

AERIAL, GEOLOGICAL AND  
GEOPHYSICAL SURVEY  
OF  
NORTHERN AUSTRALIA.

**ORIGINAL COMPONENT  
IN POOR CONDITION**

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REPORT  
QUEENSLAND No. 25.

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**THE FELSITE AURIFEROUS AREA,  
CROYDON GOLD AND MINERAL FIELD**

BY

R. J. S. CLAPPISON, B.Sc., AND S. B. DICKINSON.

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# LIST OF PUBLICATIONS.

## PERIODICAL REPORTS.

- Report for Period Ended 30th June, 1935  
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## GENERAL REPORTS.

- No. 1, Geophysical Practice of the Aerial, Geological and Geophysical Survey of Northern Australia, by J. M. Rayner, B.Sc., F.Inst.P., R. F. Thyer, B.Sc., A.Inst.P. and L. A. Richardson, A.Inst.P.

## INDIVIDUAL REPORTS.

### WESTERN AUSTRALIA.

- No. 1, McPhee's Patch Area, Pilbara Gold-field, by K. J. Finucane, M.Sc.  
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 No. 4, The Nullagine Conglomerates, Pilbara Gold-field, by K. J. Finucane, M.Sc.  
 No. 5, The Nullagine River Concessions, No. 695H, Pilbara Gold-field, by K. J. Finucane, M.Sc.  
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 No. 11, Lalla Rookh Gold Mine, Pilbara Gold-field, by K. J. Finucane, M.Sc. (Supplementary to W.A. No. 3.)  
 No. 12, Station Peak Mining Centre, Pilbara Gold-field, by K. J. Finucane, M.Sc.  
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 No. 17, The Sharks Well Mining Centre, Pilbara Gold-field, by K. J. Finucane, M.Sc. (In same publication as W.A. No. 26.)  
 No. 18, The Twenty Ounce Mining Centre, Pilbara Gold-field, by K. J. Finucane, M.Sc., and C. J. Sullivan, B.Sc.  
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 †No. 25, Recent Gold Discoveries near Wyman's Well, Pilbara Gold-field, by K. J. Finucane, M.Sc.  
 No. 26, The Country between Sharks and North Shaw, Pilbara Gold-field, by F. H. Jones. (In same publication as W.A. No. 17.)  
 No. 27, The Hall's Creek-Ruby Creek Area, East Kimberley District, by K. J. Finucane, M.Sc. (In same publication as W.A. Nos. 41 and 42.)  
 No. 28, Halley's Comet and Adjacent Mines, Pilbara Gold-field, by K. J. Finucane, M.Sc. (Supplementary to W.A. No. 10.)  
 No. 29, The Mount Dockerell Gold Mining Centre, East Kimberley District, by K. J. Finucane, M.Sc. (with Appendix on the Christmas Creek Area, by C. J. Sullivan, B.Sc.)  
 †No. 30, Tin-Columbite Deposits South-East of Mount Dockerell, East Kimberley District, by K. J. Finucane, M.Sc.  
 No. 31, The Mount Amherst Gold and Silver-Lead Deposits, East Kimberley District, by F. H. Jones.  
 No. 32, The King Sound Tin-Wolfram Deposit, West Kimberley District, by K. J. Finucane, M.Sc.  
 No. 33, The Mount Broome Area, West Kimberley District, by K. J. Finucane, M.Sc.  
 No. 34, The Chromite Deposits of Coobina, Peak Hill Gold-field, by K. J. Finucane, M.Sc.  
 †No. 35, Geophysical Report on the Kookynie Area, North Coolgardie Gold-field, by E. L. Blazey, M.E.E., J. M. Rayner, B.Sc., and P. B. Nye, M.Sc., B.M.E.  
 No. 36, Geophysical Report on the Wiluna Area, Wiluna. (Part 1, Electro-magnetic Surveys), by E. L. Blazey, M.E.E., J. M. Rayner, B.Sc., and P. B. Nye, M.Sc., B.M.E.  
 †No. 37, (a) Notes on the Geology of the Big Bell Area, by K. J. Finucane, M.Sc.  
 (b) Geophysical Report on the Big Bell Area, by E. L. Blazey, M.E.E., J. M. Rayner, B.Sc., and P. B. Nye, M.Sc., B.M.E. } One publication.  
 No. 38, Geophysical Report on the Norseman Area, Norseman, by E. L. Blazey, M.E.E., J. M. Rayner, B.Sc., and P. B. Nye, M.Sc., B.M.E.  
 No. 39, Geophysical Report on the Bamboo Creek Area, Pilbara Gold-field, by E. L. Blazey, M.E.E., J. M. Rayner, B.Sc., and P. B. Nye, M.Sc., B.M.E.  
 †No. 40, The Grant's Creek Gold Mining Centre (Panton River), East Kimberley District, by K. J. Finucane, M.Sc.  
 No. 41, The Mary River Gold Mining Centre, East Kimberley District, by K. J. Finucane, M.Sc., and C. J. Sullivan, B.Sc.  
 No. 42, The Twelve-mile Alluvial Workings and Elvire River Dredging Reserves (893H and 948H), Hall's Creek, East Kimberley District, by K. J. Finucane, M.Sc. } In same publication as W.A. No. 27  
 No. 43, The Barker River Area, West Kimberley District, by K. J. Finucane, M.Sc., and F. H. Jones } In one publication.  
 No. 44, The Granite Range Area, West Kimberley District, by K. J. Finucane, M.Sc.  
 †No. 45, The Jimblebar Gold Mining Centre, Peak Hill Gold-field, by K. J. Finucane, M.Sc.  
 No. 46, The Tantalite Deposits of the Pilbara Gold-field, by K. J. Finucane, M.Sc., and R. J. Telford.  
 †No. 47, The Antimony Deposits of the Pilbara Gold-field, by K. J. Finucane, M.Sc., and R. J. Telford } In one publication.  
 †No. 48, The Mallina and Peeawah Mining Centres, Pilbara Gold-field, by R. J. Telford  
 No. 49, The Blue Asbestos Deposits of the Hamersley Ranges, Western Australia, by K. J. Finucane, M.Sc.  
 †No. 50, The Iron Deposits of Yampi Sound, Western Australia, by K. J. Finucane, M.Sc.  
 \*No. 51, The Weerianna, Nicol Bay and Glenroebourne Mining Centres, Pilbara Gold-field, by K. J. Finucane, M.Sc., F. H. Jones and R. J. Telford.  
 No. 52, The Hong Kong, Pilbara and Egina Mining Centres, Pilbara Gold-field, by C. J. Sullivan, B.Sc.  
 No. 53, The Toweranna Mining Centre, Pilbara Gold-field, by R. J. Telford.  
 No. 54, The Chrysotile Deposits of the Pilbara and Ashburton Gold-fields, by K. J. Finucane, M.Sc. C. J. Sullivan, B.Sc., and R. J. Telford.  
 No. 55, The Whim Well and Mons Cupri Copper Mines, Pilbara Gold-field, by K. J. Finucane, M.Sc., and C. J. Sullivan, B.Sc.



# AERIAL, GEOLOGICAL AND GEOPHYSICAL SURVEY OF NORTHERN AUSTRALIA.

## THE FELSITE AURIFEROUS AREA, CROYDON GOLD AND MINERAL FIELD.

### QUEENSLAND REPORT No. 25.

#### TABLE OF CONTENTS.

	PAGE.
I. INTRODUCTION .. .. .	3
II. PREVIOUS LITERATURE .. .. .	3
III. GEOLOGY .. .. .	4
IV. ECONOMIC GEOLOGY .. .. .	4
V. REEFS AND WORKINGS .. .. .	5
A. Mountain Maid Group .. .. .	5
(1) Introduction .. .. .	5
(2) General Geological Relations .. .. .	5
(3) Economic Geology .. .. .	5
(4) Production .. .. .	5
(5) Mountain Maid .. .. .	5
(6) Babe .. .. .	6
(7) Rainbow or Reconstruction .. .. .	6
(8) General Grant, General Gordon, and Lord Nelson .. .. .	6
(9) May Day P.C. .. .. .	6
(10) Conclusions .. .. .	6
(i) General Grant .. .. .	7
(ii) Rainbow or Reconstruction .. .. .	7
(iii) Babe .. .. .	7
B. Homeward Bound Group .. .. .	7
C. Mark Twain Group .. .. .	7
(1) Mark Twain .. .. .	7
(2) Ironclad .. .. .	8
D. Mulligan Group .. .. .	8
(1) McArthur Reef .. .. .	8
(2) Amazon and Black Eagle .. .. .	8
(3) Michael Davitt .. .. .	8
(4) Conclusions .. .. .	8
E. Jubilee or Twelve Mile Group .. .. .	9
(1) Jubilee Reef .. .. .	9
(2) Lady Lottie Reef .. .. .	9
(3) Golden Spur, Copenhagen, and Rising Sun Reefs .. .. .	10
(4) Apex Reef .. .. .	10
(5) President or Rough and Tumble Reef .. .. .	10
(6) Maybelle Reef .. .. .	10
(7) Other Reefs .. .. .	10
(8) Golden Fleece Reef .. .. .	10
(9) Rosshire Reef .. .. .	11
(10) General Recommendations for Group .. .. .	11
F. Tabletop Group .. .. .	11
(1) Introduction .. .. .	11
(2) General Geological Relations .. .. .	11
(3) Mining Geology .. .. .	11
(4) Production .. .. .	12
(5) Federation Reef .. .. .	12
(6) Mount Morgan .. .. .	12
(7) Bobby Dazzler and Great Eastern .. .. .	13
(a) Bobby Dazzler .. .. .	13
(b) Great Eastern .. .. .	13
(8) Ace of Hearts .. .. .	14
(9) Blackbird .. .. .	14
(10) Happy Jack .. .. .	14
(11) Day Dawn and Last Chance .. .. .	14
(12) Surprise .. .. .	14
(13) Black Diamond or Hard Struggle .. .. .	14
(14) Break of Day .. .. .	14
(15) Bella Mortimer and Lady Jane .. .. .	14
(16) Comet .. .. .	14
(17) Ida .. .. .	15
(18) Republic .. .. .	15
(19) Conclusions .. .. .	15



## TABLE OF CONTENTS—continued.

	PAGE.
G. Golden Valley Group .. .. .	15
(1) Introduction .. .. .	15
(2) General Geological Relations .. .. .	15
(3) Mining Geology .. .. .	15
(4) Production .. .. .	16
(5) King of Wallabadah .. .. .	16
(6) Grace Leigh .. .. .	16
(7) Australian Beauty .. .. .	16
(8) The Isabella .. .. .	16
(9) Other Reefs .. .. .	16
(10) Conclusions .. .. .	16
H. Carron River Group .. .. .	17
I. Various Reefs in Felsite .. .. .	17
(1) The Parnell and Wanderer Reefs .. .. .	17
(2) C.D. Roe Line of Reef .. .. .	17
(3) Ryan's Reef .. .. .	17
(4) Ancient Britton Reef .. .. .	17
(5) Democrat and Queen of the Springs Reefs .. .. .	17
(6) King of the Springs Reef .. .. .	18
J. Various Reefs in Granite .. .. .	18
(1) Moonstone .. .. .	18
(2) Jolly Tar .. .. .	18
(3) City of London .. .. .	18
(4) Croydon King .. .. .	19
(5) Richmond .. .. .	20
(6) Morning Light .. .. .	20
(7) White Star .. .. .	20
(8) The Elgin, Boomerang, &c. .. .. .	20
(9) Problem .. .. .	20
(10) The Demon of the Gap, Pyramids, and Crocodile .. .. .	20
VI. SUMMARY AND CONCLUSIONS .. .. .	20
(1) Mountain Maid Group .. .. .	20
(2) Homeward Bound Group .. .. .	21
(3) Mark Twain Group .. .. .	21
(4) Mulligan Group .. .. .	21
(5) Jubilee or Twelve Mile Group .. .. .	21
(6) Tabletop Group .. .. .	21
(7) Golden Valley Group .. .. .	21
(8) Carron River Group .. .. .	21
(9) Various Reefs in Felsite .. .. .	21
(10) Various Reefs in Granite .. .. .	21

## PLATES.

1. Geological map of the Croydon Gold-field.
2. Production map of the Croydon Gold-field.
3. Geological plan showing sampling and workings, Mountain Maid Group.
4. Geological plan of Homeward Bound Group.
5. Geological plan of Mark Twain Group.
6. Plan of the McArthur workings.
7. Geological plan of Twelve Mile Group and inset showing assay plan of G.M.L.'s, 205 and 591.
8. Contour plan of Jubilee and Lady Lottie.
9. Geological plan of Tabletop Group.
10. Geological plan Mount Morgan Lease (Tabletop Group).
11. Assay plan of Bobby Dazzler Lease (Tabletop Group).
12. Geological plan of Golden Valley Group.
13. Geological plan of Croydon King and Richmond Group.



# AERIAL, GEOLOGICAL AND GEOPHYSICAL SURVEY OF NORTHERN AUSTRALIA.

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### I. INTRODUCTION.

The township of Croydon is situated 85 miles to the east-south-east of Normanton on the Gulf of Carpentaria, and is connected with that port by both road and railway some 94 miles in length. Croydon can also be reached by travelling westwards from Forsayth over a road 139 miles in length, Forsayth being the railhead of the State Railway from Cairns—this railway is 263 miles in length.

The Croydon gold-field lies chiefly to the north and east of the township although the area to the north-west of the township has been the most productive portion. The gold-field may be divided into two parts in accordance with the occurrences of the gold-bearing reefs and the rocks in which they occur. These parts have been termed the Felsite area and the Granite (or Croydon-Golden Gate) area. The Felsite area is by far the most extensive and occupies the northern portion of the field. The Granite area is restricted mainly to a narrow belt with a length of 7.6 miles and trending from north-west to south-east through the township of Croydon. Somewhat larger areas of granite occur to the east of this part but are not as important as the part referred to in the Granite area above. The Felsite area of the field will be described in this report but the descriptions will include those of mines in granite outside the Granite (Croydon-Golden Gate) area. The Granite (Croydon-Golden Gate) area has already been described in a previous report of the survey.<sup>(1)</sup> The adjacent country to the south-east includes the Stanhills tin-field which was also surveyed and is described in a separate report.<sup>(2)</sup>

The Croydon gold-field has been one of the most important producers in Queensland and the total of the production to date is £2,976,046 (being the value of gold bullion recovered from ore milled, and not including the value of the gold from re-treated materials). The Granite area was the most productive portion of the field, the production being £2,388,412 of the above total. The remainder (£587,634) can be regarded as the production of the Felsite area. The Felsite area has been almost deserted, and little or no mining operations have been conducted, in recent years.

An area of 130 square miles of the Croydon gold-field was photographed from the air by the Royal Australian Air Force. The geological mapping of the Felsite area was conducted partly with the aid of the aerial photographs (contact prints and copy mosaics). The surveys of the reefs and workings were conducted by ground survey methods (chain and compass, &c.). Existing maps and plans were used where available and satisfactory. Some sampling was done, but it was of the nature of a reconnaissance sampling campaign rather than a systematic and detailed one.

Acknowledgment is made of the assistance of Mr. M. S. Jewell, Acting Mining Registrar of Croydon, in making available office accommodation and in the search for, and perusal of, old plans, &c.; also, to various residents of Croydon for supplying particulars of, and directions to, various parts of the field.

### II. PREVIOUS LITERATURE AND HISTORY.

Numerous official reports on the Croydon gold-field have been published but the greater number deal particularly with the Granite area. The geology of the Granite area has, of course, a direct bearing on the geology of the Felsite area, and a list of the reports dealing with the former area is contained in a previous report,<sup>(3)</sup> but is not reproduced here. The following list contains only those reports which refer to the geology and the mines of the Felsite area:—

Rands, W. H. On the Croydon Goldfield. Qld. Geol. Surv. Pub. No. 118, 1896.

Jensen, H. I. New Lode on the Mark Twain P.C., near Croydon. Qld. Govt. Min. Jour. Vol. XXI., p. 11, 1920.

Reid, J. H. Report on the Croydon Goldfield, with Discussion of its Possibilities for Future Production. Qld. Govt. Min. Jour., Vol. XXXVI., 1935, pp. 76-78, 125-131, and 155-165.

(<sup>1</sup>) Honman, C. S. The Croydon-Golden Gate (Granite) Area, Croydon Gold and Mineral Field. Aer. Geol. Geoph. Surv. N.Aust. Qld. Rept. No. 16, 1937.

(<sup>2</sup>) Clappison, R. J. S. The Tin Deposits of the Stanhills Area, Croydon Gold and Mineral Field. Aer. Geol. Geoph. Surv. N.Aust. Rept. Qld. No. 23, (forthcoming).

(<sup>3</sup>) Honman, C. S. *op. cit.*



A considerable amount of information concerning the situation and underground workings of some of the old mines was obtained from old maps and plans in the office of the Registrar of Mines, Croydon.

Historical summaries have been given in the reports of Rands and Reid referred to immediately above and will not be repeated here. It may be stated, however, that many of the reefs were discovered in the early years of the field (1885 and 1886) and that the greater part of the work was done in the immediately succeeding years. In the nineties and later the reefs were overshadowed in importance by those of the Golden Gate portion of the Granite area and were neglected. In recent years little mining has been carried out on the area and even that done has been on a small scale.

### III. GEOLOGY.

The mapping and survey of the area described in this report were conducted in conjunction with those of the Croydon-Golden Gate (or Granite) area, both being conducted under the instruction and supervision of the Senior Geologist, Mr. C. S. Honman. One geological map (including both areas) was prepared and was published in one of the Survey's periodical reports.<sup>(4)</sup> That map is being included in a slightly amended form as plate 1 of this report.

The geology of the two areas was also described in the periodical report<sup>(5)</sup> referred to above. The geology of the Granite area has also been described in a previous report by Mr. Honman.<sup>(6)</sup> The views expressed in those reports are those of Mr. Honman and not necessarily those of the writers of the present report.

No detailed description of the geology will be given in this report. Brief reference will, however, be made to the rocks occurring within the area.

Extensive deposits of Recent alluvium, &c. occur along portions of the streams of the area. Cappings of laterite also occur in a number of places in the flat country. These deposits were not shown on the geological map.

Thin cappings of Cretaceous marine sedimentary rocks (sandstones, conglomerates, &c.) occur on a number of isolated hills throughout the southern part of the area.

The remainder of the area is occupied by felsite, granite, graphitic granite, &c., the ages of which are pre-Cretaceous but cannot be more definitely determined.

The felsites extend over the greater part of the district and occupy the whole of the northern half of the area. The name of felsite has been applied to these rocks as a field name. The rocks include agglomerates, tuffs and flow breccias and apparently represent a volcanic series, the so-called felsites being lava flows and the above fragmental types being interbedded with them. The felsites are not uniform in type but in general may be described as having a fine-grained to glassy groundmass with small phenocrysts of quartz and felspar. More precise determinations would be dependent upon petrological examinations of thin sections. The felsites contain a small amount of graphite.

The granite and graphitic granite occur in the southern part of the field. The granite shows a considerable range in grain from fine to coarse and consists principally of quartz and felspar with only a small amount of ferro-magnesian minerals (generally altered). In many places around the township of Croydon, the granite contains xenoliths of sedimentary rock types.

The graphitic granite is generally soft and apparently altered and is characterized by the presence of large amounts of graphite. It occurs chiefly in the form of narrow belts trending from north-west to south-east in a tract near the Croydon township.

Differing views have been held as to the origin of the different types of granite, the relations between each type and also between them and the felsites, but such matters will not be discussed in this report.

Without any reference to the nature of the junction, it is known that, near the Croydon Queen reef near Croydon, the felsites occur above the granite and the contact dips to the north-east at small angles.

No attempt was made to determine the detailed structure of the greater part of the felsite series but it is probably a folded and faulted series. A number of faults (and shears) have been shown on the geological map (plate 1). In addition to those located on the ground a number of such features were deduced from the aerial photographs and were marked on the maps, from the photographs. The majority of these faults and shears have strikes between north and north-west, and the remainder have strikes between east and north-east.

### IV. ECONOMIC GEOLOGY.

This report is concerned mainly with the auriferous reefs in the Felsite area. It also describes a few reefs in granite in the south-eastern part of the area but no further reference will be made to such reefs in this section. The reefs are quartz ones of the usual type.

(4) Report for Period ended 30th Dec., 1936. Aer. Geol. Geoph. Surv. N.Aust.

(5) *Ibid.*

(6) Honman, C. S. *op. cit.*



The reefs in the felsites are divisible into two divisions—

- (i) Those occupying vertical fissures.
- (ii) Those occupying overthrust (?) faults. These reefs dip at angles ranging from 15 to 45 degrees.

The general strike is north-south (this is in agreement with the general strike of the faults and shears) and the dip is almost without exception to the east.

The reefs sometimes attain considerable lengths, e.g., 9,600 feet in the case of the Homeward Bound reef. The widths are usually small, the greatest being 16 feet for the Federation reef. The quartz was generally of low to medium grade.

The production from the reefs is shown on plate 2. The production is small (about one-fifth) compared with the total production from the field, but nevertheless it is considerable (£587,634).

## V. THE REEFS AND WORKINGS.

The reefs of the area occur as a number of more or less separated groups. Each group has more or less characteristic features and will be described separately.

The reefs and the groups are shown on plates 1 and 2. On plate 2 the production from each reef (ore treated and gold obtained) is shown. The figures for the gold production quoted in this report are from amalgamation only.

The groups were described as follows:—

Sections B, C, D, E, F (7) (a), H, I and J	..	by R. J. S. Clappison.
Sections A, F and G	.. ..	.. by S. B. Dickinson.

### A. MOUNTAIN MAID GROUP. (See plate 3.)

(1) *Introduction.*—This group of quartz reefs is situated about 3 miles north-north-east of Croydon. It includes the Mountain Maid which was the greatest producer in the Felsite area, the Babe, the Rainbow or Reconstruction and other small reefs. Part of the Mountain Maid reef was re-opened in 1934–35 at considerable cost by a syndicate but the ore raised assayed poorly and was not treated when work ceased. No records of these latter operations at the Mountain Maid have so far been obtained. The workings are now all under water and inaccessible. The report of W. H. Rands supplies some underground details of the two major shoots worked.

(2) *General Geological Relations.*—The rock formation in which the major reefs occur is a glassy quartz felsite. Small areas of tuffs and agglomerates occur in the southern part of the group.

(3) *Economic Geology.*—The reefs comprise vertical or nearly vertical fissure lodes striking in a north-south direction. In some cases the reefs are solid quartz bodies continuous over a length up to 300 feet. In other cases the lode formation consists of a composite network of veins with much country rock. The quartz is generally hard and solid without vughs and with little evidence of a substantial pyrite content in the primary zone. Galena and lead carbonates are present in minute quantities in most of the quartz which carries gold.

#### (4) *Production.*

Reef.	Ore Crushed.	Gold Recovered.	Grade of Ore.	Bullion Value.
	tons.	oz.	dwt. per ton.	per oz. £ s. d.
Mountain Maid .. .. .	30,559.0	23,183.0	15.2	3 3 0
Babe .. .. .	3,866.3	2,525.7	13.1	3 0 0
Rainbow .. .. .	1,092.7	939.1	17.2	3 5 0
General Grant .. .. .	1,081.4	1,163.3	21.5	3 0 0
General Gordon .. .. .	762	935.5	24.6	3 3 0
Phoenix .. .. .	362	453.5	25.0	..
May Day P.C. .. .. .	264.5	510.5	38.5	3 5 0
Lord Nelson .. .. .	98	114.0	23.3	3 5 0
Total .. .. .	38,085.9	29,824.6	15.7	..

(5) *Mountain Maid.*—The Mountain Maid reef which has produced over 30,000 tons of ore of an average grade 15.2 dwt. of gold per ton contains two major shoots of auriferous ore.

The northern one was about 700 feet long and was known as the Mountain Maid United. It has been worked to a depth of approximately 350 feet and yielded about 20,000 tons of ore.



The southern one, known as the P.C. or No. 1 North, produced about 10,000 tons and has been worked to an approximate depth of 200 feet over a length of about 800 feet.

Recent work on the latter shoot by the North Queensland Gold Development Company demonstrates that the mining of the deeper ground is unpayable, and that the reef may be considered as worked out. The presence of other shoots is exceedingly unlikely.

(6) *Babe*.—This line of reef is about 2 feet wide and underlies at about 60 degrees to the east. It is parallel to, and to the west of, the Mountain Maid. A shoot of 13 dwt. stone has been worked at the southern end over a length of 500 feet and to a depth in places of not more than 60 feet.

