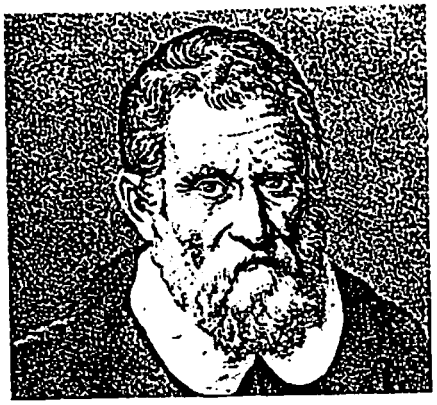
asbestos the raw material

The Myth

Asbestos in History

The Emperor Charlemagne



Marco Polo

The existence of asbestos, or amianthus as it used to be called, has been known and the mineral used for at least 2,500 years. In 438 BC Plutarch recorded that the Vestal Virgins who tended the ever-burning fire of the sacred royal hearth held 'perpetual lamps' with wicks of a woven material which was almost certainly asbestos mixed with vegetable yarn.

The ancient Romans who found asbestos in the Italian Alps regarded it as a vegetable and worked it up into cremation cloths, in which they wrapped the bodies of their kings to protect them from the all-consuming heat of the funeral pyre and so preserve the ashes.

Linum vivum (living linen) they called it. In 1702 a funeral urn was found near the Naevian Gate at Rome containing a skull, calcined bones and ashes wrapped in a long piece of asbestos cloth. It can be seen, with its contents, in the Vatican Museum today. A Greek doctor called Anaxilaus who was banished by the Roman Emperor Augustus in 28 BC for practising magic wrote: 'if a tree is surrounded with linen made of (asbestos) the noise of the blows given by the axe will be deadened thereby, and the tree may be cut down without being heard. For these qualities it is that this linen occupies the very highest rank among all the kinds that are known.' It was being used for acoustic insulation even then.

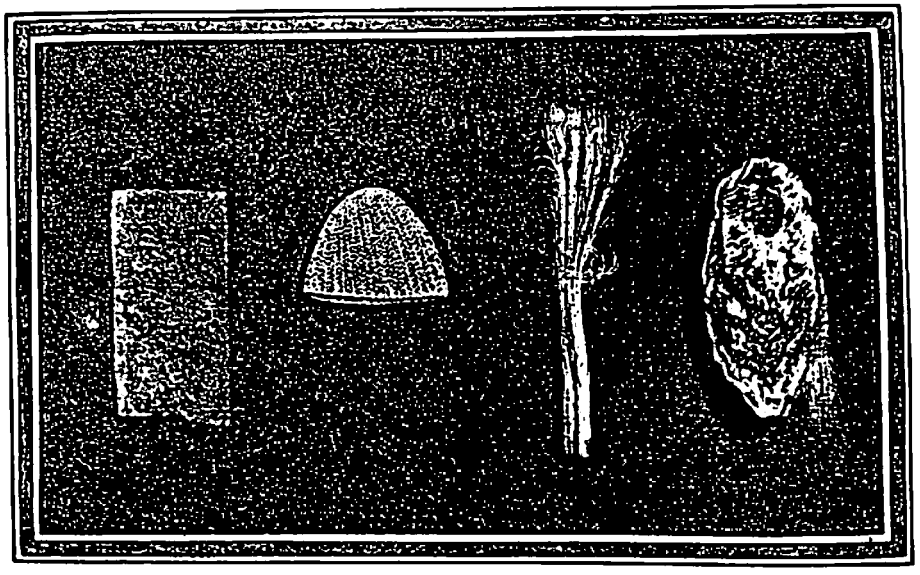
Down the centuries references are found in chronicles and proceedings of learned societies which indicate that the 'magic mineral' was never forgotten. For example, the Emperor Charlemagne, who lived in the 9th century, is alleged to have saved a desperate situation by throwing his tablecloth into the fire and recovering it unharmed. His enemy bowed in deference to the possessor of obviously supernatural powers. The cloth was undoubtedly made of woven asbestos.

In the Middle Ages the Venetian explorer Marco Polo described how in Siberia in 1250 he was shown a piece of unburnable cloth made, they said, from the skin of the salamander which lived in fire. His enquiries led him to asbestos mines which were probably those known to have been operating in the Russia of Peter the Great.

In the 15th century we hear of asbestos cloth being used for armour in battle. A contemporary rhyming account of the siege of Rouen (1420) talks about:

The Kyngis herauldis and pursuiauntis
In cotis of armys amyauntis

In 1671 there appeared in a magazine called *Journal de Letterati*, published in



An 18th century drawing of asbestos. Plate 32 – Volume V 'Fossils' of the collection of Natural History drawings which form part of the Royal Collection in the library of Windsor Castle, reproduced here by gracious permission of HM the Queen

Venice, an account of 'a Substance found in great quantities in Some Mines of Italy out of which is made a kind of incombustible Skin, Paper and Candle Week.' A certain Signor Castagna who had come upon this asbestos could treat it so that it resembled lambskin dressed white. 'Of the same matter this Artist hath wrought a Week (Wick), never to be consumed as long as 'tis fed, nor altering its quality after the aliment is wasted away. And if that famous and incombustible Oyl were found out again, we read of, this matter would yield the Week for that everlasting Light so much celebrated by the Antients.' But of course it wasn't everlasting, someone was always topping it up.

It was only by the end of the 17th century asbestos began to be regarded as something other than an object of superstition and curiosity. Asbestos came into its own with the discovery of the deposits in Canada in the middle of the 19th century, with the accent perhaps on the conservation of heat by 'lagging' rather than resistance to fire. When the price of coal began to increase, 'thermal insulation' gradually developed into the science it is today.

Sir William Logan, the first Director of Geological Survey in Canada, 'noted' asbestos as early as 1847. In 1876 it was rediscovered by Joseph Fecteau, and two years later the mining of the principal deposits at Thetford, Quebec, had become a going concern.

The asbestos Sir William Logan noted was White (Chrysotile) Asbestos, as indeed was every deposit discovered up to that time. The Italian amianthus used by the ancients was White, and the asbestos of the Russian, Chinese, Indian and Cypriot mines was White.

Some time between 1803 and 1806, however, many years before Sir William Logan's findings in Canada, Mr H. Lichtenstein, a German geologist, was travelling near Prieska in the Orange River Valley in South Africa where he came upon a mass of heavy asbestos which was lavender blue in colour. This was something quite new, and though there are deposits of Blue Asbestos (Crocidolite) in Australia, South Africa, where it was first discovered, is still its main source for commercial purposes, the chief of which is in the manufacture of asbestos-cement products.

But as with the discovery of White Asbestos in Canada, so with Blue in South Africa. The discovery was merely noted, and no attempt was made to explore its possibilities until 1891, when Francis Oats, a director of De Beers Consolidated Mines Ltd, who controlled the diamond mines of South Africa, formed a group of his associates into the Cape Mineral Syndicate to exploit it. Oats' attention had been called to the Blue Asbestos at Prieska by a speculator called Cohen, to whom specimens of the rock had been brought by some African 'boys' working at the Kimberley diamond mines who had their home at Prieska.

Two years later Oats was persuaded to broaden the activities of the Cape Mineral Syndicate and establish a company in London which would undertake manufacture as well as mining. The name given to this company, which was incorporated on December 28, 1893, was The Cape Asbestos Company Limited.

In 1925 the company acquired a number of mines in the Transvaal of the kind of fawn-coloured asbestos, first discovered in 1907, known as Amosite. This had long, stiff, rigid fibres, and while unsuitable for easy spinning and weaving proved itself ideal for use in insulating materials. Today it is used exclusively in the Group's 'Caposite,' 'Asbestolux' and 'Marinite' products, and in 'Caposil 1400' calcium silicate materials.

The Reality

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Asbestos the Word

The mineral has been known in England by two names – first Amianthus or Amiantus, and later Asbestos.

Amianthus is the Greek *Amiantos*. *A* is the negative and *miaino* means to paint over something with another colour, to stain or dye it, and thus to defile, soil, taint, pollute, corrupt it, make it impure. The adjective *amianto* was applied to this undefilable mineral, for on being thrown into the fire it was not only not consumed by it or diminished by it, but seemed positively to be purified by it. Pliny reports that after the stains were burnt out, a piece of asbestos cloth 'came out of the flames whiter and cleaner that it could possibly have been rendered by the aid of water.'

Such words were doubtless based on observation, but he was guessing when he went on to say that the natural colour of the mineral was red, only becoming white through the agency of fire, and that it grew in the deserts of India scorched by the burning rays of the sun. 'Here, where no rain is ever known to fall,' he writes, 'and amid multitudes of deadly serpents, it becomes habituated to resist the action of fire.' It is very rare, and those who find it sell it at prices equal to those given for the finest pearls. Moreover 'it effectually counteracts all noxious spells, those wrought by magicians in particular.'

Apart from all this, the realisation that it was not affected by fire led to the belief that it did in fact ignite and, once ignited, went on burning for ever without being consumed. In this respect the word *amiantos* was probably also applied to a mineral which wasn't asbestos at all but a 'fabulous stone' which was reputed to burn with an unquenchable flame and was more likely to have been unslaked lime. However that may be, this second attribute gave the mineral its other name.

Asbestos is another Greek word. *A* is the negative again, and *sbestos* is the adjective from the verb *sbennumi* meaning to quench, die down, dry up, extinguish. Asbestos is the inextinguishable material, the mineral which once it starts burning never goes out. It has thus acquired a name which contradicts its essential characteristic, which is that it does not burn.

The mineral was called undefilable and inextinguishable, but never what one would have expected, incombustible. *Amiantos* came into the English language as *amianthus* and survived till the beginning of the 20th century, when it gave way to *asbestos*. In the early 19th century both words were used in England, though it is likely *amianthus* was reserved for the silkier, softer types. The poet Robert Southey (1774–1843) used both words in *The Young Dragon*, which he wrote about 1815:

> With amianth he lined the nest
> An incombustible asbest.

Asbestos is the word used in North America and in North European languages (German: *asbest*). But *amiantos* has held its ground in the southern Latin languages: *amiante* in French, *amianto* in Italian, *amianto* in Spanish.

Marco Polo found the mineral being called salamander; in Germany it has been known as Stone Flax (*steinflachs*), and French-Canadian miners have called it Cotton Stone (*pierre-à-coton*). One type of asbestos has been called by a Greek word which means Woolly Stone (*crocidolite*), another type by a Greek word meaning Fine Hair of Gold (*chrysotile*).

An 18th century drawing of asbestos. Plate 32 – Volume V 'Fossils' of the collection of Natural History drawings which form part of the Royal Collection in the library of Windsor Castle, reproduced here by gracious permission of HM the Queen

The Reality

Contents

The Cape Asbestos Company Ltd was formed in London in 1893 to undertake the mining of asbestos in South Africa and the manufacture from it of thermal insulation materials (lagging) in Italy.

Since then it has expanded into a Group of associated companies manufacturing not only insulation materials from asbestos but also of mineral wool, as well as a range of asbestos-based brake linings.

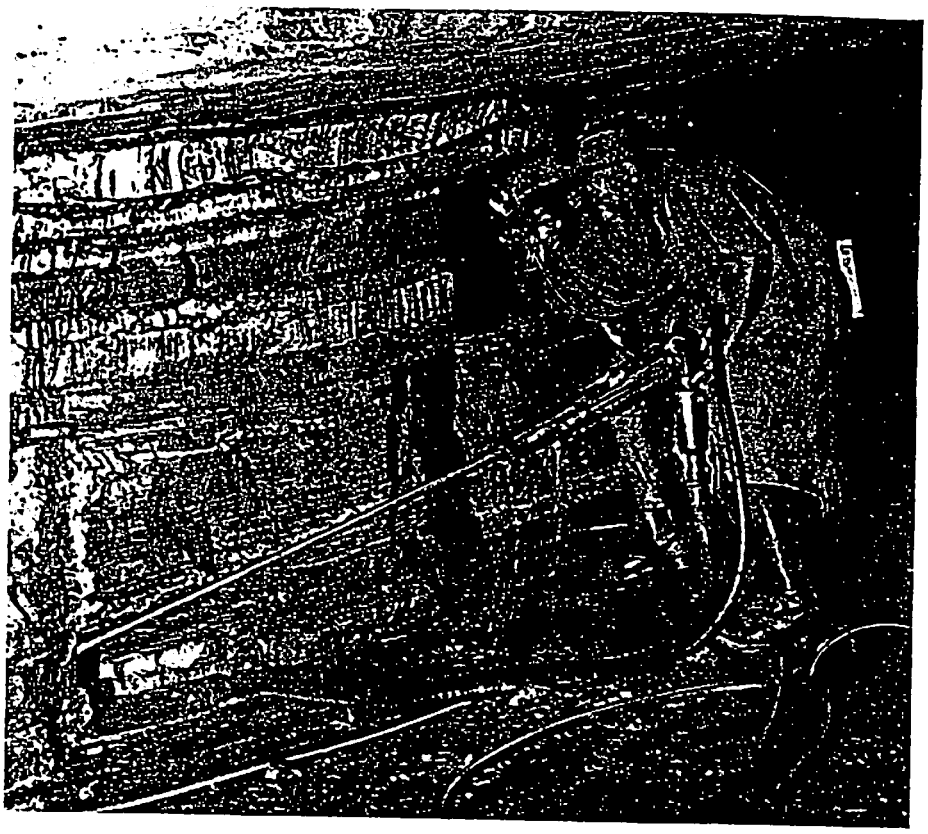
Production of raw asbestos fibre from its own mines in South Africa is still a basic activity of the Group, and is the subject of the present booklet. Two types of asbestos are mined – known as Blue Asbestos and Amosite – which have unique qualities differentiating them from the great bulk of asbestos produced elsewhere (mostly in Canada, Russia and Rhodesia). The company's development has been based on making the most effective use of these special qualities.

