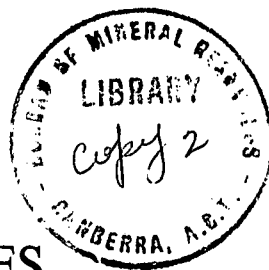


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REPORT ON MICA DEPOSITS ON YINNIETHARRA AND BIDGEMIA STATIONS,

GASCOYNE RIVER, WESTERN AUSTRALIA.

by

H.B. OWEN.

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Mineral Resources Survey.REPORT ON MICA DEPOSITS ON YINNIETHARRA AND BIDGEHIA STATIONS,
GASCOYNE RIVER, WESTERN AUSTRALIA.Report No. 1943/2. Plan No. 788-791.I. Introduction.

The presence of muscovite on Yinnietharra Station in commercial sizes and qualities has been known since 1913, but little active development was carried out in the locality until 1926, when a syndicate, formed in England, took up leases and began operations. Activity lapsed the following year, but desultory prospecting more recently has led to the production of a few small cases of spotted mica, some of which was sold in Melbourne in the early part of 1942. During 1926-27 the number of men employed in mica mining on Yinnietharra and Bidgehia Stations ranged between 60 and 100 according to different estimates.

Yinnietharra Homestead is situated on the right (north) bank of the Gascoyne River in approximately Lat. $24^{\circ}40'$ S. Long. $116^{\circ}10'$ E., and the mica deposits examined occupy a belt of country with an area of some 50 square miles stretching about 8 miles north to 12 miles north-west of the homestead.

The country is semi-arid with a normal rainfall of 9 inches. It normally supports one sheep to about 20 acres. Rain is distributed between winter and summer. The season just passed was very wet and floods were experienced over great areas on each bank of the Gascoyne. There is at present much water in pools and in the river sands.

Vegetation consists mainly of low scrub practically all being leguminous plants of a wide variety. Acacia cambagei (the gidgee of Central Australia) was recognised in scattered clumps and also an Erythrina, similar to, but of a species different from the bean tree common in the eastern Hart's Ranges. Mulga (Acacia aneura) grows in the hilly areas on the eastern side of Bidgehia Station, and White gums (Euc. rostrata?) are common in the creeks. These latter two provide a supply of mining timber.

II. ACCESS.

The field is connected by road to the port of Carnarvon. This road crosses the Gascoyne River at least twice and may, therefore, be temporarily closed for short periods when the river flows. The exact distance by road between Yinnietharra and Carnarvon is not known, but is about 200 miles (airline distance is 160 miles).

III. WATER SUPPLY.

Most well waters in the mica field are too saline for human consumption, but seepage water of good quality may be obtained from the numerous creeks which are confluent with the Gascoyne west of the homestead and conveniently situated to the mica deposits.

IV. TOPOGRAPHY.

Drainage is south and south-westerly into the Gascoyne River. Hills are low (100-150 feet) and scattered and chiefly comprise rounded or rocky eminences consisting of quartz reefs or pegmatite dykes. Some bold outcrops of gneiss form tors about 50 feet high. The plains are sandy and only very slightly undulating.

V. GENERAL GEOLOGY.

The area is occupied by Pre-Cambrian (Archaean) rocks comprising gneissic granite, paragneiss and schist. It is shown as granite on the late Sir T.W. Edgeworth David's map. The regional strike is north-west, but there are local deviations from this. The country rock has been intruded by numerous acid dykes which range in size from almost insignificant veins to rock masses over 100 feet wide by 600 feet long. Of eleven such dykes examined, six possess an approximate north-west strike concordant with that of the country rock, four cut across the schistosity at right angles, and the strike of one could not be determined definitely.

Economic minerals contained in these pegmatite dykes include muscovite, beryl and bismutite (by alteration of bismuthinite?). Beryl is widely distributed on the field and crystals up to 2 feet in diameter were noted.

VI. DESCRIPTION OF MICA DEPOSITS EXAMINED.

The deposits described hereunder are shown on the accompanying locality map, Plate 1. At this stage only brief references are made to deposits containing stained and spotted mica unsuitable for critical electrical or radio applications.