The fissure extends persistently for nearly half-a-mile to the north across O'Briens and Waterfall Creeks and a number of prospecting shafts and costeans occur where quartz is well developed. The faces in these workings yielded pan prospects consistently over 8 dwt. per ton. The quantity of ore, however, is limited as there is no continuity of good ore, the maximum length of shoots being about 40 feet, but small tonnages could readily be obtained by small parties and prospectors.

(7) *Rainbow or Reconstruction*.—This reef averaged about 12 inches in width (according to the surface stopes) and contained two shoots of ore.

In the northern workings, the faces prospected averaged 6 to 8 dwt. per ton and recently from the place where the 20 dwt. prospect was obtained, a crushing of about 4 tons yielded at the rate of 30 dwt. to the ton. The early workings extend for some 500 feet but the shafts do not appear to have been sunk beyond 30 feet. This section offers very promising possibilities for a small party as the grades of ore are well above the average for the Felsite area. The ore is easily accessible and can be mined with little or no development work.

The southern shoot is about 200 feet long, but has been worked to a much greater depth than the northern one and has produced greater tonnages. A 10 dwt. prospect was obtained from a pillar in the centre, but the faces of the old workings were not accessible.

Possible rich patches may occur on the southern extension of this reef. At one place a 3 oz. prospect was obtained on a 6-inches leader and this portion is worthy of being opened up by a prospector. Otherwise very low grade prospects were obtained.

The Rainbow reef offers mining prospects only to small parties. On account of its narrow width, only limited tonnages can be expected immediately. The development of the northern shoot is initially advised.

(8) *General Grant, General Gordon, and Lord Nelson*.—These three major lines of reef are situated to the south of the Mountain Maid reef. They occur in a distinctive agglomerate which is non-graphitic in hand specimens. They are vertical and have a maximum width of 3 feet, the average, however, being about 10 inches. Except for the General Grant, the shoots were very short, about 80 feet being the maximum length.

Prospects on the Lord Nelson, the smallest of the three, averaged about 6 dwt. per ton, the width of reef being 6 inches. This result shows little promise beyond the possibility of a few further small crushings being obtained by prospectors.

The General Grant gave the most consistent dish prospects. It averages about 18 inches wide and the nine prospects taken averaged 7 dwt. over a length of 400 feet. As the reef has been worked fairly well over this length to a depth of about 40 feet, the deepest shaft being 75 feet, a carefully planned scheme would be required to re-open it in the best way. Such a scheme would not entail much work and it is advised that a small party of men should re-open it. As ore with a grade of 21 dwt. was mined in the past and as dish prospects show the shoot still persists a grade of say 15 dwt. may possibly be expected.

The General Gordon is small and its possibilities are akin to those of the Lord Nelson.

(9) *May Day P.C.*—This mine is south of the Mountain Maid and occurs at the intersection of two fissure reefs. The shoot was very small but rich, ore yielding 38 dwt. to the ton being obtained by the early miners. The prospects on the northern extension of the reef did not reveal any gold and it is unlikely that further payable ore can be obtained here in any quantity.

(10) *Conclusions*.—The Mountain Maid group has profitably produced gold from ore containing more than 14 dwt. per ton. The Mountain Maid reef yielded 85 per cent. of the total bullion, namely, 27,694 oz. The last attempt to work the deep ground, in the southern and less developed shoot, failed. Unfortunately there is no information available of the recent activities. It must be concluded, however, that the Mountain Maid is worked out and that the existence of other shoots beyond those worked is extremely unlikely.



The remaining reefs of the group have produced a total of only 6,000 oz., the average grade of ore being about 17 dwt. Dish prospecting results together with an analysis of the early productions show that several localities can be suggested for development by prospectors and small parties. These localities have been briefly referred to above, and can be briefly summarized in order of preference as follows:—

(i) *General Grant*.—The reef has an average width of 18 inches and the shoot was about 400 feet long. The dish prospects of abandoned faces averaged 7 dwt., but a higher grade than this may be expected as its earlier production yielded ore with a grade of 21 dwt. The open stopes appear to be about 40 feet deep and a certain amount of preliminary work is necessary before any ore could be broken.

(ii) *Rainbow or Reconstruction*.—The northern workings have ore averaging 6 to 8 dwt. in a 12-inch reef left in them and there are places where development work could easily proceed. A pump may be necessary as the water level was rather near the surface when the mine was examined.

(iii) *Babe*.—Numerous disjointed patches of ore gave consistent prospects from 8 to 10 dwt. on the northern extension of the line of reef. Small quantities of ore could be easily be mined, and there is also the possibility of another shoot being found during such work.

Apart from these recommendations, it must not be overlooked that the deeper ground in the Babe reef has distinct potentialities especially at the intersection at depth with the Mountain Maid reef where there is a possibility of a shoot of ore. A drilling programme would be well-advised both in the shallower ground just beyond the deepest workings and, if successful, in the deeper ground to test the possible intersection with the Mountain Maid reef.

#### B. HOMEWARD BOUND GROUP. (See plate 4.)

The Homeward Bound line of reef occurs in graphitic tuffs. It has an approximate north-south strike and dips easterly at 20 degrees. The reef averages about 12 to 18 inches in width but has been worked along a length of about 1.5 miles. It would appear from a study of the surface workings that the shoots are small and occur at irregular intervals. The underground workings are inaccessible but it appears that the reef has been mined to a depth at which the search for, and exploitation of, further shoots was no longer a payable proposition.

The production from the individual claims was not large but, owing to the length of the line, it has produced 17,873 oz. of bullion from 18,953 tons of ore (including Homeward Bound, Waterfall and Pride of the Hills, but not the Walhalla).

With regard to the future of this line, the prospects are by no means bright. The narrow width, hard country rock, scattered shoots, and the low dip will render mining costs high and there does not appear much likelihood of finding shoots of sufficient persistence to warrant working.

#### C. MARK TWAIN GROUP. (See plate 5.)

(1) *Mark Twain*.—The Mark Twain reef occupies a well-defined vertical fissure trending north-south in massive quartz felsite. The fissure has a tendency to branching and to the development of parallel fissures. The branches and parallel fissures were in parts productive. A system of cross shears of little or no displacement intersects the main fissure at numerous places.

The reef has been traced for about 1 mile along its length. It is known at its extreme northern end as the Magenta, further south as the Premier and the remainder as the Mark Twain (under various claim numbers).

This line has produced 8,873 oz. of bullion valued at £3 4s. 3d. per oz. from 8,819 tons of ore, the greater part of the production having been from the old P.C. mine.

The reef probably averages about 18 inches in width. The shoots, with the possible exception of that in the P.C., are very short and decomposed felsite formation occurs between the quartz bodies. Galena and pyromorphite occur in the quartz and can be regarded as a favorable sign for gold. It seems highly probable that the intersection of shears is one of the main factors in the shoot control.

At the time of inspection five claims were held on the line. The most promising of these is Dowling and Son's Magenta claim on the old Premier lease. The workings on this claim are situated on a branch fissure from the main reef channel which is itself barren at the surface at this locality. On the northern side of the workings this branch fissure is intersected by a third fissure parallel to the main reef channel, the shoot occurring between these two intersections. The northerly continuation of the branch fissure after this second intersection is again barren at the surface. The parallel fissure though barren before the intersection has low gold contents on its northerly continuation after intersecting the branch fissure.

Dowlings are at present in the old workings and are removing blocks of ore left in the early days. One crushing of 20 tons put through the Waratah mill yielded just over 1 oz. bullion per ton. At the time of inspection they were pumping and cleaning out the old shaft and had exposed



a block of ore averaging about 2 feet wide above the 60-foot level. Prospects from this block are quite good and they intend to commence stoping soon. They propose to proceed with the cleaning out of the shaft and are quite hopeful for a considerable quantity of ore below the 60 feet level.

Slattery sank about 25 feet in a new shaft between the old Nos. 5 and 6 shafts. Rather low-grade quartz was passed through for about 10 feet and then decomposed felsite formation was entered. It is understood that Slattery has now abandoned the claim to try a new claim on the old Magenta lease.

G. Lucas put through a crushing but results were very disappointing.

Several small leaders near the main line have produced a few tons of ore which was usually fairly rich. The Billy Brown with a production of 91 oz. from 45 tons was the most important.

No doubt prospectors will win parcels of good ore from this line from time to time but large tonnages are not expected.

(2) *The Ironclad*.—This reef occurs in massive quartz felsite about 1 mile west of the old Magenta lease. The reef strikes approximately north-north-west and dips at about 45 degrees to the east. It is narrow and averages about 15 inches in width. It has been extensively worked to shallow depth along its entire length, but little can be seen in the workings at present. Some fair specimen stone is to be found on the dumps, the iron-bearing material being the best. The reef has yielded 3,608 oz. from 2,314 tons of ore, the bullion having a value of £3 6s. 6d. per oz.

Several small leaders have been worked in the neighbourhood.

In view of the good crushings, the long length worked and the comparatively shallow depth of the workings, this reef may be regarded as a possible further producer of small tonnages of ore. It must be pointed out that a certain amount of dead work would be necessary before any production could be expected.

Vertical shafts are recommended rather than an attempt to recondition old underlay shafts which have collapsed.

#### D. MULLIGAN GROUP. (See plate 6.)

(1) *McArthur Reef*.—The chief reef in the Mulligan group is the McArthur. This reef strikes in a general north-south direction but the outcrop has a sinuous course (see plate 6). It dips at 30 degrees to the east. A cross reef dipping at 55 degrees to the south exists to the east of the outcrop of the main reef to the north of the main underlay shaft. The cross reef has been worked and is considered to control the shoot in the main reef as practically all the gold won has been to the south of this cross reef. The main reef ranges in width from 2 to 6 feet in the stopes which are accessible (such stopes are accessible to water level but are in a rather dangerous condition).

The shoot worked appears to have been about 90 feet in length but patches of ore were apparently also won in other places along the reef. Little work has been done to the north of the cross reef and in this section there is a reef parallel to the McArthur and dipping at 75 degrees to the east. Along this part of the McArthur reef prospects yielded only a few colours of gold, but from ferruginous floaters on the surface, prospects of at least an ounce of gold per ton can be obtained. These floaters may have come from the main shoot (or from ore mined therefrom) and do not necessarily indicate a further shoot of good price ore.

An old press report stated that this reef had been fairly well tested by a syndicate who deepened the underlay shaft and drove at the 200 feet level (inclined depth). It was stated that the results were disappointing as the reef did not maintain either its width or grade.

The production from the McArthur reef was 2,856 oz. of bullion from 4,564 tons of ore, the bullion being valued at £3 per oz.

(2) *Amazon and Black Eagle*.—Several small practically vertical leaders occur about 600 feet to the south-east of the McArthur workings. These leaders include the Amazon and Black Eagle but it is difficult to know to which leaders these names were given. The Amazon produced 197 oz. of bullion from 130 tons of ore and the Black Eagle produced 100 tons of ore which yielded 85 oz. of bullion, the bullion value being £3 in each case.

(3) *Michael Davitt*.—This reef occurs at the western side of the group but little information is available. Some small and old workings exist in flat country, but have collapsed. They appear to indicate a reef striking east-south-east. The production was 147 oz. of gold from 206 tons of ore.

(4) *Conclusions*.—The reefs in this group do not appear to offer much prospect for future workings. The McArthur reef is the most important one, but even if any payable ore is left the quantity would probably be small.



## E. JUBILEE OR TWELVE MILE GROUP. (See plates 7 and 8.)

The group was one of the most important ones in the Felsite area.

The reefs for the most part occur in graphitic tuffs and are of two types, namely, flatly dipping and vertical.

(1) *Jubilee Reef*.—The largest producer of this group was the Jubilee reef. The reef occurs in graphitic tuffs, and has a north-east-south-west strike. It dips to the south-east at approximately 35 degrees, but at the northern end the dips increase to 50 degrees. From Rands' section,<sup>(7)</sup> it appears that the reef rolls so that it is not possible to accurately determine its depth from the surface at any given point. The reef is wide, being up to 14 feet in places, but the average is considerably less. The reef is composed of quartz and quartz-veined formation.

The underground workings are not accessible but from descriptions, in former reports, cannot be very extensive. There are two main sets of workings, the Jubilee being at the northern end and the Jubilee Consols in the middle portion. The southern half of the reef consists of white quartz, the only workings being shallow potholes and trenches. The deepest recorded workings are 148 feet (vertical depth) on the Consols. An old mine plan showed very little stoping, and work done since the plan was prepared cannot have been very great.

It seems likely, therefore, that the underground workings have no great extent and that a large portion of the reef remains to be prospected in the deeper ground. The grade of the reef will certainly be low but it is possible that further payable portions may be found.

Little can be said regarding the ore shoots worked in the past. From the surface workings it would appear that the best portions of the reef were a length of about 600 feet at the old Jubilee workings and a separate length of about 400 to 500 feet at the Consols workings.

The production was 7,832 oz. of bullion valued at £3 6s. per oz. from 13,846 tons of ore.

In view of the past production and the length and width of the reef, the prospecting of untested portions is justified. Probably the best method would be the reconditioning of the old Consols underlay shaft on the top of the Jubilee Hill. This shaft appears to be in reasonably good order. The deepening of this shaft and driving from it would be necessary.

An alternative proposal is drilling a number of holes just west of the Lady Lottie reef. A depth of approximately 500 feet would be required near the Lady Lottie P.C. shaft with lesser depths to the north where the Jubilee and Lady Lottie reefs converge in strike. These drill holes would test the theoretical possibility of a shoot occurring at the intersection of these two reefs. If drilling is resorted to, it must be pointed out that a number of holes are necessary and should be spaced at intervals of not more than 100 feet. Local miners do not favour drilling on the field, owing to the number of low grade patches in the shoots. Mr. F. W. Cuthbert put down two holes on this reef, the results of which are described in J. H. Reid's report.<sup>(8)</sup>

(2) *Lady Lottie Reef*.—This reef occupies a very defined fissure in graphitic tuffs, strikes practically north and south and dips vertically. The reef is traceable from Chalmers or Twelve Mile Creek to the top of Jubilee Hill. On the northern side of Jubilee Hill and near the probable intersection with the Jubilee reef the fissure contains no quartz and the Jubilee reef has not been traced beyond the possible intersection. North of this point, the fissure contains a quartz reef, while further to the north it is traceable for a short distance but contains no quartz. To the south of Twelve Mile Creek, where massive quartz felsite exists, the fissure appears to have died out.

The reef is mostly solid quartz with a small proportion of quartz-veined formation. It ranges in width from 2 to 4 feet and has been worked at intervals along its length. The deepest workings are the P.C. just north of Jubilee Creek. In the P.C. the vertical shaft is 183 feet deep, and the drives therefrom have a total length of 260 feet. Details of stoping are not available. It is recorded by Reid<sup>(9)</sup> that the grade (judging by the last crushing) fell to 5 dwt. of gold (fine) per ton.

In the southern portion of the reef, some of the workings are accessible, and the reef was sampled where possible (see plate 7). There are three sets of stopes each approximately 100 feet in length. In the South stope, two samples were taken, the results being 12.6 dwt. and 13.1 dwt. of gold (fine) per ton across widths of 30 and 24 inches respectively. The Middle stope, which appears to be the deepest, is open but not accessible. The reef appears to have been taken out entirely and it may be assumed that there was payable ore in the stope. In the North stope two samples were taken, the assays yielding 1.1 dwt. across 46 inches and 7.6 dwt. across 60 inches.

On the hill between Twelve Mile and Jubilee creeks there is a shaft reported by Rands<sup>(10)</sup> to be 120 feet deep and to have yielded quartz which gave in the battery "about 8 dwt. of gold per ton". There is much quartz on the dump and a sample composed of pieces taken at intervals over the dump yielded traces of gold on assay. It is assumed, therefore, that the quartz crushed was selected. Further amounts of such ore may possibly be present.

(7) Rands, W. H. On the Croydon Goldfield. Qld. Geol. Surv. Pub. No. 118, 1896.

(8) Reid, J. H. Report on the Croydon Goldfield, with Discussion on its Possibilities for Future Production. Qld. Govt. Min. Jour., Vol. XXXVI, 1935, p. 161.

(9) Reid, J. H. *Ibid.*

(10) Rands, W. H. *op. cit.*



Sampling between the three shoots described above gave low results, 4.3 dwt. of gold per ton being the highest assay. The sampling, therefore, indicates that a long continuous shoot is not to be expected, but that there is a possibility of obtaining payable ore by further development from the three stopes described above. The reef south of the South stope has been exposed to shallow depths but dish prospecting proved that gold was present in only a few places and in small quantity only.

The production from the Lady Lottie reef was 1,008 oz. of bullion valued at £3 8s. per oz. from 1,827 tons (it is not possible to separately identify the returns from the various portions of the reef).

It appears that this reef has a definite chance of producing further payable ore, the most promising places being adjacent to the three stopes described above. The testing would be easy and would comprise sinking below the old workings and driving along the reef.

(3) *Golden Spur, Copenhagen, and Rising Sun Reefs.*—The Golden Spur, Copenhagen, and Rising Sun are possibly on one line of reef. The first two are certainly on one and the same line of reef, and the last-mentioned could be a faulted extension of the same line. The reefs occur in quartz felsite, strike west of north and dip about 20 degrees to the east. The reefs are fairly narrow and not considered of much importance. The productions were:—

Reef.	Gold Bullion.	Ore.	Bullion Value.	
			oz.	per oz. £ s. d.
Golden Spur .. .. .	1,434	1,347	3	7 6
Copenhagen .. .. .	207	254	3	7 6
Rising Sun .. .. .	3,356	2,311	3	0 0

(4) *Apex Reef.*—This reef is fairly narrow, composed of quartz and occurs in graphitic tuffs east of the Lady Lottie. It strikes north-south and dips steeply to the east. Not much work has been done on it and the workings are only shallow. At its northern end, the quartz appears to have been removed (and treated) to depths of 20 feet over a length of 200 to 290 feet. At its northern end a cross-reef connects it to the Lady Lottie. Small amounts of ore have been mined at a few places along the southern part of the reef.

It is not possible to gather much information about the width, &c., of the reef as most of the workings are collapsed. The production has been 134 oz. from 200 tons of ore, the bullion being valued at £3 5s. per oz.

It is difficult to express an opinion on the prospects of this reef, but from the production figures it would appear that the reef must either be rather narrow or that only a portion contained payable ore, otherwise the tonnage from the length of the workings would have been greater. The reef can hardly be considered of importance.

(5) *President, or Rough and Tumble Reef.*—This reef is a fairly large quartz-veined formation in graphitic tuffs. The formation contains too large a proportion of unmineralized country rock to enable it to yield ore of payable grade without hand-picking. It cannot be regarded as important. The production was 1,445 oz. of bullion valued at £3 6s. 6d. per oz. from 2,111 tons.

(6) *The Maybelle Reef.*—This is a small quartz reef about 12 inches wide. It occurs in graphitic tuffs, strikes north-south and dips at 20 degrees to the east. Numerous shafts have been sunk, but they do not appear to be deep. The production was 3,376 oz. from 2,820 tons, the bullion being valued at £3 6s. 6d. per oz.

As the ore treated had an average grade of 24 dwt. per ton, this reef may be considered as a possible producer in the deep ground. However, nothing is known as to the occurrence of shoots and the workings are very irregular, and any further work must be regarded as subject to more than the usual risks attendant on mining operations.

(7) *Other Reefs.*—Between the Maybelle and the old Goldstone dam on Chalmers Creek, there are several steeply-dipping leaders which have been worked in places. The most important of these is the Colleen Bawn. It has been worked fairly extensively by open cuts or shallow stopes, and produced from 621 tons of ore, 808 oz. of bullion valued at £3 11s. per oz. The workings are no longer accessible and the reef cannot be seen.

(8) *Golden Fleece Reef.*—This is a leader 9 to 12 inches wide occurring in a fissure in quartz felsite. It strikes north-south and dips at 75 degrees to the west. It has been worked by open cutting for about 600 feet, but apparently to no depth. Two shallow shafts were sunk. All workings are very old and cannot be entered. The production was 604 oz. of bullion valued at £3 5s. per oz. from 464 tons of ore.



In view of the comparatively rich grade (26 dwt. per ton) and apparent long length of shoot, it is reasonable to assume that this reef is worthy of being tested as it may possibly be capable of producing limited tonnages of good ore.

Testing in deeper ground by sinking and driving is recommended.

(9) *Rosshire Reef*.—This reef occurs in quartz felsite, strikes at 20 degrees and dips at 45 degrees to the east. The width of the reef cannot be definitely determined owing to the collapsed workings, but from available exposures appears to average about 24 inches. In parts where quartz-veined formation is present the width reaches a maximum of 48 inches.

The workings have collapsed, but nowhere appear to have been of any depth (probably no more than 40 feet). Judging from the workings, the length of the shoot was about 400 feet. The production was 988 oz. from 647 tons of ore, the bullion value being £3 5s.

In view of the grade (30.6 dwt. per ton) and length of shoot, this reef is worth a further trial. Testing of the deeper ground by sinking and driving is recommended.

(10) *General Recommendations for Group*.—It is considered that for success to be attained in this group, central crushing and treatment facilities are of prime importance. Cyanide plant is also necessary as the old tailings are reported to have given good returns to the cyanide companies. It is not, however, suggested that any plant be erected until satisfactory amounts of ore are proved to be present.

It is considered that unified control of the group is desirable, i.e., that the group be taken up as a whole by a company rather than by a number of small parties. The reasons for this are firstly that the greater part of the ore will not be high grade and secondly that a fairly large amount of preliminary development and testing would be necessary before it would be possible to assess the value of the various reefs. Furthermore, it is not considered (with the possible exception of the Jubilee) that any one reef is likely to yield sufficient ore to warrant the erection of a suitable treatment plant.

It is considered that the Jubilee, Lady Lottie, Rosshire, and Golden Fleece reefs of the group warrant testing with a view to working under a scheme on the above lines. Testing recommendations are set out under the various reefs. The Rosshire and Golden Fleece reefs may be expected to yield somewhat richer ore than the other two.

#### F. TABLETOP GROUP. (See plates 9, 10 and 11.)

(1) *Introduction*.—The Tabletop group is situated about 12 miles north-north-east of the township of Croydon. The geology, the most recent mining leases and the major workings are shown on plate 9. No mining operations are being conducted at Tabletop at present.

The geological work was greatly hampered because the majority of the workings could not be entered. The Bobby Dazzler and Mount Morgan were partially accessible and so both these mines received more attention than the rest of the workings of the group. Because of the inaccessibility of the workings the report of W. H. Rands,<sup>(11)</sup> must be consulted for underground information.

The descriptions of the various leases and reefs given here are, unless otherwise stated, essentially from a geological aspect based on surface observations. Except for the Bobby Dazzler and Great Eastern reefs no samples were submitted for assay and it must be understood that the grades quoted for other reefs are based on estimation of dish prospects (after crushing in a dolly pot).

(2) *General Geological Relations*.—The rocks are wholly of effusive and pyroclastic types. Felsite is the general term that has been adopted to cover all types. The representatives in this group are tuffs, quartz felsites and agglomerates. They show marked changes in texture and pronounced fluxion structure and contain graphite (primary ?) either finely disseminated or in segregations up to 0.5 inches in size. The strike of the crude bedding of these rocks is fairly regular and in a north-north-westerly direction and the dip, where determinable, is nearly vertical.

Definite evidence as regards the structure is confined to faulting and fracturing. The major faults are clearly post-reef formation, as they have severed and displaced portions of some of the reefs. Along these faults there is well-defined drag contortion, shattering of the country rock and, in places, abrupt termination of a definite effusive rock type. There is also an absence of mineralization except for minor quartz veining the dip of which is usually vertical or nearly so. The direction of displacement and throw cannot be definitely stated.

The jointing of the country rock, and the fractures and fissures containing the reefs (due partially to folding and overthrust faulting) generally have strikes in a north-south direction.

(3) *Mining Geology*.—Excepting the complex occurrences on the Mount Morgan hill, Day Dawn, &c., the main reefs have low easterly dips of approximately 35 degrees. Complementary vertical reefs and fractures occur very sparingly, whilst horizontal or almost horizontal quartz

<sup>(11)</sup> Rands, W. H. *Ibid.*



reefs occur in close proximity to the main reef. The channels of the latter reefs were probably formed by horizontal fracturing from the main fissure during overthrusting. Normal strike faults and transverse faults are present in the reefs but only minor displacements are evident.

