HEDMAN MINES LIMITED
P.O. BOX 340
TIMMINS, ONTARIO, CANADA
P4N 7E1

April 9, 1975

MEMO TO: The New Jersey Zinc Co., Pigment Sales Division
SUBJECT: HCF and other asbestos-replacements

With reference to enquiries you received from several of your customers as to how HCF compares with certain mineral fillers containing non-asbestos fibres with regard to health hazards, we provide the following data for your information:

The enclosed copy of an article by Mearl F. Stanton, M.D., of the National Cancer Institute, Public Health Service, U.S. Department of Health, Education and Welfare, was referred to by a Senior Inspector of H.M. Factory Inspectorate, U.K. Department of Employment (equivalent to OSHA). It was given to understand that Dr. Stanton's findings are considered to be of validity by British government occupational health authorities. Dr. Stanton's paper can be summarized as follows:

(1) Durable fibres cause cancer simply because they are fibres and irrespective of their physiochemical characteristics.

(2) Asbestos causes cancer not because it is asbestos but because of the structural characteristics.

(3) The most convincing evidence of a structural relationship to carcinogenicity is that fine, long fibres of any durable materials completely unrelated to asbestos are similarly carcinogenic.

(4) Any durable fibres narrower than 3 microns in diameter and longer than 20 microns are far more carcinogenic than fibres shorter than 20 microns with diameters wider or narrower than 3 microns.

Dr. Stanton's findings which appear to receive international acceptance, may eventually be reflected in new occupational health standards which include all durable fibres of certain sizes, and not only asbestos fibres. Currently calcium silicate fibres are commercially used as filler in order to avoid OSHA asbestos regulations. In the light of Dr. Stanton's text, however, users of calcium silicate fibres are exposed to a definite health risk, as the table below clearly shows:

Material:	CALCIUM SILICATE FILLERS					SERPENTINE COMPOUND
Grade:	P-4	P-1	C-1	C-6	F-1	HCF
Percent Fibrous	100	100	100	100	100	14
% longer than 20 microns	5	8	30	40	55	0.098
% longer than 5 microns	54	66	76	80	87	1.7
Average Fibre Length (microns)	5.5	8.9	13	16	22	2.52

(Fibres having an average length of less than 5 microns are not considered pathogenic.)
Average Diameter: Less than 3 microns for all above materials.

The above values for the calcium silicate fillers are based on technical data sheets published by a major producer. The values for HCF are based on results of electron-microscopic average determinations of chrysotile and fibre length distribution of HCF at 4000X magnification carried out by the Ontario Research Foundation.

We feel these figures speak for themselves and, if Dr. Stanton's findings are valid, indicate the relative environmental safety of HCF.

FOS-00-0000001332

PLAINTIFF'S EXHIBIT
FOS-729

2200

HEDMAN MINES LIMITED
P.O. BOX 500
TIMMINS, ONTARIO, CANADA
P4N 7E7

March 4, 1975

Gentlemen: RE: Composition of Hedman Cationic Fibre

As requested, the following with the attached Material Safety Data Sheet will certify the composition of our material, Hedman Cationic Fibre (HCF).

HCF is a natural mineral mixture, consisting predominantly (over 80%) of Lizardite, and possibly Antigorite. Approximately 14 percent by weight or volume consists of the mineral Chrysotile. All three minerals belong to the Serpentine family, and have the chemical formula of Hydrous Magnesium Silicates.

The Lizardite and Antigorite particles are flaky, platy, or amorph, and not fibrous. Neither mineral is classified as an asbestos mineral. Chrysotile, the only fibrous serpentine variety, is an asbestos mineral, however only the fibres longer than 5 microns are "asbestos fibres" and subject to OSHA and other asbestos health regulations.

The average fibre length of the chrysotile portion of HCF is 2.52 microns. (Medical reports, incl. Dr. Gross', as per attached, are unanimous in stating that asbestos fibres with an average fibre length below 5 microns are not pathogenic and incapable of causing cancer or fibrosis.) Only 1.7% of all particles in HCF are asbestos fibres.

