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REPORT

ON

VISIT TO

RHODESIA & SOUTH AFRICA

MADE BY

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&

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IN THE SUPREME COURT

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v.

H. DABER P/L

CORAM

HAMPEL, J.

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I N D E X

RHODESIAN - SOUTH AFRICAN VISIT

	<u>PAGE</u>
Introduction	1
Summary	1
<u>RHODESIAN ASBESTOS LTD. TENERAIRE</u>	1
Financial	2
Mining Operations	2
Milling - General	3
Sorting, Crushing & Drying	4
Rock Line and Fibre Aspiration	4
Fibre Sections	4
Laboratory	4
<u>Notes on Machines</u>	5
Symons Crushers	5
Rotary Driers	5
Hassam Crushers	5
Dunovan Screens	6
Aspirating Hoods	6
Johns Manville Type Fiberisers	6
Baker Separator	7
Blending Mill	7
Grading Trommel	7
Dust Collection	8
Pilot Plant	8
Bagging Machine	8
Paddle Trommel	8
Surface Installations	8
Housing	8
<u>PEAK MINE</u>	9
<u>BEND MINE</u>	10 - 11
<u>VANGUARD MINE</u>	12
<u>BOSS MINE</u>	13
<u>SOUTH AFRICAN VISIT</u>	14
<u>CENTRAL ASBESTOS CO. KUPUMAN</u>	14
Ore Reserves	14
Fibre Production	15

	PAGE
<u>BREDDY MINE</u>	15
<u>ASBES MINE</u>	15
Mining	15
Milling	15 - 16
<u>Machines Used</u>	
Hammer Mills	16
Grading Belt	16
Dedusting Machine	17
<u>WHITE ROCK MINE</u>	17
<u>RIRIES MINE</u>	17
Mining	17
Milling	18
Costs	20
Discussions	20
<u>KURUMAN CAPE BLUE ASBESTOS CO.</u>	20
<u>CAPE ASBESTOS CO., POMFRET</u>	21
Personnel	21
Ore Reserves	21
Mining	21
Picking Section	22
Milling	22
General	24
<u>INTERVIEW with Mr. Cornish-Bowden</u>	24
Asbestos Grading Equipment Limited.	25
Mr. Fulcan, Director of Chamber of Mines, Johannesburg.	25
Mr. D. Harding, Sales Director, African Associated Mines Ltd.	25
 <u>FLOWSHEETS</u>	 No.
Riries Mill	1
Riries Mill - Cleaning Section	2
Asbes Mill	3
Pomfret Mill	4
Tenerville - White Asbestos	5

PHOTOGRAPHS

No.

Head Frame & Bins -
Tamarais Mine

1

Boss Mine - Schmidtheiny
Group

2

Treatment Plant - Pomfret

3

Picking Section - Pomfret

4

Tamarais Surface
Installation

5

- Sullivan
A. H. M.

INTRODUCTION

Preliminary arrangements to visit the operations of Rhodesian Asbestos Limited at Temeraire in the Mashaba district of Southern Rhodesia were made through Messrs. Johns Manville Limited.

Final details were worked out with Mr. Robert Winson the General Manager after arrival in Johannesburg. A flight to Bulawayo was arranged on the normal South African Airways Limited schedule and then a small plane was chartered from Air Carriers Limited at Kumalo airport, Bulawayo. The distance to Mashaba is approximately 210 miles - about 1 1/2 hours flying time.

Accommodation was arranged in the Company's guest house at Temeraire. Mr. Winson arranged visits to Peak mine owned and operated by R. Longhurst; Bend mine in which Goliath Cement Company have an interest; Vanguard and Boss mines owned and operated by the Schmidtmeyer group. All travelling to these mines was done by car.

The Rhodesian visit was made from 26.2.57 until 3.3.57.

SUMMARY

All the mines visited were producing white asbestos and the main object was to get details of milling machinery which could be applied to blue asbestos and to observe dust collection systems.

Temeraire was the largest producer amongst the mines visited - this mine is at present producing 1100 tons per month. The others are comparatively small producers.

Generally, the plants were well laid out and well maintained. No attempt was made in any of the mines except Temeraire to instal any major dust collection system. Conditions around all plants were generally more dusty than at Witteboom.

TEMERAIRE - RHODESIAN ASBESTOS LIMITED.

A. E. Winson	...	...	...	General Manager
W. Archer	...	...	...	Asst. General Manager
E. McKenna	...	...	...	Quality Control Supt.
G. Hamel	...	...	...	Mill Superintendent
D. Mulholland	...	...	...	Mine Foreman

Mashaba is the centre of the white asbestos mining in this area and is located about 210 miles from Bulawayo and 45 miles from Shabani. There are seven mines producing asbestos of which Temeraire is the largest.

The settlement of Temeraire is about three miles from Mashaba. It is laid out in two sections - one section consisting of about 25 houses centred around the General Office and Mine Club and the other section about half a mile away consisting of 20 houses. The school and hospital are in this section.

The settlement is high amongst the hills.

Water is obtained from bores and each house has its own septic system.

Power for the whole area comes by line from Shabani.

There is a transformer station at Temeraire - the power is fed to the mine at 220 V. Power cost is less than 2d. per unit.

FINANCIAL

Rhodesian Asbestos have invested nearly £3,000,000 in Temeraire and to date results have not been too favourable. There have been three changes in General Managers since its inception - the present manager, R. E. Winson, was sent out from Canada. He said that they are barely breaking even at present. He hoped to be able to reduce their overdraft quite appreciably within a few months. However, it appears that the value of their production - only 1100 tons per month at present - is a very poor return on the large capital outlay. The ore is very low grade and the anticipated fibre production has not been achieved. They have sent fibre experts out from Johns Manville to try and improve the grade up to No. 4. Winson said that this was the only means he could see for increasing the monthly income.

MINING OPERATORS

Mining is carried on at a depth of 200 feet below the surface.

The method of mining is blasthole stoping.

The blastholes are 50 ft. in diameter and ring drilling is carried out at 6 ft. centres.

The ore body is vertical and 150 ft. wide and crosscuts are made every 200 ft.

Drilling is done on one shift only and ore tramming and haulage on 3 shifts.

Once the slusher drift and cone are completed vertical holes are drilled and the whole block is fired down into the cone and drawn away by Joy Sullivan scrapers. These are 5 ft drum size.

The scraper bucket is hinged - it folds up on the backward pull and as soon as the forward pull is applied it opens up and digs in.

The vertical holes are drilled in three stages - 70 ft - 60 ft. and 50 ft.

Holman air leg machines are used throughout. Steel footage obtained is 900 ft. per steel. ~~500-500~~

Development is two years ahead of production and at present only one man is working on development.

The ore is very low grade averaging from 1 - 2% fibre.

All haulage underground is done by Goodman Electric locomotives which pull 7 x 6 ton Granby cars. The batteries are changed in the locus every eight hours.

