

1944.

—
WESTERN AUSTRALIA.

=====
DEPARTMENT OF MINES.

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REPORT

OF THE

GEOLOGICAL SURVEY

FOR THE

YEARS 1941 AND 1942

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PERTH :

BY AUTHORITY : ROBERT H. MILLER, GOVERNMENT PRINTER

—
1944.

Table of Contents.

	Page
Staff and Fieldwork, 1941	5
Publications	6
Summaries of Reports, 1941	6
Investigation of Bituminous Samples from the country between Albany and the Fitzgerald River	6
Supposed Nitrate Deposit East of Mt. Ridley, Eucla Division	6
Investigation of Water Supply at Callion, Ularring District	6
Notes on a Dam Site on the Ord River, Kimberley Division	6
Proposed Drilling in the Vicinity of the Clackline (Baker's Hill) Ironstone Deposits	6
Progress Report on the Geology of Portion of the Mt. Margaret Goldfield	6
The Phosphate Deposits in the Dandaragan District, South-West Division	7
Whim Creek Investigations	7
Report on a Petrological Investigation of Metasomatism near the Corinthian Ore Body	7
X The Geology of Tindals, Coolgardie Goldfields	7
Two Reputed Iron Ore Deposits in the Vicinity of Albany, South-West	7
The Hill 60 Lode, Mt. Magnet Gold Mines Ltd., Mt. Magnet	8
X A Supposed Manganese and Hematite Deposit near Wallangie, Coolgardie Goldfield	8
Geological Notes on Boring in the Mt. Palmer District, Yilgarn Goldfield	8
Staff, 1942	8
Field Work	8
Office and General	8
Publications	9
Summaries of Reports, 1942	9
Soapstone at Glen Lynn, South-West Division	9
Alleged Scheelite Deposit near Kununoppin	9
Neville's Scheelite Prospect, Melville, Yalgoo Goldfield	9
Copper Prospects at Galena, Northampton Mining District	9
Emery Deposits, Richenda River Area, Kimberley District	9
Investigations in the Greenbushes Tinfield	9
Sampling of Some Lakes near Baladjie and Mt. Palmer for Alunite	10
Boring on M.C. 6, Greenbushes	10
Bauxite Investigations	10
Investigations on the Mica Deposits in the Yinnietharra, Ajana, Northampton and Mullalyup Dis-	10
tricts	10
Investigation of Meaney's Bridge Soapstone Deposit	10
Inspection of Norrish and Selkirk's Beryl Show, Mundaring, South-West Division	11
Inspection of Molybdenite Show, Swan View, South-West Division	11
Inspection of an Alleged Quartz Crystal Deposit, Katanning, South-West Division	11
Report on Antimony in the Moonlight Leases, Wiluna, East Murchison Goldfield	11
Boring at Whim Creek—Logs of Bores	11
Notes on an Inspection of the Principal Tantalite-Bearing Districts of the Pilbara Goldfield	11

Annual Progress Report of the Geological Survey of Western Australia for the Years ended 31st December, 1941, and 31st December, 1942.

The Under Secretary for Mines.

I have the honour to submit, for the information of the Honourable the Minister for Mines, my report on the operations of the Geological Survey for the year 1941.

STAFF AND FIELD WORK.

There were no changes of staff during the year, and the work of the Branch continued to be carried out by the Government Geologist, three Field Geologists, a typiste, a junior clerk and a messenger.

On the completion of the field work connected with the re-survey of a portion of the Mt. Margaret Goldfield, the conduct of broad geological examinations of the goldfields of the State was temporarily abandoned owing to the difficulty of carrying on this type of work during war time, and the necessity of having every member of the field staff available at short notice for the conduct of investigations directly relating to the war effort.

The principal activities of the professional officers of the Branch are set out below:—

F. G. Forman, B.Sc., Government Geologist.—In January, in the company of representatives of Phoenix Oil Extractors, Ltd., I inspected portions of oil prospecting area 10H, east of Albany, where surface indications of mineral oil were alleged to have been found. No genuine indications of the existence of petroleum in the area were discovered.

During March and April a number of short trips were made to investigate a variety of mineral deposits; these included limonite at Clackline, bauxitic laterites in the Darling Ranges and mineral phosphates at Dandaragan.

During May I examined deposits of lime sand at Karidale, soapstone at Glenlynn, and tin at Greenbushes, all in the South-West Division. At the latter end of the month I inspected the progress of the geological survey being carried out on the Tindals' Gold Mine, Coolgardie, by Mr. Miles, and on the same trip viewed developments on the Ora Banda Amalgamated Mine at Grants Pateh, and investigated the possibilities of a water supply for mining purposes at Callion.

In June I investigated an occurrence of sillimanite in the Chittering district and made a visit of inspection to the Dandaragan area where Mr. Matheson was carrying out a survey of the mineral phosphate deposits. I also investigated the alleged occurrence of potassium nitrate deposits in the Mt. Ridley district, north-east of Esperance.

During the latter part of August and the early part of September I accompanied the Director of Works on an investigation of dam sites on the Ord River in the Kimberley district, and at the same time made inspections of mining operations in the vicinity of Halls Creek and of drilling operations at the Nerrima Bore Site of the Freney Kimberley Oil Co.

During the latter part of October and early in November I made a second visit to Nerrima in connection with petroleum prospecting operations, and with the Commonwealth Geological Adviser and the Chief Geologist of Caltex Oil Development Ltd., reviewed in the field the progress of geological work being conducted by that company. During the return trip to Perth the opportunity was taken to inspect recently found de-

posits of crocidolite asbestos at Marramamba in the Hamersley Ranges and the workings of the Whim Well Copper Mine at Whim Creek.

During December I paid a visit to the Jimperding Gold Mine near Toodyay and investigated the possibility of obtaining commercial supplies of beryl near London-derry in the Coolgardie Goldfield.

R. A. Hobson, B.Sc. (Hons.) Geologist.—From January until May Mr. Hobson was mostly at head office. During this time he completed his report on the copper deposits in the Murchison and Yalgoo Goldfields which were inspected by him towards the end of 1940. He also made a preliminary examination of the diatomite specimens in the geological survey collection with a view to further field work in connection with this mineral. A brief inspection was made of the diatomite occurring in the bed of Lake Gnangarra in the Wanneroo district. Summaries of reports on field work done during 1940 were also prepared. Two weeks were spent by Mr. Hobson in examining and mapping the ironstone deposits in the vicinity of Clackline in connection with a proposal to drill for sulphide ore bodies in this locality.

