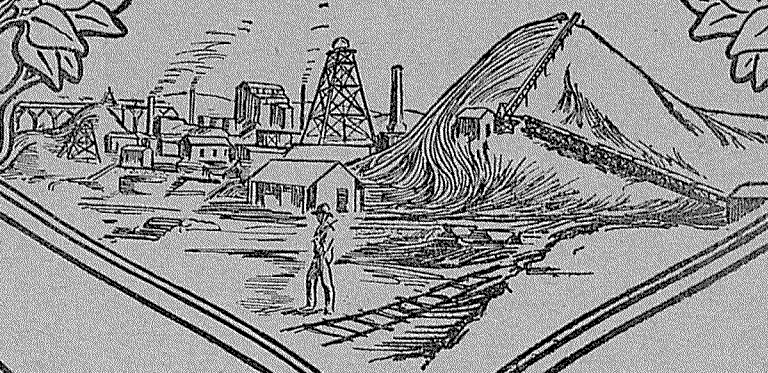




REPORT
OF THE
DEPARTMENT OF MINES
FOR THE YEAR
WESTERN · 1937 · AUSTRALIA



PRESENTED TO BOTH HOUSES OF PARLIAMENT

BY HIS EXCELLENCY'S COMMAND



H. D. CHIGGINS

1938.

—
WESTERN AUSTRALIA.

REPORT

of the

Department of Mines

FOR THE YEAR

1937

PERTH :

BY AUTHORITY : FRED. WM. SIMPSON, GOVERNMENT PRINTER.

—
1938.

ANNUAL REPORT OF THE DEPARTMENT OF MINES, WESTERN AUSTRALIA, 1937.

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STATE OF WESTERN AUSTRALIA.

Report of the Department of Mines for the State of Western Australia for the Year 1937.

To the Hon. Minister for Mines.

Sir,—I have the honour to submit the Annual Report of the Department for the year 1937, together with reports from the officers controlling the sub-departments, and comparative tables furnishing statistics relative to the Mining Industry

I have, etc.,

A. H. TELFER,
Acting Under Secretary for Mines.

Department of Mines,
Perth, 31st March, 1938.

DIVISION 1.

The Hon. the Minister for Mines,—

I have the honour to submit, for your information, a report on the Mining Industry for the year 1937.

The estimated value of the mineral output of the State for the year was £4,732,925 (calculating gold at £4 4s. 11.45d. per ounce); an increase of £693,320 over the preceding 12 months. The estimated premium paid to gold producers amounted to £A.4,493,281, bringing the gross value of all minerals up to £A.9,226,206, an increase of £A.1,407,522 in Australian currency over the 1936 production.

There were increases in the quantities and value of copper, gold, gypsum, lead ore, silver, tantalite and tin, and in the value of coal. During the year, a considerable tonnage of antimonial concentrates was exported. Decreases in the quantity of coal raised, and in the quantity and value of arsenic, asbestos, felspar, and glauconite produced were recorded.

The estimated value of gold received at the Royal Mint and exported in gold-bearing material was £A.8,743,755 and equalled 94.77 per cent. of the value of all the minerals. (See footnote to Table 1, Part II.) Other minerals realised:—Coal, £340,444; arsenic, £36,972; antimonial concentrates, £25,323; silver, £20,596; tantalite, £16,846; tin, £12,421; gypsum, £9,809; felspar, £9,031; lead ore, £7,248; asbestos, £1,950; and glauconite £825.

Dividends paid by mining companies amounted to £1,213,529, an increase of £134,691, when compared with 1936. (See Table 6.)

To the end of the year 1937, the total amount distributed by gold mining companies in dividends was £34,131,159. To the same date the value of the mineral production totalled £198,857,177, of which the gold production accounted for £183,525,473, based on normal values; but premiums from sales of gold during 1920-4 and 1930-1937, and payments under "The Gold Bounty Act, 1930," increased by £21,692,013, the total value of mineral and gold productions.

GOLD.

The reported yield of gold showed an increase of 154,867 fine ounces, the best since 1916.

The estimated average value per ton of ore treated in the State as a whole declined from 28.85 shillings per ton in 1936 to 28.15 shillings per ton in 1937, calculated at the rate of £4 4s. 11.45d. per fine ounce, but the averaged premium obtained for gold during the 12 months (105.616 per cent.) would more than double this estimate. In the East Coolgardie Goldfield (which produced approximately 42.61 per cent. of the State's reported yield) the estimated average value of the ore treated dropped from 31.26s. to 30.85s. per ton. The estimates for the East Murchison (Wiluna Gold Mine); Mt. Margaret (Sons of Gwalia and Lancefield Mine); and Murchison Goldfields (Triton, Big Bell, and Mt. Magnet Gold Mines) were 17.81s. (18.24s.); 31.23s. (31.36s.); 22.59s. (27.03s.) respectively; 1936 figures in parentheses.

The reported tonnage of ore treated in 1937, 3,039,607 tons, was an increase of 547,573 tons over the 1936 output, being within 66,000 tons of the peak

production of 1909. Increased tonnages were reported from all Goldfields, except Peak Hill and North East Coolgardie, which showed a decrease of 1,188 and 1,373 tons respectively. The principal increases were from the following goldfields:—East Murchison (183,838), Murchison (113,687), East Coolgardie (100,319), Yilgarn (39,472), Dundas (37,021), North Coolgardie (30,548) and Mt. Margaret (28,276).

The quantity of gold recorded as being received at the Perth branch of the Royal Mint and exported in bullion, concentrates and other gold bearing material exceeded that of 1936 by 154,439 fine ounces (*vide* Table 1). The reported yield from the tonnage treated exceeded that of 1936 by 154,867 ounces (*vide* Table 3). The estimated average tonnage of ore raised, and the number of ounces of gold produced, per man engaged in the industry, both showed substantial increases, notably in the Murchison, East Murchison, Yalgoo and Dundas Goldfields, as compared with figures for 1936, as set out in Table 3.

Only three goldfields failed to report yields of gold in excess of 1936 production, viz., Ashburton, Broad Arrow and Phillips River, which showed reduced outputs of 64, 672, and 22 ounces respectively. The principal increases were reported from the East Murchison, 35,292 ounces; East Coolgardie, 30,644 ounces; Yilgarn, 25,397 ounces; Murchison, 17,839 ounces; Dundas, 17,108 ounces; North Coolgardie, 13,259 ounces; Mt. Margaret, 9,420 ounces.

The acreage held under mining lease for all minerals was 68,369, being a decrease of 4,336 acres when compared with 1936. The area held for gold mining was lesser by 4,713 acres, but an increased area of 377 acres was recorded in regard to mineral leases. The area held under prospecting areas was 38,633 acres, including one coal area of 3,000 acres. Mineral claims totalling 8,049 acres were also held, while a number of reservations under Section 297 of the Mining Act remained in force, and were being actively prospected.

The average number of men engaged in mining operations was reported to be 17,136, an increase of 484 over the number recorded for 1936. The number engaged in the production of gold is still on the up-grade, the average number reported being 16,174; an increase of 478 for the year 1937. The increased number seeking base metals and minerals total 6. More men have been engaged in the preliminary work at Koolan Island (11); and asbestos (17); gypsum (7); tin (11); and tantalite (7), are also occupying more attention. In the coal mining industry there was a reduction of 45 men, and at Northampton 3.

The estimated value of the average amount of gold produced per man engaged in the gold mining industry (calculated at the normal price) was £264.55 in 1937; an increase over 1936 value of £33.85 per man. The estimated average tonnage of ore raised per man was 187.93 tons, in the previous year 158.77 tons; an increase of 29.16 tons per man. East Murchison, East Coolgardie, Mt. Margaret, and Murchison Goldfields produced the highest tallies of ore per man with averages of 386.55; 269.95; 225.11 and 189.22 tons respectively.

YILGARN GOLDFIELD.

Another successful year was experienced in this field, and an increased yield of 25,397 fine ounces of gold was recorded.

Bullfinch was an active centre, but most of the gold recovered came from the old "Bullfinch Proprietary" leases now operated by a private syndicate.

Corinthia and Eenuin were moderately active. Golden Valley reported some good returns, the consistent "Radio" lease being the largest producer.

At Holleton, the "North End" mine continued operations; while at Hope's Hill the "Pilot" mine was the chief producer and its battery worked continuously.

Kennyville and Koolyanobbing both recorded productions.

At Marvel Loch, the Marvel Loch Gold Development, N.L., employed 110 men and crushed consistently. "Edwards Reward" was worked in conjunction with the "Sunshine" lease and the prospects of the property appear to be bright. The New Yilgarn Gold Mines, N.L., experienced water difficulties. Extensive development work was reported at the May Queen, and a five-head battery and other plant has been erected. The N.G.M., Limited, at Nevoria, carried out extensive development and is, it is understood, now endeavouring to raise the capital necessary to instal a plant capable of treating 10,000 tons of ore monthly.

The "Jacoletti" battery was overhauled and is now available for public crushing.

The Mt. Jackson Gold Mines, N.L., were the main producers at Mt. Jackson, but there was considerable general activity and numerous crushings were recorded.

The chief producer at Mt. Palmer was Yellowdine Gold Development, Limited, which worked continuously during the year and employed 130 men.

A large number of prospectors were attracted to Parker's Range, and the local batteries were kept practically continuously in operation.

At Southern Cross, the Southern Cross United Mines Limited commenced crushing, but the returns were reported to be disappointing. At the end of the year the mine employed 80 men. The Yellowdine Gold Options, N.L., re-opened its mine in September. The Edna May (W.A.) Amalgamated Gold Mines, N.L., commenced operations about August, and is employing 70 men.

The new Evanston centre shows promise, but is handicapped by lack of water.

COOLGARDIE GOLDFIELD.

This field showed an increase of 1,538 fine ounces.

Coolgardie District.—Extensive development and machinery erection was effected by two large mining companies, Phoenix Gold Mines, Limited, and Consolidated Gold Mines of Coolgardie, Limited. The former employed an average of 64 men throughout the year, while the latter's average figure was 95. The Consolidated Company, it is anticipated, will shortly commence to erect a plant of a capacity of 5,000 tons per month.

The "Manolive" mine at this centre recorded 411 fine ounces of gold from 33.50 tons of ore. There was considerable general activity in and around Coolgardie.

Bonnie Vale and Burbanks reported numerous crushings, the leading producers being the "Lucky Hit," at the former centre, and the "Lord Bobs" and "Boshter" mines at Burbanks. Returns were also recorded from Cave Rocks, Eundynie, Gibraltar and

Grosmont, Hampton Plains, Londonderry, Paris Group and St. Ives centres had regular producers.

"Spargo's Reward" commenced crushing during November at its new plant.

Widgiemooltha kept a fair number of prospectors engaged, but ore was generally of low grade.

Kunanalling District.—There was a reduced output during the year from this district, mainly caused by the closing down of the Golden West property and the cessation of operations by United Westralian Gold, N.L., in September.

During the year, Goldfields Australian Development Company, Limited, purchased the Gorman's Find property and completed the erection of a 10-head battery. It is anticipated that 1,000 tons per month will be treated.

A very rich reef was discovered by Messrs. Wisby and Norton at Dunnsville in February, and 1,468 fine ounces were obtained therefrom during the year.

Carbine, Chadwins, Dunns and Kintore centres all reported crushings. The Kunanalling Gold, N.L., at Kunanalling operated during the year and this centre was also generally active.

DUNDAS GOLDFIELD.

This field showed a vastly increased production of 17,108 fine ounces of gold.

The Central Norseman Gold Corporation and the Norseman Gold Mines, N.L., were the two largest producers, and both companies undertook considerable developmental work during the year and employed large numbers of men.

Other successful companies were the Blue Bird Gold Mines, N.L., Norseman Developments, N.L., and Norseman South Gold Mines, N.L. The field was generally most active and undoubtedly has a bright future. The extension of the Goldfields Water Supply to this field has made a wonderful difference. The Norseman townsite has made great strides and contains many new buildings.

EAST COOLGARDIE GOLDFIELD.

This field, comprising East Coolgardie and Bulong districts, experienced a most successful year, producing 1,181,896 tons and 429,175 fine ounces of gold. These figures exceeded 1936 respectively by 100,319 tons and 30,644 fine ounces. The number of men engaged in gold mining was 4,250, which was an increase of 184.

East Coolgardie District.—The Lake View and Star, Limited, continued as the principal producer, and employed during the year an average of 1,260 men. The Chaffers shaft has now reached a depth of 3,758 feet, while satisfactory diamond drilling was undertaken at a greater depth. During the year 645,739 tons of the old Associated dump were re-treated by the company. The next largest producer was the Great Boulder Proprietary Gold Mines Limited, which employed 876 men. This company is now increasing its plant with the object of treating 30,000 tons monthly.

An increased yield was recorded by both the North Kalgurli (1912), Limited, and Boulder Perseverance, Ltd. The latter company's one 24-acre lease has the wonderful record to date of 4,319,000 tons of ore produced for a return of 2,369,000 fine ounces of gold.

On the Gold Mines of Kalgoorlie, Limited, a treatment plant of 8,000 tons capacity was erected and in full operation at the end of the year.

The Paringa Company reported a much larger return, and it is expected that its plant will be in operation during the first half of 1938.

The South Kalgurli Consolidated increased its yield from 16,274 fine ounces in 1937 to 21,130 fine ounces, while the Enterprise on its south boundary is actively proceeding with development work. Under the control of the Paringa Company over 13,000 feet of boring was undertaken on the old Hannans Reward Leases with satisfactory results, and a developmental policy in the near future will, it is anticipated, be put into action. At the North End, the Broken Hill Proprietary Company was the principal producer.

Golden Ridge and Binduli centres were very quiet, but at Mt. Monger several hundred men were engaged and some excellent returns were reported. The "Milano" lease returned 1,060 fine ounces from 383 tons, while the "Big Bull" recorded 328 fine ounces from 37 tons of ore. The Mt. Monger public battery was in operation for most of the year.

At Hampton Plains, the Celebration Mine was active, but future prospects are uncertain. A number of men were at work on Locations 45, 48 and 50, and several crushings, mostly low grade, were put through.

At Mt. Martin, Feysville, Boorara and other smaller centres, slight activity was shown.

Bulong District.—There were 113 men engaged in this district but no new discoveries of note were reported.

NORTH-EAST COOLGARDIE GOLDFIELD.

This field showed an increased production mainly owing to the activity in the Kurnalpi district. The field gave employment to 178 men.

Kanowna District.—The output for this district was slightly less than in the previous year and was the result of small-scale operations and treatment of tailings dumps.

Kurnalpi District.—Mulgabbie centre recorded a number of rich crushings, the outstanding one being from Prospecting Area 369K, 275 fine ounces being obtained by dollying and 379 fine ounces coming from 12 tons of ore treated.

Kurnalpi centre was fairly active but nothing of note occurred in the others.

BROAD ARROW GOLDFIELD.

This field recorded an increased tonnage but a smaller return than in 1936. It was very active, however, and contained many good producers.

At Ora Banda, development work was continued by the Ora Banda United Mines, Ltd., and the construction of the plant is expected to be put in hand at an early date.

Bardoc centre contained about 50 prospectors and miners, and numerous good crushings were recorded. Other centres, such as Christmas Reef, Waverley, Riches Find and Smithfield were all fairly active.

At Collard's Find, the "Three Eights" lease was taken over by the Western Mining Corporation, and returned 618 fine ounces from 420 tons.

At Paddington a remarkable yield of 199 fine ounces from 3½ tons came from Prospecting Area 3394W.

Broad Arrow centre was more active than for some time.

The State Battery at Ora Banda operated continuously, and also treated 8,595 tons of tailings

NORTH COOLGARDIE GOLDFIELD.

This field showed an increased yield of 13,259 fine ounces. The men employed therein totalled 970.

Menzies District.—A large increase, both in tonnage and yield, was recorded, the main producers being the Sand Queen Gladsome mine at Comet Vale, the Lady Shenton property at Menzies, the Mt. Ida Gold Mines, Limited, at Mt. Ida, and the First Hit mine also at Menzies.

The latter centre was particularly active and a number of profitable returns were reported.

Mt. Ida, Golden Vale, and Yundaga also kept a number of men engaged. At Menzies the "Lady Harriet" battery crushed for the public and also treated 2,550 tons of tailings.

Ularring District.—A vast improvement in the figure for this year was shown mainly on account of the "Riverina" mine coming into production. A new find was also reported five miles north of this centre and rich returns were obtained by the finder, J. W. Morley. Ularring and Mulwarrie centres were quiet, but Davyhurst and Mulline evidenced increased activity.

Yerilla District.—This centre reported a decreased yield, mainly owing to falling off in the returns from the "Edjudina Gold Mines" and Kimberley Oil Options.

At Edjudina the Paget Gold Mines continued with exploratory work, but the future programme has not yet been disclosed.

The "Mt. Wallbrook" mine at the centre of that name erected a plant, but subsequent operations it is understood were not profitable.

Yarri centre was active and the State Battery provided public crushing facilities and also treated a large parcel of tailings. Other centres carried varying numbers of prospectors.

Niagara District.—The greatest activity in this district took place in the Kookynie centre, where the Cosmopolitan Mines N.L. was the main producer. This mine is to undergo further scientific examination. The "Waratah" lease at Tampa had a good year and shows promise.

MURCHISON GOLDFIELD.

This goldfield, comprising the Cue, Day Dawn, Meekatharra and Mt. Magnet districts, showed an increase of 17,839 fine ounces, and its future prospects look to be bright.

Cue District.—An increase of 83,483 tons and 10,690 fine ounces was recorded, attributable mainly to the Big Bell Mines, Limited, which came into production in October. The Big Bell township now comprises 700 people and 78 houses. The mine should be a consistent producer at the rate of 360,000 tons annually in future.

The Triton Mine at Reedy added a new unit to its crushing plant during the year, bringing its capacity to 9,000 tons monthly.

Other active centres reporting production were Behring Pool, Cuddingwarra, Cue, Culleulli, Eelya, Mindoolah, Oliver's Patch, Tuckabianna, Tuckanarra, and Weld Range.

Day Dawn District.—An increase of 1,013 fine ounces was recorded, mainly as the result of operations in the Day Dawn and Lake Austin centres. Mainland and Webb's Patch were very quiet, but there was some activity at Pinnacles. Prospects at Lake Austin are not bright as the mine is now closed.

Mt. Magnet District.—There was again a substantial increase totalling 6,200 fine ounces, the main producer being the Mt. Magnet Gold Mines, Limited, which successfully treated low-grade ore. This company also commenced to instal additional plant.

The Hill 50 Gold Mine, N.L., had a satisfactory year and paid its first dividend.

The third largest producer was the Edward Carson mine which is privately owned. Its ore is high grade. These and other good producers are situated in the vicinity of Mt. Magnet and this centre was extremely busy.

Jimbulyer, Moyagee, Paynesville and Wynyangoo centres were all active and producing, but Lennonville, while active, was not as successful as in the previous year.

Meekatharra District.—This district showed a small decrease of 64 fine ounces, and the main producer was the Ingliston Consols Extended.

Abbotts, Gabanintha, Garden Gully, Holden's Find, Meekatharra, Nannine, Quinns and Yaloginda were all centres in which numbers of prospectors were engaged and from which crushings were reported, but Burnakura, Chesterfield, Jillawarra, Munarra Gully, Ruby Well, and Stake Well were quiet.

Gabanintha and Nannine reported particularly good returns, and both are excellent prospectors' localities. At the former a plant was in course of erection to treat the Gabanintha tailings dump, which is refractory and has lain idle for many years.

YALGOO GOLDFIELD.

This field was responsible for an increase of 656 fine ounces over the previous year's production.

Bilberatha and Carlaminda were active prospectors' centres, but Field's Find was quieter than usual. Goodingow retained its position as the biggest producer in the goldfield, the two main properties being the "Carnation" and the "Orchid." The Payne's Find State Battery ran continuously.

Gullewa was most active and its principal returns came from the "Mugga King" and "King Solomons" properties. On the former, a five-head battery was erected.

Kirkalueka, Messenger's Patch and Mt. Gibson were very quiet.

Noongal was busy and this centre supplies most of the ore for the Yalgoo State Battery.

Nyounda, Pinyalling and Retaliation recorded small productions.

At Rothsay, the Rothsay Gold Mines Ltd. erected a modern treatment plant, and has been carrying out an extensive developmental programme. It should next year regularly treat 2,000 tons monthly.

Wadgingarra and Warda Warda showed a marked decrease in prospecting activities, while Warriedar, Yalgoo and Yuin centres only reported moderate returns.

The Warriedar and Yalgoo State Batteries ran for several months during the year.

PEAK HILL GOLDFIELD.

This field recorded an increase of 498 fine ounces.

The main producing centres were Mt. Egerton, where Lease 352P. reported 802 fine ounces from 342 tons with the possibility of further ore of this value forthcoming, and Peak Hill, where the State Battery ran continuously.

Considerable activity took place at the Labouchere Ranges, and prospectors were engaged in testing the gold bearing formation north of the old workings. Mt. Padbury, Murphy's Well, Horseshoe, Jimble Bar and Heines Find were quiet.

Mt. Seabrook showed some activity.

At Peak Hill, a syndicate commenced treating the sands dump, but after several months' work ceased operations, the venture apparently proving unprofitable.

EAST MURCHISON GOLDFIELD.

