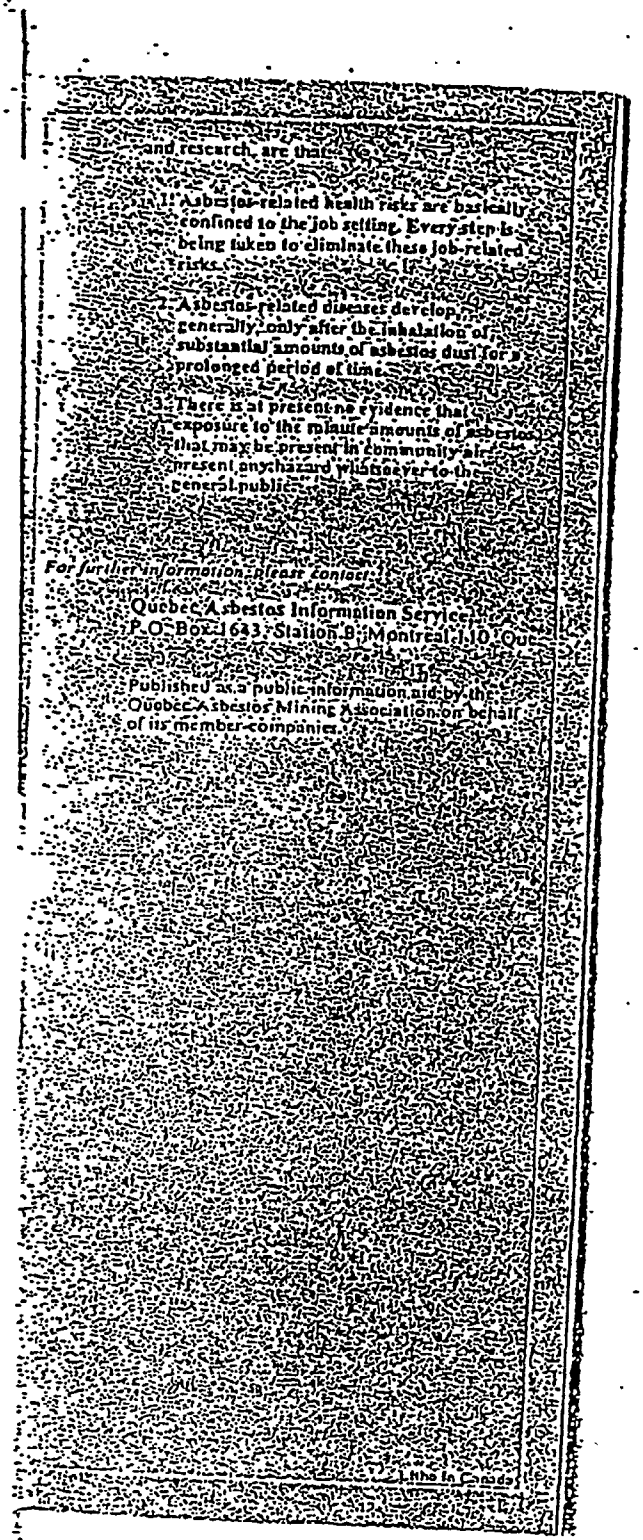
In some applications plastics containing asbestos are abraided. Small amounts of fiber may be released. Here is one convient way to control the dust.

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and research are that:

1. Asbestos-related health risks are basically confined to the job setting. Every step is being taken to eliminate these job-related risks.

2. Asbestos-related diseases develop generally only after the inhalation of substantial amounts of asbestos dust 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 community air present any hazard whatsoever to the general public.

For further information please contact:

Quebec Asbestos Information Service
P.O. Box 1643, Station B, Montreal, H3B 3L3, Que.

Published as a public information aid by the Quebec Asbestos Mining Association on behalf of its member-companies.

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A I R B O R N E A S B E S T O S

A Report Prepared by the
Committee on Biologic Effects of Atmospheric Pollutants
of the
Division of Medical Sciences, National Research Council

National Academy of Sciences
National Academy of Engineering Washington, D.C. 1971

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CHAPTER 7

CONCLUSIONS AND RECOMMENDATIONS

PATHOGENICITY OF ASBESTOS MINERALS

Any of the commercially used asbestos minerals, when inhaled in sufficient numbers, as in uncontrolled occupational exposures, can cause disabling fibrosis of the lungs. An association between occupational exposures to asbestos and bronchogenic carcinoma has been established, but the dose relationship and the role of cofactors have not been defined. Evidence of a causal association between some but not all exposures to asbestos fibers and diffuse malignant mesotheliomas of the pleura and peritoneum is substantial, but evidence of such a relationship with other tumors is inconclusive. Although the different types of asbestos differ in some of their biologic effects, no type can be regarded as free of hazard. The hypothesis that asbestos fibers act as cofactors or carriers of carcinogens is attractive, but as yet unproved.