On the 21st May Mr. Hobson left for the Mt. Margaret Goldfield and was engaged continuously in field work in that district until his return to head office on the 6th December. This work was a continuation of that stopped due to war conditions in July, 1940, and enabled the completion of field work over the area as originally proposed for examination.

Until the end of December Mr. Hobson was engaged at head office mainly in work connected with the re-survey of the Mt. Margaret Goldfield.

R. S. Matheson, B.Sc., Geologist.—From January until March Mr. Matheson was engaged at head office in completing reports and revising plans and sections dealing with the mining groups in the northern portion of the Yilgarn Goldfield, which had been examined by him during 1940. During April Mr. Matheson was engaged in preparations for a survey of the phosphate deposits at Dandaragan, and from May to August was engaged in field work connected with the survey and sampling of these deposits. On his return to Perth Mr. Matheson was engaged until the middle of October in the completion of his report and accompanying plans on the above area.

In November Mr. Matheson made a surface geological examination of the Whim Creek Copper Mine and was engaged in miscellaneous duties at head office. During December Mr. Matheson was continuously at head office finalising his work on Whim Creek and in compiling information for a proposed examination of the bauxitic laterites of the State.

K. R. Miles, B.Sc. (Hons.) Geologist.—From the 14th January, after having returned from annual leave, to 21st March Mr. Miles was engaged in miscellaneous duties which included petrological investigations of bore cores from Meier's Find and Heaney's Find, near Yellowdine; from Corinthian G.M. Bullfinch; and from Wiluna; examination of rocks from the North Yilgar and from the Mt. Margaret Goldfields; correction of typescripts of various reports; and various office duties in connection with the preparation of departmental reports by the Government Geologist. Also during this

period he paid a short visit to the quarries at Cardup and Armadale for the purpose of investigating the possibilities of certain alleged honestone deposits in the district.

From the latter part of March to the middle of April he was working on the preparation of a petrological report on metasomatism of the Corinthian Ore Body.

On April 16th Mr. Miles left Perth for Coolgardie and was engaged there until May 30th in making a complete surface and underground geological survey of the Tindals Gold Mine.

From June to November Mr. Miles spent most of his time at head office, leaving Perth only for brief periods to carry out a number of short geological examinations. His duties during this period included the completion of a full report on the geology of Tindals G.M., drafting and petrological work in connection with this report; petrological and mineralogical determinations for the public; and various office duties, including the registering of many rocks and their sections. During this time he also made numerous brief petrographical determinations of rock specimens sent down from the field in connection with the Mt. Margaret survey. This work was often seriously delayed by the absence of any trained technical assistant—the preparation of thin sections for the microscopical examinations having to be carried out by himself in addition to his other duties.

From July 15th-19th he paid a short visit to Albany to make a report for departmental purposes on an alleged iron ore deposit near Warriup, about 30 miles north-east of Albany.

On July 31st Mr. Miles left Perth for Mt. Magnet where until August 10 he was engaged in an underground investigation for departmental purposes of the ore body of the Hill 60 Gold Mine, which was closed down shortly after.

From October 27th-30th in the company of two Kalgoorlie prospectors, Mr. Miles paid a visit to the Wallangie Hills, about 100 miles due west of Kalgoorlie, in order to prepare a report for departmental purposes on the possibilities of an alleged manganese and iron deposit in that district.

From December 1st to 15th he took his annual leave and from then on to the close of the year was engaged in miscellaneous office duties, including the preparation of a report on the geology of bore sites at Meier's Find and Heaney's Find, Yilgarn Goldfield.

PUBLICATIONS.

During the year the following publications were issued by this Branch:—

Annual Progress Report of the Geological Survey for the year 1940.

Geological Survey Bulletin 99:—The Mining Groups of the Yilgarn Goldfield, South of the Great Eastern Railway, Part 2. South of Marvel Loch, by R. A. Hobson, B.Sc. (Hons.) and R. S. Matheson, B.Sc.

Bulletin 99 is the third of a series of three Bulletins numbers 97, 98 and 99, which were compiled as a result of a re-survey of that portion of the Yilgarn Goldfield situated south of the Great Eastern Railway.

Bulletin 98 dealt with the mining groups from Southern Cross southwards as far as Marvel Loch, and Bulletin 97 dealt with the regional geology of the whole of the area covered by the mining groups described in the other two bulletins.

All members of the staff have worked conscientiously throughout the year, sometimes under very trying circumstances.

F. G. FORMAN,
Government Geologist.

SUMMARIES OF REPORTS.

F. G. FORMAN, B.Sc., Government Geologist.

INVESTIGATION OF BITUMINOUS SAMPLES FROM THE COUNTRY BETWEEN ALBANY AND THE FITZGERALD RIVER.

In January, portions of oil prospecting area 10H, where surface indications of mineral oil were alleged to have been found, were inspected in the company of representatives of Phoenix Oil Extractors, Ltd. No genuine indications of the existence of petroleum were discovered in the area.

SUPPOSED NITRATE DEPOSIT EAST OF MT. RIDLEY, EUCLA DIVISION.

Following reports that an important deposit of potassium nitrate occurred in the vicinity of Mt. Ridley an examination of the area was carried out during the period 16th June to 2nd July, 1941. Although the actual spot where the deposit is reported to occur was not visited negative results from tests carried out on a number of lakes in the district together with unfavourable climatic conditions, indicate that the area is unsuitable for the occurrence of commercially valuable nitrate deposits.

INVESTIGATION OF WATER SUPPLY AT CALLION, ULARRING DISTRICT.

In August, 1941, an examination was made of the country in vicinity of the Callion Mine, in connection with selecting bore sites for water. The investigations led to the conclusion that further boring in the area was not justified, and in all probability it would be necessary to pipe water to Callion to obtain an adequate supply.

NOTES ON A DAM SITE ON THE ORD RIVER, KIMBERLEY DIVISION.

During August, 1941, a brief inspection of a gorge on the Ord River in the vicinity of River Traverse Station N 27 was carried out in the company of the Director of Works and the Acting Engineer for the North-West. It was hoped that this gorge would provide a suitable dam site for a proposed irrigation scheme. Attention was paid to the suitability of the country rocks as a foundation for a dam, and the size of the retaining wall that would be necessary to impound the water. In the area examined, the site most suitable from both aspects is situated about $\frac{1}{2}$ miles north of N 27, where the gorge narrows, and at low water has a water gap of 315 feet.