This field shows the splendid increase of 169,016 tons, and 35,292 fine ounces, compared with 1936. Its three districts, Black Range, Lawlers and Wiluna all contributed towards same.

Black Range District.—This district reported an increase of 9,404 fine ounces, due mainly to the operations of the Youanmi Gold Mines, Ltd., at Youanmi. Such company carried out an extensive development programme in order to prepare the mine for production from the sulphide zones. Work on the sulphide unit of the treatment plant also proceeded and this should be ready for production early in 1938.

Mining operations at Barrambie, Birrigrin, Curran's Find, Errolls, and Montague, were fairly quiet.

At Jonesville, the Swan Bitter Gold Mining Company proceeded with successful development work. It also treated 10,080 tons of ore and 9,828 tons of accumulated sands and slimes and completed a satisfactory year.

The North End Mine was also a regular producer and crushed at its own mill 3,993 tons, and treated 5,110 tons of sands and slimes.

At Maninga Marley, the Atlas Gold Mines, Ltd., concentrated on development and diamond drilling on the old Maninga Marley property. After six months' operations, the company discontinued in October, and its future intentions are not yet known.

The Sandstone Battery crushed for almost the whole of the year for prospectors at Sandstone and outlying centres.

Lawlers District.—Due to the commencement of crushing operations by Emu Gold Mines, Ltd., at Agnew in September, this district shows an increase of 2,185 fine ounces.

Kathleen Valley centre was fairly quiet, the bulk of its yield coming from the re-treatment of old tailings.

At Lawlers, prospectors were active, and two plants were engaged treating sands. On the Emu property, four miles west of the town, production at the rate of 3,000 tons per month was instituted, and 125 men were employed.

Mt. Sir Samuel recorded a much lesser output than in the previous year.

Wiluna District.—This district returned an increase of 120,014 tons and 23,702 fine ounces of gold.

At Cole's Find and Corboys a fair number of men were engaged. At the latter centre the "Toscana" battery and cyanide plant provided public crushing facilities.

Diorite, Kingston, Mt. Eureka, Mt. Fisher, Mt. Keith and New England centres were all active, and others in Gum Creek and Waldecks reported production.

At Wiluna both the Wiluna Gold Mines, Ltd., and the Moonlight Wiluna Gold Mine recorded good returns.

Considerable development work was undertaken on the properties and new equipment installed.

This district is now responsible for the employment of a very large number of miners.

MT. MARGARET GOLDFIELD.

This field showed a good increased yield of 9,420 fine ounces.

Laverton District.—This district was active and showed a fine increased return, mainly as the result of the activity in the Erlistoun centre, where the Western Mining Corporation employs 105 men on its mine at Cox's Find, and produced over 14,000 fine ounces.

The King of Creation Company closed its mill during the year and concentrated on development, but it is understood that the results were not impressive and the future of the mine is in doubt.

Duketon and Mt. Barnicoat centres were fairly active.

At Beria the Lancefield property maintained a steady output, and Beria town is now established.

Encouraging developmental operations have been carried out at the Gladiator, and the erection of a plant is contemplated.

Mt. Morgans District.—The yield from this district was slightly below that for 1936.

Linden centre showed very pleasing activity and one lease produced 788 fine ounces from 21 tons.

Other centres were rather quiet.

Mt. Malcolm District.—A comfortable increase in both ore crushed and gold produced was recorded.

The Sons of Gwalia Mine was of course easily the main producer and is progressing well. It employs 361 men.

At the Reefer Battery, which was erected with Government funds, 4,594 tons of ore were treated as well as a large tonnage of tailings.

Freeman's Find, a discovery 40 miles north of Darlot, attracted attention, and several good crushings were recorded. Other centres showing fair activity were Randwick, Wilson's Patch, Mertondale and Mt. Clifford.

PHILLIPS RIVER GOLDFIELD.

There was again a slight decrease amounting to 22 fine ounces reported from this field, and not so much activity in mining was displayed as in 1936.

At Kundip, the Beryl Gold Corporation's operations were almost at a standstill, and the company's future programme is obscure.

In the vicinity of Ravensthorpe a number of leases reported crushings, the most active being the lease owned by Messrs Plowman Bros.

From Hatter's Hill 248 ounces of gold were produced, but no new developments were noticed.

PILBARA GOLDFIELD.

This field also reported an increased yield, and the activity displayed was very pleasing.

Marble Bar District.—The principal producer was the "Halley's Comet" Mine with 3,107 ounces milled and a good sands return.

Activity was shown at Corunna, Ellerin Hills, Talga, Warrawoona, Shark's Gully, North Shaw, Tambourah, and Yandicoogina centres.

The Marble Bar and Bamboo Creek State Batteries were kept busy, particularly the former.

The "Lalla Rookh" Mine ceased operations during the year, having obtained exemption.

Nullagine District.—Eastern Creek, Middle Creek and Mosquito Creek all reported crushings. The Mosquito Creek Battery during the year was moved to 20 Mile Sandy and a large tonnage has been booked for its re-opening.

KIMBERLEY GOLDFIELD.

It is pleasing to note the gold mining activity manifested in this field, as the result of the erection with Government assistance of a battery at the Ruby Queen near Hall's Creek. An increase of 73 fine ounces was recorded for the year, the total produc-

tion being 397 fine ounces. Next year should show a much greater output now that battery facilities are available.

ASHBURTON GOLDFIELD.

Showed a decrease in production and no special activity was noticeable.

GASCOYNE GOLDFIELD.

Recorded only 11 ounces of alluvial gold.

OUTSIDE PROCLAIMED GOLDFIELDS.

From districts outside the proclaimed goldfields productions were reported from West Pilbara, Donnybrook, Burracoppin, and Mt. Browne in the West Kimberley district.

The Weerianna Battery at Roebourne closed down during the year.

The periodical examination of mine workers under the provisions of the Mine Workers' Relief Act was completed on the 31st December, 1937, and the results of this examination, together with the results of the previous examinations are shown in the following table:—

TABLE SHOWING RESULTS OF PERIODICAL EXAMINATION OF MINE WORKERS, FROM INCEPTION OF EXAMINATIONS (1925) TO 31st DECEMBER, 1937.

<i>First Examination (1925-26).</i>										per cent.		
Normals, etc.	3,239	=	80.5
Silicosis Early	459	=	11.4
Silicosis Advanced	183	=	4.5
Silicosis plus Tuberculosis	131	=	3.3
Tuberculosis only	11	=	.3
Total number of men examined										4,023	=	100.0
<i>Second Examination (1927).</i>										per cent.		
Normals, etc.—												
Previously reported as Normals, etc.	2,290		
New cases (<i>i.e.</i> , cases examined for the first time)	826		
										3,116	=	83.6
Silicosis Early—												
Previously reported as Early	348		
New cases	33		
										381	=	10.2
Silicosis Advanced—												
Previously reported as Advanced	85		
New cases	8		
										93	=	2.5
Silicosis plus Tuberculosis—												
Previously reported as Normals, etc.	13		
Previously reported as Silicosis Early	27		
Previously reported as Silicosis Advanced	62		
New cases	26		
										128	=	3.4
Tuberculosis only	10	=	.3
Total number of men examined										3,728	=	100.0
<i>Third Examination (1928).</i>										per cent.		
Normals, etc.—												
Previously reported as Normals, etc.	2,738		
New cases	239		
										2,977	=	85.5
Silicosis Early—												
Previously reported as Normals, etc.	47		
Previously reported as Silicosis Early	303		
New cases	12		
										362	=	10.4
Silicosis Advanced—												
Previously reported as Normals, etc.	1		
Previously reported as Silicosis Early	16		
Previously reported as Silicosis Advanced	79		
New cases	2		
										98	=	2.8
Silicosis plus Tuberculosis—												
Previously reported as Normals, etc.	10		
Previously reported as Silicosis Early	14		
Previously reported as Silicosis Advanced	10		
New cases	8		
										42	=	1.2
Tuberculosis only—												
Previously reported as Normals, etc.	3		
New case	1		
										4	=	.1
Total number of men examined										3,483	=	100.0

<i>Fourth Examination (1929).</i>										per cent.
Normals, etc.—										
Previously reported as Normals, etc.	...	...	...	...	...	...	...	2,099		
New cases	...	...	...	...	...	...	...	21		
								2,120	=	81.9
Silicosis Early—										
Previously reported as Normals, etc.	...	...	...	...	...	...	...	100		
Previously reported as Silicosis Early	...	...	...	...	...	...	...	224		
New cases	...	...	...	...	...	...	...	2		
								326	=	12.6
Silicosis Advanced—										
Previously reported as Silicosis Early	...	...	...	...	...	...	...	34		
Previously reported as Silicosis Advanced	...	...	...	...	...	...	...	60		
								94	=	3.6
Silicosis plus Tuberculosis—										
Previously reported as Normals, etc.	...	...	...	...	...	...	...	8		
Previously reported as Silicosis Early	...	...	...	...	...	...	...	14		
Previously reported as Silicosis Advanced	...	...	...	...	...	...	...	19		
								41	=	1.6
Tuberculosis only—										
Previously reported as Normals, etc.	...	...	...	...	...	...	...	7		
								7	=	.3
Total number of men examined										
								2,588	=	100.0

<i>Fifth Examination (1930).</i>										per cent.
Normals, etc.—										
Previously reported as Normals, etc.	...	...	...	...	...	...	...	2,751		
New cases	...	...	...	...	...	...	...	34		
								2,785	=	81.9
Silicosis Early—										
Previously reported as Normals, etc.	...	...	...	...	...	...	...	133		
Previously reported as Silicosis Early	...	...	...	...	...	...	...	247		
New cases	...	...	...	...	...	...	...	3		
								383	=	11.3
Silicosis Advanced—										
Previously reported as Silicosis Early	...	...	...	...	...	...	...	22		
Previously reported as Silicosis Advanced	...	...	...	...	...	...	...	43		
New cases	...	...	...	...	...	...	...	2		
								67	=	2.0
Silicosis plus Tuberculosis—										
Previously reported as Normals, etc.	...	...	...	...	...	...	...	6		
Previously reported as Silicosis Early	...	...	...	...	...	...	...	60		
Previously reported as Silicosis Advanced	...	...	...	...	...	...	...	46		
New cases	...	...	...	...	...	...	...	2		
								114	=	3.3
Tuberculosis only—										
Previously reported as Normals, etc.	...	...	...	...	...	...	...	47		
New cases	...	...	...	...	...	...	...	3		
								50	=	1.5
Total number of men examined										
								3,399	=	100.0

<i>Sixth Examination (1931).</i>										per cent.
Normals, etc.—										
Previously reported as Normals, etc.	...	...	...	...	...	...	...	2,530		
								2,530	=	84.0
Silicosis Early—										
Previously reported as Normals, etc.	...	...	...	...	...	...	...	94		
Previously reported as Silicosis Early	...	...	...	...	...	...	...	252		
								346	=	11.5
Silicosis Advanced—										
Previously reported as Silicosis Early	...	...	...	...	...	...	...	18		
Previously reported as Silicosis Advanced	...	...	...	...	...	...	...	35		
								53	=	1.8
Silicosis plus Tuberculosis—										
Previously reported as Normals, etc.	...	...	...	...	...	...	...	4		
Previously reported as Silicosis Early	...	...	...	...	...	...	...	35		
Previously reported as Silicosis Advanced	...	...	...	...	...	...	...	19		
								58	=	1.9
Tuberculosis only—										
Previously reported as Normals, etc.	...	...	...	...	...	...	...	25		
								25	=	.8
Total number of men examined										
								3,012	=	100.0

Seventh Examination (1932).

			per cent.
Normals, etc.	3,835	3,835	= 89.5
Silicosis Early—			
Previously reported as Normals, etc.	35		
Previously reported as Silicosis Early	338	373	= 8.7
Silicosis Advanced—			
Previously reported as Silicosis Early	6		
Previously reported as Silicosis Advanced	47	53	= 1.2
Silicosis plus Tuberculosis—			
Previously reported as Normals, etc.	3		
Previously reported as Silicosis Early	9		
Previously reported as Silicosis Advanced	4	16	= .4
Tuberculosis only—			
Previously reported as Normals, etc.	8	8	= .2
Total number of men examined		4,285	= 100.0

Eighth Examination (1933).

			per cent.
Normals, etc.	2,920	2,920	= 86.5
Silicosis Early—			
Previously reported as Normals, etc.	57		
Previously reported as Silicosis Early	322	379	= 11.2
Silicosis Advanced—			
Previously reported as Normals, etc.	1		
Previously reported as Silicosis Early	15		
Previously reported as Silicosis Advanced	44	60	= 1.8
Silicosis plus Tuberculosis—			
Previously reported as Normals, etc.	2		
Previously reported as Silicosis Early	9		
Previously reported as Silicosis Advanced	4	15	= .4
Tuberculosis only—			
Previously reported as Normals, etc.	3	3	= .1
Total number of men examined		3,377	= 100.0

Ninth Examination (1934).

			per cent.
Normals, etc.	5,140	5,140	= 92.4
Silicosis Early—			
Previously reported as Normals, etc.	54		
Previously reported as Silicosis Early	315	369	= 6.6
Silicosis Advanced—			
Previously reported as Normals, etc.	1		
Previously reported as Silicosis Early	24		
Previously reported as Silicosis Advanced	12	37	= .7
Silicosis plus Tuberculosis—			
Previously reported as Normals, etc.	6		
Previously reported as Silicosis Advanced—	6	12	= .2
Tuberculosis only—			
Previously reported as Normals, etc.	5	5	= .1
Total number of men examined		5,563	= 100.0

Tenth Examination (1935).

		per cent.
Normals, etc.	4,437	
	4,437	= 92.3
Silicosis Early—		
Previously reported as Normals, etc.	35	
Previously reported as Silicosis Early	303	
	338	= 7.0
Silicosis Advanced—		
Previously reported as Silicosis Early	24	
Previously reported as Silicosis Advanced	2	
	26	= .6
Silicosis plus Tuberculosis—		
Previously reported as Silicosis Early	5	
	5	= .1
Tuberculosis only—		
Previously reported as Normals, etc.	2	
	2	= .0
Total number of men examined	4,808	= 100.0

Eleventh Examination (1936).

		per cent.
Normals, etc.	6,972	
	6,972	= 94.7
Silicosis Early—		
Previously reported as Normals, etc.	29	
Previously reported as Silicosis Early	323	
	352	= 4.8
<i>(Note.—Of the 352 cases of Early Silicosis reported, 23 were already suffering from Early Silicosis and 4 from Pneumoconiosis when re-admitted to the industry on the Re-admission Certificate under Regulation 7 of the Mines Regulation Act, 1906.)</i>		
Silicosis Advanced—		
Previously reported as Normals, etc.	1	
Previously reported as Silicosis Early	15	
Previously reported as Silicosis Advanced	4	
	20	= .3
Silicosis plus Tuberculosis—		
Previously reported as Normals, etc.	3	
Previously reported as Silicosis Early	8	
	11	= .1
Tuberculosis only	8	
	8	= .1
	7,363	= 100.0

Twelfth Examination (1937).

		per cent.
Normals, etc.	7,487	
	7,487	= 95.4
Silicosis Early—		
Previously reported as Normal, etc.	15	
Previously reported as Silicosis Early	319	
	334	= 4.3
<i>(Note.—Of the 334 cases of Early Silicosis reported, 37 were already suffering from Early Silicosis when re-admitted to the industry on the Re-admission Certificate under Regulation 7 of the Mines Regulation Act, 1906.)</i>		
Silicosis Advanced—		
Previously reported as Silicosis Early	14	
Previously reported as Silicosis Advanced	4	
	18	= .2
Silicosis plus Tuberculosis—		
Previously reported as Normals, etc.	1	
Previously reported as Silicosis Early	10	
	11	= .1
Tuberculosis only	2	
	2	= .0
Total number of men examined	7,852	= 100.0

Men employed in the outlying districts were not examined during 1929 or 1931, only those employed in Kalgoorlie and surrounding district being examined.

The increase in numbers diagnosed as early silicosis and tuberculosis in 1930 was due to the improved plant and radiographic technique.

Only new miners and those whose previous diagnosis warranted review were examined in the outlying districts during 1933.

TIN.

The quantity of tin exported was 80 tons valued at £12,421, an increase of 30 tons, and in value of £5,539. The production reported was 3 tons from the Pilbara Goldfield, valued at £500, and 51 tons from the Greenbushes Mineral Field, valued at £8,118. The average number of men employed in the latter field was 51, being 11 more than in 1936.

TANTALITE.

Nineteen (19) tons valued at £16,846 were exported; an increase of five (5) tons, and in value of £8,034.

The reported production was 18 tons from the Pilbara Goldfield.

COPPER.

Thirty-five (35) tons valued at £986 were exported, but not any production was recorded.

LEAD.

6,163 tons valued at £7,248 was raised in the Northampton Mineral Field, being an increase of 4,628 tons on 1936. The bulk of this was produced by the Wiluna Gold Mines, Limited, from the Grand Junction Mine at Galena, which was, however, closed down before the end of the year.

An average of 29 men were employed during the year on the field.

COAL

The output of coal was 553,510 tons, being 11,565 tons less than in 1936. The whole production came from the Collie field, which employed 723 men, being 45 less than in 1936. The output per man was 766 tons as compared with 736 tons in the previous year.

ASBESTOS.

The production of asbestos for the year was 42 tons, valued at £1,950, a falling off compared with 1936 of 117 tons, and £1,529.

OTHER MINERALS.

The quantity of silver obtained as a by-product and exported was 180,562 ounces, valued at £20,596; an increase of 75,343 ounces and £8,823.

2,900 tons of felspar were produced at Coolgardie, valued at £5,801, while 2,989 tons were exported, worth £9,031.

165 tons of glauconite were produced, valued at £825, and 9,073 tons of gypsum, worth £9,809. This latter mineral showed an increase of 2,412 tons, valued at £2,240 on the 1936 production.

Arsenic totalling 2,054 tons, valued at £36,972, was recorded from Wiluna.

Antimonial concentrates were reported, amounting to 693 tons, valued at £25,323. The bulk of this came from Wiluna, and the balance from Nullagine.

The development of the iron ore deposit at Yampi Sound was vigorously continued, and at the end of the year some 40 men were employed there. No activity was manifested in regard to the search for oil.

MINING GENERALLY.

The only base metals produced were lead, tin, tantalite and antimony.

In gold mining it is most pleasing to record that the activity was maintained and that the production exceeded one million fine ounces. This was the highest since 1916, and was the result of several of the larger mines coming into full production. As there are yet more companies which have not reached the producing stage, it seems safe to assume that 1938 will also record a substantial increase.

The Government continued during the year its policy of assisting prospectors and encouraging the industry generally. The total number of men assisted under the State Prospecting Scheme since its inception until the end of 1937 was 2,920. At the end of the year 106 men were in receipt of full assistance including ration orders. At that date the cost to the Department since inception totalled £96,561, while refunds from successful prospectors amounted to £18,108. Reported production by prospectors whilst on the scheme was 12,140 fine ounces.

Operations under the Commonwealth Metalliferous Fund were continued very satisfactorily and the expenditure totalled £109,666 11s. 8d. This was divided under four headings:—

	£	s.	d.
(1) Staff	1,211	1	2
(2) Prospecting	68,216	9	8
(3) Batteries, etc.	33,447	8	9
(4) Education of Miners	4,462	2	8

Under (1) the services of two geologists have been continued, and good work has been accomplished.

(2) To the end of the year 2,974 prospectors had received full assistance by way of rations and loan of tools, 81 had been assisted with loan of tools only, and 22 granted rail fares only. At the close of the year 475 were in receipt of full assistance. Reported production was 9,032 fine ounces, and refunds totalled £10,998.

(3) This item provided treatment facilities in various parts of the State.

(4) This item was used in the extension of facilities at the Schools of Mines, Kalgoorlie and Wiluna, and at the Government Chemical Laboratory.

The total acreage held under prospecting areas for gold and minerals, apart from coal, was 35,633, compared with 40,452 acres during 1936.

AERIAL, GEOLOGICAL AND GEOPHYSICAL SURVEY OF NORTHERN AUSTRALIA.

The work of the survey in Western Australia was principally confined to the Pilbara Goldfield, and 30 of the mining centres therein were examined.

Geological investigations were also carried out in 10 centres in the Kimberley district.

During the year geophysical work was undertaken at Kookynie, Wiluna, Big Bell and Norseman, and the economical value of same should be considerable if the predictions prove to be warranted.

The survey is to be continued during 1938 and the programme is as follows:—

Geological.

Ashburton Gascoyne District—

Top Camp, Mt. Mortimer, Soldiers' Secret, Dead Finish, Black Hills, Westons, Red Hills, Yarraloola, Uaroo, Silver Sheen, Hancock and Obergooma.

Pilbarra District—

Weerianna, Nichol Bay, Hong Kong, Mallina, Pilbara, Toweranna, Egina, Whim Creek, Roebourne, Nunyerrie, Lionel, Soanes-

ville, Sherlock, Eginbah, Hamersley Range, Andover, Wodgina, Strelley, Cooglegong, Tabba Tabba, Moolyella, Peewah, Sherlock Crossing, Mount Negri, Lalla Rookh, North Shaw, Coongan, Bamboo Creek.

Kimberley District—Yampi Sound.

Geophysical.

Norseman (Mararoa Reef).

Aerial Photography.

Koolan and Cockatoo Islands and extensions along strike on mainland.