A. YINNIETHARRA.

1. The Cairn. M.C. 175 H. (formerly 173 H).

This deposit, which lies 7 miles N. 75° W. from Morrissey Hill has been described in some detail by H. A. Ellis in the Annual Report of the Department of Mines, Western Australia, 1939, pages 83-86. At that time Mr. Ellis was chiefly interested in the eluvial bismuth workings on the claim.

Ellis describes the deposit as a coarsely grained pegmatite dyke forming a low rise terminating in rugged quartz hills at each end, but the ridge appears to be formed of two or three large lenticular dykes en echelon.

The general strike of the system of dykes is N.50°E., the length is about 10 chains and the width over 100 feet. The dip is probably steep to the south-east.

Stained and spotted mica in large sound sheets has been recovered on both sides of the centrally placed quartz segregation near the north-eastern end of the principal dyke, and some of that from the north-western side is only lightly spotted. Careful selection might yield a small proportion of mica suitable for defence work. The great bulk of the mica however is heavily stained.

2. Thompson's.

A small quantity of very high quality clear mica has been recovered from a narrow dyke four miles south from the Cairn by Mr. A.B. Thompson during recent months.

The dyke is 5 feet wide and strikes N.50°W. It has been trenched for 15 feet along the strike to a depth of 4 feet at the deepest. This excavation, which represents 20 tons of rock, has yielded only 50 lb. of trimmed mica, mostly 'washer' size. Despite the quality of the mica, the narrowness of the dyke and the poor yield make this an unattractive proposition and Mr. Thompson was advised to transfer his activities to No. 4 deposit described below.

About 100 yards north-west of the trench, mica was observed outcropping sparsely over a width of some 30 feet in a parallel dyke. Allowing for surface weathering effects, this mica appears to be of good quality and the outcrop should be investigated further when opportunity offers.

3. Old Mine. (Name unknown).

A mica-bearing body at about 2 miles N. 70°W. from the Cairn has been developed by open-cutting on the footwall for a length of about 50 feet to a depth of 10 feet and by sinking an inclined shaft from the centre of the open cut to a total depth of 25 feet down the dip. The shaft underlies north-west at about 40°.

There is abundant small mica showing in the hanging wall of the shaft and the quality of the mica is good, it being clear greenish mica, fairly soft and easily split, but only 'washer' mica was visible. Beryl is showing freely in the workings and would provide a valuable byproduct to mica mining.

It is suggested that no action should be taken to reopen this deposit at present.

4. (Unnamed).

Except for the sinking of pot holes about 1 foot in depth, no work has been done on a pegmatite dyke of large proportions which outcrops on a low rounded hill about 1½ miles from the Cairn on a magnetic bearing of 280°.

The dyke strikes N. 50°E, dips 50° north-west, and can be traced for over 300 feet in length. Near the south-west end the outcrop is 15 feet wide and is enclosed in gneiss. Both walls are visible. Towards the north-east end the dyke is probably considerably wider, but the contacts cannot be seen.

There is abundant mica showing on the surface where edges of books in situ show out well in outcrop. In one shallow hole, a book of mica, from which flawless sheets of 20 square inches could be obtained, was showing. Allowing for weathering effects this mica is of excellent quality. It is hard, clear, easily split and of the 'ruby' type; one specimen contained a few very small orange-coloured spots.

The outcrop of this dyke, being on a relatively flat surface, is much obscured by detritus and in attempting to gauge the mica content there is some risk of an over optimistic estimate being formed due to loose blocks of mica embedded in the soil. There is little doubt, however, that by far the greater part of the mica seen on the surface over this dyke represents books still in situ, embedded in pegmatite.

Under the conditions existing, i.e., lack of underground development and masking of the outcrop by soil, any quantitative estimates are difficult to make, but by comparison with many other mica-bearing pegmatites in Central Australia and at Yinnitharra where mining operations have exposed sections of the dyke rock, it is considered that this dyke contains at least the proportion of muscovite commonly associated with the enriched zones in large pegmatite bodies, namely about 10 per cent.

The possible recovery of marketable sheet mica is discussed below.

