URMISCA/120-129

Creek, Beaconsfield

LAUNCESTON, 24th October, 1916. (120)

by W.H. Twelvetrees

PRELIMINARY REPORT, ASBESTOS DEPOSITS, ANDERSONS CREEK, BEACONSFIELD.

Sir,

Agreeably to your instructions I inspected the asbestos field at Anderson's Creek last month, and now beg to hand you a brief preliminary report on same.

The deposits are confined to a belt of serpentine rock in the Anderson's Creek basin, which is entered from Beaconsfield at between two and three miles west of the township. This belt extends from 1½ to 2 miles in length from north to south and is about a mile wide. Its northern part can be reached by road to Leonardsburgh, and its southern and central parts by a rough road which, with its present deep wheel ruts, is only fit for strong carts. The area bordering the creek is lightly timbered, hilly, and best explored on foot.

The chromiferous magnetite and haematite deposits which were worked for a time 44 years ago also occur in the Anderson's Creek basin.

The district is now being prospected for its asbestos mineral by two groups of investors operating from Melbourne and Sydney respectively: M. Paul Charriol of Collins Street, Melbourne, is carrying out trial work on his 80 acres section $\frac{7232}{M}$ on the west side of the creek, ¾ mile west of the York Town tramway road at Leonardsburgh. The Durabestos Company of Sydney is at work as option holders on C. B. Buxton's leases $\frac{6479}{M}$ 70 acres, $\frac{6340}{M}$ 10 acres and $\frac{6341}{M}$ 80 acres, 1½ mile to the S.E. on the east side of the creek.

Asbestos has been known for over 50 years to exist in this area. Although prospecting of some kind or another has been carried on at intervals for a long time, and the ground has been trenched and cuts made at numerous points, industrial results have not yet been achieved. Lately the enhanced prices ruling for asbestos fibre and the increased uses to which it is being put in modern life have led to a renewal of interest in the field, and the two groups above mentioned are sending out trial lots of material to Melbourne and Sydney for testing purposes.

Only a few words in reference to the geology of the district are here necessary. A traverse from Beaconsfield to the great Badger Head range which closes in the field of view westwards, reveals that that mountain chain is a belt of Pre-Cambrian schist and slate, to some extent copper bearing and auriferous. No schist is seen east of it. Its junction with the Ordovician strata of Beaconsfield is interrupted by an intrusion of basic or ultra-basic igneous rock, which under the influence of numerous later granitic intrusions has fallen a prey to serpentinisation resulting in the development of asbestos. As in the great Thetford vein fibre district in Canada, these intrusions represent abnormal varieties of granite. We may figure to ourselves the process as being something like the following:-

1. The intrusion of the ultra basic rocks, peridotite and pyroxenite.
2. The sporadic intrusions of granitic rock.
3. The magmatic hydration of the ultra basic rock, converting it to serpentine.
4. The fissuring of and differential-movement partings in the serpentine.
5. The fibrous crystallisation of asbestos in the fissures and partings.

It will be noted that 3, 4, and 5 are processes following upon and related to the intrusions under 2, and this helps us to understand how it is that the occurrences of granite in the area are favourable indications for asbestos. If there had been no intrusive granite, there would have been no serpentine and no asbestos. In accordance with this we find developments of granitic rock in the asbestos-bearing serpentine on both Charriol's and Buxton's leases. In the SW corner of Buxton's 70-acre lease is a belt of peculiar dark granitoid rock (greatly resembling basalt in appearance) which abuts on the serpentine for over ½ mile in a southerly direction.

Numerous belts of fibre-bearing rock traverse the field irregularly, but principally from north to south and parallel with the exposures of granite. Bands of lean rock separate these belts and naturally often make economic mining difficult and sometimes even impossible. The occurrence of veins of asbestos showing at surface, however small they may be, indicates favourable sites for prospecting.

The asbestos varies in character in different parts of the field and in different parts of the same workings. There are two main varieties of it, namely chrysotile and hornblende asbestos. Besides these two varieties, the useless picrolite is found in all quarries in its usual hard and splintery forms resembling petrified wood.

The chrysotile occurs in narrow irregular veins or partings traversing the rock in all directions and with its fibres disposed at right angles to the walls of the vein. The fibre is white with a slight greenish tinge, and translucent and has a fine silky appearance. The veinlets vary from the thickness of a knife edge to ½" and 1½" and even upwards, but the majority are between ⅛" and ½". When there is a repetition of successive veins, the rock presents a highly characteristic ribboned appearance. Sometimes long six inch fibre coats the walls of the rock crevices: this is still chrysotile but is known under the term "slip fibre", having slipped from its original cross position in consequence of rock movements. The slip fibre is woolly or silky and has an apparent length of several inches, but this length is not actual, for it overlaps owing to the slipping movement.