The low-dipping reefs show a considerable range in width. In the Federation mine, widths between 2 and 16 feet are recorded. The gold throughout the Tabletop group has been found to occur more freely in the rubbly iron-stained quartz containing galena and other lead minerals. Although mining has been concentrated on this type of quartz, there is no quartz that can definitely be recognized as barren in any of the reefs at Tabletop.

(4) *Production.*—The production from the mines in this group is as follows:—

Mine.	Ore.	Gold Bullion.	Average Grade.	Bullion Value.
	tons.	oz.	dwt. per ton.	per oz. £ s. d.
Federation .. .. .	29,732	12,972	8.7	3 7 0
Mount Morgan .. .. .	11,182	5,821	10.4	3 7 6
Bobby Dazzler .. .. .	5,035	2,572	10.2	3 10 6
Ace of Hearts .. .. .	2,843	1,412	10.0	3 7 0
Happy Jack .. .. .	2,391	3,227	27.0	3 0 0
Day Dawn .. .. .	1,288	849	13.1	3 0 0
Hope .. .. .	979	887	18	3 12 6
Surprise .. .. .	452	548	24	.. .. .
Hard Struggle .. .. .	448	376	16.8	3 9 0
Break of Day .. .. .	372	289	15.5	3 9 0
Bella Mortimer .. .. .	314	292	18.5	.. .. .
Great Eastern .. .. .	303	291	19.3	3 5 0
Last Chance .. .. .	252	109	9	.. .. .
Comet .. .. .	175	213	24	3 9 6
Ida .. .. .	40	73	37	3 4 0
Republic .. .. .	98	64	13	.. .. .
Total .. .. .	55,904	29,995	10.7	.. .. .

(5) *Federation Reef.*—The Federation is the largest, and was the most productive, reef at Tabletop. It is reputed that on the closing of the mine, there was no payable ore in any of the faces. The workings are now completely inaccessible but the mouths of the surface stopes have widths up to 10 feet. The reports of W. H. Rands<sup>(12)</sup> and J. H. Reid<sup>(13)</sup> give more comprehensive accounts of the mine.

(6) *Mount Morgan.*—The Mount Morgan hill is composed of innumerable quartz bodies. Considerably more work was done here than elsewhere at Tabletop, and it was considered that a geological examination of this complex system was very necessary to understand its structure, whereby a favorable prospecting scheme might be suggested. The resulting plan is shown on plate 10. Unfortunately there was not sufficient time to obtain data for contouring.

The felsite in this locality has been much folded, fractured and fissured. During mineralization, complex fissure reefs were formed in some places, e.g., the large formation along the southern edge of the hill crest, but at other places the conditions were favorable for the formation of the quartz reefs in the crests of the anticlinal folds and along the limbs of such folds. The parallelism of the definite fold axes and reef outcrops supports this statement. The existence of saddle reefs recurring at depth is therefore a distinct possibility.

The payable quartz was confined to the eastern end of the hill as shown by the incomplete stopping record on plate 10, and it appears that the crests of the two anticlinal folds are closely related to shoot control.

The portions of the supposed saddle reefs already worked have very little quartz left. Where visible underground, the reefs are narrowing very quickly and may be considered as worked out. In the early dayste sting of surface outcrops and formations to shallow depths was very thorough. The quartz obtained from the Mount Morgan hill was very patchy and needed careful hand-picking to keep up the grade. Dish prospects on the underground faces confirmed this, as the results obtained were very inconsistent and averaged about 3 dwt. of gold per ton.

The potentialities of the Mount Morgan depend on whether there is a repetition of saddle reefs at depth and testing work should be planned to test such a view. A suitably chosen north-south line of vertical drill holes is advised. Geological work suggests the above explanation

<sup>(12)</sup> Rands, W. H. *Ibid.*

<sup>(13)</sup> Reid, J. H. *op. cit.*



of the structure, but because the country consists of an effusive suite of rocks with only suggestions of bedding and dips, &c., the evidence is not conclusive and the saddle reef theory must be accepted with reservation.

(7) *Bobby Dazzler and Great Eastern*.—These two reefs are probably parts of one and the same reef, the two parts being separated by faulting. The large apparent displacement is due to topography and the low dip of the reef. The fault is probably a normal one with a downthrow to the west. In proximity to the fault on the Bobby Dazzler and Great Eastern reefs, there exists a network of quartz veinlets showing great variety of thickness and form. Minute quartz veinlets and veins gather into clusters, fray out, and cross one another in all directions. A large portion of the formation consists of non-mineralized country rock.

(a) *Bobby Dazzler*.—On the Bobby Dazzler side there is a greater development of this formation and much surface testing has been done with disappointing results. The shoot opened up on the Bobby Dazzler reef is well to the west of the fault. This shoot was sampled and an assay plan is shown on plate 11. The reef occurs in graphitic tuffs, is fairly wide and dips at low angles (average being about 25 degrees). Stopping has not proceeded to any great depth. The country is standing well and the workings are kept open with props only. The faces in the stopes are very irregular, indicating that the last men to work the mine were gouging out the rich patches. As the approximate calculated tonnage from the stopes is slightly less than that given in the production figures and as there is no quartz lying on the surface, it can be said that the figures represent the average run of mine ore. The reef should average 4 feet or slightly less in width. The mean grade obtained in sampling was 5.4 dwt. per ton for a length of about 250 feet. If the first four samples on the southern end of the stopes and the most northerly sample are discarded, the length of the shoot is reduced to about 180 feet and the mean grade increased to 6.5 dwt. of gold (fine) per ton. The sampling shows that the grade is not constant and that a shoot of ore 180 feet long and averaging 6.5 dwt. of gold (fine) per ton might be expected.

In view of the fact that the richer portions of the faces have been gouged out, it is reasonably safe to assume that the grade of ore which might be mined will be somewhat higher than that indicated by sampling and not greatly below that of ore worked in the past.

The only attempt to test the reef at depth is a vertical shaft 200 feet deep which cut 3 feet of quartz. Four tons from this shaft yielded 1 oz. over the plates. To this must be added the gold in the sands. No further work was done.

The chief trouble appears to be that the mine will not be able to produce sufficiently large tonnages for the grade of the ore. Although the ground stands well, tonnages will be reduced considerably by the necessity for leaving frequent pillars owing to the flat nature of the reef. However, at this stage of development it is not possible to accurately assess either the grade or prospective tonnages of ore.

The known values and its past history render the mine worthy of further trial. The following work is recommended:—(i) Reconditioning the 200 feet shaft and driving south therefrom. This shaft is in fair condition but will need retimbering in the upper portion at least. There is water standing at a level estimated to be 150 feet from the surface; (ii) Following the reef down from the present faces by underlay shafts and driving therefrom.

(b) *Great Eastern*. (See plate 9).—With regard to the Great Eastern reef, the low-dipping portion extending eastwards from the fault has been well prospected along the surface and from shallow underlie shafts. The outcrops suggest an average width of 36 inches and the crushing returns from selected quartz gave a 5 dwt. per ton recovery. It is hardly likely that battery returns would give this grade if the quartz had been treated without selection unless its grade was higher than that in the existing faces. Dish prospects from existing faces averaged about 3 dwt. per ton over this portion of the reef.

The main workings occur on the north-south trending portion of the Great Eastern reef. Here the main reef strikes along the uppermost part of the hill and dips at 75 degrees to the east. Below it, down the hillside, a number of parallel leaders (averaging 10 inches wide) outcrop, and these have been more thoroughly worked. The workings are of a shallow nature and have not cut the main reef. From them 302.5 tons of quartz was obtained and treated for a return of 290.9 oz. of gold. The outcrop of the main reef was prospected and found to contain from 2 to 7 dwt. per ton over a length of 150 feet, with increasing values towards the northern end.

At the northern end of this steeply-dipping section, a low-dipping reef junctions with it and there is a possibility of the existence of a pipe of auriferous ore along the intersection. Dish prospects at this place averaged 6 dwt. per ton. However, the two samples submitted for assay gave very low results (about 1 dwt. each) and it must be concluded that the quartz as a whole has a grade which is probably unpayable.



(8) *Ace of Hearts*.—This reef is a large and low-dipping one with several branch reefs including the Hope reef. Prospecting gave consistent results ranging from 3 to 8 dwt. per ton where accessible in shallow surface cuts. The early working of this reef was hampered by the problem of water. There was not available at the time a pump of sufficient capacity to keep the mine free from water. Hence the reef has only been worked partially to a very shallow depth (20 to 30 feet). Its southern extension probably crosses Tabletop Creek and junctions the Lady Jane reef. This part is largely masked by alluvium.

At its northern end the Ace of Hearts reef is faulted transversely and upthrown about 20 feet on the northern side of the fault. This part of the reef is very flat and outcrops over a large portion of the lease. In the early days, some of this quartz was indiscriminately taken and carted to the Tabletop battery by its owner and is reputed by old prospectors to have bulked 3 to 4 dwt. of gold per ton.

(9) *Blackbird*.—The Blackbird reef is parallel to the Act of Hearts and on the footwall side of the latter. It has recently been opened up by an old prospector to about 20 feet depth, and his ore gives prospects of 7 to 9 dwt. of gold per ton.

(10) *Happy Jack*.—This reef outcrops in a valley to the north-west of Tabletop. It has been worked to a considerable extent over a length of 500 feet from numerous vertical and underlay shafts. The northern part of the shoot dips at 40 degrees to the east and the southern part at 20 degrees. At the latter end particularly rich ore was struck. The lode formation appears to be from 3 to 7 feet wide, consisting of well developed quartz veins carrying the gold, together with much country rock. The shoot has been partially worked to an approximate depth of 200 feet. The large mullock dumps indicate that only the rich quartz leaders and veins were crushed. The quartz has been taken out right to the surface where the shoot occurs and so no prospecting could be done on this reef.

(11) *Day Dawn and Last Chance*.—These reefs occupy a hill alongside Tabletop Creek. A complex system of quartz reefs and leaders outcrops over the whole hillside and presents many similarities to the Mount Morgan reefs. The workings are shallow ones. There are immense quantities of quartz outcropping over this hill and gold is definitely present in the majority of it. Prospecting work with the dish shows that the grade varies from place to place; prospects up to 10 dwt. per ton as well as numerous blank prospects can be obtained. Barren quartz occurrences cannot definitely be differentiated from the auriferous quartz.

These large surface quartz occurrences, not only at the Day Dawn, but elsewhere at Tabletop call for careful sampling to determine whether the erection of a battery at Tabletop would be justified and the treatment of this easily obtainable ore a payable proposition. A consideration of the reef possibilities is also necessary as such would furnish higher grade quartz.

(12) *Surprise*.—The Surprise reef is 3 to 6 feet wide where it outcrops. The workings are completely inaccessible. A section of the reef can be seen at the mouth of one underlay shaft with the hanging wall and footwall appearing to converge with increasing depth. At the mouth of this shaft, prospects range from 3 to 5 dwt. Rands' report<sup>(14)</sup> supplies further information.

(13) *Black Diamond or Hard Struggle*.—The reef outcrops for a length of 1,500 feet and has been well prospected by shafts to an average depth of 60 feet. The shoot appears to be about 600 feet in length and the gold occurs in narrow quartz veins through a formation which is from 1 to 4 feet in width and which dips at 35 degrees to the east. Prospects taken over the whole width of lode were low (1 to 2 dwt. per ton) and it is not a payable proposition in that respect. The ore treated was obtained from selected quartz from the veins and averaged 17 dwt. of bullion per ton.

(14) *Break of Day*.—This reef has 12 to 18 inches of formation which dips about 65 degrees to the east. Very low grade quartz occurs through it and the work done has been of the nature of prospecting to a shallow depth. Crushings probably consisted of quartz taken from the outcrop and along a length of 200 feet. Prospects over the full width of the formation ranged from traces to 3 dwt. per ton along this length.

(15) *Bella Mortimer and Lady Jane*.—These are probably portions of the one and the same reef which is covered by alluvium for the greater part of its length. The width of the reef averages about 3 feet as revealed in the shallow workings on both leases. The quartz is of the white and opaque type and, where visible, is not contaminated with country rock. Dish prospects were up to 8 dwt. per ton approximately, but many showed no gold, and the prospecting indicated the very patchy nature of the quartz.

(16) *Comet*.—The Comet reef outcrops along the top of the hill east of the Black Diamond and is very similar to the latter. The length of the shoot is about 400 feet and the reef is about 2 feet wide. It is composed of a number of small quartz veins and patches with much country rock. A leader at the southern end of the reef, striking in an east-west direction, has been worked

<sup>(14)</sup> Rands, W. H. *op. cit.*



to a depth of 25 feet. From the surface quartz with a grade of 2 oz. per ton has been obtained whilst the total production has been 174.5 tons for 212.5 oz., giving an average grade of 24 dwt. per ton. Prospects over the width of the reef were all under 5 dwt. per ton. The main underlay shaft is 40 feet deep, but was inaccessible, and another just to the south shows the reef tapering very quickly with depth.

(17) *Ida*.—The reef outcrops on the top of a ridge east of the Happy Jack. There is 2 to 3 feet width of formation with the quartz distributed irregularly through it. The reef has been worked by small open cuts and shallow underlay shafts and the crushings have come from carefully selected stone. The prospects along its outcrop gave very low results.

(18) *Republic*.—A number of small, nearly vertical reefs 6 to 12 inches wide exist on the Republic lease. They have been partially worked to a shallow depth (30 feet) and most of the prospects taken were between 4 and 8 dwt. per ton. With a battery close at hand a small party might be able to conduct profitable mining operations.

(19) *Conclusions*.—The reefs at Tabletop were mined in the early days for ore which gave a return of about 10 dwt. of bullion per ton. The total returns were 55,904 tons for 29,995 oz. of gold bullion. The Federation mine, which produced over half the above tonnage, may be considered to have been worked out. It is also the only mine that has yielded any quantity of ore below 100 feet vertical depth. All the other reefs have been worked to depths less than 100 feet and have been abandoned either owing to mining difficulties or to the ore becoming of unpayable grade.

The most desirable method of reviving mining at Tabletop would be the taking up of all favorable properties by one company which should carry out a systematic prospecting and development programme. A broad outline of such a programme is suggested below.

For small parties and syndicates the resumption of activity depends primarily on the erection of a central treatment plant at Tabletop. It would then be possible to mine and treat ore containing less than 10 dwt. per ton (the minimum value for payable results would have to be determined) and which was passed by in early days.

It is suggested, firstly, that mining operations be resumed on the more important ore shoots beginning with the Bobby Dazzler and the Ace of Hearts, and, secondly, that prospecting and consequent mining of payable quartz from outcrops (outcrops are abundant in the majority of the leases) be undertaken.

The Mount Morgan and Day Dawn hills offer larger scale prospecting operations to syndicates. A diamond drilling programme is recommended for the former, and, if successful, another could be considered for the latter hill.

#### G. GOLDEN VALLEY GROUP. (See plate 12.)

(1) *Introduction*.—The mining centre of Golden Valley is about 15 miles north-north-east of Croydon township.

The field is completely deserted at present and no mining has taken place since about 1908. The workings are inaccessible and geological work was confined to the surface and to examinations of reefs in shallow open cuts, &c. The report of W. H. Rands,<sup>(15)</sup> who inspected the field at the height of activity, contains information on the underground workings.

As at Tabletop, the grades of ore given throughout the description of this group are estimates of pan prospects.

(2) *General Geological Relations*.—The rocks are part of the same suite of effusive types that are present at Tabletop and elsewhere in the Felsite area. In this group, however, there is a much greater development of graphitic tuffs, and the more important auriferous reefs are within such rocks.

(3) *Mining Geology*.—The quartz reefs are distinct from the usual type of reef in the Croydon gold-field. They are of narrow width and occupy persistent lines of fissuring in a north-south direction and have either a vertical or a steep easterly dip. The only exception is the low-dipping King of Wallabadah reef which resembles those at Tabletop.

The shoots of auriferous quartz are not continuous along these lines, a length of 500 feet being the maximum. No geological records, assay plans, &c., are available concerning the underground workings and so questions of shoot control, enrichment, variation of lode minerals with depth, &c., cannot be answered.

The principal producers were the King of Wallabadah, Grace Leigh, Australian Beauty and Isabella, and these mines are dealt with separately below. The other reefs have only yielded small parcels of ore obtained from prospecting work.

<sup>(15)</sup> Rands, W. H. *Ibid.*



(4) *Production.*—The production from the mines in this group is given in the following table :—

Mine.	Ore.	Gold Bullion.	Average Grade.	Value of Bullion
	tons.	oz.	dwt. per ton.	per oz. £ s. d.
King of Wallabadah .. .. .	5,910.0	9,141.0	30.9	3 13 0
Grace Leigh .. .. .	4,892.0	4,021.0	16.4	3 11 0
Australian Beauty .. .. .	4,248.8	4,250.2	20.0	3 8 0
Isabella .. .. .	2,859.5	3,095.0	21.6	3 8 0
Vasco de Gama .. .. .	571.0	431.1	15.2	3 9 0
Venture .. .. .	398.5	208.8	10.6	3 5 0
Monkland .. .. .	346.0	503.0	29.1	..
Belfast .. .. .	268.25	186.45	13.9	3 4 7
Queen of Sheba .. .. .	159.0	157.0	19.7	..
Lady Mabel .. .. .	151.3	309.9	41.0	3 11 6
Try It .. .. .	149.9	177.4	23.6	..
Carpentaria .. .. .	149.5	69.0	9.2	..
Hercules .. .. .	69.5	25.0	7.2	..
Queen of the Valley .. .. .	66.5	65.5	19.7	..
Defiance .. .. .	51.0	51.0	20.0	..
Perseverance .. .. .	38.0	27.6	14.6	..
Total .. .. .	20,328.75	22,718.95	22.3	..

(5) *King of Wallabadah.*—This reef produced almost half the gold bullion won at Golden Valley. The reef ranges in width from a few to 36 inches and has been worked extensively over about a length of 400 feet. The presence of numerous minor dip or cross faults made the mining very difficult and costly. To the north a major cross fault has cut off the reef and the Queen of Sheba reef to the east is probably the displaced portion. Faces in the shallow workings on the King of Wallabadah gave prospects of about 5 dwt. per ton, but very little quartz remains near the surface. The southern extension of the King of Wallabadah is almost barren according to the results of surface prospecting work. The re-opening of this mine does not appear to be justified.

(6) *Grace Leigh.*—The reef outcrops over a considerable length and contains two definite auriferous shoots. The northern one, which has been mainly worked, shows 2 feet of formation over a length of about 600 feet and with quartz veins well developed in it. The southern shoot is smaller and has been worked only to a shallow depth (20 feet approximately). The reef is faulted between these two shoots where the quartz is rather poorly developed. The gold-bearing quartz in both portions of the reef is some distance from the fault.

In this reef there is a quantity of easily accessible quartz which is worth testing. The average prospect across three faces in the northern shoot was about 6 dwt. per ton.

(7) *The Australian Beauty.*—This reef has been worked and prospected to a considerable extent along its length. The gold occurrences are very patchy for the most part, although at the southern end a good shoot has been worked over a length of about 200 feet and to an approximate depth of 150 feet. However, the limited supply of ore, due partly to the small width of reef (maximum 2 feet), made mining unpayable below a certain depth, and it is unlikely that there exist sufficiently promising factors to justify a re-opening of these workings. A lower grade of ore in the northern portions of the reef is well worth careful prospecting. The few preliminary dish prospects taken gave results with a very wide range.

(8) *The Isabella.*—This reef, which may be the southern-most shoot on the Australian Beauty line, has been thoroughly worked over a length of 400 feet to a depth of 80 feet. The surface stopes reveal an average width of reef of 12 inches. No prospecting work was possible on this lease. Re-opening of the Isabella mine is not advocated.

(9) *Other Reefs.*—Of the remaining reefs included in the production table above, all that can be said is that they are all small and have been only sparsely worked. In some cases rich patches have been struck, e.g., Lady Mabel, Don Juan, &c., which have yielded limited crushings giving a yield of 2 oz. per ton.

There would be scope for prospectors and small parties to develop these reefs if treatment facilities were reasonably near. The erection of a battery at Golden Valley is not warranted, but one at Tabletop would induce a revival of prospecting work in the former area.

(10) *Conclusions.*—The Golden Valley group was essentially one for the prospector or for small parties. It has produced 22,719 oz. of gold bullion from 20,329 tons of ore, which gives a grade of 22.5 dwt. per ton. Its boom period came somewhat suddenly to a close by the efflux



of miners to the Golden Gate area shortly after the very rich strikes were made there. In some cases quite promising prospects were abandoned. In the major mines it was also reported that the rapidly increasing refractory nature of the ore at water level caused work to finally cease as the battery was incapable of a good recovery. Unfortunately, no records of assays of the ore exist. An increase in mining costs with depth was also an important factor in the decline of mining in this group.

The production table shows that 20 dwt. to the ton was approximately the minimum grade of payable ore. This is almost double the grade of ore mined at Tabletop. The different nature of the reefs readily accounts for the inequality. Hence it must be concluded that the reefs are small and, if re-worked, can yield only very limited quantities of ore which must have a grade of at least 10 to 15 dwt. to be payable.

There is no reef at Golden Valley at present with any favorable possibilities for mining. A revival of prospecting and mining will be only the accompaniment of successful venture in the more promising localities of the Felsite area.

## H. CARRON RIVER GROUP.

Only a cursory examination of the Carron River group was made. From Rands' description<sup>(16)</sup> and what was seen it was not considered worth while attempting to locate the various somewhat scattered mines of this group. Their size and position render it unlikely that successful exploitation would be possible.

### I. VARIOUS REEFS IN FELSITE.

A number of reefs occur in the felsite at the south-eastern portion of the area and are shown on plate 1.

(1) *The Parnell and Wanderer Reefs*.—These reefs occur along a line of shearing in massive felsite. Numerous small veins branch from the reefs, and parallel leaders occur near the reefs. The reefs are only a few inches wide and are not considered of much importance even to the gouger as all the easily mined ore has been taken out.

The production from the Parnell has been 564 oz. from 292 tons, the bullion value being £3 7s. per oz., and from the Wanderer 2,043 oz. from 827 tons, the bullion value being £3 8s. 6d. per oz.

From the amount of work done it appears doubtful if all the ore crushed from the Parnell has been recorded.

(2) *C.D. Roe Line of Reef*.—This line is continuous with the Duchess-Eureka line and is about 2 miles in length. The reef occupies a fairly prominent line of shearing. The reef, which is up to 12 inches in width, has been worked in various parts and known as the Bismark, Duke, Star, Empress, Good Iron, Duchess, and Eureka. At the Eureka, the reef makes into a large quartz-veined formation. The ore in parts is heavily mineralized and contains pyrite, arsenopyrite and galena.

The production has been 5,815 oz. from 5,197 tons, the bullion being valued at £3 to £3 3s. per oz.

(3) *Ryan's Reef*.—Ryan's reef trends north-west but junctions a north-south reef near the southern end of the latter, south of this junction the reef appears to have been named the Alice Cornwall. Workings on these reefs have not been extensive. The Princess Midas shaft on Ryan's reef is the only shaft which is of any depth. The total production was 278 tons which yielded 148 oz.

(4) *Ancient Britton Reef*.—The Ancient Britton lies midway between the Problem and Ryan's reefs. The reef outcrops on either side of a small hill capped with sandstone and has been worked under the sandstone. The reef strikes east-west and dips to the north at a low angle. The reef is narrow and workings are not extensive. The production was 759 oz. from 799 tons of ore.

(5) *Democrat and Queen of the Springs Reefs*.—These reefs occur at the foot of the sandstone tableland and a few hundred yards to the north of the Croydon to Georgetown road. The reefs are parallel and strike north-west. Though in places the outcrops are several feet in width workings are not extensive and are shallow in depth. Alluvial gold has been worked in the loam and gullies in the vicinity of these reefs. The distribution of these latter workings suggests that some of the gold was derived from the weathering of the sandstone. The productions were for the Democrat 262 tons which yielded 172 oz. with an average bullion value of £3 3s. per oz. and for the Queen of the Springs 295 tons for a yield of 155 oz. The quantity of alluvial gold obtained is not known.

(16) Rands, W. H. *Ibid.*



(6) *King of the Springs Reef*.—The King of the Springs reef crosses the Croydon to Georgetown road about 0.5 miles to the west of the Democrat. The reef which is vertical is narrow. The workings consist of several shallow shafts and there is no evidence of a long shoot having been worked. The production was 110 tons which yielded 139 oz. of bullion the average value of the bullion being £3 3s. per oz.

