REPORT ON SOME TIN ORE DEPOSITS IN GLADSTONE DISTRICT

INTRODUCTION

This report is the result of a short visit of inspection to the Garfield, New Esk, and Amber Hill Mines. It deals particularly with alluvial deposits of tin ore from the commercial point of view, but also on their origin, manner of distribution, extent, and nature. Observations based solely upon fragments of deposits belonging to defunct river systems have been made upon the processes of land sculpture since Tertiary times, the effects of oscillatory land movements, and the influence of an older topography. A complete account cannot be given of the history of development until further evidence can be gleaned from the results of a more comprehensive survey about to be undertaken by the Department.

SITUATION AND ACCESS

The small township of Gladstone lies in the north-eastern corner of the Island, 13 miles south of Bass Strait, and 9 miles south-east of the port of Boobyalla in Ringarooma Bay. Good roads connect with Boobyalla and with Herrick, the terminus of the North-eastern Railway.

GENERAL OUTLINES OF THE TOPOGRAPHY

The surface of the country is gently undulating between Mt. Cameron Range and the sea, and, in the immediate neighbouhood of Gladstone, altitudes vary from 300 to 800 feet. Mt. Cameron in the background rises steeply from the well-planed coastal shelf to an altitude of 1808 feet above sea-level.

The main draingge channel of the district is Ringarooma River, which, since its original diversion, has altered its channel in certain parts. On the east side are Little Mussel Roe and Great Mussel Roe Rivers and on the West side Boobyalla River receives the drainage of a large tract of country.

DEVELOPMENT OF THE TOPOGRAPHY

In early Tertiary time the general elevation of the coastal shelf was considerably higher than it is today. At that time numerous small streams heading in Mt. Cameron Range flowed direct to the sea, and larger streams of river dimensions, receiving their waters from the country beyond to the east and west of that range, formed the main drainage channels of a large district.

The gradual subsidence of the land allowed the sea to encroach upon low lying coastal country and tidal waters ran back to the base of the mountain. That subsidence led to comparatively rapid deposition of sands and vegetable matter upon the log-bestrewn river gravels, and so were formed the second and third beds of river sediments. Rapidity of deposition did not allow of natural concentration of the heavy minerals, consequently the second and third beds contain very little tin ore in proportion to granite waste, which composes the bulk of the sediments. The fourth bed,

consisting largely of felspathic clay, records an arrest of the subsidence during which the now slow-moving waters carried in suspension only the finest particles to the line of tidal action. A further subsidence led to the formation of the fifth bed, which consists of pebbles of granite waste, now almost completely decomposed and disintegrated, and pebbles of well-worn white quartz distributed in irregular layers through the bed. These well-worn, well-assorted and rounded pebbles typify the action of tidal waters, which, by their constantly repeated washing, produces a high degree of rounding for particles above the diameter of one-tenth millimetre. Moreover, it is found that the tin ore in this bed, because of its brittleness, has been reduced to a fine state of division by the constantly applied power of tidal waters, and that the tin ore is in greater proportion in the pebbly layers than in the fine-grained sands. In places the upper pebbly quartz beds extend over the low banks of the old streams and at one time probably covered a large area.

The subsequent rapid elevation of the land at least 600 feet inaugurated the cycle of erosion, which continues to the present day. This land uplift resulted in the diversion of streams from their old courses, and the resultant cutting up of the old river deposits, of which remnants only remain to mark their aforetime existence. It is now difficult to piece these fragments together and outline the courses of the several old streams.

GEOLOGIC RELATIONS

Cambro-Ordovician - The oldest formation in this district consists of the slates, sandstones, and tuffs of Cambro-Ordovician age that occupy such large parts of the mineral belts of Tasmania. Here, as in some other mineral fields these strata have been intruded by granites of Devonian age. They strike a little west of north, and have been subjected to the metamorphic influences of the granitic intrusion, especially along the lines of contact.

Devonian.- The granite, like the normal biotite variety of Blue Tier, of which this body is an extension, presents a porphyritic phase and in places is distinctly pegmatitic. Both orthoclase and plagioclase are everywhere present and the accessory minerals ilmenite and zircon are abundant. Along the lines of contact with the intruded stratigraphic rocks the effects of greisenisation are strikingly evident.

Intruding the granite are dykes of alaskite-aplite and veins of greisen. A body of alaskite-aplite, 40 to 100 feet wide, passes in an easterly direction through granite and greisen along the southern side of Hardens Ravine. This dyke completely intersects the greisen veins and is representative of the last barren differentiate of the granitic magma.