The hornblende asbestos is in the form of long cottony fibre parallel with the walls of the partings or fissures. It is nearly anhydrous and does not possess the tensile strength which is characteristic of chrysotile fibre, but it is applicable to some of the uses which have been found for the latter.

Buxton's Leases.

The option party under the control of Mr.Hartwell Conder M.A., has been prospecting on the three leases. This is perhaps the first time that a serious attempt has been made under trained control to investigate the resources of these sections. Tyndal's quarry was started some years ago and has been worked into the hill northwards for a distance of 75 feet by 44 feet in its widest part and with a face 15 feet in height. The rock is greenish, somewhat decayed, serpentine with rotten slickensided partings intersecting it at steep angles. When the option holders came here, the quarry face was practically barren, except for a width of about 10 feet in the N.W. corner. A prospecting shaft 6' x 3' in the clear has been sunk at the quarry face to a depth of 27 ft. from the floor. From 17 ft. down to the bottom of shaft good fibre was obtained from the east side, but the ground is poor again at the bottom. The fibre here is good cross vein chrysotile with a length ranging from ¼ to ½ inch and occasionally 1¼ inch.

(122)

A little NE of the above in the NE corner of the 10 acre section, is an old quarry cut out by the Australasian Asbestos Co. in 1899 for 100 feet into the hill with a face 25 feet high and a short drive. It is in decayed serpentine from which the old Company shipped a good deal of fibrous rock containing long slip fibre and picrolitic material. A mineralogical feature of this quarry was the occurrence of a vein of scapolite a foot wide associated with pink rhodonite. A few boulders of the scapolite are still lying about the approach.

Some trenches have been opened up outside the NW corner of the 10 acre section, just over the northern brow of the hill, showing narrow repeated ribbon veins of good quality chrysotile, often only one tenth or one twelfth inch wide. Rock of this character no doubt has a milling value, but its present utility depends on whether Mainland dealers have more than a limited range of requirements.

In the flat country south of the hill quarries a series of trenches have been opened, exposing patches and belts of chrysotile-bearing rock. A silky cross vein fibre comes from these trenches, generally between ¼ and ½ inch in length, but sometimes accompanied by long slip fibre of superb quality 6 or 7 inches long. These trenches are distinguished by the letters A, B, C, D, E, F, going north to south.

"A" is a set of double trenches east to west 330 ft. and 80 ft. respectively, situate about 300 feet north of the south boundary of Section 6479/M. There are two belts of good fibre rock in the long trench separated by about 20 ft. of lean rock. Some of the fibre from this trench is the best which has been seen on the field. "B" trench is 200 feet further south in pale green serpentine rock and showing fibre from one-sixteenth to ¼ inch in length. "C" trench is on the boundary line 100 feet further south and has been driven 60 feet E. and W.. The serpentine is a little harder and the fibre not quite so plentiful as in the northern trenches. Some picrolite fibre is noticeable on the gliding planes of the rock. 100 feet to the south is "D" trench with an old shaft; 116 ft. south of which is "E" trench. About 200 feet south of the above is an old tunnel which has been driven east with a long approach. Some good fibre has apparently been obtained from this point, as evidenced by the existence of an old knapping floor.

South of the tunnel are some hard knobs of bronzitic rock and no prospecting has been done in this direction. The asbestos area however continues, for some fair chrysotile fibre exists for some 200 feet SE of the tunnel; and ¼ mile SE are surface exposures of excellent fibre ¼ inch and ⅜ inch in length. This goes to show that almost anywhere in this field prospecting would disclose fibre.

A complete scheme of prospecting would mean the extension of the present plan of work to the whole of the ground so as to make sure of locating all the important patches. The present plan has no doubt been to carry out as much prospecting as possible with a fixed limited outlay. As far as operations have proceeded, the indications are that the patches of fibre-bearing rock will be found to be numerous, but of small size. Their number, if they are in close juxtaposition, may possibly compensate for their size.