The Granby cars tip into an ore pocket lined with 1" plate. The ore pocket is concreted and the steel plate is bolted on to bolts set in concrete and the heads are welded over. The plates have been in position for three years and

show very little signs of wear. There is no grizzly on the ore pocket.

The ore is fed from the pocket on a heavy duty apron feeder into a 60 x 48 Traylor Jaw Crusher set to 10". The crusher is driven by a 350 H.P., motor through 100 section vee ropes. The ore is discharged into another ore pocket 110 ft. deep.

The ore is then fed into 25 ton skips in the shaft. There are two doors on each chute (a) a guillotine type air operated door and (b) a butterfly door which controls the discharge into the skip.

The shaft is a three compartment one - two for ore haulage and one for men and materials. About 90 skips per shift are pulled.

The mine is very wet and water is lying everywhere. It is drained along the main drives into a sludge pond. Here the sludge settles and it is then pumped to the surface by a 4" sludge pump and goes to waste. The clean water overflows to another sump from whence it is pumped to the surface by a 3" pump. A 6" and a 4" pump are kept as standby units. There are all Ballis and Morcom type pumps and are said to give very little trouble.

Firing is done at the end of day shift but a lot of blasting is carried out during the shift. There does not seem to be any set rule about setting off "bombs" as they are called.

Any spillage from the loading chutes is cleaned up once a fortnight. It appears to fall into another pocket and special buckets are used for this job.

Ore is also brought to Temeraire from Shamala mine also six miles away. This is a slightly richer ore body. The mining method is similar to Temeraire but the ore is hoisted to the surface and dumped into a bin. Then it is brought round to the Temeraire mill by tractor trailers. They pull about 20 tons each.

The ore production is 70,000 tons per month from Temeraire mine and 68,000 tons from Shamala.

Mining costs are 11/- per ton ore mined.

The European underground earns from £120 - £140 sterling per month. The native miners earn £4 per week and can make up to £5 per week bonus depending on production. In addition every native is given free housing, he is fed and clothed free and gets free medical and dental attention. There is a fully equipped native hospital near the native settlement.

MILLING

The mill is housed in a three storied building. They have a Swiss dust installation and while this operates reasonably efficiently there is still a lot of dust around the plant and if the wind is blowing from the west it is very difficult to see in the plant.

The flow sheet is a very complicated one - the plant being divided into four main sections - (1) Sorting, Crushing and Drying Sections (2) Rockline and Fibre Aspiration Section (3) A. & B. Fibre Sections and (4) Short Fibre Section.

SORTING, CRUSHING AND SAVING.

Practically all sorting is done by native women. The ore from the two mines is fed into the plant on separate belts. They have about 20-30 pickers on each belt.

Symons Bar Vibrating grizzlies are used for separating coarse and fines.

Crushing is done in 4 1/2 ft. Standard Symons and 4 ft. Shorthead crushers. They get long life from their bowl liners and mantles. The crushers have been in operation for over three years and none has been changed yet.

Haskag crusher are used on fine ore.

The ore is dried in two rotary driers both coal fired and directly driven through a reduction gear by 50 H.P. motors. They revolve at about 10 r.p.m., and are inclined at approximately 6°.

The dust is exhausted from the driers to cyclones. The fine dust is discharged to atmosphere. The heavy material falls into an airlock and then on to a conveyor which discharges to tailings.

ROCK LINE AND FIBRE ASPIRATION.

Screens are used in preference to trommels. They are a Rotex type unit called a Demoxen screen. The fibre is aspirated through suction hoods to cyclones.

Bias Hammer Mills and Johns Manville type fiberisers are used for fiberising.

Bauer separators are used for cleaning the fibre.

A large volume of air is used for separation - 4500 c.f.m., on each screen.

FIBRE SECTIONS.

More Bauer separators are used for cleaning graded fibre.

A cumbersome grading trommel is used for separating the fibre in lengths.

A large mixing mill is used for blending fibres.

The bagging machines are the screw type.

The bags used are of a fairly heavy hessian 28" x 44" in size and are all hand sewn. No hand ramming of bags was seen.

LABORATORY.

This is a very well equipped section. They have a machine for every known test. The laboratory is under the control of the Quality Control officer and most of the work is done by natives.

They are having a lot of trouble with their fibre - their grades are too low. A lot of research is being done with a view to lifting the fibre to Grade 4. The main production at present is 5 - 6 - 7.

The plant is manned by two Europeans per shift plus sixty five natives.

One White and thirty eight natives for Crushing and Sorting.

One White and twenty seven natives for milling.

Tailings are taken away by a series of conveyors to a high dump. The tailings are distributed by boom stackers which are moved at regular intervals.

All conveyors are covered.

Fibre is carried away by lorries to Shabani railhead 45 miles away by an independent contractor. It is railed from Shabani to Lourenco Marques in Portuguese East Africa. Freight costs from mine to coast are £25.0., per ton. There is a big hold up in shipping because of the single track line to the coast. Storage facilities are said to be very good on the coast.

The contractor brings all inward freight back to Mashaba.

Milling costs are about £11 - £13 stg. per ton fibre.

NOTES ON MACHINES.

SYMONS CRUSHERS.

These crushers were doing an excellent job but there was practically no wear on the bowl liners or mantles.

There was no vibration and the springs hardly worked at all. The feed and discharge chutes are completely boxed in. Dust is collected by a 6" pipe with a fishtail suction on each side of the feed bowl and a similar pipe on the discharge conveyor. Four crushers are installed - two standard and two shorthead but only one of each type was being used.

ROTARY DRIERS.

These appeared to be locally made units. They were coal fed through automatic stokers.

They were direct driven through a reduction gear to a gear and pinion. They were reported to operate most satisfactorily and do not give any trouble. The shells were made from 5/8 plate and were lined with manganese wear plates. We could not obtain the liner thickness. The wear on the liners is negligible. The drums are 4' 6" in diameter and 25 - 30 ft. long. The two driers operate in parallel.

The dust collection system is only fair around the driers.

HASMAC CRUSHERS.

There were two of these machines in the crushing section - both 4' 6" size. They appear to be a very good crushing unit but the wear on the beaters and impact plates is high for white asbestos. They change the beaters once per week. The beater change take 3-4 hours. There are six beaters to each machine and there are six bolts to each beater. It is said that a new shoe has been developed to

fit the beater and this makes beater changing much faster. The impact plates can be adjusted but wear on these plates also is high. One advantageous point is the easy access to the inside of the machine. There are two quick release doors which give immediate access to the beaters. The beater shaft is 6" in diameter and is mounted on heavy bearings. This size machine is driven by a 75 H.P. motor. The operating staff like this unit but point out that they are not using it as a fiberiser but as a crusher in place of a shorthead symons crusher. From observation it seems that while the Hasemag crushes finer than a shorthead Symons could do, the amount of maintenance required on the Hasemag would be much greater. They are big units and occupy a considerable amount of space.

DEMOVAN SCREENS.

These are similar to the ones used by Johns Manville in Mill No. 5 at Asbestos in Canada.