Small veins of greisen, all tin-bearing and some very rich, are prominent, and from such as these a large portion of the alluvial tin ore contained in the drifts has originated.

Mesozoic - Remains of diabase of Mesozoic age appear north of Gladstone. This rock has no direct connection with mineral deposits.

Tertiary and Quaternary Deposits - Drifts and gravels of late Tertiary to Quaternary age still occupy a large part of the higher country in the neighbourhood of Gladstone. These deposits, which consist of river gravels buried beneath sands and gravels that have been subjected to the

action of tidal waters, range in thickness from 10 to 60 feet in the Garfield area and up to 120 feet in the neighbourhood of Lochaber. Some of the beds are firmly cemented with carbonaceous material and other media, and the upper ones are compacted and seamed with limonite. Remants only of these leads remain and, because of the difficulty in piecing together the parts dissected by recent streams, the tracing of the old river courses is not an easy matter.

It is quite certain that some of the deposits now being worked for tin ore represent the beds of inconsiderable streams only which headed from Mt. Cameron Range; and indications are found here and there of a major drainage channel the source of which lay far beyond the confines of this district.

The present river system is responsible for the cutting up of old leads, the removal and redistribution of their contents, and for the formation of Recent beds of gravels and drift.

ORE -DEPOSITS -

The ore-deposits under consideration may be divided for convenience of description into two classes, namely:

1. Primary -
   (a) Greisen Veins
   (b) Contact ore-bodies
   (c) Quartz-cassiterite veins, and

2. Secondary -
   (a) Alluvial deposits of Tertiary age
   (b)" " " Quaternary to Recent age

Primary Deposits - Greisen veins are prominent near the lines of contact between granite and stratified rocks. They are as a rule contained wholly in the granite but a few extend beyond into the intruded formation. Their general trend is west of north, from 8 to 20 degrees, and their dip is in a south-westerly direction. A few of these where exposed contain tin ore in proportion, it is reported, of 0.5 to 2 per cent. Some consist largely of dark mica, others predominatly of quartz, while a few consist of quartz and muscovite. As a rule the mica-rich ores contain the highest proportions of tin ore.

Along the lines of contact between the granite and the Cambro-Ordovician formation are large bodies of partly greisenised tin ore-bearing material. These bodies represent alterations of the granitic fringe due to the action of mineralising agents. In them all stages of metamorphism and pseudomorphism are illustrated. Thus are found pinite and secondary micas after felspars, cassiterite and quartz after felspar, many other secondary minerals and quartz-cassiterite veins.

Venis of quartz-cassiterite in granite and also in the intruded slates and sandstones are fairly common, and some are rich. The tin ore in such as these is coarsely crystalline, richest on the walls, but is splashed through the quartz in large blebs here and there.

Secondary deposits - The most important of these are the river and tidal water deposits of Tertiary age. They derived their stores of tin ore largely from the waste of greisen veins and quartz veins, but also from the large contact deposits of pegmatitic nature. There is little doubt that the ore-bodies contained in the granite of Mt. Cameron Range shed a considerable portion of the alluvial tin ore, especially that of fine grain that has been subjected to attrition, but the bulk of it came from the flat country north of the range. It is quite evident that a large portion of the coarse tin ore in the basal river wash is of local origin, much of it having been shed from contact deposits. For instance, the rich bottom wash at the No. 1 Face of the Garfield Mine does not extend far beyond the line of contact between the granite and the stratified rocks. Moreover, the basal member of the alluvial formation in parts remote from these contact deposits is almost invariably very poor.

A typical section is that exposed in No. 1 Face Garfield Mine:-

	Feet
Peat and sandy clay	2.5
Tidal wash composed of well-assorted and well-rounded pebbles of decomposed granite.	12.5
Compacted evenly-assorted sands and kaolin	4.0
Compacted carbonaceous fine-grained felspathic sands	6.0
Very fine white sands with bands of kaolin	6.0
Lignitic sands	5.0
Lignite, drift sand, and coarse river gravel	2.0
	38.0

The upper 15 feet of material only is of any economic importance, except at a few places where the basal gravels contain small rich concentrations of tin ore.

Iron sulphide in thin layers, small nodules, and in blebs and streaks is abundant, though not easily discernible, in the carbonaceous sandy clay, sand, and basal gravel beds. The black disulphide, melnikowite, appears to predominate in the carbonaceous sandy clay beds, which were laid down under conditions of poor circulation; but pyrite, probably formed by the gradual alteration of melnikowite, is not an inconspicuous accessory.