MINING DEVELOPMENT ACT.

The expenditure incurred in rendering assistance to mine owners and the industry generally under the provisions of this Act totalled £7,300 7s. 1d., and in the preceding year £13,956 11s. 3d.

PART II.—MINERALS.

TABLE I.

Quantity and Value of Minerals produced and/or exported during Years 1936 and 1937.

Description of Minerals.	1936.		1937.		Increase or Decrease for Year compared with 1936.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
		£		£		£
1. Antimonial Concentrates (reported), statute tons ...	...	...	693	25,323	+ 693	+ 25,323
2. Arsenic (reported), statute tons ...	3,470	62,460	2,054	36,972	— 1,416	— 25,488
3. Asbestos (reported), statute tons ...	159	3,479	42	1,950	— 117	— 1,529
4. Copper (exported), statute tons ...	2	97	35	986	+ 33	+ 889
5. Coal (raised), statute tons ...	565,075	331,565	553,510	340,444	— 11,565	+ 8,879
6. Felspar (exported), statute tons ...	3,048	9,170	2,989	9,031	— 59	— 139
7. Fireclay (exported), statute tons ...	4	15	...	...	— 4	— 15
8. Glauconite (reported), statute tons ...	219	1,095	165	825	— 54	— 270
9. Gold (exported and minted), fine ozs. ...	846,208	*3,594,460	1,000,647	4,250,474	+154,439	+656,014
10. Gypsum (reported), statute tons ...	6,661	7,569	9,073	9,809	+ 2,412	+ 2,240
11. Lead Ore (raised), statute tons ...	1,535	2,228	6,163	7,248	+ 4,628	+ 5,020
12. Silver (exported), fine ozs. ...	105,219	11,773	180,562	20,596	+ 75,343	+ 8,823
13. Tantalite (exported), statute tons ...	14	8,812	19	16,846	+ 5	+ 8,034
14. Tin (exported), statute tons...	50	6,882	80	12,421	+ 30	+ 5,539
	...	4,039,605	...	4,732,925	...	+693,320

* The value of fine gold is computed at £4 4s. 11.45d. per ounce; in addition the estimated premiums received by producers amounted to £A4,493,281 for 1937, as compared with £A3,779,079 for 1936.

TABLE 2.

Value and Percentage of Mineral Exports in relation to the Value of Total Exports from Western Australia.

Year.	Total Exports.	Mineral Exports (exclusive of Coal).	Percentage.
	£	£	
1902	9,051,358	7,530,319	83.20
1903	10,324,732	8,727,060	84.53
1904	10,271,489	8,625,676	83.98
1905	9,871,019	7,731,954	78.33
1906	9,832,679	7,570,305	76.99
1907	9,904,860	7,544,992	76.17
1908	9,518,020	7,151,317	75.13
1909	8,860,494	5,906,673	66.66
1910	8,299,781	4,795,654	57.78
1911	10,606,863	7,171,638	67.61
1912	8,941,008	5,462,499	61.09
1913	9,123,607	4,608,188	50.48
1914	8,406,182	3,970,182	47.23
1915	6,291,934	2,969,502	47.19
1916	10,873,153	6,842,621	62.92
1917	9,323,229	5,022,694	53.87
1918	6,931,834	2,102,923	30.34
1919	14,279,240	6,236,585	43.67
1920	15,149,323	3,096,849	20.44
1921	10,331,405	1,373,810	13.30
1922	11,848,025	2,875,402	24.27
1923	11,999,500	3,259,476	27.16
1924	13,808,910	1,424,319	13.24
1925	13,642,852	173,126	1.27
1926	14,668,184	1,597,698	10.89
1927	15,805,120	472,041	2.99
1928	16,911,932	996,099	5.88
1929	16,660,742	1,802,709	10.82
1930	19,016,639	6,370,396	33.49
1931	14,266,650	4,333,421	30.37
1932	16,771,465	5,657,870	33.74
1933	18,098,214	5,328,869	29.44
1934	16,784,705	5,759,324	34.31
1935	17,611,547	5,698,721	32.36
1936	19,564,716	7,130,381	36.45
1937	21,487,681	8,984,400	41.81
Total since 1902 ...	455,149,092	176,305,693	38.74

Exclusive of Arsenic prior to 1935.

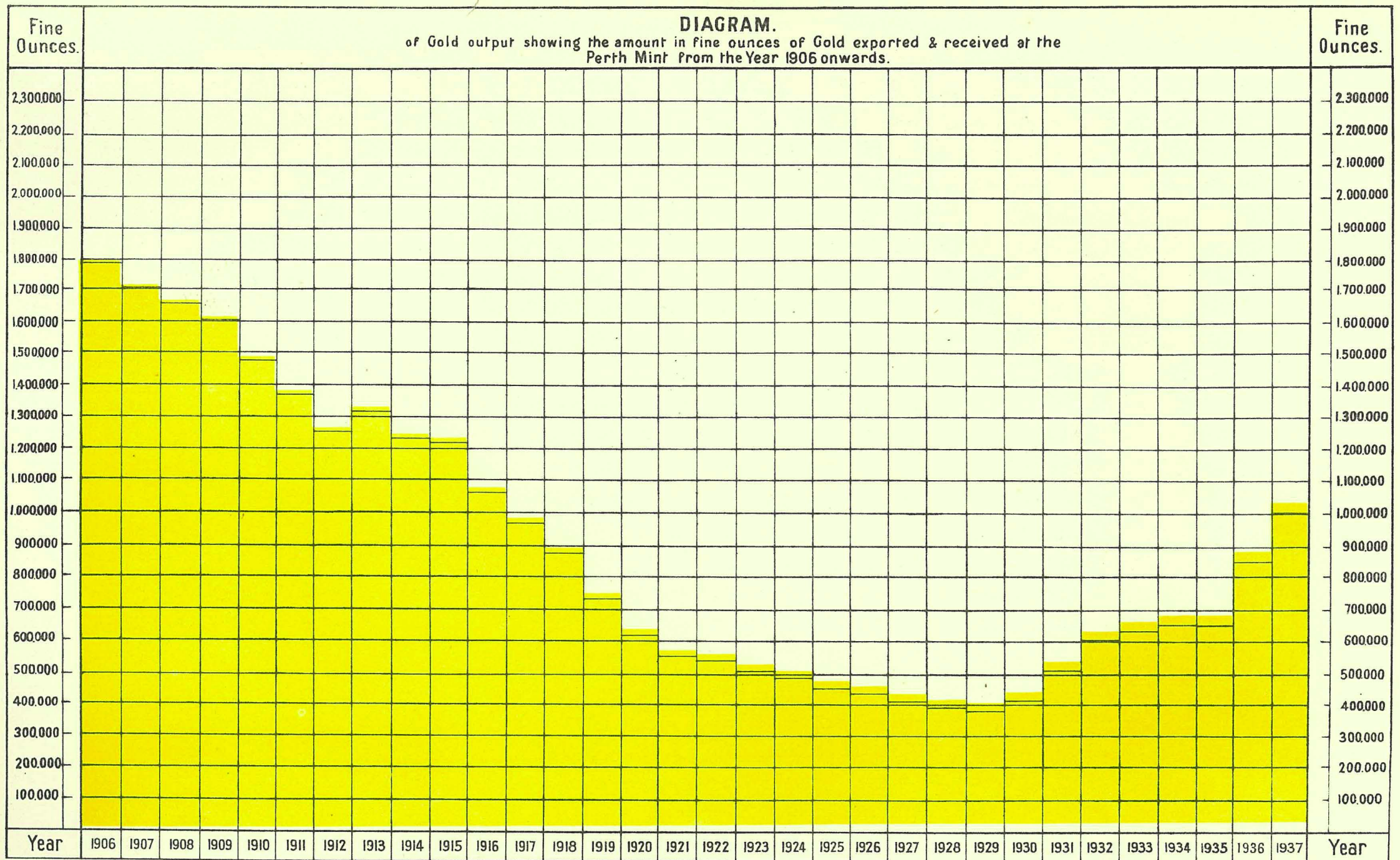
TABLE 3.

Showing for every Goldfield the amount of Gold reported to the Mines Department as required by the Regulations; also the percentage for the several Goldfields of the total reported, and the average value of the Gold per ton of ore treated.

Goldfield.	Reported Yield.		Percentage for each Goldfield.		Average Value per ton of Ore Treated. (Gold at £4 4s. 11.45d. per fine oz.).	
	1936.	1937.	1936.	1937.	1936.	1937.
	fine ozs.	fine ozs.			shillings.	shillings.
1. Kimberley	323	397	.038	.039	87.84	...
2. Pilbara	9,791	13,175	1.149	1.308	82.73	77.60
3. Ashburton	309	245	.036	.024	68.19	...
4. Gascoyne ... ..	...	12	...	.001	...	...
5. Peak Hill	2,108	2,607	.247	.259	22.77	35.53
6. East Murchison	127,786	163,078	14.991	16.190	18.24	17.813
7. Murchison	68,494	86,333	8.035	8.571	27.03	22.587
8. Yalgoo	6,808	7,464	.800	.741	45.44	38.81
9. Mt. Margaret	95,503	104,923	11.204	10.416	31.36	31.23
10. North Coolgardie	22,403	35,662	2.628	3.540	38.78	38.278
11. Broad Arrow	19,582	18,910	2.297	1.877	49.18	45.47
12. North-East Coolgardie	2,165	2,534	.254	.252	47.85	105.475
13. East Coolgardie	398,531	429,175	46.753	42.607	31.26	30.849
14. Coolgardie	16,469	18,007	1.932	1.788	47.42	48.676
15. Yilgarn	49,533	74,930	5.811	7.439	37.62	42.25
16. Dundas	31,131	48,239	3.652	4.789	28.86	31.86
17. Phillips River	1,248	1,226	.146	.122	39.75	22.77
Outside Proclaimed Goldfield ...	238	372	.027	.037	...	...
Totals and Averages	852,422	1,007,289	100.000	100.000	28.65	28.153

The total yield of State is as shown in Table 1, being the amount of the gold received at the Royal Mint, the gold exported in bullion and concentrates, and alluvial and other gold not reported to the Mines Department.

When comparisons are made as to the yield from any particular Field with the preceding year, the figures reported to the Department are used.



Note:— Previous to 1906, Gold Produced, 14,871,687 Fine Ozs.
Peak Year 1903, Gold Produced, 2,064,801 . . .

TABLE 4.

Average Quantities of Gold Ore raised and treated, and Gold produced therefrom, per man employed on the several Goldfields of the State, during 1936 and 1937.

Goldfield.	1936.				1937.			
	Tons of Gold Ore raised and treated.		Fine ounces of Gold produced therefrom.		Tons of Gold Ore raised and treated.		Fine ounces of Gold produced therefrom.	
	Per man employed under ground.	Per man employed above and under ground.	Per man employed under ground.	Per man employed above and under ground.	Per man employed under ground.	Per man employed above and under ground.	Per man employed under ground.	Per man employed above and under ground.
	tons.	tons.	fine ozs.	fine ozs.	tons.	tons.	fine ozs.	fine ozs.
1. Kimberley ... ..	...	...	...	...	...	...	...	...
2. Pilbara	66.01	38.53	68.47	39.96	89.43	45.87	82.86	42.50
3. Ashburton ... ..	...	...	...	...	...	...	...	...
4. Gascoyne ... ..	...	...	...	...	...	...	...	...
5. Peak Hill	176.69	95.14	50.19	27.03	207.79	103.89	86.90	43.45
6. East Murchison	515.99	281.07	111.02	60.48	685.84	386.55	143.81	81.05
7. Murchison	304.95	133.31	98.98	43.27	412.39	189.22	109.67	50.31
8. Yalgoo	73.43	30.46	39.35	16.33	105.93	44.77	49.76	20.45
9. Mt. Margaret	393.20	191.76	146.03	71.22	416.68	225.11	153.19	82.75
10. North Coolgardie	82.09	40.20	37.84	18.53	139.10	66.18	62.67	29.82
11. Broad Arrow	93.49	42.60	56.11	25.56	95.75	45.01	51.25	24.09
12. North-East Coolgardie	48.76	19.39	30.93	12.30	28.75	11.86	35.69	14.73
13. East Coolgardie	448.60	266.00	165.30	98.02	458.63	269.95	166.55	98.03
14. Coolgardie	40.11	18.25	23.43	10.66	39.83	18.94	22.82	10.85
15. Yilgarn	213.80	104.59	95.26	46.60	250.66	136.33	124.65	67.81
16. Dundas	182.11	106.76	61.89	36.28	230.10	137.60	86.29	51.54
17. Phillips River	40.30	20.62	18.91	9.67	86.25	43.13	23.12	11.56
Total Averages	307.39	158.77	105.15	54.31	354.43	187.93	117.45	62.28

TABLE 5.

Output of Gold from the several States of Australia, the Northern Territory, Papua, the mandated Territory of New Guinea, and the Dominion of New Zealand.

	Output of Gold.	Value.*	Percentage of Total.	
			Output of Commonwealth.	Output of Australasia.
	Fine Ozs.	£		
1. Western Australia	1,000,647	4,250,476	71.281	63.550
2. Victoria	145,799	619,314	10.386	9.258
3. New South Wales	68,607	291,424	4.887	4.356
4. Queensland	127,281	540,655	9.067	8.082
5. Tasmania	20,276	86,127	1.444	1.287
6. South Australia	6,962	29,573	.496	.443
7. Papua	†22,678	96,330	1.615	1.440
8. Northern Territory	11,563	49,116	.824	.734
9. Mandated Territory of New Guinea ... ..	‡	...	...	...
10. New Zealand	170,715	725,151	...	10.850
	1,574,528	6,688,166	100.000	100.000

* Exclusive of Premium.

† Estimate.

‡ Not available.

TABLE 6.

Dividends, etc., paid by Western Australian Mining Companies during 1937 and Total to date.
(Mainly compiled from information supplied to the Government Statistician's Office, by the Chamber of Mines of Western Australia.)

Goldfield.	Name of Company.	Bonuses and Profit Sharing Notes.	Capital returned.	Dividends.	
				1937.	Grand total paid to end of 1937.
		£	£	£	£
Peak Hill	Various Companies ... ..	...	...	...	160,666
East Murchison	Swan Bitter G.M., No Liability ... ..	...	...	3,520	3,520
Do.	Various Companies ... ..	...	...	...	1,644,634
Murchison	Ingliston South Gold Development, N.L. ... ..	...	...	4,608	4,608
Do.	Mt. Magnet G.Ms., Ltd. ... ..	...	...	7,888	7,888
Do.	Triton G.Ms., Ltd. ... ..	...	...	48,000	96,000
Do.	Various Companies ... ..	...	...	...	1,992,670
Mt. Margaret	Lancefield (W.A.) G.Ms., Ltd. ... ..	...	...	112,500	212,500
Do.	Sons of Gwalia, Ltd. ... ..	...	...	97,500	1,567,238
Do.	Various Companies ... ..	...	...	...	376,213
North Coolgardie	First Hit (1934) G.M., N.L. ... ..	...	...	4,661	4,661
Do.	Various Companies ... ..	...	...	...	575,032
Broad Arrow	Ora Banda Amalgamated Mines, Ltd. ... ..	...	...	20,000	30,000
North-East Coolgardie	Various Companies ... ..	...	...	...	89,854
East Coolgardie	Boulder Perseverance, Ltd.	(a)	...	106,921	1,805,065
Do.	Golden Horseshoe (New), Ltd. ... ..	...	(d)	13,750	151,250
Do.	Gold Mines of Kalgoorlie, Ltd. ... ..	...	...	22,875	22,875
Do.	Great Boulder Proprietary, Ltd. ... ..	...	...	62,500	6,456,797
Do.	Lake View and Star, Ltd.	(b)	...	280,000	1,427,000
Do.	North Kalgurli (1912), Limited ... ..	...	...	110,000	322,500
Do.	South Kalgurli Consolidated, Limited	(c)	(e)	25,000	727,501
Do.	Various Companies ... ..	...	...	...	14,927,489
Coolgardie	do. do. ... ..	...	...	...	339,495
Yilgarn	Yellowdine Gold Devel. Ltd. ... ..	...	...	208,806	208,806
Do.	Various Companies ... ..	...	...	...	540,374
Dundas	Blue Bird G.M., No Liability ... ..	...	...	5,000	5,000
Do.	Central Norseman Gold Corporation ... ..	...	...	15,000	15,000
Do.	Norseman Gold Mines, N.L. ... ..	...	...	65,000	193,898
Do.	Various Companies ... ..	...	...	...	222,625
		...	...	£1,213,529	£34,131,159

(a) £45,091 in 1935-36. (b) £42,000 in 1934. (c) £75,000 in 1932-5. (d) £55,000 in 1932. (e) £93,750 in 1932-3.

TABLE 7.

Quantity and Value of Minerals, other than Gold, reported to the Mines Department during 1937.

Goldfield, District, or Mineral Field.	1937.		Increase or Decrease for Year as compared with 1936.	
	Quantity.	Value.	Quantity.	Value.
	tons.	£A	tons.	£A
ANTIMONY.				
East Murchison (Wiluna)	319	25,173	+ 319	+ 25,173
Pilbara (Nullagine)	30	150	+ 30	+ 150
ARSENIC.				
East Murchison (Wiluna)	2,054	36,972	- 916	- 25,488
ASBESTOS.				
Pilbara (Nullagine)	20	1,190	+ 20	+ 1,190
Ashburton (Onslow)	8	770	+ 8	+ 770
Outside Proclaimed Goldfield	14	*	- 145	- 3,479
FELSPAR.				
Coolgardie (Coolgardie)	2,900	5,801	+ 60	+ 120
GLAUCONITE.				
Outside Proclaimed Goldfield (Moora District)	165	825	- 54	- 270
GYPSUM.				
Yilgarn Goldfield (Yellowdine)	479	479	+ 29	+ 29
Outside Proclaimed Goldfield	8,594	9,330	+ 2,388	+ 2,216
TANTALITE.				
Pilbara Goldfield (Marble Bar)	20	† 29,011	+ 6	24,750
LEAD ORE.				
Northampton Mineral Field	6,163	7,248	+ 4,628	+ 5,020
BLACK TIN.				
Pilbara Goldfield (Marble Bar)	3	500	- 2	- 167
Greenbushes Mineral Field	51	8,118	+ 29	+ 5,334

* Not stated. † Partly estimate.

COMPARATIVE STATISTICAL DIAGRAMS

RELATING TO
OUTPUT AND VALUE OF GOLD AND OTHER MINERALS, LANDS LEASED FOR GOLD MINING
 IN WESTERN AUSTRALIA
 AND THE **GOLD PRODUCTION OF AUSTRALASIA** FOR THE YEAR 1937.

FIG. 1. Output of Gold from various Goldfields as reported to Mines Dept.

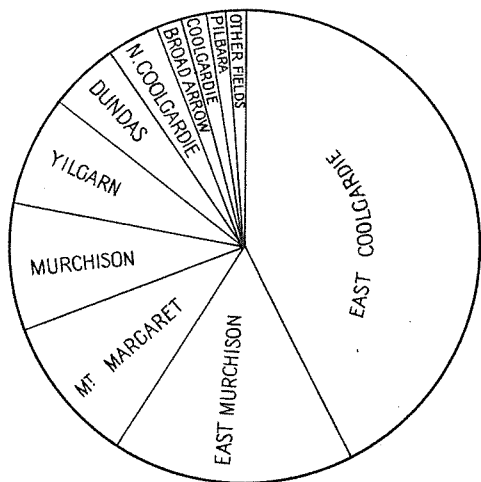


FIG. 2. Gold produced from various Goldfields as given by the Export and Mint Returns.

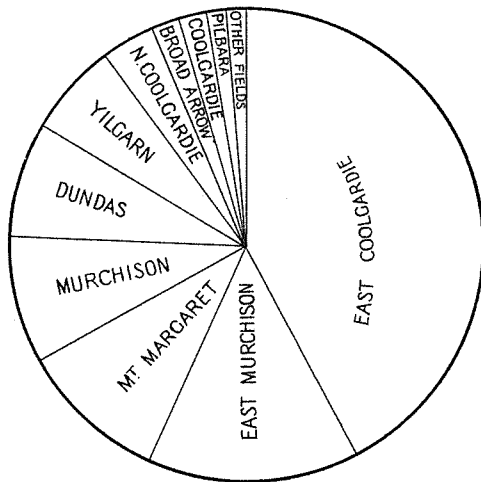


FIG. 3. Value of Gold and other Minerals.

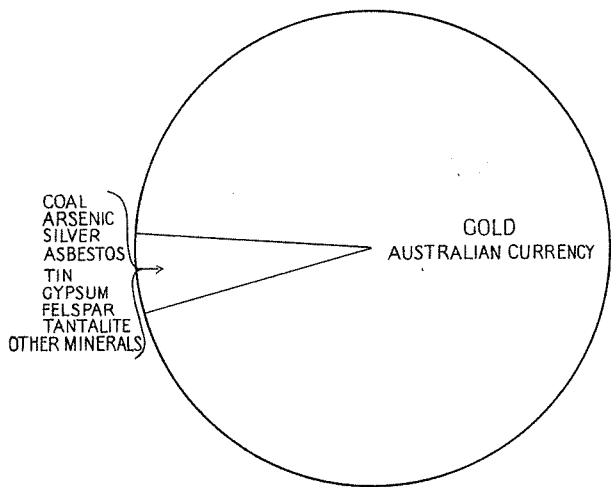


FIG. 4. Value of Minerals other than Gold.