R. A. HOBSON, B.Sc., (Hons.).

PROPOSED DRILLING IN THE VICINITY OF THE CLACKLINE (BAKER'S HILL) IRONSTONE DEPOSITS.

In connection with the search for sulphides for use in the preparation of sulphuric acid an examination was made, during March, 1941, of an area in the vicinity of a number of old ironstone quarries near Clackline. Between 1899 and 1907 the Fremantle Smelting Works obtained ironstone from these quarries for use as a flux. It was thought that the ironstone may have been formed by the oxidation of sulphide ore bodies.

However, investigation showed that the ironstone was merely the more ferruginous portions of the laterite and that the iron was derived mainly from ferromagnesian minerals, but possibly also from iron oxides contained in banded quartzites.

As there was no evidence of the existence of sulphide ore bodies below the zone of oxidation drilling was not recommended.

PROGRESS REPORT ON THE GEOLOGY OF PORTION OF THE MT. MARGARET GOLDFIELD.

This report refers to work commenced at Beria in 1937 by Mr. Hobson and his colleagues and continued during the following years. The work was completed during 1941 and in all, 6,300 square miles of country were examined and mapped. During the 1941 field season Mr. Hobson was concerned with an area extending north and south from Murrin. In the vicinity of Murrin the outcrops were very much better than in the

areas previously examined and more information was obtained regarding the relationship of the various rock types.

The report includes a detailed classification of the rock types of the whole of the area so far examined and summarised such new information as was obtained during 1941. A point of interest noted is the occurrence at one place of thin bands of a metamorphosed sandy magnesian limestone.

Reference is also made to the structural geology of the area and to various factors of the economic geology such as the relation of the various rock types and of structure to gold deposition. It was found that the principal ore bodies in the area examined during the 1941 field season occur at the junction of igneous and sedimentary rocks. This however does not apply to the whole of the area examined since 1937.

Some notes are given on the Waiti Kauri Group and on the Anaconda Group.

Prospecting is recommended at three localities in the vicinity of Murrin and some advice is given regarding prospecting in the district generally.

A map on a scale of 300 chains to an inch was prepared to illustrate the report.

R. S. MATHESON, B.Sc.

THE PHOSPHATE DEPOSITS IN THE DANDARAGAN DISTRICT, SOUTH-WEST DIVISION.

Detailed mapping and test sampling of the principal phosphate deposits in the Dandaragan district were carried out by Mr. Matheson during the period May to August, 1941. The deposits are the outcropping sections of two, thin, nodular, phosphate beds of chemical origin, which are part of a series of Cretaceous rocks consisting mainly of greensands and chalk.

Estimates of the reserves, based on a 20ft. stripping limit, indicate that deposits on the lower bed contain 691,000 long tons of phosphate rock, while those on the upper bed contain 263,000 long tons. Due to the presence of iron and aluminium phosphates, and to their probable low average phosphoric oxide content, the deposits on the lower bed are of no importance. Deposits on the upper bed, which have an average phosphoric oxide content of about 11 per cent., and in which the phosphoric oxide occurs mainly as apatite, could be utilised in the event of a critical shortage in supplies of imported phosphate rock, but are of little commercial importance under normal conditions. It would be possible to improve the grade of the material available from the deposits on the upper bed by concentrating the nodules separately, though this would result in a reduction in the quantity of reserves.

Additional deposits associated with the upper phosphate bed may be located elsewhere in the district by prospecting at the base of the chalk, particularly on the Vine Cottage and Yerri Yerri properties.

WHIM CREEK INVESTIGATIONS.

In November, 1941, following a request of the Commonwealth Copper and Bauxite Committee, a geological and contour map of the country in the immediate vicinity of the Whim Well Copper Mine, and a cross section of the mine workings, were prepared by Mr. Matheson. An estimate was also made of the tonnage of material in the various dumps. The work carried out was in connection with a proposed diamond drilling campaign.

K. R. MILES, B.Sc. (Hons.).

REPORT ON A PETROLOGICAL INVESTIGATION OF METASOMATISM NEAR THE CORINTHIAN ORE BODY.

Petrological investigations of bore cores from bores drilled by Big Bell Mines Ltd., to explore the ore body of the Corinthian G.M. 10 miles N.W. of Southern Cross, were made by Mr. Miles during March, 1940. The object of this investigation was to determine whether or not from a megascopic and microscopic examination of the core any evidence could be obtained indicating significant metasomatic changes in mineralogical composition of the wall rock as the ore body was approached. It was thought that if it could be established that cer-

tain constant mineralogical changes did occur, then under such conditions rapid petrological examinations of core should provide very special material assistance during campaigns of prospecting by drilling.

The megascopic and microscopic examination of the core did indicate that certain detectable mineral changes had taken place in the wall rock in proximity to the ore body, but it appeared probable that these changes could not all be attributable to metasomatic replacement by contemporaneous emanations from the ore body, but that they were to a considerable degree contact metamorphic effects. Chemical analyses of representative samples of the country rock confirmed this view.*

THE GEOLOGY OF TINDALS, COOLGARDIE GOLDFIELD.

During the period 17th April to 29th May, 1941, Mr. Miles was engaged in investigations of the geology of the country in the immediate vicinity of the Tindals Gold Mine, situated some 2½ miles by road south of Coolgardie townsite. A detailed geological subsurface map of an area of some 2½ square miles was prepared and all lodes and underground workings were examined.

The principal geological features revealed in this investigation are—(1) the country to the north and north-east of Tindals Mine has been folded on a major east-west axis in a broad east-facing arc (probably an east pitching anticline). Tindals is situated on the southern limb of this fold. (2) The Tindals lodes occur in a belt of comparatively soft basic schists (believed to represent recrystallised products of original basic tuffs) bounded to the east and west by belts of harder recrystallised basic (probably basaltic) lava flows. (3) Contact between the basic schists and the eastern lava belt, which contains interbedded thin bands of metamorphosed graphitic slate, forms a well marked structural horizon.

The Tindals main lode is a compound, post folding acid intrusive body consisting of (1) dark aphanitic siliceous material, little mineralised and seldom auriferous, (2) med-coarse grained auriferous aplite which is usually well mineralised with sulphides and intersected by quartz veins. From field observations and microscopic studies Mr. Miles considers that these two types are co-magmatic, the first probably representing an early phase injection of very fluid and volatile acid material at fairly high temperatures along planes of lamination in the basic schists, the second or aplitic phase being a later phase of injection of material from the same magma source along substantially the same channels. The final emplacement of the vein quartz, and the sulphide mineralisation of the aplite with concomitant introduction of gold was probably an end phase process carried out at falling temperatures.

