MT. CAMERON WATER RACE

In compliance with instructions received by letter dated 13th May, 1926, I proceeded to Gladstone via Waratah on 24th May, arriving at there 29th May, and left on return to Zeehan on 11th August.

Survey of Water Race Deviation.

A line of race commencing from the end of the Mt. Cameron Water Race deviation was surveyed to Link up with the old races connecting with the Native Lass and Echo Dams.

The distance from the end of deviation to race connecting with the Native Lass dam is 398½ chains and on the race connecting with Echo dam 7 miles 10 chains.

The route of race was levelled to a fall of 4' 9" to the mile. Level and guard pegs were placed at each chain with distance marked thereon.

The greater portion of the surveyed line is through comparatively level open country sparsely timbered.

Short sections on the line particularly at Sextus and Deep Creeks are rough, with bare granite rock at surface, the aggregate length of this class of country is approximately 22 chains.

At Sextus Creek crossing 149 chains from end of race a length of 103 feet of fluming will be necessary. Greatest height of trestling required is 22 feet.

At 186 chains from end of race the surveyed line crosses some old sluicing workings necessitating 3 chains of fluming. Height of trestling 12 to 15 feet.

At 331 chains from end of race Deep Creek is crossed, fluming will be necessary here for a length of 118 feet. Greatest depth of trestling required is 24 feet. At several points along the surveyed line where small creeks are crossed short embankments will be needed. These will be a few feet in depth, and preferable to fluming.

The remainder of the route of race is for the most part in open country and much of the surface portions of the excavation for race could be ploughed out. The ground traversed by the race is through sandy loam and clay at a depth of 2 to 3 feet, in some portions fine gravel, on the whole the ground is very favourable for a water race channel.

Estimated cost of construction of Deviation to Native Lass and Echo dams £2360.

Native Lass Dam.

The surveyed line of race from the end of deviation of the Mt. Cameron Water Race passes within ¼ mile south of the Native Lass Dam. A race extending south from the latter is crossed by the extension survey of deviation, so that no race cutting is necessary to convey water from the proposed extension of race to this dam.

Dimensions of Dam

Capacity 681, 156 cubic feet
10 sluice heads for 5 days.
Ground slope 1 to 40 feet.
Length of embankment 13½ chains, Direction 265°
Width at Bottom 50 feet.
Width at Top 8 feet.
Greatest Depth 20 feet.
Earthwork embankment of sandy loam, procured at site.

Bottom of dam about 1 foot deep, sandy loam resting on impervious clay slate bottom. There are two gaps in the embankment, the first being 2.25 chains from east end requiring 460 cubic yards of fluming. This gap at top is 37 feet long. Second gap 5.4 chains from east end of embankment, 600 cubic yards of filling will be necessary to repair this gap. For outlet box 840 super feet of timber will be required. Total estimated cost to repair £250.

Echo Dam

Length of breast 594 feet.
Height of embankment 7 feet.
Earthwork embankment of sandy loam 8 feet wide at top.
Estimated capacity 382, 536 cubic feet.
Outlet box requires renewing. Cost £20.

Ground slope about 1 to 30. Bedrock 1 to 30 feet sandy loam underlain by impervious slate and sandstone.

Dams North Side of River

A well constructed dam with capacity of 103, 680 cubic feet, is situated near the south end of syphon at race deviation to south side of river. This dam is served by water from the main race and is used for sluicing operations in the locality.

The Government Reservoir north of Gladstone is in good order requiring only a new outlet box with gate to be made serviceable. The average depth of water in this reservoir is approximately 2' 6". The embankment consists of sandy loam and is not more than 4 feet in height at deepest point. It is a circular wall built round a natural basin in low lying marsh country and is now partly filled with water.

The Reservoir has a capacity of 241,970 cubic feet equal to a supply of 7 sluice heads for 24 hours. Estimated cost to repair outlet box £10.

There is a small dam about 2 miles south of the Government Reservoir. This is of very small capacity would supply approximately 1 sluice head of water for a period of 24 hours when in full. What is known as Harvey's Dam is situated near the Race Manager's house, this is estimated to supply 10 sluice heads of water for 24 hours. This dam is in good condition.

Constructed Water Races

This race with the exception of one short section was examined from end to end. The race generally is in good condition. That portion from the intake to the first syphon at the lower caretaker's

house could with advantage be cleared of all under water plant growths also of all tussocks ferns and other vegetation in contact with the water. Shrubs, ferns etc. have been allowed to grow on the sides of the race and come in contact with the water, causing retarding action on the rate of flow. To remove this plant growth effectively preferable this could be done when the race is empty. To turn the water off would cause a serious dislocation of work to users. To avoid this, men provided with gum boots could carry out the work satisfactorily.