5. Rowe's Mine.

This deposit lies about 2 miles south-east from Morrissey Hill. At this mine a dyke not less than 35 feet wide, striking N. 60° W. can be traced for 200 feet. It contains the typical quartz core and tourmaline and beryl are present.

Much mica is contained in the dyke on either side of the quartz, but it is stained and badly striated. A shaft 25 feet deep has been sunk in the dyke.

6. Mica Queen (a).

This mine is situated four miles west from Morrissey Hill. The pegmatite body at this claim has a dominant central quartz core,

is pear shaped in plan, longer axis striking north-east and the body tapering to the south-west. The surface dimensions of the body are approximately:-

Length - over 300 feet.

Width near south-west end - 50 feet.

" " north-east " - 200 feet.

Books of mica outcropping on the surface are very abundant. A shaft 15 feet deep near the south-west end of the body contains lightly spotted and stained mica which is rather badly striated, but would yield some medium (about 12 sq. inches) sheet mica of the greenish variety.

The enclosing rock consists of gneiss striking N. 50° W. It is heavily tourmalinised adjacent to the pegmatite.

7. Mica Queen (b).

This dyke outcrops in flat country, $\frac{1}{2}$ mile N. 30° E. from the Mica Queen (a), strikes N. 65° W. and dips south-west at 85°. It is not less than 22 feet wide where the outcrop can be observed, but its length is difficult to determine owing to soil cover.

Three shallow shafts and a pit have been sunk in the outcrop as shown on the sketch plan (plate 2). Some of the mica uncovered is fairly clear, of useful quality and in sizes up to No. 4 (6-10 sq. ins.) or even larger. The dyke is notable in not possessing the usual quartz core which would be expected in a body of these dimensions.

Both tourmaline and beryl are present.

8. Unnamed.

This deposit which consists of a large pegmatite body, very irregular in outline, but apparently trending about east and west, forms a low quartz-capped hill and lies $\frac{1}{4}$ of a mile west from Morrissey Hill.

It is divided by a narrow horse of schist and its boundaries are mostly obscured by alluvium. However, its length is greater than 140 feet and the maximum width observed is about 100 feet (See sketch plan, Plate 3).

The pegmatite has been tested by open cutting on the southern wall to a depth of 5 feet. A shaft sunk from the open cut contains water at about 14 feet from natural surface. To that depth it is in pegmatitic material.

The mica consists of slightly stained greenish muscovite which would yield some clear mica on splitting. It is doubtful whether larger sizes than medium (10-12 sq. ins.) could be recovered.

9. Mica King.

This mine was the principal producer during the field's short-lived heyday of 1926-27. The principal workings lie about $\frac{1}{2}$ of a mile south from Morrissey Hill which is about 8 miles north from Vinniotharra Homestead.

The mine produced black-stained mica of the type commonly used in electrical appliances using low voltages, such as domestic flat-irons etc.

The dyke which has been exploited is about 25 feet wide and is exposed for 400 feet on a flat surface. It has been worked on the hanging wall by open cutting down the dip (60°) to a depth of about 30 feet, at which depth water was encountered. The open cuts aggregate a total length of about 140 feet along the strike and are divided by a pillar. The body strikes about N. 70° W. and dips at 60° to the south-west.

A vertical shaft has been sunk in gneiss at a point about 60 feet south-west from the north-western end of the open-cut, but owing to the presence of water it was not possible to determine whether a cross-cut extended to the bottom of the open cut or not (See Plate 4).

Stained muscovite is abundant in the dyke, a sketch section of which is attached, and approximately 10 tons of mica, mainly scrap, is lying on the surface. This mica, although rejected, is mostly good sound material. It splits well and contains a proportion of 'large' sheet (24 sq. ins. or larger). However, it does not yield clear films on splitting.

A little beryl is contained in the dyke.

B. BIDGEMIA.

Bidgemia Station adjoins Yinnietharra on the west and the mica deposits are reached by following a very indistinct track which skirts round the northern bank of the Gascoyne River and crosses numerous sandy creeks (See Plate 1).