From his examination Mr. Miles could find no structural evidence to suggest any immediate diminution in dimensions of the lode channel with increasing depth. The distribution of gold within this channel is indicated by the distribution of the sulphide mineralisation.

A table has been prepared giving a complete analysis of the recorded production for the Tindals area dated from the time of first official records (prior to 1893) up to July, 1941.

TWO REPUTED IRON ORE DEPOSITS IN THE VICINITY OF ALBANY, S.W.

Following representations by the Mayor, Chairman of the Road Board and residents of the district, Mr. Miles was instructed to make inspections of two reputed iron ore deposits in the vicinity of Albany. These examinations were made during 16th-18th July, 1941. The first deposit is situated near Warriup at about 33 miles by road north-east of Albany and the second on a ridge just north of Lake Sepping, about two miles north-east of Albany townsite.

Short inspections quickly revealed that both of these reputed iron deposits represented portions of a thin ferruginous laterite capping apparently overlying tertiary (Plantagenet) sediments. Although specimens of high grade limonitic iron ore could be obtained it was

* The full text of this report has since been published under the title "Metasomatism Near the Corinthian Ore body, Western Australia," in the Proceedings of the Australasian Institute of Mining and Metallurgy (New Series No. 125, 1942, pp. 71-83).

obvious that in neither locality was iron ore present in sufficient quality or quantity to be of any commercial value.

THE HILL 60 LODE, MT. MAGNET GOLD MINES, LTD., MT. MAGNET.

From August 2nd-9th, 1941, Mr. Miles was engaged in an examination of the underground workings of the Hill 60 Mine, Mt. Magnet, in order to determine the nature, origin, mineralisation and any structural features of the ore body such as might provide indications of its future prospects at depth. This investigation was in connection with the proposed closing down of this mine which had been for some months carrying out certain development work subsidised by the Government.

After a careful review of the nature of the lode, its grade, distribution of the values, and a close survey of the development work then in progress, Mr. Miles came to the conclusion that further expenditure on a continuation of development work was not warranted.*

A SUPPOSED MANGANESE AND HEMATITE DEPOSIT NEAR WALLANGIE, COOLGARDIE GOLDFIELD.

Accompanied by two well known Kalgoorlie mining men, Messrs. J. Bordon and S. Stene during 28th-29th October, 1941, Mr. Miles paid a brief visit to the Wallangie district near the north-western boundary of the Coolgardie Goldfield to examine and report on alleged deposits of manganese and iron ore.

The site of the supposed deposit is about six miles north-east of Wallangie Rock and about 7½ miles north of the old Wallangie leases. It proved to be the same deposit as that described by R. C. Wilson in 1921.†

Where exposed the manganese deposits were seen to be small and probably limited in depth so as to be of little commercial value at present. Although considerable quantities of iron ore undoubtedly occur in the jasper bars forming numerous outcrops in this belt of country, nowhere was it seen in sufficient purity or concentrated in sufficient quantity to be of any commercial importance under existing conditions.

GEOLOGICAL NOTES ON BORING IN THE MT. PALMER DISTRICT, YILGARN GOLDFIELD.

During August, 1940, Mr. Miles carried out detailed geological mapping on two temporary reserves (Nos. 1087H and 1088H) at Meier's Find, approximately 2½ miles due south, and at Heaney's Find, approximately 3¼ miles N.N.E., respectively, of Mt. Palmer townsite. This work was done to assist in the selection of sites for boring by Yellowdine Gold Development, Ltd.

Six bore holes were drilled at Heaney's Find and four at Meier's Find. Later the core from all these bores were forwarded to Perth where Mr. Miles was able to examine them and prepare petrographical logs of each. Results of all assays made by the company were also supplied. These bore cores have provided some extremely interesting petrological data regarding the products of high grade metamorphism of Western Australian jasper bars.

The Under Secretary for Mines.

I have the honour to submit for the information of the Honourable the Minister for Mines, my report on the operations of the Geological Survey for the year 1942.

STAFF.

There were no staff changes during the year, and the work of the Branch continued to be carried out by the Government Geologist, three field geologists, a junior clerk, a typiste, and a messenger.

FIELD WORK.

The war has had a disturbing influence on the normal activities of the Geological Survey, and from the primary function of mapping, all the professional officers have been diverted to special investigations urgently called for by the abnormal conditions.

* Following Mr. Miles' visit, development was continued until the end of August when all work ceased and the mine was closed down.

† Manganese Ore at Mount Walton, Coolgardie Goldfield. Ann. Prog. Rept., G.S.W.A. for 1921, p. 37.

F. G. Forman, B.Sc., Government Geologist:

The greater part of the time spent by me in the field was occupied in short visits of inspection connected with special investigations on the Greenbushes tinfield and the development of a soapstone deposit at Glen Lynn in the Bridgetown district. The investigations at Greenbushes included the possibility of developing an unworked area of tin-bearing material on M.C. 47 and a general re-survey of the whole of the Greenbushes district.

Considerable time was spent in investigating the emery deposits of the Richenda River district in the Kimberley division, and towards the end of the year I commenced, in the company of a representative of the British Phosphate Commission, an investigation of certain of the phosphate deposits of the State. This work was still in progress at the end of the year.

R. A. Hobson, B.Sc. (Hons.), Geologist:

During April Mr. Hobson was engaged in an examination for alunite of some lakes in the vicinity of Baladjie and Mt. Palmer, both in the Yilgarn Goldfield.

From June to December Mr. Hobson was continuously engaged on geological mapping in the Greenbushes tinfield. In addition to co-operating with Mr. Matheson in the production of a geological map of the principal lode bearing area, he prepared a new sketch map of the whole of the mining district.

R. S. Matheson, B.Sc., Geologist:

During February Mr. Matheson investigated, by detailed mapping and sampling, the tin prospects of M.C. 47, Greenbushes.

In March he accompanied Mr. H. R. Hose, of the Aluminium Laboratories Ltd., Canada, on a reconnaissance survey of the more likely bauxite bearing localities in the South-West Division.

During April Mr. Matheson assisted Mr. Hobson with sampling operations at Baladjie and Mt. Palmer.