The compacted carbonaceous sands, resting upon the gravel bed, likewise contain both pyrite and melnikowite; and into the well preserved trunks, branches and roots of cedar (?) trees embedded in the basal gravels iron sulphides have been precipitated.

Probably the iron was precipitated there, either directly as black colloidal hydrous ferrous sulphide by reaction with hydrogen sulphide liberated by bacteria from decaying organic matter, or as ferric hydroxide by iron bacteria, which, according to some authorities, in the presence of hydrogen sulphide under reducing conditions is changed to hydrated ferrous monosulphide. By loss of water and the addition of sulphur present in the mud, the latter is changed to melnikowite, which gradually alters to pyrite as the encasing materials become consolidated.

Deposits of Quaternary to Recent age consist in part of rewashed Tertiary leads and in part of concentrations brought about by the action of present streams.

THE GARFIELD MINE -

Two years ago a Company was formed in Hobart to acquire certain leases of land enclosing Garfield Tin Mine and to provide the necessary capital for the equipment of the mine and the working of the ore deposits on a commercial scale. The Company designed the lay-out of their works well, but might have improved their plan had they carried out preliminary drilling along the courses of the old leads. After a rather dearly-bought experience they now have the Mine in good working order and well equipped.

The Company hold under lease from the Crown:-

Consolidated lease 10302/M of 540 acres
Machinery site 9837/M of 3 acres
Easement Area (tail race) 2442/W of 11 acres.

The Alluvial and Detrital Deposits -

Main alluvial lead opened at four places over a distance of 3200 feet, has been proved by boring and pitting to extend 1,1/3rd mile in length and 500 to 700 feet in width at surface. The greatest depth of the deposit is 60 feet; but the uppermost bed only, 15 to 20 feet thick, contains tin ore in commercial concentration, excepting a few places where the basal bed of river gravel also contains a fair proportion of tin ore. The lead and tro tributaries are clearly marked on the accompanying plan. The tin ore on the upper beds of this deposit is in a uniformly fine state of division.

Other deposits, such as those opened in Nos. 7 and 8 cuts are of small extent and much shallower, and are younger . They contain coarser tin ore and in higher proportion, and apparently represent the waste of tin-bearing greisen veins in granite, cut No. 9 and shafts 1 and 2 open greisen veins in granite the northern continuation of which may be seen in workings on 9025/W. The tin ore exposed there is coarse and angular and is confined to a very narrow strip which leads into a remnant of an old lead of no commercial importance.

Workings along the upper reaches of Harden's Ravine expose recent rewashings of Tertiary drifts and gravels.

Exploratory Work - Aside from the several open-cuts along the course of main lead and in the deposits of recent formation exploratory work has been performed by drilling and shaft sinking. Very extensive drilling was performed by the late Captqin Thomas many years ago, but the greater part outside the boundaries of the old leads. It is quite apparent that that engineer had little idea of the actual nature of the deposit, otherwise more attention would have been directed to the main lead. The records left behind by Captain Thomas are invaluable as regards the depth of the deposits, but unreliable as regards value. Check boring by the Department many years ago and recently has shown that his estimates of tin ore content are much too high. I may be stated here that the average tin ore content is no more than one third that given by him. The results obtained by shaft sinking are more reliable, but too few were sunk to serve as a basis of calculation.

Reserve and value of ore-bearing material - Main Lead - Assuming a length of 7000 feet, average width of 400 feet, and depth of 15 feet, the quantity of material available for treatment amounts to 1,555,555 cubic yards.

Tributary leads may add 250,000 cubic yards making a round total of 1,800,000 cubic yards.

The average value is very difficult of estimation because no reliable records have been kept of the work of early operators. It may be assumed, however, that the tin ore is distributed fairly evenly through the uppermost alluvial bed, because the results obtained in the past at the several openings appear to have been almost equal.

According to the reports issued by the Garfield Company the present plant is handling 35 cubic yards of 0.5 lb. material per hour at a cost of 5⅝ d. per cubic yard. Although the material breaks down very easily with 12 sluice-heads of water under 80 feet pressure and requires very little manual attention in treatment and in transport to the tailing dump, this estimate appears in part open to doubt. Unless based upon data carefully compiled from actual measurements of material removed and weight of tin ore saved, such estimate cannot be accepted as an indication of average cost and value.