From the appearance of the shrubs etc., it is evident that in years past very liitle attention has been given to the prevention of the growth of vegetation on the sides of the race. It would entail very little extra work on the part of the caretakers to prevent plant growths of any kind growing in or near the race while the plants are small. Now that they have been allowed to grow unhindered, the work of removing them will be considerable. All trees and ferns on the lower bank of the race which forms the footpads should be cut down and removed therefrom. I would suggest that instructions be given to the Manager to see that this work is not neglected.

In several places on that section between the caretakers' cottages, small leakages occur, where large tree stumps have been allowed to remain on the Lower side of the race. The decaying of the roots cause leakages which cannot be effectively stopped without the complete removal of the stumps and the bank rebuilt. During my examination the race was running to its full capacity; owing to the wet weather, leakages under these conditions are likely to be much more in evidence than in normal weather conditions.

At the time of my visit to the intake of race of Great Mussel Roe River was in high flood, everything appeared to be in good condition excepting some portions of the timber work of the intake gate which is rather badly decayed. Some attention should be given to this during the next summer season. Any timber needed could be squared from trees growing near by. The cost of the work should not exceed £10.

A length of about 1 chain or iron fluming near the upper caretaker's cottage is in a rather weak condition and in one portion is leaking. The wood work supporting the iron flume is sound but the iron itself is rusted on the inside under the water. The outside appears to have been well attended to by tarring.

All syphons were examined and found to be in very fair condition, as far as could be judged from the outside. Several small leakages occur at some of the joints, but these can be stopped without much difficulty. The wooden portion of the syphon across the Ringarooma River is in parts showing signs of decay outwardly, on the inner side the wood will no doubt be sounder and should last with attention for a number of years to come. The trestling supporting the syphon pipes across river is in sound condition. The short length of syphon between the River and Gladstone is in good order also the supporting trestling. The deviation of race to Gladstone and beyond to end is in good order.

The constructed water races on the north side of River now disused are in very good order requiring only a little clearing out and some light scrub growth removing to render them fit for the conveyance of water. The earthwork on the disused portions of the race is practically intact.

In my preliminary report on the best site for syphon to divert water to the north side of river, the site from which the former syphon was removed was recommended. The line is straight from intake to outlet. The distance on contour is 63 chains, the greatest depth of valley is 71.97 feet. The working head is 15 feet.

The approximate cost to instal a 22" diameter 16 guage pipe is £2500. Enquiries are being made for relative cost in wood piping. The line for this syphon is prepared, ferns and light scrub on several small sections require removing.

The greater portion of the wood bearers formerly used for syphon are in good condition; probably 90% are lying along the route and can be again utilised.

The life of 16 guage galvanised pipes can be estimated in the least at over 20 years. If it is decided to put in these pipes they could preferable be made and tarred on the site or at Gladstone and carted out. This method would save freight compared to manufactured pipes.

Water Race Revenue Expenditure

It is a difficult matter to estimate the revenue derived from the water owing to the varying quantity available. The race in the winter months is capable of delivering up to 47 sluice heads, but this is only possible when water can be picked up from streams below the main source of supply. From the latter for a distance of several miles the race has not the capacity it has lower down where contributory streams add to the flow.

No advantage would be gained in widening the race on the section referred to since for the greater portion of the year I am informed by the Manager there is no greater quantity than 20 sluice heads available from the main source of supply. The narrow section of the race is capable of delivering at least 303 sluice heads. The quantity of water available from smaller streams lower down on the race is almost negligible for the greater portion of the year, consequently the only reliable source of supply is from the Great Mussel Roe River and the quantity from this for 8 months in the year is directly depending upon the volume it carries. There does not appear to be any means of augmenting the supply during the dry season.

The proposed dam on Chum Creek would not warrant the estimated cost of construction. The capacity according to Government plans and estimates is 12,361,300 cubic feet. This would supply 10 sluice heads of water continuously for a period of 35 days only.