They appear to run well mechanically but there is a large tendency for the feed to run to one side of the screen. In fact, only one screen in the plant, and there are thirty of them, was feeding centrally. Constant adjustment is necessary. This is done by small handwheels fitted on 1" diameter rods.

Rubber balls are used in compartments under the mesh. Their bouncing action keeps the mesh fairly clean.

Dust hoods cover the entire screen and they are hinged about 1/3 of the way down the length. This allows a section of the hood to be swung back for maintenance and inspection. The entire back of the screen is totally enclosed.

The feed enters on a plate at the rear and is distributed in a rotary motion.

On the majority of the screens, there was no aspiration for dust. The hood appeared to act as a settling device. The hoods are made of 1/16" plate and all are fitted with rubber flaps.

The impression gained was that the screens are rather cumbersome and most inconsistent in their operation.

ASPIRATING HOODS.

These hoods are of a totally different design from those in use at Wittenoom. They are 4 ft. long and spread up to 8" at the widest then taper to 6" wide for a height of 2' 6". They then join into a 10" pipe. A butterfly valve is incorporated in the hood and this adjusts the air velocity. No means of raising or lowering the hood could be seen.

A large volume of air is used for aspiration - 7500 c.f.m. for rock screens and 8500 c.f.m. for fibre screens. This is almost twice as much as is used at Wittenoom.

JOHNS MANVILLE TYPE FIBERISER.

This is a very rugged unit about 4 ft. high, 6 in. in diameter. Its action is similar to a Torr. It has four rows of horizontal ribs - 4 beaters on each. In addition there are 12 horizontal arms protruding from the sides. These are staggered so as to clear the

wear plates are all corrugated. The feed enters at the top through two chutes on to a plate attached to the main shaft. It discharges at the bottom through two slots 15" x 8". It is driven by an 100 H.P., motor at 550 r.p.m. The wear on beaters did not appear to be excessive.

GRIT SEPARATOR.

This is a very efficient grit separating machine. It is quite possible that it would operate satisfactorily on blue fibre. The machine is made in two sizes - 62" and 72" diameters.

The feed enters the hood at one side and falls on to a perforated plate. Air is drawn up through the plate at 8500 c.f.m. to an 18" duct. The fibre is aspirated through this duct and the grit remains behind. The eccentric action of the perforated plate removes the grit to a discharge chute.

The grit discharge was examined and found to contain many sticks of unopened fibre. It is thought that this may be a definite disadvantage on blue fibre which is heavier and more bulky than white. The sticks of unopened fibre would not lift and would be discharged with the grit. However, if this grit discharged were returned for further treatment no loss of fibre should occur.

The machine is driven by a 3 H.P., motor.

A working drawing of this unit was obtained.

BLENDING MILL.

This is a massive unit - 12 ft. in diameter by 5 ft. long. It has a screw feed and screw discharge both operating through the trunnions. These screws are both adjustable so that the length of time in the mill can be varied. It is chain driven by a 30 H.P., motor. The trunnions are narrow being only 6" wide.

This machine is not in use regularly and is used for special batches of fibre.

GRADING TROMMEL.

This appeared to be a very efficient but cumbersome machine. Its shaft has a four step cam which runs on a roller and has two guide grease rollers. There is a constant bumping action and it certainly keeps the screen meshes clean, and produces well graded fibre. The shaft is wooden and is 6" in diameter. The trommel is 20 ft. long, 5 ft. in diameter and can be fitted with up to seven different size meshes. The construction is quite heavy. A variety of chutes carry the products to screw conveyors.

The trommel is driven by a 3 H.P., motor direct coupled to a S.D.3 reduction gear and then a chain and sprocket drive. This drive is being changed to a vee belt unit. The bearings are fairly light and despite the continual bumping there is very little vibration.

The cover is a box type with complete panel inspection doors. Dust is exhausted by 6" pipes with fish tail connections to the square hoods.

They do not carry any details of this machine nor mine but suggested that if further working details are required they could be obtained from the Company's Head Office through

Mr. Carl Lindell.

DUST COLLECTION.

As mentioned above, this system appeared to be efficient. The plant was housed in a building 120' x 60' - two stories high. The dust was drawn into socks which were automatically cut off at regular intervals allowing the heavy material to discharge into screw conveyors and out to tailings. The air passing through the socks was exhausted to atmosphere. No visible discharge from the exhausts was noticed. The fan exhausts were 6 ft. in diameter. Each of the three fans drawing dust from the plant was driven by a 200 H.P. motor.

PILOT PLANT.

A small pilot plant capable of treating one ton of ore per hour is installed in a section of the mill. It consists of several conveyors, an API Hasebag crusher, a small fiberising unit, a trommel, a screen and a rotary aspirator. This plant is in constant use testing all varieties of ore.

BAGGING MACHINE.

These are a screw type machine and operate without any trouble. The white fibre packs quite solidly and feeds in the bag easily. The natives stop the machine while changing bags.

A drawing of this machine was obtained.

PADDLE TROMMEL.

This trommel was used for cleaning and grading fibre. It was a circular unit - 4 ft. in diameter and 8 ft. long. The paddles were attached to a central shaft and rotated in the same direction as the trommel but at a slightly higher speed. It appeared to be quite an efficient unit for separating long and short fibres. The drive was by a reduction unit and then a v belt drive. It was totally enclosed, dust being drawn off the semicircular hood.

A drawing of this unit was obtained.

SURFACE INSTALLATIONS.

A large workshop and garage attend to all major repairs and maintenance. Very little equipment is manufactured on the site - most of it is made in Johannesburg or Bulawayo.

HOUSING.

The European houses are all very comfortable - they are of brick construction and fitted with steel framed windows. Native servants can be obtained for £2.15.0., per month.

Houses are supplied with water, wood and electricity free. The rental is £2.0.0., per week.

PEAK MINE.

Mr. S. Longhurst - Owner-Manager
Mr. C. Kilpatrick - General Foreman
Mr. Van Der Welden - Accountant

This was visited on 28.2.57. It is a small mine approximately 150 miles from Mashaba situated on the edge of a large native reserve.

It produces only 60 tons white asbestos per month and treats 1 1/2 ore.

No inspection of the underground working was made but the labour force in the mine was 1 European and 150 natives all trucking and loading was done by hand. The ore was brought from the tunnel and tipped into a bin. The tunnel is driven straight into the hill about 100 feet above the valley floor.

MILLING.

This was quite a simple process. The ore was fed into a Kubit Mill running at high speed (actual speed not known but from a rough calculation of pulley sizes, the mill was doing nearly 900 r.p.m.) The Kubit mill discharged on to a conveyor which delivered into a small Tel-smith cone crusher.

From the Tel-smith the ore went to a Bias Hammer Mill which discharged on to screens. The fibre was aspirated to a central cyclone. The oversize and undersize from the screens was liberised again, screened and fibre aspirated. This process was then repeated twice more. The tailings looked to be quite clean.

Cleaning and grading was done in round trommels with paddles inside revolving in the same direction as the trommel but about three times the trommel speed. The paddles were curved at the end and were made like forks - five prongs to each paddle. The trommels worked quite efficiently.