#### J. VARIOUS REEFS IN GRANITE.

A fairly large extent of granite occupies the south-eastern portion of the area. The geological structure and the reefs in the granite of the Croydon gold-field have been described generally in a previous report.<sup>(17)</sup> That report did not, however, contain descriptions of the reefs in the granite in the south-eastern portion of the Felsite area. Such descriptions are therefore being included in the present report.

(1) *Moonstone*.—The Moonstone reef is situated on the south bank of Moonlight Creek. The reef is narrow, strikes east-west and dips to the north at a low angle. The country rock is normal granite. The production was 14,424 oz. from 5,456 tons of ore, the bullion being valued at £2 6s. per oz. This reef is probably almost worked out.

(2) *Jolly Tar*.—The reef is large and strikes at 302 degrees and dips steeply to the east. The country rock is normal granite. The reef has been worked spasmodically in parts over a length of 150 to 200 feet.

It has been suggested that this reef is a south-eastern continuation of the Highland Mary reef, which reappears after passing under the sandstone. This idea is thought to be highly improbable as the characteristics of the reefs differ and further, at its southern end, the Highland Mary reef appears to split up into numerous branching leaders.

According to verbal information received the reef was much faulted and numerous breaks were encountered.

The production of 778 tons yielded 813 oz. of bullion valued at £3 4s. per oz.—a somewhat high value for a reef occurring in the granite.

As Reid<sup>(18)</sup> points out little has been done beyond demonstrating that the reef carries payable ore and must, therefore, be regarded as a possible producer. The sinking of, and driving from, an underlay shaft are suggested.

(3) *City of London*.—The City of London reef is situated on the southern bank of Moonlight Creek about 0.5 miles downstream from the Moonstone reef.

It is a small almost vertical fissure reef occurring in normal granite. The production was 504 tons which yielded 2,154 oz. of bullion valued at £2 14s. per oz.

Very little is to be seen at present but the following description is to be found in Rands' report.<sup>(19)</sup>

The total depth of the workings is 125 feet. The reef is nearly vertical but has a slight underlie to the west and bears north-south. At the time of my visit I could not get down the reef to a greater depth than 15 feet. Mr. Madsen, to whom I am indebted for the following notes, informed me that from 50 feet downwards the reef averaged about 18 inches and crushings have gone from 4½ oz. to 7 oz. 4 dwt. of gold per ton.

At 115 feet a level has been driven north for 125 feet, and in the vicinity of the shaft the reef has been stoped from that level nearly to the surface. At the end of the level only a small portion of the reef has been worked out. The last crushing was obtained in sinking the well-hole, and starting the level at 115 feet, when 11 tons yielded 7 oz. 4 dwt. of gold per ton. Continuing the drive, 15 tons yielded 6 oz. 5 dwt., and all through the level the stone is good.

Above the 50 feet level the reef is small, not averaging more than 8 inches in width. The stone was not so good, going about 3 oz. per ton. In starting the shaft at the surface 4½ tons yielded 104 oz.

\* \* \* \* \*  
The country is hard to a depth of 50 or 60 feet; below that it is of a little milder character.  
\* \* \* \* \*

The best crushings have come from those parts of the reef that have been the biggest.

The lower levels have been abandoned as they could not contend with the water without an engine.

Since the year 1888, 289 tons have been crushed for a return of 1,338 oz. of gold valued at £2 14s. per oz.

Departmental records show that, since the above was written, only 215 tons have been crushed for a return of 816 oz. of bullion.

From the above description of the workings the calculated tonnage proved by the drive between 115 feet and the surface (assuming from the above description an average width of 8 inches to a depth of 50 feet and a width of 18 inches from 50 feet to 115 feet, and allowing 12 cubic feet of ore per ton) works out at 1,363 tons. As only 504 tons have been crushed it would appear that there may be some 850 tons of ore still available.

With the probability of this ore available the mine offers a rather attractive proposition. No attempt has been made to test the reef deeper than 115 feet where the grade of ore was still good. Further, as far as can be gathered, the grade was still good in the end of the 115 feet level but water difficulties caused cessation of the work, and it is possible that 125 feet is not the total

<sup>(17)</sup> Honman, C. S. *op. cit.*

<sup>(18)</sup> Reid, J. H. *op. cit.*

<sup>(19)</sup> Rands, W. H. *op. cit.*



length of the shoot. To the south of the workings (about 100 feet), there is an old collapsed costean. The quartz from the dump of this costean gave a good prospect in the dish (about 1 to 1.5 oz. per ton). As the reef is completely covered by alluvium the possibility of finding an extension of the shoot or a further shoot is reasonable.

There does not seem to be any reason to doubt that the reef will persist in depth as the walls where visible are good and indicate that the lode occurs in a defined fissure. The grade might also continue. This lode, therefore, offers an attractive proposition to a small syndicate with adequate pumping machinery and, if properly worked, should be capable of further production. It must be pointed out that the mine is small and rich and that tonnages are expected to be limited.

It is recommended that, before any underground work is done, preliminary costeaning should be carried out to the south of the workings to prove the extent, if any, of the shoot to the south and the possibility of further shoots.

In view of the fact that the old workings are in rather a collapsed state it would be probably best to sink a new shaft. The position of this would depend on the results of costeaning. If the costeans to the south do not reveal anything to suggest sinking, the best position would be to the north of the present shaft. The shaft could be connected with the old drive with a view to working the block of ore left and deepened to test the deeper ground.

In conclusion, it may be said that this lode, in the light of the information available, appears an attractive small scale mining venture.

(4) *Croydon King*. (See plate 13.)—The Croydon King and Emperor workings are situated 6 miles from Croydon along the Croydon to Georgetown road. Ore was mined from the Croydon King claims (P.C. and Nos. 1 to 8). The total production for the Croydon King reef was 7,990 tons of ore for a yield of 17,015 oz. of gold bullion with an average value of £2 7s. 6d. per oz. and from the Emperor reef 547 tons of ore yielded 1,413 oz. of gold bullion, the average bullion value being £2 2s. per oz.

The Croydon King reef occurs in flat country partly covered by soil and laterite. The country rock is granite where visible in outcrop or in the workings. The felsite contact is parallel to the reef and at a distance of 1,000 feet on the north-eastern side of the reef. Near the granite-felsite contact the granite is finer than in the main mass while the felsite shows signs of recrystallization. Throughout the granite in the vicinity of the reef are scattered small patches of graphitic granite. In one open cut a block of highly altered graphitic slate about 2 feet in diameter is visible as a xenolith in the granite. On the dump of one of the underlay shafts graphitic slate has been deposited. The reef which is composed of quartz has an average width of about 12 to 24 inches. The strike of the reef is north-west and the dip is to the north-east at 20 to 30 degrees. There are in addition several other leaders and reefs near the southern end of the main reef. In the deeper workings it is stated<sup>(20)</sup> that the reef splits into a hanging wall and a footwall reef separated by granite.

The main workings extend over a horizontal length of 1,700 feet but it appears that the greatest vertical depth at which ore was stoped was 85 feet.<sup>(21)</sup> Shafts are sunk along the frontage of the reef at close intervals and three old underlay shafts were located. Two collapsed stopes 300 feet and 200 feet in length respectively are visible. None of the workings are now accessible.

It is stated<sup>(22)</sup> that the reef is down faulted on the dip side by a north-south fault. It was considered that the reef had not been located in some of the deeper shafts but Reid<sup>(23)</sup> points out it has been proved by three drill holes that the reef does continue in depth. Where intersected in the above-mentioned workings it is thought that the quartz may have given place to formation which was not recognized as such by the miners. The results of the drill holes are apparently incompletely recorded but it is stated<sup>(24)</sup> "prospects of low grade bullion were detected" in two reefs with widths of 12 and 24 inches at depths of 165 and 173 feet respectively in one drill hole. Apparently Reid was unable to obtain any record of assays of the cores.

As stated by Reid<sup>(25)</sup> there is a possibility of a faulted extension of the reef being located under Recent deposits. It is considered that there may be further shoots of payable ore in the deeper levels. Auriferous quartz has been proved by the drilling to exist at twice the depth of the deepest stopes. No guidance can be given as to the most likely positions for testing but a vertical shaft with drives from the bottom of the shaft may possibly locate a further shoot or shoots. In the main reefs of the Granite area in most cases the mining operations have extended down the dip of the reefs till the reefs were lost against "breaks". In the case of the Croydon King reef, however, from Reid's report<sup>(26)</sup> it seems that there is still a portion of the reef in the deeper ground which has not been prospected. Testing of the deeper ground is recommended

<sup>(20)</sup> Rands, W. H. *Ibid.*

<sup>(21)</sup> Reid, J. H. *op. cit.*

<sup>(22)</sup> Reid, J. H. *Ibid.*

<sup>(23)</sup> Reid, J. H. *Ibid.*

<sup>(24)</sup> Reid, J. H. *Ibid.*

<sup>(25)</sup> Reid, J. H. *Ibid.*

<sup>(26)</sup> Reid, J. H. *Ibid.*



as it is considered the rich grade of the reef as shown by past records and the experience of the distribution of the shoots in the main reefs in the Granite area make this testing a legitimate mining venture.

The Emperor workings consist of a number of shallow shafts and open cuts running in a south-easterly direction off the Croydon King reef. It is probable that more than one reef was worked though all the workings are now collapsed and the country is covered by Recent deposits.

(5) *Richmond*. (See plate 13.)—The Richmond reef is situated about 1.5 miles north-north-east from the Croydon King reef. The Richmond reef strikes north-south and dips to the east at a low angle. The reef is composed of quartz and averages 3 to 4 inches in width. The reef is traceable for about 1,700 feet and occurs in normal granite along the western edge of a prominent line of sandstone-capped hills.

The workings visible are a number of vertical and underlay shafts. These workings are now either collapsed or in a dangerous state and could not be inspected. The deepest workings are 670 feet inclined depth in the old P.C. underlay shaft. The bulk of the gold was obtained from the P.C. workings and some rich grade and specimen ore was obtained. In recent years small amounts of quartz picked from the old mullock dump have given payable returns. The total production from the Richmond reef was 7,460 tons of ore which yielded 23,192 oz. of bullion with an average value of £2 5s. per oz.

(6) *Morning Light*. (See plate 13.)—The Morning Light reef is situated about 2 miles along the Croydon-Stanhills road from the Croydon King reef. The country is flat and soil covered. Normal granite outcrops in places and is visible in the workings. The reef strikes east-west and dips to the south at a low angle. The workings consist mainly of numerous vertical shafts and are now collapsed and the reef cannot be seen. It is understood, however, that the quartz was narrow. Near the western end of the reef is a north-south leader on which there are two potholes and one costean so it appears that this leader was too low grade to be worth mining. The production from the Morning Light reef was 521 tons of ore which yielded 1,589 oz. of bullion, the bullion having an average value of £2 5s. per oz. It is stated locally, however, that in parts of the reef the bullion contained a high percentage of silver.

(7) *White Star*.—Included under the White Star are several large parallel quartz reefs occurring in a zone of shearing running slightly east of north in normal granite. Only one short shoot has been worked to any extent though there are a few shallow cuts on other parallel reefs. Dish prospects indicated that even low-grade ore was not to be expected outside the old workings. The only good prospects to be obtained were from quartz from the dump at the main shoot. The production was 211 tons of ore which yielded 162.5 oz. valued at £3 10s. 6d. per oz.

In view of the short shoot the reef does not offer an attractive prospect.

(8) *The Elgin, Boomerang, &c.*—The Elgin, Boomerang and several other small parallel vertical leaders occur in a zone of fracturing in normal granite near the felsite contact. They are not regarded as of importance.

The productions were for the Elgin reef 1,116 tons of ore which yielded 697 oz. and for the Boomerang 104 tons which yielded 118 oz.

(9) *Problem*.—The Problem strikes east and dips at 50 degrees to the north. The country rock is normal granite though the felsite contact is not far to the north of the outcrop. The reef is only about 15 inches in width. There is not much to be seen as the workings are collapsed and shafts are no longer distinguishable. The production was 2,025 oz. from 1,355 tons of ore, the value of the bullion being £3 3s.

(10) *The Demon of the Gap, Pyramids, and Crocodile*.—These are narrow reefs in granite and appear to have been very patchy. The Pyramids reef has had more work done on it than the others have. The productions were very small.

## VI. SUMMARY AND CONCLUSIONS.

The Felsite area is the term used for that portion of the Croydon gold-field which lies to the north and east of the township. The area is occupied by a suite of volcanic rocks in which both effusive and pyroclastic types are present. The reefs of the Felsite area have produced gold to the value of £587,634. The reefs are numerous but they occur mainly in groups. Two types of reefs are present; firstly, reefs dipping at low angles and secondly reefs which are vertical or dip at high angles. In general the vertical reefs are narrower than those which dip at low angles. Some of the reefs merit further testing and may yield further quantities of payable ore if worked in a systematic manner. Such reefs will be referred to below.

(1) *Mountain Maid Group*.—The Mountain Maid reef which has been the chief producer of this group was recently re-opened and tested in the deeper levels. The results were not available but as the work was discontinued after testing it is concluded that the main shoots are worked out. The existence of shoots beyond the workings is not considered likely. The General Grant



may yield ore if additional work is carried out in the deeper levels. Small tonnages payable to prospectors may be obtained from the Rainbow reef. The Babe reef may yield small tonnages of payable ore and there is, in addition, the possibility of a shoot of ore at the intersection of the Babe and Mountain Maid reefs in the deeper levels.

(2) *Homeward Bound Group*.—The Homeward Bound reef though of considerable length is narrow and it is probable that all or most of the payable ore has been extracted. The other reefs of the group do not appear likely to have extensive future productions.

(3) *Mark Twain Group*.—The Mark Twain reef is likely to produce small quantities of payable ore. The Magenta claim on the old Premier lease is the most favorable locality. Further testing of the Ironclad reef in the deeper levels may yield payable ore.

(4) *Mulligan Group*.—Additional productions of appreciable tonnages are not expected from the reefs of the Mulligan group.

(5) *Jubilee or Twelve Mile Group*.—Testing with a view to working this group under single management with central treatment plant, if proved to be warranted, is recommended. The Jubilee reef is one of the longest and widest reefs of the Felsite area and if a payable grade of ore is proved the reef would be capable of yielding considerable tonnages of ore. Three shoots on the southern end of the Lady Lottie merit testing below the old workings. On the Rosshire and Golden Fleece reefs fairly long shoots were worked to shallow depths in the past and testing may yield payable ore. It is unlikely that the other reefs of the group will have further productions of importance.

(6) *Tabletop Group*.—Tabletop was the most important centre in the Felsite area. The average grade of ore mined in the past was 10.7 dwt. of gold per ton and it is possible that with more efficient equipment some of the mines could be re-opened. As in the case of the Jubilee group it is considered that an organization controlling the whole group would have better chances of a successful undertaking than small parties working individual reefs.

At Mount Morgan and Day Dawn hills careful sampling of the surface outcrops is recommended. Diamond drilling to test the possibility of a repetition of reefs at Mount Morgan hill is recommended and if this drilling is successful further diamond drilling at Day Dawn hill should be undertaken.

Mining operations with a view to testing the more important shoots of the Bobby Dazzler and Ace of Hearts reefs are also recommended.

(7) *Golden Valley Group*.—The Golden Valley group differs from the other groups in that, with one exception, the reefs are vertical or dip at high angles. Furthermore, the average grade of ore for the Golden Valley group is higher than that of the other groups. It is stated locally that the ore from the deep levels was extremely refractory and the inability of the treatment plant to remove a sufficient percentage of the gold was a factor which largely contributed to the closure of the mines. The information available does not allow the recommendation of further work in this group.

(8) *Carron River Group*.—It is not considered likely that any future production of importance will come from this group.

(9) *Various Reefs in Felsite*.—A number of reefs occur in felsite in the south-eastern portion of the area but they are not considered to be important.

(10) *Various Reefs in Granite*.—These reefs are scattered through the south-eastern portion of the Granite area. The reefs are mainly narrow and productions have not been large. The Croydon King offers scope for prospecting in the deeper levels as the reef has been proved to exist at a greater depth than it has been mined and further shoots in this unprospected portion of the reef are possible. At the City of London reef there may be a block of fairly high grade ore which, owing to the difficulties in coping with the water, was not mined. There is a discrepancy of 850 tons of ore between the tonnage calculated from an old description of the workings<sup>(27)</sup> and the production recorded in the Warden's office.<sup>(28)</sup> The above description also states that the ore along the bottom level is high-grade. Costeaning to test for an extension of this reef as a preliminary is considered justified. The Jolly Tar may also warrant further trial. The other reefs in this portion of the Granite area do not appear worth further trial.

(Sgd.) R. J. S. CLAPPISON,

(Sgd.) S. B. DICKINSON,

Assistant Geologists.

Brisbane, 18th March, 1937.

<sup>(27)</sup> Rands, W. H. *op. cit.*

<sup>(28)</sup> Original Register of Crushings, Warden's Office, Croydon.



# LIST OF PUBLICATIONS—continued.

## WESTERN AUSTRALIA—continued.

- †No. 56, The Ellarine Hills and Andover Iron Deposits, Pilbara Gold-field, by K. J. Finucane, M.Sc., and R. J. Telford.  
 No. 57, The Moolyella and Cooglegong Tin-fields, Pilbara Gold-field, by C. J. Sullivan, B.Sc.  
 †No. 58, Prospecting of the Coongan-Bamboo Creek Area, Pilbara Gold-field, by F. H. Jones.  
 †No. 59, The Lalla Rookh-North Shaw Area, Pilbara Gold-field, by C. J. Sullivan, B.Sc.  
 No. 60, The Black Hills Area, Ashburton Gold-field, by K. J. Finucane, M.Sc.  
 No. 61, The Dead Finish, Mount Mortimer, Top Camp and Soldier's Secret Mining Centres, Ashburton Gold-field, by F. H. Jones and R. J. Telford. } In one publication.  
 No. 62, The Lead and Copper Deposits at Uaroo, Weston's and Hancock's, Ashburton Gold-field, by K. J. Finucane, M.Sc., and C. J. Sullivan, B.Sc. } In one publication.  
 No. 63, The Red Hill and Yarraloola Copper Fields, Ashburton District, by F. H. Jones.  
 †No. 64, Geophysical Report on the Wiluna Area, Wiluna (Part 2, Magnetic Surveys), by L. A. Richardson, J. M. Rayner, B.Sc., and P. B. Nye, M.Sc., B.M.E.

## NORTHERN TERRITORY.

- No. 1, The Pine Creek Gold-field, by P. S. Hossfeld, M.Sc.  
 No. 2, The Union Reefs Gold-field, by P. S. Hossfeld, M.Sc.  
 No. 3, The Golden Dyke Mine and Adjacent Areas, by P. S. Hossfeld, M.Sc.  
 No. 4, Report on Magnetic Prospecting at Tennant Creek, by J. M. Rayner, B.Sc., and P. B. Nye, M.Sc., B.M.E. (see also Nos. 23, 41 and 57).  
 No. 5, The Mount Todd Auriferous Area, Pine Creek District, by V. M. Cottle (see also No. 31).  
 No. 6, Geophysical Report on the Mount Todd Auriferous Area, Pine Creek District, by J. M. Rayner, B.Sc., and P. B. Nye, M.Sc., B.M.E.  
 No. 7, Geophysical Report on the Fountain Head Area, Pine Creek District, by J. M. Rayner, B.Sc., and P. B. Nye, M.Sc., B.M.E. } In one publication.  
 No. 8, Geological Report on the Fountain Head Area, Pine Creek District, by V. M. Cottle } In one publication.  
 No. 9, Geophysical Report on the Yam Creek Area, Pine Creek District, by J. M. Rayner, B.Sc., and P. B. Nye, M.Sc., B.M.E. } In one publication.  
 No. 10, Geological Report on the Yam Creek Area, Pine Creek District, by V. M. Cottle. } In one publication.  
 No. 11, Geophysical Report on the Woolwonga Area, Pine Creek District, by J. M. Rayner, B.Sc., and P. B. Nye, M.Sc., B.M.E. } In one publication.  
 No. 12, Geological Report on the Woolwonga Area, Pine Creek District, by A. H. Voisey, M.Sc. } In one publication.  
 No. 13, Geophysical Report on the Iron Blow Area, Pine Creek District, by J. M. Rayner, B.Sc., and P. B. Nye, M.Sc., B.M.E. } In one publication.  
 No. 14, Geological Report on the Iron Blow Area, Pine Creek District, by P. S. Hossfeld, M.Sc. } In one publication.  
 No. 15, (a) Geophysical Test Surveys on the Britannia, Zapopan and Mount Wells Areas, Pine Creek District, by J. M. Rayner, B.Sc., and P. B. Nye, M.Sc., B.M.E. } One publication.  
 (b) Geological Notes on the Britannia and Zapopan Areas, Pine Creek District, by V. M. Cottle.  
 No. 16, Geophysical Report on the Hercules Gold Mine, Pine Creek District, by J. M. Rayner, B.Sc., and P. B. Nye, M.Sc., B.M.E. (see also No. 47).  
 No. 17, The Fletcher's Gully Area, Daly River District, by P. S. Hossfeld, M.Sc.  
 No. 18, The Tin Deposits of the Buldiva-Collia Area, Daly River District, by P. S. Hossfeld, M.Sc.  
 †No. 19, The Daly River Copper and Silver-Lead Area, Daly River District, by P. S. Hossfeld, M.Sc. (see also No. 32).  
 No. 20, The Eastern Portion of the Arltunga Area, Eastern MacDonnell Ranges District, by P. S. Hossfeld, M.Sc.  
 No. 21, Quartz Body at Simpson's Gap, Alice Springs, by P. S. Hossfeld, M.Sc.  
 No. 22, The Ciccone Mine, Winnecke Area, Eastern MacDonnell Ranges District, by P. S. Hossfeld, M.Sc. (In same publication as N.T. Nos. 39 and 40.)  
 No. 23, Second Report on Magnetic Prospecting at Tennant Creek (1936), by L. A. Richardson, J. M. Rayner, B.Sc., and P. B. Nye, M.Sc., B.M.E. (Supplementary to N.T. No. 4) (see also Nos. 41 and 57).  
 No. 24, Geological Report on the Southern Extension of the Pine Creek Gold-field, Pine Creek District, by P. S. Hossfeld, M.Sc. } In one publication.  
 No. 25, Geophysical Report on the Southern Extension of the Pine Creek Gold-field, Pine Creek District, by J. M. Rayner, B.Sc., and P. B. Nye, M.Sc., B.M.E. } In one publication.  
 No. 26, The Evelyn Silver-Lead Mine, Pine Creek District :  
 (a) Geological Report by P. S. Hossfeld, M.Sc.  
 (b) Geophysical Report by J. M. Rayner, B.Sc., and P. B. Nye, M.Sc., B.M.E.  
 No. 27, The Maude Creek Mining Centre, Pine Creek District, by V. M. Cottle.  
 No. 28, The White Range Gold-field, Eastern MacDonnell Ranges District, by P. S. Hossfeld, M.Sc.  
 No. 29, The Home of Bullion Mine, Central Australia, by P. S. Hossfeld, M.Sc.  
 No. 30, Preliminary Report on The Granites Gold-field, Central Australia, by P. S. Hossfeld, M.Sc. (see also N.T. Nos. 43 and 48).  
 No. 31, Second Report on the Mount Todd Auriferous Area, Pine Creek District, by P. S. Hossfeld, M.Sc., and P. B. Nye, M.Sc., B.M.E. (Supplementary to N.T. No. 5.)  
 No. 32, The Wallaby Silver-Lead Lode, Daly River District, by P. S. Hossfeld, M.Sc. (Supplementary to N.T. No. 19.)  
 \*No. 33, The Wolfram Hill-Hidden Valley Area, Pine Creek District, by A. W. Klesman, M.Sc.  
 \*No. 34, Geophysical Report on the Wolfram Hill Area, Pine Creek District, by R. F. Thyer, B.Sc., J. M. Rayner, B.Sc., and P. B. Nye, M.Sc., B.M.E. } In one publication.  
 \*No. 35, The Maranboy Tin-field, Pine Creek District, by T. V. Lewis, B.C.E. } In one publication.  
 \*No. 36, Geophysical Report on the Maranboy Tin-field, Pine Creek District, by R. F. Thyer, B.Sc., J. M. Rayner, B.Sc., and P. B. Nye, M.Sc., B.M.E. } In one publication.  
 \*No. 37, The Horseshoe Creek Tin-field, Pine Creek District, by A. W. Kleeman, M.Sc.  
 \*No. 38, The Driffield Area, Pine Creek District, by P. S. Hossfeld, M.Sc.  
 No. 39, The Glankroil Mine, Winnecke Gold-field, Eastern MacDonnell Ranges District, by P. S. Hossfeld, M.Sc. } In same publication as N.T. No. 22.  
 No. 40, The Winnecke Gold-field, Eastern MacDonnell Ranges District, by P. S. Hossfeld, M.Sc. } In same publication as N.T. No. 22.  
 \*No. 41, Third Report on Magnetic Prospecting at Tennant Creek (1937), by L. A. Richardson and J. M. Rayner, B.Sc. (see also N.T. Nos. 4, 23 and 57).  
 †No. 42, Geophysical Report on the Henbury Meteorite Craters, Central Australia, by J. M. Rayner, B.Sc.  
 No. 43, The Gold Deposits of The Granites-Tanami District, Central Australia, by P. S. Hossfeld, M.Sc. (to which N.T. No. 30 was preliminary) (see also N.T. No. 48).  
 \*No. 44, The Minerall Deposits of the Yearalba Area, near Katherine, by P. S. Hossfeld, M.Sc.  
 \*No. 45, The Brock's Creek Area (including the Howley Gold Deposits), Pine Creek District, by P. S. Hossfeld, M.Sc.  
 †No. 46, The McKinley Gold Mine, Pine Creek District, by P. S. Hossfeld, M.Sc.  
 †No. 47, The Hercules Gold Mine, Pine Creek District, by C. J. Sullivan, B.Sc. (see also N.T. No. 16).  
 \*No. 48, Geophysical Report on the Granites Gold-field, Central Australia, by R. F. Thyer, B.Sc., J. M. Rayner, B.Sc., and P. B. Nye, M.Sc., B.M.E. (see also N.T. Nos. 30 and 43).  
 \*No. 49, Limestone Deposits near Alice Springs, Central Australia, by P. S. Hossfeld, M.Sc.  
 No. 50, The Redbank (or Wologorang) Copper Field, Northern Territory, by H. I. Jensen, D.Sc.  
 \*No. 51, Geophysical Report on the Redbank (or Wologorang) Copper Field, by R. F. Thyer, B.Sc., and J. M. Rayner, B.Sc.  
 \*No. 52, The Wauchope Creek Wolfram Field, Central Australia, by P. S. Hossfeld, M.Sc.  
 \*No. 53, The Hatches Creek Wolfram Field, Central Australia, by P. S. Hossfeld, M.Sc.  
 \*No. 54, The Mount Doreen Wolfram Field, Central Australia, by P. S. Hossfeld, M.Sc.  
 \*No. 55, The Mount Hardy Copper Field, Central Australia, by S. N. Kiek, B.Sc.  
 \*No. 56, }  
 \*No. 57, Fourth and Final Report on Magnetic Prospecting at Tennant Creek, by L. A. Richardson and J. M. Rayner, B.Sc. (see also Nos. 4, 23 and 41).



