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*Hygiene rule*

29th September, 1966.

AUSTRALIAN BLUE ASBESTOS PTY. LTD.

Historical

In 1943 developments at Wittenoom through A.B.A. Pty., Ltd. were commenced in order to produce crocidolite asbestos to provide raw material for the asbestos cement industry in Australia and in the expectation that fibre surplus to Australia's need could be sold abroad. At this time practically all asbestos fibre required by Australian industry was imported and importance was attached to the project because of the difficulty of importation under war-time conditions in addition to the saving in overseas exchange.

As far as I am aware no thorough investigation of the deposit at Wittenoom was made, the decision to proceed being made on outcrop readings and on Mines Department reports which indicated minimum values of 3" of fibre over about 2'-0" of ore in the general Wittenoom area, and indications according to Mines Department reports of excellent continuation of the deposit over a vast area of the Hamersley Range as judged by outcrops in the various gorges along the Hamersley Range.

After operations were commenced and when results were not as good as anticipated, a reassessment was made and it was discovered that the fibre in the Wittenoom area was unlikely to average more than about 2 1/4". Nevertheless operations were continued. The company struggled on, with Government assistance in the way of roads, provision of water and general township houses and facilities, but by 1955 the company had accumulated losses of approximately \$1,600,000.

Investigations in the meantime had indicated that a better ore body existed in Colonial Gorge some two miles from Wittenoom mine. Diamond drilling was carried out to substantiate outcrop readings and, despite the difficulties of diamond drilling at that time, sufficient drilling was carried out to confirm that a fairly large deposit of fibre values above 3" existed. A decision was made to open up the area, in the first place using the old Wittenoom mill to process the ore. A little later in 1958, and following firm fibre contracts from Johns-Manville, a decision was made to instal an improved mill at Colonial Gorge to treat the ore from that area and the Wittenoom operations were shut down completely.

From 1957 to 1961 we were mining in Colonial Gorge in ore averaging about 3.4" of fibre, and as a result A.B.A. Ltd. operated profitably, reducing the accumulated loss to almost zero. A dividend (the only one) of \$364,200 was paid in 1960. From 1961 onwards, however, as the mine extended in from the gorge, ore values began to deteriorate gradually to the present 2.8" approximately and once again A.B.A. Ltd. operated at a loss each year. The P. & L. Appropriation Account now shows an accumulated loss of approximately \$2,500,000. By the time decreasing ore values were apparent we had outstripped the boundaries of the diamond drilling and outcrop readings for the area and it was decided to again diamond drill ahead of the workings to establish what values lay ahead. This further diamond drilling had been avoided previously as it was known that it would be difficult and costly as the asbestos seam was dipping further below the ground. At that time the geologists and the A.B.A. staff still believed that outcrops in a gorge two miles from Colonial Gorge indicated without doubt that the deposit lived

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on, at least for that distance. However, when we commenced diamond drilling it became apparent that the Colonial Gorge deposit petered out rapidly and it is now believed, as a result of this and other prospecting in the Hamersleys, that the asbestos deposits are not continuous, but come and go, enrichments taking place in lens type elliptical areas just as they do in the South African asbestos deposits. The position now at Colonial Gorge is that fibre values of about current value, 2.8", can be mined for perhaps a further three to four years and then the deposit virtually cuts out.

Following the discovery that the Colonial Gorge deposit did not live on, further prospecting was done in the general Wittenoom area by diamond drilling. We also sought and obtained the assistance of the Western Australian State Geological Service to carry out a geological survey in the Hamersley Ranges, with a view to endeavouring to determine what factors caused enrichments of fibre, so giving a lead on how to find such enriched areas. Also, of course, it was hoped that the geological team might locate some enriched pockets.

To date the only success is that in the Wittenoom area generally we have located and delineated an area of reasonable values at Eastern Creek, about two miles from the present mine. Diamond drilling is not statistically an accurate way of assessing overall fibre values, because the cost of drilling holes closely enough to obtain accurate information is too high. However, on the information we have gathered on the Eastern Creek area from outcrops and from drilling, it appears that the area, viewed optimistically, may contain about 60,000 tons of fibre averaging 3.4" of fibre, or perhaps a total of 100,000 tons averaging 3" of fibre. If one took 2.8" as the minimum mineable value, then perhaps the area contains 200,000 tons, but it is not possible to see at present that anything less than 3" could, in fact, be mined economically. On the outcrop and diamond drill readings this area does not look as good as the Colonial Gorge area did at the same phase of operations. On the other hand, with rising costs an area considerably better than Colonial Gorge would be needed for profitable operation.