Conditions influencing the method of operation - The position of the Tertiary leads with relation to the topographic relief is such as to allow of economical working by ordinary ground sluicing methods. By reference to the plan it will be seen that the lead lies between the 550 foot and the 600 foot contours along the summit of a gently sloping ridge, and that on both the north and south sides small gullies lead to the major drainage channels. A greater slope of the natural drainage courses for the easy removal of the tailing might prove of advantage, but the number and positions of such courses allows of attack from so many points as to equalise the ultimate result.

The acquisition of lease 2274/M of 5 acres in Harden's Ravine would give command over a large section of the lead for that valley and provide an easy and direct outlet to Ringarooma River. In the manner Saw-Pit Creek and Cybele Valley would become suitable outlets for tailing in the working of the Eastern end of the lead.

The deposit is conveniently situated with relation to the Mt. Cameron water-race, and the selection of the site for the power station at a sharp bend in the race could not be improved upon.

The ground sluicing method of operation, taking everything into consideration, is the best, despite the loss of fine tin ore. Important considerations are the initial cost of plant and the quantity, nature, and value of the material available for treatment. As far as can be seen the Company has been well⅜advised in adopting the present plan of operation, and the proposed extension of this system to provide a greater output at a reduced cost may be worthy of consideration.

The Mine is not big enough to warrant a further heavy expenditure plant.

System of operation - Ground-sluicing is the method of operation. At present work is confined to No. 1 Face, where some time ago difficulty was experienced in reaching the basal bed of river wash owing to an obstruction of hard granite. Lately, the company, after preliminary boring, cut another tailrace on the north side of the bar and from the present level through the new channel can operate upon a large section of the lead.

Water is delivered from a head-race through a pipe column (14" dia. at the top and 9" dia. at the base) connected with a 3½ inch nozzle under a head of 80 feet to the face of compacted drift and gravel. The material under that head and volume of water disintegrates very easily and is carried by the water into sluice boxes. A race, following the course of the lead, conducts water from the "rising mains" to the pipe column at the working face. At present the water is being pumped at least 20 feet too high as there is a loss of head amounting to 30 feet between the intake and the outlet. By lowering the point of discharge 20 feet and substituting one large rising main in place of the two small ones, the fuel consumption could be reduced 20 per cent. It is unnecessary to pump the water higher than the reservoir situated between cuts 3 and 4.

Equipment - The mine is equipped with two Imperial Keighley Oil engines of Diesel type of 58-60 horsepower; with two-stage 5-inch pumps made by Tompson of Castlemaine; and a dynamo.

These pumps deliver 300 cubic feet of water per minute through two 8-inch spiral-rivetted pipes to a small dam 109 feet above the Mt. Cameron Water-race, from which the supplies are drawn.

The power and pumping plants are set on a solid concrete foundation, and are well housed. A mixture of one part kerosene to five parts crude oil is used as fuel, and the consumption of each engine is three gallons per hour.

The Workings - No. 1 Face is about 500 feet wide and is opened, by way of a tail-race from Tamar Creek, to an average depth of 30 feet. At present work is confined to the upper bed 15 to 20 feet deep. The lead here is about 700 feet wide bounded on the south-west by hard granite and on the north by sandstone, tuff and slate of Cambro-Ordovician age. The line of contact between these formations may be seen coursing N.55°W. at the bottom of the cut. At that part concentrations of coarse tin ore in the basal gravels brought belief in the existence of another productive bed. Apparently, however, the tin ore is of local origin, because the gravels are rich in parts only.

A long trench from Mallinson's dam exposes the upper bed of tin-bearing gravel 500 feet wide and 12 feet deep. The material showing here is above average grade.

In No. 2 Cut the section shows tidal wash to 12 feet, then granitic waste containing very little tin ore. A shaft sunk from the bottom of this cut exposes drift and shingle to a depth of 20 feet. The cut is 150 feet wide and 100 feet long.

No. 3 Cut exposes similar materials to a depth of 18 feet. It is 400 feet wide and 100 to 150 feet long.

The No. 4 Cut is 200 feet wide and 300 feet long and from 10 to 20 feet deep.

No. 6 is a shallow cut in gravels resting upon a high tuff bottom.

No. 5 lies on the edge of a tributary lead and exposes high level tidal gravels eight feet deep.