# LIST OF PUBLICATIONS—continued.

## QUEENSLAND.

- No. 1, The Mount Freda-Canteen Area, Soldiers Cap, Cloncurry District, by C. S. Honman, B.M.E.  
 No. 2, The Gilded Rose Area, Cloncurry District, by C. S. Honman, B.M.E.  
 No. 3, The Geophysical Methods of the Electrical Prospecting Company of Sweden, used in the Aerial, Geological and Geophysical Survey of Northern Australia, by Sepp Horvath.  
 No. 4, Geophysical Report on the Soldiers Cap Area, Cloncurry District, by J. M. Rayner, B.Sc., and P. B. Nye, M.Sc., B.M.E.  
 No. 5, Geophysical Report on the Trekelano Area, Cloncurry District, by J. M. Rayner, B.Sc., and P. B. Nye, M.Sc., B.M.E. (see also No. 17).  
 No. 6, Geophysical Report on the Dobbyn Area, Cloncurry District, by J. M. Rayner, B.Sc., and P. B. Nye, M.Sc., B.M.E.  
 No. 7, Geophysical Report on the Dugald River Silver-lead Lodes, Cloncurry District, by J. M. Rayner, B.Sc., and P. B. Nye, M.Sc., B.M.E.  
 No. 8, The Dugald River Silver-Lead Lodes, Cloncurry District, by C. S. Honman, B.M.E.  
 No. 9, Geophysical Report on the Croydon-Golden Gate Area, Croydon Gold and Mineral Field, by J. M. Rayner, B.Sc., and P. B. Nye, M.Sc., B.M.E. (see also No. 44).  
 No. 10, The Silver Ridge Auriferous Lodes, Cloncurry District, by E. O. Rayner, B.Sc.  
 No. 11, Geophysical Report of the Silver Ridge Auriferous Lodes, Cloncurry District, by J. M. Rayner, B.Sc., and P. B. Nye, M.Sc., B.M.E. } In one publication.  
 No. 12, The Claudie River Gold and Mineral Field, Portland Roads District, Cape York Peninsula, by E. Broadhurst, M.Sc., and E. O. Rayner, B.Sc. (see also No. 30).  
 No. 13, Geophysical Report on the Iron Range Area, Claudie River Gold and Mineral Field, by C. A. Jarman, B.Sc., J. M. Rayner, B.Sc. and P. B. Nye, M.Sc., B.M.E.  
 No. 14, The Hampdon Copper Mines, Kuridala, Cloncurry District, by E. Broadhurst, M.Sc.  
 No. 15, The Mount Oxide Copper Mine, Cloncurry District, by C. S. Honman, B.M.E. (In same publication as Q. No. 20.)  
 †No. 16, The Croydon-Golden Gate (Granite) Area, Croydon Gold and Mineral Field, by C. S. Honman, B.M.E. (see also No. 26).  
 \*No. 17, Second Geophysical Report on the Trekelano Area, Cloncurry District, by R. F. Thyer, B.Sc., J. M. Rayner, B.Sc., and P. B. Nye, M.Sc., B.M.E. (Supplementary to Q. No. 5.)  
 †No. 18, The Soldiers Cap Area, Cloncurry District, by C. S. Honman, B.M.E. (with portions by R. J. S. Clappison, B.Sc., and E. O. Rayner, B.Sc., and Appendix by A. C. Booth, on Methods of Mapping with the aid of Aerial Photographs).  
 No. 19, The Bower Bird Auriferous Area, Cloncurry District, by C. S. Honman, B.M.E. (see also No. 48).  
 No. 20, The Mount Oxide Area, Cloncurry District, by C. S. Honman, B.M.E. (In same publication as Q. No. 15.)  
 \*No. 21, The Ballara Area, Cloncurry District, by C. S. Honman, B.M.E. (with portions by M. L. Wade).  
 \*No. 22, The Mount Elliott-Hampden Area, Cloncurry District, by C. S. Honman, B.M.E.  
 No. 23, The Tin Deposits of the Stanhills Area, Croydon Gold and Mineral Field, by R. J. S. Clappison, B.Sc. (In same publication as Q. No. 51.)  
 No. 24, Geophysical Report on the Lolworth Area, Charters Towers District, by R. F. Thyer, B.Sc., J. M. Rayner, B.Sc., and P. B. Nye, M.Sc., B.M.E. (see also No. 55).  
 No. 25, The Felsite Auriferous Area, Croydon Gold and Mineral Field, by R. J. S. Clappison, B.Sc., and S. B. Dickinson (see also No. 38).  
 \*No. 26, The Croydon-Golden Gate (Granite) Area, Croydon Gold and Mineral Field, by S. B. Dickinson. (Supplementary to Q. No. 16.)  
 \*No. 27, The Herberton Tin Lodes, Herberton District, by E. Broadhurst, M.Sc. (see also Nos. 40 and 42).  
 \*No. 28, The Watsonville Tin Lodes, Herberton District, by M. L. Wade (see also Nos. 40 and 43).  
 \*No. 29, The Tyrconnell-General Grant Auriferous Area, Hodgkinson District, by S. B. Dickinson.  
 No. 30, The Claudie River Gold and Mineral Field, Portland Roads District, Cape York Peninsula, by E. O. Rayner, B.Sc. (Supplementary to Q. No. 12.)  
 No. 31, The Auriferous Conglomerates Area, Palmer River District, by R. J. S. Clappison, M.Sc. } In one publication (see also No. 45).  
 No. 32, The Maytown Auriferous Area, Palmer River District, by R. J. S. Clappison, M.Sc.  
 No. 33, The Cannibal Creek Tin Lodes, Palmer River District, by R. J. S. Clappison, M.Sc.  
 No. 34, The Cobalt Deposits of the Cloncurry District, by E. O. Rayner, B.Sc.  
 No. 35, The Cloncurry Copper Deposits, with Special Reference to the Gold-Copper Ratios of the Ores, by P. B. Nye, M.Sc., B.M.E., and E. O. Rayner, B.Sc.  
 No. 36, Geophysical Report on the Area south east of Mount Coolon Gold Mine, by B. P. Oakes, B.Sc., B.E., J. M. Rayner, B.Sc. and P. B. Nye, M.Sc., B.M.E.  
 No. 37, The Lochness Area, Cloncurry District, by H. I. Jensen, D.Sc.  
 †No. 38, The Felsite Auriferous Area, Croydon Gold and Mineral Field, by R. J. S. Clappison, M.Sc. (Supplementary to Q. No. 25.)  
 †No. 39, The Hodgkinson District, by H. I. Jensen, D.Sc. (see also No. 50).  
 \*No. 40, The Herberton District, by H. I. Jensen, D.Sc. (see also Nos. 27, 28, 41, 42 and 43.)  
 \*No. 41, Geophysical Report on the Herberton Deep Lead, Herberton District, by R. F. Thyer, B.Sc., J. M. Rayner, B.Sc., and P. B. Nye, M.Sc., B.M.E. (see also No. 40).  
 \*No. 42, Geophysical Report on the Herberton Tin Lodes, Herberton District, by R. F. Thyer, B.Sc., J. M. Rayner, B.Sc., and P. B. Nye, M.Sc., B.M.E. (see also Nos. 27 and 40).  
 \*No. 43, Geophysical Report on the United North Australian Group of Mines, Watsonville, Herberton District, by R. F. Thyer, B.Sc., J. M. Rayner, B.Sc., and P. B. Nye, M.Sc., B.M.E., (see also Nos. 28 and 40).  
 \*No. 44, Geophysical Report on the Croydon-Golden Gate Area, Croydon Gold and Mineral Field, by L. A. Richardson, J. M. Rayner, B.Sc., and P. B. Nye, M.Sc., B.M.E. (Supplementary to Q. No. 9.)  
 \*No. 45, The Palmer River District, by H. I. Jensen, D.Sc. (see also Nos. 31 and 32).  
 \*No. 46, The Lawn Hill Silver-Lead-Zinc-Field, Lawn Hill-Wollogorang District, by H. I. Jensen, D.Sc.  
 \*No. 47, Report on Portion of North-Western Queensland adjacent to the Northern Territory Border, by H. I. Jensen, D.Sc.  
 No. 48, The Eastern Portion of the Bower Bird Area, Cloncurry District, by H. I. Jensen, D.Sc. (See also Q. No. 19.)  
 \*No. 49, Geophysical Report on the Blair Athol Coal-field, by R. F. Thyer, B.Sc., and J. M. Rayner, B.Sc.  
 \*No. 50, The Antimony Deposits of the Hodgkinson District, by H. I. Jensen, D.Sc. (see also No. 39).  
 No. 51, The Tin Deposits of the Stanhills Area, Croydon Gold and Mineral Field, by H. I. Jensen, D.Sc. (In same publication as Q. No. 23.)  
 No. 52, The Manganese Deposits of the Cairns District, by H. I. Jensen, D.Sc.  
 \*No. 53, The Chillagoe District, by H. I. Jensen, D.Sc.  
 \*No. 54, (a) Geophysical Report on Supposed True Blue Deep Lead, Croydon Gold-field, by R. F. Thyer, B.Sc., and J. M. Rayner, B.Sc. } In one publication.  
 (b) Geophysical Report on Potential Ratio Survey in the Croydon Gold-field, by R. F. Thyer, B.Sc., and J. M. Rayner, B.Sc.  
 \*No. 55, Second Geophysical Report on Lolworth Area, Charters Towers District, by R. F. Thyer, B.Sc., and J. M. Rayner, B.Sc., (see also No. 24).

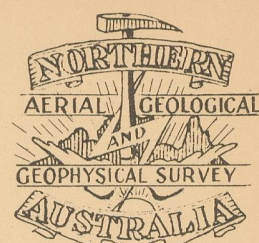
In the above list—

\* denotes reports prepared and in course of being edited ;

† denotes reports prepared, edited and forwarded to the Printer, but not yet published.

Absence of any mark before a report number indicates that such report has been published.





# GEOLOGICAL MAP CROYDON GOLDFIELD (NORTH QUEENSLAND)

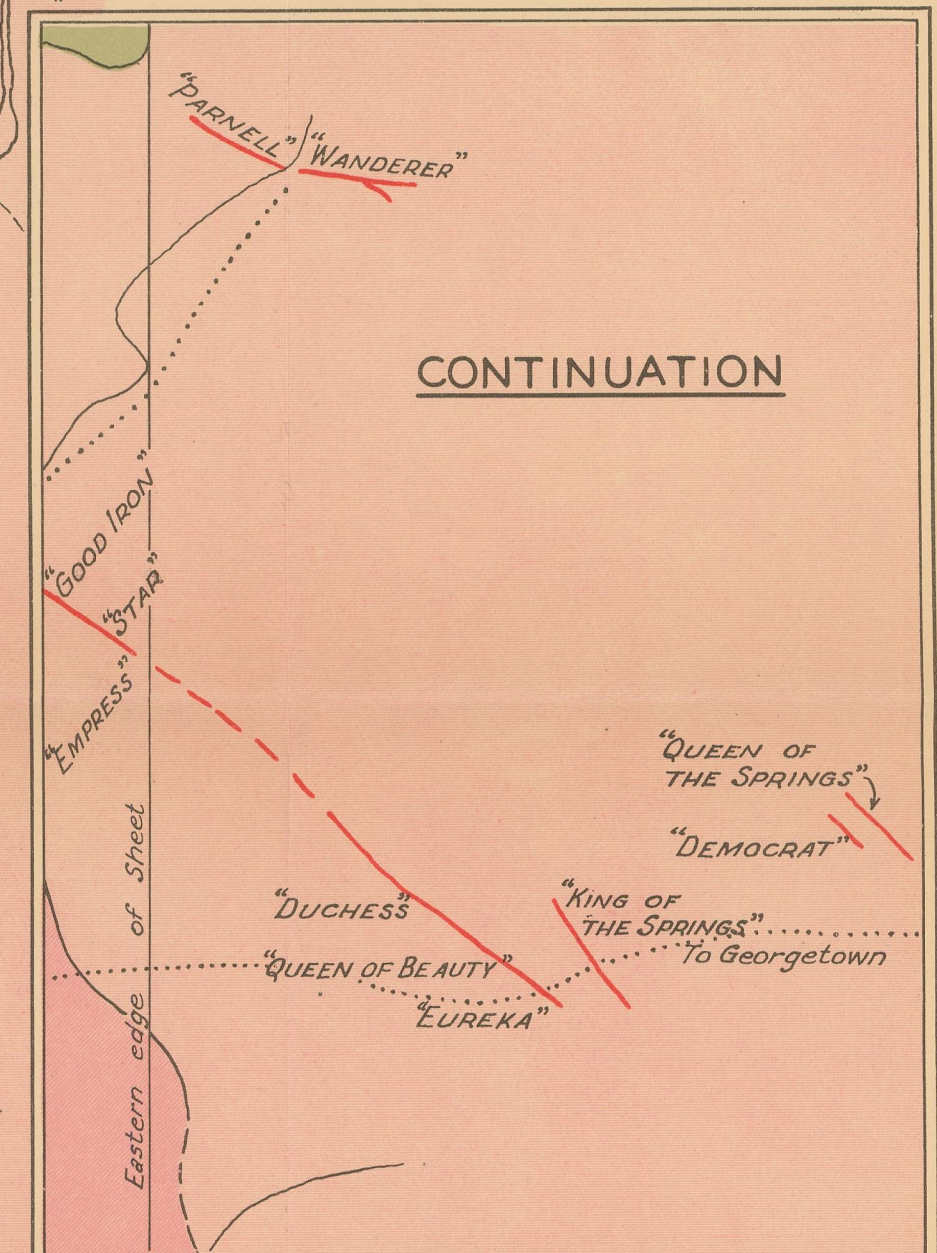
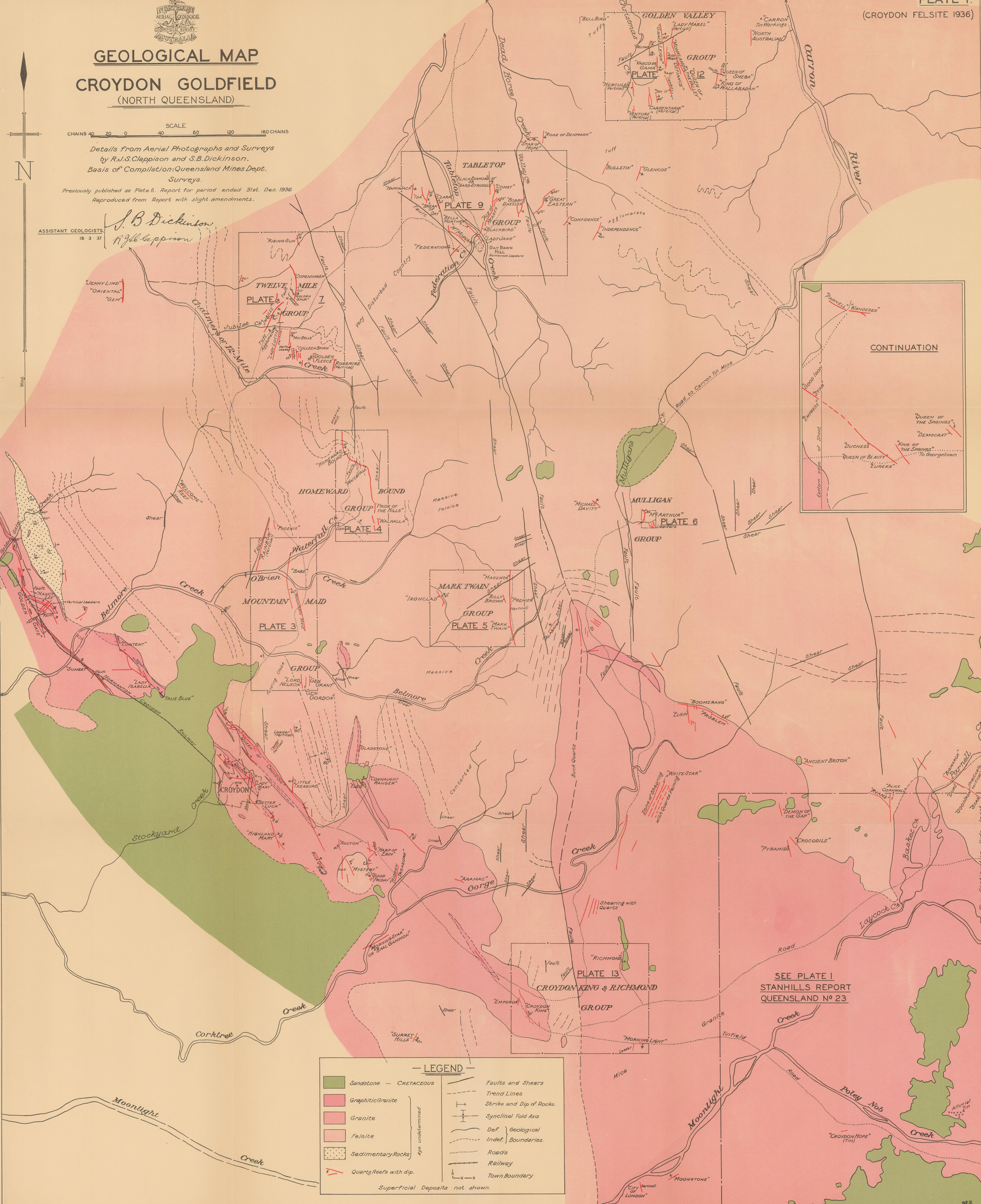
SCALE  
CHAINS 40 80 120 160

Details from Aerial Photographs and Surveys  
by R.J.S. Clappison and S.B. Dickinson.  
Basis of Compilation: Queensland Mines Dept.  
Surveys.

Previously published as Plate 5, Report for period ended 31st. Dec. 1936  
Reproduced from Report with slight amendments.

ASSISTANT GEOLOGISTS  
18-3-37

S. B. Dickinson  
R. J. S. Clappison



**— LEGEND —**

Sandstone — CRETACEOUS	Faults and Shears
Graphitic Granite	Trend Lines
Granite	Strike and Dip of Rocks.
Felsite	Synclinal Fold Axis
Sedimentary Rocks	Def. Geological
Quartz Reef's with dip.	Indef. Boundaries.
	Roads
	Railway
	Town Boundary

Age undetermined

Superficial Deposits not shown.

SEE PLATE I  
STANHILLS REPORT  
QUEENSLAND NO 23

For Continuation - Vide Inset



# PRODUCTION MAP CROYDON GOLDFIELD (NORTH QUEENSLAND)

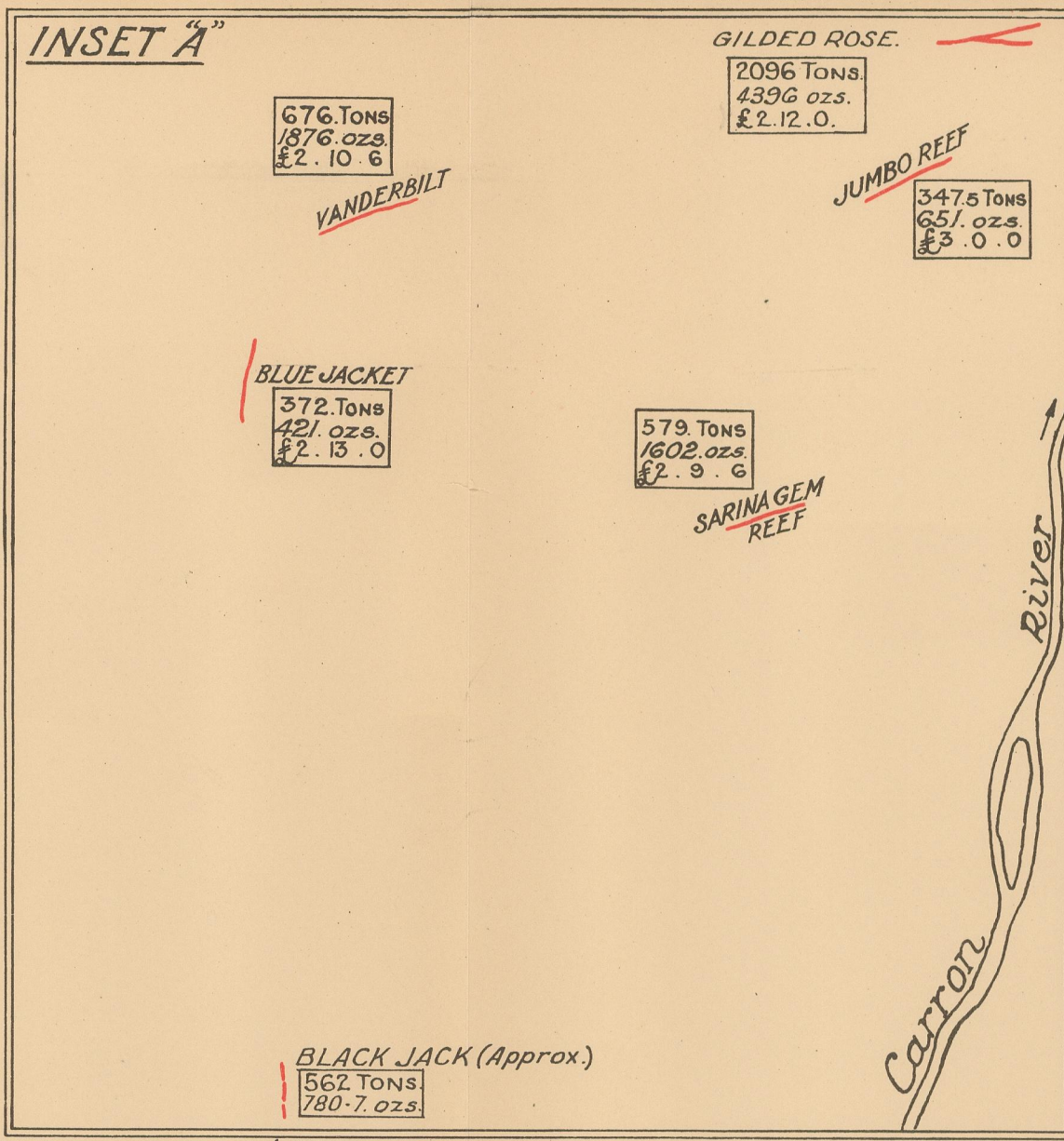
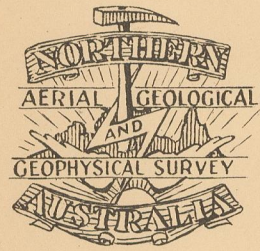
SCALE  
CHAINS 40 20 0 40 80 120 160 CHAINS

For Geology - See Plate I.