Four grades of fibre were made - 4 - 5 - 6 and 7 and it appeared to be very clean.

One European and 50 natives run the mill. All maintenance is done by native labour.

Longhurst sells all his fibre to Rhodesian Asbestos Limited at Tzameraira.

SHABANI MINE

The Collieth Cement Co., have an interest in this mine.

A. Birch - Manager

This mine is situated about 100 miles from Mashaba in wild country. It is in the throes of a changeover period.

MINE

The mine looks to be a very primitive operation. The tunnel is driven into the hillside about 70 feet above the valley floor. It is only 5 ft. x 4 ft. wide. Mr. Birch said that the mine was in poor shape. No development has been done at all and the mill output is governed by the amount of ore brought from the mine. The ore is said to be about 4%. The production of fibre is 100 tons per month.

The mine is also very wet.

MILLING

The mill is a very modern and compact unit. It has not been operating very long. It was designed and constructed by the Barbeton Iron & Steel Company and they have used all their own types of machines. The mill produces 100 tons of fibre per month in four grades. The mill is a four stage mill each stage making its particular grade.

There were several machines there which were of interest:

- (1) The Bias Hammer Mill. This is very much like a Kubit Mill only on a much smaller scale. The beaters weight only 16 lb. They appear to do a very satisfactory job on white asbestos. Beaters could be changed quickly and very easy access was obtained to the interior of the unit. The whole top half of the machine was hinged and with the undoing of two wing nuts it could be swung back. It was driven at 1000-1200 r.p.m., by a 15-20 H.P., motor. Their cost is about £240 stig.
- (2) Trommels. These were a very compact unit. The whole unit consisted of two trommels in parallel completely encased in a hopper and cover. They discharged on to a shaking feeder which fed the ore in a steady stream over a rotary aspirator. The fines from the trommel hoppers was taken away by a shaker feeder on to a below ground level conveyor.
- (3) Christy & Norris Hammer Mills. Quite a number of these units were seen around the outside of the mill building. They have been discarded in favour of the Bias mill. The Christy & Norris type have not been successful here.

The fibre produced was of excellent quality and the excellent quality was also commented upon by the Johna Hanville people.

One feature of the milling was that the ore was wetted before treatment. They do not like to mill the ore unless it contains at least 10% moisture. If the run of mine ore does not contain a sufficient amount of moisture sprays are turned on. The reason given for this is that the fibre is inclined to be brittle and it requires wetting so that crushing and hammer milling will not injure the fibre or reduce the length. This is the Shabani method of milling and many milling plants in

Rhodesia follow this example. The Zambians on the other hand insist that the ore must be dried and they give the optimum percentage of moisture at 2%.

The mill was operated solely by natives under boss boys and Mr. Birch.

This mine is owned and controlled by the armistheary group.
Dr. Franz Fritzelstein was in control of operations.

This mine is situated about 60 miles from Casaba and about 7 miles from Lelievre.

Its present capacity is 400 tons per month but they ad
to increase to 1100 tons per month as soon as possible.

The mine was inspected on 28.2.57 late in the afternoon. It was too late to go underground and no information was obtained on the mining operations.

It is a very well laid out mine and the settlement is attractively placed among the hills. Houses are all of brick construction and very comfortably furnished. A good club takes care of all entertainment.

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The Mill was very well laid out and contained some very modern machinery.

Kennedy Van Sorn jaw and gyratory crushers were used in the crushing sections.

The ore was dried in a Suggles Cole type drier at a temperature of 600°. The drier section was wholly automatic - it was coal fired and capable of treating 40 tons per hour. The drier seal was most effective. It was fitted with tension springs throughout the circumference and an airtight seal was maintained at all times. The ring gear on the drier was fitted with expansion bands which avoided any distortion due to excess heat. This unit was built by Furnace Construction Company of Johannesburg.

Hazenag crushers were used early in the milling circuit size AP3. They were regarded very well and considered to be an efficient unit.

Sias Hammer Mills were used in the fibrating step:

They used duplex trommels and rotary aspirators for fibre separation. One noticeable feature of the milling was the number of trommels in use. Dr. Fritzsigrist said that the number worked out at one trommel per ton of seed per hour. This again is the Shahani milling principle but strangely enough Vanguard people do not agree with the wetting idea. They agree that 25 is the optimum percentage.

The fibre was of good quality but appeared to be very much opened. This was apparent in the three grades produced.

BOSS MINE

This is another mine owned and controlled by the Schmidheiny group.

Mr. L. Harben is the General Manager but he is under the control of Dr. Fritsgrist.

Boss Mine is about 10 miles from Kashaba in hilly country.

MINING

No visit was made underground but it is understood that mining is carried on by stoping. The ore is hand trammed out to bins.

MILLING

The mill was under maintenance which gave an excellent opportunity to inspect the interiors of many of the machines.

The mill is exactly the same as Vanguard plant except that different units are used in the crushing sections. It contains a Krupp Jaw Crusher - a massive unit which gave incessant trouble with pitman bearings. Mention was made of the Wittenoom practice of using a small percentage of copper in the white metal. This has proved very successful in eliminating cracking in the bearings.

A Telamith cone crusher and a 1' 8" Traylor TY crusher complete the crushing section.

Hammer crushers, Bias Hammer Mills and duplex trommels are used throughout the treatment section.

They used Kubit Mills at one time but discarded them as most unsuitable units. They use the principle of one trommel per ton of feed per hour.

Their production is 360 tons per month but as at Vanguard the fibre appears to be very opened. Johna Hanville people say this is a regular practice with the Schmidheiny people.

The housing settlement was small but well laid out. There appeared to be a large native population here.

The mill was under the control of one white man as foreman.

Power to all mines mentioned was supplied by the Shabani powerhouse

REPORT ON THE VISIT

Preliminary arrangements for a visit to Central Asbestos Ltd., were made with Mr. A. E. Stewart in London. Final details were completed with him and Dr. Killman in Johannesburg. Permission to visit the Cape Asbestos Company's mine at Koesmas was granted by Mr. Cornish Snowden in Johannesburg but at the last minute this was cancelled. Instead a visit to the Company's operations at Potchefstroom was arranged. This coincided with an inspection visit to this property by the Company's Consulting Engineer, Dr. Keep. Mr. Cornish Snowden inferred that a very good picture of his Company's mining and milling operations would be gained by a visit to Potchefstroom. He said that their methods were standard at all blue asbestos mines and added to this, Dr. Keep would gladly give any information asked for.

KURUMAN

This town was visited on 4th and 5th March, 1957. A plane was chartered by Central Asbestos Limited from Commercial Air Services Limited. The 350 mile trip from Johannesburg occupied 2 hours 20 minutes.

Kuruman is one of the oldest towns in South Africa. It was founded by Moffat, one of the early pioneers and Dr. Livingstone used Kuruman as a base for some of his expeditions. It is a well established town but is 45 miles from the nearest railroad.