The Western Australian Geological Survey has not come up with any firm indications of how fibre can be located, except from obvious outcrops. In the course of their work they did discover promising outcrop readings at Junction Gorge, 60 miles from Wittenoom, but this area has not been drilled. The outcrop does not indicate an area any better than the Colonial Gorge area and it would, in fact, have to be considerably better than this to justify a new establishment 60 miles away from Wittenoom. We are about to drill on this Junction Gorge area.

#### Mining Methods.

The improvement in performance for a few years from 1957 onwards was not only because of better fibre values, but also because of improved mining techniques which were adopted when the Colonial Gorge mine was commenced. This method consisted essentially of mining large stopes to a height of only 40" to 42", leaving small pillars at about 30 ft. spacing. (The height has crept up to 44" lately.) With good economic conditions in Australia now and with ample work available in the Northwest of Australia, it is now difficult indeed to get men to work in 42" high stopes, irrespective of pay.

A system of mining, using full hoodroom for men, has been evolved and reasonably proven in our present workings.

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on a limited scale as a satisfactory method. If a new area was opened up it is believed that this method would have to be the one adopted in order to remove the disability of otherwise working in 42" heights. Indications are that the system could possibly be cheaper than the present one, apart from the advantages of being able to man it more easily. The variation in method is a long-wall system of mining. It has the disability that it requires a great deal of costly preliminary development before one begins to mine ore on a commercial scale, and this, in turn, of course, means considerable outlay of capital expenditure before mining of ore can commence. Although the method has been reasonably proven in our present workings on a small scale, it is probably beyond doubt that when developed on a large scale many difficulties will still emerge. Expert mining opinion is, however, that it should be possible to overcome any such difficulties. It must be remembered, however, that this method was carefully considered some years ago when the 42" high stope was adopted and on expert advice at the time was rejected because of possible difficulties with the roof caving and because of possible loss of fibre bearing ore.

#### Selling Prices and Market.

When we started mining at Wittenoom, the type of asbestos that occurs there - crocidolite, or "blue" asbestos - was suspect as a fibre to use for the manufacture of asbestos cement. Today it is recognised as being as satisfactory as the normally used chrysotile and now sells for this purpose at about the same price, grade for grade, as chrysotile. It is now recognised as being worth about twice the price, grade for grade, as amosite fibre. Work done by C.S.R. to prove that blue fibre was satisfactory helped materially to bring about this situation and augmented work by Johns-Manville. In recent years Hardie's also have proven the efficiency of blue fibre for use in asbestos cement products, particularly in pressure piping.

In 1954, however, Hardie's would not recognise that blue fibre was worth more than amosite fibre and consequently we could not obtain a market in Australia for the fibre we were producing at a reasonable price. We asked for and obtained a Tariff Board hearing with the object of getting a form of protection which would force the use of blue fibre in Australia at what we believed to be the correct price for its quality. We were turned down by the Tariff Board who accepted Hardie's view that the fibre was only as good as amosite and so worth only \$100 per ton approximately as compared to \$200 per ton which we assessed as its proper value.

Later, in 1957, we entered into an arrangement with Hardie's whereby we agreed to keep out of the asbestos cement industry as manufacturers and they, in turn, would purchase blue fibre from us at prices keyed to the price of chrysotile fibre. This meant a price of approximately \$200 per ton. It also meant, however, that C.S.R. ceased to have a reason for mining fibre unless it was profitable.

Over the past ten years fibre prices have fallen by some 7% despite the fact that the quality of fibre has improved. Our basic costs at Wittenoom, however, have risen sharply, wages and stores having risen some 60% to 70%. For example, in 1956 a tradesman received a total of \$36.50 per week. He now receives \$59.26 per week, and in addition we have to ensure a 6-day week to keep such men.

Hardie's have continued to pay us more for our fibre than we can obtain on the world market, despite the fact that our grading has not been as good as fibre available from

elsewhere (because we could not afford to make it so). Hardie's consider that they have been paying us about \$10 per ton more than the fibre is actually worth based on what they could otherwise obtain on the world market and it is difficult not to agree with this.