In 1961 the responsibility for advising on negotiations and sale of all crude and processed fibres produced from our South African mines was delegated to a wholly owned subsidiary company with head office in London created for the purpose, 'Cape Asbestos Fibres Limited.'

The Group's mines in South Africa are based on two main centres in the Cape Province and in the north-eastern Transvaal, where small settlements have been built up entirely by the Company, housing and providing for a population of some 900 Europeans and upwards of 9,000 Africans.

The manufactured products of the Group are dealt with in separate literature listed at the end of this booklet. They cover a wide range, including 'Caposite' asbestos, 'Caposil 1400' calcium silicate and 'Rocksil' rock wool, thermal insulation materials; 'Asbestolux' asbestos insulation board; 'Marinite' asbestos sheet; and 'Capasco' brake linings.

The Natural Fibre that will not Burn



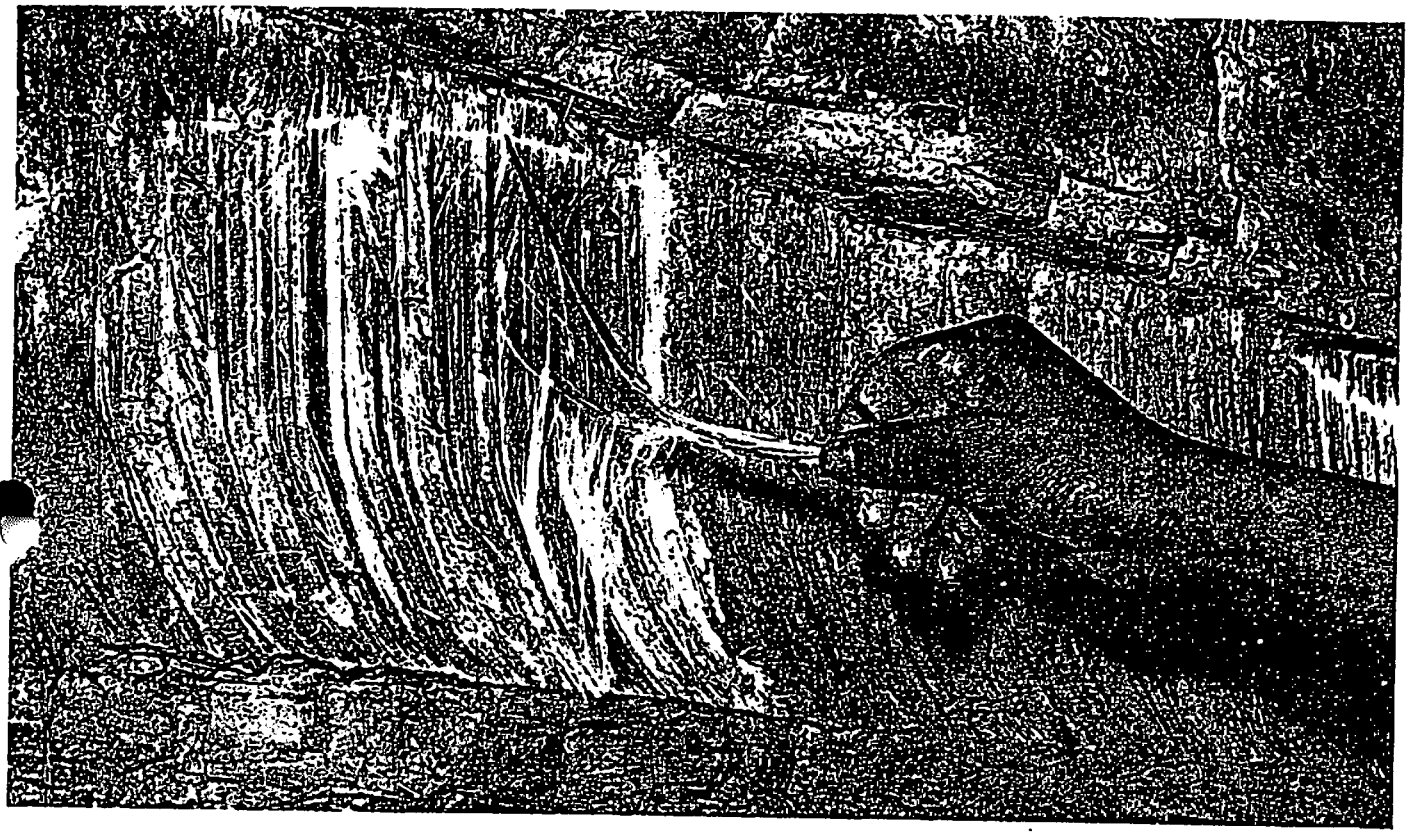
'It is found in seams or layers between greater thicknesses of rock of almost identical composition' – the rock face at one of our Amosite mines in South Africa

Asbestos has the exceptional property of being a natural fibre that will not burn. Fibres are the essential building materials of nature, but fibres of the vegetable and animal kingdoms will all burn more or less freely. Asbestos, the fibre of the mineral kingdom, stands apart: it is non-combustible.

Before it is mined, asbestos is a rock – as solid and dense as granite or marble. It is found in seams or layers between greater thicknesses of rock of almost identical composition. The asbestos rock breaks down to fibres when it is milled, but the accompanying rock becomes powder. The reason for the existence of the seams of asbestos is not completely known, but they are of entirely mineral origin. They are not caused by the decay of vegetable deposits like coal.

The great value of asbestos is its fibrous nature. Very fine fibres can be obtained by rubbing the surface of asbestos rock. Each fibre pulled away is seen to be composed of more fibres, and these in turn can be further subdivided. The most powerful optical microscopes cannot pick out the smallest fibres; these are between one millionth and one ten-millionth of an inch in diameter. The average thickness of the fibres used in our factories is about ten times this size, but even so some hundreds could lie side by side in the thickness of this paper. A piece of crude asbestos as big as the top of a finger yields many thousand millions of fibres, which would stretch round the world if placed end to end.

'The asbestos rock breaks down to fibres when it is milled.' Fiberised Amosite



'Each fibre pulled away is seen to be composed of more fibres.' Amosite seam in one of our South African mines

Mineralogical Classification of Asbestos

Any naturally occurring mineral which may be manipulated or processed into fibres may be called Asbestos, but there are a number of different types that are quite distinct mineralogically, although they may conveniently be classified in two groups:

Group 1 Amphibole Asbestos
The Amphibole Group of minerals contains many varieties, including five which are fibrous. These are complex silicates having the general chemical formula $M_7Si_8O_{22}(OH)_2$, M representing calcium, magnesium, sodium or iron in various proportions. The fibrous amphiboles contain double chains of silica tetrahedra and this arrangement gives enormous strength along the chains and in the fibres; the bond between adjacent chains is very much weaker, and for this reason the fibrous amphiboles may be easily broken down to give strong fine fibres.

The two important varieties of Amphibole Asbestos are:

Crocidolite or Blue Asbestos and Amosite
Both are iron silicates – Crocidolite a sodium ferroso-ferric silicate; Amosite a ferrous magnesium silicate.

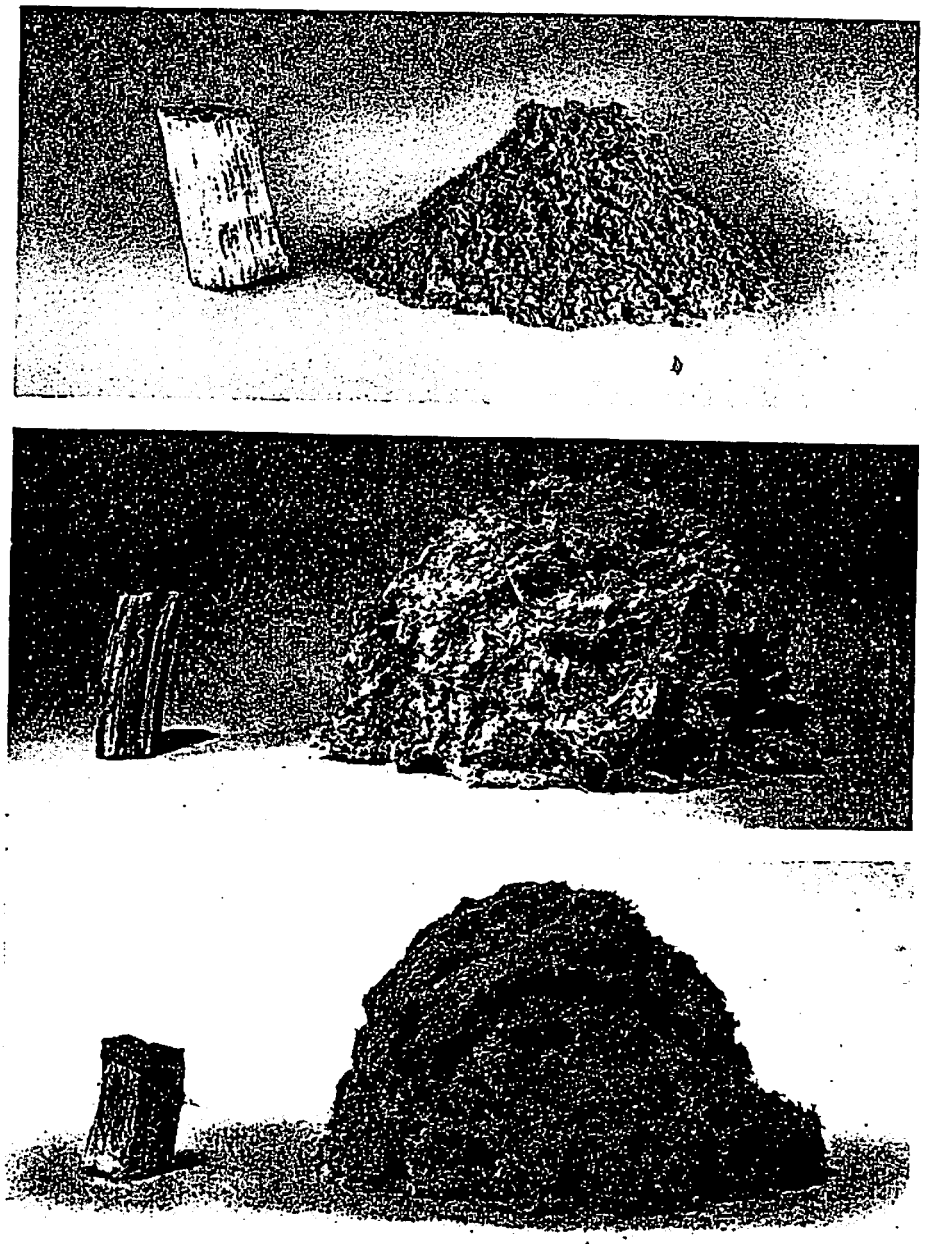
Crocidolite is found mainly in South Africa, but also in Australia and Bolivia. Amosite is found exclusively in South Africa.

Other fibrous amphiboles are Tremolite (calcium magnesium silicate), Actinolite (calcium magnesium iron silicate) and Anthophyllite (magnesium silicate), but these are only of limited commercial importance to the asbestos industry.

Group II Chrysotile or White Asbestos
This is the fibrous variety of Serpentine, a magnesium silicate mineral having the chemical formula $3MgO2SiO_22H_2O$. It is produced from extensive deposits in Canada, Russia, Rhodesia, and to a smaller degree in the Transvaal, Australia and elsewhere.

Difference between Amphibole and Chrysotile

Scientists have shown that there is a fundamental difference in structure between the fibres of Chrysotile Asbestos on one hand and of Amphibole Asbestos on the other. The finest Chrysotile fibres are believed to be hollow, whereas the ultimate Amphibole Asbestos fibres are solid throughout. This explains why Amosite and Blue Asbestos fibres are hard and springy and why White Asbestos fibres

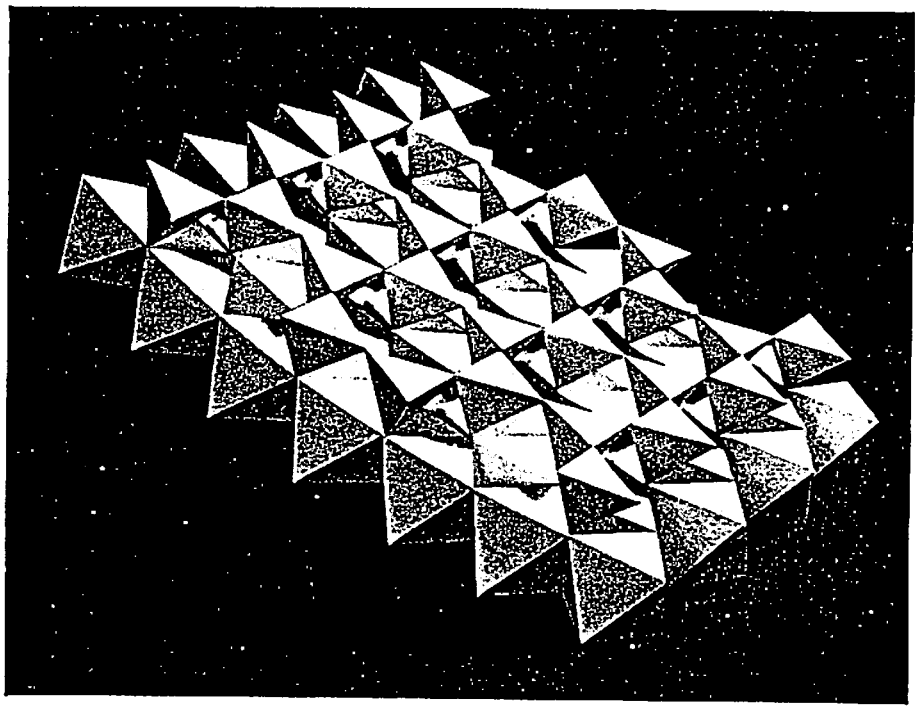


From pieces of White (top), Amosite (centre) and Blue (bottom) Asbestos rock of equal weight come piles of fibre of unequal volume. These photographs illustrate how the stiff resilient nature of Amphibole (Blue and Amosite) fibres make them considerably more flocculent than White Asbestos fibres

are soft, flexible and absorbent. As shown in the electron micrographs, Amphibole fibres are larger in diameter. The finest White Asbestos fibres are usually in the region of 0·02 microns in diameter, whereas the finest Amphibole fibres are in the region of 0·1 microns in diameter. When separated by fiberising processes, Blue or Amosite fibres will produce a great flocculent volume: this consists very largely of still air which is held in minute cells by the scaffolding of fine resilient fibres. On the other hand, the soft flexible fibres of the Chrysotile variety are particularly suitable for use in asbestos cloth, engine packings, gaskets and like products.