The foregoing was confirmed by a series of electron microscopic tests on samples of HCF by the Ontario Research Foundation during 1974. ORF's findings are average values determined at 4000X magnification. (ORF is an independent, non-profit Research Institute co-sponsored by the Ontario government. It has developed the world's most sophisticated and reliable techniques to determine asbestos concentrations in water, air and solids, and is therefore under contract to various government agencies, including EPA in U.S.A.)

In summary, we certify that HCF is not raw asbestos, but a serpentine compound consisting predominantly of non-asbestos minerals and non-asbestiform particles. The minor chrysotile portion consists of very short fibres of an average length which is well within the category considered as safe. HCF is devoid of free silica, the cause of silicosis.

FOS-00-0000001333 Encl.

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SECTION I

·nufacturer's Name: Hedman Mines Limited	Emergency Telephone No.: (705) 264-0593
·et Address: P.O. Box 590	City, State, & Zip Code: TIMMINS, Ontario, Canada P4N 7E7
·emical Name and Synonyms: Hydrous Magnesium Silicate	Trade Name: Hedman Cationic Fibre
·emical Family: Serpentine (Mixture)	Formula: $Mg_3(Si_2O_5)(OH)_4$

SECTION II - HAZARDOUS INGREDIENTS

Paints, Preservatives, & Solvents	%	TLV (Units)	Alloys & Metallic Coatings	%	T
·ments			Base Metal		
·talyst			Alloys		
·hicle			Metallic Coatings		
·lvents NOT APPLICABLE			Filler Metal plus Coating or Core Flux NOT APPLICABLE		
·ditives			Others		
·her					

Hazardous Mixtures of Other Liquids, Solids, or Gases	%
Chrysotile Asbestos Fibres (longer than 5 microns)	1.7
(Average Determination at 4000X Magnification)	

SECTION III - PHYSICAL DATA

·iling Point (°F.)	N/a	Specific Gravity (H_2O=1)	1.87
·por Pressure (mm Hg.)	"	Percent Volatile By Volume (%) N/a	
·por Density (Air=1)	"	Evaporation Rate (.....=1) N/a	
·lubility in Water	"		
·pearance and Odor	Odorless		

SECTION IV - FIRE AND EXPLOSION HAZARD DATA N/a (NON-FLAMMABLE)

·sh Point (Method Used)	N/a	Flammable Limits N/a	Lel	Uel
·inguishing Media	N/a			
·cial Fire Fighting Procedures	N/a			
·usual Fire and Explosion Hazards	N/a (NON-FLAMMABLE)			

SECTION V - HEALTH HAZARD DATA

·cal old Limit Value	See OSHA Regulations 1910.93
·fects of Overexposure	
Skin Contact	N/a
Eyes	N/a
Inhalation	Prolonged continuous exposure to dust may cause impairment to the respiratory system.

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Skin Contact

Eyes

Inhalation

Ingestion

SECTION VI - REACTIVITY DATA N/a

Stability	Unstable		Conditions to avoid
	Stable		

Incompatability (Materials to avoid) N/a

Hazardous Decomposition Products N/a

Hazardous Polymerization	May occur		Conditions to avoid
N/a	Will not occur		

SECTION VII - SPILL OR LEAK PROCEDURES

Steps to be taken in case material is released or spilled Vacuum-clean spillage. Repair broken bags; if sweepin is necessary wet down spillage.

Waste Disposal Method Store waste in closed containers.

SECTION VIII - SPECIAL PROTECTION INFORMATION

Respiratory Protection (Specify type) OSHA Part 1910 - 12/7/71, if applicable.

Ventilation	Local Exhaust	Special
	Mechanical (General)	Other

Protective Gloves | Eye Protection

Other Protective Equipment

SECTION IX - SPECIAL PRECAUTIONS

Precautions to be taken in handling and storing Avoid creating excessive dust.
Store in closed containers.