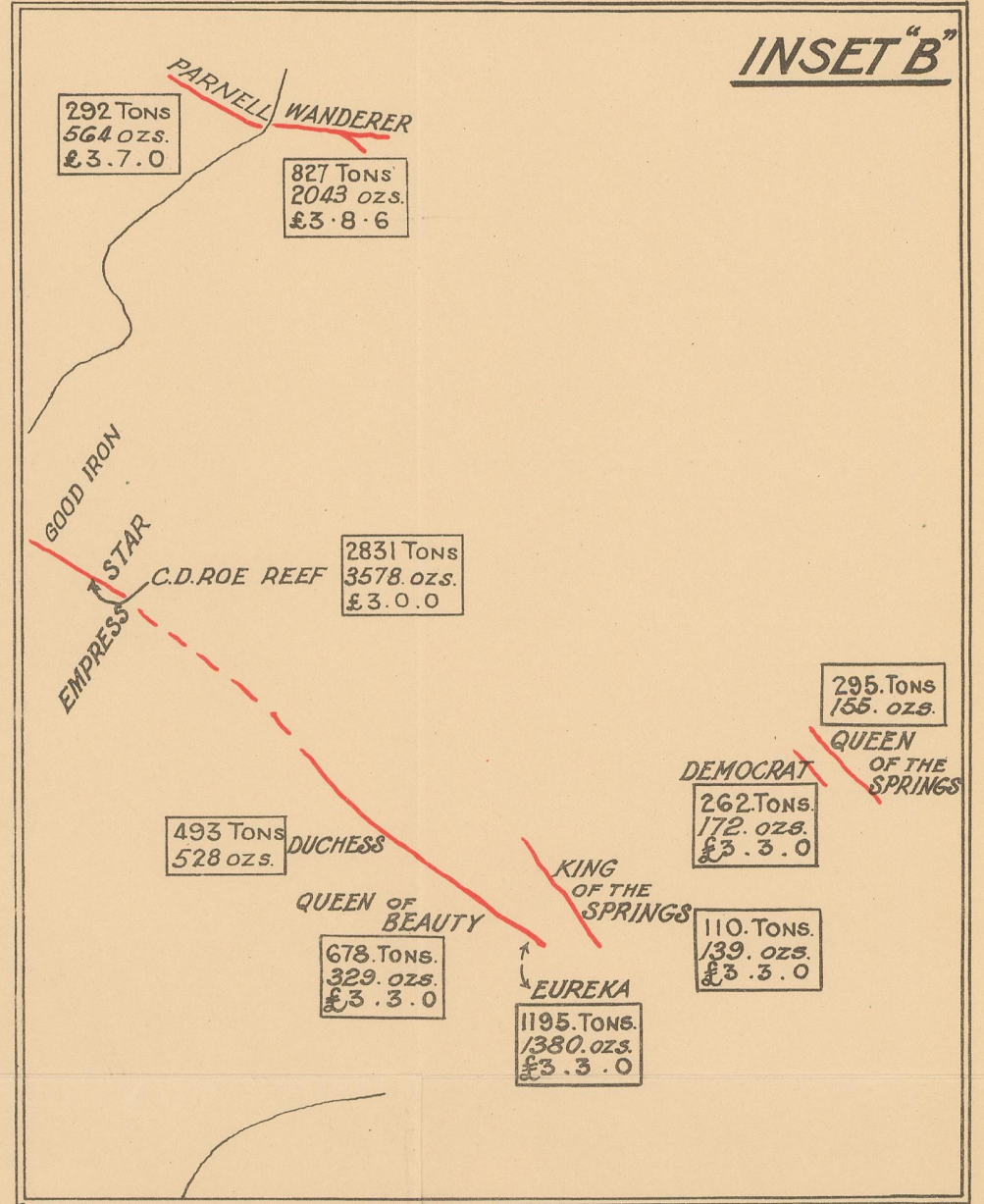
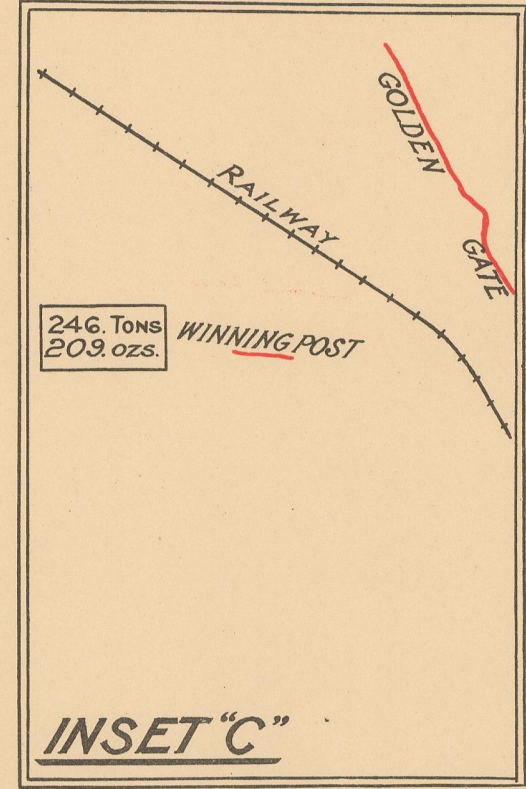
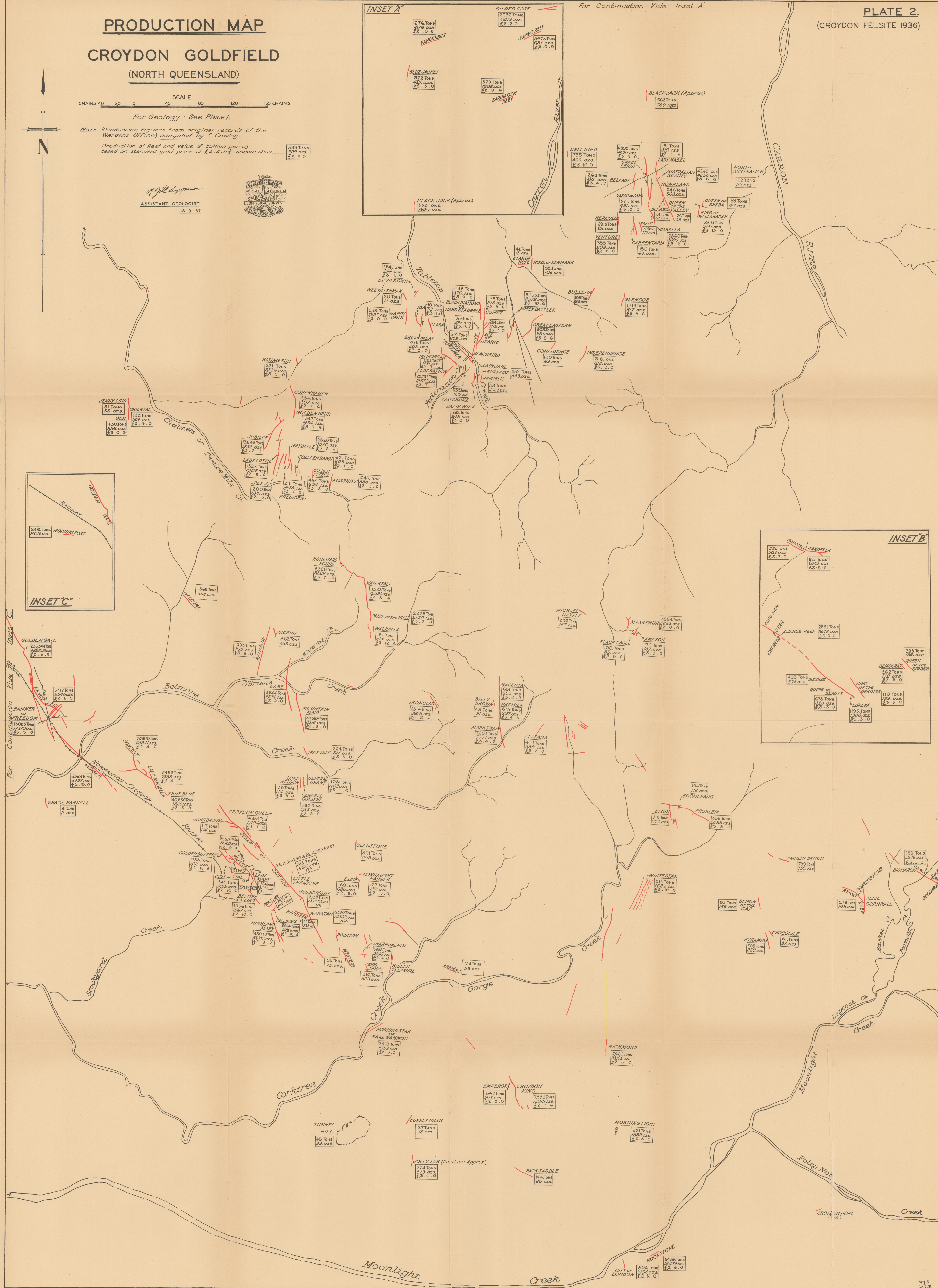
Note: (Production figures from original records of the Wardens Office) compiled by E. Cowley.

Production of Reef and value of bullion per oz based on standard gold price of £4.4.11<sup>3</sup> shown thus: 300 TONS 209 ozs £3.5.0

Assistant Geologist  
18.3.37



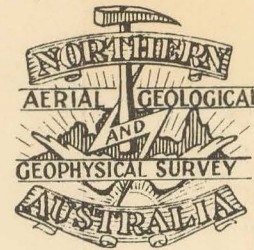
For Continuation Vide Inset A





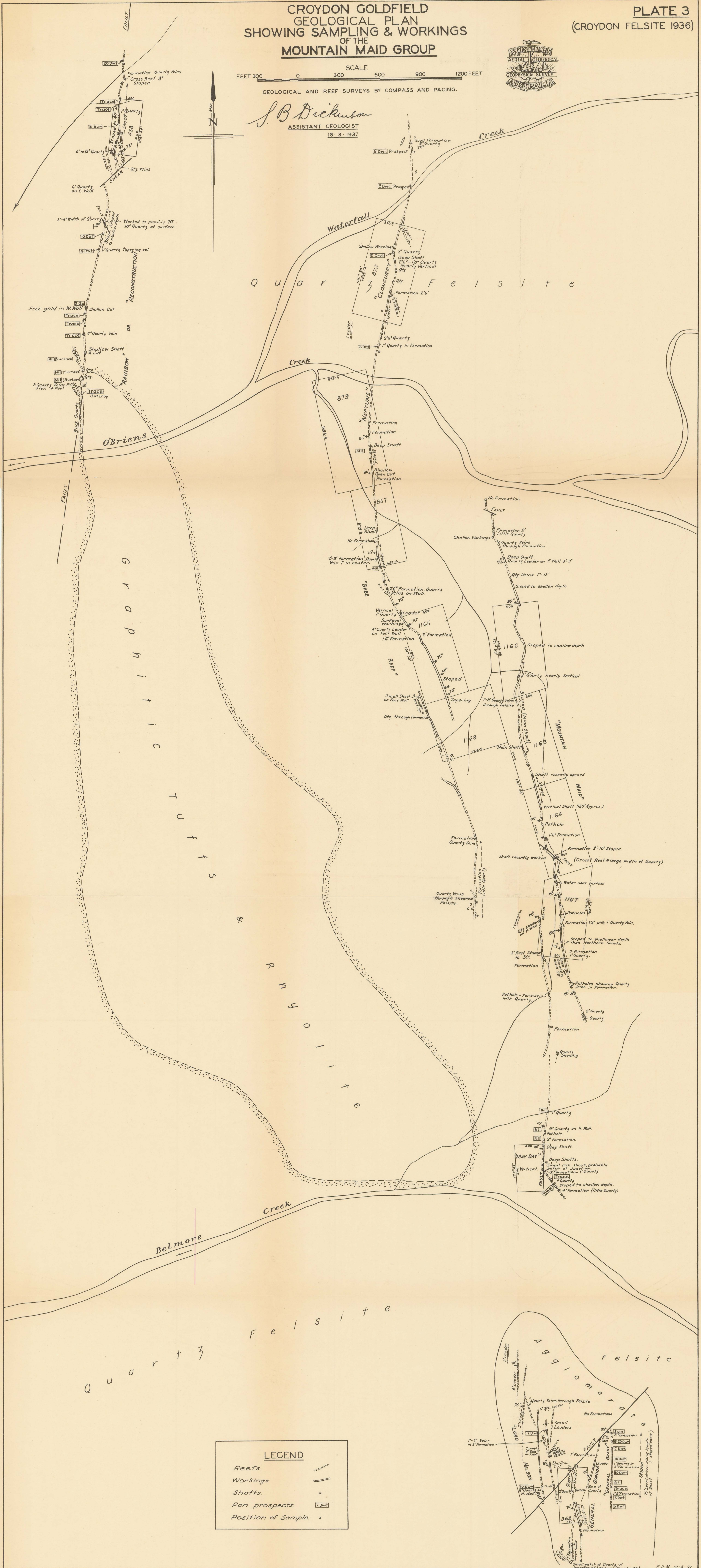
**CROYDON GOLDFIELD  
GEOLOGICAL PLAN  
SHOWING SAMPLING & WORKINGS  
OF THE  
MOUNTAIN MAID GROUP**

**PLATE 3  
(CROYDON FELSITE 1936)**



SCALE  
FEET 300 0 300 600 900 1200 FEET  
GEOLOGICAL AND REEF SURVEYS BY COMPASS AND PACING.

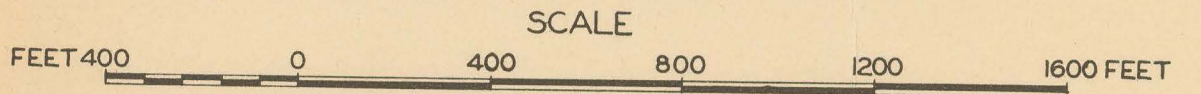
*S. B. Dickson*  
ASSISTANT GEOLOGIST  
18.3.1937



LEGEND	
Reefs.	---
Workings	—
Shafts.	⊙
Pan prospects	□
Position of Sample.	x



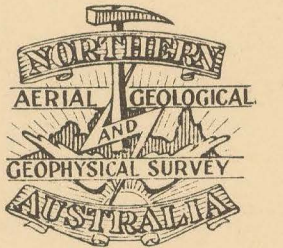
# CROYDON GOLDFIELD GEOLOGICAL PLAN OF HOMEWARD BOUND GROUP



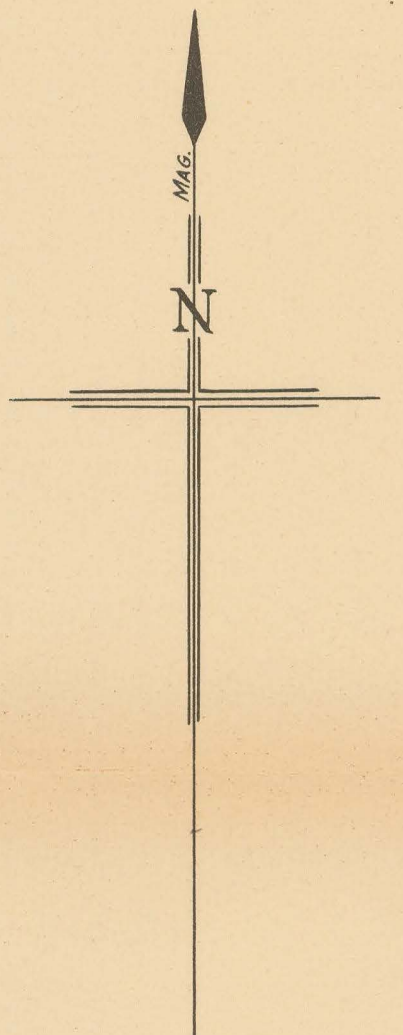
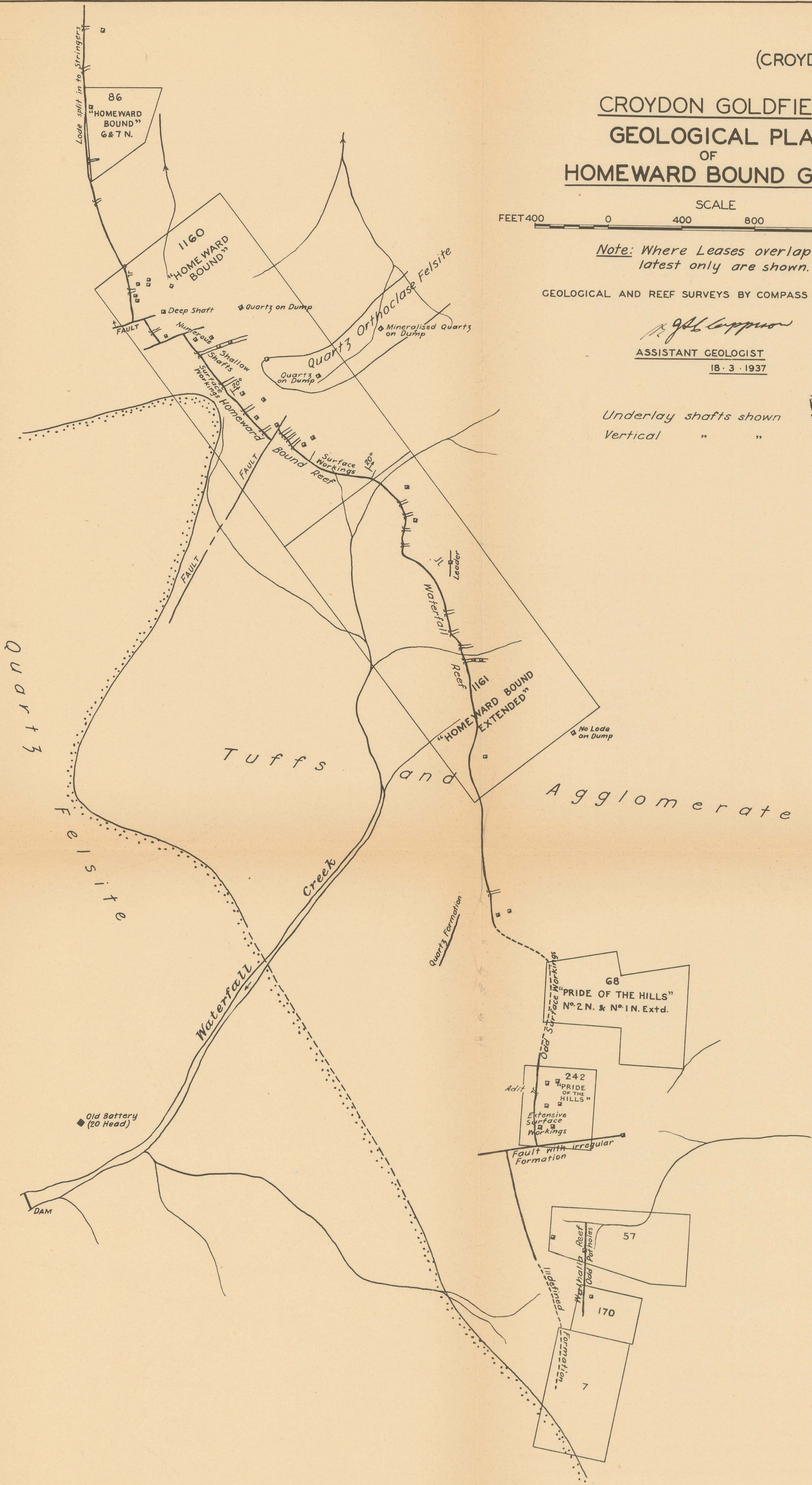
Note: Where Leases overlap latest only are shown.

GEOLOGICAL AND REEF SURVEYS BY COMPASS AND PACING

*J. G. Lippman*  
ASSISTANT GEOLOGIST  
18.3.1937

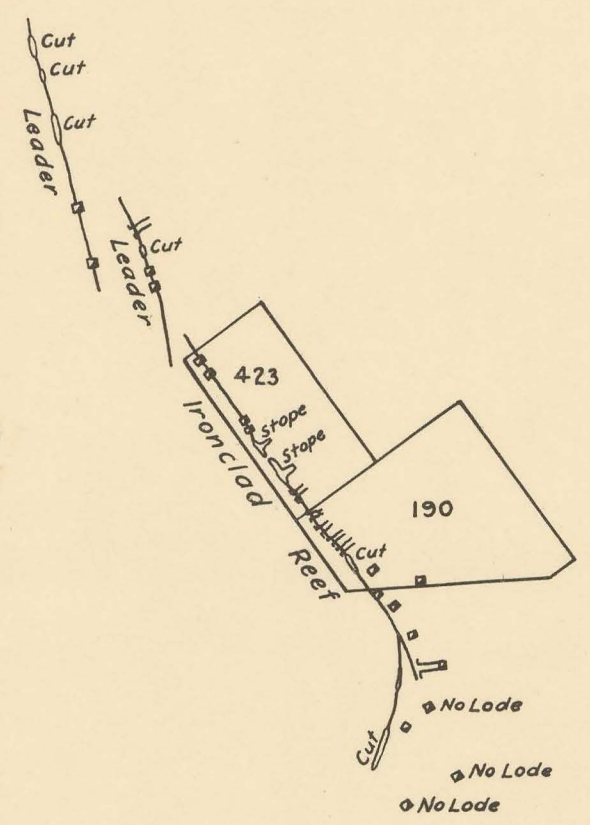


Underlay shafts shown  
Vertical " "