Water is plentiful. There is a natural spring called the "Kuruman Eye" which flows at the rate of 3,000,000 gallons per day. This is irrigated through the town and serves as water for gardens.

The town is the base for the operations of The Griqualand Exploration & Finance Co., which is the subsidiary company of Central Asbestos Limited. This company operates four mines which are 60 miles apart. The General Manager and Senior Staff all live in Kuruman and operations at the four mines are controlled from there.

The staff is as follows:-

A. D. Todd	-	General Manager
E. Dismitt	-	Underground Manager
G. Marville	-	Underground Manager Asbestos
R. Gibson	-	Chief Engineer
D. Wilson	-	Accountant
G. Pascoe	-	Geologist
F. Maxwell	-	Personnel Manager

ORE RESERVES

The ore does not occur in seams as the ore at Witwatersrand does, but in pockets which are generally very rich. Continual prospecting is being done and any likely areas are being drilled. The drilling is done by "jumper drill" and water and if fibre is found it appears as a sludge. The method is said to indicate on the occurrence of fibre but gives no indication of the value of the ore penetrated. This type of drilling is said to be very prone "salting" as a few good samples of fibre put into a hole could falsify the whole drilling result.

The estimated ore reserves at each mine were given as follows:

Bradby	...	...	425,000 tons
Asbestos	...	...	100,000 "
White Rock	...	...	50,000 "
Rivers	...	...	Sufficient for 22 years
			at a production rate of 800 tons fibre p.m.

The above figures are known reserves. These figures are borne out by Sinclair in an article in "Asbestos" magazine. He reports that South Africa reserves of crocidolite are sufficient only for 20 years.

PRODUCTION

The total production from the four mines is 1,300 tons per month. Todd says that this figure is not likely to be exceeded.

BREDDY MINE

This mine is about 40 miles south of Kuruman. It produces 250 tons per month. This property was not visited.

ANDERSON MINE

This property is about 17 miles from Kuruman. It is only a small pocket of ore and produces 250 tons of fibre per month.

There are only six Europeans on this site but quite a large native population.

MINING

There are two shafts at this mine both down 200 ft. Only single compartment shafts. All hoisting of men and ore is done in buckets. Hoists are driven by natives.

The mine is very wet and dirty.

The mining practice is cut and fill and they advance on a 300 ft. face. The seam is said to be 20 ft. wide and averages 6% fibre but in some sections is as high as 20% as mined. They disregard all fractions under 2" when estimating assays.

The cuts are taken out at 6 ft. heights. The ground is poor and there is a great deal of timber used. The ore as broken is sorted by natives and the waste is used as fill.

Working areas are cramped and in most faces inspected there was only about 4 ft. between the face and the fill. The method is most wasteful because a good proportion of the fibre goes back into the fill area. The sorted ore is barrowed to chutes which delivers it to one ton cars.

Ventilation is quite good - they have two fans operating.

Holman airlegs are used for drilling.

The ore is hoisted to the surface and dumped for drying.

Generally one shaft is used for hauling ore and the other is used to hoist water. No attempt is made to pump the water out.

MILLING

The ore from the mine is dumped and windried. A large team of natives sort the big ore from the pile. This is put on one side and is crushed separately on afternoon shift. Any very long fibre is hand cobbled and bagged.

The finer material is fed on to a picking belt and waste is sorted out by about 30 women. The fibre bearing ore goes to a b.

This is wired with the block ore crusher on afternoon shift.

The mill flow sheet is attached.

The flow is very simple. The ore is crushed in Felsmith gyratory crushers in three stages. Each crusher discharges directly into a Hammer Mill and then to a trommel. The oversize from the trommel passes to the next crusher, the undersize goes to tailings. There are three crushing and trommeling stages. The oversize and undersize from the third trommel goes to waste. The fibre is aspirated from inside the trommel's. The aspirating hood is fitted through the mouth of the trommel and the fibre is drawn into a cyclone which discharges through an airlock on to the floor. The fibre is then barrowed to the cleaning section. The tailings from the plant are high and from observation would appear to be more than 75%. Mill recovery is between 60 - 65%.

The cleaning section consists of a Cobra Mill which opens the fibre. This discharges direct to a cyclone. The cyclone discharges through an airlock to a trommel. Some grit is removed through the trommel and this goes to waste. The fibre passes from the trommel to a cleaning belt. This belt eliminates more grit, but the fibre and any other material which are not aspirated go back to the Cobra Mill for further fiberising. The fibre is aspirated from the cleaning belt to a cyclone and discharged through an airlock to a dedusting machine. This machine eliminates a good percentage of dust. Fibre is then delivered to a bagging table. Fibre is tagged by hand rammung but screw type bagging machines are ready for installation.

The fibre is beautifully clean and contains less than 2% rock grit dust.

There is no attempt made to collect or eliminate dust. In and around the plant the dust was so bad that it was most difficult to see.

MACHINES USED -

HAMMER MILLS: Three types are used - the Bias Mill, Christy & Morris type (modified) and the Cobra Mill. They are not too happy about the first two types and are replacing them with the Cobra Mill.

The Cobra Mill appears to be a most effective machine. It looks very much like a Richardson 3 SD fan. The feed is introduced through one side at the centre. The rotor in the machine is a six bladed unit with wedge shaped beaters on the end. It moves at 1400 - 1700 r.p.m. The feed is discharged upwards at an angle from 45° - vertical into a cyclone. The machine stands about 3 ft. high and is 8" - 10" wide. The sides and ends are lined with manganese steel. The rotor is made of specially heat treated steel and is carried on a 4" shaft and very heavy duty bearings. The only cast section of the machine is the base. The remainder is fabricated. It will take up to 15 h.p., and requires 40 H.P. to drive it.

It can be used either as a crusher or a fiberiser and is said to be capable of crushing - 2" material.

On the ore being treated, the beaters lasted up to 24 hours.

One of the main advantages appeared to be the fact that material was elevated direct from the machine without the use of any other unit.

CLEANING BELT: This is a machine developed by Todd at Kuruman. It consists of a fast moving endless belt about 12 feet between centres and moving at about 200 ft. per minute. It is totally

enclosed. The floor is fed to the machine by a feeder containing 3 rollers. About six feet along the belt is a screening device. This is a shaft with lengths of fine chain on it. It is driven by an independent drive and it appears to screen the floor across the belt. Immediately beyond this is an aspirating hood which removes part of the floor. It then passes over the head pulley where there is another aspirator. The grit and unweathered sticks fall on to a conveyor which returns them to the Gruba Mill.

This device certainly appears to drop the grit out.

It would be an easy machine to construct if only approximate measurements were obtained but there are not any intricate parts.

SEPARATING MACHINE: This machine works on the principle of a flour sifter. It is an "U" shaped screen which has a revolving paddle in it. It is level but the paddle seems to move the floor along the screen. There is no screen on the top of the "U" screen - only a dust cover. It drops the dust out of the floor and gives a good product. It is also a simple machine. It has a quick release mechanism on the screen meshes for ease in changing them. The meshes appeared to be held in position with leather belts and buckles.