We have been selling about half our output to Hardie's in recent years.

James Hardie Asbestos Pty., Ltd.  
Cape Asbestos Co., Ltd.

At the beginning of this year we invited James Hardie Asbestos Pty., Ltd. to study operations at Wittenoom with a view to them taking an interest in this project as they were the largest user of the fibre produced there. They expressed interest and said that they did consider that it was desirable to obtain asbestos from Australian sources if possible, and confirmed that if the fibre could be upgraded to world standard that they would be content to go on using considerable tonnages of Wittenoom fibre at about the price they were then paying. After some further consideration of the matter they asked if Cape Asbestos Co. could join with them in an assessment of the prospects of Wittenoom with the intention that if the prospects were satisfactory Hardie's and Cape would join in the project, Cape possibly supplying some technical know-how for operations, and in any case marketing any fibre that had to be sold abroad. We agreed to this approach.

The assessment by Cape Asbestos and by Hardie's has now been completed and as a result both Cape and Hardie's say that they cannot see how they can interest themselves in the venture. They cannot see that the area can be mined economically. They believe that the values of fibre are just too low and, in any case, they believe that on present indications the life of the known ore deposits is so short (a maximum of about five years in their judgment) based on presently available information, that they cannot see that it is worthwhile trying to keep Wittenoom alive. They agree that based on South African experience, other pockets of asbestos fibre may be found, but by the same token consider that all the evidence to date is that even if such pockets are found they will be no better than the ones already known. The position in South Africa is somewhat different the Cape people believe, because although the South African deposits may not be as widespread as ours, they do get very good local pockets or enrichments, even up to 18" of fibre. It is the presence of these very good local enrichments in South Africa that enable them to mine the general run of country economically. They cannot see any hope of striking such rich local enrichments at Wittenoom or in the Hamersleys generally.

The abstract and conclusions section of Mr. Kuyper's report is attached. The full report is available. Mr. Kuyper concludes by saying "I cannot recommend that James Hardie & Co., Pty., Ltd. interest themselves in Wittenoom in any way".

Mr. J.T. Adamson in a letter to me which accompanied the report says "I suppose I should confirm in writing what I said to you last week - with the utmost regret my company has decided that it cannot accept your kind invitation to be in the Wittenoom Eastern Creek proposition".

As part of his report Mr. Kuyper compares Wittenoom (Colonial Gorge) with the lowest grade mine they have in South Africa. This is their Koegas mine. This mine is 20

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miles from railhead to port compared to road transport of 180 miles for Wittenoom. Some figures are:

|                                                                                                                                                                                                                        | Koegas | Colonial Gorge Mine<br>Present<br>Operations | If ore sorting<br>is installed and<br>production lifted<br>to 20,000 t.p.a. |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|----------------------------------------------|-----------------------------------------------------------------------------|
| Deposit - inches of<br>fibre (av. last yr.)                                                                                                                                                                            | 4.01   | 2.93                                         | 2.93                                                                        |
| Direct Costs - \$ per<br>ton fibre                                                                                                                                                                                     | 133    | 184                                          | 145                                                                         |
| F.O.B. cost including<br>transport, depreci-<br>ation and overheads<br>(Depreciation at Koegas<br>is only \$7.68 compared<br>to \$33.47 at Wittenoom<br>due to Wittenoom's high<br>capital cost for<br>mechanisation.) | 149    | 234                                          | 184                                                                         |

This illustrates how uncompetitive Wittenoom is compared to Cape's lowest grade mine.

#### Ore Sorting.

As mentioned previously we are mining approximately 44" of rock to obtain, say, 3" of fibre. This means the ore is only 6% fibre. If ore of this quality is milled the yield is very low and the fibre quality is ruined because of the large amount of rock ground with it. To avoid this we have a gang of men manning a picking belt where they endeavour to pick off and discard barren rock. It is important in this operation not to discard rock with fibre in it. By this means we can sort out and reject enough barren rock (15% of the total feed) to bring the grade of ore to about 8%.