The distance from Yinnietharra Homestead to the mica deposits on Bidgemia is about 30 miles by the shortest practicable route.

Two deposits were examined which are described below. (To avoid confusion on Plate 1, these are numbered consecutively following the Yinnietharra deposits).

10. Unnamed.

This is a large pegmatite body lying on the slopes of a low hill about 4 miles N.35°E. from the Pyramid. Dip, strike and width could not be ascertained, but near the south-west extremity of the body a few feet of wall striking N.65°W. was observed.

The pegmatite is characterised by graphic intergrowths of quartz and feldspar and intergrowths of muscovite-biotite. The medium grained texture of the pegmatite appears too fine to permit of the existence of crystals of mica in satisfactory sizes and in any case the extensive intergrowth of biotite with the muscovite renders virtually all that could be observed in a small open cut useless. It is doubtful if the deposit could produce useful clear mica in larger sizes than No. 5 and No. 6 (washer). The texture of the pegmatite is coarser in the open cut, the site of which presumably had been chosen for this reason, but the mica present is dominantly biotite.

11. Unnamed.

This deposit is situated about 2 miles north-west from No. 10 to which it is similar. The deposit consists of a pegmatite dyke and outcrops on the slopes and crest of a low hill. Its strike is N.65°W. and the dip south-westerly. Near the workings it is 100 feet wide. The muscovite present is rather larger than that observed in No. 10 deposit, but biotite is very prominent.

An open-cut, 6 feet wide, has been put down on the hanging wall. Water in the open-cut at 25 feet from the surface could be drained to lower ground down the slopes of the hill.

CONCLUSIONS AND RECOMMENDATIONS.

The object of present activities is the production of clear and nearly clear muscovite suitable for defence needs. This embraces the Australian types 'clear' and 'commercial-clear' which together are equivalent to Indian, clear, slightly stained, fair-stained, good-stained and stained. Mica of these qualities cannot be produced in appreciable quantities from any of the deposits described in this report with the exception of No. 2 (Thompson's),

possibly No. 3, No. 4, No. 7 (Mica Queen (b)), and No. 8.

The low yield of mica which can be obtained from Thompson's makes it unattractive, but there is room for further prospecting of this deposit. Nos. 3, 7 and 8 do not appear to contain any 'large' mica, although this statement must be qualified by the consideration that the working faces now exposed are those abandoned by prospectors and may, therefore, show lower values than average. No. 4 is by far the most promising body seen on this field. Though No. 1 (the Cairn) is the largest body on the field, and will compare well in dimensions and mica content with the Central Australian pegmatites, only a small proportion of the mica recoverable is of the clearer type.

With further reference to quantitative estimates of marketable mica recoverable from the deposits on Yinnietharra, it must be stressed that a number of unknown variables enter into any computations. These are due to the irregular spatial relations between mica 'pockets' within the dyke, variable dimensions of the 'pockets' themselves and the proportion of mica contained in such 'pockets' which may be spoiled by mineral inclusions, warping or striations and 'fish bone'. It is possible to make fairly reliable estimates of the probable yield from the Northern Territory deposits because there has been considerable development and some reliable data are available, but there has only been limited development at Yinnietharra and estimates are, in consequence, difficult to make.

However, on the basis of the information given earlier in the report and assuming that the usual barren quartz core (which may constitute 25% to 33% of the dyke) will not be mined, it is considered that from deposit No. 4 an average yield of about 10 pounds of the clearer types of mica may be obtained per ton of rock mined. This figure is derived as follows:-

As stated previously, it is estimated that 10 per cent of the rock mined will be mica (i.e. 22½ lb. per ton). Of this quantity 85 to 90 per cent will be rejected, leaving 22 to 50 per cent (i.e. 6 to 17, or say about 10 pounds) is expected to be marketable mica. This means that the exposed portion of deposit No. 4, to a depth of thirty feet, might be expected to yield approximately 4000 lb. of 'clear' to 'commercial-clear' mica, valued at £2000-£3000, from the mining of about 400 tons of rock.

It is recommended that attention should first be directed to deposit No. 4 and a careful record kept of the proportion of mica recovered relative to the total amount of rock mined.