Other Precautions Maintain good housekeeping practices.

Precautionary labeling No label is required where asbestos fibres have been modified by s bonding agent, coating, binder or other material so that during any foreseeable use, handling, storage, disposal, processing or transportation, no airborne concentratio of asbestos fibres in excess of the exposure limits prescribed will be released. (OSHA Regulations 1910.93)

PR-387

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DATA SUMMARY TABLE

	Samples Taken At	
	Preparation Table (#2)	Blow-Off Area (#1)
Air Volume Sampled. $ft.^3$	364.1	248.4
Filter weight gain. mg.	420	90
Particulate Loading. $mg/ft.^3$	1.15	0.36
$grains/ft.^3$	0.018	0.006
Asbestiform type found.	Chrysotile	Chrysotile
Fibre length range. µm.	0.1 - 3.0	0.1 - 1.0
Mean fibre length. µm.	0.74	0.36
Asbestos Concentration. fibres/cc.	6.28	5.41
Number of fibres of length greater than 4 µm.	0	0

TABULATION OF RAW SIZING DATA: CHRYSOTILE

SAMPLE: FRED HOPTON SAMPLE #2 15/3/74 DATE: 14/05/74

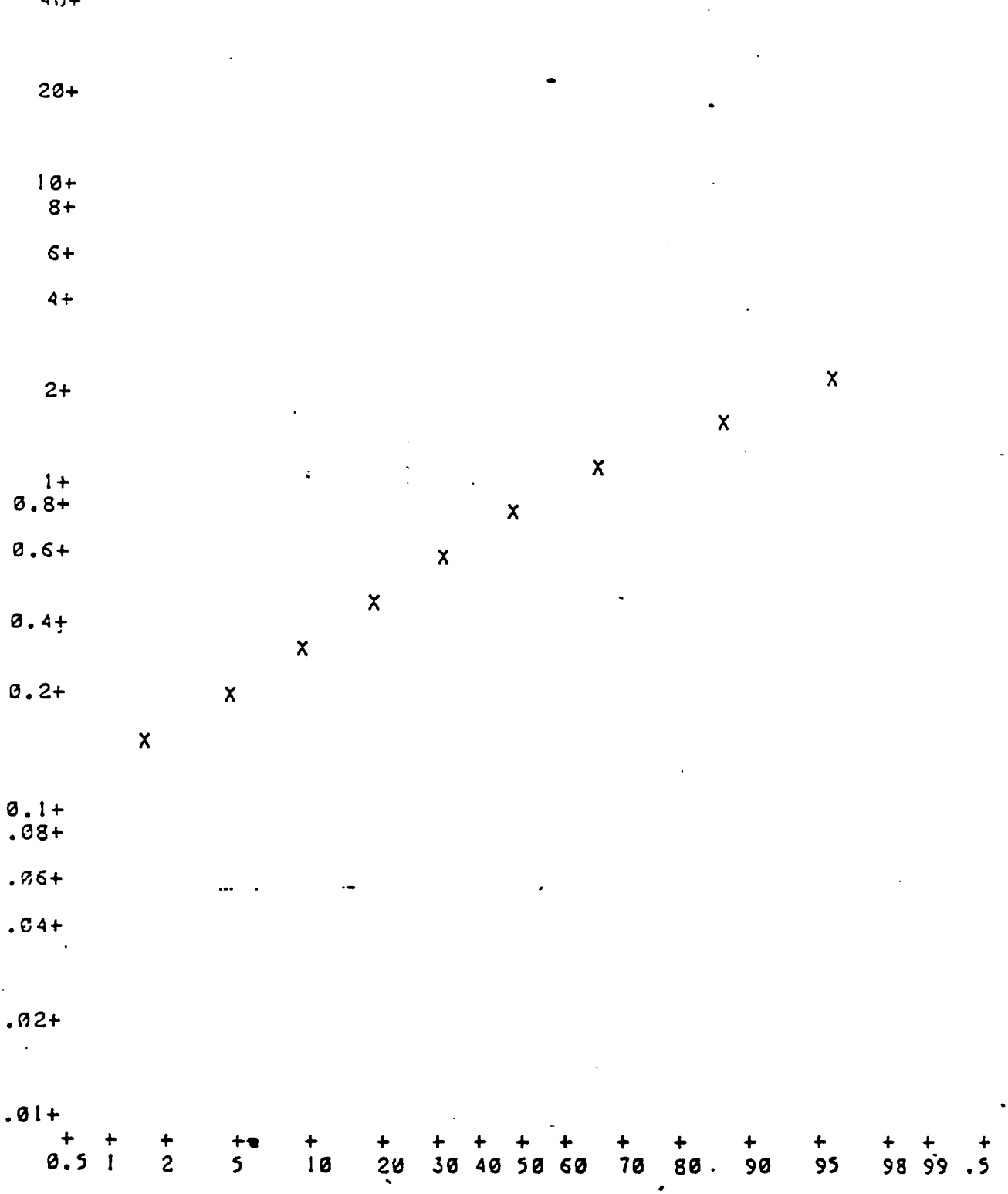
Preparation Table

SIZE CATEGORY	FIBRE LENGTH, UM	NUMBER COUNTED	WIDTH CATEGORIES INTO WHICH FIBRES WERE CLASSIFIED, MICROMETRES				
1	0.040	0					
2	0.057	0					
3	0.080	0					
4	0.113	2	0.040	0.040			
5	0.160	1	0.040				
6	0.226	4	0.057	0.040	0.040	0.040	
7	0.320	5	0.040	0.040	0.040	0.040	0.042
8	0.453	5	0.040	0.040	0.040	0.040	0.057
9	0.640	8	0.040	0.040	0.040	0.040	0.040
			0.040	0.040	0.040		
10	0.905	3	0.040	0.040	0.040		
11	1.280	7	0.040	0.040	0.040	0.040	0.040
			0.040	0.040			
12	1.810	2	0.040	0.040			
13	2.560	1	0.040				
14	3.620	0					

ASBEST FIBRE LENGTH DISTRIBUTIO. DATE: 14/05/74

SAMPLE : FRED HOPTON SAMPLE #2 15/3/74
Preparation Table

TYPE OF ASBESTIFORM - CHRYSOTILE
NUMBER OF FIBRES SIZED = 38



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ASBESTOS FIBRE COUNT ANALYSIS