From June to October Mr. Matheson collaborated with Mr. Hobson in the mapping of the Greenbushes lodes, and supervised the prospecting work carried out by the Mines Department on M.C. 47. Whilst in the district he also examined a soapstone prospect at Meaney's Bridge, six miles north of Greenbushes, and the felspar-beryl deposit at Ferndale, near Balingup.

In December Mr. Matheson accompanied Mr. H. B. Owen, of the Mineral Resources Branch, Department of Supply and Shipping, on an inspection of mica deposits at Yinnietharra, Ajana, Northampton and Mullalyup.

K. R. Miles, D.Sc., Geologist:

In February Dr. Miles examined a beryl prospect situated 18 miles east of Mundaring in the South-West Division.

In July he investigated the availability of anti-mony ore from the Moonlight Wiluna G.M. at Wiluna, East Murchison Goldfield.

During August and September Dr. Miles reported on a molybdenite prospect at Swan View, in the Darling Ranges east of Perth, and made an inspection and valuation of a limestone quarry in the Fremantle area.

In October he inspected Mr. R. H. Rooke's property about 14 miles south-east of Katanning in search for an alleged deposit of quartz crystals.

During November Dr. Miles was engaged on a tour of investigation of the principal tantalite bearing areas of the Pilbara Goldfield. Localities visited included Wodgina, Tappa Tappa, Strelley, Pilgangoora and Abydos. He was accompanied on this trip by Mr. A. L. Kennedy, late manager of Tantalite, Ltd., and now of the Mineral Resources Branch, Department of Supply and Shipping.

OFFICE AND GENERAL.

Petrological determinations for the public and for departmental purposes were made throughout the year by Dr. Miles. This work was considerably hampered

by the lack of a trained assistant, much of Dr. Miles' time being consumed in the mechanical operation of preparing thin sections.

Dr. Miles also took charge of a reorganisation of the rock and mineral collection of the Geological Survey, the registering and indexing of which had fallen some years into arrears. This work was carried out intermittently throughout the year, and was particularly urgent because of the necessity for frequent reference to the collection in dealing with problems connected with strategic minerals.

The professional officers of this branch are to be commended for their efforts in assisting at a three day trial of a small copper smelter in January. Labour for the short period involved was extremely difficult to procure, and the trial was finally made possible by the Geological Survey officers volunteering to provide the labour for one shift each day.

In February it was decided to send all original and unpublished plans to a country centre for safe keeping against the risk of loss through enemy action. All the professional staff were engaged in their collection and disposal.

PUBLICATIONS.

Geological Survey Bulletin 100 was published early in the year. It is in two parts, Part I, The Blue Asbestos Bearing Banded Iron Formations of the Hamersley Ranges, by Keith R. Miles, B.Sc., (Hons.), Geologist; and Part II, The Blue Asbestos Deposits of the Hamersley Ranges and their Economic Importance, by J. S. Foxall, B.E. (Syd.) M.I.E., Aust., Assistant State Mining Engineer.

In order to conserve paper and printing costs, summaries only of the various reports prepared during the year appear on the following pages. The full text of the reports are available for public information at the office of the Geological Survey, Beaufort street, Perth.

I wish to record my appreciation of the work of all members of the staff, who have worked conscientiously throughout the year, sometimes under very trying circumstances.

F. G. FORMAN,
Government Geologist.

SUMMARIES OF REPORTS.

F. G. FORMAN, B.Sc., Government Geologist.

SOAPSTONE AT GLEN LYNN, SOUTH-WEST DIVISION.

The development of a soapstone deposit on Mr. Mabey's property near Glen Lynn siding, five miles south of Bridgetown was closely watched throughout the year.

The rock being developed is massive and greenish-grey in colour. It consists of talc, chlorite, rutile and actinolite. Its exact origin is somewhat doubtful. The most recent inspection of the property indicated that the stone was not opening up as well as was originally expected and that much difficulty would be encountered in obtaining blocks large enough from which to cut sizes of 12in. by 12in. by 6in., which size of blocks constitutes a large proportion of an order now being dealt with.

The future of the Glen Lynn deposits would appear to depend on whether the ground soapstone can be used for agricultural purposes.

ALLEGED SCHEELITE DEPOSIT NEAR KUNUNOPPIN.

Following a report from Mr. Barrymore of Greenbushes that scheelite occurred in pegmatite veins cutting through granite at Yarogin Rock, north of Kununoppin, an examination of this locality was made with negative results.

Yarogin Rock is typical of many of the bare granite rocks which occur throughout the wheat belt. The rock is a coarse-grained porphyritic granite and shows a distinct gneissic banding, the lineation almost everywhere following the direction of the outer surface of the rock. The gneiss contains numerous xenoliths of a dark coloured basic rock, which clearly proves its intrusive character. The rock is cut by numerous remarkably straight veins of pegmatite and graphitic granite, the

minerals present being quartz, microcline and biotite mica. A whole morning spent in the examination of pegmatite veins failed to reveal the presence of any heavy minerals likely to be of economic value.

NEVILLE'S SCHEELITE PROSPECT—MELVILLE, YALGOO, G.F.

In November, 1942, a short visit was paid to a scheelite prospect at Melville being developed by Neville and party.

The scheelite occurs as disseminated grains and scattered lumps in a sheared greenstone close to granitic intrusions. At the time of inspection the scheelite had been located in only three shafts and a few shallow costeans, the work done being totally inadequate to enable an opinion to be formed regarding the prospects of the deposit.

At the conclusion of the examination Australian Mines Management and Secretariate, Ltd., were advised that the securing of an option for prospecting purposes was warranted. It is understood that after the expenditure of a few hundred pounds in trenching and shaft sinking, the option was abandoned as being unlikely to be payable.

COPPER PROSPECTS AT GALENA—NORTHAMPTON MINING DISTRICT.

Following representations by Mr. T. Weir, of Galena, an examination was made of two areas; a prospecting area held in the name of F. Cordingly (late Mining Lease 73) and Mining Lease 205 held in the name of T. Weir.

As a result of the examination the conclusions reached regarding the two areas were that Cordingly's P.A. does not warrant any further work and that any possible body of ore on Lease 205 must be further opened up before an opinion can be formed regarding its value.

EMERY DEPOSITS—RICHENDA RIVER AREA, KIMBERLEY DISTRICT.

Early references to the occurrence of emery near the Richenda River are brief notes in the Annual Report of the Geological Survey for the years 1918 and 1919.