A machine like this could easily be built on the site.

Three white men run the plant together with 60 - 70 natives.

WHITE ROCK MINE

This is a comparatively small pocket of ore estimated to contain only 50,000 tons. There is no mill on this site.

The ore is hoisted up a shaft, dumped into cars and tipped into a concrete area for sundrying. It is then shovelled into 6 ton trucks and carted to the Miries area for milling.

It is fairly rich ore and there is some sorting done by natives on the dump.

MIRIES MINE

This area is about 25 miles from Kuruman and is the main mining and milling area. It produces 800-900 tons of floor per month.

There is a white settlement at Miries containing 22 four and five roomed houses. They appeared to be quite comfortable. There is a single men's quarters. There is also a native settlement with accommodation for 1500 natives and a section with accommodation for 400 coloureds (half castes etc.).

Water is obtained from bores but it is not very plentiful.

MINING.

The mine is a 45° incline shaft which goes down to 250 feet. There are two levels - one 70 ft. below the other. There are two haulage tracks and hoisting is done by a winch which takes up three one ton cars at a time.

The mine is rich and is reasonably dry. The system of mining is cut and fill - similar to Ashes mine but the ground is very bad.

It is twisted and folded and very oxidized. Very heavy timbering is necessary to keep the backs up. The team they are mining is 32 feet thick and very rich. The fibre ranges in length from $\frac{1}{2}$ " to $\frac{3}{4}$ ". Sorting is done underground and the waste used for fill. This is most wasteful as all the filled areas inspected showed a large percentage of fibre. The cuts are six feet high and in several places they are up to the 4th cut and intend to make six cuts in all. The ore is wheeled in barrows to chutes and tipped down to the main loading pockets.

Ventilation is good. The ore appeared to be very much similar to the ore near the cliff face at Colonial Gorge.

Although Todd stressed the point that mining regulations were very strict, they did not appear to be so. All work is done in shorts and no helmets were available for the visit underground.

The ground is sinking rapidly from the surface and several areas were pointed out where the ground had subsided 5 - 6 feet. Todd said that the excessive use of timber in the mine gave him trouble with milling. There was far too much wood in the fibre. He introduced a special wood removing section to counteract this.

MILLING

The ore is sundried and then dumped into concrete bins. There are four of these and they hold 50 tons each. Some sorting of fine material is carried out by women and children on the mine dump.

The mill flowsheet is very simple and follows the general South African practice of removing the fibre as soon as it is freed from the ore. Everyone stressed this point of removing the early. They avoid using any machine which produces dust or b-dust into the fibre.

The flowsheet is shown in Figure 1

The ore is fed to a Pegson Jaw crusher which crushes down to 2". This passes on to a Rotex 3 deck screen containing $\frac{1}{2}$ " - $\frac{1}{4}$ " and $\frac{1}{16}$ " mesh decks. The $\frac{1}{16}$ " material is discarded to waste. The $\frac{1}{4}$ " fraction goes to a separate treatment section. The $\frac{1}{2}$ " material goes to a Telsmith gyratory crusher set to 3". The ore break in large flakes and in the gyratory crusher the fibre is easily freed from the rock. The gyratory crusher discharges on to another Rotex three deck screen - the $\frac{1}{16}$ " and $\frac{1}{4}$ " fractions again being separated out - the $\frac{1}{16}$ " to waste and the $\frac{1}{4}$ " to the special section. The oversize material drops on to a sorting belt where natives remove as much fibre as possible. This oversize is in closed circuit with the crusher. The fibre recovered by the native is dropped on to the floor and barrowed direct to the cleaning section. The $\frac{1}{4}$ " fraction is discharged on to a belt which delivers the ore to an elevator. At the point of delivery to the elevator there is an airlock which removes loose fibre. The elevator discharges the ore into another Telsmith crusher set as fine as possible. This crusher discharges on to another Rotex screen and the $\frac{1}{4}$ " and $\frac{1}{16}$ " fractions are separated out and treated as formerly. The oversize from the screen is delivered to a Cobra Mill running at 1700 r.p.m. The Cobra Mill throws the fibre up into a cyclone which discharges through an airlock into a trommel. The trommel is fitted with $\frac{1}{16}$ " mesh. The undersize goes to waste. The oversize delivers to a shaking screen where suction is applied to remove the fibre. The material passing the micker goes back to the elevator and into the crusher. The fibre lifted from the belt is also aspirated into the cyclone and the fibre from here is discharged on to the floor and barrowed to the treatment section. The $\frac{1}{4}$ " fractions are delivered to a bin. Here the ore is fed through a trommel with $\frac{1}{2}$ " mesh. The undersize goes to a Cobra Mill

which blows the fibre and rock into a cyclone. This cyclone discharges through an airlock into a trommel fitted with 1/16 mesh. The undersize goes to tailings and the oversize goes to a D.U.F. 4 air separator. The clean fibre from this separator is discharged on to the floor and sent to the cleaning section. The rock and dust go to waste. The oversize from the first trommel goes to a Cobra Mill then to a cyclone and then to a trommel. This trommel has two meshes fitted. The undersize from this fine mesh goes to tailings, the undersize from the coarse mesh goes back to the Cobra Mill for further fibering and the discharge from the trommel which is mainly fibre goes on to the floor and is barrowed to the cleaning section. The tailings are very high and would probably assay up to 6%.

The cleaning and grading section is quite compact and is divided into three lines each treating from 1-2 tons fibre per hour. They are set up to treat various grades but at the time of the inspection they were all treating one grade. The fibre fed into the cleaning section is very gritty and is hand fed to a screw feeder. This goes to a Cobra Mill running in reverse. This blows the fibre to a cyclone which then discharges through an airlock to a trommel. The 1/16" mesh lines are discarded. The trommel discharges to a grit separator - the grit returning to the Cobra Mill. The fibre is aspirated to a cyclone and then to a dedusting machine. The fines from this machine are discarded. The fibre then goes to a double screw bagging machine. The machine discharge is an oval shape and the 28" x 44" bag fits comfortably over the spout which is about 18" long. The operator holds the bag with a twisted belt and allows it to slip off as it is filled. The bag holds 100 lbs. comfortably but the fibre appears to be knotted. A lot of heat is generated by the machine. There is a generous clearance between the screw and the oval cover - at least 1".

The bags are hand sewn and stacked. The bags cost 1/9d. each.

Milling is under the control of a foreman.

The mill operates on two 10 hour shifts. Four hours each day from noon to 4 p.m. is taken up with maintenance. There are at least 60 natives on each shift.

Magnets are set up in the cleaning section to remove steel or iron.

The beaters in the Hammer Mills last from 15 - 24 hours

There does not appear to be very much wear in the cyclones. Each cyclone has longitudinal ribs down each cone about 2" - 3" wide. The ribs are lined with heavy wear plates (old beaters). This stops excessive wear on the cones.