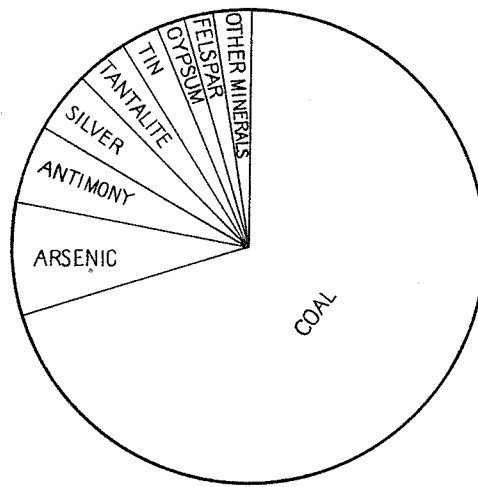


FIG. 5. Areas of land leased for Goldmining on various Goldfields.

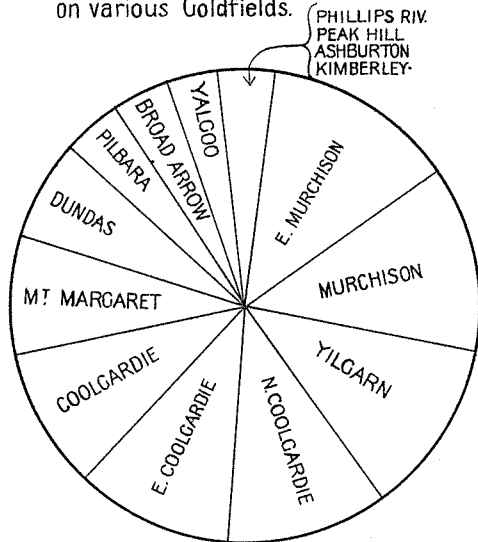
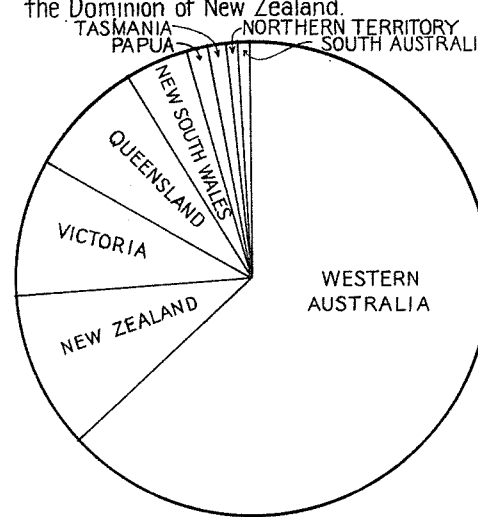


FIG. 6. Output of Gold in the States of Australia and the Dominion of New Zealand.



Note: Output Figures for New Guinea not Available.

The averaged number of men reported to be engaged showed an increase of 6, the number in coal mining being 46 less. Eleven more men were engaged in development work at Yampi Sound, though not reaching the production stage. Towards the end of the year the Wiluna G.M. Co. ceased obtaining lead ore from Northampton. Increased employment of men producing tin, tantalite and asbestos was recorded.

TABLE 8.

Quantity of Coal raised during 1936 and 1937, estimated Value thereof, Number of Men employed, and Output per Man.

Coalfield.	Year.	Quantity raised.	Estimated Value.	Men employed.		Quantity raised.	
				Above ground.	Underground.	Per Man employed underground.	Per Man employed above and underground.
		tons.	£			tons.	tons.
Collie	1936	565,075	331,565	166	602	939	736
	1937	553,510	340,444	148	575	963	766

The above figures indicate that the 1937 production realised £8,879 more than that of 1936 notwithstanding that the quantity of coal raised was 11,565 tons less. The average number of tons per man increased by 30 tons. The average number of men employed showed a decrease of 45.

PART III.—LEASES AND OTHER HOLDINGS UNDER VARIOUS ACTS RELATING TO MINING.

TABLE 9.

Total Number and Acreage of Leases and Prospecting Areas held for Mining on 31st December, 1936 and 1937.

Description of Leases.	1936.		1937.	
	No.	Acreage.	No.	Acreage.
Gold Mining Leases on Crown Land	1,870	33,617	1,656	28,926
" " Private Property	20	456	20	434
Mineral Leases on Crown Land	158	38,520	175	38,935
" " Private Property	5	112	3	74
Mineral Claims	*75	5,264	†111	8,049
Prospecting Areas	2,013	46,452	1,875	38,633
	4,141	124,421	3,840	115,051

* Includes 2 Coal Prospecting Areas of a total area of 6,000 acres. † Includes 1 Coal Prospecting Area of a total area of 3,000 acres.

The number of Gold Mining Leases decreased by 214 and the area by 4,713 acres.

The number of Mineral Leases increased by 15 and the area by 377 acres.

The number of Mineral Claims increased by 36 and the area by 2,785 acres.

The number of Prospecting Areas decreased by 138 and the area by 7,819 acres.

The total number of leases, etc., decreased by 301 and the area by 9,370 acres as compared with the year 1936.

PART IV.—MEN EMPLOYED.

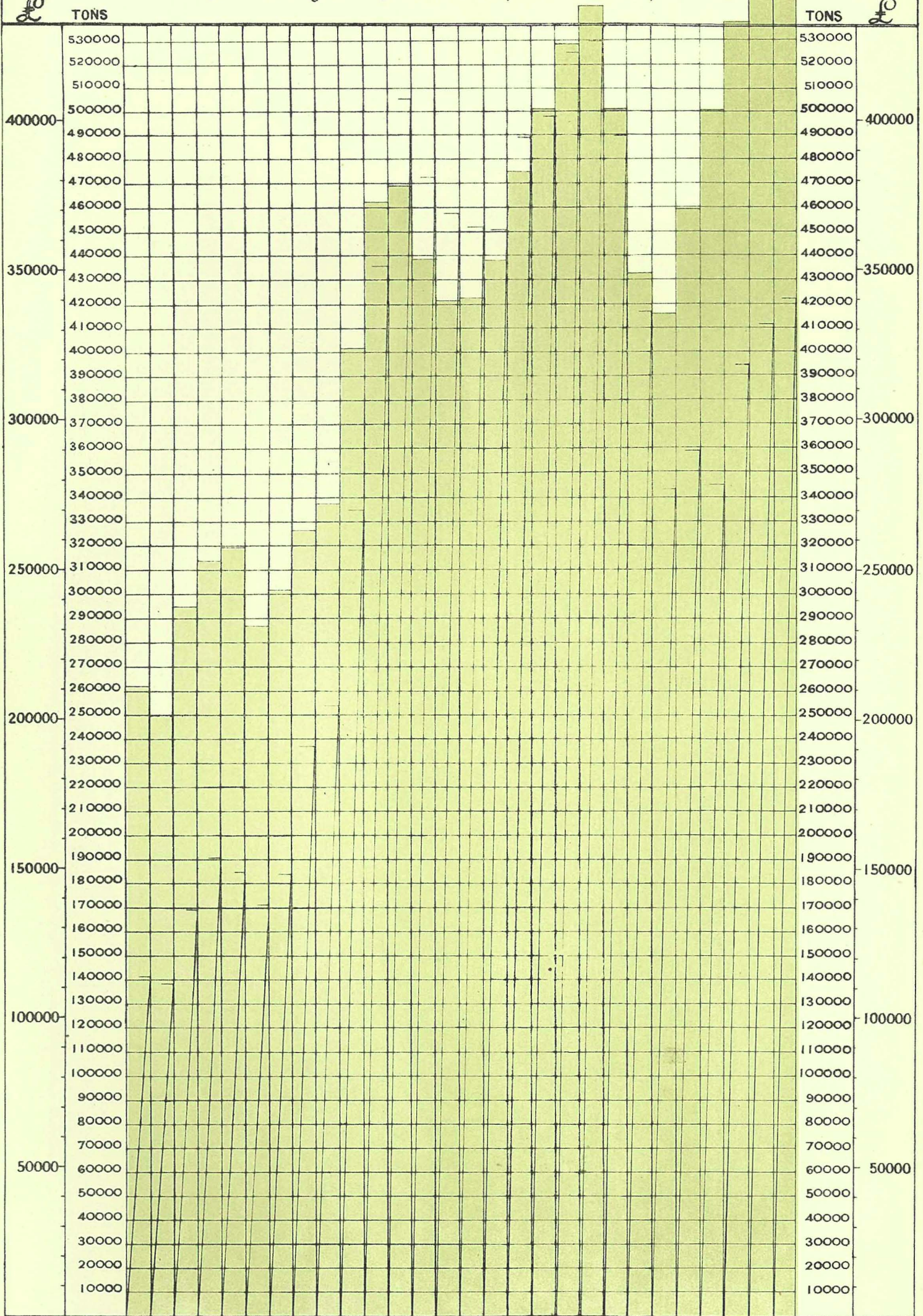
TABLE 10.

Average number of Men reported as engaged in Mining during 1936 and 1937.

Goldfield.	District.	Reef or Lode.		Alluvial.		Total.	
		1936.	1937.	1936.	1937.	1936.	1937.
1. Kimberley		3	3	6	6	9	9
2. Pilbara	Marble Bar	169	247	4	4	173	251
3. Ashburton	Nullagine	71	57	1	2	72	59
4. Gascoyne		7	10	3	2	10	12
5. Peak Hill		6	...	2	3	8	3
		78	59	...	1	78	60
6. East Murchison	Lawlers	172	199	...	...	172	199
	Wiluna	1,561	1,433	...	...	1,561	1,433
	Black Range	380	380	...	...	380	380
	Cue	571	805	26	12	597	817
7. Murchison	Meekatharra	423	339	...	7	423	346
	Day Dawn	88	86	17	10	105	96
	Mt. Magnet	453	453	5	4	458	457
8. Yalgoo		417	365	...	...	417	365
	Mt. Morgans	170	114	...	...	170	114
9. Mt. Margaret	Mt. Malcolm	494	509	11	...	505	509
	Mt. Margaret	666	645	...	...	666	645
	Menzies	596	547	15	12	611	559
10. North Coolgardie	Ularring	174	229	6	6	180	235
	Niagara	93	68	8	...	101	68
	Yerilla	311	326	6	8	317	334
11. Broad Arrow		740	757	26	28	766	785
12. North-East Coolgardie	Kanowna	117	117	7	9	124	126
	Kurnalpi	47	41	5	5	52	46
13. East Coolgardie	East Coolgardie	3,877	4,209	52	50	3,929	4,259
	Bulong	129	112	8	7	137	119
14. Coolgardie	Coolgardie	1,034	1,130	96	86	1,130	1,216
	Kunanalling	400	409	15	34	415	443
15. Yilgarn		1,040	1,101	23	4	1,063	1,105
16. Dundas		834	908	24	28	858	936
17. Phillips River		128	105	1	1	129	106
Outside Proclaimed Goldfields		80	82	...	...	80	82
Total—Gold Mining		15,329	15,845	367	329	15,696	16,174
MINERALS OTHER THAN GOLD.							
Arsenic	Wiluna	20	22	...	...	20	22
Asbestos	Pilbara	4	4	...	...	...	...
	Outside Goldfields	6	23	...	...	10	27
Coal	Collie	768	723	...	...	768	723
Felspar	Coolgardie	10	9	...	...	10	9
Glauconite	Gingin	3	2	...	...	3	2
Gypsum	Yilgarn	2	4	...	...	...	...
	Outside Goldfields	13	18	...	...	15	22
Iron Ore	Koolan	25	36	...	...	25	36
Lead Ore	Northampton	32	29	...	...	32	29
Tantalite	Pilbara	25	32	...	...	25	32
Tin	Greenbushes	40	51	...	...	...	...
	Pilbara	...	...	8	9	48	60
Total—Other Minerals		948	953	8	9	956	962
GRAND TOTAL		16,277	16,798	375	338	16,652	17,136

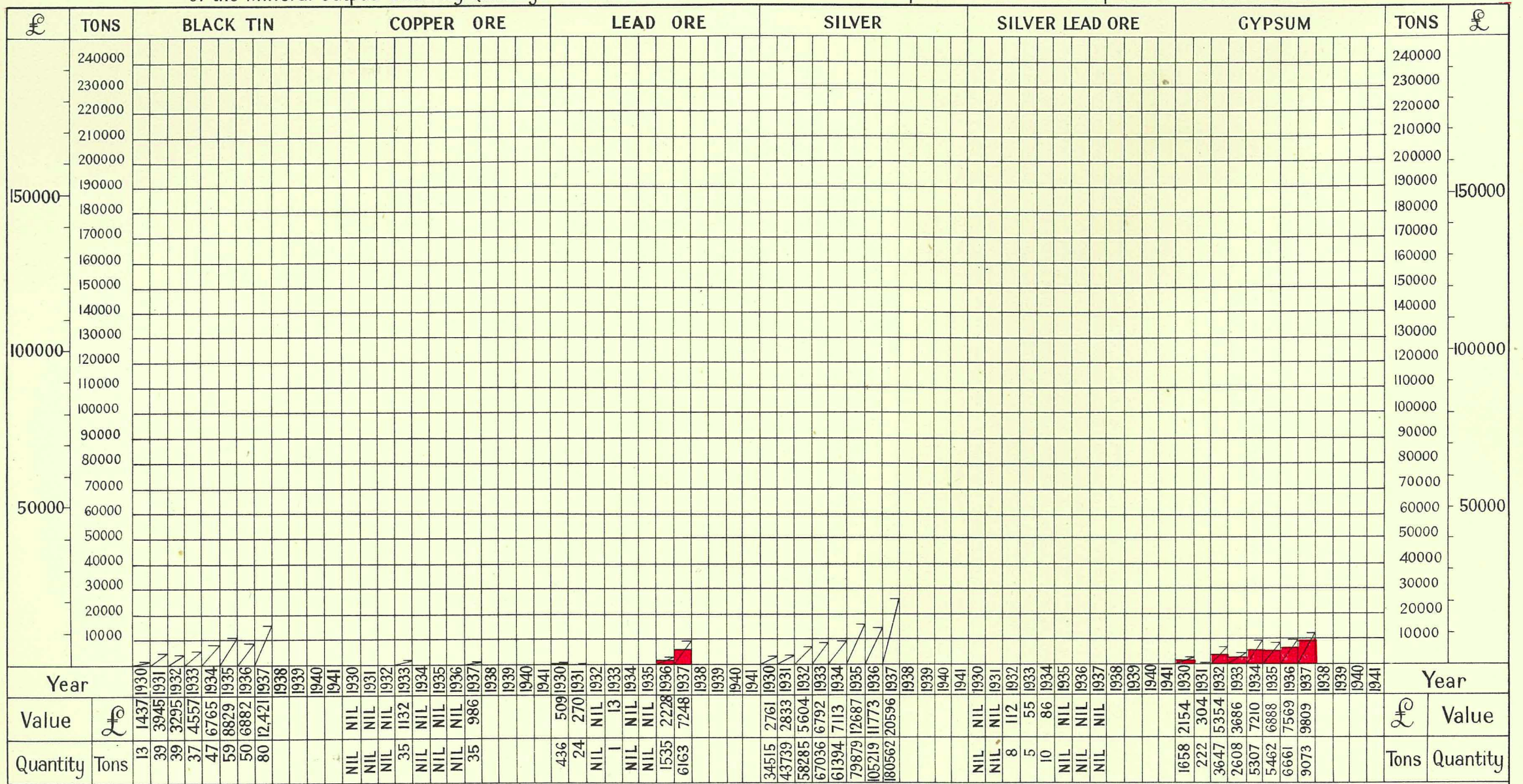
D I A G R A M

Of the Coal Output - Shewing Quantity & Value as reported to Mines Dept from 1910 onwards



D I A G R A M

of the Mineral Output showing Quantity & Value of Minerals other than Gold & Coal reported to the Mines Dept from the Year 1930 onwards



NOTE : The Red denotes Quantities produced & Diagonal lines Values thereof.

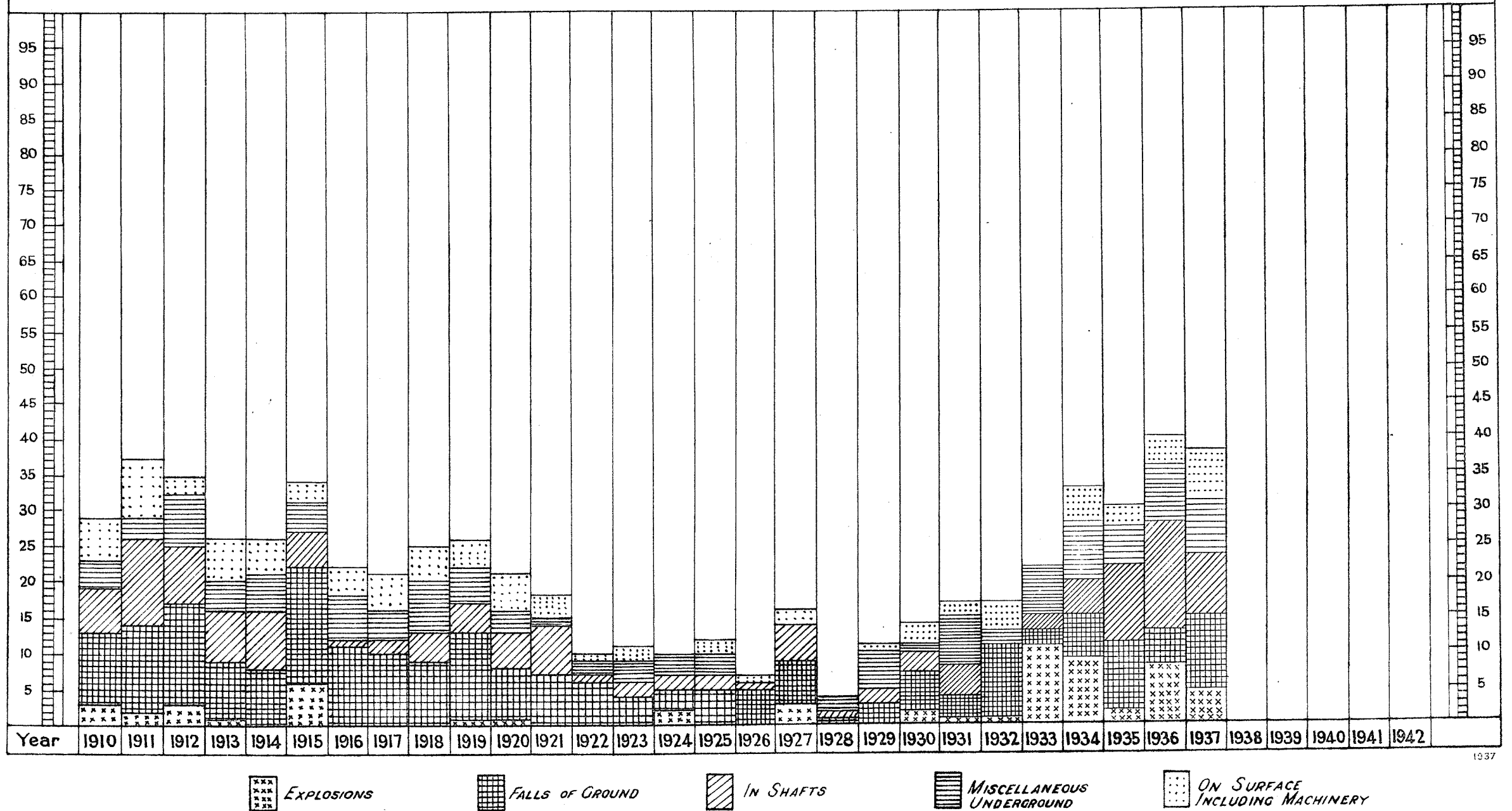
Minerals not shown above

Tantalite 14 tons Value £8,812
 Asbestos 42 " " £1,950
 Arsenic 2054 " " £36,972
 Felspar 2989 " " £9,031

Previous to 1930 the Quantity & Value of various Minerals reported amounted to

Black Tin	16934 Tons	£1,503,200	Silver Lead	2884 tons	£ 33,987
Copper	253422 "	1,746,625	Tantalite	163 "	28,064
Ironstone	57830 "	36,695	Limestone	93706 "	18,290
Lead	408321 "	1,271,087	Silver	2756167 ozs	384,147
Asbestos	1291 "	58,038	Gypsum	28119 tons	38,571
Pyritic Ore	58470 "	26,146			

DIAGRAM SHEWING THE NUMBER OF DEATHS FROM ACCIDENTS ARRANGED IN FIVE CLASSES,
IN THE MINES OF WESTERN AUSTRALIA DURING THE YEARS 1910 AND ONWARDS.



PART V.—ACCIDENTS.

TABLE 11.

MEN EMPLOYED IN MINES KILLED AND INJURED IN MINING ACCIDENTS DURING 1936 AND 1937.

A.—According to Locality of Accident.