The length of Amphibole Asbestos depends upon the grade, but, in general, Amphibole fibres are considerably longer than White Asbestos fibres of similar price or grade. The additional length and the stiff resilient nature of the fibres means that a given weight of Amphibole Asbestos will fiberise to a much greater volume than the same weight of White Asbestos.

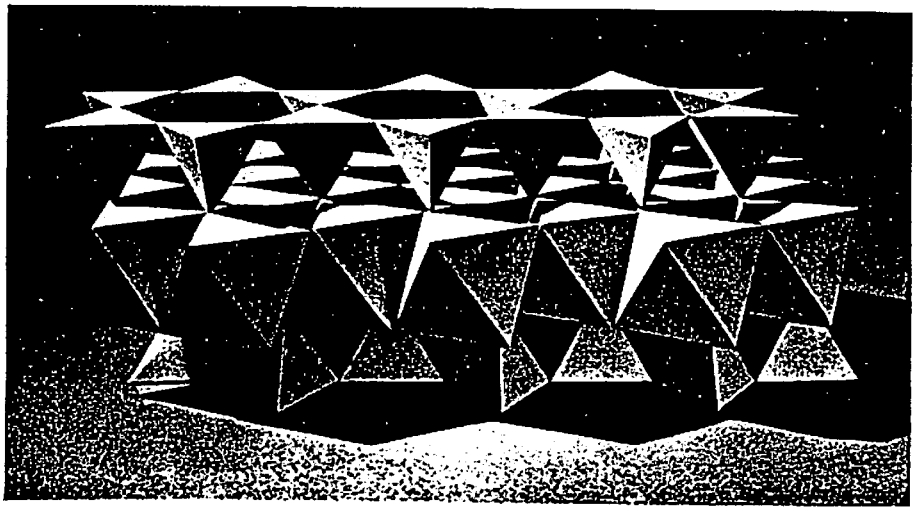
Customers who are used to purchasing White Asbestos will notice that they receive their raw Blue or Amosite in a less finely milled condition than Chrysotile. Our asbestos is despatched in this relatively crude or unfiberised form from our mines deliberately in order to reduce shipping costs. If Blue or Amosite was milled at the mine to the same extent as White, the volume produced would be so great that the cost of transport would be inflated out of all proportion.



Photograph of schematic representation of the structure of Chrysotile Asbestos

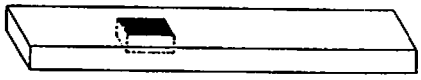
$3MgO2SiO_2H_2O$

The molecules are fitted together to form a tubular structure. The diameter of the smallest tubes is less than one ten-millionth of an inch



Photograph of schematic representation of the structure of Amphibole Asbestos

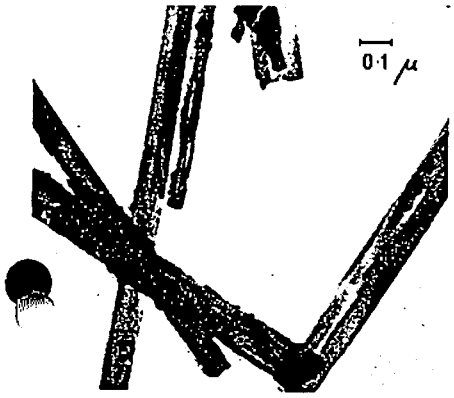
Crocidolite – Blue Asbestos
$Na_2O3FeOFe_2O_38SiO_2H_2O$
Amosite Asbestos
$1·5MgO5·5FeO8SiO_2H_2O$

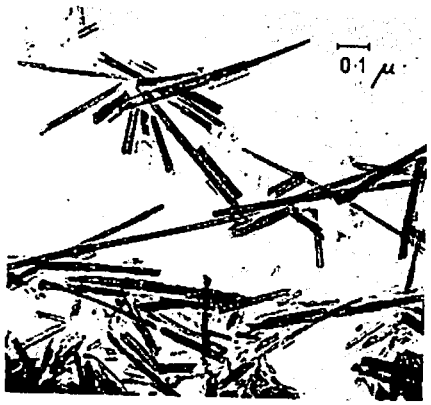


The molecules are fitted together to form straight, narrow strips. The smallest fibres are a few millionths of an inch in width and may contain as many as a hundred of these strips

Photographs of Chrysotile and Amphibole Asbestos fibres magnified 80,000 times on an electron microscope

They show that Chrysotile (White) Asbestos forms very fine, hollow fibres, whereas Amphibole (Amosite and Blue Asbestos) consists of long, solid and rigid fibres





Resistance to heat

Amosite and Blue Asbestos fibres discolour and lose strength, as a result of oxidation, when they are heated at temperatures above 480° F. Textile and flocculent products made from these fibres alone, such as yarn and cloth, packings, mattresses, rope lagging and loose fill, should not be used above this temperature. But products incorporating Amosite or Blue Asbestos with stable inorganic binders or fillers may be used safely at much higher temperatures. The resistance of such products is not adversely affected by the discoloration of Amosite due to oxidation, and any loss in fibre strength will not affect the integrity of the products within the limiting temperature ranges normally claimed for the various heat insulating materials.

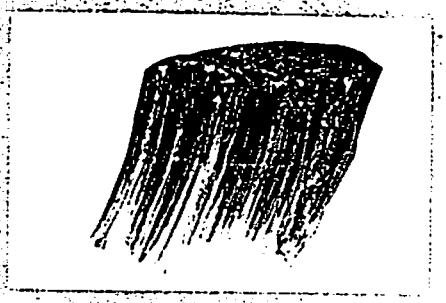
Colour

Average tensile strength

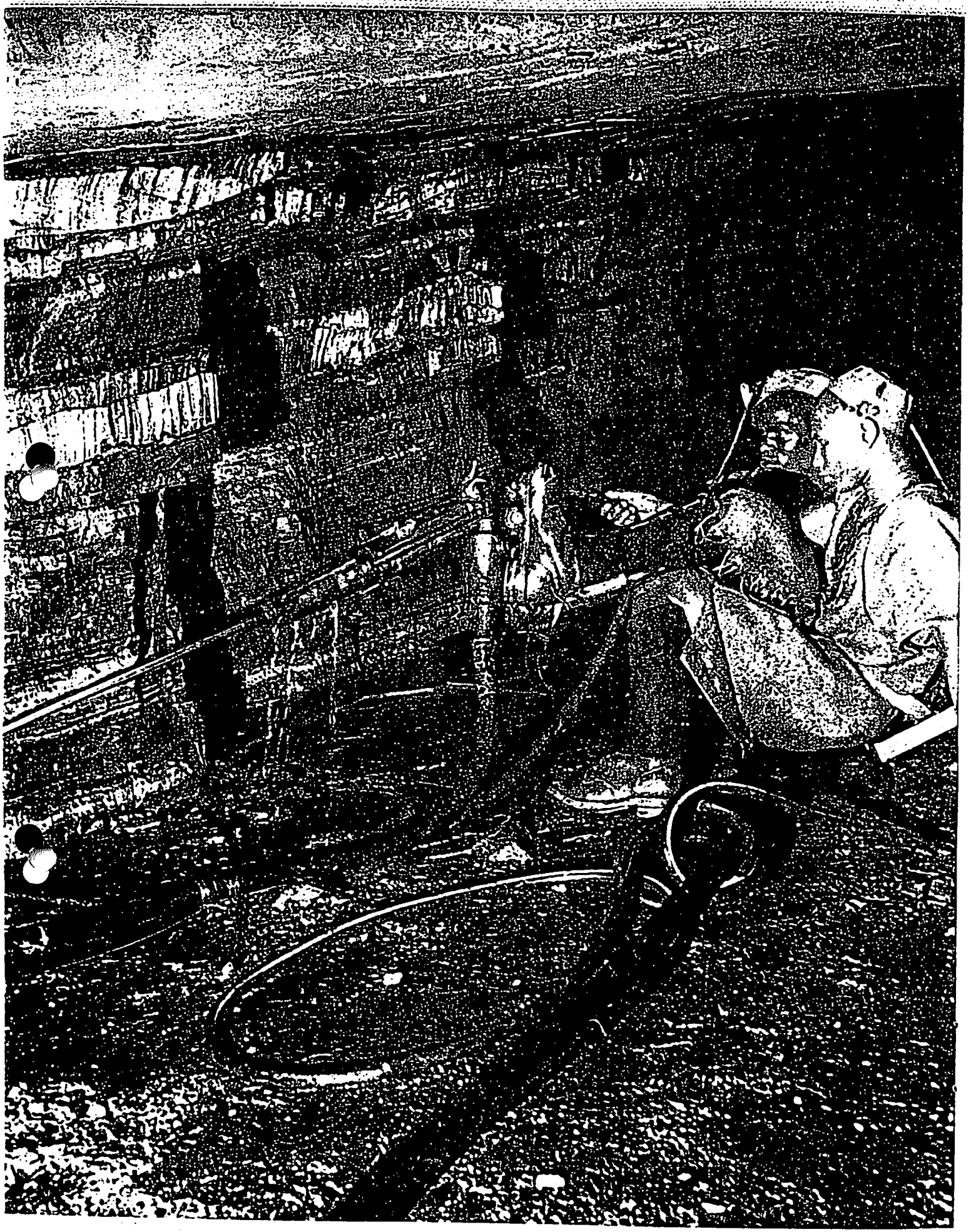
Resistance to chemicals

Typical chemical analysis

Silica	SiO_2
Alumina	Al_2O_3
Ferrous oxide	FeO
Ferric oxide	Fe_2O_3
Manganous oxide	MnO
Calcium oxide	CaO
Magnesium oxide	MgO
Sodium oxide	Na_2O
Potassium oxide	K_2O
Carbon dioxide	CO_2
Water of crystallisation	H_2O

CHRYSOTILE (White)	CROCIDOLITE (Blue)	AMOSITE
		
Matt White	Lavender blue, varying somewhat with slight changes in chemical composition associated with different mining areas.	Varies from almost white to yellowish-brown, according to small changes in iron content.
350,000 lb/sq in	500,000 lb/sq in. The strongest of all natural fibres, its basic tensile strength being one and a half times that of steel piano wire.	175,000 lb/sq in
Virtually no resistance to acids, which dissolve the magnesia component of the mineral. Good resistance to alkalis, neutral salts and organic solvents.	Outstanding in its resistance to acids. Good resistance to alkalis, neutral salts and organic solvents.	Good resistance to acids, but not as good as Crocidolite. Good resistance to alkalis, neutral salts and organic solvents.

%	%	%
40·3	51·4	49·3
0·7		
1·0	20·3	40·9
1·5	17·5	0·4
	0·1	0·7
0·2	0·8	0·4
42·4	1·4	5·7
	6·2	0·2
		0·3
0·2	0·4	0·2
13·7	1·9	1·9
100·0	100·0	100·0



Our Asbestos Mines in South Africa

We operate Amosite and Blue Asbestos mines in South Africa at the places shown on the map.

Extensive deposits of Amosite and Blue Asbestos occur in the banded ironstones of the Cape Province and the Transvaal. The asbestos was originally mined from the surface where the seams emerge, but our mines now penetrate many hundreds of feet into the rock where fresh asbestos of excellent quality is obtained.

Unlike the deep deposits of White Asbestos that occur in serpentine, Amosite and Blue Asbestos occur in relatively narrow strata extending over great areas of South Africa. The deposits do not usually persist in great depth, and for this reason variations of properties exist in fibres mined in different areas. This enables us to supply a range of fibres having individual characteristics which may be used to the maximum advantage in particular processes.

The crude ore is brought to the surface and purified by processes that have been developed and perfected over many years the asbestos mining industry.

Our mining activities in South Africa are controlled by Cape Asbestos South Africa (Pty) Limited, through its subsidiaries Cape Blue Mines (Pty) Limited and Consolidated Blue Asbestos Corporation Limited, on the production of Blue (Crocidolite) Asbestos; and Egnep (Pty) Limited, with its wholly owned subsidiary company, Amosa (Pty) Limited, which produce Amosite Asbestos.

BLUE ASBESTOS

As already mentioned, in 1890 the Cape Mineral Syndicate was formed and acquired mining rights over certain farms in the Prieska and Hay districts of the Cape Colony. The Cape Asbestos Company was formed in 1893 to take over these rights from the syndicate, and in 1948 Cape Blue Mines (Pty) Limited purchased all the assets and mining rights of The Cape Asbestos Company's Blue Crocidolite mining activities.