TABULATION OF RAW SIZING DATA: CHRYSOTILE

SAMPLE: FRED HOPTON SAMPLE #1 15/3/74 DATE: 14/05/74

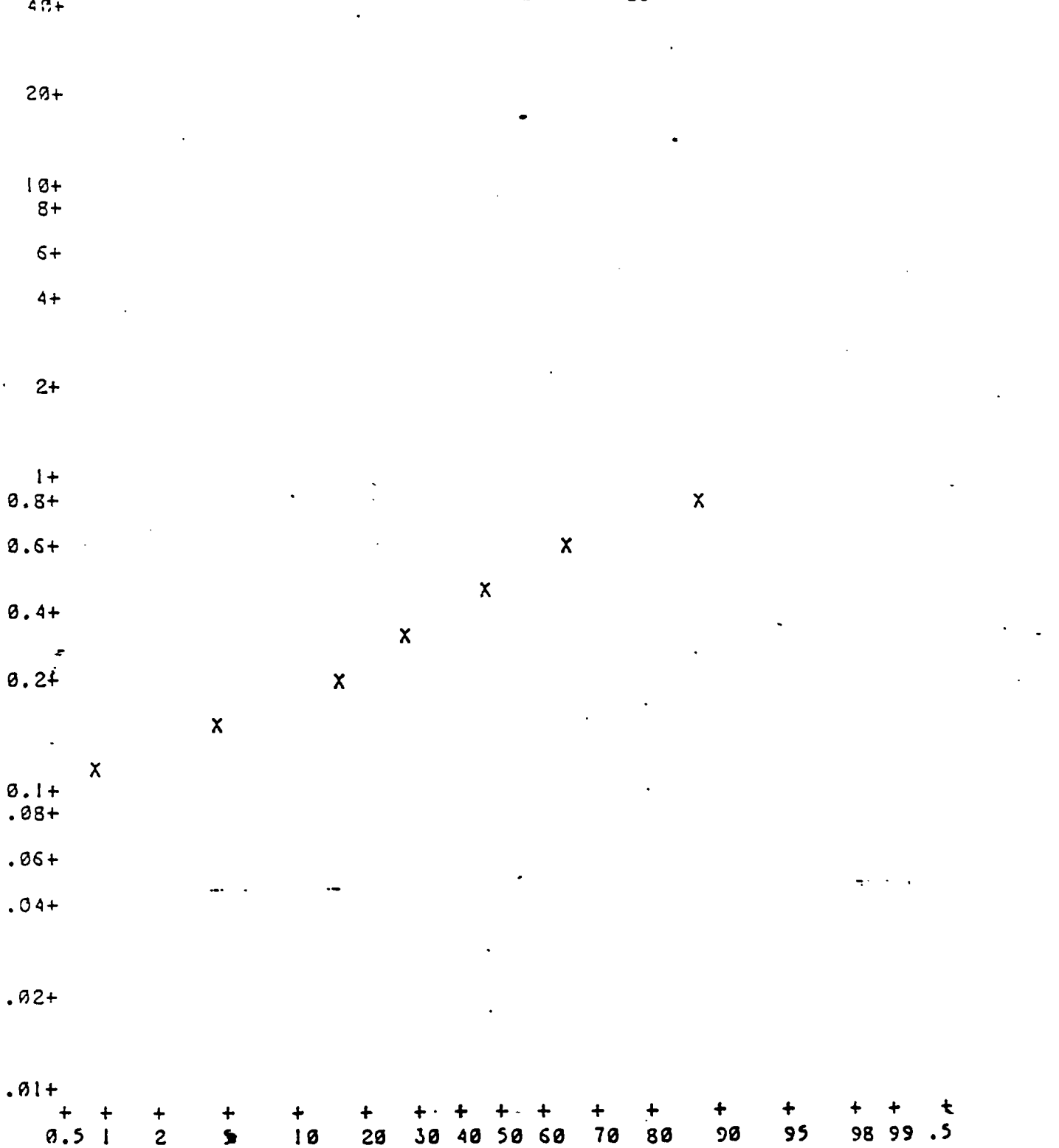
Blow-Off Area

SIZE CATEGORY	FIBRE LENGTH, UM	NUMBER COUNTED	WIDTH CATEGORIES INTO WHICH FIBRES WERE CLASSIFIED, MICROMETRES				
1	0.040	0					
2	0.057	0					
3	0.080	0					
4	0.113	1	0.040				
5	0.160	3	0.040	0.040	0.040		
6	0.226	6	0.057	0.040	0.040	0.040	0.040
			0.040				
7	0.320	2	0.040	0.040			
8	0.453	4	0.040	0.057	0.040	0.040	
9	0.640	2	0.057	0.040			
10	0.905	2	0.040	0.057			
11	1.280	0					

SAMPLE : FRED HOPTON SAMPLE #1 15/3/74
Blow-Off Area

FIBRE LENGTH, MICROMETRES

TYPE OF ASBESTIFORM - CHRYSOTILE
NUMBER OF FIBRES SIZED = 20



CUMULATIVE PERCENTAGE MASS
LESS THAN STATED LENGTH (LOG. PROBABILITY SCALE)

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