The revenue from water assuming that the quantity sold did not vary would be dependent upon the method of purchase. In the case of most users the water is taken at a price fixed per sluice head

according to the quoted market price of tin. At the present quoted price each sluice head of water cost the users £1.2.0 per week whether used continuously or for 8 hours a day only. Should the water have to be lifted for use the buyer pays the full rate as above for 8 hours and ½ rate for the remaining 16 hours. Working on a royalty basis the users pay 25% of the nett proceeds of tin sold. Several parties are at present working on the royalty system. Revenue derived from water sold is therefore likely to vary within wide limits dependent upon the number of users and the amount of tin output.

There are so many varying conditions changing from week to week in connection with the supply and use of water from the race that it is not possible to give even an approximate estimate of revenue to be expected assuming that the whole of the water is used for 24 hours daily. When the wet season is over the water will gradually diminish in flow with possibly a few periodical replenishments of short duration until the minimum flow is reached.

Without data giving records of the average flow in the race over a number of years an estimate of the quantity that may be expected to flow in this or any future year cannot be made with any degree of accuracy. Applications for water from the race at the present time are considerably greater than it is possible to supply.

The water used by individual miners is as a rule delivered at comparatively low pressure to the working faces for hydraulic sluicing purposes. The water in all cases used from the race is allowed to run to waste after. Once being used no provision whatever is being made for the use of "return" water. Owing to increased activity of tin mining in the Gladstone district the demand for water is likely to be greatly increased in the near future, and if the same methods for using water continue as in the past the expansion of the industry on those areas depending upon a water supply from the race will be limited.

It is not to be expected that the individual miner can make provision for the use of "return" water since as a rule he does not make use of machinery in carrying on productive work.

Wherever possible, provision for the use of "return" water should be a condition in the terms of contract with any company, syndicate or party using power in their operations otherwise too much restriction will be placed on productive work during the dry season due to inadequate water supplies if the more economic use is not made of water delivered by the race.

Alluvial Tin Deposits

Native Lass and Echo Dam Areas

The deposits of alluvial tin on low terrace ground south of the Ringarooma River and between 4 and 5 miles west of the township of Gladstone on the Boobyalla road, extend over an area of about two miles long by ½ mile wide. Some portions of the ground have been worked in past years and since abandoned.

The working of these areas has been dependent upon storm water and supplies as may be conserved in the Native Lass and Echo Dams which for many years past have fallen into disuse and disrepair. The quantity of water which these dams could conserve would be quite inadequate for anything in the way of continuous work excepting for a short period in the winter months.

The successful working of alluvial ground depends upon a constant water supply, it is therefore not surprising to find the alluvial areas intended to be served by water from the Native Lass and Echo Dams are neglected. The areas referred to are well suited for Miner's claims. Dish prospects tried from the faces of the old workings showed payable quantities of tin, in some parts very little tin occurs, but in the majority of cases the prospects were satisfactory.

In the most westerly portion of the area worked the drift has an average depth of about 8 feet, going easterly deeper ground up to 15 feet occurs. The wash dirt consists of fine gravel and clay on a bed rock of slate and sandstone. In some of the old workings fairly coarse river gravel up to 2" diameter occurs. The ground which is only lightly timbered is fairly flat, but has sufficient undulation in ordinary sluicing methods for the disposal of tailings.

A constant water supply to this area which can only be made possible by the extension of the deviation of the Mt. Cameron Water Race would give renumerative employment to a number of miners for a considerable period.

In the Gladstone district the majority of residents gain a livelihood by working their own claims under a Miner's right and it is by the efforts of such workers only that has maintained the township of Gladstone.

The deviation of the water race to the south side of the Ringarooma River a few years ago was chiefly undertaken for the purpose of providing a constant water supply for miner's claims in the vicinity of the township. There is now very little payable ground remaining and unless the extension of the race is carried on the Native Lass and Echo Dam areas the number of men working on miner's claims at Gladstone will be very few.

Serviceable races for the reticulation of water from both the Native Lass and Echo Dams connect with the alluvial deposits referred to. To serve these areas with water per medium of the Native Lass, and Echo Dams would not necessarily cause a shortage to other users. "Night" water, that is water flowing to waste at night by miners and others working in the day time only at other points along the race, could be delivered to the Native Lass and Echo Dams and stored for use by operators therefrom during the day time.

It is only by the adoption of some such scheme and the more general economic use of water from the race that the demand which is already so insistent can in some measure be met. Individual tin miners as a rule cannot afford to carry on work intermittently. To commence operations on a claim it is necessary to do more or less preparatory work and make provision for pipes and other necessary appliances. Unless in addition

to being satisfied with the prospective value of the ground he intends to work he can be assured of a reasonable constant water supply he is not likely to go to the expense and loss of time in establishing himself on any claim if provision for the latter is not assured.