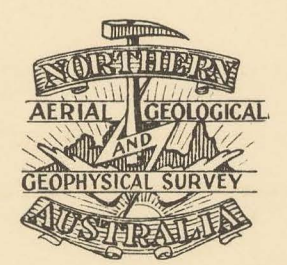


Q u a r t z F e l s i t e

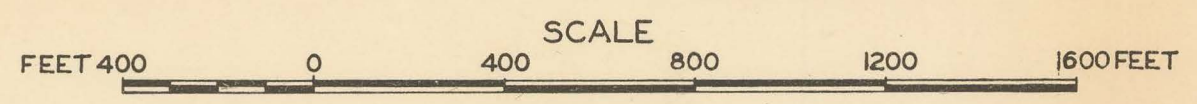


Q u a r t z

F e l s i t e



CROYDON GOLDFIELD  
GEOLOGICAL PLAN  
OF  
MARK TWAIN GROUP



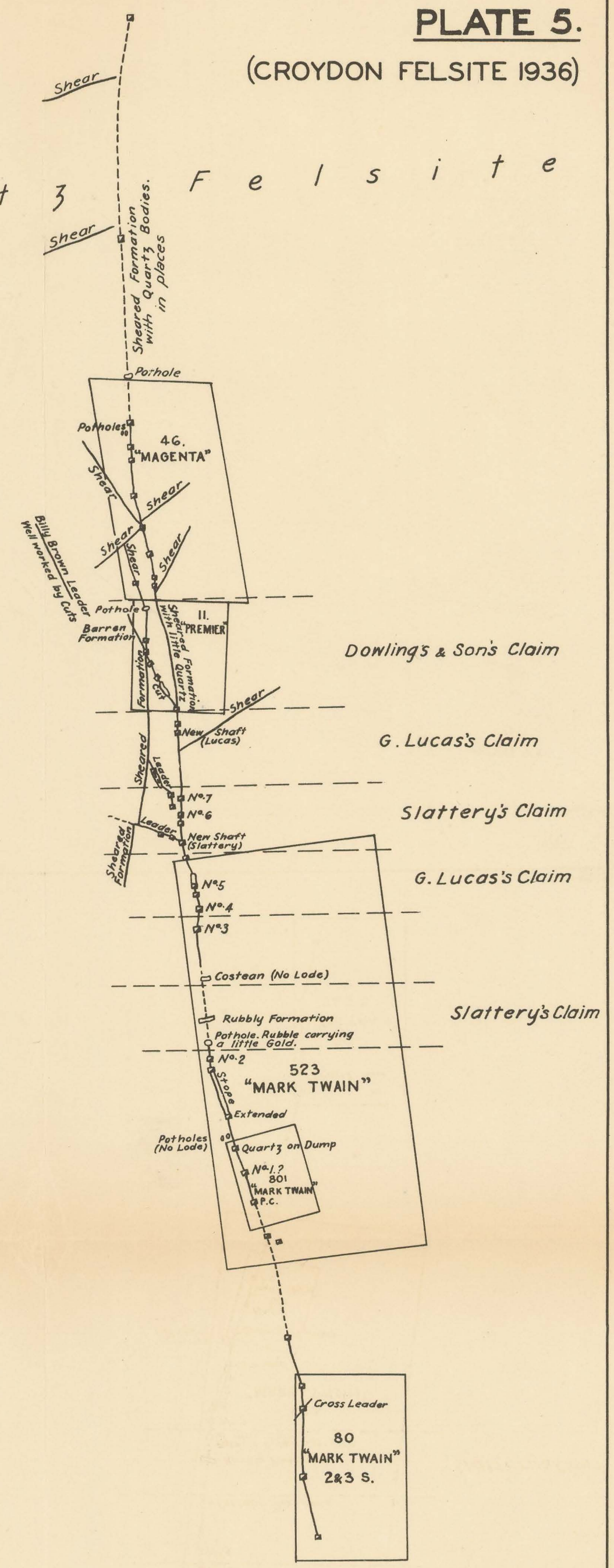
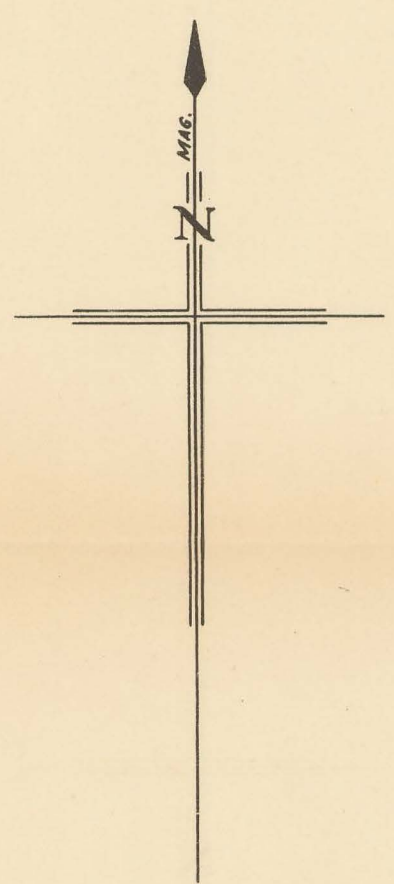
REEF SURVEYS BY COMPASS AND PACING

Underlay shafts shown  
Vertical " " " "

*H. J. Capperton*

ASSISTANT GEOLOGIST

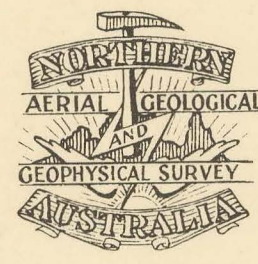
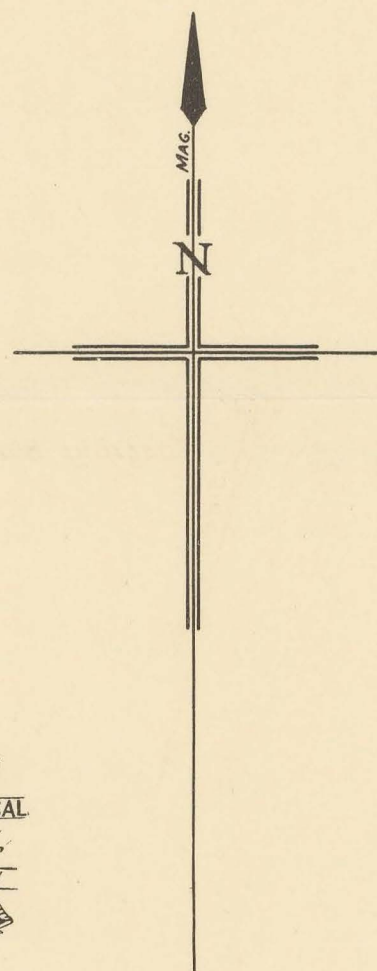
18. 3. 1937





Felsite  
G.M.L. 467  
"THE McARTHUR"

G.M.L. 1001  
"THE McARTHUR P.C."



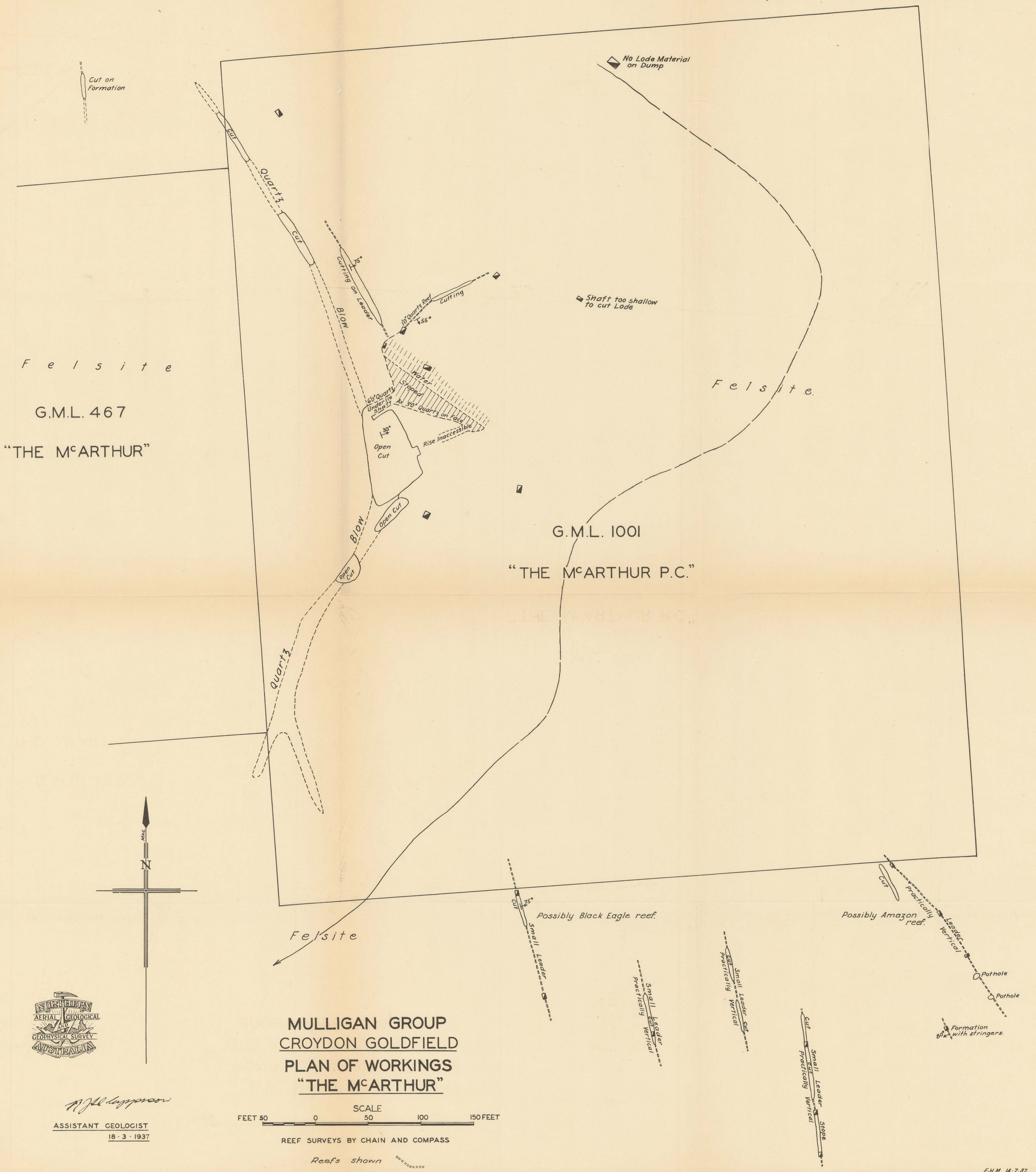
MULLIGAN GROUP  
CROYDON GOLDFIELD  
PLAN OF WORKINGS  
"THE McARTHUR"

SCALE  
FEET 50 0 50 100 150 FEET

REEF SURVEYS BY CHAIN AND COMPASS

Reefs shown

ASSISTANT GEOLOGIST  
18.3.1937



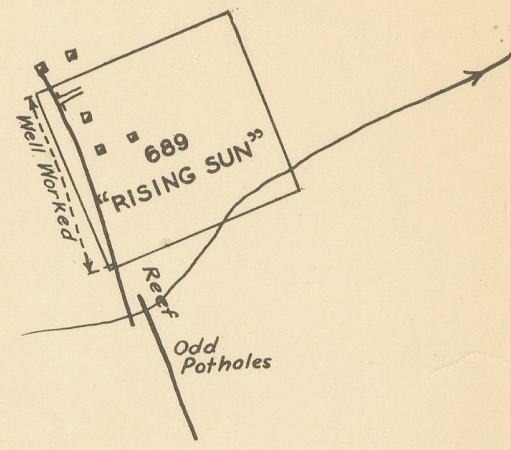


CROYDON GOLDFIELD  
GEOLOGICAL PLAN  
OF  
TWELVE MILE GROUP

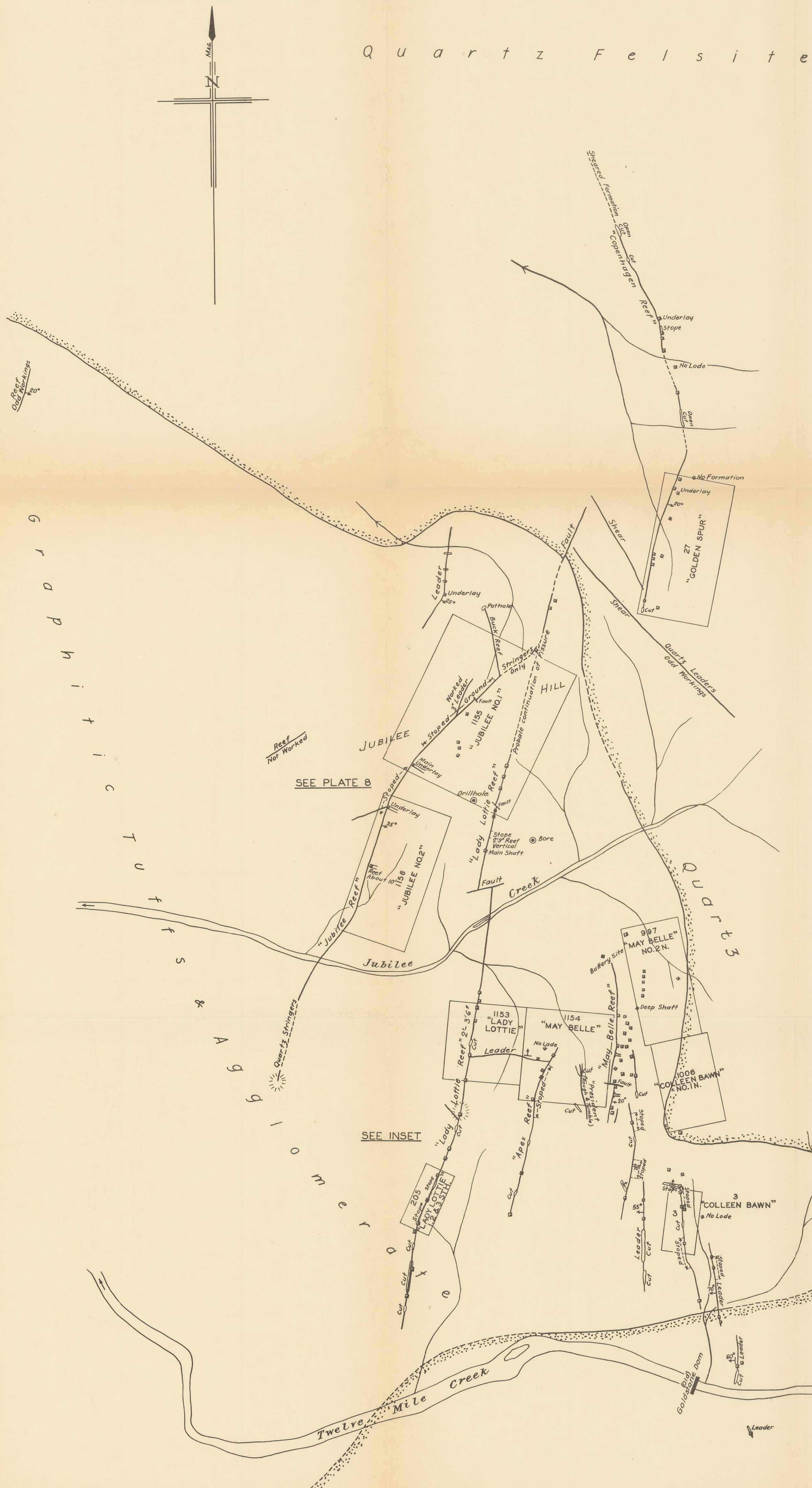
SCALE  
FEET 400 0 400 800 1200 1600 FEET

NOTE: Where Leases overlap latest only are shown.

GEOLOGICAL AND REEF SURVEYS BY COMPASS AND PACING.



Q u a r t z F e l s i t e

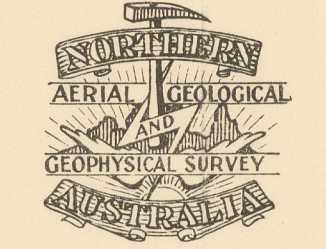
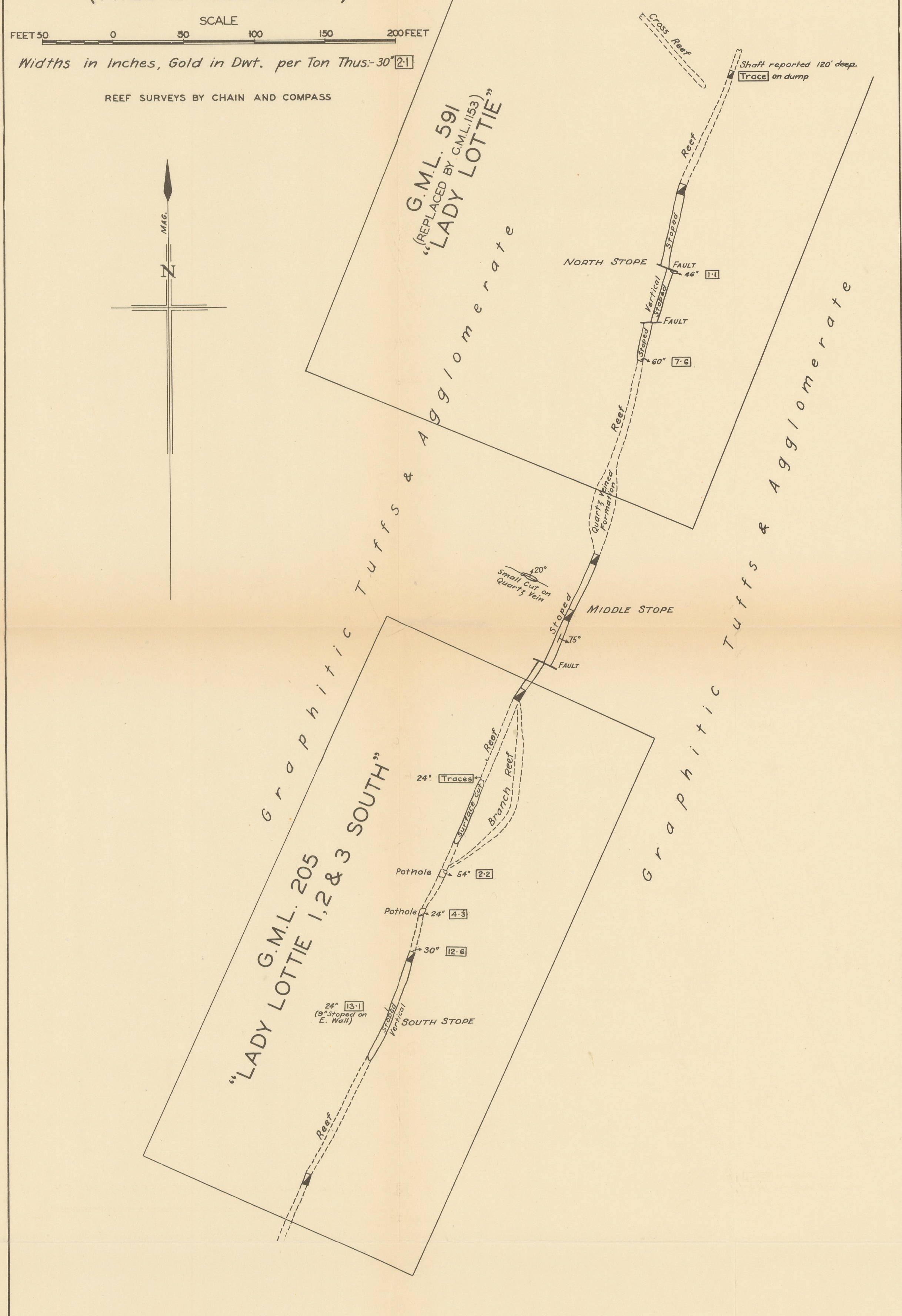
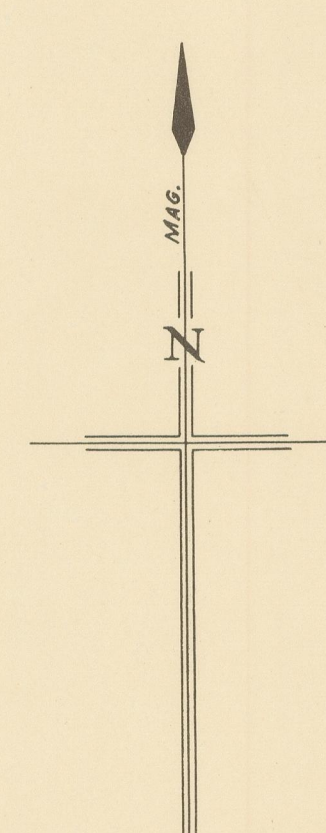


CROYDON GOLDFIELD  
ASSAY PLAN  
OF  
G.M.L's. 205 & 591  
(TWELVE MILE GROUP)

SCALE  
FEET 50 0 50 100 150 200 FEET

Widths in Inches, Gold in Dwt. per Ton Thus:- 30" [21]

REEF SURVEYS BY CHAIN AND COMPASS



Assistant Geologist  
18.3.1937



TWELVE MILE GROUP  
CROYDON GOLDFIELD  
CONTOUR PLAN  
OF  
JUBILEE AND LADY LOTTIE

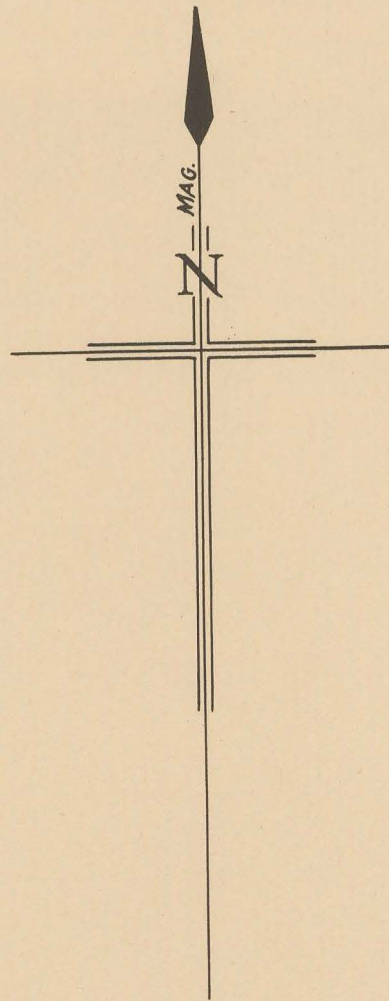
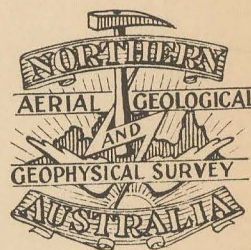
SCALE  
FEET 100 50 0 100 200 300 400 FEET

Contour Intervals = 10 Feet

TACHEOMETER SURVEY

S. B. Dickinson

ASSISTANT GEOLOGIST  
18-3-1937



G.M.L. 1155  
"JUBILEE NO. 1"

250  
Main Underlie Shaft

200  
Stringers Only

Probable Continuation of Fissure

250

200  
35°

150  
"JUBILEE"  
REEF

G.M.L. 1156  
"JUBILEE NO. 2"

"LADY LOTTIE"  
Main Shaft  
Vertical

FAULT

"LADY LOTTIE"  
Vertical

Creek

Jubilee

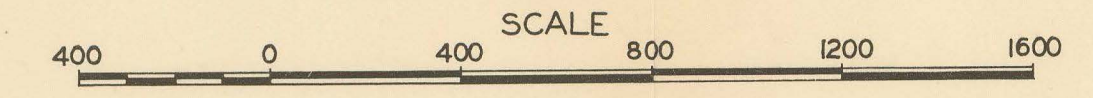
Quartz Stringers

G.M.L. 1153  
(REPLACING G.M.L. 59)  
"LADY LOTTIE"



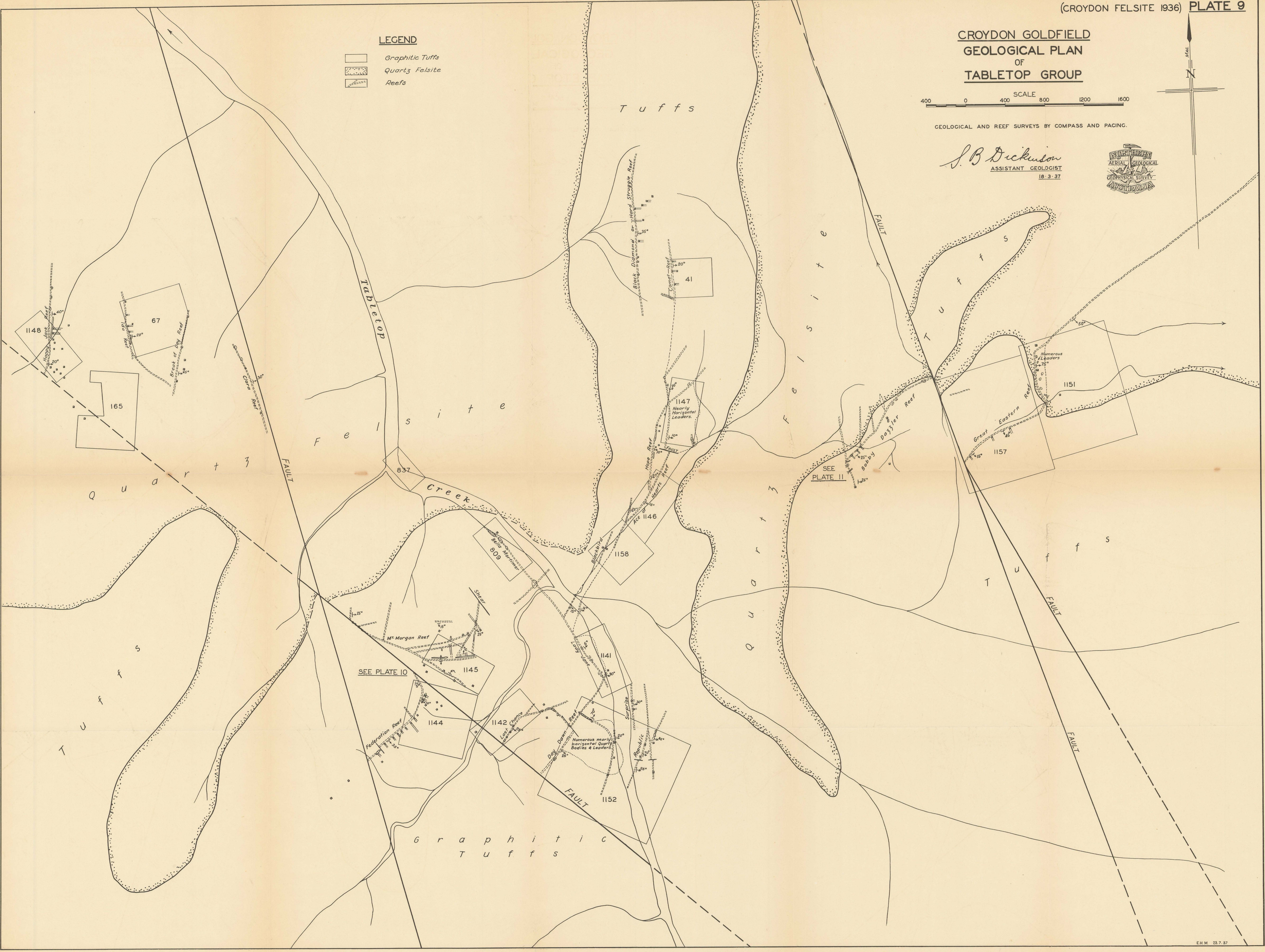
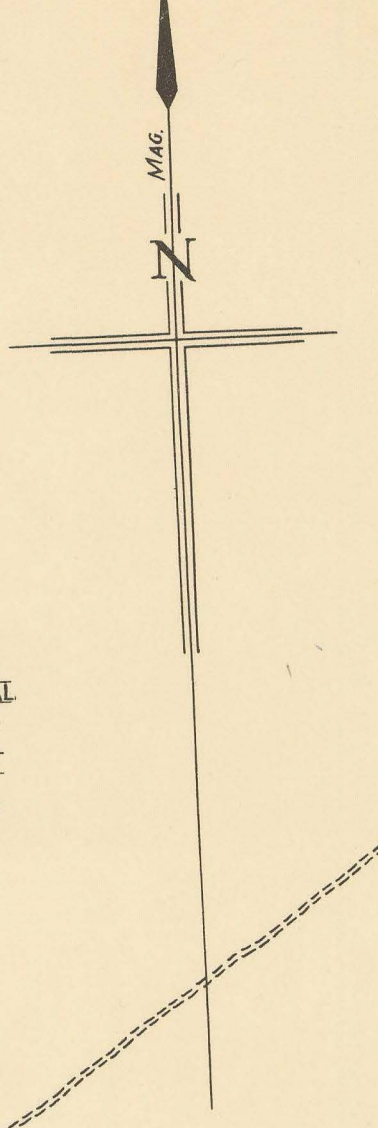
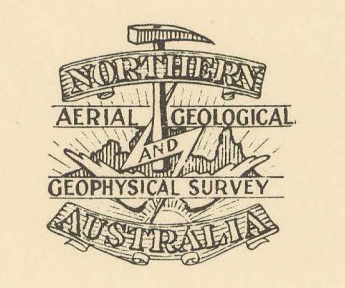
**CROYDON GOLDFIELD**  
**GEOLOGICAL PLAN**  
OF  
**TABLETOP GROUP**

- LEGEND**
- Graphitic Tuffs
  - Quartz Felsite
  - Reefs



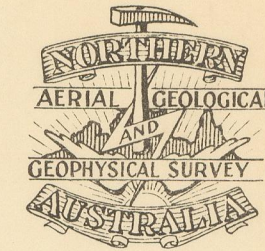
GEOLOGICAL AND REEF SURVEYS BY COMPASS AND PACING.