The trials have not yet progressed sufficiently to allow it to be said that it will pay to raise and ship the stone in bulk to Sydney for mill treatment. Possibly with a little improvement in the percentage of fibre, this could be done. Even to restrict export to hand cobbed crude fibre or to select stone seems at present to be remunerative. The ultimate realisation of the asbestos resources here, involves treatment on the spot, so as to turn to account all lengths and classes of fibre. However,

(123)

the erection of crushing and fiberising plant is premature before the leases are prospected throughout, and a better idea gained of their capacity to supply the demands of a mill.

Remarks on Milling.

Canada sets the milling practice for the world, producing over 80% of the world's fibre. The rock broken down in the quarry is selected and the best fibre hand picked. This preliminary cobbing separates fibre down to three-eighths of an inch in length and the shorter fibre goes to the mill. After drying by either air, steam, or in a rotary dryer, the stone is crushed in a jaw stone breaker and reduced still further in some form of rotary crusher. Rolls reduce it to a still finer size and effect a preliminary coarse separation of fibre from rock. The material is subsequently fed into a fiberising apparatus of some kind, beaters or cyclones, which separate the fibre from rock by means of revolving blades, reducing the material by mutual concussion of the constituent grains. The stuff is then discharged on to shaking screens which separate the fibre completely. The latter is removed by exhaust fans and blown into collectors and settling chambers in which it is graded by means of screens.

The cost of an asbestos mill of average capacity will run to anything between £5,000 and £10,000, dealing with 30 to 50 tons of rock per shift. Cirkel, the Canadian authority, estimates that 1 to 1½ HP is required for treating each ton of rock.

The idea of a central treatment plant for the products of both the northern and southern parts of the Anderson's Creek field is an alluring one. The possibility of this will eventually have to be studied, though the differences of fibre militate against it. But operations are by no means sufficiently advanced yet for the idea to be within range of realisation. The limited extent of work in this field materially hampers a proper appreciation of its resources, and it may even be that a full development of these will not be brought about just now, but it is almost certain that the deposits will ultimately be better utilised than present markets will admit of.

For the moment the economic value of Buxton's leases depends upon whether Australian buyers have a connection which will enable them to absorb the short fibre material. Even so, their permanent value will depend on the size and character of the ore-bearing patches yet to be disclosed by prospecting.

P. Charriol's Section.

No. 7232 M 80 acres.

This is situate 1½ mile up Anderson's Creek and about ½ mile west of it. Two roads give access to the lease, one the Leonardsburgh road from Beaconsfield, the other a longer but better one round by York Town. The country rock between the creek and the mine is serpentine, interrupted on the SE boundary of the section by one of the intrusions of granitoid rock so characteristic of this serpentine-asbestos field. A quarry has been excavated in rotten fissured serpentine rock to a depth of 25 feet. Partings in the decayed rock, 4" to 6" wide dip towards the north and are filled with long asbestiform fibre, ranging from 6" to 10" in length. Two or three tons of fibre and fibrous rock have been broken out and selected from a formation width of 10 to 15 feet: other formations also appear in the face. The rock partings are open and have admitted much surface water, in addition to which the quarry has been full of water for a considerable time, so that the fibre as mined is moist, clammy, and discoloured. When dried over a fire its colour turns to a pure dead white. There is an extreme range in the character of the fibre in this quarry.

The bulk,however, consists of a cottony fibre between 6" and 1' in length, which is easily separated with the fingers. It is plainly of a different type from the chrysotile worked on Buxton's sections and has none of the greasy feel possessed by chrysotile. Mr.Card of the Mining Museum, Sydney, informs me that in appearance it is quite like the amphibole variety found at Gundagai, New South Wales. The analysis now in progress by the Government Assayer indicates by the lime content and the anhydrous nature of the fibre that its place is in the hornblende asbestos group and not in the chrysotile division.

A rather peculiar feature of the occurrence is the association with the fibre of some hard veinstone composed entirely of felspar. The precise nature of this stone is still to be determined by microscopical examination. It often occurs in the heart of bunches of fibre, and again sometimes it is itself traversed by veinlets of asbestos. In this connection it may be mentioned that at the SE angle of the lease is a somewhat allied rock flecked with long bladed crystals of amphibole (hornblende). The fibre is rather weak, but a good deal of this may be due to long soaking in water during the time that the quarry has been flooded. The removal of the moisture by heat also tends to make the staple more brittle. With more cover I anticipate an improvement in these respects. In the Italian hornblende asbestos mines the experience is that as the workings go deeper in the serpentine, the fibre becomes softer and better. This fibre ought to be of use for such purposes as demand heat-resisting qualities. The Italian asbestos is used for gas stoves, mill boards, etc. Cirkel, contrasting the Italian hornblende asbestos and the Canadian chrysotile, says:- "Both the Canadian and Italian varieties possess "some fine qualities and characteristics and each finds its special "application. Manufacturers even say that in some cases a mixture "of both gives better results; and is superior to the best quality "of either of them used separately."