Alluvial Deposits North of Ringarooma River

Extensive deposits of alluvial tin ground occur between the Mussel Roe and Ringarooma Rivers. The examination of these was confined to the old Cybele workings. The Garfield and Empress and the deeper deposits north of Gladstone comprising the Lochabar, Scotia and Mc. Gregor. The Cybele workings are situated near the Mt. Cameron Water Race in the vicinity of section 5069M.

It is many years since active work was in progress in this area. The old workings are fairly extensive covering an area of several acres on the eastern portion of a ridge forming the divide between the Great Mussel Roe and Ringarooma Rivers. The wash dirt consists of fine gravel ranging in depth from 6 to 10 feet resting on a very uneven bed-rock of slate. Some very good yields of tin are reported to have been recovered from these workings but from the manner in which the faces have been worked indications point to irregularity in the distribution of tin. The drift ground in the vicinity of the worked area appears to have been extensively tested by bore holes: apparently the results obtained from these were not sufficiently encouraging to warrant a continuance of work at that time.

A short distance to the south east of the Cybele old workings of limited extent show deposits of drift 8 to 10 feet deep similar to that of the Cybele. About ½ mile south of the Cybele workings a series of boreholes known as No. 3 line were put down by the Government a number of years ago. These bores proved a deep run of wash coursing in the direction of the Great Mussel Roe river. This line of 32 bores was 108 chains in length. The records of the values obtained from a number of these bores fully warrant further investigation of this lead and the adjacent areas. The high price ruling for tin combined with modern methods of handling alluvial drifts should be sufficient encouragement to attract attention to these neglected areas.

Garfield Mine

The Garfield Mine is situated north of the Cybele. The leases of this property are in the name of W. J. Westcott, comprising sections Nos. 9670M, 9658M, 9659M, and 9671M each of 80 acres and some further leases south and adjoining the above acquired subsequent to the time of this examination.

These sections lie about a mile to the east of the Ringarooma River and cover a wide ridge running parallel to the latter, the crest being about 300 feet above the River. The Mt. Cameron Water Race passes through a portion of the most southerly section. The level of the Water Race is a little over 100 feet below the highest point on the sections.

From the appearance of the old workings of more or less limited extent and which are situated at widely separated points on the property it is many years since productive work was in progress here. Recent investigations carried out by the present leases show that the drifts in the old workings are well payable.

The ground formerly worked is not confined to any particular run of drift, the old workings generally speaking have been confined to the slight depressions in the gently sloping ground towards the Ringarooma River. Good facilities exist for the disposal of tailings without the necessity of elevating them.

The openings in the old workings vary from one to several chains in width over considerable distances in length. The wash dirt consists of fine gravel and sand. The gravel is of well rounded quartz sandstone and slate pebbles, on the average the largest sized pieces would not exceed ¾" dia. The greater portion of the wash is fine sandy grit being of loose character would shift readily with comparatively low water pressure. The wash dirt being light would afford a ready separation of the tin. There is no heavy mineral present in the wash, consequently the tin can be dressed to a very high grade quality without difficulty. In some of the faces fine particles of tourmaline are scattered through the gravel. The average grain size of the tin ore is about 1/32" of the usual amber and resin variety. The face in Harden's Ravine carries coarse black tin with particles ranging up to ¼" diameter.

The drifts of this property carry no over burden, the whole of the gravel from the surface downwards being tin bearing, there is however as a rule an enriched layer on or close to the bottom. The average depth of wash dirt in the various faces examined is 14 feet. Dish prospects of average samples taken at various points from the old faces showed invariably well payable quantities of tin. In a number of the openings very rich layers of wash occur. The ground between the various old workings has not been systematically prospected, but from the general nature of the ground and indications obtained from shafts and shallow openings it is reasonable to assume that similar quality of wash will extend over the intervening ground between the old workings.

The bed rock of the greater portion of the area consists of granite, the contact of the latter with slate occurs in the vicinity of the south west portion of section 9658M, the line of contact taking a gradual outward curve to the north west coursing a short distance to the north of Section 9671M.

This property is well situated for economic mining the whole area of drifts can be operated by hydraulic sluicing, the old sludge channels formerly used can again be utilised for the disposal of tailings.