*S. B. Dickinson*  
ASSISTANT GEOLOGIST  
18.3.37





# CROYDON GOLDFIELD GEOLOGICAL PLAN OF MOUNT MORGAN LEASE (TABLETOP GROUP)



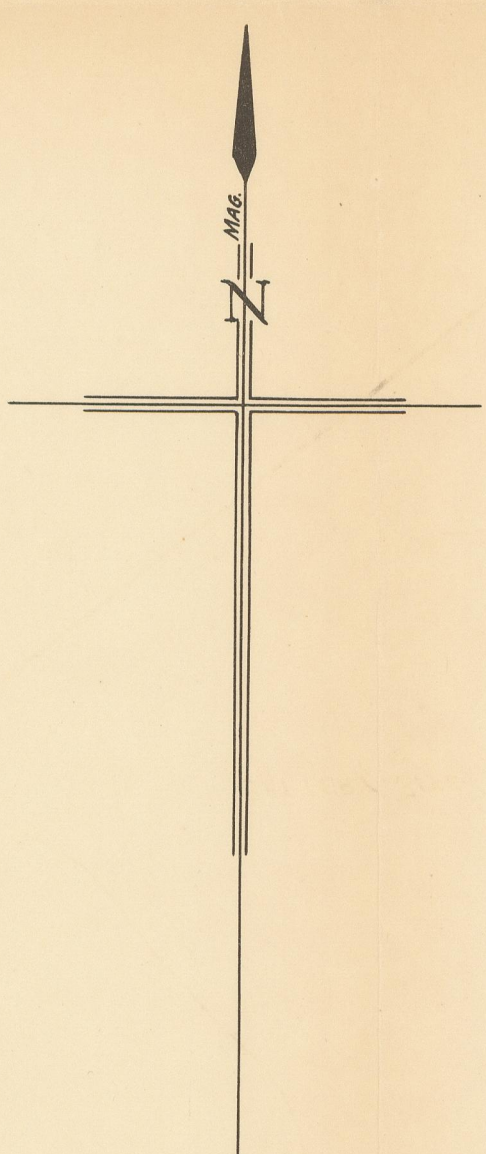
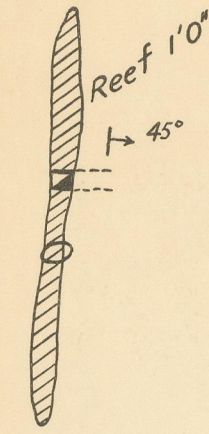
SCALE 0 50 100 150 200 FEET

CHAIN AND COMPASS SURVEY

*S. B. Dickinson*  
ASSISTANT GEOLOGIST  
18-3-1937

### LEGEND

- Quartz Reefs & Formation
- Stopped Ground
- Underground Workings
- Axes of Folding
- Country Rock, Graphitic Tuffs.

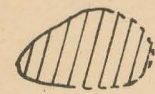




CROYDON GOLDFIELD  
ASSAY PLAN  
OF  
BOBBY DAZZLER LEASE  
(TABLETOP GROUP)

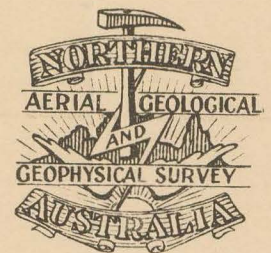
(CROYDON FELSITE 1936) PLATE II

Underground workings shown



NOTE: Underground surveys and  
sampling by R.J.S. Clappison. (Chain & Compass)  
Contours by S.B. Dickinson. (Tacheometer)

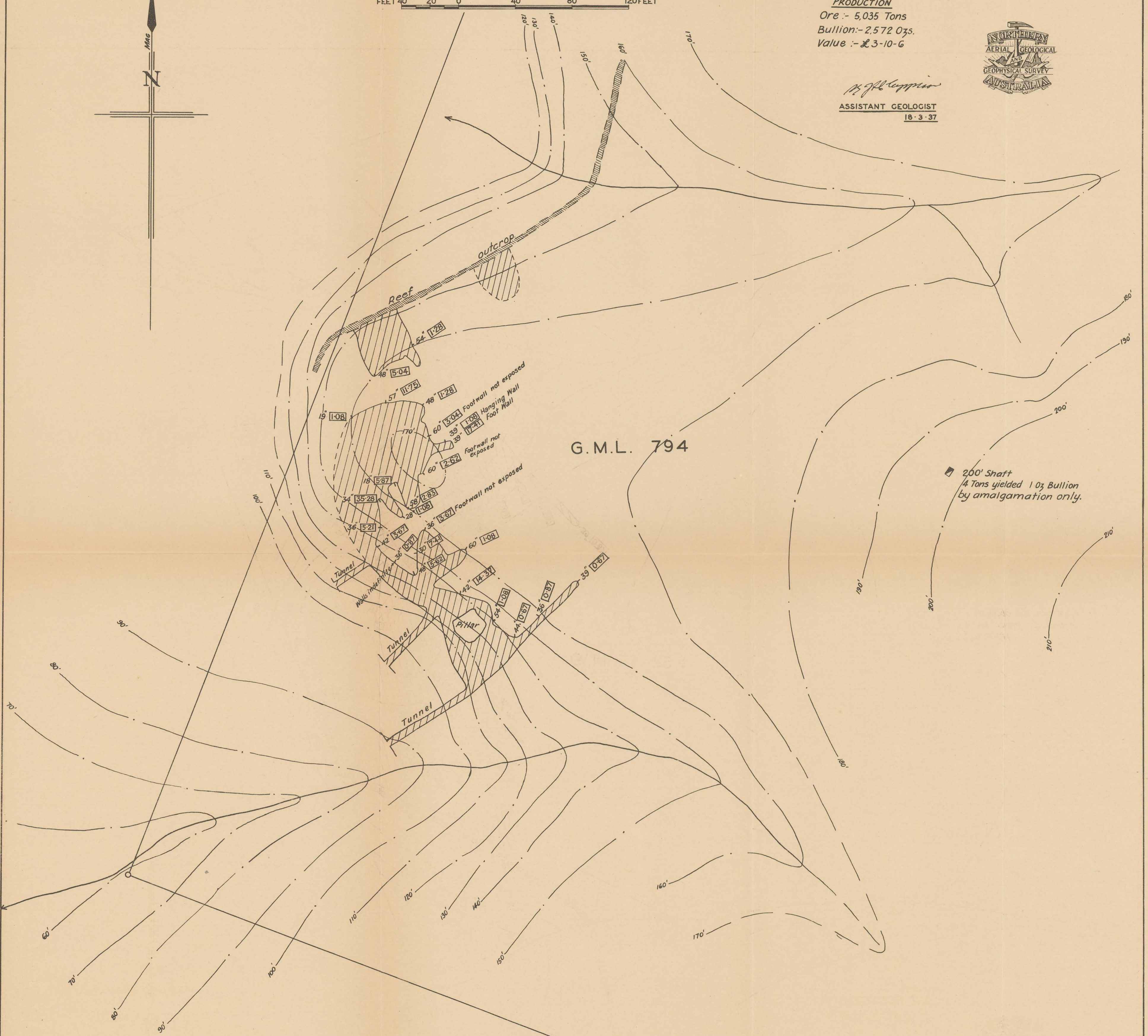
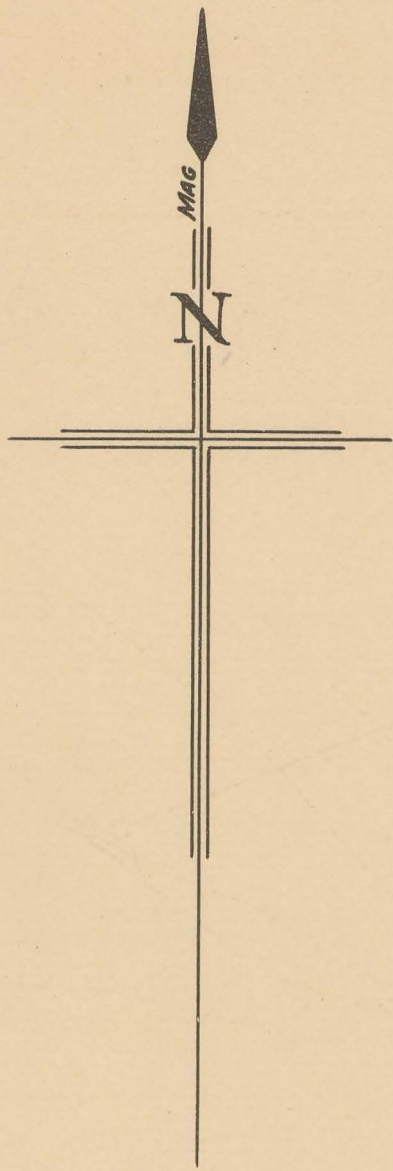
PRODUCTION  
Ore :- 5,035 Tons  
Bullion :- 2,572 Ozs.  
Value :- £3-10-6



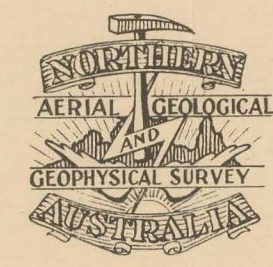
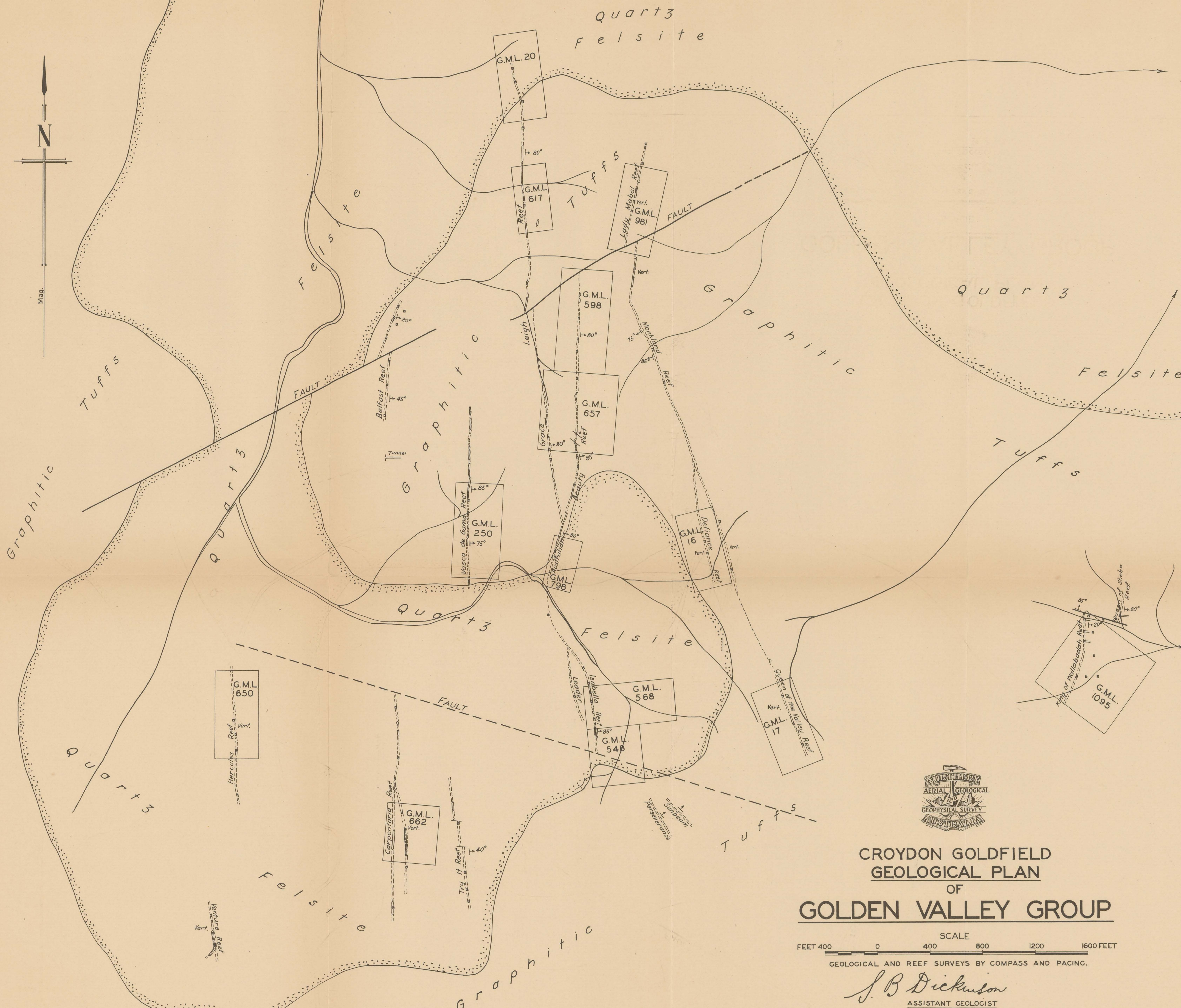
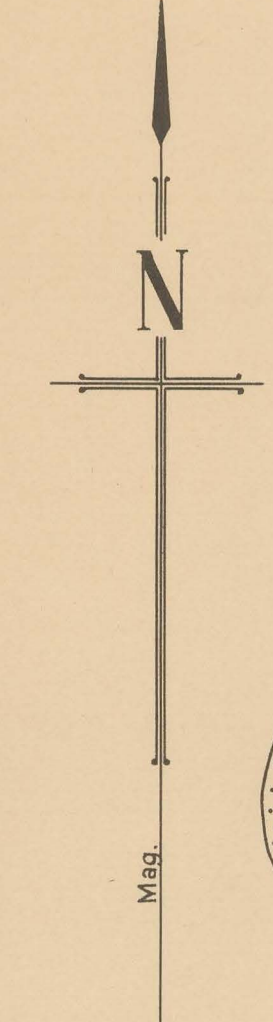
*R.J.S. Clappison*

ASSISTANT GEOLOGIST  
18-3-37

SCALE  
FEET 40 20 0 40 80 120 FEET





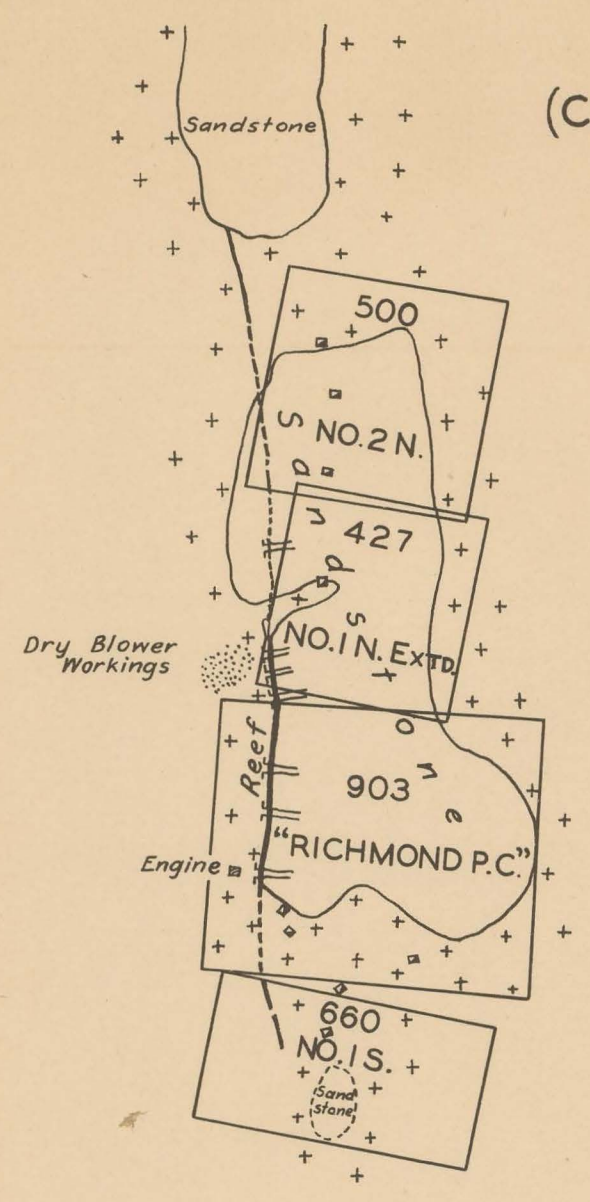
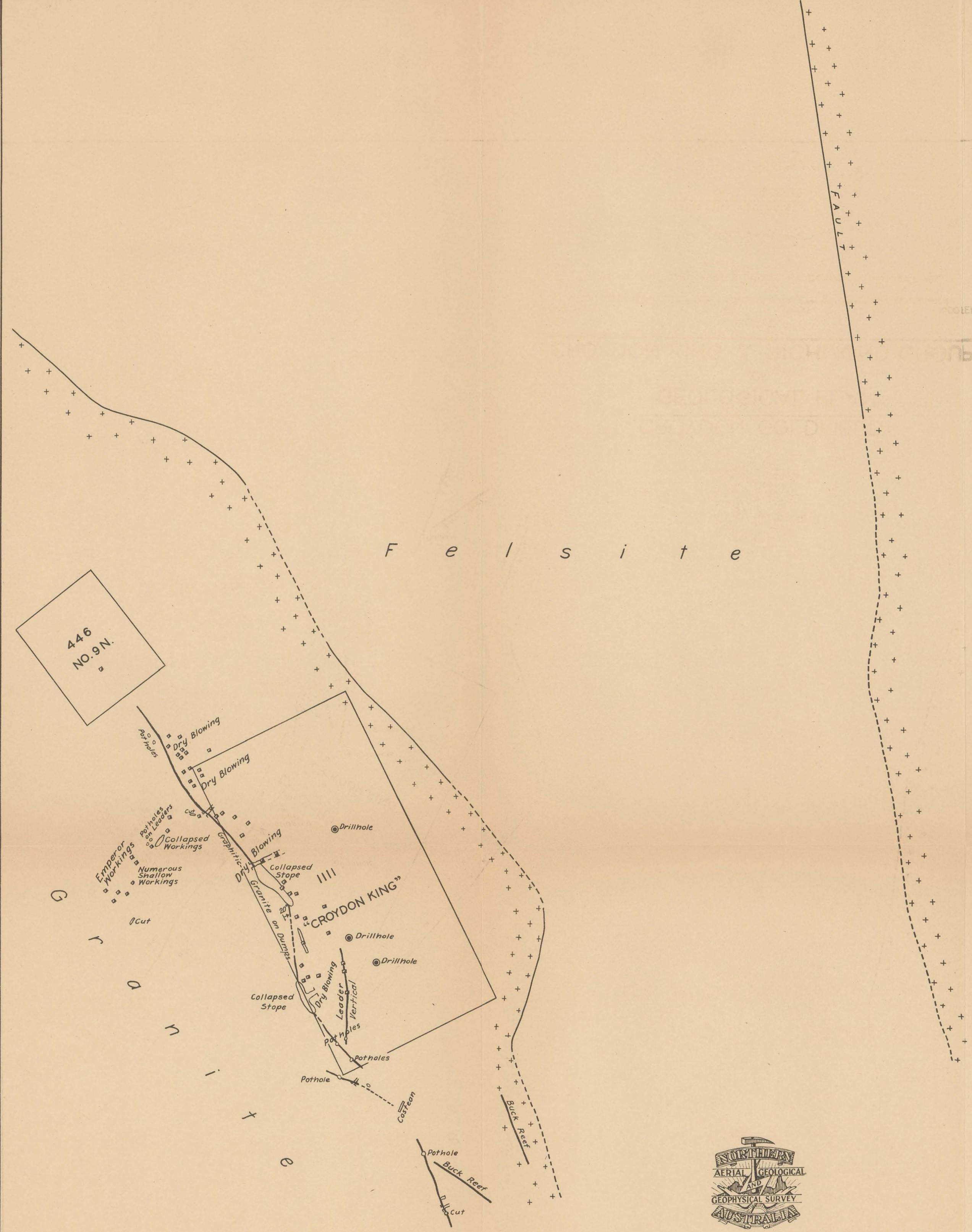


CROYDON GOLDFIELD  
GEOLOGICAL PLAN  
OF  
GOLDEN VALLEY GROUP

SCALE  
FEET 400 0 400 800 1200 1600 FEET  
GEOLOGICAL AND REEF SURVEYS BY COMPASS AND PACING.

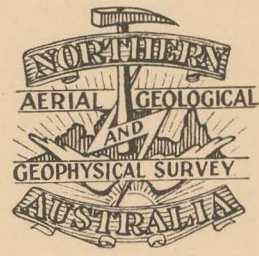
*S. B. Dickinson*  
ASSISTANT GEOLOGIST  
18. 3. 37



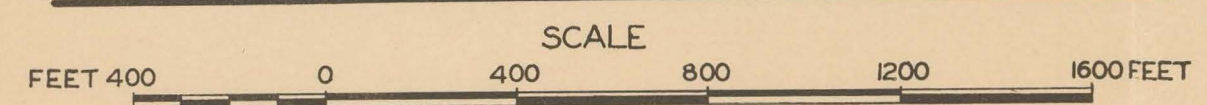


G r a n i t e

F e l s i t e



CROYDON GOLDFIELD  
GEOLOGICAL PLAN  
OF  
CROYDON KING & RICHMOND GROUP



GEOLOGICAL AND REEF SURVEYS BY COMPASS AND PACING.

*A. J. B. ...*  
ASSISTANT GEOLOGIST

18.3.37

Underlay shafts shown  
Vertical " "