If labour is available, simultaneous prospecting of the other dykes which contain 'clear' mica and which are mentioned above could be conducted.

CANBERRA A.C.T.
20th January, 1943.

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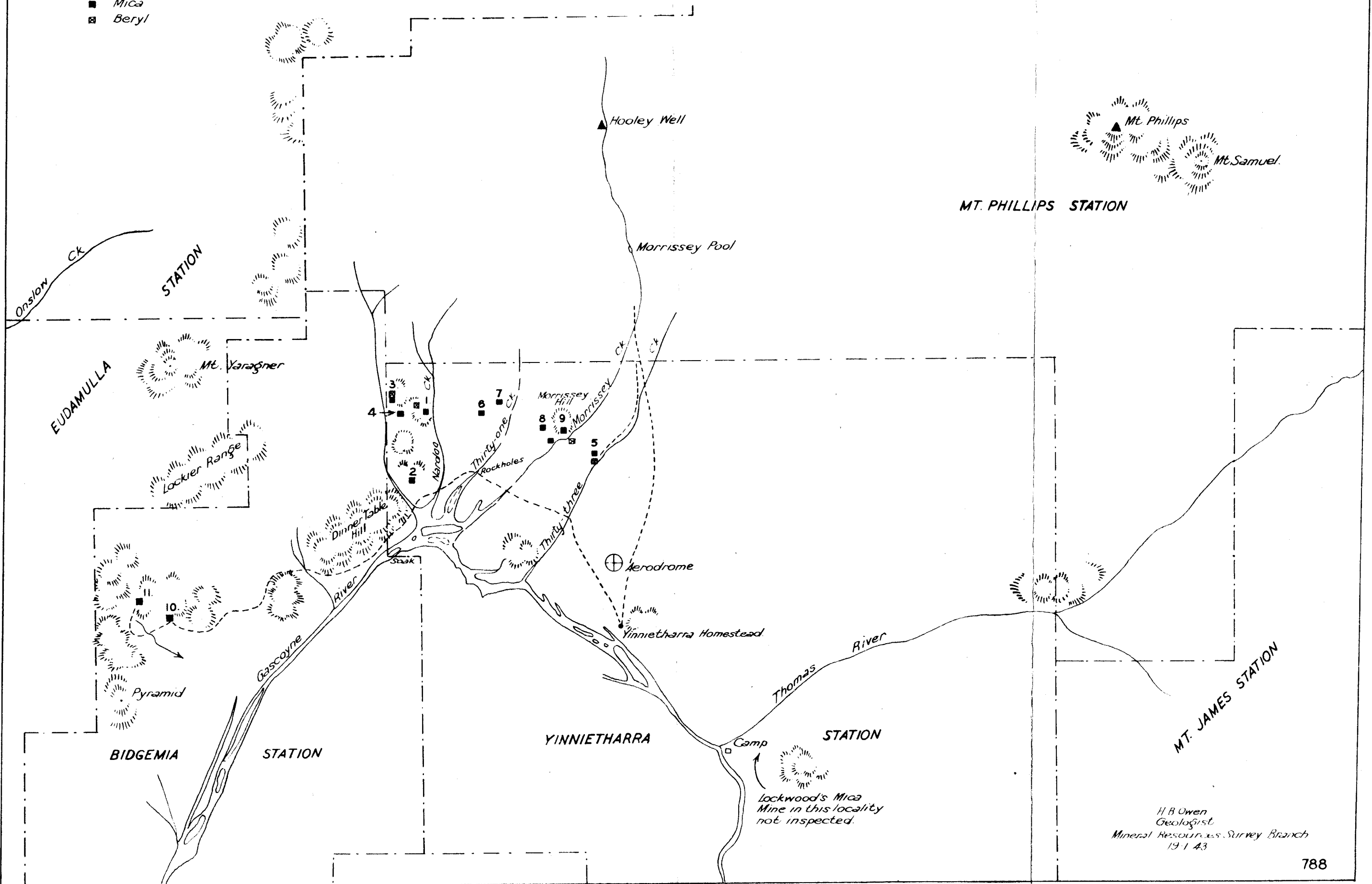
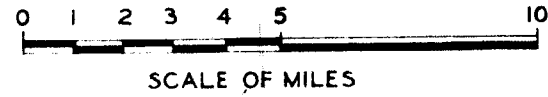
Reference