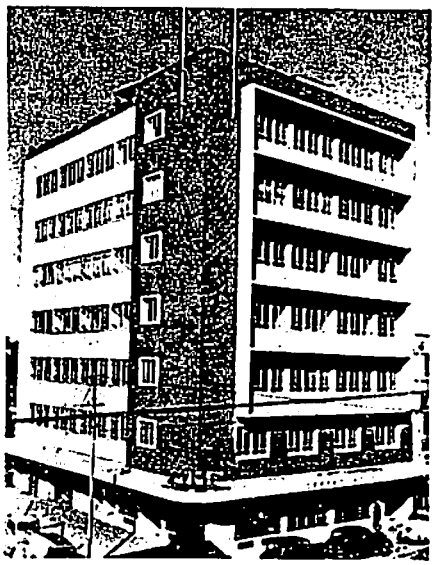
Cape Blue Mines (Pty) Limited

Cape Blue Mines operates Blue Asbestos mines and plants at Koegas/Westerberg in the North-Eastern Cape; at Carn-Brae in the Prieska District of the North-Eastern Cape; at Prieska; the Pomfret Mine in the Vryburg District of the Cape Province, and the Malipsdrift Mine in the Pietersburg District of the Transvaal.

Koegas and Westerberg Mines

Situated on the north and south banks respectively of the Orange River some 46 miles downstream from Prieska, the two mines being connected by the Riley Bridge, constructed in 1951. In this area the company owns, in addition, large tracts of asbestos-bearing ground, on which several small mines have in the past yielded quantities of Blue Asbestos and are awaiting further exploration.

Skefko House, Rissik Street, Johannesburg, where Cape Asbestos South Africa (Pty) Limited have their offices



The grades of Blue Asbestos produced at the Koegas/Westerberg mines are:

S	Medium grade
H	Shorts grade
SBG	A specially blended grade for the battery box trade
A,B,C,D	Machine-treated long grades

Carn-Brae Mine

Situated on the farm Keikamspoort, 18 miles south of Prieska, was closed down in 1949 when the company's mining activities in the Cape were concentrated at Koegas and Westerberg, but was reopened in 1958. The ore is cobbed and transported to the Prieska Mill for treatment.

Prieska Mill

This treatment plant, newly erected on ground owned by Cape Blue Mines in the Municipality of Prieska, was commissioned in 1958 to treat ore mined at Carn Brae and by tributors on company-held ground, and purchased ore and fibre from small mine owners in the Prieska area, the production from this plant being Cape P grade.

Pomfret Mine

Situated some 134 miles north-west of Vryburg in the Northern Cape, near the Bechuanaland border and the edge of the Kalahari Desert. The farm Pomfret, where the mine is established, is one of the farms in this area over which Cape Blue Mines (Pty) Limited holds the asbestos mining rights, the total area of these farms being 59,000 morgen (about 125,000 acres).

The grades produced at Pomfret are: S (Medium grade) and A, B, C, D (Machine treated long grades). Special hand-cobbed grades are also available for specific requirements.

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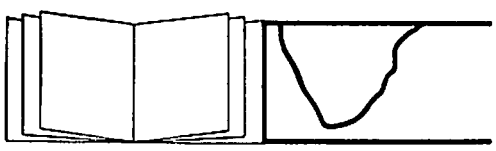
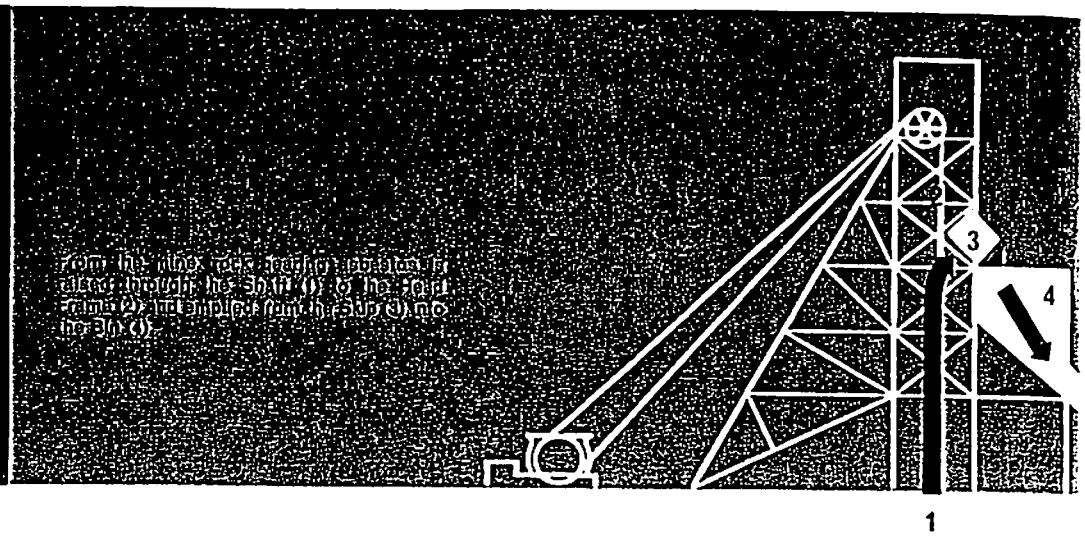


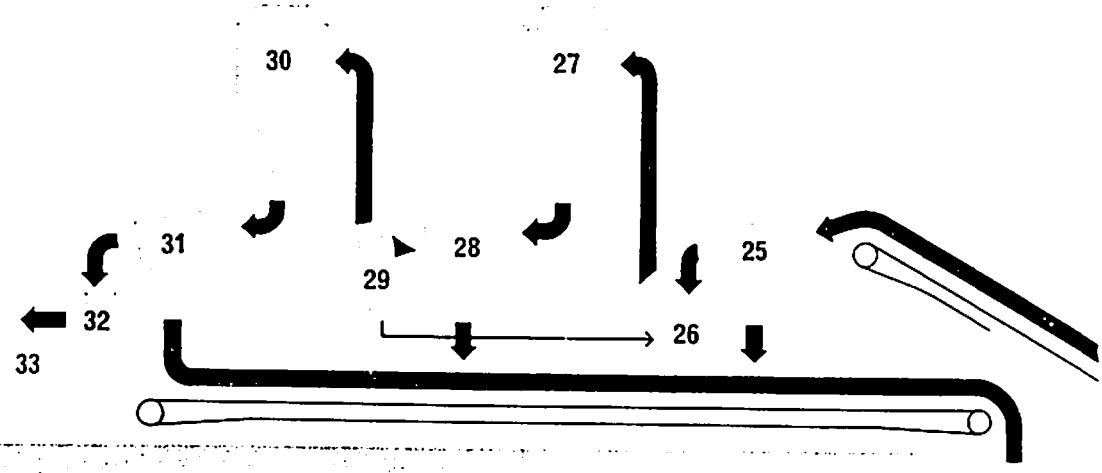
Flow Diagram of the Production of Asbestos

Here are illustrated in diagrammatic form the various processes through which the pieces of crude asbestos rock pass after they have been brought to the surface at one of our South African mines.



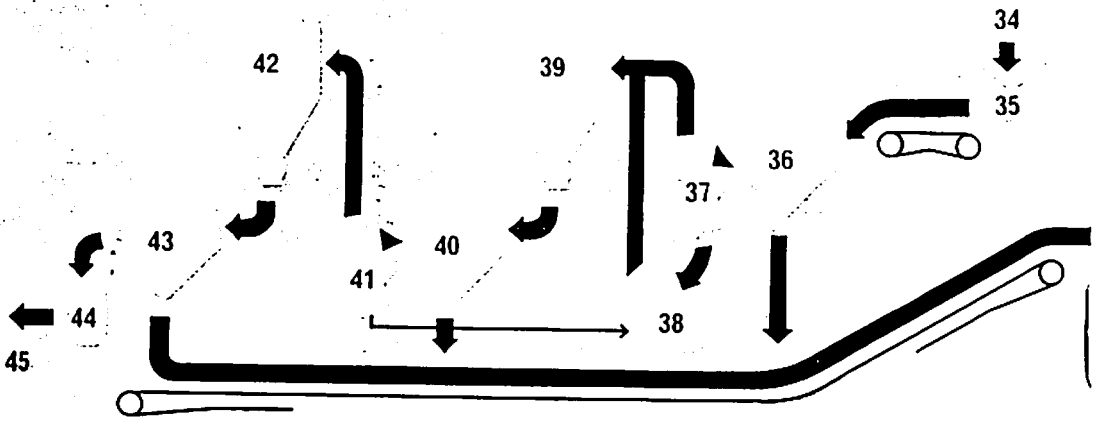
Long Fibre Plant

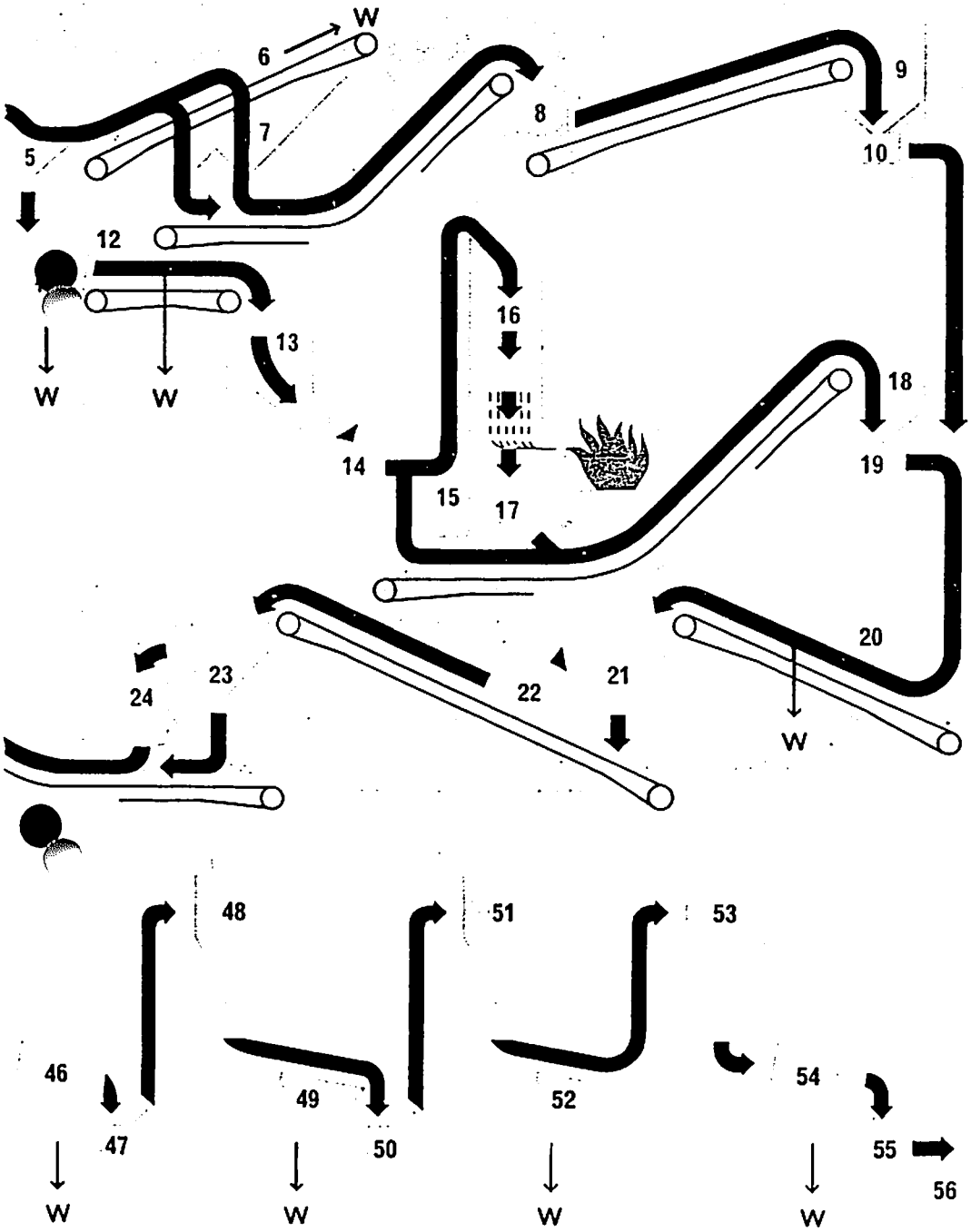
From the preparatory cleaning plant the asbestos is fed on to Trommels (25), through the Fiberiser (26) and into the Cyclone (27). Then it proceeds down on to the Trommels (28), through the Air Separators (29), the unders being recirculated back to the Fiberiser (26) from the Separators (29) into the Cyclone (30). The asbestos proceeds to the Final Cleaning Trommels (31), where it is put into Bags (32). It is then weighed and after inspection and quality control the asbestos is sent to storage sheds at the mine and then by road transport to the railhead (33).



Medium Fibre Plant

The unders from the Long Fibre Plant (25) and (31) are fed to the Medium Fibre Plant Storage Bins (34) into Feeder (35) and on to Trommels (36), then to Air Separators (37), and into the Fiberiser (38). Then the asbestos goes to the Cyclone (39) and on to the Trommels (40), then to the Air Separators (41). The unders are recirculated to the Fiberiser (38) and the remainder to the Cyclone (42). Then the asbestos goes on to the Trommels (43) and is put into Bags (44). It is then weighed, and after inspection and quality control the asbestos is sent to the storage sheds at the mine and by road transport to the railhead (45).