We have now developed at Roseville a sorting device which should enable manpower for sorting to be eliminated and should enable us to reject safely 30% of the mill feed, thus increasing the grade of ore milled to about 10%. It is believed in fact that by installing two such sorters at different locations in the mill circuit we may be able to lift the amount of rock rejected safely without significant loss of fibre to almost 50% of the total feed, so enriching the ore to about 12%.

Advantages which should flow from the use of these sorters would be:

1. Reduction of men and reduction therefore in housing and township facilities.
2. Less wear and tear on the milling equipment.
3. Better quality fibre.
4. Better yield of fibre per ton of rock mined.

The possible economic advantage for installation of these sorters at Wittenoom on the basis of producing 20,000 tons of fibre per annum has been assessed as follows:

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- (a) Capital cost for two sorters installed \$150,000
- (b) Possible overall savings in cost and value of extra fibre recovery \$300,000 p.a.

It must be emphasised that these figures are still to be confirmed by experience and that the electronic sorting device is still only in a development stage.

At lower production rates the gain would be roughly pro rata to production, i.e. at our present production level of about 12,000 tons p.a. the gain would probably be about \$150,000 p.a.

#### The Future

Recent losses have been:

|                             |                |
|-----------------------------|----------------|
| Year ended December, 1962   | \$235,000 p.a. |
| " " " 1963                  | \$225,000 "    |
| 15 months ended March, 1965 | \$515,000      |
| 12 months ended March, 1966 | \$820,000      |
| Current rate of loss        | \$850,000 p.a. |

The above results are after charging about \$400,000 p.a. for depreciation of plant. Capital expenditure (so called but it is essential expenditure to keep Wittenoom going), however, has been averaging about \$400,000 p.a., so that currently our cash outgoings, neglecting change in stocks, are at the rate of approximately \$850,000 p.a.

We have been forced to increase wages at Wittenoom in order to compete with the iron ore ventures, etc. Having done this we are not experiencing great trouble in getting enough men to man the trades sections, the mill section and other surface sections of our operations. We cannot hold men in the vital underground sections, however, and the opinion has firmed at Wittenoom that almost irrespective of earnings and living conditions we cannot get and train and hold men to work in 42"-44" of headroom. Even our efforts throughout this year to bring workmen in from abroad, particularly from Lebanon, have been quite unsuccessful as almost all of them have now left Wittenoom despite the fact that some of them reached the stage where they were earning very high money as underground workers. If the present opinion on labour is correct (as I believe it is), then we cannot expect to do any better at Wittenoom in the present mine and may easily do worse. With rising costs we now need to produce 400 tons of asbestos per week at Wittenoom to just break even, whereas a year ago we considered that at 300 tons per week we could break even. The mine staff hold out no prospect of being able to obtain labour to produce 300 tons per week, let alone 400 tons per week.

We could change over our mining to full headroom long wall mining. This would probably take us close to two years to complete and in the meantime there would be little improvement to costs. At the end of that two years we would then have at most two years life left in the mine. It must be emphasised too, that we do not know what our loss of fibre may be with this new system.

Assuming we instal electronic sorting and that it lives up to its present promise, and do change the mine over to a long wall system, then the position over the next two years could be guessed at, something as follows:

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|                                                                                                                                                          | <u>Cash Loss</u> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
|                                                                                                                                                          | <u>£</u>         |
| 6 months operating as now<br>(it will take 6 months to<br>instal the sorters)                                                                            | 400,000          |
| 18 months change-over period but<br>with electronic sorting<br>(losses continuing at \$800,000<br>p.a. but less the saving of<br>\$150,000 from sorting) | <u>975,000</u>   |
|                                                                                                                                                          | <u>1,375,000</u> |

After that we could operate for two years and on the assumption made that we could then get enough labour to enable us to produce 20,000 tons p.a., we could just about operate on a break-even cash basis.

It is attractive to instal the sorting equipment to prove just what it may save and the effect it has on milling operations and to convince others in the mining field that we have a valuable invention. On these estimates, however, it cannot possibly save enough to warrant us doing this because its presence makes no difference to the vital factor which limits production - i.e. getting men to work underground.