EVIDENCE OF HUMAN NONOCCUPATIONAL EXPOSURES TO ASBESTOS

The demonstration of ferruginous bodies, similar to those found in asbestos workers, in a large proportion of randomly selected lung specimens in many parts of the world is presumptive evidence that persons with no occupational contact may have inhaled and retained asbestos. Proof has come in some areas with positive identification of chrysotile asbestos fibers. Analyses of community air for asbestos have been too limited to define the sources, concentrations, and distribution of fibers in the environment. The fiber concentrations that have been demonstrated in ambient air are small, compared with those in industry, but data are inadequate for definitive comparisons.

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ESTIMATION OF RISK IN HUMAN NONOCCUPATIONAL EXPOSURES TO ASBESTOS

The most important question in the case of persons with nonoccupational exposures to asbestos is whether there is an increased risk of malignancies. Industrial experience indicates that there is no likelihood of significant asbestosis in nonoccupational exposures. The major potential for risk appears to lie in those with indirect occupational contacts, household contacts, or residence in the immediate neighborhood of asbestos sources; and even there, the actual risk is poorly defined. But the fact that there appears to be a gradient of effect in such groups suggests that there are levels of inhaled asbestos without detectable risk. It is not known what range of respirable airborne asbestos fibers will ultimately be found to have no measurable effects on health. At present, there is no evidence that the small numbers of fibers found in most members of the general population affect health or longevity.

NEED FOR AND FEASIBILITY OF CONTROLS

Asbestos is too important in our technology and economy for its essential use to be stopped. But, because of the known serious effects of uncontrolled inhalation of asbestos minerals in industry and uncertainty as to the shape and character of the dose-response curve in man, it would be highly imprudent to permit unrestricted additional contamination of the public environment with asbestos. Continued use at minimal risk to the public requires that the major sources of man-made asbestos emission into the atmosphere be defined and controlled. In the absence of such controls, local fiber concentrations might at times approach those in occupational sites. Analytic methods and epidemiologic data are inadequate for the development of ambient air standards, but emission controls are needed and appear feasible.

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What is Calidria ASBESTOS

CALIDRIA Asbestos, a product of Union Carbide, is a chrysotile asbestos obtained from a unique, short-fiber deposit located in the New Idria area of the Diablo Mountain Range in central California, approximately 150 miles south of San Francisco.

New Idria ore is essentially free of hard, consolidated rock masses typical of asbestos ores from the Quebec region—generally conceded to be the center of the established free world industry. Further, this ore assays up to 60 per cent asbestos fiber compared to Canadian ore which ranges from 7 to 15 per cent.