The asbestiform serpentine known as picrolite has been found in this quarry in large splintery fragments. This is a form usually common in the serpentine of chrysotile mines.

There seem to be several bands of fibre rock in the face of the quarry, and the exposed seams ought to yield a moderate quantity of material. The conditions indicate the necessity of continuing the face into the hill and seizing every opportunity of increasing the amount of cover, so as to free the workings from the influence of surface water. Considering the quantity of fibre which may be anticipated, the idea of a treatment plant suggests itself. Some small drying arrangement would be desirable even at the present stage, if a market is assured for the product, but it would be advisable to continue the quarry workings further and open out the faces before thinking of the erection of a dressing plant. Even a small plant eats up the supply of ore remorselessly. The milling machinery required for dealing with the long hornblende asbestos differs considerably from the fiberising plant of a chrysotile quarry; it is more complicated and the fibre is more difficult to treat.

The first task which the lessee has to set himself is to make sure of a market for this particular fibre, and then to lay out the workings which are still in strictly an initial stage.

Costs of Production on this Field.

Only an approximate estimate can be made at the present stage, the per centage of fibre in the rock not being yet established and very little guidance available for forming a proper idea of the milling costs. Part of the output of stone being derived from the hill quarries and part from excavations in the flat country, the mining cost will be affected by the proportion of work carried on at the respective points. It looks as if fully one half, if not more, of the rock broken would go to the spoil heap, perhaps a very small proportion be cobbed, and the remainder be milled. The rock might yield 5% of fibre or it might yield 10%. Some samplings have given even more, but the quantities have been too small for decisive results. In Canada the extraction runs from 6 to 10 per cent. for ordinary cross fibre and from 7 to 12 per cent. for slip fibre. Assuming a recovery of 10%, it would seem possible for the fibre to be produced here for about £10 per ton at works site, exclusive of management expenses, depreciation on plant and cartage to Beauty Point or York Town.

It is interesting to note that Mr.Blatchford of the Geological Survey of Western Australia estimates the cost of producing crude fibre at the Pilbara field in that State and placing it on a local or foreign market as not exceeding £20 per ton. A few tons of crude were sent away from Somnesville, Pilbara, in 1908 and 1909, valued at £40 and £54 per ton respectively.

Returns.

The grades of fibre in the asbestos trade are not standardised and are different at different mines, so that little information can be gleaned from mere quotations. In some cases, the grades are governed by the length of fibre, in others by its quality, in others by length and quality combined. Thus Cirkel states that No.1 crude is a fibre about 1" long and No.2 from ½" to 1". Other market grades of crude comprise No.1 for 1" and No.2 averaging ¾", the length used for spinning and weaving being from three-eighths to over one inch. The milling fibre is generally classed in three grades, worth from £2 to £20 per ton in Canada, the third grade being the shortest (or "paper stock" as it is called in the trade) with a value of £2 to £3 per ton.

The crude fibre which commands in Canada a price of from £30 to £60 per ton is stated to be worth £200 and upwards in Australia, but reliable information about Australian prices is in the possession only of the firms who control the local market.

The bulk of the chrysotile which would be won from the Anderson's Creek field would probably range between the ¼" and ½" lengths.

The annual production of asbestos in Canada is in the neighbourhood of 100,000 tons and the profits are stated on good authority to be small. With the higher values ruling in Australia, the margin of profit on locally mined ore is likely to be greater.

Quality of F-ibre.

Good asbestos fibre is silky to the feel, strong in the staple and has great heat resisting capacity. The tensile strength and infusibility can only be established by practical or experimental tests: the other qualities may be determined by inspection and handling. The Anderson's Creek best chrysotile is flexible and soft and passably strong when tried in the hand; its behaviour in the fire seems also good, but systematic investigations and trials are necessary for any authoritative assertions in these respects. All that can be said at present is that, judging by its appearance, it is suited for the usual uses to which asbestos is put.

The long fibre on Charriol's section can hardly be appraised yet, for the workings are not sufficiently advanced to get rid of the effects of the water in the quarry. Water weakens the fibre and drying it by heat weakens it still more, so that for the present it is impossible to judge its real quality, and this must be borne in mind in connection with the remarks on this section. The long white cottony fibre of this quarry ought to command an Australian market for boiler covering and kindred uses.