From the Bin (4) the rock and asbestos move to the Vibrating Grizzley (5) and are sorted on the Reef Picking conveyor belt (6). The asbestos falls into the Reef Bins (7), the waste (W) goes to the dump. The asbestos is fed through the Jaw Crusher (8), thence into the Dry Ore (Reef) Storage Bin (9) and into the Feeder (10).

From the Vibrating Grizzley (5) the unders are fed over the Washing Screen (11), the waste (W) goes to the slimes dam and the remainder over the Waste Sorting conveyor belt (12). The waste (W) proceeds to the dump and the asbestos to the Ore (Reef) Bin (13), through the Feeder (14) up Bucket Elevator (15) and down the Tower Dryer (16). Then the asbestos goes down to the Feeder (17) or by way of the dryer bypass. From here the asbestos is conveyed into the Dry Ore (Reef) Storage Bin (18) and into the third Feeder (19).

The contents of Feeders (10) and (19) are fed on to the Waste Sorting conveyor belt (20). The waste (W) goes to the dump and the asbestos on to the Screen (21), fine pieces falling through the Screen and the remainder passing on through the Jaw Crusher (22). The total is passed on to the Screen (23). While fine pieces fall through the screen the remainder goes through the Cone Crusher (24). The total is conveyed to the Long Fibre Plant.

Short Fibre Plant

The unders from the Medium Plant (36), (40) and (43) are fed to the Short Fibre Plant on to the Trommels (46). The Tailings are deposited on the dump while the remainder goes into the Fiberiser (47), then to the Cyclone (48), over the Screen (49), through the Fiberiser (50), then to the Cyclone (51), over the Screen (52), then to the Cyclone (53), then into the Final Cleaning Trommels (54) and finally into Bags (55). It is then weighed and after going through inspection and quality control is conveyed to the storage sheds at the mine and thence by road transport to the railhead (56).

Consolidated Blue Asbestos Corporation (Pty) Limited

The share capital of this company was purchased in July, 1958. The company operates a mine on the farm Warrendale, 8 miles from Silverstreams station on the Kimberley–Postmasburg branch railway line. In addition to mining activities on Warrendale, the company is engaged on exploratory work on several promising prospects in the area and on Warrendale itself.

The Warrendale mine has been working in a small way for the past thirty years, and the fibre produced is marketed as:

KBY1 Long Blue
BY2 Long Blue
KBY3 Medium Blue

AMOSITE ASBESTOS

Egnep (Pty) Limited and Amosa (Pty) Limited

These companies were registered in 1916 to acquire leases of the mineral rights over the farms Penge and Streatham on the banks of the Olifants River in the native area of Sekhukhuneland in the Lydenburg district of the Eastern Transvaal. The mining camp at Penge is 65 miles from Lydenburg, the then railhead. Later the railway line was extended to Steelpoort, bringing the railway station at Burgersfort on the Lydenburg–Steelpoort line to within 22 miles of the mine.

These companies were purchased by The Cape Asbestos Company Limited in 1925, by which time the mining leases had been extended over the farms Havercroft, Riverside, Weltevreden, Zamenloop and Kromellenboog. In 1927 Egnep (Pty) Limited purchased the assets of Malipsdrift Asbestos Company, which held 943 mining claims in the Pietersburg area, and in 1958 the 186 adjoining mining claims of Uitkyk asbestos were purchased.

The farms Havercroft, Streatham, Penge, Riverside, Weltevreden, Zamenloop and Kromellenboog cover an area of approximately 25,000 morgen (53,000 acres) bounded on the north by the Olifants River and on the east by the Steelpoort River. Four separate mines are in production on these farms. The Amosite Asbestos ore from the mines on Streatham and Penge is treated in plants on the farm Penge, the grades produced being:

D3 Extra Long fibre
DX, D11 Long fibre
M, MD Medium Long fibre
S2 Medium Short fibre
S3 Short fibre

The mine at Weltevreden has its own treatment plant, and the grades produced are:

W3 Medium fibre
SW Medium Short fibre
GW Short fibre

At Kromellenboog the treatment plant produces:

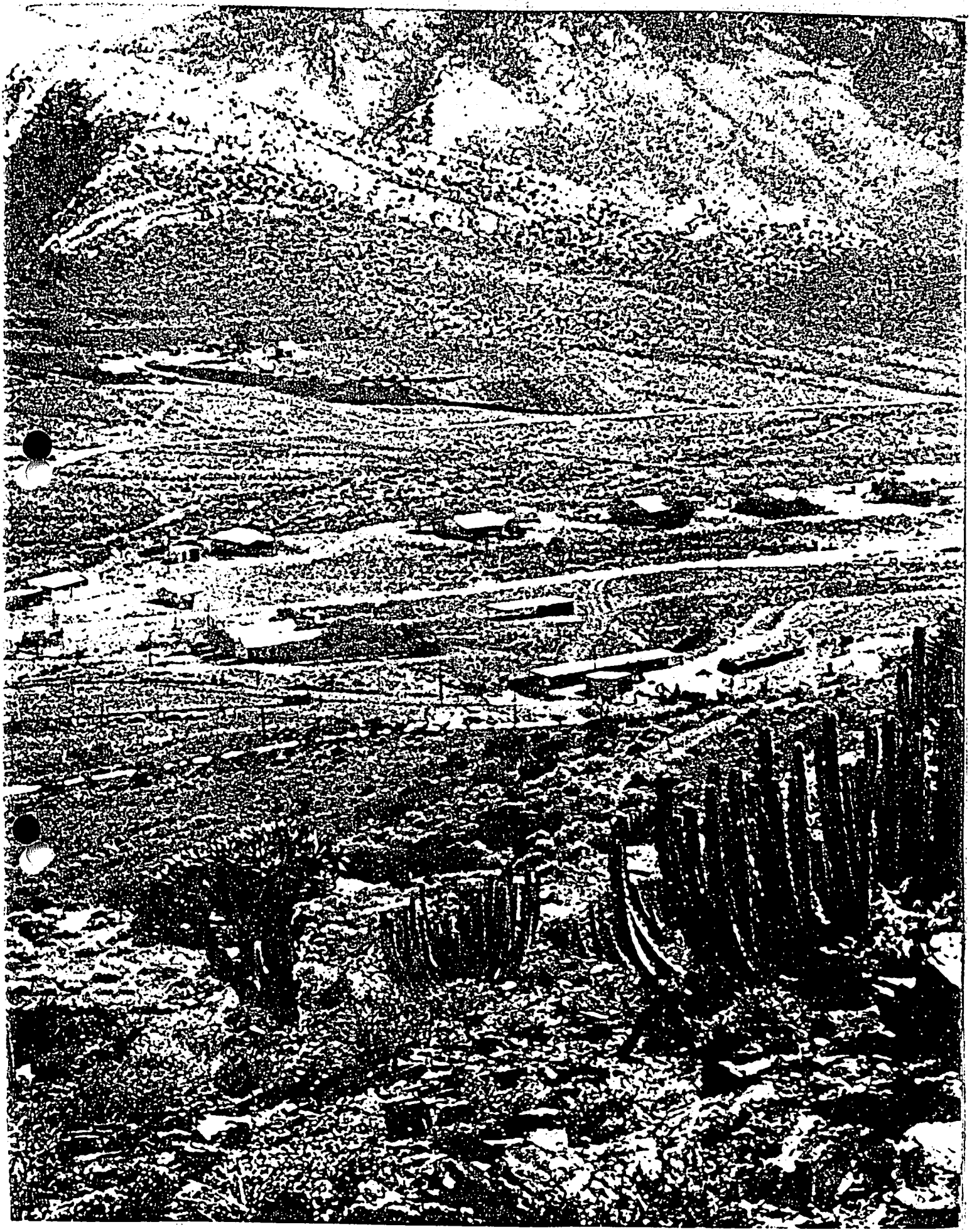
K3 Medium fibre
SK Medium Short fibre
GK Short fibre

BLUE AND AMOSITE

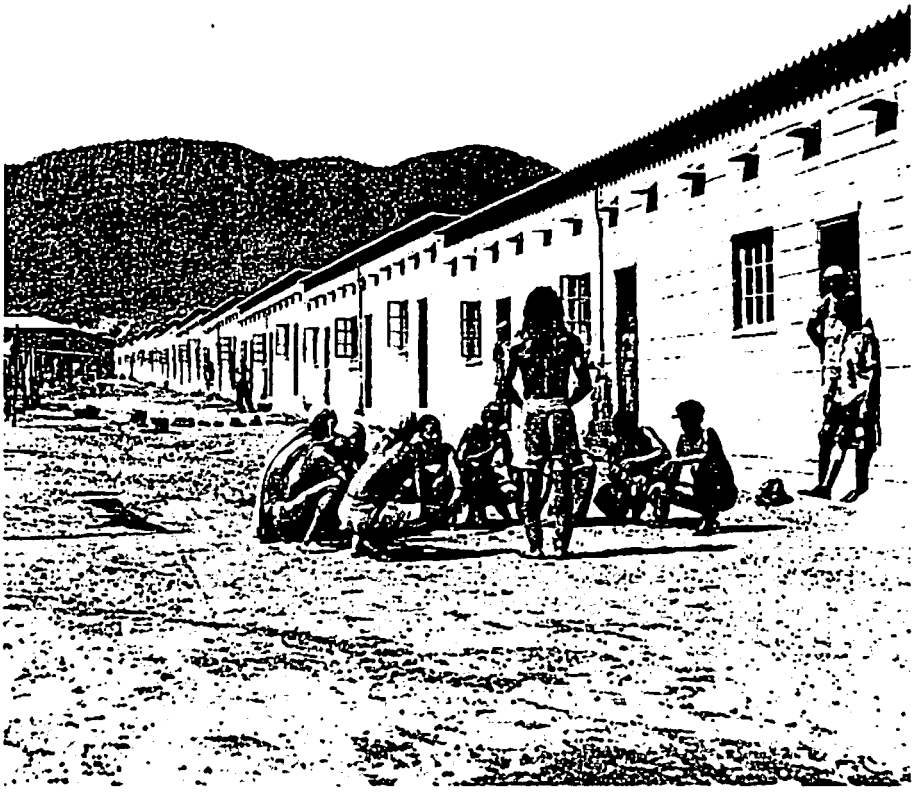
In the Malipsdrift area Blue Asbestos is mined for Cape Blue Mines (Pty) Limited and Amosite for Egnep (Pty) Limited. The Blue production is blended to produce Standard Transvaal S, while the Amosite grades are blended with production from other mining areas to produce opened fibres against specific demand.

The broken asbestos-bearing rock – ten parts of asbestos to a hundred parts of rock – is brought to the surface by diesel train

Batch sampling of bagged fibre for quality control plus visual assessment of fibre quality and uniformity being carried out under European supervision after milling

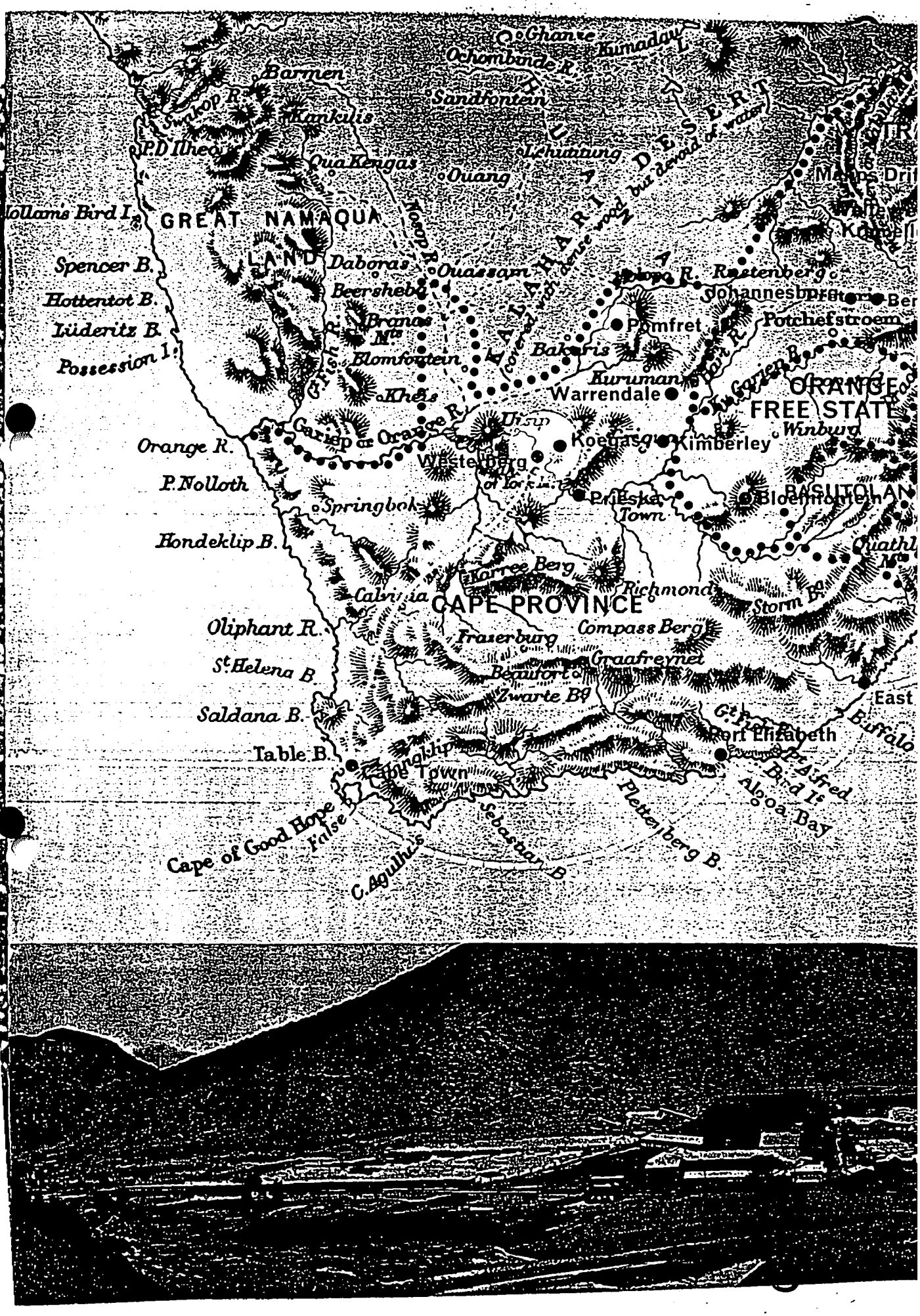


Westerberg Valley from above Section Six. Note indigenous cactus and 'Kokerboom' in foreground