1. The Cairn
2. Thompson's
3. Old mine (unnamed)
4. Un named
5. Rowe's
6. Mica Queen (a)
7. Mica Queen (b)
8. Un named
9. Mica King
10. Un named
11. Un named

- Mica
- Beryl

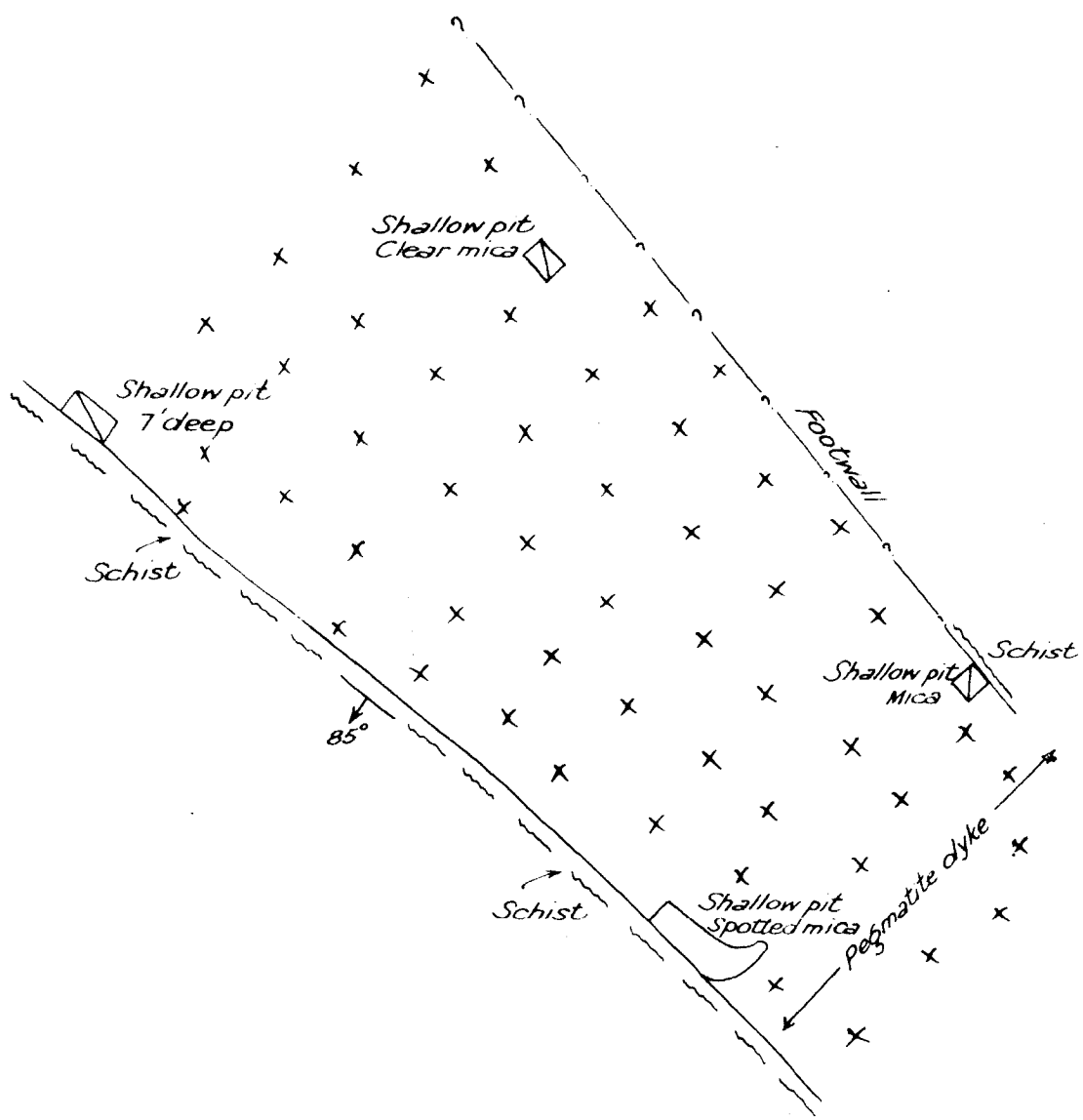
— MICA LOCALITIES —
YINNIETHARRA & BIDGEMIA STATIONS