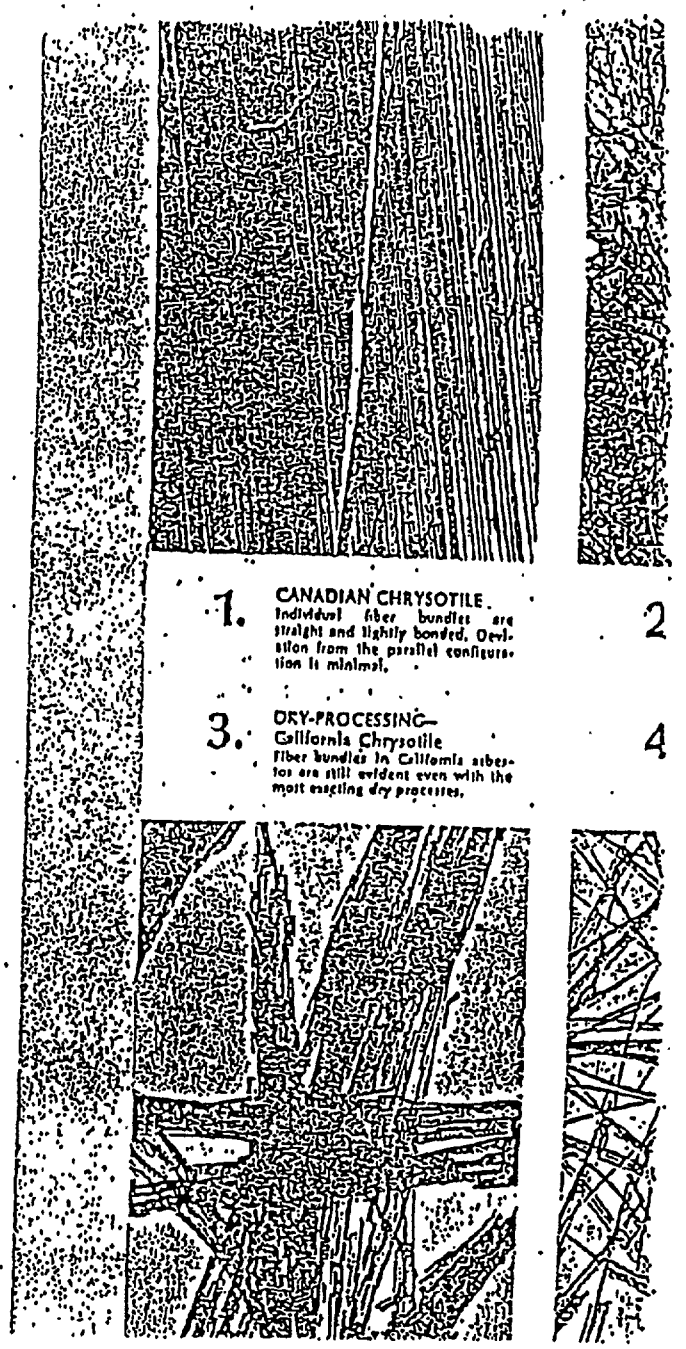
Through special mining methods and processing techniques developed by Union Carbide, New Idria ore is converted into CALIDRIA Asbestos products with many superior advantages. Their unusual properties have been instrumental in the introduction of unique, economical products of high purity which have found application in an entirely new spectrum of industrial uses.

Union Carbide's California deposit is one of the world's largest sources of high-grade asbestos ore, assuring continued supply for development and expansion of CALIDRIA Asbestos materials.

Where is it being used today?

Listed are the primary, conventional, and specialized application areas where the high purity, non-abrasiveness, high brightness and end use efficiency of CALIDRIA Asbestos are contributing to better products and lower costs:

- Viscosity Control Additive
- Thixotrope
- Extender
- Reinforcing Agent
- Pollution Control Agent
- Thickener
- Co-Flocculant
- Opacifier
- Softener
- Bulking Agent



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High purity and proprietary processing make

CALIDRIA ASBESTOS

superior to any other asbestos

CALIFORNIA CHRYSOTILE
Random orientation, point contact and high fiber content tell CALIDRIA Asbestos are apart from other asbestos sources.

WET-PROCESSING—
CALIDRIA Asbestos
Unique process used to produce CALIDRIA Asbestos provides 98 per cent liberated, individual fibrils.

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CALIDRIA ASBESTOS

sets new standards of performance!

Typical Applications in

VISCOSITY CONTROL

Resin Systems:

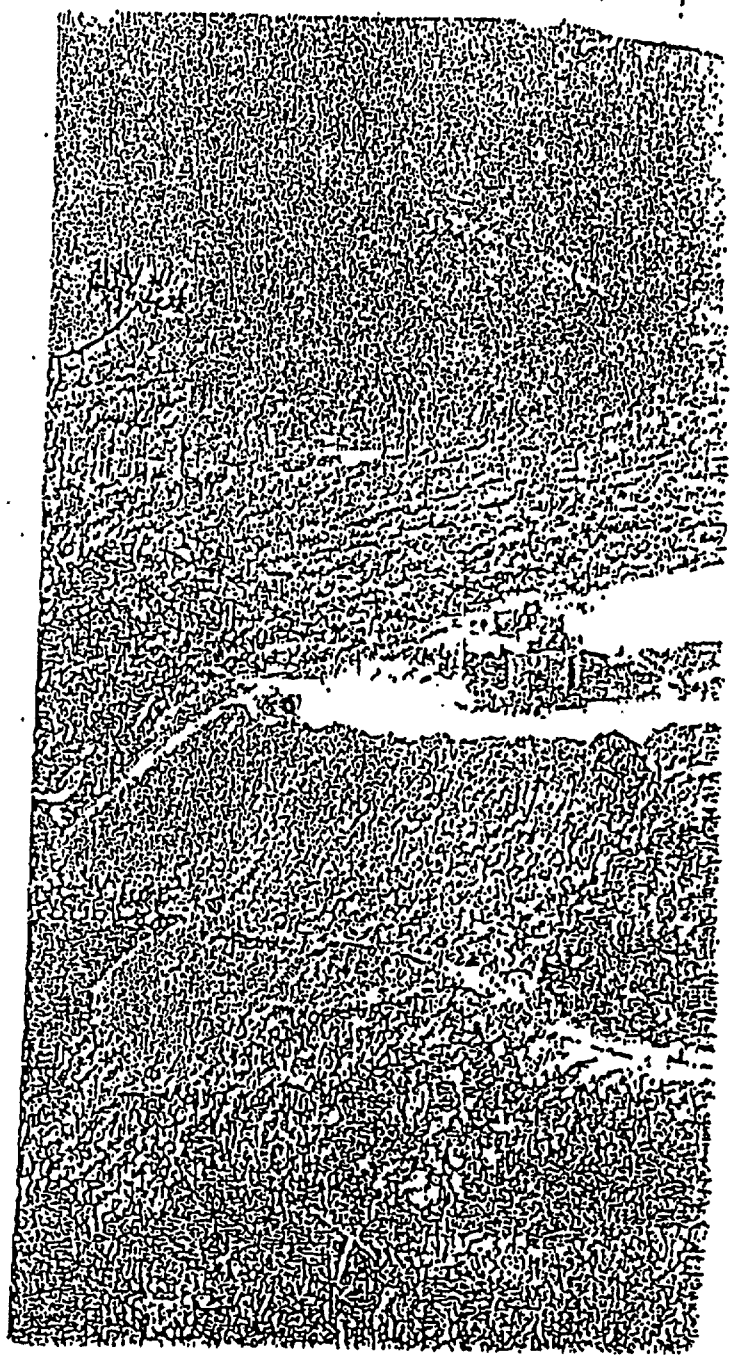
Coatings, Adhesives, Sealants, Caulks, Mastics

Aqueous Systems:

Water Thickening · Drilling Muds · Joint Cements

The distinctive properties of CALIDRIA Asbestos offer thickening efficiency quite unlike anything available!

UCASB00719137



For complete information on properties, applications and prices, or technical assistance in utilizing

CALIDRIA ASBESTOS

contact the nearest Union Carbide sales office or CALIDRIA Asbestos representative

Atlanta, Ga. 404-633-6161 • Baltimore, Md. 301-944-8211 • Boston, Mass. 617-444-5400 • Buffalo, N.Y. 716-837-6450 • Charlotte, N.C. 704-364-1400 • Chicago, Ill. 312-822-7000 • Cincinnati, Ohio 513-272-0206 • Cleveland, Ohio 216-621-4202 • Clifton, N.J. 201-778-2900 • Dallas, Texas 214-631-0010 • Detroit, Mich. 313-354-0800 • Houston, Texas 713-621-1000 • Indianapolis, Ind. 317-255-3181 • Kansas City, Kan. 913-362-2200 • Los Angeles, Calif. 213-583-3061 • Memphis, Tenn. 901-396-5375 • Minneapolis, Minn. 612-927-4221 • Moorestown, N.J. 609-235-6200 • New York, N.Y. 212-551-3763 • Niagara Falls, N.Y. 716-285-3311 • Philadelphia, Pa. 215-923-3200 • Pittsburgh, Pa. 412-922-5700 • St. Louis, Mo. 314-726-0324 • San Francisco, Calif. 415-765-1244 • Seattle, Wash. 206-723-8660

UNION CARBIDE CORPORATION
MINING AND METALS DIVISION
270 Park Avenue New York, N.Y. 10017
Marketing and Technical Center: P. O. Box 579, Niagara Falls, N.Y. 14302
Plant: P.O. Box K, King City, Calif. 93930

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71-065
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CALIDRIA is a trade mark of Union Carbide Corporation.

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Calidria Asbestos

REPRESENTING VARIED PRODUCTS THAT POSSESS THEIR OW

1. FIBER PRODUCTS

Standard Grade

Standard Grade

100 Series

200 Series

Vinyl Asbestos Floor Tile

Drilling Fluids

Joint Cements

2. COLLOIDAL PRODUCTS

High Purity

Resin Grade

Asbestos

100 Series

Cellulose

Viscosity

Paper

Control

Additive

Reinforcement

UCASB00719139

High concentration of liberated fibrils, purity, and low abrasiveness provide quality compounds at improved costs.

Typical Applications in REINFORCEMENT

(High mechanical strength makes CALIDRIA Asbestos fibers effective reinforcing whiskers.)