West of the Garfield are the old Tamar and Empress workings. The Tamar workings are about ½ mile of the Garfield and the Empress similar distance further on. The drift ground at the north west portion of the Garfield takes a southwesterly course into Harden's Ravine. 50 feet deep, coursing 360 degrees. The Empress workings consist of a deep gutter through a granite ridge at right angles. The southern of the lead extending into Harden's Ravine and the northern

extension into Tamar Creek valley where the drift runs into shallow ground on a bed rock of slate and gives out altogether going further north beyond Tamar Creek.

Lochaber Workings

These workings are situated about a mile north west of the Empress and about 1½ miles due north of the township of Gladstone, comprising leases 4234M, and 412M in the name of E. R. Groves and others. A branch of the Mt. Cameron Water Race passes through the ground. A large area of ground has been worked here, the average depth being about 20 feet. From the appearance of the faces it is many years since productive work was in progress. The bed rock is slate and is very irregular. In parts of the floor of the workings, owing to depression in the bed rock below the general level of the drift has given rise to the belief of the existance of a deep lead alluvial ground extending northerly from these workings. There is no direct evidence from an examination of these workings to support this theory.

These deposits are of fine quartz water worn gravel, sand and clay. In the lower portions of the drift which is fairly plentiful this has been carbonised to a substance greatly resembling charcoal.

Dish prospects taken from various parts of old faces gave very satisfactory results. Good facilities exist for the economic workings of this ground. There is plenty of scope for the continuation of the ground in similar grade to that worked.

Scotia Mine

This property is embraced in leases 9379M, 9380M, 9381M in the name of E. M. Shields and 9675M in the name of J. T. Shields and is situated a short distance to the south west of the Lochaber.

A large area of ground has been worked on the southerly portion of the property in the earlier days of the field when payable returns are said to have been obtained.

The present large face extends from the valley of the Ringarooma on the south, in the north easterly direction. In the main portion of the workings the drift is 60 feet deep and consists of fine quartz and sandstone pebbles with sand and clay. In the most northerly portion of the workings the face has decreased in depth to about 20 feet, but as the slate bottom is not visible as in the portions lower down it is difficult to say if the bottom has been allowed to rise in order to provide fall for the disposal of tailings.

A few chains to the north east of the workings a series of bore holes have been put down proving the existence of a large area of alluvial ground averaging about 60 feet in depth. The results of these bores show erratic values in tin ranging from a trace up to about 2 lbs. to the cubic yard. Further boring could with advantage

be undertaken to prove the extent of payable portions of the drift located by the bores.

Large areas of ground have recently been acquired under lease on the extensive lightly timbered plain extending north westerly from the Scotia and Lochaber leases. It is understood that a strong mainland syndicate is about to undertake the work of thoroughly testing the ground by boring. This work when completed should prove definitely if the theory that a deep lead runs through this ground is correct. North east of the Lochaber a good deal of boring has been done in the past but the results obtained are reported as not being very encouraging. More intensive boring on any concentration of tin located in the drifts should be undertaken than has been the practice in the past.

The McGregor and Aberfoyle workings lie about 3 miles north west of the Scotia, a fair area of ground has been sluiced in past years and since abandoned. The alluvial deposits here consist of fine gravel and sand lying on what appear to be marine sand dunes impregnated with oxide of iron.

The Government Reservoir at the extreme northerly end of the Mt. Cameron Water-race lies at a short distance to the east of these workings. With a constant water supply the alluvial areas in this locality are well worthy of attention.

Conclusion

Although the Gladstone district has been a constant producer of tin for a great many years the alluvial deposits are far from being exhausted. There are very large areas of potential tin bearing drifts particularly on the north side of the Ringarooma River and to a lesser extent on the south side yet to be explored.

A good deal of attention is now being directed to the work of testing these areas by boring, there is every probability if systematically carried out further payable concentrations of tin ore will be located.

A great hindrance in progress in the past has been the want of a constant water supply. To a great extent in the localities served by the Mt. Cameron Water-race this want has been supplied, but as the demand for water from the race has recently increased to beyond its carrying capacity it follows that unless some more economic use of the water can be devised that has been the practice in the past productive work will be greatly retarded.

A careful check on the distribution of water to users should be made and the minimum quantity only which in the opinion of the Manager of the water-race is sufficient to carry on operations should be allowed to any individual, party or company, not necessarily the quantity that any application stipulates.

The writer is indebted to Mr. D. Shields, Manager of the Mt. Cameron Water-race, also to Messrs. J. Ogilvie, M. Curtain, B. Bowen and other for information and assistance.

J. B. Scott.

24th August, 1926.