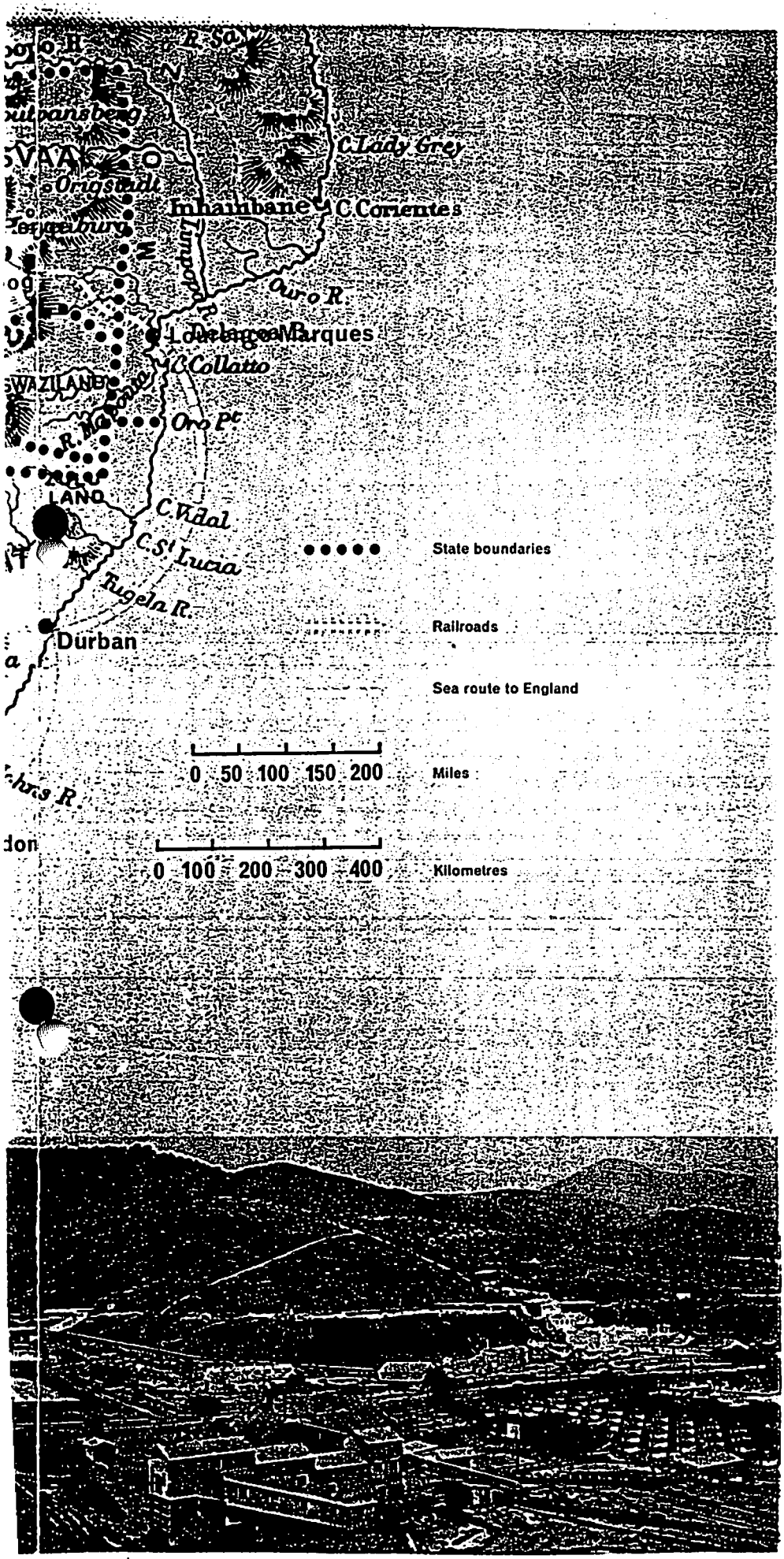


Houses built by the company for Africans who work on our Amosite mines at Penge in the Transvaal

Africans seeking employment on our Amosite mines at Penge in the Transvaal are examined by the Mine Doctor


Ghanze
Kumadau
Ochombonde R.
Barmen
Sandfontein
Swakop R.
Kankulis
P.D Ilhec
Quakengas
Ouang
Ichuntung
GREAT NAMAQUA LAND
Hollams Bird I.
Spencer B.
Hottentot B.
Lüderitz B.
Possession I.
Daboras
Ouassam
Beershebe
Bramas
Blomfontein
Khes
Orange R.
Warrendale
Pomfret
Bakaris
Kuruman
Rostenberg
Johannesburg
Potchefstroom
ORANGE FREE STATE
Winburg
Kimberley
Koegasberg
Prieska
Town
Bloemfontein
Orange R.
Springbok
Hondeklip B.
Karree Berg
Richmond
Storm B.
CAPE PROVINCE
Oliphant R.
Compass Berg
Fraserburg
St Helena B.
Graafreynet
Beaufort
Zwarte Bg
Saldana B.
Table B.
Port Elizabeth
East
Buffalo
Table Town
Algoa Bay
Bird I.
Cape of Good Hope
False
C. Agulhas
Sebastian B.
Plettenberg B.

Our South African Asbestos Mines



From this map of the Union of South Africa you can see the location of each of our asbestos mining areas, indicated by the white circles.

The main Blue Asbestos mines are at Koegas, Westerberg and Pomfret in Cape Province and are operated by Cape Blue Mines (Pty) Limited; those operated by Consolidated Blue Asbestos Corporation (Pty) Limited are at Warrendale, also in Cape Province, between Postmasburg and Kuruman; and there is also one at Malips Drift in the Transvaal.

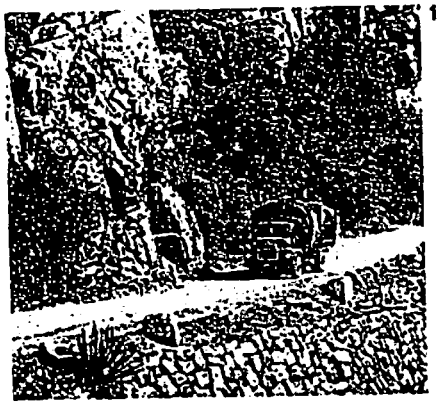
The Amosite mines are at Penge, Weltevreden, Kromellenboog and Malips Drift in the Transvaal and are operated by Egnep (Pty) Limited and Amosa (Pty) Limited.

A panoramic view of our Amosite mining area at Penge in the Transvaal

The Journey Back

1 By road from the mine to the railhead

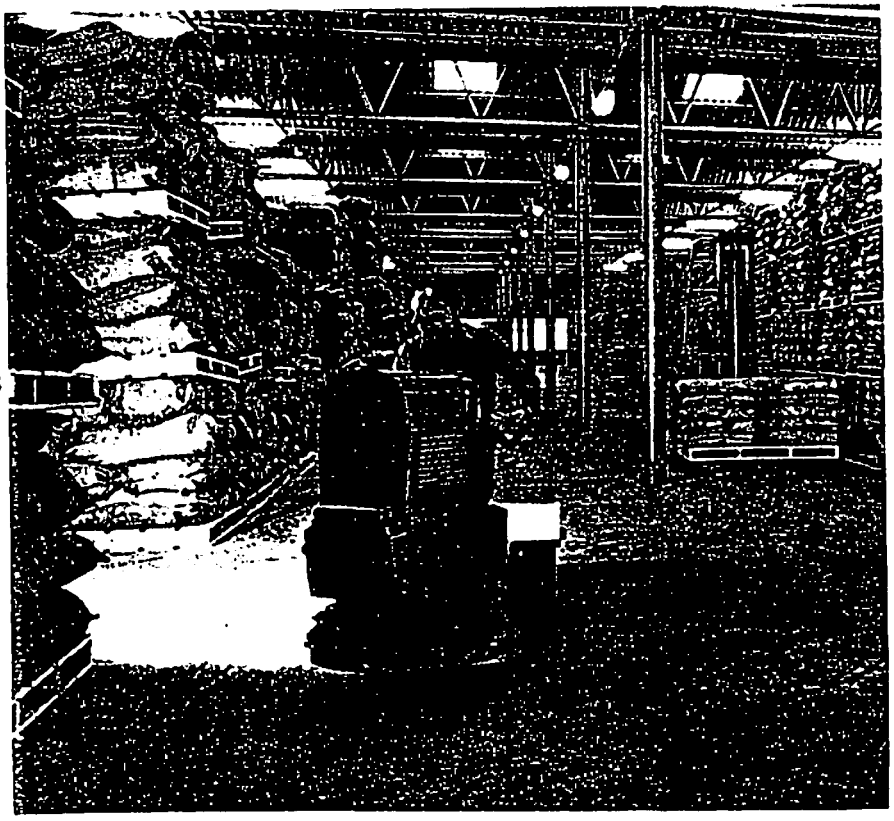
2 From the truck into the train which will take the sacks of asbestos to the South African port for shipment overseas



1

2

3



4

3 From London docks the sacks are taken by barge to the private quay at our Barking Works

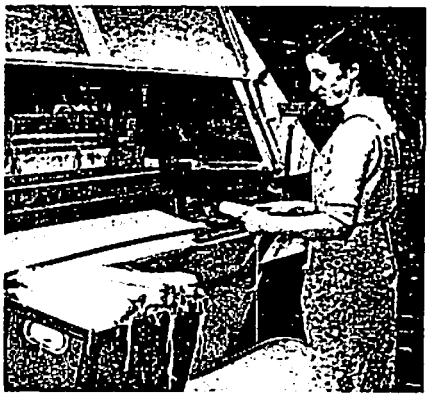
4 At the big warehouse at our Barking Works the long journey from Penge in the Transvaal comes to an end

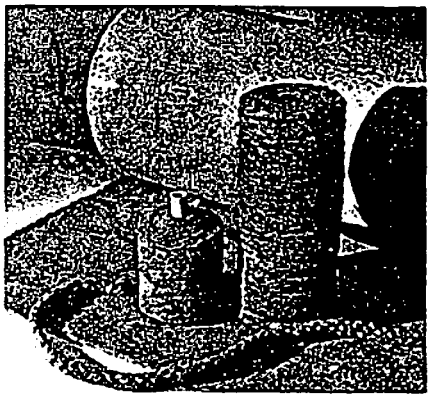
African types who work on our
ansvaal asbestos mines:
t Basuto and right Pondo

Uses for Blue Asbestos and Amosite

Commercial Applications

In the preceding pages we have pointed out the distinctive properties of Blue Asbestos and Amosite. These properties lead to distinct and specialised uses - Blue and Amosite have never been regarded as 'substitutes' for White. In the following pages we discuss the wide range of commercial applications for Blue Asbestos and Amosite either alone or blended with White Asbestos.





PACKINGS

Blue Asbestos, Long Fibred Grades for Plaited Packings.
Blue Asbestos, Medium and Short Grades for Blue Asbestos Millboard.

Packings woven from Blue Asbestos yarns are used for glands and stuffing boxes in chemical plants, particularly where resistance to acids is required. The packings are plaited in the usual way, graphite or grease being incorporated as required.

Polytetrafluorethylene covers or sleeves may be used in conjunction with blue asbestos packings if extreme conditions of acidity are involved.

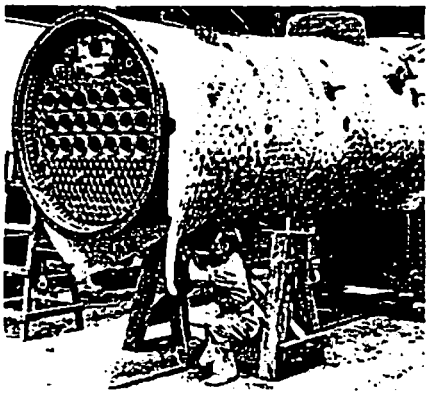
Millboard prepared from short Blue Asbestos is also used as a packing or gasket material on chemical plant where acid resistance is particularly required.

YARNS AND CLOTHS

Blue Asbestos, Long Fibred Grades

Yarns and cloths woven from long Blue Asbestos fibres are strong and have high chemical resistance.

Typical uses for Blue Asbestos cloth are;
Filtration cloths.
Diaphragms in electrolytic cells.
Curtains, forming dampers in fume exhausts.
Smoke chutes.
Heat insulation in mattress covers for use on railway locomotives and in acid-containing atmospheres generally.



REINFORCED PLASTICS

Blue Asbestos, Long Fibred Grades for felts.
Blue Asbestos, Medium and Short Grades for premix compounds.