— GASCOYNE RIVER, W.A. —



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19-1-43

SKETCH PLAN
DEPOSIT NO. 7. MICA QUEEN (b.)
SCALE 1" = 20

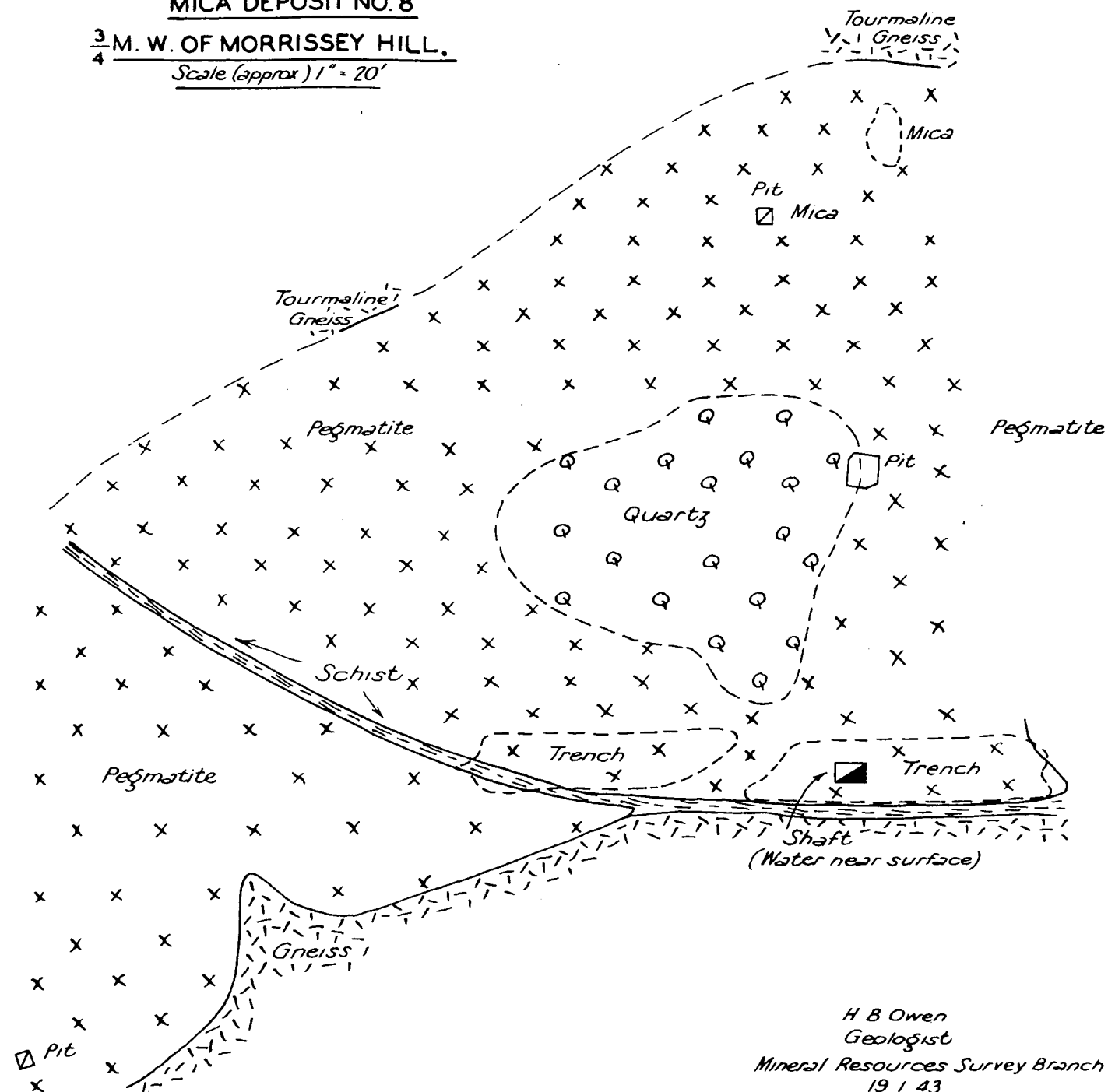


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SKETCH MAP
MICA DEPOSIT NO. 8