#### Eastern Creek Area.

To open up the Eastern Creek area, erect new plant there and carry out the very considerable mine development which is necessary if we adopt the long-wall system of mining would be very difficult if we attempt it whilst still trying to operate our present mine. Each operation would interfere with the other. We would need more men, more accommodation and so on. For the purpose of this particular estimate I am assuming, therefore, that our present operations are shut down and that we treat Eastern Creek as a new venture carrying none of the burden of depreciation of plant or of write-off of development from the existing operations, but on the other hand, taking free advantage of any assets that are at present at Wittenoom.

#### New Capital Cost.

|                                                                                                          |                    |
|----------------------------------------------------------------------------------------------------------|--------------------|
| Crushing plant, ore sorting, sundry<br>other equipment, roads, etc.                                      | \$600,000          |
| Alterations to existing mill                                                                             | 300,000            |
| New mine equipment for complete<br>mechanisation                                                         | 250,000            |
| Mine development (\$500,000 before<br>mining operations can commence<br>rising to a peak of \$1,000,000) | <u>1,000,000</u>   |
|                                                                                                          | <u>\$2,150,000</u> |

In addition the township would need to be upgraded. This could cost \$1 M. if done properly, but at least probably \$500,000 expenditure would be essential. This now capital has not been taken into consideration in the figures below. It has been assumed for the present purpose that Government would have to provide this if we were to decide to go ahead.

Depreciating the assets involved in this Eastern

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Creek development over five years (which would be the life of the mine at 20,000 tons p.a. rate), total cost of fibre ex Wittenoom is estimated by Mr. Broadhurst to be \$144 per ton. If an average selling price of \$165 per ton ex Wittenoom is assumed, then the profit is \$21 per ton, or say \$400,000 p.a., or say 20% p.a. return on the \$2 M. risk (no tax would be paid).

This is the most optimistic presentation that can be made. It assumes a 20,000 tons p.a. rate which we have never achieved and involves considerable changes and developments in mine mechanisation, the effectiveness of which has not been proven at Wittenoom. It also ignores the probable high cost of building up the labour force again in order to enable a production level of 20,000 tons p.a. to be achieved.

If one is more conservative, assumes an average output of 15,000 tons p.a. and bases estimates on the present type of mining equipment now being used, then the cost of fibre ex Wittenoom is estimated to be \$170 per ton as compared to the selling price of \$165 per ton. Under these circumstances the operation would result in a loss, that is we could not even fully repay the new capital over a five year period.

It could be held, of course, that in the next five years other areas worth mining may be found and that hence the depreciation of all new assets over five years is unrealistic. However, to offset this view, one must consider -

- (a) that from our experience to date establishment charges at any new area may be again at least as much as we are now proposing for the Eastern Creek area;
- (b) no provision has been made in assessing the capital cost above for the continuing capital expenditure which always seems inevitable whilst operations continue;
- (c) our experience at Wittenoom has been that performance is always worse than estimates.

#### Government.

Help which is within the power to give by Government if they wish to do so is:

- (a) Up-grading the township. As stated above it is estimated that a minimum of \$500,000 would be required to bring the township to something approaching the type of accommodation and conditions generally which will apply to the iron ore ventures and which people in these localities will no doubt demand more and more.
- (b) Government could subsidise development as they do for gold mining, for example.

On the basis of the figures presented, we would need a subsidy of something like \$30 per ton to encourage us to go ahead. On 100,000 tons of fibre and five years operation this is equivalent to \$3 M. subsidy by the Government. Even if one could conceive of the Government agreeing to subsidise to this extent, it would be difficult to do it on development alone as the total development under the normal definition of that word at Eastern Creek would not be more than \$1 M.

It is certain from past experience that negotiations with the Government for large amounts by way of subsidy or other assistance would be very protracted.

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Dust and Asbestos Hazards.

We have greatly improved the dust collection system at Wittenoom, but it is doubtful if conditions are even now as good as will be required and demanded. Gradually throughout the world, as more medical work is done on asbestosis and allied complaints, the more opinion appears to be hardening as to the long term effect of even mild exposure. I believe that as time goes on more and more costly measures will be called for to prevent exposure to asbestos dust and short fibres.

Conclusion.

We have no option but to shut down as quickly as we can, having regard to the need to give reasonable notice to various parties. We should probably aim to be completely shut down by the end of January next. We do have an agreement with Hardie's which calls for three years notice of cessation of supply of fibre, but Mr. Adamson has assured me that Hardie's would waive this condition.

K.O.B.  
Sydney,  
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