Goldfield.	Killed.		Injured.		Total Killed and Injured.	
	1936.	1937.	1936.	1937.	1936.	1937.
1. Kimberley ...	...	...	...	...	...	...
2. West Kimberley ...	...	...	...	...	...	...
3. Pilbara ...	...	...	...	1	...	1
4. West Pilbara ...	...	...	...	...	...	...
5. Ashburton ...	...	...	...	...	...	...
6. Gascoyne ...	...	...	...	...	...	...
7. Peak Hill ...	...	...	...	...	...	...
8. East Murchison ...	4	3	141	167	145	170
9. Murchison ...	5	5	33	65	38	70
10. Yalgoo ...	...	2	...	2	...	4
11. Mt. Margaret ...	5	3	117	123	122	126
12. North Coolgardie ...	2	...	10	17	12	17
13. North-East Coolgardie ...	...	...	...	1	...	1
14. Broad Arrow ...	2	3	2	2	4	5
15. East Coolgardie ...	10	9	728	582	738	591
16. Coolgardie ...	5	1	14	9	19	10
17. Yilgarn ...	4	5	29	30	33	35
18. Dundas ...	...	5	6	18	6	23
19. Phillips River ...	1	...	1	1	2	1
MINING DISTRICTS—						
Northampton ...	...	2	...	...	...	2
Greenbushes ...	...	...	...	...	...	...
Collie ...	...	...	325	251	325	251
Swan ...	2	...	41	39	43	39
Total ...	40	38	1,447	1,308	1,487	1,346

From the above table it will be seen that the number of fatal accidents for the year 1937 was 38, as against 40 in the preceding year. The number injured showed a decrease of 139. In the report of the State Mining Engineer, published in Division II. of this report, these accidents are classified according to their causes.

B.—According to Causes of Accident.

Cause.	1936.		1937.		Comparison with 1936.	
	Fatal.	Serious.	Fatal.	Serious.	Fatal.	Serious.
1. Explosives ...	8*	15*	5	13†	— 3	— 2
2. Falls of Ground ...	5	66	10	67	+ 5	+ 1
3. In Shafts ...	15	42	8	32	— 7	— 10
4. Miscellaneous Underground ...	8	1,052	8	892	...	— 160
5. Surface ...	4‡	272‡	7	304§	+ 3	+ 32
Total ...	40	1,447	38	1,308	— 2	— 139

* Includes 1 fatal and 2 serious at Quarries.
1 serious at Quarries.

† Includes 1 fatal and 39 serious at Quarries.
‡ Includes 38 serious at Quarries.

† Includes

Thirty-six fatal accidents occurred on gold mines and two on lead mines. The death rate per 1,000 men employed at gold mines was 2.23 as against 2.48 in 1936.

PART VI.—STATE AID TO MINING.

The number of State batteries existing at the end of the year was 24 with 3 leased. From inception to the end of 1937 gold and tin to the value of £9,596,743.82, including gold premium estimated at £1,519,856.98 has been recovered from State plants. 2,169,288.94 tons of auriferous ore have been treated and have produced £7,606,911 17s. 8d., plus estimated premium by amalgamation; £1,619,767 3s. by cyanidation; £265,266 2s. 3d. by slimes; £10,392 10s. 1d. from residues; and 81,786 tons of ore produced tin to the value of £93,834, and in addition £572 3s. 4d. was recovered from residues.

During the year gold ore treated was 102,800.25 tons for 53,305.70 ozs. of bullion by amalgamation, producing 47,694 tons of payable tailing yielding 14,943.9 ozs., 39,686 tons of unpayable tailing, yielding 2,762.4 ozs., and 5,140 tons refractory tailing yielding 1,221.3 ozs., making a total of 92,520 tons for 18,927.6 ozs.

The working expenditure for all plants was £112,383 14s. 5d. and the revenue £121,589 1s. 1d., which shows a profit of £9,202 6s. 8d. on the year's operations.

The capital expenditure since inception of the scheme has been £512,088 14s. 4d., £378,314 5s. 4d. from General Loan Fund, £91,981 1s. 8d. from Consolidated Revenue, £28,006 19s. 4d. from Assistance to Gold Mining Industry, and £13,786 8s. from Commonwealth Assistance to Metalliferous Mining.

The cost of administration for the year was £7,564 12s. 10d., as against £6,844 13s. for the year 1936.

The working expenditure from inception to the end of the year exceeds the revenue by £93,037 16s. 4d.

GEOLOGICAL SURVEY.

The work of the Geological Survey under this heading during 1937 is represented by the following reports, which are fully set out in the Annual Report of the Geological Survey.

- "A Reconnaissance of the Gascoyne, Ashburton and Fortescue Districts."
- "Geological Survey of the Yilgarn Goldfield."
- "Riverina" Gold Mine—30 miles west of Menzies.
- Morley's Find—30 miles west of Menzies.
- King of Creation Gold Mine—Mt. Margaret Goldfield.
- Clackline Firebrick Clay Pits.
- Lancefield Gold Mine—Mt. Margaret Goldfield.
- "Beria Main Lode"—Mt. Margaret Goldfield.

ASSISTANCE UNDER MINING DEVELOPMENT ACT, 1902.

The following statement shows the sum advanced during the year 1937 under the Mining Development Act, 1902:—

	£	s.	d.
1. Advanced in aid of Mining Work and Equipment of Mines with Machinery...	105	10	0
2. Subsidies on stone crushed for the public	92	5	6
3. Providing means of Transport Equipment and Sustenance to Prospectors ...	6,619	6	5
	£6,817	1	11
Other Assistance granted from the Vote, during the year on various matters, totalled	483	5	2
The Subsidies paid on stone crushed for the public amounted to	92	5	6
and are subsidies paid to owners of plants crushing for the public, the conditions being that they crush at fixed rates. The ore crushed during the year at those plants totalled 463½ tons.			
The Receipts under the Mining Development Act, exclusive of Interest payments, amounted to	6,214	3	5
and included—			
Refunds of Advances ...	2,872	19	7
Sales of Securities ...	617	8	2
Miscellaneous Refunds ...	2,723	15	8
	£6,214	3	5

PART VII.—INSPECTION OF MACHINERY.

The Chief Inspector of Machinery reports that the number of useful boilers registered at the end of the year totalled 4,193 as against 4,121 total for the preceding year, showing an increase after all adjustments of 72 boilers.

Of the total 4,193 useful boilers, 2,280 were out of use at the end of the year; 1,864 thorough and 90 working inspections were made, and 1,870 certificates were issued.

Permanent condemnations totalled 37 and temporary condemnations 25. There were five conversions. Five boilers were transferred beyond the jurisdiction of the Act.

The total number of machinery groups registered was 13,933 against 12,925 for previous year, showing an increase of 1,008.

Inspections made total 10,852 and 4,407 certificates were granted.

Six hundred and twenty-one applications for engine-drivers' and boiler attendants' certificates were received and dealt with, and 496 certificates, all classes, were granted as follows:—

Winding Competency (including certificates issued under regulation 40 and section 60) 45

First Class Competency (including certificates issued under regulations 40 and 45, and sections 60 and 63)	6
Second Class Competency (including certificates issued under regulation 40 and section 60)	76
Third Class Competency (including certificates issued under regulation 45 and section 63)	83
Locomotive Competency	14
Traction Competency	2
Internal Combustion Competency	160
Crane and Hoist Competency	9
Boiler Attendants' Competency	96
Interim .. .. .	..
Copies	4
Transfers	1
	496

The total revenue from all sources during the year was £8,801 14s. 2d. as against £8,634 7s. 3d. for the previous year, showing an increase of £167 6s. 11d.

The total expenditure for the year was £7,336 3s. 5d. as against £7,251 7s. 6d. for the previous year, showing increase of £84 15s. 11d. Profit on operations for year was £1,465 10s. 9d.

PART VIII.—SCHOOL OF MINES.

(a) KALGOORLIE.

In this the thirty-fourth year of the School's existence, the individual enrolment reached a maximum of 617, as compared with 629 during 1936. This figure was, however, exclusive of Correspondence Course students. Enrolments in Correspondence Classes were as follows:—

Metallurgy I.	11
Assaying I.	17
Mining I.	24
Mine Sampling	8
Mining II.	8
Ore Dressing	13

These classes were conducted on a self-supporting basis, and have been so successful that it is proposed to extend them wherever possible in 1938.

In the Public Assay branch of the School, 722 assays for gold, 41 for other metals, and 97 mineral determinations were carried out mainly for prospectors.

The Metallurgical Laboratory completed 26 investigations into the treatment of ores and metallurgical products, thus greatly assisting companies and others whose mines were approaching the production stage and who required the metallurgical information necessary to enable treatment plants to be designed. In connection with the work 1,455 assays for gold were carried out, and 325 chemical analyses.

During the year an intensive course of training in internal combustion engines was given under the auspices of the Jubilee Appeal Fund, and a series of lectures to youths enrolled under the Jubilee Fund Prospecting Scheme.

(b) WILUNA.

Classes were continued with a satisfactory attendance. Total class enrolments numbered 172 and comprised 105 individual students.

The institution of classwork at Wiluna has been of great benefit to students in the surrounding mining centres. A number of them sat for the School of Mines examinations in November and passed.

CONCLUSION.

In dealing with the various activities of the Department, I have commented only on the principal items.

Detailed information is given in the reports of the responsible officers, published as Divisions II. to VIII. of this report.

In September last, Mr. M. J. Calanchini, who had occupied the position of Under Secretary for Mines since July, 1918, commenced long service leave prior to retirement. Mr. Calanchini's long record of service extended over forty years, and he has been one of the most capable and outstanding administrators in the Department's history.

News of his retirement was received with great regret by all ranks of the Department and it is sincerely hoped that he will have many years ahead of him in which to enjoy his well-earned leisure.

In conclusion, I desire to acknowledge the loyal support received from every officer of the Department during what was a strenuous year.

I have, etc.,

A. H. TELFER,
Acting Under Secretary for Mines.

Department of Mines,
Perth, 31st March, 1938.

DIVISION II.

Report of the State Mining Engineer for the Year 1937.

The Under Secretary for Mines.

Sir,

I have the honour to submit, for the information of the Hon. Minister for Mines, my report on this branch of the Mines Department for the year 1937.

STAFF.

Changes in the staff during the year were as follows:—

Inspector J. S. Foxall was appointed Assistant State Mining Engineer, taking up his duties as from the 11th February.

This appointment, and the retirement of Senior Inspector W. Phoenix, left two vacancies on the inspectorial staff, which were filled by the appointment of Messrs. W. A. Hughes and L. E. Elvey in April.

Inspector Elvey, who was stationed at Leonora, resigned his position on the 24th November. Mr. T. Johnson, who was selected to replace Inspector Elvey, was unfortunately unable to take over the duties of the position on account of ill-health.

It will thus be seen that the branch was understaffed for an appreciable portion of the year.

OBITUARY.

General regret was felt at the death of the late Senior Inspector of Mines, Mr. W. Phoenix, who was enjoying a well-earned holiday abroad, subsequent to his retirement from the service, and who passed away in England on the eve of his projected return to Australia via America.

The late Mr. Phoenix was highly esteemed and respected among all sections of the mining community, both personally and on account of his valuable services, especially in connection with dust and ventilation problems underground and improved health conditions for mine workers generally. His loss is keenly felt by his late colleagues.

ACCIDENTS.

Continuous and concentrated efforts are being made to minimise the number of accidents on mines.

A perusal of the details of all fatal accidents that occurred during the year, as set out below, clearly shows that a large proportion of these may be classed as preventable, provided that reasonable care is exercised to avoid dangerous practices.

A General Safety Committee has been formed, including members of the Chamber of Mines, the Australian Workers' Union, and the Inspectors of Mines, and several meetings were held at Kalgoorlie for the purpose of studying and discussing methods of safe working and protective devices.

The Boulder Perseverance Gold Mine has formed its own Safety Committee and is doing excellent work in this respect. This Committee consists of a chairman, who is an official of the mine, and six employees as follows:—

- one underground foreman,
- one surface employee,
- one machine man,
- one trucker,
- one employee on general work underground,
- first aid man.

The employee representatives are nominated and elected by the men in their respective classifications, and hold office for three months in order that many men may have an opportunity of serving on the committee.

The committee meets once each month, after its members have visited all the workings with which they are respectively concerned according to their occupations. The time taken for these visits and meetings is considered, and paid for, as working time.

The duties of the committee are to discuss accidents which have taken place during the month preceding the meeting, with a view to avoiding similar occurrences, and to bring forward for discussion suggestions for the prevention of accidents.

Minutes of meetings are kept and copies posted on the various mine notice boards for the benefit of employees.

Records of all accidents are kept and carefully classified under different headings and graphed month by month.

The committee had its first meeting in February, 1936, and a study of the figures and graphs for the past two years shows that whereas the average accident rate for both surface and underground workers for the first six months of 1936 was 4.1 per 1,000 shifts worked, the figure for the year was 3.34 per 1,000, while the average for the whole of 1937 had dropped to 3.15 per 1,000 shifts. The total number of shifts worked in 1936 was 88,022 and in 1937 was 102,210. The numbers of days lost per 1,000 shifts through accidents in 1936 and 1937 were 28.7 and 20.37 respectively.

These figures indicate that, since the first half of 1936, there has been a drop of approximately 25 per cent. in the total accident rate and time lost, and both the management and the workers of the Boulder Perseverance, Ltd., are to be congratulated on the successful efforts of their Safety Committee.

Several other mines have appointed experienced mine workers as "safety men," whose particular job is to see that safe working conditions are observed and to check all dangerous practices.

It cannot be too strongly stressed, however, that it is only by the active co-operation of every man engaged in mining that the desired result can be brought about. Men must not think that their individual responsibility in this respect ceases on the appointment of a "safety man" or the formation of a Safety Committee.

During the year 38 fatal and 1,308 serious accidents were reported to this office (including 290 serious accidents in coal mines and quarries), compared with 40 fatal and 1,447 serious accidents in 1936 (including 2 fatal and 366 serious accidents in coal mines and quarries). These figures show a decrease of two fatal and 139 serious accidents on the previous year.

Of the fatal accidents, 36 occurred on gold mines as compared with 38 in 1936, and two on a lead

mine. There were no fatalities on coal mines nor in any of the quarries working under the provisions of the Mines Regulation Act, 1906.

The total number of serious accidents reported on gold mines was 1,016, as compared with 1,081 in 1936, a decrease of 65.

The number of men employed in gold mining increased for the same period from 15,696 to 16,174.

The number of serious accidents on coal mines showed a decrease of 22.7 per cent. from 325 to 251, the number of men employed decreasing from 798 to 723.

Table II., showing the locality and causes of all fatal and serious accidents, is forwarded herewith for inclusion in your annual report, together with a diagram of fatal accidents year by year arranged according to their causes.

The following table shows the number of fatal accidents recorded during the last five years and the death rate per 1,000 men employed.

	1933.	1934.	1935.	1936.	1937.
Fatal accidents to men engaged in mining (exclusive of quarries)	22	30	30	38	38
Total number of men engaged in mining (average) ...	10,690	13,310	15,557	16,652	17,136
Accident death rate per 1,000 men	2.06	2.25	1.93	2.28	2.22
Fatal accidents at quarries ... ..	...	3	...	2	...

FATAL ACCIDENTS.

Particulars of all fatal accidents that occurred during the year are briefly set out hereunder.

Explosives.

There were five fatalities under this heading.

Frederick James Wheatley, a miner employed by the Great Boulder Pty. Ltd., and his mate lit eighteen holes in firing out a stope face. The lighting was delayed owing to moisture making the fuses difficult to spit, and the men, in retreating after lighting up, had not reached a safe distance from the face when the explosions occurred. Wheatley received injuries to which he succumbed on the following day and the other man was seriously hurt.

Failure to employ the cartridge system of firing, as laid down in the Mines Regulation Act, 1906, was responsible for this accident.

Harry John Burt, a miner on the Yilgarn Gold Mine at Neveoria, had fired the centre cut of four holes in the face of the drive in which he was working. As the cut did not come out satisfactorily, he apparently took in some more fracteur and recharged the cut. Shortly afterwards an explosion occurred which killed him. As the time of the fatal explosion was only about three-quarters of an hour after the first firing, it seems probable that the deceased reloaded the butts of the holes before they were sufficiently cooled.

In this case there were at least two breaches of the Regulations by deceased.

- (1) He fired at an unauthorised time.
- (2) He did not take another man with him whilst firing.

It is also doubtful whether a cartridge was used.

Giovanni Bonzi was the victim of a curious fatal accident at the May Queen Gold Mine at Marvel Loch, where he was employed as a miner engaged in shaft sinking. He had lit his fuses when, owing to confusion in signalling, the hoist driver raised the kibble to the surface without him. Bonzi then withdrew the capped fuses from the charges, and the driver, finding the bucket empty, immediately lowered it. Bonzi entered the bucket and gave the signal to hoist and had just reached the surface when an explosion occurred in the bucket itself, causing injuries as a result of which he died six weeks later. Deceased had, by some means, dropped into the bucket one of the capped fuses he had withdrawn from the holes. This exploded and set off some loose plugs of fracteur which were in the bucket.

In this case again Regulations were infringed by

- (1) Not using a cartridge.
- (2) Not using canisters for carrying fracteur and rods.

The cause of death was directly due to these breaches of regulations by the deceased.

Edward Bradburn was killed outright and Alfred Richard Jarrett received fatal injuries when they bored into the butt of a hole containing some unexploded fracteur in the Viking shaft of the Central Norseman Gold Mines. The face had been fired out on the previous shift and the explosions carefully counted. Portion of the fracteur in one of the holes evidently remained unexploded and this was unnoticed when the men were cleaning down the face. There was no evidence of any neglect.

Falls of Ground.

There were ten deaths during the year due to accidents caused by falls of ground.

Santino Guimelli was one of a party working at the Copperhead Gold Mining Lease at Bullfinch. The party was working a block of ore in rather treacherous ground. They put up two toms to hold up the heavy hanging wall, but the support was insufficient and while they were working in the stope, some 25 to 30 tons of ground came away without warning, causing the death of Guimelli and seriously injuring two other men.

Cyril Louis Snell, a prospector, working in a stope at a shallow depth on a prospecting area near Ora Banda, was killed and another man seriously injured when a fall of about 3 tons of ground came away from the hanging wall of the stope. It was considered that, owing to the inexperience of the miners, insufficient support had been given to the ground. Instructions were given to timber and mullock the stope before continuing ore breaking operations.

William Kendall, a prospector, working at the Fenbark leases, Broad Arrow, together with three other prospectors, was working in a costean about 25 feet long and 8 feet deep. Part of the side of the trench unexpectedly fell away and buried him. When uncovered by his mates, life was found to be extinct. The evidence showed no signs of negligence and the ground was considered safe before the accident.

James Lindsay Halbert, a shoveller at the Youanmi Gold Mine, was shovelling in a stope after a face had been fired. He was preparing the place for the erection of a bulkhead to support some dangerous ground. Whilst engaged at this work a fall of about two tons of rock came away from the back and killed him.

Clifford Roy Russell, who was in charge of a mechanical bogger on the 800ft. level of the Central Norseman Gold Mine, received fatal injuries when a fall of rock occurred from the hangingwall of a leading stope. About 50 tons of rock fell. Two other men were seriously injured. Numerous attempts had been made to get this ground down with pinchbars and it was considered reasonably safe for the time being. Arrangements had been made to shoot it down later in the day. It fell without giving any warning.

Charles James Matthews, a miner employed by the Lake View and Star, Ltd., was barring down a slab of bad ground in a stope at the Associated Mine. This slab, in coming away, released another slab about 6 feet long, 3 feet wide and 6 inches thick, directly above his head, which fell on him and killed him. He was working alone at the time and was not discovered until about an hour after the accident was presumed to have occurred.

It is customary for miners to have assistance when barring down, but, in this instance, Matthews apparently did not think that circumstances warranted it.

Patrick Doherty, a miner employed at the Bannockburn Gold Mine, was barring down a loose piece of ground on the wall of a stope about 35 feet below the surface, which, on coming away, struck and killed him. It was considered that the inexperience of the deceased in barring down ground was responsible for the accident.

Robert Terence Wood, a miner in the employ of the Central Norseman Gold Corporation, N.L., was killed by a fall of ground from the back of the main underlay shaft, where he and two other men were engaged in cleaning up after firing the face. The evi-

dence showed that there was no reason to anticipate the fall. The other two men were also injured, one seriously.

Robert Stanley Cross, a timberman on the Mt. Magnet Gold Mines, Ltd., was killed by a fall of about 10 tons of earth which fell from the roof of the drive in which he was working. The ground had just previously been sounded and was considered safe. Cross was an experienced miner.

John Patrick Francis Carroll was a shoveller employed on the Hill 60 section of the Mt. Magnet Gold Mines, Limited. He was working in a stope with three other men when a fall of about 150 tons of ground occurred unexpectedly and with very little warning, completely burying and killing Carroll outright. One other man was seriously injured, while a third sustained minor injuries. The evidence at the inquiry showed that all reasonable precautions had been taken to ensure the safety of the men and that the fall was one that could not have been foreseen.

Shafts.

There were ten fatalities under this heading.

Rex Warrillow, surveyor on the Marvel Loch Gold Development, N.L., fixed a temporary wooden bearer across a compartment of the Main Shaft at the 100ft. level to carry a 56lb. weight, suspended by a steel wire, for survey purposes. He appears to have been in the bottom of the shaft, steadying the weight, when the bearer came away and struck him on the head with fatal results. The deceased had evidently satisfied himself that the bearer was wedged tightly enough to hold the weight, and the accident was therefore due to an error of judgment on his part.