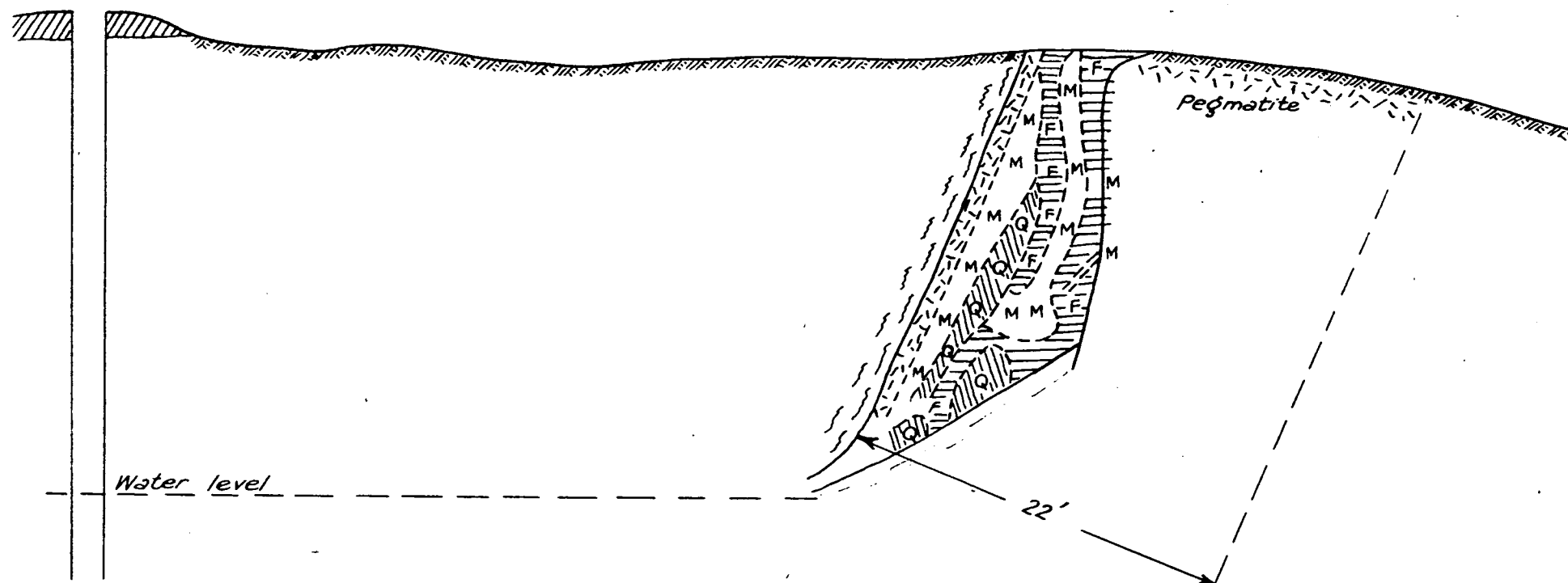
$\frac{3}{4}$ M. W. OF MORRISSEY HILL.
Scale (approx) 1" = 20'

PLATE 3



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19143

SKETCH SECTION
DEPOSIT NO. 9 MICA KING MINE YINNIETHARRA W.A.
SCALE 1"=10'



Reference

- | | |
|------------------------------|---|
| [Pattern of small triangles] | <i>Aplite</i> |
| [Box with 'M'] | <i>Muscovite predominant</i> |
| [Box with 'F'] | <i>Felspar (microcline) predominant</i> |
| [Box with small circles] | <i>Quartz</i> |

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