In 1936 Mr. George Wye of Derby, forwarded to the Government Chemical Laboratory a large sample of emery from a deposit near Mt. Broome, and some time later Mr. R. J. Coleman, of Derby, forwarded samples from a deposit near Mt. Rose, both localities being on the Richenda River watershed.

On the visit of inspection covered by the present report, Wye's deposit was located at a point about 4 miles south-west of Mt. Broome. The emery occurs as veins or lenses associated with a shaly band in metamorphosed sediments. The mineral is in the form of a dark, dense, fine-grained rock sprinkled with glassy crystal facets, which sparkle on a freshly broken surface.

A rough estimate of the amount of broken emery lying on the surface at Wye's original discovery is between 50 and 100 tons, the distribution of the lumps indicating the presence of a number of parallel veins or lenses.

At a point between a half and one mile north-west of Wye's discovery detrital emery was also seen, but a short search which was all that was possible in the circumstances, failed to locate the actual outcrop.

From the uniform nature of the country in the vicinity, coupled with reports of detrital emery from various scattered localities, there is little doubt that further search would reveal other deposits of a grade similar to that already found.

R. A. HOBSON, B.Sc. (Hons.).

INVESTIGATIONS IN THE GREENBUSHES TINFIELD.

During the period June to December, 1942, detailed geological mapping and investigations were carried out by Mr. Hobson and his colleague, Mr. R. S. Matheson, in the Greenbushes Tinfield. Mr. Hobson made a detailed examination of the north-west end of the belt of lode-bearing country, which includes the tantalite workings, and also revised the general geology of the district.

The principal contributions to our knowledge of the geology of the Greenbushes Tinfeld are that the older alluvium has a wider distribution than was previously recognised, and that the basement complex consists largely of metamorphosed lavas and meta-sediments. More information concerning the geology, and descriptions of the mines is contained in a comprehensive report, which is being prepared.

The prospecting of Paper Bark Swamp is recommended.

SAMPLING OF SOME LAKES NEAR BALADJIE AND MT. PALMER FOR ALUNITE.

In April, 1942, Mr. Hobson with the assistance of Mr. R. S. Matheson, sampled lakes near Baladjie and Mt. Palmer with a view to locating useful deposits of alunite.

Preliminary prospecting indicated that the only deposit of any consequence occurred in a small lake situated about 3½ miles south-south-east of Mt. Palmer. Subsequent systematic sampling of this deposit indicated the probable existence of 290,000 tons of material containing 59% alunite.

BORING ON M.C. 6—GREENBUSHES.

During November, 1942, an unworked portion of the alluvial ground in the upper part of Bunbury Gully, which was reported to contain high values, was tested by boring under Mr. Hobson's supervision. The results obtained from 6 bores indicated that the alluvium was neither as deep nor the values as high as was reported, and that the unworked area was small.

R. S. MATHESON, B.Sc.

INVESTIGATIONS IN THE GREENBUSHES TINFIELD.

During the period June to October, 1942, detailed geological mapping and investigations were carried out by Mr. Matheson at the south-east end of the belt of lode-bearing country, while similar work was done at the north-west end by his colleague, Mr. R. A. Hobson. The area examined by Mr. Matheson includes Mineral Claims 4, 6, 34 and 45 and dredging claim 90, reports on which have been compiled.

During this period Mr. Matheson also made a detailed examination of M.C. 47, and supervised certain prospecting operations being carried out on behalf of the Mines Department.

Mineral Claim 47.—Prospecting operations revealed the existence of several scattered lenses of stanniferous lode material in this area, but their commercial importance cannot be determined until the assay results come to hand.

Mineral Claim 4.—Mining was in progress on the "Vulcan" lode at the time of inspection (August, 1942) but ore reserves were reported to be small and operations were expected to cease at an early date. There is scope for prospecting north-west of the "Vulcan" open cut, in the vicinity of the old "Ironclad" workings and in the unworked belt of newer alluvium along the northern side of Westralian Gully.

Mineral Claim 6.—If the results obtained in bores put down by Greenbushes Tin Ltd., are accepted as correct, there is a large quantity of cassiterite yet to be recovered from lode material and alluvial deposits on M.C. 6. It has been estimated that 740,000 cubic yards of material with an average value of 1.31 lbs. of SnO₂ per cubic yard occur in the area prospected, between the surface and 38 feet vertical depth. The solid laterite capping which occurs over much of the area, and, in the case of the alluvial ground, the occasional cementing together of the "wash," may present mining difficulties.

Mineral Claim 34.—The principal workings included in this mineral claim are those of the old "Kapanga" Mine, but there is no incentive to prospect them at depth. With the present high price of tin (66/- per unit), it may be possible to recover small parcels of ore from the old workings and some prospecting appears to be warranted beyond the south end of the line of workings.

Mineral Claim 45.—This mineral claim includes the workings of the old "Lost and Found" Mine. Much of the cassiterite recovered from the area has been obtained from alluvial deposits, but narrow, irregular pegmatitic lodes, occurring below the alluvium, have also been mined. Further mining on M.C. 45 is dependent on the discovery of unworked patches of oxidised ore in the lode workings, and on the discovery of other concentrations of cassiterite in the alluvial ground.

Dredging Claim 90.—Most of the old alluvial workings in Elliot's Gully are included in the ground now occupied by D.C. 90. Two horizons of stanniferous "wash," occurring in alluvial deposits up to about 50 feet in thickness, appear to have been mined in the area but their full extent is not known. Meagre information concerning the old workings causes difficulties in correlating the two seams of "wash," and it is possible that some of the old workings were discontinued on a false bottom. There is scope for further prospecting in this area.

BAUXITE INVESTIGATIONS.

In the early part of March, 1942, Mr. Matheson accompanied Mr. H. R. Hose, of the Aluminium Laboratories Ltd., Canada, on a reconnaissance survey of the likely bauxite-bearing localities in the South-West Division.

Various deposits of bauxitic laterite overlying several different types of rocks, were sampled and their topographic situation noted. Samples collected in the Toodyay district, from deposits overlying metamorphosed argillaceous sediments gave the best results, but so far as is known the deposits are not extensive. In most of the samples collected in other districts the silica and/or iron oxide content exceeded present permissible limits.

Other areas worthy of investigation include York, Greenhills, Greenhills-Quairading, Chittering and Woodlloo.

INVESTIGATIONS ON THE MICA DEPOSITS IN THE YINNIETHARRA, AJANA, NORTHAMPTON AND MULLALYUP DISTRICTS.