In all of these workings the tin ore is associated with the titanium-iron mineral ilmenite which in places comprises three quarters of the heavy mineral components. Ilmenite is prominent in all the leads and forms an important accessory of the granitic rocks, but it can be separated without great difficulty from the tin ore.

No. 7 Cut from Saw Pit Creek opens 6 feet of peaty clay enclosing sub-angular to rounded quartz pebbles resting upon decomposed tuff. The tin ore here is of coarser grain.

A long cut up the bed of a tributary of Saw Pit Creek exposes 12 feet of rewashed tidal material and decomposed tuff.

In cut No. 8 coarse-grained tin ore is found in a detritus of alaskite-aplite, tuff, sandstone, and granite in the east branch. Apparently this ore and that also contained in the main part of the cut has been shed from greisen veins. The extent is not known.

No. 9 Cut opens two greisen veins, one of which appears in shaft No. 1 a little to the south. The tin ore here is coarse, angular, and unassociated with other heavy metallic minerals.

A remnant of a narrow lead in the south-western quarter of the holding has been explored by drilling and shaft sinking. The record of the work is unreliable as regards tin ore content. Check drilling by the Department shows that the results reported by early operators are much too high.

Summary - Within the boundaries of the Garfield Tin Mining Company's property are remnants of two Tertiary river leads from 20 to 60 feet deep. Examination shows that these leads are tin-bearing throughout their lengths, but some beds are almost barren. Although the basal river gravel bed in places contains tin ore in profitable proportion the full extent is not known. The productive beds are the top and bottom ones, which are separated by almost barren carbonaceous sands.

It seems, on the information available, that the top bed only will prove of economic importance. In any case it is doubtful whether the removal of the barren carbonaceous sand beds in order to get the basal river wash would be productive of good result. The top bed, 15 to 20 feet thick, can be worked by the use of water under pressure at a very low cost. On that the future of the Company depends.

In addition to the Tertiary beds other leads are known which may prove of commercial value. These are much shallower but richer.

Shallow detrital material, tin bearing in places, covers the greater part of the granite and sedimentary formations. These are not important.

The conditions for mining are generally favourable.

NEW ESK MINE -

A small company has recently acquired the following list of leaseholds on the south side of Harden Ravine:-

A 5 acre lease charted in name of A.H. Mallinson,
10179/M of 10 acres
10030/M " 40 "
9864/M " 5 "
9947/M " 10 "
9948/M " 10 "
9946/M " 5 "

Many years ago very rich but narrow runs of alluvial and detrital deposits were worked from Harden Ravine into these leaseholds. Part of the tin ore was of local origin, having been shed from underlying veins of greisen: but part was derived from an outside source.

On these properties there remain remnants of Tertiary leads on the high ground and shallow unexplored alluvial and detrital material on the lower ground. The deposits on the lower ground are now being systematically explored by drilling.

Five-acre Block - Lessee A.H. Mallinson - The latest operations have been confined to this block which is enclosed by Consolidated lease 1032/M of the Garfield Company.

A narrow watercourse has been sluiced out on the south side of the alaskite dyke. In that work three parallel veins of mica greisen and quartz-mica greisen have been unearthed and opened to a depth of 10 feet. The smallest of these (8 inches wide) contains at the place of intersection a high proportion of coarse brown tin ore; the next is 12 inches wide and contains a lower proportion; and the third (4 to 6 feet wide) consisting almost wholly of dark green mica contains a much lower proportion in bulk of fine tin ore. The three bodies intersect soft decomposed pegmatitic granite and the outside ones lie within 40 feet of one another. They bear a little west of north and dip east, and their southern extensions have been opened in No. 9 Cut and No. 1 shaft of the Garfield Tin Mining Coy. The fact that they have been proved to extend southward such a long distance should give encouragement to the lessees to continue sluicing. The hill rises to the south, therefore the ground available for treatment above drainage level increases proportionately as the work is carried in that direction.

A Fordson tractor is used to provide motive power to the pump which delivers water under pressure at the workings.

Ten-acre lease 10179/M - The alluvial and detrital ground in this block, from 5 to 8.5 feet deep, has been tested by drilling at 21 points. Results showed traces up to one pound per cubic yard, but the rich ground was found to be confined to small patches only. Gutters leading from Harden Ravine have been worked up to the barren dyke of alaskite aplite.

Very little material is available on this block for profitable treatment.

Forty-acre Lease 10030/M - Very little is known of the deposit in this block. At the present time the Syndicate is engaged in boring near the northern boundary where the ground is 4.5 to 6.5 feet deep.