Michael John Cleveland Maloney, a prospector at the Belgian Queen Lease at Burbanks, with his mate, discovering that some of the shaft timber was being attacked by white ants, splashed strong cyanide solution on to the affected timber and, after an interval of half an hour, descended the shaft from the surface. He was overcome by fumes and fell from the ladder and was killed.

These men were evidently not aware of the toxic nature of the fumes given off by cyanide solution, which would be particularly dangerous in this case as there was no through current of air to dislodge the fumes once they had formed.

Charles Joseph Edwards, a timberman employed on the Lancefield Gold Mine, was travelling up the north compartment of the Main Incline Shaft. He apparently missed his footing, slipped under the guard rail into the middle main haulage compartment and was struck by an ascending skip, receiving injuries resulting in his death the following day.

General instructions had been issued by the mine management to the effect that this portion of the shaft was not to be used as a travelling way, as it was the mullock haulage track from shaft-sinking operations. As no mullock was being hauled on this particular day, Edwards' action appeared safe.

Giacomo Ronchi was one of a party of five miners working the Ganymedes Gold Mines at Marvel Loch. He was descending the shaft, which is about 220 feet deep, and was nearing the bottom when he fell from the ladder and received fatal injuries. There was no evidence to show what caused him to fall.

Andrew Clark Steel was a miner engaged in sinking the Main Shaft on the Moonlight Wiluna Gold Mine. In the course of his work he cut his finger

and decided to go up in the kibble to the level above to have it bandaged. When about 60 feet from the bottom of the shaft he fell from the kibble and was killed. It was suggested that the injury to his finger may have brought on a fainting fit.

Francis Joseph Pearson Gill and Umberto Zannini were the victims of an unfortunate double fatality at the intermediate shaft at the 1,950ft. level of the Hamilton Shaft workings of the Great Boulder Proprietary. Gill was braceman and was sending steel down to the men working in the bottom of the shaft 160 feet below the level, of whom Zannini was one. When handling steel or gear in the kibble a safety door covers the middle compartment of the shaft. The door is provided with a balance weight to facilitate opening. When the door is opened, it swings to within 9 inches of a clip and has to be pushed the remaining distance.

On the occasion of the accident, Gill pushed the door back with his foot and in doing so overbalanced and fell headlong down the shaft, falling on Zannini. Gill was killed outright and Zannini sustained injuries as a result of which he died on the following day.

It is probable that, had Gill pushed the door back with his hand, no accident would have occurred.

John Denis Treacy was employed as a platman on the Hill 60 Gold Mine. According to evidence he was at No. 1 Level Bin and gave four knocks to be raised to the surface. The engine-driver raised the cage to the surface and Treacy was found with his head only in the cage and his body hanging in the shaft. He was dead.

There was insufficient evidence to show how the accident occurred, and it can only be assumed that Treacy was unusually slow in getting into the cage after knocking it away.

Frederick Harvey Morrison, a miner employed at the Pakcha Gold Mine, Paddington, was bailing water from a close-timbered box shaft. He went down the ladders to ascertain the amount of water below the 200ft. level. Bailing operations had been in progress for about eight days and had apparently washed out a quantity of filling with the result that, when Morrison was descending the shaft, some of the sets collapsed. Morrison was found unconscious, jammed between a bearer and the wall of the shaft. It seems likely that he fell into this position. He was removed to Kalgoorlie Hospital, where he died.

William Francis Landers, crackerman in the employ of the Norseman Gold Mines, N.L., while off duty started to climb to the cracker platform, missed his footing and fell down the underlay shaft, rolling down to the 110ft. level, where his fall was stopped by a stationary skip. The accident signal of 12 bells was rung from the surface. The skipman, who was unloading steel from a trailer attached to the other skip at the 600ft. level, thinking the accident was at the surface, gave the signal to lower his skip to the 600ft. level. This had the effect of raising the other skip a corresponding distance and it ran over Landers, who then rolled down the shaft to the 300ft. level. He was dead when picked up.

The fatality might have been averted had the person who rang the accident signal also rung five bells to warn the driver not to move the skips.

Miscellaneous Underground.

There were six deaths during the year due to accidents in this class.

James Leonard Tyler was a pumper at the Horseshoe No. 2 Shaft on the Lake View and Star group. He was working alone at the pumping station on the 2,100ft. level and was found dead with a severe wound on the head. There was no evidence to show exactly what occurred, but it is surmised that he slipped and fell and that his head was crushed against the bedplate by the crank.

Ernest George Holmes, a miner engaged in winze sinking on the Grand Junction Lead Mine at Galena, was at the bottom of a winze 90 feet deep. His mate was lowering a kibble to him containing a drilling machine, some steel and two hoses with metal connections at their ends. When the kibble had been lowered about 15 feet the hoses slipped and fell to the bottom of the winze, one of the metal connections striking Holmes and causing fatal injuries.

Carelessness in not attaching the hose securely was responsible for this fatality.

Phillip Stanley Juett lost his life on the Moonlight Wiluna Gold Mine through breathing poisonous fumes in a drive off a winze. The face of the drive had been fired out at mid-day on Saturday, and Juett went down on the Sunday morning. The presence of the fumes was due to the breaking of the Venturi pipe in the winze, probably by concussion due to firing. Juett, in descending the winze, apparently failed to notice this and was found dead in the drive about an hour later.

Leonard Ward, a shoveller on the Laucefield Gold Mine, was engaged in shovelling ore into a chute some 30 feet, on the incline, below where a machine was working. A loose drill, about 6 feet long, was dislodged from a stack near the machine and in falling struck Ward on the head. He was removed to Laverton Hospital where he contracted pneumonia and died a fortnight later. There was no evidence of neglect or carelessness, but it was considered that, had Ward been wearing a hard hat, the injury would probably not have proved fatal.

Frank Western, a timberman employed by King Solomon's Gold Mines, was working on a staging supported by stulls. One of the stulls fell out, collapsing the staging, and Western was precipitated a distance of 70 feet into an open stope below, receiving fatal injuries. His workmate also fell and was severely injured. At the inquest the jury found the accident was due to the incompetence of the deceased and negligence on the part of the manager.

Thomas Casey was a pipe fitter on the Boulder Perseverance Gold Mines. Having fitted some pipes in a winze, he tied his pipe wrench to the windlass rope and called to his mate to haul up. When near the top, the wrench became detached and fell, striking and fatally injuring Casey.

All tools should be hauled up in kibles, and failure to fasten the wrench securely was the cause of this fatality.

Surface.

There were seven fatal accidents in this category.

Girolomo Giacometti, an employee of the Big Bell Gold Mine, with another man named McGregor, lifted a 44-gallon drum of petrol on to a stand in order to fill a small drum from it. Giacometti unscrewed the large bung and petrol squirted out on to both men's clothes. The petrol fumes were ignited by a lighted carbide lamp some 12 feet away and the

clothes of both men caught fire. McGregor ran to a tank of water some 30 feet away and extinguished the flames on his clothes. He then chased and caught Giacometti, who had run in the opposite direction, and rolled him in the sand to extinguish the flames. Giacometti died in hospital the next day from burns received. McGregor was complimented on his action by the Coroner.

Instructions had been issued by the management that the petrol drum was to be emptied by siphon until about 30 gallons were left, after which a brass tap was to be inserted and used until the drum was emptied. Had these instructions been carried out, the tragedy would have been averted.

Robert Pearsall, a battery hand employed at the Edward Carson Gold Mine at Mt. Magnet, was shockingly mutilated while attempting to replace a driving belt, which had previously been repaired, on the mill countershaft. It is surmised that he was attempting to push the belt on with his foot, got his leg caught in the belting and was dragged under the countershaft. He was unconscious when picked up and died without regaining consciousness.

Humphrey Roy Hassell, an employee of the Yuin Reef Gold Mine, was trying to start up an engine which had stopped and had emptied the contents of the petrol tank into an enamel basin. The flame of a naked light, placed about three feet away from the basin, set alight to the petrol, and Hassell's clothes, which apparently had petrol on them, caught fire. Hassell sustained burns and shock from which he died the following day in Mullewa Hospital.

Charles William Ainsworth, a mill hand at the Grand Junction Lead Mine, at Galena, was leaning over a guard rail, evidently endeavouring to free a stone in the rock crusher. He overbalanced and fell between the flywheel of the crusher and the crusher

itself while the machinery was in motion. He was found dead in the elevator pit.

Frank Albert Day, winch driver on the New Hope Gold Mine at Celebration, was fatally injured when an overcoat he was wearing caught in the shaft of an engine around which it wound until it pulled him up against the fly wheel. He was dead when picked up.

This accident emphasises the danger of wearing loose clothing whilst working amongst machinery, a practice which should be strongly discouraged.

Neil Douglas Jack, an employee of the Boulder Perseverance Gold Mine, was engaged in carting ore and tipping it on to the Enterprise dump. The tip gear jammed in the act of tipping, causing the front portion of the truck to rise. Jack jumped on to the front bumper of the truck in an endeavour to hold it down. In jumping down he fell and at the same moment the tip gear acted and the front of the truck came down, the wheel striking Jack's back, causing injuries as a result of which he died two days later.

Robert Crowe was assisting fitters who were doing repair work on a Diesel engine in the power house of the Gold Mines of Kalgoorlie. They were working after dark and he was holding the brass socket of an electric light globe attached to an extension cable, when he suddenly received a severe shock. It is thought that one of the twin wires must have come into contact with the inside of the brass socket. Crowe was taken immediately to the Kalgoorlie Hospital and the doctor, who arrived a few minutes later, pronounced life extinct.

The following table shows all the fatal and serious accidents reported to this office during 1937, which are classified according to the gold or mineral field in which they occurred. The causes of accidents are also shown:—

	Explosives.		Falls of Ground.		In Shafts.		Miscellaneous Underground.		Surface.		Total.	
	Fatal.	Seri-ous.	Fatal.	Seri-ous.	Fatal.	Seri-ous.	Fatal.	Seri-ous.	Fatal.	Seri-ous.	Fatal.	Seri-ous.
1. East Coolgardie	1	5	1	3	...	10	4	448	3	116	9	582
2. Mt. Margaret ... ..	...	...	1	1	1	5	1	92	...	25	3	123
3. Coolgardie ... ..	...	...	...	...	1	1	...	5	...	3	1	9
4. North Coolgardie ... ..	...	1	...	...	...	2	...	11	...	3	...	17
5. North-East Coolgardie ... ..	...	...	...	1	...	...	...	...	...	...	...	1
6. Broad Arrow ... ..	...	...	2	1	1	...	...	1	...	...	3	2
7. Dundas	2	3	2	7	1	2	...	4	...	2	5	18
8. Yilgarn	2	...	1	2	2	3	...	15	...	10	5	30
9. Murchison ... ..	...	...	2	1	1	3	...	38	2	23	5	65
10. East Murchison ... ..	...	1	1	1	1	6	1	100	...	59	3	167
11. Peak Hill ... ..	...	...	...	...	...	...	...	...	...	...	...	...
12. Yalgoo ... ..	...	...	...	...	...	...	1	1	1	1	2	2
13. Northampton ... ..	...	...	...	...	...	...	1	...	1	...	2	...
14. Greenbushes ... ..	...	...	...	...	...	...	...	...	...	...	...	...
15. Swan ... ..	...	1	...	...	...	...	...	...	...	38	...	39
16. Phillips River ... ..	...	...	...	...	...	...	...	1	...	...	...	1
17. Collie ... ..	...	2	...	50	...	...	...	175	...	24	...	251
18. Pilbara ... ..	...	...	...	...	...	...	...	1	...	...	...	1
19. West Pilbara ... ..	...	...	...	...	...	...	...	...	...	...	...	...
20. Ashburton ... ..	...	...	...	...	...	...	...	...	...	...	...	...
Totals for 1937	5	13	10	67	8	32	8	892	7	304	38	1,308
Totals for 1936	8	15	5	66	15	42	8	1,052	4	272	40	1,447

WINDING MACHINERY ACCIDENTS.

There were 23 accidents to winding machinery reported during the year, including two skip derailments, ten overwinds, four broken winding ropes and seven miscellaneous accidents.

Skip Derailments.

One derailment was due to a flat sheet, loaded on a trolley, slipping to the rails, and the other to the dumping wheels of the skip coming into contact with a loose rock. In neither case was any appreciable damage caused.

Overwinds.

All overwinds were fully reported on by the Inspector of Machinery or investigated by the Engine-Drivers' Board.

Broken Ropes.

A rope broke while bailing operations were in progress. It was not a rope used for hauling men and no damage was done.

A rope attached to a sinking kibble in the main shaft broke when the kibble was in a tipping position on the safety door. The actual cause of the break was unknown, but it is surmised that there was a kink in the rope. Tests of the broken rope showed the condition to be good. No damage was done.

On another occasion the sinking cable in the same shaft broke 80 feet above the kibble attachment when the signal to hoist was given. No damage was done and the cause of breakage is unknown. The rope was condemned and a new one installed.

A rope parted 80 feet above the shackle, during bailing operations. The weakness was due to insufficient oiling.

Miscellaneous Accidents.

The cage struck an obstruction in the shaft and was caught up. The cause of the accident was defective timbering. The shaft was retimbered for 90 feet.

A truck of ore being hauled to the surface in the cage, coming in contact with the shaft timber, tore out four sets.

The drawbar of a skip fractured whilst pulling ore. The skip fell to the bottom of the shaft.

The skid straps of a double deck cage broke while pulling ore. Three skids were damaged.

A safety hook came apart. No damage was done.

On two occasions, the grippers caught while lowering a cage slowly in single gear, and a loop of rope was caught round the bottom of the cage. Minor damage only was caused.

ADMINISTRATION.

Amendments of Acts.

Mines Regulation Act, 1906.

- Reg. 7—(a) Amendment of Schedule.
 (b) Addition of Clause (11).
 (c) Addition of new Form 18C. Gazetted 22nd January, 1937.

- Reg. 7—(a) Repealing Clause 3 and substituting new Clause 3.
 (b) Repealing Form 4 in Schedule and substituting new Form 4. Gazetted 23rd April, 1937.

Reg. 10—Re Plans of Mines. Amendment by deleting subparagraphs (b) and (c) and substituting new subparagraphs. Gazetted 28th May, 1937.

Sec. 32—Amendment of new subparagraph (ii) of paragraph (g) of General Rule 3. Gazetted 10th September, 1937.

Reg. 4—Amendment of General Rule 23. Gazetted 10th September, 1937.

Reg. 4—Additional new General Rules Nos. 48e, 48d, and 48c. Gazetted 10th September, 1937.

Notice defining districts assigned to various Inspectors of Mines cancelled and new notice issued in lieu thereof.—Gazetted 24th September, 1937.

Reg. 17a—Amendments to Clause 2. Gazetted 10th December, 1937.

The Mining Act, 1904.

Reg. Nos. 26-28, inclusive, repealed. Gazetted 23rd April, 1937.

Mining Development Act, 1902-24.

Reg. 13a—Addition of new regulation. Gazetted 19th March, 1937.

PROSECUTIONS.

During the year eight prosecutions were undertaken under the Mines Regulation Act, 1906, and in every case a conviction was registered and a fine imposed.

A manager was prosecuted under Regulation 26 for failure to report an accident.

There were two prosecutions under Section 31.

A miner was fined for taking charge of a winch without a certificate, and the manager for allowing this breach.

Under Section 32 there were three cases.

A miner and a magazine attendant were both convicted, the former for taking a naked light into a magazine and the latter for permitting this action.

A manager was prosecuted for failure to provide ladders in a winze.

Under Section 43, a manager was fined for employing Sunday labour without a permit.

For contravention of Clause 49, Regulation 4, by advancing a development end for a distance of more than 20 feet from a through air current without providing a blower, a manager was fined.

UNDERGROUND SUPERVISORS.

The Board of Examiners for Underground Supervisors' Certificates held examinations in May and October. In all 125 candidates were examined, 86 of whom were successful in gaining a Certificate of Competency.

In addition six reciprocal Certificates of Competency were issued without examination to candidates holding Mine Manager's Certificates for another State.

Certificates of Service were issued to thirteen applicants who were acting in the capacity of underground supervisors at the time of the gazettal of Regulation 17A.

Two duplicate certificates were approved and issued to persons who had lost the originals.

Copies of the papers set for the examinations for Certificates of Competency are attached to this report. (Appendix No. III.)

EXEMPTIONS.

Two hundred and thirteen certificates were issued in accordance with the provisions of Section 31 (4), for exemption from the provisions of Section 31, Subsection 1 (b) of the Mines Regulation Act, 1906.

SUNDAY LABOUR.

Twenty permits were granted in the course of the year to employ men on Sunday as follows:—

Seven men to work one Sunday fitting a new winding rope.

Six men to work two Sundays blocking and skidding shaft.

Three men to work one Sunday on septic tank installation.

On three occasions permits were issued for four men to be employed for one Sunday, skidding in the shaft.

Six men to work for two Sundays on water supply work.

Twenty-seven men to work for six consecutive Sundays in order to get the main shaft in working order by the time the treatment plant came into operation.

Two men to work for one Sunday improving ventilation.

Twelve men to work two Sundays on penthouse construction.

Sixteen men to work one Sunday on the completion of an underground ore bin.

Fifty men to work two Sundays on erection of plant.

Two men to work one Sunday cleaning mullock and rubbish off plat.

Ten men to work for three Sundays clearing and conditioning lower levels, which work could not be carried out while the ordinary shaft work was in progress.

Eight men to work for one Sunday cleaning out well hole of main shaft.

Twenty to thirty men to work for four Sundays transferring machinery, to avoid loss of time in subsequent working.

Twelve men to work for one Sunday, clearing and repairing shaft.

Twenty-one men to work on Sunday for six months in shaft sinking to save loss of time in subsequent working.

Fifteen men to work for four Sundays shaft sinking to keep mine free of water and save loss of time.

Diamond drilling crew to work for three Sundays sealing up holes on lower level to safeguard against an inrush of water and ensure safety of men working underground.

LOANS AND SUBSIDIES.

The following monetary assistance was given to the mining industry:—

	£	s.	d.
Advances towards development work and equipment of mines	105	10	0
Providing transport and general assistance to prospectors	6,619	6	5
Boring			—

Subsidies paid to privately owned batteries	92	5	6
Miscellaneous expenditure	483	5	2
	£7,300	7	1

The total expenditure was £7,300 7s. 1d., compared with £13,956 11s. 3d. during 1936 and £44,791 6s. 5d. during 1935. (Appendix No. 1.)

No expenditure was incurred during this year on "Advances on ores."

VENTILATION.

The subject of ventilation, which is of such vital importance to the health of mine workers, has received special attention from all Mines Inspectors, and the report of Inspector E. E. Brisbane, who is the departmental specialist on this subject, is quoted hereunder:—

The use of fans for mine ventilation has increased considerably during the year. There are now eleven mines equipped with fans of fairly large capacity. In 1931 there were only three mines—Sons of Gwalia Ltd., Wiluna and Great Boulder—equipped with fans. Under average conditions, a fan may be expected to increase the quantity of air flowing in a mine from 3 to 6 times the quantity circulated by natural ventilation. During this year fans for main ventilation have been installed on Central Norseman, Bulletin, Big Bell and Moonlight mines, and another fan has been placed in commission on the Sons of Gwalia, Ltd.

A table showing the main ventilating fans in commission is attached hereto.

Fans have also been applied to the ventilation of development ends in the following mines: Hannan's North, Central Norseman, Gold Mines of Kalgoorlie, Great Boulder, Lake View and Star, South Kalgurli, Triton and Wiluna. In some cases electric drive is used and in others various types of air motors are in use.

On several mines exhaust fans, coupled to hoods, are used to carry away the dust produced by small crackers and grinding machines in sample rooms. This practice disposes of the dust efficiently and improves the ventilation of the room.

Cone crushers used in conjunction with vibrating screens are now widely used as secondary crushers. These units cause dust to be thrown into the air. In some mines the dust is controlled by wetting down the ore. In other cases the nature of the ore is such that it cannot be wetted down very much and in several plants dust collectors are installed.

The change houses at the Perseverance, Enterprise and Tindal's Mines are provided with fans which blow air into the room through ducts concealed in the floor. In the winter months the air is heated by hot water radiators. The air current dries the clothes of the miners and steam pipes are not necessary.

Cooling by means of humidified air is used by the Wiluna Gold Mines for the office block and power house. The same system is in use at the drill sharpening shop on the Lake View and Star and in the winder house at the Sons of Gwalia. The fan draws a supply of air through a mist produced by forcing water through sprays by means of a centrifugal pump. The excess water falls into the reservoir which supplies the pump and in which a constant water level is maintained by a float valve. The current of air impinges on a set of vanes designed to remove excess water in suspension and is then piped to the required places.

It appears that the principal direction in which improvement in conditions both on the surface and underground may be expected is in the extended and improved use of fan ventilation. For this reason a large amount of time has been devoted to the study of fan problems in various mines. The regular testing of all fans in operation is necessary in order to see that the fans are properly cared for and in order to detect leaks in the airways.

In addition to the fan measurement which gives the total quantity of air circulating, the distribution of the air underground should be studied and checked against

the fan performance. During this year surveys of the Wiluna and Moonlight mines were made. The layout of these mines is simple and the surveys may be made in a comparatively short time. In other cases where the ventilating system is complex a survey may take a long time. A survey of the western leases of the Lake View and Star is at present in progress. This will require about 500 measurements of air quantity and will take from six weeks to two months. About 75 per cent. of this survey is now complete.