During the period 1st to 19th December, 1942, Mr. Matheson, accompanied Mr. H. B. Owen, of the Mineral Resources Survey Branch, Department of Supply and Shipping, on an inspection of the mica deposits in the above districts. The principal object of the investigations was to locate workable deposits of clear or commercial clear muscovite mica, and consequently a number of deposits in the districts known to contain only stained and spotted muscovite were not visited.

Important deposits of clear and commercial clear sheet muscovite, development of which has since been undertaken, were located in the Yinnietharra district. It is possible that this centre may also be an important source of beryl.

Although small amounts of clear sheet mica could be obtained from some of the deposits in the Ajana, Northampton and Mullalyup districts, it is unlikely that they could be successfully exploited solely for sheet mica, under existing circumstances.

INVESTIGATION OF THE MEANEY'S BRIDGE SOAPSTONE DEPOSIT.

A detailed examination of this deposit, which is situated about six miles north by road from the Greenbushes railway station, was made by Mr. Matheson in July, 1942.

The deposits consists of 17 lenses of soapstone occurring in a complex of quartz-mica gneiss, quartz veins and epidiorite dykes. A few of the lenses consisted of fairly fresh soapstone and the quality was expected to persist if not improve with depth. Subsequent prospecting showed that the soapstone in these particular lenses became decomposed at depth, however, and operations were discontinued. It is therefore suggested that the belts of soapstone are lenticular, vertically as well as horizontally, and that the fresh soapstone occurs as kernels in the more decomposed material.

K. R. MILES, D.Sc.

INSPECTION OF NORRISH AND SELKIRK'S
BERYL SHOW, MUNDARING, S.W. DIV.

This show is situated about 18 miles by road south-east of Mundaring township and approximately five miles north-east of Mt. Dale. It was inspected by Dr. Miles on February 11th, 1942, with the object of assessing the commercial possibilities of the deposit. The very small amount of beryl visible in the exposure and shallow workings gave little grounds for the belief that the deposit will prove of any economic importance.

INSPECTION OF MOLYBDENITE SHOW,
SWAN VIEW, S.W. DIV.

On August 4th, 1942, Dr. Miles accompanied Messrs. Ives Bros. on an inspection of the workings of an old molybdenite show $1\frac{1}{2}$ miles north-north-east of Swan View Railway Station in what was the old Reward Lease 211H. This show was previously inspected in 1914 by H. W. B. Talbot. Although a little further work had been done since then, there is no evidence to suggest that a workable deposit of molybdenite exists here.

INSPECTION OF AN ALLEGED QUARTZ
CRYSTAL DEPOSIT, KATANNING,
S.W. DIVISION.

An inspection was made during October 26th-29th of the property of Mr. F. H. Rooke at about 14 miles by road south-east of Katanning, with the object of investigating a claim that quartz crystal suitable for optical or piezo electric purposes occurred there. After a brief inspection it was obvious that the claimants had not appreciated the requirements of crystals to be used in optical munitions, etc., and that no suitable crystal was to be found in this locality.

REPORT ON ANTIMONY IN THE MOONLIGHT
LEASES, WILUNA, EAST MURCHISON G.F.

During July, 1942, an inspection of the leases held by the Moonlight Wiluna Gold Mines, Ltd., at Wiluna, was made by Dr. Miles with the object of assessing the available antimony ore on the property and reporting on the possibilities of developing any further deposits not yet exploited. An opportunity was also made to enquire into the antimony production of the Wiluna Gold Mine during Dr. Miles' visit. It was found that the known surface exposures of antimonial ore in the Moonlight leases (four in number) gave little promise of the existence of workable antimony deposits. In the Moonlight Mine itself most of the antimony sulphide (stibnite) ore has now been worked

out, the total available antimony reserve at the time of inspection probably amounting to little more than 400 tons, of which about 300 tons metallic antimony would be recoverable.

Surface indications of antimonial ore on the Wiluna G.M. Company's leases are extremely limited, whilst in the mine itself ore reserves at the time of inspection were said to be little more than five months' supply, or 750 tons of recoverable metallic antimony.

BORING AT WHIM CREEK—LOGS OF
BORES.

A drilling programme to investigate the downward continuation of portions of the ore body of the Whim Well Copper Mine at Whim Creek, Pilbara district, was carried out between June and August, 1942, by arrangement with the Commonwealth Copper and Bauxite Commission. On completion of the drilling of seven bores (Nos. 12-18) and after the core had been split and samples sent to the Government Mineralogist and Analyst for assay, the remaining core was delivered to the Geological Survey, where Dr. Miles made a careful petrographical and minerographic log of each bore and took representative samples for preservation in the Survey Museum collection.

Details of the bores and their logs have been listed in tabulated form, and the results of the recent assays, together with a complete analysis of a representative bulk sample of sulphide ore from Bore 18, have been added as appendices.

NOTES ON AN INSPECTION OF THE PRINCIPAL
TANTALITE-BEARING DISTRICTS OF THE
PILBARA GOLDFIELD.

This inspection was made during the period November 13th-24th, 1942, in the company of Mr. A. L. Kennedy, a representative of the Commonwealth Department of Supply and Shipping, late manager of the Tantalite Mine at Wodgina, the world's principal producing centre for tantalite. The centres inspected included Wodgina, about 70 miles due south of Port Hedland, Pilgangoora, about 14 miles east of Wodgina, Tappa Tappa, 40 miles south-east of Port Hedland, and Strelley, about 15 miles north-east of Tappa.

During the course of this tour Dr. Miles was impressed by the possibilities of future systematic development of the tantalite lodes, particularly at Wodgina and Strelley. Some attention was also paid to occurrences of several other minerals for which there is a reported present demand, viz.: beryl, lithium-bearing minerals (spodumene and lepidolite) at the above mentioned centres, and corundum at Abydos, south of Wodgina.

Index to Geological Survey Annual Report.