Near the north-eastern corner is a strong vein of quartz-mica greisen, two feet wide, which course N. 17°W. and dips N.E. Its outcrop has been opened at a number of points over a distance of 600 feet southward of the alaskite dyke. Where opened it is tin bearing but the average content has not yet been determined.

Lease 9864/M, 5 acres - On this block two gutters leading from Harden Ravine have been worked up to the alaskite dyke. The ground here is 10 feet deep. Greisen veins are largely responsible for the loose ore in this ground.

Boring south of the dyke is recommended.

Ten-acre lease 9947/M - Very little unworked tin-bearing ground remains on this block. A 20 foot cut near the alaskite dyke exposes gravels embedded in clay material, resting upon large rounded stones of quartz and covered with iron-cemented granitic waste.

The numerous greisen veins in the granite bedrock evidently are largely responsible for the contained tin ore which is found in greater proportion in association with the gravel.

The southern part of the block is worthy of attention.

Ten-acre lease 9948/M - A large area of shallow ground has been sluiced for tin ore from Harden Ravine over 100 feet past the alaskite dyke. This ground is only 5 feet deep and is composed largely of well-rounded quartz pebbles and boulders from 3" to 18" diameter. The wash rests upon a fine-grained to porphyritic granite veined with tin-bearing greisen from which evidently is derived a large portion of the tin ore in the gravels. Some of the greisen veins, bearing N. 17° W. and dipping N.E., have been trenched along their course to a depth of 10 feet. Near the Western boundary are much larger veins of mica and quartz-mica greisen bearing N. 22° W. from 2 to 3 feet wide, some of which can be traced over 300 feet in length. Apparently these gravels represent the southern continuation of the Empress lead, the tunnel bed of which is composed of similar materials.

Between the leasehold and 9946/M are a number of parallel veins of quartz-mica greisen, one to four feet wide, coursing N. 15°W to 17°W. These veins have been opened at a number of points in pits and trenches, and an adit crosscut, 30 feet above Ringarooma River, bearing nearly east intersects several. The adit is over 100 feet below the summit of the hill, therefore, this would prove a suitable opening for their further exploration. An examination of the greisen ore on the dump of this adit and at the other openings shows that it is everywhere tin-bearing but that the proportion of tin ore varies greatly from point to point. These bodies are worthy of very careful sampling and further investigation.

Murray's Lode - On the north side of Harden Ravine east of Ringarooma Bridge and close to the granite-slate contact a vein of greisen one foot wide has been opened at several points. It coursed 330° extends beyond the granite into the sedimentary rocks and evidently is a continuation of one of those just described. The work consists of an open trench along its course 37 feet long and another 18 feet long with a shaft between. Stone on the dump shows coarse tin ore, but the rock in the faces at both ends of the drives is poor.

THE EMPRESS LEAD -

This well-known lead lies on the north side of Harden Ravine in a saddle cut through a high ridge of hard granite. On both sides of this ridge the softer granite and sedimentary rocks have been eroded to a level much below the bed of the old stream leaving a short section (about 800 feet) of the lead high above present drainage level. Apparently this remnant marks the course of tributary of the Garfield lead.

This narrow lead (450 feet at top and 160 feet at bottom) is about 40 feet deep and rests upon soft greisenised granite containing tin ore and veined with quartz. It is quite apparent that the course of the lead was conditioned by the soft greisenised rock lying between hard biotite granite walls. Moreover, the greater richness of the basal bed of the lead here is due to the presence of this tin-bearing greisen.

A section of the lead showed:-

Ferruginous sandy clay	15 feet
White felspathic sands	10 "
Alternate bands of fine gravel and felspathic sands with an occasional large boulder of decomposed granite	12 "
Coarse quartz and greisen boulder wash	3 "
Soft greisenised granite bedrock	

In the fine gravel bed some of the stones are not well-worn but most are exactly similar in nature and appearance to the gravels of the Garfield lead. White vein quartz predominates, and large crystals of the smoky variety with edges rounded, pebbles of alaskite and greisen compose the bulk of the remainder.

In the bottom wash many boulders of quartz, greisen and alaskite show little mark of attrition, but some few are well rounded. It is evident that their source is nearby.

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No carbonaceous material was noticed in these shingles and drifts.

A little work is performed here from time to time.

signed A.McIntosh Reid
DIRECTOR OF MINES

Mines Department,
Hobart.

30th October, 1928