The silky chrysotile of Buxton's leases will meet a demand for best quality xx fibre. If any Australian market can be depended upon, the bulk of the Anderson's Creek material will be used. Short fibre can now be used in numerous directions. Asbestos roofing slate and boards, pipe coverings, etc., are using up large quantities of medium to short fibre. Fibre one-eighth inch upwards can be used for mill board. A certain quantity of short fibre material is employed for electric fittings, flooring etc., and the powdered waste comes in for refractory bricks, furnaces and the like. In short, the introduction of milling methods has made available large tonnages of short fibre which used to be relegated to the dumps.

Section $\frac{7414}{M}$ 80 acres: H.Conder.

This section is south of and adjoining C.B.Buxton's 80 acres lease, and has recently been taken up for prospecting the extension of the asbestos belt existing on the northern properties. It is still in the serpentine area and no doubt fibre rock will be found in it.

400 feet south of the bridge which crosses Anderson's Creek and on the east side of the creek is a quarry which was worked for a time by the Tasmanian Granstone Company for ornamental building stone. The quarry has a face opened to a depth of 15 to 20 feet. The derrick for lifting the stone is still there and some blocks of hewn and squared stone 3 or 4 feet x 2 feet x 1ft. 6 in. are lying about the quarry ready for shipment.

The attempt to establish an industry was a laudable one and it is to be regretted that it did not meet with greater success. The stone is a dark green mottled serpentine and would take a good polish. It is however traversed by innumerable parallel partings only an inch or two apart, which while enhancing the beauty of the prepared stone will inevitably cause the rock to break away when sawn into thin slabs: and it is possible that the same tendency will develop in the solid blocks if left exposed to the weather long enough. This feature is common in serpentine rocks all over the world, as they are notorious for bad jointing. Owing to these flaws, serpentine is a specially weak building stone, besides which it weathers in a way detrimental both to the solidity and appearance of the stone if used for outside work. For ornamental and interior work the rock is highly prized, and with a greater population and increased demand for decorative work and articles de luxe, probably a nice little trade will be developed. At present the demand has to be created and care taken not to put the stone to a wrong use which will militate against success later on.

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Prospects of the Field.

The field is just in that condition that it may, if the industry is fostered, develop into a payable enterprise. Present prices are encouraging. Information from the Commonwealth offices in London is to the effect that every particle of asbestos is now worth £20 a ton: in this case, the market prices in Australia should be higher than this and should be such as will enable the Anderson's Creek deposits to be worked at a profit, if workable concentrations of any size can be exposed. Preliminary work of a prospecting nature on a rather extensive scale seems necessary in order to establish the tonnages available, and this must be done before the installation of a treatment plant can be thought of. The Department has been asked as to the possibility of subsidising such work, and if it proved satisfactory, of further subsidising the erection of a fiberising plant and finally of providing a bonus on the initial output. These proposals will no doubt receive careful consideration.

Some fear has been expressed that the asbestos veins are merely superficial phenomena: but this is not the case. The formation of asbestos was a deep seated process and the fibre will be found in the serpentine at all depths. Quarrying, however, may be expected to be the mode of mining it, as sinking and driving underground is hardly likely to be remunerative except where the ore body is extensive and the fibre of high grade. If prospecting discloses any broad zones of fibre rock, the outlook for the field will be encouraging. At present the prospecting work appears to be just on the border land between payable and unpayable results, and it would require only a slightly greater measure of success to turn the balance.

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Govt. Geologist

✱ ATTACHMENT FOR URMISCA/130-139

PRELIMINARY REPORT, ASBESTOS DEPOSITS, ANDERSONS CREEK, BEACONSFIELD

BEACONSFIELD

FOR SECTIONS NORTH AND ADJOINING SEE ILFRACOMBE MINERAL CHART

YORK TOWN

LEONARDSBURGH

BEACONSFIELD

MIDDLE ARM

SCALE 8 INCHES TO ONE MILE

NOTE- Sections within hatched lines Exempt from the operation of The Mining Act 1905 Ex: Notice 23.4.15

Copies of this plan may be obtained at the Mines Department Hobart and Launceston
Price One Shilling

FOR SECTIONS SOUTH AND ADJOINING SEE SALISBURY MINERAL CHART

Photo Lithographed by John Vail Government Printer Hobart Tasmania, September 1916

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