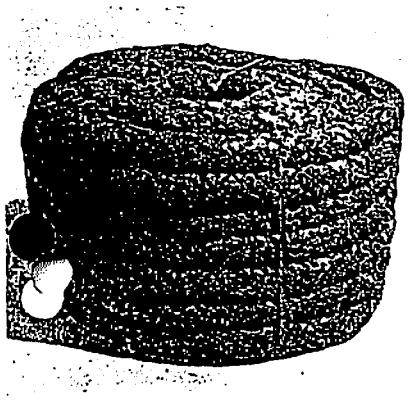
The elastic modulus of Blue Asbestos is over twice that of glass fibre. Felts prepared from long Blue Asbestos are being developed for use with epoxy, polyester and phenolic resins, particularly for applications where great stiffness or chemical resistance is needed. The adhesion of plastics to asbestos is superior to that of glass, and this increases the chemical and water resistance.

Shorter Blue Asbestos fibres may be used in 'premix' or 'dough' moulding compositions to confer dimensional stability and water or chemical resistance.

HEAT INSULATION

Amphibole Asbestos is particularly suitable for use in heat-insulating materials. It is in this field that the long fibred Amosite is particularly useful. There are two reasons for this: firstly because the long, stiff fibres form a large volume, enclosing a high proportion of still air which confers good heat insulation; and second, because Amosite provides excellent reinforcement in magnesia or calcium silicate and, more important, enabling the slurries from which these materials are prepared to be filtered rapidly.

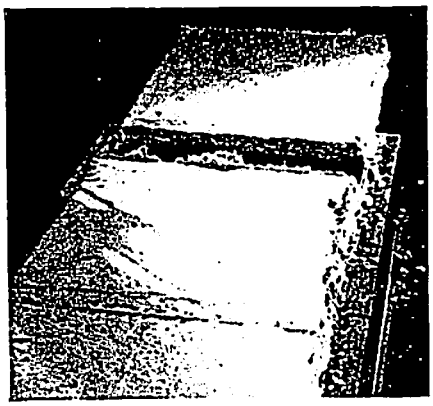
Details of the use of Amosite and Blue Asbestos in various products for heat insulation are given below.



Rope Lagging

Amosite Grade D3

Long fibred Amosite is particularly suitable for use in rope lagging. The long fibres lend themselves for use in simple carding machines in which the fibres are rolled and twisted together to form a rope that may subsequently be covered in a braiding made from an asbestos or glass yarn. The high bulk volume of this asbestos gives a rope that is very light in weight and having better heat insulating value than ropes made from the softer White Asbestos.



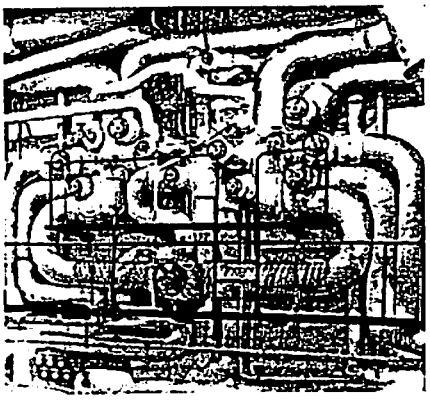
Preformed Asbestos Blocks and Pipe Sections

Amosite Long and Medium Long Grades

'Asbestos' blocks and pipe sections for use in heat insulation are best made from Amosite.

These materials have been used for many years on oil refineries, generating stations and in all conventional heat insulating applications against hot surfaces at temperatures up to 1000° F.

One of the particular features of this material is in its fibrous, resilient nature. This means that it may be transported over great distances with less risk of breakage than is usually encountered with lightweight materials.



Preformed Magnesia or Calcium Silicate Blocks and Pipe Sections

Amosite Long and Medium Grades

Experience has shown that Amosite is the best reinforcing fibre to use in these products.

The function of the fibre is to provide reinforcement and resistance against impact, heat stress and accidental damage.

Between fifteen and twenty per cent of Amosite, fiberised in such a way as to retain a good proportion of coarse, crude bundles, is usually employed.

A particular virtue of Amosite in these processes is that the long resilient fibres keep the wet slurry 'free' and 'open,' thus enabling it to be filtered quickly and cleanly.

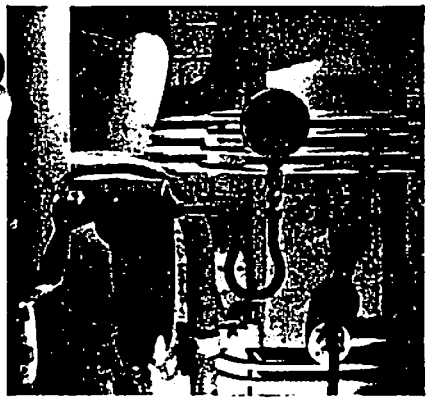
Blocks and pipe sections for use against higher temperatures are usually denser and contain high proportions of diatomaceous earth or calcined magnesia.

These are usually made by the same processes and, for the same reason as given above, Amosite fibres are incorporated with advantage.

Loose Fill

Blue Asbestos or Amosite Medium Long and Short Grades. Use longer fibres if greater bulk is required.

Well-fiberised Blue Asbestos and Amosite may be used for loose fill insulation and as the filling in heat insulating mattresses, particularly where some measure of chemical resistance is required.



Insulating Compositions

Amosite Medium Long Grades for Insulating Compositions
Amosite Short Grades for Finishing and Self-setting Compositions

Amosite is a very convenient fibre to use in heat insulating compositions. Its long, stiff fibres ensure that a good bulk is obtained and also provide the necessary reinforcement.

Mixtures of between twenty and fifty per cent of well-fiberised, long amosite with magnesium carbonate or a good grade of diatomaceous earth will give a composition having good thermal insulating properties. Up to ten per cent of clay may also be added to give some 'slip' and 'bind.'

For finishing compositions, up to ten per cent of well-fiberised Amosite may be used with cheap fillers such as chalk or sand; again, add up to ten per cent of clay to give 'slip' and 'bind.'

Self-setting compositions are prepared from cement containing between ten and thirty per cent of well-fiberised, short Amosite.

ASBESTOS SPRAY

Blue Asbestos and Amosite Medium and Short Grades

Short, well-fiberised Amosite or Blue Asbestos is the best fibre to use in asbestos spray.

Asbestos spray has been extensively developed as a heat insulating, acoustic, and anti-condensation medium.

The fibres are usually sprayed in a fine mist of water, and a soluble adhesive is sometimes added to the water.

When dry, the sprayed asbestos will have a density of 9–13 1b/cu ft (depending upon the conditions), at which its thermal conductivity will be in the region of 0·32 Btu/sq ft/hr/(°F/in).

BITUMEN AND PITCH MOULDING COMPOUNDS

Blue Asbestos and Amosite Medium and Short Grades

Mouldings for use in conjunction with water and chemicals have for many years been prepared from mixtures of bitumen or pitch with blue asbestos. Amosite asbestos may also be used.

It is usual to employ a short, well-opened Blue Asbestos or Amosite for this purpose and to mix it hot with bitumen or pitch, then to press it in water-cooled moulds or to extrude or otherwise form it into pipes.

A particular use for Blue Asbestos in this connection is in bitumen composition battery boxes.

'Dagenite' battery boxes being made from a Blue Asbestos-bitumen composition at Pritchett and Gold's works, Dagenham

ASBESTOS-CEMENT AND OTHER BUILDING BOARDS

Asbestos-Cement Sheets

Blue Asbestos and Amosite Medium and Short Grades

Blue Asbestos and Amosite are, with great advantage, added to the fibrous component for the production of asbestos-cement sheets. It is well known that the speed at which asbestos-cement machines may be operated depends upon the rate at which the film on the blanket may be filtered. Blue Asbestos and Amosite are unique in that they act as filter aids in this process and at the same time contribute to the reinforcement of the product.

As was pointed out earlier, the basic fibres of Blue Asbestos and Amosite are considerably coarser than those of White Asbestos, and experience has clearly shown that there is considerable advantage in having a proportion of coarser fibres present in order to keep the stock 'free' and to prevent the finer White Asbestos fibres from settling in too 'dead' a mass.

Twenty-five per cent or more of the fibrous component may usefully consist of Blue Asbestos and/or Amosite for flat sheet manufacture. Up to fifteen per cent in recommended for use in corrugated sheets and sheets which are to be used for moulded products.

Lightweight Asbestos Insulation Boards

Amosite Asbestos Medium and Short Grades

Lightweight asbestos insulation boards may be prepared on the same type of machine using between twenty-five and thirty-five per cent of Amosite blended with lime and diatomaceous earth. After forming the sheets in the usual way, a calcium silicate bond is formed in high-pressure steam. Hydraulic cement may also be used as the binding medium in this process.

Asbestos-Cement Pressure Pipes

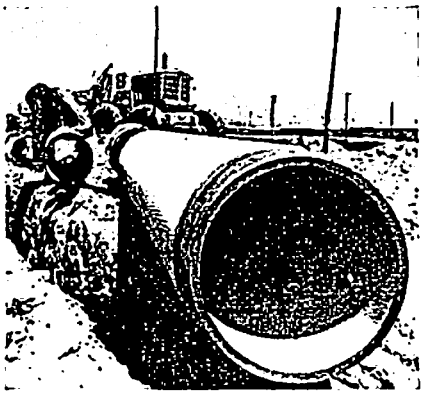
Blue Asbestos and Amosite Medium and Short Grades

The factors that have been outlined regarding the use of Blue Asbestos and Amosite for asbestos-cement sheet apply to an even greater degree to the manufacture of asbestos-cement pressure pipes, where a high rate of production is required together with a strong product.

In such processes it is usual to apply pressure to the surface of the pipe as it builds up on the machine by means of a blanket roll or a rubber roll. It is essential that the mix does not squeeze out or move as a result of this pressure, and the fast-drying properties conferred by the use of Blue Asbestos in particular are of great value in this respect.

Depending upon the type of process employed, between twenty and fifty per cent of the fibrous content of the mix may usefully be Blue Asbestos or Amosite.

Johns-Manville Asbestos-Cement pipes of the type in which our Cape Blue Asbestos fibre is used



Preparation and Fiberisation

As has been explained, it is customary to supply Blue Asbestos and Amosite in a relatively 'crude' form in order to save transport costs.

It is therefore usually necessary to open the asbestos further before using it in the various processes that have been described.

For textile processes, the same opening machinery as is used for White Asbestos is employed.

For heat insulating products it is usually desirable to open the asbestos as much as is reasonably possible, and high-speed hammer or attrition mills are recommended. (For reinforcement of magnesia insulation and like products, a less severe opening is recommended.)

For use in asbestos-cement products and other board-making processes the best filtration properties are obtained from relatively coarse fibres, and it is therefore advisable not to open the fibres any more than is necessary to produce a smooth, uniform sheet or pipe.

Slow-speed mills or kollergangs as are conventionally used for White Asbestos may be used for Blue Asbestos and Amosite, but the hard, springy fibres may be damaged by excessive heavy milling, and this treatment should be kept to a minimum.

If wet milling is preferred, approximately thirty per cent of water should be added to the fibre in the mill.

Processed Asbestos Fibres

Apart from producing raw asbestos from our mines and selling it in that form throughout the world, we also meet the demands of customers who require their fibre already processed; and our factories at home and overseas are equipped with the latest machinery for processing and preparing all types of asbestos fibres, Amosite, Blue and White Asbestos for all trades and uses. Our experience in this field is at the disposal of all actual or potential users of asbestos. Types, blends, lengths, and degrees of opening can be varied to suit customers' requirements.

We shall be glad to give advice on the selection, preparation and blending of asbestos for use with cements and bituminous products for building materials, roofing compounds, plastic and electrical mouldings, etc. Specially prepared fibres are available as a heat insulation medium either alone or as the binder for various types of plastic non-conducting materials.

Our processed Blue Asbestos fibres are widely used for loose-fill acid packing or insulation, filtration of liquids or gases, adsorption and mechanical reinforcing; our Amosite Processed Fibres for many varied types of insulation products, adsorption and mechanical reinforcing.

Processed Fibres Plant

Summary of Grades

BLUE ASBESTOS

Eight grades: D, C, B, A, S, P, B1, H.

D, C, B
Long-fibred asbestos for use in asbestos cloth, reinforced plastics and packings. The lengths of the crude asbestos from which these grades are obtained are:

Grade	Length of fibre in inches
B	¼ to 1½
C	½ to 1½
D	longer than ½

A
This is an intermediate grade, being prepared from asbestos seams between ¼ and ½ inch long. It may be used for Blue Asbestos textiles and packings and also in order to speed filtrations and increase the strength of asbestos-cement products.

S, P
Prepared from seams below ¼ inch long. These are the grades of Blue Asbestos used most commonly in asbestos-cement sheet and pressure pipe. They are also used as loose fill and in moulding compounds and asbestos spray.

B1
A blend of processed Blue fibres of fibre length intermediate between S and A. The asbestos is in a more open condition than the S or A and renders easy entry of polythene treatment to produce maximum asbestos-cement mixtures, moulding compounds, loose fill or asbestos spray.

H
A short but particularly uniform and closely graded asbestos. Used to asbestos-cement sheet and pressure pipe.

Note:
Blue Asbestos in most of the length gradings given above is available from different areas. One of these yields particularly hard, resilient fibres giving the best filtration and the maximum reinforcement in asbestos-cement products. The other, a somewhat softer fibre, opening more easily, is applicable in processes where a more fully opened fibre is required.

AMOSITE

Fifteen grades: D3, D11, DX, MD, M, K3, W3, S2, SK, SW, S3, GW, GK, AW, A10

D3
This is an extra long grade, the largest proportion of the fibre being several inches in length, used for the manufacture of rope lagging on simple carding machines.