Nylon 6/6 — CALIDRIA R-G144

Molding Compounds

Reinforcement of Nylon 6/6 with CALIDRIA R-G144 asbestos results in compounds with greatly improved tensile and flexural properties and heat distortion temperature. Tensile strength, for example, is more than doubled by the addition of R-G144 at twenty per cent by weight in the molding compound.

Test	"Typical" Nylon 6/6	Nylon 6/6 with 20% (wt.) R-G144
Tensile strength @ 73°F, psi	10,000	30,000
% Elongation @ 73°F	30	2.4
Modulus of Elasticity @ 73°F psi x 10^5	3	13.2
Flexural strength @ 73°F psi	13,000	32,200
Flexural modulus @ 73°F psi x 10^5	—	15.4
Izod Impact (notched) @ 73°F (ft.lb./in.	1.0	0.9
Heat Distortion Temperature, 264 psi—°C.	66	241

Reinforced Nylon 6/6

Water and Waste Treatment: clarifier, aerobic digestion promoter, reducer of BOD and COD, filtration aid and waste oil controller.

Cellulose Paper Additive: for pitch control, pigment retention, softening, extending, opacifying (T-133) and improved save-all efficiency.

Vinyl and Asphalt Flooring: adds to dimensional stability and improves hot strength reinforcement.

Oil Well Drilling Fluids: designed as a viscosity modifier and used to increase carrying capacity and suspending ability of drilling muds.

Tape Joint Cements: fine, consistent, uniform particle size and high bulking factor make for more efficient joint cements for gypsum board applications.

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produced in 3 grades—

DISTINCTIVE CHARACTERISTICS!

3. MODIFIED PRODUCTS

Resin-Grade 244

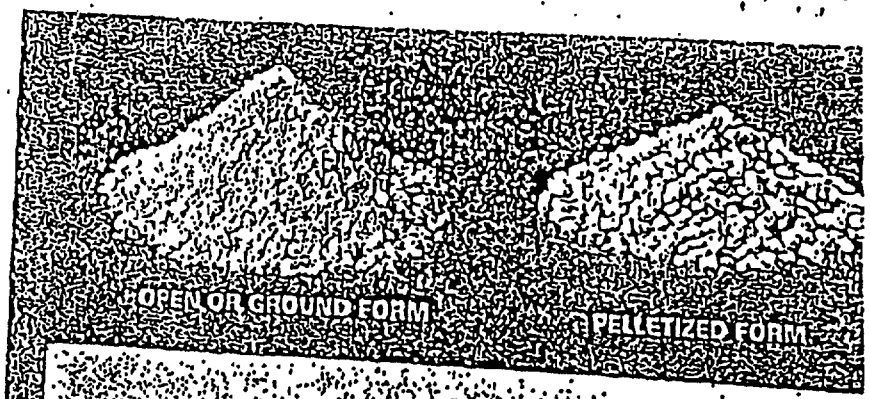
Viscosity Control for Polyester Resin Systems

Resin-Grade 244 was developed for maximum thickening efficiency in a wide range of applications. It offers ease of dispersion with non-settling, stable viscosity, long shelf life and true thixotropy.

Asbestos T-135

Opacifying Agent for Cellulosic Paper

Asbestos T-135 is a titanated High Purity Asbestos. The titania portion of the product does not agglomerate when added to a paper pulp. The result is greatly enhanced opacifying power.



Typical Physical Properties of CALIDRIA ASBESTOS PRODUCTS

General Properties

Specific Gravity	2.45
Surface Charge	Electropositive (Cationic)
Surface Area	60 sq. meters per gram
Refractive Index	1.54—1.56
Fiber Diameter	0.025 microns
Length/Diameter	200 avg. (1000 max.)

PROPERTY	Fiber Products		Colloidal Products		Modified Products	
	SC-100 Series	SC-200 Series	High Purity Open	Resin-Grade 144	Resin-Grade 244	T-135 Open
% Magnetite	2.0	2.0	0.75	0.6	0.3	0.6
Reflectance	64-68	68-70	73-76	—	—	85-88
Oil Absorption #DOP/100 # Asb.	90-100	110-120	—	120-140	300-350	—
Dry Bulk, lbs/ft³	8-10	5-6	5	4	1-5	8
Screen Size, Typical % + 325 Mesh	32	15	NIL	NIL	NIL	NIL
Water Absorption Wt % in Filter Cake	35-40	42-45	—	—	—	—

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