The Dust Collecting system is much the same as the one being installed at Wittemoon. All the dusty areas are enclosed with galvanized iron rooms and are sealed. There are inspection doors fitted. The dust is exhausted by a large fan and this passes into a V.W. type Rotocyclone. The rotocyclone has not been in operation yet because of a shortage of water. They have run 4 rotocyclones without water - the dust from the exhaust appears as a very fine haze.

Todd stressed that all doors must be kept closed for good operation. The general atmosphere around the plant was quite good.

The ore is rich and would be about 30% fibre entering the plant.

The recovery is poor and is in the order of 60 - 65%.

COSTS

Mining costs are about £15 per ton.

Milling costs vary from £10 - £12 per ton.

Freight is about £6 per ton.

The fibre is carted to the railhead 40 miles away by the road bus which takes out about 10 tons each trip in a trail.

POINTS FROM DISCUSSIONS with Mr. Stewart and Mr. Todd.

Central are rather worried about their rising costs. When told of the trend at Wittenoom they remarked that in a short time they would be higher than this figure. They could not see any possibility of reducing their costs. Mechanisation is not possible in any of their mines and mill recovery can only be improved by the addition of plant.

They are both rather keen on dispensing with the various grades of fibre. At present they make A, S and SS and B.O.H. grade (run of mine grade). This last named is the grade produced at Wittenoom. Both men thought that this single grade would be acceptable to customers everywhere.

They assessed the annual production of blue fibre at between 65,000 - 70,000 tons per annum. This was allowing Wittenoom 20,000 tons. They do not anticipate that they will increase their production at all. They intimated that present ore reserves were sufficient for 20 years at the production rate of 1300 tons per month. They firmly believe that a price increase will operate in two years.

KURUMAN CAPE BLUE ASBESTOS CO.

This is the other blue asbestos mine in the Kuruman area.

No visit was made to this mine but from conversations Kuruman and in Johannesburg the following information was gained.

The mine is financed by the Schmidheiny group who put up the major part of the capital.

It is managed by two Armstrong brothers. Their ore reserves are not large and exist in pockets similar to the area already described. The maximum anticipated output is reported to be 10,000 tons per annum. This figure has not yet been attained but almost the total production is absorbed by the Schmidheiny combine.

According to Dr. Keop, Consulting Engineer for Cape Hat Asbestos Limited, his Company is not very happy about the Kuruman Cape Blue Company. They allege that confusion has arisen because of the similarity of names and that the Kuruman people are trading on his Company's name and reputation.

This was the general opinion in Kuruman also.

These latter reports were gleaned from conversations and no facts were obtained to substantiate them.

POMFRET

This area was visited on 6th and 7th March. The visit was made in the company of Dr. Keep, Consulting Engineer to Cape Asbestos Company. The journey was made in their Company's Beaver aircraft and the 370 mile trip occupied 2 hours 40 minutes.

Pomfret is only a small settlement almost on the Bechuanaland border. It is connected by road to Vryburg, the nearest railhead. They have telephone communication with all the rest of the Union.

Water is a problem. They draw their water from bores most of which have a very small output.

PERSONNEL

General Manager - Major A. A. Ackerman.
Mill Superintendent - L. Jacobsen.
Chief Engineer - W. Jackall.

There was no Underground Manager - the mine was in charge of a Foreman C. de Longen.

ORE RESERVES

They are mining a small area at present - a quick calculation from the mine plans showed the tonnage to be in the vicinity of 450,000 tons. This is practically a new area which only been opened up for eight months. There is no more ore known but prospecting is being done in the country adjacent.

This new area is about 2 1/2 miles from the old Pomfret mine.

MINING

This is done by pillar and stope method. There is an inclined shaft 450 which goes down to a depth of 180 feet. The country is quite good. Mining is done on the fibre seam and this is followed along the contours with the result that the drive undulate frequently and the haulage problem is quite difficult.

The stopes are 22 ft. high and pillars are at 15 ft. intervals - the pillars being 8' x 8'. The grade of ore is about 19% fibre. The face is fired in three sections. After each firing the ore is cleared by hand shovelling and barrows. In parts of the mine the grade is down as low as 8%.

All hoisting is done by small electric hoists. It is rather a complicated hoisting system because there is a small hoist at the top of each dip in the drive and there is much unhooking and hooking up of trucks.

Dr. Keep was questioned on the economy of such methods and his reply was that the mine was not big enough to mine under the fibre and make level drives. They preferred the present idea even though it appeared rather ludicrous and wasteful.

Dr. Keep took over the position as Consulting Engineer six months ago and he devised and controls all mining methods. The mine is very clean and fairly dry. It is neatly laid out and is very tidy. There is every appearance of good order.

The ore is drawn to the surface by a large hoist - four trucks at a time, averaging about 1 ton each. The ore is damp. The ore is dumped into a bin with a bar grizzly on the top. The spacing is 8". There are about 20 natives working on the bin. They sort out the large pieces of ore which will not pass through the grizzly and hand feed them to a 20" x 8" Jaw Crusher.

PICKING SECTION

The ore from the Mine Bin is fed by an apron feeder to a vibrating screen having a $\frac{3}{4}$ " mesh on it. The fines are discharged on to a belt and this takes the fines away to a dump where they are sundried. They are feeding a small tonnage of fines back to the main plant as they become sufficiently dry. It is their intention to instal a drier as soon as possible.

The oversize goes to a long inclined conveyor where primary picking is carried out. There are 40 natives picking waste. The waste rock is thrown into bins which discharge to a belt directly below the picking belt. This runs parallel with the picking belt and discharges into a waste rock bin alongside the ore bin. The waste rock is taken away by small trucks which discharge over a dump. The ore is dumped from the bin to 6 ton lorries and is transported 2y miles to the Mill.

MILLING

This is a very simple process. The mill is a fairly large building but the majority of this is taken up by the picking sections.

They run only two shifts per day - one 10 hour shift and one 9 hour shift - 5 hours are taken up by maintenance.

Crushing is done on 2 shifts.

Their production aim is 600 tons per month and they hope to maintain this figure.

The mill flow sheet is shown.

A description is as follows:-

The ore is fed on to a picking belt where waste is picked. This is thrown into piles by the side of the belt and wheeled away in barrows.

The picked ore passes into a Tel-smith Jaw Crusher set 2 - 2y" and then goes to a 2 deck Kennedy Screen with 1" and $\frac{3}{4}$ " meshes.

The $\frac{3}{4}$ " fraction goes to the final screen before the Mill Surge Bin.

The 1" fraction goes to a picking belt about 60 feet long. From the first section of the belt waste is picked and thrown into bins. From the second section long fibre is picked and is thrown into chutes to barrows. This long fibre is taken away to a sorting dump to be sorted into various lengths by about 150 men, women and children. These are spec grades.

The picked ore passes into a 2 ft. Symons Crusher.

The $\frac{3}{4}$ " - 1" fraction goes to a picking belt where some waste rock is removed. The belt discharges to a chute and ore joins the discharge from the Symons crusher. The Symons is set to $\frac{3}{8}$ ".