	Page		Page
Abydos	8, 11	Granite	9
Actinolite	9	Grant's Patch	5
Ajana—Mica deposits at	8, 10	Graphitic Slate	7
Albany—Iron ore deposit, North-East of	6, 7	Greenbushes	5, 8, 9, 10
Albany—O.P.A. 10H, East of	5, 6	Greenbushes Tin Ltd.	10
Aluminium Laboratories Ltd.	8, 10	Greenhills	10
Alunite	8, 10	Greensand	7
Anaconda group	7		
Antimony	8, 11	Halls Creek	5
Apatite	7	Hamersley Ranges	5, 9
Aplite	7	Heaney's Find	5, 6, 8
Armada—Honestone deposits at	6	Hematite	8
Asbestos—Crocidolite variety	5, 9	Hill 60 Gold Mine	6, 8
Australian Mines Management & Secretariate Ltd.	9	Hobson, R. A.	5, 6, 8, 9, 10
		Honestone	6
		Hose, H. R.	8, 10
Baladjie—Alunite at	8, 10	Ironstone	5
Balingup	8	Iron Ore	6, 7, 8
Barrymore, Mr.	9	Ives Bros. prospect	11
Basic lava	7		
Basic Schists	7	Jasper bars	8
Bauxitic laterites	5, 8, 10	Jimperding Gold Mine	5
Beryl	5, 8, 10, 11		
Big Bell Mines, Ltd.	7	Karridale—Limesand at	5
Bordoni, J.	8	Katanning—Quartz crystals at	8, 11
Bridgetown	8, 9	Kennedy, A. L.	8, 11
British Phosphate Commission	8	Kununoppin—Scheelite at	9
Bunbury Gully	10		
		Lake Gnangarra—Diatomite at	5
Callion—Water supply for	5, 6	Lake Sepping	7
Caltex Oil Development Ltd.	5	Laterite, bauxitic	5
Cardup—Honestone deposits at	6	Laterite, ferruginous	7
Cassiterite	10	Lava, basic	7
Chalk	7	Lease 211H	11
Chittering District	5, 10	Lepidolite	11
Chlorite	9	Limestone	7, 8
Clackline—Ironstone deposits at	5, 6	Lime Sand	5
Coleman, R. J.	9	Limonite	5
Coolgardie—Tindal's Gold Mine at	5, 6, 7	Londonderry—Beryl near	5
Coolgardie Goldfield	8		
Coolgardie Goldfield—Beryl in	5	Mabey, Mr.	9
Copper deposits	5, 9, 11	Manganese	6, 8
Cordingly, F.	9	Marramamba—Crocidolite at	5
Corinthian Gold Mine—Pore cores from	5	Matheson, R. S.	5, 6, 7, 8, 9, 10
Corinthian Ore Body—Metasomatism of	6, 7	M.C. 4	10
Corundum	11	M.C. 6	10
Cretaceous Rocks	7	M.C. 34	10
Crocidolite Asbestos	5, 9	M.C. 45	10
		M.C. 47	8, 10
Dandaragan—Phosphates at	5, 7	Meaney's Bridge—Soapstone at	8, 10
Darling Ranges	5, 8	Meier's Find	5, 6, 8
D.C. 90	10	Melville—Scheelite at	9
Derby	9	Metasomatism	6, 7
Diatomite	5	Mica	8, 10
		Miles, K. R.	5, 6, 7, 8, 10
East Murchison Goldfield	8	M.L. 73	9
Elliot's Gully	10	M.L. 205	9
Emery	8, 9	Molybdenite	8, 11
Epidiorite	10	Moonlight Wiluna Gold Mine	8, 11
Esperance—Mt. Ridley, North-East of	5	Mt. Broome	9
		Mt. Dale	11
Felspar	8	Mt. Magnet... ..	6, 8
Ferndale—Felspar-Beryl deposit at	8	Mt. Margaret Goldfield—Resurvey of	5, 6
Fitzgerald River	6	Mt. Palmer	8
Forman, F. G.	5, 6, 8, 9	Mt. Palmer—Alunite at	8, 10
Foxall, J. S.	9	Mt. Ridley—Potassium nitrate near	5, 6
Fremantle Smelting Works	6	Mt. Rose	9
Freney Kimberley Oil Co.	5	Mt. Walton—Manganese at	8
		Mullalyup—Mica at	8, 10
Galena—Copper at	9	Mundaring—Beryl at	8, 11
Glen Lynn—Soapstone at	5, 8, 9	Murchison Goldfields—Copper in	5
Gold	7	Murrin	6, 7
Gneiss—Quartz-mica	10		

INDEX TO GEOLOGICAL SURVEY ANNUAL REPORT—*continued*

	Page		Page
Nerrima Bore Site	5	Soapstone	5, 8, 9, 10
Neville's Prospect—Scheelite at	9	Spodumene	11
Norrish and Selkirk's prospect	11	Stene, S.	8
Northampton—Copper at	9	Stibnite	11
Northampton—Mica at	8, 10	Strelley	8, 11
		Swan View—Molybdenite at	8, 11
Oil	5, 6		
O.P.A. 10H.	5, 6	Tabba Tabba	8, 11
Ora Banda Amalgamated Gold Mine	5	Talbot, H. W. B.	11
Ord River—Dam site on	5, 6	Talc	9
Owen, H. B.	8, 10	Tantalite	8, 9, 11
		Tantalite Ltd.	8, 11
Paper Bark Swamp	10	Tin	5
Pegmatite	9	Tindal's Gold Mine	5, 6, 7
Petroleum	5, 6	Toodyay—Bauxite at	10
Phoenix Oil Extractors Ltd.	5, 6		
Phosphate deposits	5, 7, 8	Vine Cottage—Phosphate at	7
Pilbara Goldfield	8, 11		
Pilgangoora	8, 11	Waiti Kauri Group	7
Port Hedland	11	Wallangie Hills—Manganese and iron at	6, 8
Potassium nitrate	5, 6	Wallangie Rock	8
		Warriup—Iron at	6, 7
Quairading	10	Weir, T.	9
Quartz crystals	8, 11	Whim Creek—Copper at	5, 7, 11
Quartz—Mica Gneiss	10	Whim Well Copper Mine	5, 7, 11
Quartz veins	7, 10	Wilson, R. C.	8
		Wiluna	5, 8, 11
Reserve 1087H	8	Wodgina	8, 11
Reserve 1088H	8	Wooroloo	10
Richenda River—Emery at	8, 9	Wye, G.	9
Rooke, F. H.	11		
Rutile	9	Yalgoo Goldfield—Copper in	5
		Yarogin Rock	9
Scheelite	9	Yellowdine Gold Development Ltd.	8
Schists, basic	7	Yerri Yerri—Phosphate at	7
Sillimanite	5	Yilgarn, G. F.	5, 6, 8
Slate, graphitic	7	Yinnietharra—Mica at	8, 10
		York	10