Conditions underground in the bigger mines have again shown some improvement. Very little dust counting has been done but the results of a few observations show very fair conditions. There is certainly a great increase in the air flowing in some of the mines on account of the fans placed in commission.

Only two complaints in regard to conditions underground were received during the year.

Temperature conditions have shown a slight improvement, but there are indications that difficulties will be encountered as mines are worked at deeper levels. The temperatures in the development ends at the lowest levels in Chaffers can be kept down to 80° F. (wet bulb) by efficient ventilation and the workings cool off 3 or 4 degrees when a through connection is obtained.

In the deepest development work in the Sons of Gwalia the dry bulb temperature is within one or two degrees of 87° F.

During the year 31 mines have been visited. The main features are:—

In the Kalgoorlie district there is little change in most of the mines. Gold Mines of Kalgoorlie, Hannan's North and Paringa are developing new ground but are still at relatively shallow depths. The only deep developments are in the Great Boulder and Lake View and Star, Ltd.

The Lake View and Star has developed No. 2 and No. 3 lodes extensively. The programme of work has been well planned and vertical connections have been put down promptly and regularly with corresponding benefit to the ventilation. No. 4 Lode has been developed at the deepest levels yet worked in Kalgoorlie and the ventilation of the development ends has been well attended to.

The old Horseshoe Shaft, which is the main return from the deeper levels, has again been repaired. The old Chaffers Shaft has been repaired and sealed off down to the 1,000 level and this will provide another return airway from the southern sections.

At the Great Boulder the main developments are in the deepest levels worked from Hamilton Shaft and the ventilation in this section of the mine is good. Trouble is still being experienced with the ventilation of the sec-

tion between Main Shaft and Edwards Shaft. This area receives constant attention and a new fan has recently been placed in commission there. A survey of this mine will be made when the Lake View and Star is completed.

The southerly trend of the ore bodies in the Norseman Gold Mines has carried the workings away from the air shaft and the sinking of a new ventilation shaft is under consideration.

An upcast fan has been placed on the Blue Shaft at the Central Norseman.

The Sons of Gwalia has placed both fans in commission on the lower levels of the mine.

A lot of work for the improvement of the ventilation has been done on the Wiluna Mine. The sinking of the new air shaft has been of great value.

The Moonlight Mine is equipped with a fan of the limit load type, and is well ventilated.

Measurements made at the Triton indicate some fault in the system, but sufficient information to locate it was not to hand. The ventilation of the mine is good.

Several accidents due to fumes have been reported. In the majority of cases, men have been slightly affected. There have been a few cases in which serious consequences have been narrowly averted and these have all been in shafts or winzes. One man was fatally fumed on the Moonlight Mine. These experiences show that before returning to the face after firing, especially in winzes or shafts, all dead ends should be thoroughly blown out. In two instances ends which had been left over 24 hours after firing contained gases which quickly rendered men unconscious.

On the Sons of Gwalia a man was burned by an accumulation of gas in a rise. The gas again collected after a short interval. There have been similar instances in the Great Boulder Mine. The circumstances point to the danger that may arise from the concentration of light inflammable gases in rises above return airways.

The literature on "Silicosis" during the current year has been of great interest. A report on "The Prevention of Silicosis by Metallic Aluminium," by J. J. Denny and others, is an outstanding contribution. Certain aspects of the work are parallel with recent researches in England as reported in the Bulletins of the Institution of Mining and Metallurgy but preventive treatment is entirely new, although the idea was previously suggested by Haldane.

Improvements in the practice of forced ventilation have been the main feature of the year's work. In order to encourage the use of fan ventilation, detailed examinations of some of the bigger mines have been made and this work will be continued in the coming year.

MAIN VENTILATING FANS IN WESTERN AUSTRALIAN MINES.

Mine.	Situation.	Make.	Type.	Inlet.	Maximum Capacity. C.F.M.	Motive Power.	Drive.
Big Bell ...	Bottom of downcast main shaft	Richardson	No. 6½ Limit Load	40	30,000	Electric motor	Tex rope
Bulletin ...	Surface—exhaust ...	Richardson	No. 8 ...	48	50,000	Electric motor	Tex rope
Central Norseman*	Surface—exhaust ...	Richardson	No. 6½ Limit Load	40	60,000	Electric motor	Tex rope
Great Boulder ...	Bottom of downcast main shaft	Sirocco ...	No. 6 ...	30	23,000	Electric motor	Tex rope
Lake View and Star	Surface—exhaust ...	Jeffrey ...	8ft. 0in. Acrovane	96	110,000	Electric motor	Tex rope
Do. ...	In series with above fan at bottom of shaft	Sirocco ...	No. 9 ...	48	52,000	Electric motor	Tex rope
Lancefield ...	Surface—exhaust ...	Richardson	No. 11 ...	66	95,000	Electric motor	Tex rope
Moonlight ...	Surface—exhaust ...	Richardson	No. 12 Limit Load	72	99,000	Electric motor	Tex rope
Norseman ...	Surface—exhaust ...	Richardson	No. 5 ...	30	20,000	Electric motor	Tex rope
Sons of Gwalia* ...	Bottom of upcast main shaft	Richardson	No. 9½ ...	57	120,000	Electric motor	Direct coupled
Do. ...	In parallel with above fan at level above	Richardson	No. 9½ ...	57	120,000	Electric motor	Direct coupled
Triton* ...	Surface—exhaust ...	Richardson	No. 6 ...	36	56,000	Electric motor	Tex rope
Wiluna* ...	Surface—exhaust ...	Richardson	No. 11 ...	66	120,000	Electric motor	Tex rope
	Surface—exhaust ...	Richardson	No. 8 ...	48	50,000	Electric motor	Tex rope

* Double width double inlet fans.

A report by Mr. Brisbane on the ventilation of the Wiluna Gold Mines, Ltd., appears as Appendix IV., on page 47.

ELECTRICAL.

Since the revival of the gold mining industry, old methods have been largely superseded by modern ones, including particularly the replacement of out of date power plant by modern electrical installations.

To meet this development, a Special Inspector of Mines (Electricity) was appointed during the year, in the person of Mr. C. F. Buttle, Inspector of Machinery, who has forwarded the following report on plants visited during the time he has held this office:—

The use of electricity in the mining industry has shown a marked increase. In places steam has been eliminated and has been replaced by oil engines as a direct motive power or electrification by generators driven by crude oil engines. In no place, during this year, has a steam plant been erected solely for the purposes of generating electricity. In the coming year similar changes will take place.

I cannot deal with the electrical side on the whole of the goldfields as I have not yet visited the Murchison, East Murchison or Mt. Margaret Districts.

I will first deal with the main power station on the goldfields, viz., the Kalgoorlie Electric Power and Lighting Corporation. For the year ended December, 1936, it was mentioned that four double-drum Babcock and Wilcox water tube boilers had been added to the steam plant. During 1937 two new boilers have been added and two more are in the course of erection, while two more are on order for 1938.

In 1932 a Bellis and Morecom steam turbine coupled to a 3,000 K.W. generator was installed to take the place of a Stewart reciprocating engine coupled to a 500 K.W. generator. In 1935 a Bellis and Morecom steam turbine coupled to a 5,000 K.W. generator was installed. In 1937 a cross compound horizontal engine by Tosi coupled to a 500 K.W. generator was scrapped and in its place a steam turbine by Metropolitan Vickers coupled to a 7,500 K.W. generator is to be installed.

Owing to the rapid demand for electrical energy it is hoped to have this latter plant running before the end of 1938. Extra steam consumption has necessitated the erection of further condensing plant and a cooling tower, 270 feet by 105 feet by 40 feet, is in the course of construction.

Different companies have approached the power corporation re the supply of current for electric winders, but to date with the exception of the Boulder Perseverance and the Kalgoorlie Enterprise, nothing has to my knowledge been finalised. The Boulder Perseverance Gold Mines are replacing their steam winder on the main shaft with an electric winder by Robey. This winder will be driven by a 750 H.P. motor at 3,300 volts. When this is installed (early in 1938) the nest of Heine boilers will be shut down. Electrically driven Bellis and Morecom air compressors have already been installed to supply air to both the Boulder Perseverance and the Kalgoorlie Enterprise. At the Kalgoorlie Enterprise an electric winder by Robey is to be installed early in the new year. This winder will be driven by a 230 H.P. electric motor. To ensure against interruption of supply to the treatment plants, etc., in the event of switches tripping at the winding engine on the Boulder Perseverance a direct line has been run from the power corporation to supply this winder only.

Gold Mines of Kalgoorlie.

At the Oroya Shaft a power house was erected in 1936 to supply current to the electric winder and proposed treatment plant. The first unit was a Bellis and Morecom Diesel engine of 410 H.P. coupled to a 280 K.W. generator. During 1937 two more Diesels were installed but of 600 H.P. coupled to 410 K.W. generators. The treatment plant was completed by 18th

November and towards the end of the month was working at full capacity. The maximum daily output from the station during December was 16,300 units with an average of about 12,500, or a total for the month of 365,820 units.

Two high tension lines have been run from the power station to supply current at 3,300 volts to (1) the Iron Duke Shaft, and (2) the Lake View South Shaft. The line to the Iron Duke is 3,500 feet in length and supplies current to the surface as well as to the pumps underground. The line to the Lake View South Shaft is 3,000 feet in length and supply is to an electric winder only at present.

Central Norseman Gold Corporation.

A very similar plant to the above has been installed at the old Phoenix Gold Mines. In 1936 a 410 H.P. Bellis and Morecom Diesel engine coupled to a 280 K.W. generator was installed. In 1937 another Bellis and Morecom Diesel engine of 600 H.P. coupled to a 410 K.W. generator was installed. Steam has been eliminated on this group of mines also. The steam winder was replaced by a small electric winder by Austral Otis during the year, but in January, 1938, a Thompson electric winder will be installed. This winder will be driven by a 290 H.P. electric motor at 3,300 volts. The protective gear on this winder is supplied by Securities Electric Manufacturing Company of New South Wales, and is similar to that installed at Oroya Shaft in Kalgoorlie.

From the power house three high tension transmission lines of 3,300 volts have been run from a 400 K.V.A. transformer. One line supplies current in bulk to the local road board for the town supply at the rate of approximately 10,000 units a month. Another supplies current to the Viking Gold Mine owned by the same company some 4,000 feet distant. The third line (not quite completed at the end of the year) is about 6 miles in length and is to supply current to electrically driven pumps at the Princess Royal Gold Mines, pumping water back to the treatment plant at the Phoenix Gold Mine.

The following figures have been supplied by courtesy of the management, showing the output for the month of November, 1937:—

Plant	193,772 units
Mine	27,858 units
Hoisting	7,344 units
Viking Gold Mine ..	2,260 units

at a creditable total cost of .6227 pence per unit generated.

Great Boulder Proprietary Gold Mines, Ltd.

An electric winder driven by a 40 H.P. motor has been installed at the 1,200ft. level at the Hamilton Shaft. This winder was designed and manufactured locally by Hoskins and Company of Perth.

Yellowdine Gold Mines, Ltd.

In 1936 a power house was erected to supply current to the treatment plant. Two Babcock and Wilcox boilers were erected to supply steam to Bellis and Morecom engines coupled to generators.

In 1937 another Babcock and Wilcox boiler was added to the nest and another generator is to be installed in the new year.

Marvel Loch Gold Development.

At this mine the power plant is Diesel driven. Three electric winders are in use and the whole of the treatment plant is electrically driven. As it is five months since the two latter mines were visited by me, I am not able to quote exact figures of size of plant.

Paget Gold Mines, Edjudina.

In 1936 a power plant was put down and the steam boiler and steam winder dispersed. Two Ruston Hornsby Diesel oil engines of 330 H.P. direct coupled to generators supplied current for surface plant and pumping, and three Holman electric winders. During 1937 this mine was shut down and to date it is not known when it will be reopened.

Consolidated Gold Mines of Coolgardie.

In 1936 this mine was restarted. Temporarily an internal combustion driven winder was in use but when the power house was completed this was replaced by a Holman electric winder.

The power house was similar in size to the Paget Gold Mines and comprised of two Ruston Hornsby Diesel engine driving A.C. generators. A second winder was installed during the year, but is at present out of use.

Lake View and Star, Ltd.

For this group of mines a power plant was laid down and first generated electric current in February, 1932. Crossley oil engines of 1,100 H.P. direct coupled to General Electric generators of 800 K.W. capacity have been installed. During 1932 three engines were completed and a fourth in 1933. The fifth unit was running in 1935 and a sixth is being laid down to be running early in the new year.

Crude oil to the quantity of 20 tons per day is being consumed and, to cut down costs, an oil tank has been built at Esperance to which the oil is pumped direct from the ships and then transported by rail to Fimiston. The output from the plant for the year was over 23,000,000 units. In the power house, in addition to the above, four Crossley oil engines of 400 H.P. coupled to Bellis and Morecom air compressors of 2,000 cubic feet capacity and one electrically driven have been installed.

Two Crossleys of similar capacity have been installed at the Ivanhoe Shaft and the steam driven air compressor scrapped. In 1936 an electric winder of 40 H.P. was installed at an internal shaft at 1,100ft. level at the Hannan's Star and during the same year the old Hannan's Star steam winder was converted to electric drive. The driving motor for this winder is 100 H.P. Specifications have been drawn up to convert the steam winder at No. 2 Horseshoe Shaft to electric drive, the work to be gone on with during the coming year.

GOLD MINING.

The gold production for the year reached 1,007,289 ounces, being 154,867 ounces more than that produced in 1936, and nearly treble the production of 1929. This is the first time since 1916 that the year's production has exceeded the 1,000,000-ounce mark.

The tonnage of ore treated and the value of gold won exceeded the 1936 figures by 547,574 tons and £1,369,975 respectively. The average price realised per fine ounce was 174.68s., being about 5d. higher than the average for the previous year, while the average gold yield per ton of ore treated was 6.64 dwts., compared with 6.84 dwts. in 1936.

There was a notable absence of serious industrial trouble, and the shorter working shift, introduced at the beginning of the year, does not appear to have appreciably retarded either production or development footage.

As many of the speculative properties have either closed down entirely or sought exemption through lack of finance, the tendency during the year has been towards stability in the industry. With the completion of treatment plants on proved ore bodies, vigorous development of others of promise, and a continuance of profitable operations by mines which have been the backbone of the industry for many years, gold mining has settled down to a steadily increasing production of revenue which must be reflected in a greater feeling of security for all concerned.

The progressive stabilisation of the industry in the State generally since 1929 is well illustrated in the following table:—

Year.	Tons Treated. (2,240 lbs.)	Total Gold Yield.	Estimated Value of Yield.	Value of Yield per ton.	Number of Men Employed.	Average Value of Gold per oz., Australian Currency.	Average Yield per ton of Ore.
	tons.	fine ozs.	£A.	shillings.		shillings.	dwts.
1929 ...	628,400	372,064	1,580,426	50.30	4,108	84.96	11.84
1930 ...	645,344	419,767	1,874,484	58.09	4,284	89.33	13.01
1931 ...	982,163	518,045	3,042,019	61.94	5,961	117.44	10.55
1932 ...	1,327,021	599,421	4,358,989	65.70	8,695	145.44	9.03
1933 ...	1,588,979	636,928	4,884,112	61.48	9,900	153.36	8.01
1934 ...	1,772,931	639,871	5,461,004	61.60	12,523	170.69	7.22
1935 ...	1,909,832	646,150	5,676,679	59.45	14,708	175.71	6.77
1936 ...	2,492,034	852,422	7,427,687	59.61	15,696	174.27	6.84
1937 ...	3,039,608	1,007,289	8,797,662	57.99	16,174	174.68	6.64

NOTE.—These figures comprise those reported direct to the Department by producers and vary slightly from the official figures of annual production, which comprise Royal Mint figures, plus figures of gold exported.

OPERATIONS OF THE PRINCIPAL MINES.

The rapid expansion of the mining industry since 1933 is well illustrated in the tabulation below, showing the names and output of mines producing 5,000 ounces and upwards of gold since that date. The year 1933 was chosen as a starting point because before that date, with the single exception of the Wiluna Gold Mines, Ltd., no new producers of that

amount of gold had come into production for many years.

From a total of eight mines in 1933 producing 5,000 ounces and upwards, the list has grown to no less than twenty-eight in 1937, including a number of important mines which should be sound revenue producers for many years to come.

MINES PRODUCING 5,000 OUNCES AND UPWARDS SINCE 1933.

Mine.	1933.			1934.			1935.			1936.			1937.		
	Tons.	Ounces Gold.	Dwt. per Ton.	Tons.	Ounces Gold.	Dwt. per Ton.	Tons.	Ounces Gold.	Dwt. per Ton.	Tons.	Ounces Gold.	Dwt. per Ton.	Tons.	Ounces Gold.	Dwt. per Ton.
Lake View and Star, Ltd.	*497,019	179,608	7.23	*519,407	164,331	6.33	493,265	138,911	5.63	524,998	174,409	6.64	542,390	167,272	6.17
Wiluna Gold Mines, Ltd.	437,456	116,201	5.31	496,838	126,445	5.09	470,205	108,405	4.69	557,099	113,495	4.08	599,567	113,376	3.78
Great Boulder Pty., Ltd.	106,152	61,234	11.54	115,602	54,382	9.41	127,498	55,054	8.64	166,755	72,901	8.74	188,120	72,478	7.71
State Batteries	91,616	59,706	13.03	97,454	59,701	12.25	108,360	63,298	11.68	102,086	64,619	12.65	102,800	60,033	11.67
Sons of Gwalia, Ltd.	126,390	43,034	6.81	121,916	42,740	7.01	94,513	35,770	7.07	125,260	45,095	7.20	136,522	45,687	6.69
Boulder Perseverance, Ltd.	74,280	31,075	8.37	76,310	27,011	7.08	80,651	29,642	7.35	97,752	34,392	7.04	110,171	42,221	7.66
North Kalgorli (1912), Ltd.	57,326	26,404	9.21	87,006	32,804	7.54	104,945	32,663	6.22	147,197	45,430	6.17	140,468	55,173	7.85
South Kalgorli Consolidated, Ltd.	41,932	24,451	11.66	50,260	19,095	7.60	46,383	16,701	7.20	45,308	14,802	6.33	70,947	21,130	5.96
Norseman Gold Mines, N.L. ....	....	....	....	17,773	10,391	11.69	37,767	15,422	8.16	67,860	22,440	6.61	76,069	30,771	8.09
Broken Hill Pty. G.M., Ltd. ....	....	....	....	17,501	7,011	8.01	15,991	6,194	7.75	19,316	8,169	8.46	22,096	10,363	9.38
Ingliston Consols Extended	41,516	9,096	4.38	43,762	7,363	3.36	41,689	7,983	3.83	37,204	7,221	3.88	30,815	5,367	3.48
Lancefield (W.A.) G.M., N.L. ....	....	....	....	....	....	....	62,045	19,054	6.14	104,355	34,747	6.66	113,342	34,477	6.08
Mt. Magnet Gold Mines, Ltd. ....	....	....	....	....	....	....	46,547	7,396	3.19	54,760	10,519	3.84	59,580	8,589	2.88
Triton Gold Mines, N.L. ....	....	....	....	....	....	....	22,307	7,232	6.48	77,757	26,811	6.89	74,388	25,917	6.97
Ora Banda Amalgamated, N.L. ....	....	....	....	....	....	....	8,278	5,050	12.20	13,193	7,284	11.04	16,495	8,309	10.08
Gold Mines of Kalgoorlie, Ltd. ....	....	....	....	....	....	....	....	....	....	22,520	16,709	14.85	30,432	16,971	11.15
Yellowdine G.D., Ltd. ....	....	....	....	....	....	....	....	....	....	27,050	12,842	9.49	44,809	36,958	16.46
Cox's Fnd. ....	....	....	....	....	....	....	....	....	....	6,999	6,412	18.32	16,768	14,042	16.75
Central Norseman Gold Corporation, N.L. ....	....	....	....	....	....	....	....	....	....	20,303	5,840	5.70	48,896	13,785	5.64
Marvel Loch G.D., N.L. ....	....	....	....	....	....	....	....	....	....	33,008	5,012	3.03	35,533	5,033	2.83
Moonlight Wiluna, Ltd. ....	....	....	....	....	....	....	....	....	....	....	....	....	95,121	26,375	5.54
Youanmi Gold Mines, Ltd. ....	....	....	....	....	....	....	....	....	....	....	....	....	48,184	11,153	4.63
Big Bell Gold Mine, N.L. ....	....	....	....	....	....	....	....	....	....	....	....	....	85,958	†10,140	†2.36
Paringa Mining and Exploration Co., Ltd. ....	....	....	....	....	....	....	....	....	....	....	....	....	15,305	6,998	9.14
First Hit Gold Mine, N.L. ....	....	....	....	....	....	....	....	....	....	....	....	....	8,377	6,831	16.31
Comet Gold Mines, Ltd. ....	....	....	....	....	....	....	....	....	....	....	....	....	4,790	6,822	28.48
Hill 50 Gold Mine, N.L. ....	....	....	....	....	....	....	....	....	....	....	....	....	23,878	6,689	5.60
Riverina Gold Mines, Ltd. ....	....	....	....	....	....	....	....	....	....	....	....	....	13,822	5,565	8.05
Celebration-Golden Hope ....	....	....	....	....	....	....	....	....	....	....	....	....	26,988	5,401	4.00
Lady Shenton Gold Mines, N.L. ....	....	....	....	....	....	....	....	....	....	....	....	....	7,623	4,984	13.07
Total	1,473,687	550,809	7.47	1,643,829	551,274	6.71	1,760,444	548,775	6.23	2,250,780	729,149	6.48	2,781,907	872,079	6.27
All Others	115,272	86,119	14.94	129,102	88,597	13.72	149,388	97,375	13.04	241,254	123,293	10.22	257,701	135,210	10.49
GRAND TOTAL	1,588,979	636,928	8.01	1,772,931	639,871	7.22	1,909,832	646,150	6.77	2,492,034	852,422	6.84	3,039,608	1,007,289	6.64

* Including output of Associated Gold Mine, later absorbed by Lake View and Star, Ltd. absorbed by a new plant and also a considerable quantity of gold in the course of treatment at the end of the year.