The three products, $\frac{3}{4}$ " fines from the first screen, the picked ore $\frac{3}{4}$ " - 1", and the discharge from the Symons crusher, all are fed on to another Kennedy vibrating screen. This is fitted with a $\frac{1}{32}$ " mesh. The oversize goes to the Mill Surge Bin and the undersize goes to waste.

The ore in the Surge Bin appeared to be quite damp - wetter than Wittenoom feed.

The ore was fed to the Mill in two lines each taking about 10 t.p.h.

The ore passed into a Christy & Norris Hammer Mill and discharged into an elevator. This elevated the ore to a trommel. The trommel was fitted with 1/16" mesh. The undersize went to waste. The oversize was discharged to a Canadian type screen fitted with two decks 3/16" mesh and 3/32" mesh. The -3/32" fraction went to waste. Fibre was aspirated from the top deck only to a central cyclone. The undersize and oversize from the two lines then joined together and fed into another Christy & Norris Hammer Mill which discharged into a trommel fitted with 1/16" mesh. The undersize went to waste. The oversize was fed on to a Canadian single deck screen fitted with 3/16" mesh. There was aspiration of both undersize and oversize. The undersize and oversize passed to a vibrating screen after aspiration. This screen was fitted with 3/32" mesh. Here there was again aspiration of the undersize and oversize, after which all the ore went to waste.

The tailings were rich and would appear to assay 4 - 5

The fibre was all aspirated to one central cyclone and discharged through a rotary valve to a single screw bagging machine. No attempt was made to clean the fibre and it was very dirty. Jacobsen said the fibre assayed 6.8% stone and dust but a surreptitious look at some analysts reports gave figures as high as 15% and each report contained the note - "Fibre too dusty". The -200 mesh figure averaged 35%.

There was not much attempt made to control or eliminate dust. A large dust fan, fitted with a 40 H.P., motor aspirated dust from several points into a sock about 12" in diameter and 10' 6" long. The discharge from this sock was barrowed outside.

While the mill was running it was most difficult to go anywhere in the plant.

They are not very satisfied with the Christy & Norris Hammer Mills and they are changing over to Cobra Mills - one was practically installed. The beaters with the Christy & Norris type last only 55 minutes, but they change the beaters in 7 minutes.

The Canadian screen is very much similar to the Donovan screen at Temagami but it is very cumbersome and unyielding. They do not like this unit.

All trommels are circular.

They get good wear from the cyclones - the cones are fitted with ribs.

The bags of fibre are handsewn and stacked by hand. The fibre is transported from the mine by railway buses.

The mill is run by 2 Europeans and 12 natives per shift. There are 40 - 60 natives per shift in the picking section and about 150 natives in the long fibre sorting area.

The mill feeder units are fitted with "Servis" clocks which issue a 24 hour chart of all mill running hours and stoppages.

Mill recovery was only 60%.

It would appear that operations at Wittemoon in both mining and milling are well ahead of those at Pomfret.

GENERAL

There are about 20 houses in the settlement and there are only 100 Europeans in the area. There are over 450 natives. There is a Mine Club which is licensed and the community life centres around this. The club has a tennis court, bowling green and swimming pool. The water from the pool is used to water the bowling green. Most of the equipment in the Club has been supplied by the Company on an incentive scheme depending on the production rate. They are at present trying to obtain a billiard table - the target for which is 590 tons of fibre per month for six consecutive months. All vegetables are grown in club grounds by hydroponics and this method appears to be most successful. Each Saturday the produce is divided among the 21 families - the amount for each family depending on the number of adults and children.

They have a football ground and their tennis, bowling and football teams compete as far away as Mafeking - 170 miles.

All houses have septic systems. The Guest House is next to the Manager's house and can accommodate five people. The surrounding country is mostly low ranges and is rather barren.

On returning to Johannesburg an interview was obtained with Mr. Cornish Bowden, the Managing Director of the Cape Asbest Company. He advised that they were building a new treatment plant at Pruska but this would not be ready for 12 months. When questioned about their fibre quality he said that he saw no reason to clean it any more than at present but admitted that several complaints had been received. He also said that cleaning equipment would be installed at Pruska.

He favoured the one grade of fibre rather than several different ones.

He was interested in the wet process at Wittemoon and said that they were using water at Penge to separate long amosite from the rock.

Penge appeared to be their main worry. They cannot meet their commitments this year and James Hardie are one firm which has been drastically reduced. They are spending £750,000 at Penge within the next two years. This is under Dr. Keep's control. They are experimenting with Hasemag crushers and find them most successful on amosite. He would not give any opinion on their performance on blue fibre but said they would prefer not to use them.

An enquiry was made regarding the four 3 ft. Symons crushers now in crates at Penge but he said he would contact Mr. Broadhurst later on this matter. It appeared that they were undecided whether these units would be used in the future layout at Penge and Pruska.

He said that relations between his Company and Central Asbestos were much more cordial than previously.

He intimated that he and Dr. Keep would be visiting Australia late this year and would like to visit Wittemoon.

INTERVIEW with Mr. Bourne and Mr. D. Chama of Asbestos Grading Equipment Limited.

This firm have manufactured most of the equipment used in the blue asbestos industry in South Africa. They are only a small firm but they appear to have approached each problem in the correct manner and have tried to adapt their machines to suit each type of ore.

They manufacture the Cobra Mill, Alpha Cleaning Unit, Rotary Valves, Cyclones and D.U.F.A., Air Classifiers.

An outline of the process at Witteroom was given and they suggested various points at which their machines could be used. The unit which appealed most was the Cobra Mill. Having seen these machines in action at Kuruman it seems likely that they would perform quite satisfactorily. The wear on the beaters is a problem and it appears that they would last approximately 12 shifts.

They were asked to submit all the information they had on the various machines to Witteroom giving prices and possible delivery. It was also suggested that they sell the plans of the machines so that they could be manufactured locally.

DISCUSSION with Mr. Fulcan - Director of the Chamber of Mines, Johannesburg.

A discussion was held with Mr. Fulcan just prior to leaving Johannesburg for Australia. He had visited Australia in 1953 for the Fifth Empire Mining Congress. His estimate of production of blue fibre in South Africa was 45,000 - 50,000 tons. He also confirmed that ore reserves appeared to be sufficient for only 20 years at present rate of production. He gave some very interesting details of the gold, uranium and diamond production for the current year. The value of these three minerals was anticipated to be more than £350,000,000 stg.

He offered to provide any information on the mineral industries in South Africa should it be desired at any future date.

INTERVIEW with Mr. D. Harding - Sales Director of African Associated Mines, Bulawayo.

This Company had refused permission for a visit to their asbestos mines at Shabani but a courtesy call was made to their offices in Bulawayo. Mr. Dugmore the Managing Director was absent on leave in Cape Town and Mr. Harding was in charge. The interview was most unsatisfactory and Mr. Harding appeared to be reluctant to discuss any of their activities and was pleased when the interview was over. He said that at some future date it may be convenient for someone from Australia to visit their mine.