D11
Long fibred, for use in heat insulating products.

DX
Long fibred, for use in heat insulating products. It is somewhat softer and more easily opened than Grade D11.

MD, M
Medium long fibre, for use in heat insulating products.

K3, W3
Fibre of intermediate length, for use in heat insulating products.

S2, SK, SW
Medium short fibre length, for use in asbestos-cement products, asbestos spray, asbestos insulation board, loose fill insulating compositions and moulding compounds.

S3, GW, GK
Short fibre length, for use in asbestos-cement products, finishing compositions, moulding compounds, loose fill and in asbestos spray.

AW
A fully processed, semi-short grade, for use in asbestos-cement products, as loose fill, and in moulding compounds, or asbestos spray. This is a blend of fibres in a more opened condition than the preceding grades and may be used in many products without further fiberisation.

A10
A fully processed short grade of blended fibres. An alternative to AW if shorter fibre is required.

Appendix

Ordering Information

Cape Asbestos Fibres Limited in London acts as the commercial office for all raw asbestos produced by the Cape Group of Companies, and all enquiries should be sent to 114 and 116 Park Street, London W1.

Orders arising from these enquiries, however, are placed by the buyer with the mining company concerned. Orders for materials produced in South Africa are accepted for payment in South African currency.

All grades of asbestos except for processed fibres supplied by our United Kingdom manufacturing companies are sold in short tons of 2,000 lb net (2,020 lb gross), packed 20 bags to the short ton, each 100 lb net (101 lb gross).

BLUE ASBESTOS is supplied f.o.b.* African port, bags included, by Cape Blue Mines (Pty) Limited, who operate the mining companies within the Group producing Blue Asbestos.

Payment terms: net cash by irrevocable letter of credit opened in their favour negotiable with and confirmed by Barclays Bank DCO, Rissik Street South Branch, Johannesburg.

AMOSITE is supplied f.o.b.* African port, bags extra (three shillings each or £3 per short ton†) by Egnep (Pty) Limited, who operate the mining companies within the Group producing Amosite.

Payment terms: net cash by irrevocable letter of credit opened in their favour negotiable with and confirmed by the Standard Bank of South Africa Limited, Rissik Street South Branch, Johannesburg.

PROCESSED FIBRES produced by our South African manufacturing company, Cape Asbestos Insulations (Pty) Limited, at Benoni, Johannesburg, and other associated companies in the Union, for direct shipment from South Africa, are supplied f.o.b.* African port, bags included, by Cape Asbestos South Africa (Pty) Limited.

Payment terms are net cash by irrevocable letter of credit opened in their favour negotiable with and confirmed by Barclays Bank DCO, Rissik Street South Branch, Johannesburg.

Processed fibres produced by our United Kingdom factories and subsidiaries for delivery within the U.K. and overseas are supplied f.o.b. United Kingdom ports or delivered within the U.K. by Cape Insulation and Asbestos Products Limited. These materials are packed in standard bags each 112 lb and/or 56 lb net; alternatively 50 kilos and/or 25 kilos net.

* At customers' request, freight will be prepaid and charged at cost, insurance covered and premiums debited at cost.
† From March 1961, 30 cents each or 6 Rands per short ton.

ANNUAL CONTRACT

To assist in economic mining programming and to avoid disappointment to end users, Blue Asbestos and Amosite for direct shipment from South Africa are generally sold on an annual contract basis, the annual contract period being from January 1st to December 31st each year.

Blue Asbestos and Amosite Products of The Cape Asbestos Group of Companies and of overseas associates

BLUE ASBESTOS

PLUTO
ıe Asbestos Mattresses
oy
Cape Insulation and Asbestos Products Limited (at Barking Works, Essex)
Capamianto SpA, Italy
Cape Asbestos Insulations (Pty) Limited, South Africa

PLUTO
Blue Asbestos Cloth
by
Cape Insulation and Asbestos Products Limited (at Acre Mill, Yorkshire)
Capamianto SpA, Italy
Cape Asbestos Insulations (Pty) Limited, South Africa

PLUTO
Blue Asbestos Millboard
by
Cape Insulation and Asbestos Products Limited (at Barking Works, Essex)
apamianto SpA, Italy
.pe Asbestos Insulations (Pty) Limited, South Africa

PLUTO
Blue Asbestos Fibre Filled Rope Lagging
by
Cape Insulation and Asbestos Products Limited (at Acre Mill, Yorkshire)
Capamianto SpA, Italy
Cape Asbestos Insulations (Pty) Limited, South Africa

AMOSITE

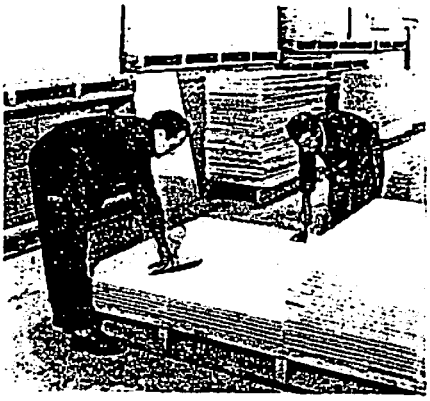
CAPOSITE
Preformed Moulded Insulation Materials
by
Cape Insulation and Asbestos Products Limited (at Barking Works, Essex; Acre Mill, Yorkshire)
Caposite Insulations Limited, Canada
Cape Asbestos Insulations (Pty) Limited, South Africa
James Hardie and Company (Pty) Limited, Australia
Isolamiante SA France (as 'Isolamiante')
Capamianto SpA, Italy
J. de Boer and Company, Holland
Eduardo Rosa, Spain
Montisol Argentina SRL, Argentina
Nippon Asbestos Company, Japan
Union Asbestos and Rubber Company, USA (as 'Unibestos')
Aislantes Industriales SA, Mexico

CAPOSIL 1800
High Temperature Block Insulation
by
Cape Insulation and Asbestos Products Limited (at Barking Works, Essex)
Capamianto SpA, Italy
Cape Asbestos Insulations (Pty) Limited, South Africa

CAPOSITE and CAPOSIL
Plastic Compositions, Hard Setting Cements and Insulating Concretes
by
Cape Insulation and Asbestos Products Limited (at Kentmere, Westmorland)
Capamianto SpA, Italy
Cape Asbestos Insulations (Pty) Limited, South Africa

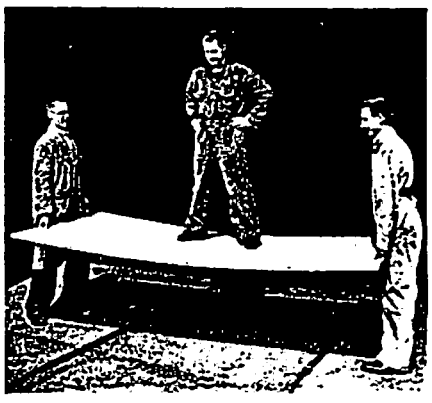
CAPOSITE
Pure Asbestos Fibre Filled Lagging
by
Cape Insulation and Asbestos Products Limited (at Acre Mill, Yorkshire)
Capamianto SpA, Italy
Cape Asbestos Insulations (Pty) Limited, South Africa

CAPOSIL 1400
Calcium Silicate Preformed Insulation
by
Cape Insulation and Asbestos Products Limited (at Barking Works, Essex)



ASBESTOLUX
Asbestos Insulation Board
by
Cape Building Products Limited (at Cowley Bridge Works, Middlesex)
Dansk Eternit Fabrik A/S, Denmark
James Hardie and Company (Pty) Limited, Australia

MARINITE
Asbestos Sheet (by arrangement with Johns-Manville International)
by
Marinite Limited (at Germiston Works, Glasgow)



Technical Sales Literature on Asbestos Thermal Insulation Products

Manufactured by Cape Insulation and Asbestos Products Limited

Ref No.	Title
CAC/1/1	Thermal Insulation Materials
CAC/2/1	Caposite Amosite Asbestos Moulded Thermal Insulation Materials
CAC/31/1	Asbestos Textiles
CAC/41/1	Asbestos Packings and Millboard
CAC/51/1	Compressed Asbestos Fibre Jointing
CAC/81/1	Produits de la Cape Asbestos Company Limited
CAC/81/2	Erzeugnisse der Cape Asbestos Company Limited
CAC/81/3	Productos de la Cape Asbestos Company Limited

Manufactured by Cape Building Products Limited

CBP/LMD/A1	Asbestolux Technical Information
CBP/LMD/A13	Asbestolux, Factory Insulation and Fire Protection

Manufactured by Marinite Limited

MAR/1/60	Marinite, the Unseen Safety Factor in Shipbuilding
MAR/11/1	Marinite, for Building and Insulating Ovens, Kilns, etc.

Manufactured by Capamianto SpA

CAP/1	Caposite (Capisolite) Isolante Preformato di Amianto Amosite

Issued by North American Asbestos Corporation

J-850	Asbestolux, Lightweight, Fireproof Insulation Board

Addresses

Fibre Sales

Cape Asbestos Fibres Limited
114 and 116 Park Street
London W1
Grosvenor 6022
Cables: Incorrupt London
Telex: 23759

A subsidiary of the The Cape Asbestos Company Limited

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North American Asbestos Corporation
Board of Trade Building
141 West Jackson Boulevard
Chicago 4
Illinois

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Cape Asbestos (Canada) Limited
200 Bloor Street East
Toronto
Ontario

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Cape Asbestos South Africa (Pty) Limited
P.O. Box 7644
Skelko House
1 Rissik Street
Johannesburg
Telegraphic Address:
Amposite Johannesburg

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1 Rissik Street
Johannesburg
Telegraphic Address:
Amosite Johannesburg

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1 Rissik Street
Johannesburg
Telegraphic Address:
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1 Rissik Street
Johannesburg
Telegraphic Address:
Amosite Johannesburg

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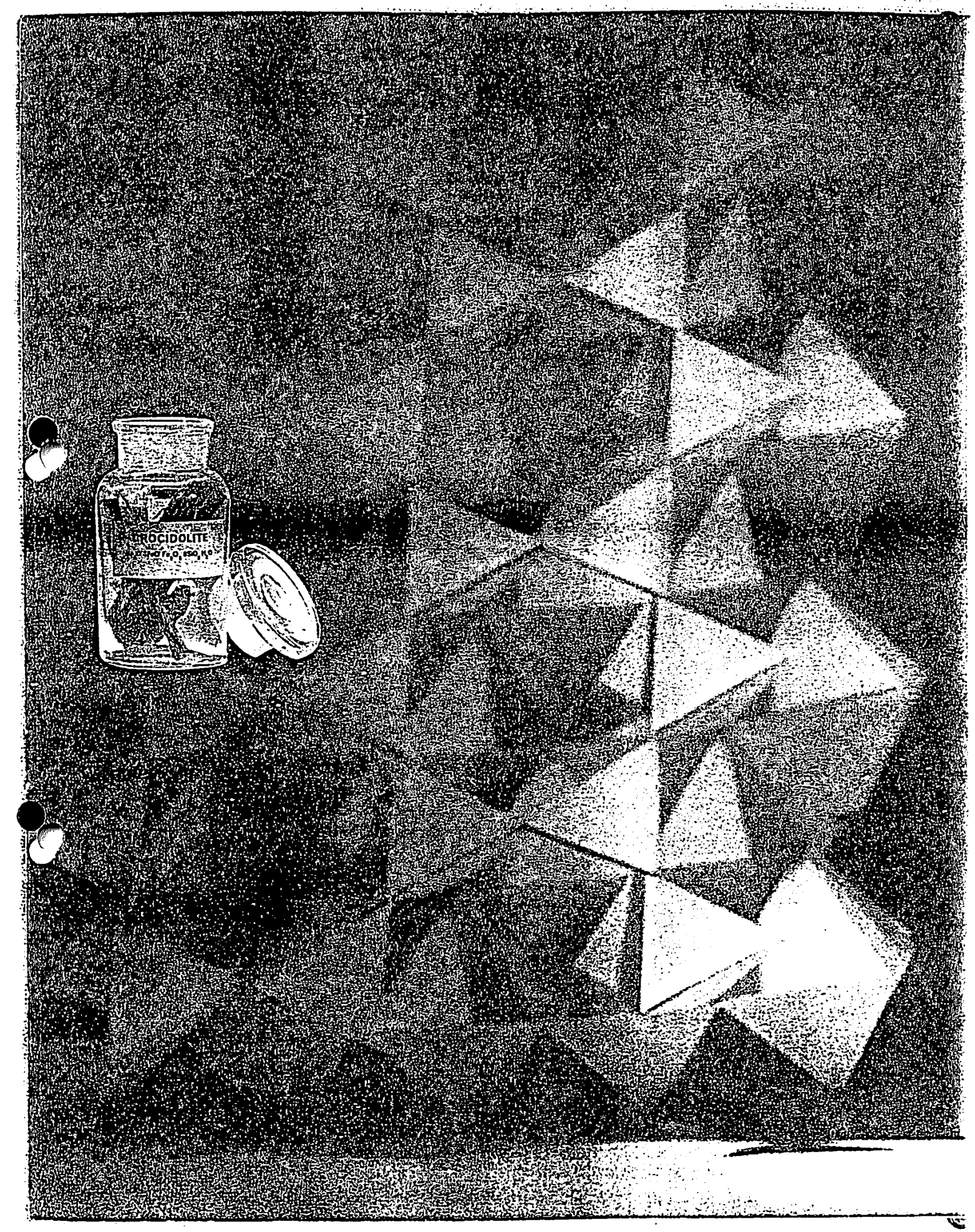
CAO/1/61


CROCIDOLITE