† This figure does not represent the full value of the ore treated, as it neglects the gold

East Coolgardie Goldfield.

This goldfield, which includes the Kalgoorlie and Boulder districts, produced 42 per cent. of the total output of the State, the production for the year

reaching a total of 424,448 ounces. The increasing activity is well illustrated by the following tabulation of the total development footages on the principal mines since 1932:—

Year.	Shaft Sinking.	Driving.	Cross Cutting.	Rising and Winzing.	Diamond Drilling.	Total.
	feet.	feet.	feet.	feet.	feet.	feet.
1932 ... ..	...	18,948	6,984	7,472	10,316	43,720
1933 ... ..	...	26,671	18,868½	9,367	15,568½	70,897
1934	539	32,533	13,448	13,687	48,480	108,737
1935	807	32,467	14,511	14,044	43,219	105,048
1936	1,014	43,919	16,043	19,459	40,673	121,108
1937	935	56,175	17,877	22,186	45,214	142,387

Lake View and Star.—Mining and milling was continued on this group of mines throughout the year at an average rate of 50,000 tons per month. The average number of men employed was 1,280 and systematic development has increased the already large ore reserves, which, at the end of June, 1937, amounted to 3,414,000 tons of an average grade of 5.68 dwts.

Chaffers Shaft is now down 3,758 feet. At the 3,500ft. level, drives north and south are progressing on No. 4 lode in fair values and crosscutting on the 3,700ft. level has exposed the downward continuation of the ore body.

On the No. 2 lode in Chaffers and Horseshoe sections, the levels from 2,100 feet to 3,100 feet have a shoot of solid ore for 1,500 feet in length, reaching to Chaffers crosscut at 3,000 feet. No development has yet been done south of this crosscut.

On the 1,200ft. level and above, ore has been stoped from 1,200 feet south of Chaffers-Horseshoe boundary and should exist at lower levels south of the crosscut. Crosscutting is now being carried out from the 3,300ft. level, 250 feet south of Chaffers-Horseshoe boundary to cut the continuation of this shoot.

At the Ivanhoe shaft developments were on the new lode at 1,800ft., 1,900ft. and 2,100ft. levels and have disclosed good values for a length of 900 feet. The width is not great. Crosscutting is now in progress at the 2,400ft. level to cut the lode.

At the Star shaft workings the internal shaft is down 644 feet and is connected with the Chaffers shaft at all levels from 1,200 feet to 1,700 feet. Crosscuts have cut Morrison's lode at the 1,200ft., 1,300ft. and 1,700ft. levels, and levels are driven in a shoot 400 feet long. Winzes are being put through to block out this ore. The northern extension of this lode will be developed by crosscutting from the upper levels of Chaffers shaft.

At the Lake View section the principal developments have been on the Central West Boulder Lode at the 400ft. to 800ft. levels. Crosscutting is now in progress on the 1,000ft. level. The Perseverance lode is being opened up at the 700ft. level in good values.

At the Associated workings the principal developments have been on Tetley's lode from the 400ft. to the 1,000ft. level. Ore has been opened up for a length of over 300 feet in good values and big widths.

The total development footages on the Group for the year amounted to 15,337 feet of diamond drilling, 310 feet shaft sinking, 5,957 feet crosscutting, 21,446 feet driving and 8,422 feet of rising and winzing.

The tonnage mined and treated in 1937 amounted to 542,330 tons for a yield of 167,272 fine ounces of gold, the average yield being 6.17 dwts. per ton.

Great Boulder Proprietary, Ltd.—This mine has continued its successful operations, retaining its position as the third highest producer of gold in the State. For the year 188,120 tons were milled for a return of 72,478 ounces of fine gold, an average recovery of 7.71 dwts. to the ton.

The underground developments have been very encouraging, and large tonnages of good ore have been opened up. Good progress has been made in this section and also with the plant additions to increase the output to 25,000 tons monthly.

Development for the year is as follows: Diamond drilling 11,817 feet, crosscutting 3,806 feet, driving 12,131 feet, rising and winzing 5,554 feet.

The future of this mine seems assured for some years to come.

Boulder Perseverance, Ltd.—This mine is progressing satisfactorily and a number of improvements have been carried out both underground and on the surface. A new electric winder is being installed, which should make a considerable reduction in haulage costs. The mine is efficiently worked, and a kindly interest is taken by the management in the welfare of the employees, who number 380.

The tonnage treated for the year was 110,171 and the gold won 42,221 fine ounces, the average yield being 7.66 dwts. per ton.

Development figures for the year were: Diamond drilling 4,933 feet, crosscutting 278 feet, driving 5,216 feet; and rising and winzing 1,434 feet.

On the Kalgoorlie Enterprise, which is under the same management and is being prepared to supply a large tonnage of payable ore to the Perseverance mill, development footages were: Diamond drilling 565 feet, shaft sinking 192 feet, crosscutting 698 feet, driving 754 feet, and rising and winzing 901 feet. This mine is responding well to developments and should be a good producer in the near future.

South Kalgurli Consolidated, Ltd.—This company carried out routine operations, employing approximately 270 men on development, stoping and treatment. A definite system of improved ventilation has been tentatively laid out which should greatly improve the working conditions on the mine.

70,947 tons of ore were crushed, yielding 5.96 dwts. per ton, a total of 21,130 fine ounces of gold. Development footages were: Diamond drilling 3,372 feet, crosscutting 954 feet, driving 3,506 feet, and rising and winzing 683 feet.

North Kalgurli, 1912, Ltd.—This company had another successful year, raising 140,468 tons of ore, which was treated by the Kalgurli Ore Treatment Company for a return of 55,173 ounces of fine gold, making this mine the fourth highest producer in the State for the year. The average extractable value of the ore treated was 7.85 dwts. per ton. The development work carried out comprised: Shaft sinking 77 feet, crosscutting 2,836 feet, driving 4,647 feet, and rising and winzings 268 feet.

Developments have been encouraging, especially in the Kalgurli Mine, where a new lode was opened up in good values.

At the North Kalgurli Shaft long shoots of payable ore are indicative of continued prosperity.

The Union Jack shaft has been sunk a further lift of 80 feet to a total depth of 420 feet and stoping and development work have been carried out. All indications point to the probability of satisfactory development on the lower levels.

The Croesus Proprietary, on which operations were suspended by the South Kalgurli Consolidated during the year, was taken over by North Kalgurli (1912), Ltd., and encouraging developments have been reported.

Paringa Mining and Exploration Co., Ltd.—This mine started production during the year and mined 15,305 tons, which was treated at the South Kalgurli Mill, for a return of 6,998 fine ounces, and an average recovery of 9.14 dwts. per ton. Development comprised: Diamond drilling 91 feet, crosscutting 1,025 feet, driving 2,082 feet, and rising and winzings 1,210 feet.

Ore reserves at the end of the year stood at 175,000 tons, estimated to average 6.1 dwts. per ton, and the Company is in a strong position. Plant construction is being pushed forward and it is anticipated that the mine will commence treatment with its own plant in April, 1938. Treatment will be carried out on flotation principles.

Gold Mines of Kalgoorlie, Ltd.—This company is operating at the Iron Duke and Oroya South shafts, developing and stoping. For the first part of the year the output was treated at the old Associated mill, but late in the year the company's mill on the Oroya South was completed and for the last two months treatment operations have been carried out on that plant. A total of 30,432 tons was treated during the year, 16,971 fine ounces of gold being extracted, an average of 11.15 dwts. per ton.

Development as follows was completed during the year: Diamond drilling 7,665 feet, crosscutting 1,650 feet, driving 3,998 feet, rising and winzings 2,435 feet.

On the Oroya South shaft, a steel headframe and bin were erected, which fed directly to a Ruwolt jaw-crusher, thence by conveyor to a Symons cone crusher. The ore from the fine ore bin is subjected to primary and secondary grinding by tube mills with Denver mineral jigs included in the circuit to trap the gold particles in place of corduroy strakes. The pulp is cyanided and then goes through the flotation section. The flotation concentrate is dewatered by a disc filter and discharged on to a 60 rabble roaster. The calcine is re-ground and also passes over a jig before final cyanidation. The plant capacity is 8,000 tons per month.

Broken Hill Proprietary.—On this company's property at Hannan's North, routine work was carried out for the year, keeping about 80 men in constant employment. Promising ore development is indicated in the Golden Zone and Star sections above the 600ft. level, with a likelihood of proving considerable ore reserves.

The ore crushed for the year amounted to 22,096 tons for a return of 10,363 fine ounces, an average yield of 9.38 dwts. per ton.

Development footages were: Diamond drilling 50 feet, crosscutting 272 feet, driving 1,731 feet, and rising and winzings 765 feet.

North Kalgurli United, Ltd.—Work on this mine was confined entirely to development, the footages being as follows: Diamond drilling 603 feet, shaft sinking 355 feet, crosscutting 399 feet, driving 505 feet, and rising and winzings 515 feet. The new main shaft is now connected with the 300ft. level.

On the old Hannan's Reward and Mt. Charlotte leases 25 diamond drill holes were bored, totalling 13,618 feet, and costing approximately £20,000. Two mineralized ore bodies were encountered, one of which is estimated to contain 1,122,000 tons of ore valued at 5.36 dwts. per ton, while the estimate for the other is 538,000 tons at 4.2 dwts. Negotiations for the necessary finance to operate and develop the mine are in hand.

Hampton Plains.

Celebration and Golden Hope.—These two mines, lying about 4 miles apart, are being worked in conjunction by the Australian Mining Trust, and have both contributed their quota of ore to the mill at Celebration. Their total output for the year was 26,998 tons for a return of 5,401 ounces.

Lack of finance has prevented a suitable development programme being put in hand, and the company has had a lean period.

Consolidated Gold Areas, N.L.—This company has kept 25 to 30 men employed on mine development and exploration work. Development results have been sufficiently encouraging for the management to consider the advisability of constructing a treatment plant capable of milling 2,000 tons per month. The mine ceased operations late in the year pending the preparation of plans and estimates for such plant.

New Hope Gold Mine.—This small mine, worked by a syndicate, has been steadily producing throughout the year. The ore body is a wide, soft, low grade formation and mining operations were confined to the zone above the 100ft. level. The ore is carted about four miles to the syndicate's Huntington mill plant, which is situated at the nearest available water supply.

Great credit is due to the members of the syndicate for evolving a payable proposition with very low grade ore under these conditions.

Coolgardie Goldfield.

Phoenix Gold Mines, Ltd.—This company is operating on the old Bayley's Reward Mine at Coolgardie. Development was carried out from two shafts, *viz.*, Price's shaft and Bayley's South shaft.

A steel headframe has been erected on Price's Shaft to replace the old wooden frame.

The ore body is quartz, strongly impregnated with arsenopyrite, and varies greatly in width and value. Development work was carried out for the year as follows:—Diamond drilling 3,320 feet, shaft sinking 115 feet, crosscutting 609 feet, driving 1,634 feet and rising and winzing 595 feet.

Consolidated Gold Mines of Coolgardie, Ltd. (Tindal's).—A vigorous programme of mine development was carried out on this ore body, which ranges in width from 4 feet to 30 feet. The grade of the ore is low, but it is not expected that any difficulties will be encountered in the treatment. Further development at the 600 feet level indicates a rise in values.

The development work completed during the year comprised: Diamond drilling 3,081 feet, shaft sinking 523 feet, crosscutting 1,141 feet, driving 2,306 feet, and rising and winzing 1,423 feet.

Sufficient ore of an average grade of about 4.5 dwts. has now been developed to warrant the erection of a plant to treat 10,000 tons per month, and at the end of the year negotiations were in hand for raising the necessary capital to finance this construction.

Spargo's Reward Gold Mine.—This mine, which has sufficient ore developed to warrant the installation of a treatment plant of a capacity of from 2,500 to 3,000 tons per month, has been forced by lack of capital to put in a plant consisting of two 5ft. Huntington mills in order to treat the oxidised ore and with the object of financing the greater expenditure of a complete sulphide treatment plant.

Crushing was commenced late in the year. The pulp is run over copper plates and corduroy strakes, and allowed to collect in dams pending further treatment. Extraction by amalgamation is estimated at about 50 per cent., leaving the balance for cyanidation treatment. Experimental work is in hand in order to decide the most suitable type of cyanide plant to instal.

The output of the two Huntington mills is reported to be 80 tons per 16 hours.

Yilgarn Goldfield.

This field may be said to be generally in a prosperous condition, not so much on account of the large producing mines, but because of the numerous small privately-owned properties which are operating successfully, many of which crush with their own plants. Prospecting is also active.

Yellowdine Gold Development, Ltd., had a successful year, treating 44,899 tons for a return of 36,958 ounces. The yield per ton was 16.46 dwts. The development figures were: Diamond drilling 4,696 feet, shaft sinking 129 feet, crosscutting 190 feet, driving 810 feet, and rising and winzing 578 feet.

Some considerable trouble was experienced with a large inflow of water, which hindered shaft-sinking operations. No new developments of importance have been reported.

Southern Cross United Gold Mines, Ltd.—Development was carried out to the extent of diamond drilling 2,063 feet, shaft sinking 125 feet, crosscutting 263 feet, driving 682 feet, rising and winzing 264 feet.

The 20-head mill and plant was completed and brought into operation during the year. Gold re-

covery, however, was disappointing and underground work was stopped at the end of the year in order to check sample the mine.

Marvel Loch Gold Development, N.L.—Operations on this mine for the year have been disappointing. The tonnage output was 35,533 for a recovery of 5,033 ounces, a yield of 2.83 dwts. per ton. The low grade of the ore was in great measure due to shrink stoping in unsuitable country and a consequent dilution. Mine ore was also supplemented with some low-grade laterite ore mined by open cut methods from the Great Victoria mine, some eight miles distant.

In the latter part of the year promising developments were met with on the 300ft. level at No. 1 shaft and below the 200ft. level on B7 lode at No. 3 shaft. Ore mined from ore bodies opened up by these later developments in the last two or three months of the year showed definitely better results, and indications are that a vigorous development policy at these two points would provide a payable grade of mill dirt.

Nevoria Gold Mines, Ltd., carried out a vigorous development policy during the year, comprising shaft sinking 384 feet, crosscutting 1,479 feet, driving 3,212 feet and rising and winzing 1,195 feet. Developments in the sulphide zone on the 250ft. level were definitely encouraging. A length of over 300 feet of good grade ore was opened up on the level on each of two lodes and winzes to a depth of 90 feet below this horizon are still in similar values.

The occurrence of numerous pegmatite dykes cut in the workings has hampered development to some extent and has made it somewhat difficult to determine the ore reserve position accurately. The total ore reserves, developed and possible, are estimated by the Company's officials as 397,500 tons at an average value of 5.8 dwts., including 140,000 tons of developed sulphide ore at 8.8 dwts.

The future activities of this mine will be watched with interest, as it has potentialities as a prospective large producer.

Edna May Amalgamated.—This mine, after a series of severe setbacks owing to the difficulty of handling the large inflow of water, which had washed the sand filling out of old stopes, commenced partial production in July with 10 stamps of the 20-head mill. At the end of the year, about 1,100 tons per month were being put through the mill for a recovery, by amalgamation only, of between 6 and 7 dwts. per ton. The tailings were stored for future cyanide treatment.

Development footages for the year were: Shaft sinking 198 feet, crosscutting 383 feet, driving 907 feet, rising and winzing 238 feet.

Evanston.—A new find during the year, which may possibly prove to be of some importance, was made at Evanston in the Mt. Jackson district, where a number of leases have been pegged and small shafts and costeans have proved payable gold near the surface over a distance of about three-quarters of a mile. The Western Mining Corporation has secured several blocks under option and put down a number of diamond drill holes, some results of which are reported to be encouraging. About twenty prospectors are working on this find.

Dundas Goldfield.

The Norseman Gold Mines, N.L., have continued to make excellent progress. 76,069 tons of ore were treated and 30,771 fine ounces of gold extracted dur-

ing the year, an average recovery of 8.09 dwts. per ton. In addition, about 50 tons per day of ore from the Iron King leases are put through the plant, additions to which are contemplated in order to increase the Iron King quota to 60,000 tons per year.

Development figures were: Diamond drilling 636 feet, shaft sinking 182 feet, crosscutting 152 feet, driving 2,984 feet and rising and winzing 1,920 feet.

This mine is maintaining its position as a sound producer and a payer of substantial dividends.

The Central Norseman Gold Corporation, Ltd., while continuing a vigorous development policy, treated 48,896 tons for a return of 13,785 ounces of fine gold, a yield of 5.64 dwts. per ton.

Development figures were: Diamond drilling 1,674 feet, shaft sinking 719 feet, crosscutting 80 feet, driving 2,589 feet, and rising and winzing 1,125 feet. The depth of the main shaft is now about 1,600 feet.

This mine is well equipped with modern machinery underground, including electrically-driven pumps, hoists, fans and drags in stopes.

Several smaller mines in this district appear to have excellent chances of success and the district as a whole shows every indication of future prosperity.

Broad Arrow Goldfield.

The Ora Banda Amalgamated, N.L., operating at Grant's Patch, treated 16,768 tons, being an increase of 25 per cent. on the amount treated in 1936. The gold recovered was 8,309 ounces, or an average yield of 10.08 dwts. per ton.

The development work carried out included 384 feet of shaft sinking, 892 feet of crosscutting, 1,280 feet of driving, and 887 feet of rising and winzing.

Ora Banda United Gold Mines at Ora Banda completed their development programme in the oxidised zone and have reached the point where the erection of a treatment plant is necessary.

The mine is well developed and the strong, well-fitted timber on the main haulage level is a special feature of the work carried out.

Development footages for the year amounted to: Diamond drilling 8,467 feet, shaft sinking 56 feet, crosscutting 1,035 feet, driving 1,119 feet, and rising and winzing 254 feet.

The Lochinvar Gold Mine at Paddington concentrated on development, including diamond drilling, shaft sinking, driving and crosscutting. Water in the old workings was tapped by diamond drills and kept under control during the dewatering stage. An average of about twenty men was employed.

The Zoroastrian and Wicheproof Mines at Bardoc are also producing in a small way. The former is equipped with a 5-head battery and cyanide plant and treats ore for local prospectors; while the latter, which has opened up some useful ore reserves, transports its ore to the South Kalgurli mill for treatment.

North Coolgardie Goldfield.

Riverina Gold Mines, Ltd., at Mulline commenced production during the year, their output being 13,822 tons for 5,565 fine ounces, a recovery of 8.05 dwts. to the ton. Crosscutting 149 feet, driving 1,192 feet and rising and winzing 376 feet comprised the development operations.

The treatment plant includes a 10-head battery and tube mill in close circuit with a rake classifier and corduroy strakes. Cyanidation is carried out by counter-flow decantation.

Sand Queen-Gladsome Gold Mines at Comet Vale operated continuously during the year with rather disappointing results. Development work included driving and stope preparation and the ore was treated at the company's mill. A 10-head battery followed by grinding pans and corduroy strakes are the chief features of the treatment plant. No cyanidation treatment followed, as it was considered economically unnecessary.

The future prospects of this mine do not appear bright.

Mt. Ida Gold Mines did some development on the old Forrest Belle. The main shaft was sunk to 250 feet and a single drum Ronaldson Tippet hoist installed. Developments at the 250ft. level exposed an ore body about 30 inches wide, crushings from which at the Mt. Ida battery returned about 1 ounce per ton. The ore is associated with some copper.

The Timoni mine was sampled by the same company, but underground work was not commenced. It is understood that it is intended to commence regular operations on these leases shortly.

Lady Shenton Gold Mines, N.L., at Menzies mined and treated 7,623 tons during the year for a return of 4,984 fine ounces. Diamond drilling to the extent of 1,941 feet, crosscutting 81 feet, driving 479 feet, and rising and winzing 453 feet, comprised the development carried out.

A new development of ore on the No. 6 level has been encouraging to the management, and it is pleasing to note some improvement in the prospects of this mine after the setback it received during the previous year.

The First Hit Gold Mine improved its position by opening up ore reserves from the Queensland Menzies shaft on the 380ft. level. Previous stoping from the Ornum shaft was confined to pipe-like shoots which dipped very flatly, but the new work is developing a more solid ore body.

8,377 tons of ore were treated during the year for a return of 6,831 fine ounces, the average yield being 16.31 dwt. per ton.

Development consisted of crosscutting 199 feet, driving 496 feet, and rising and winzing 433 feet.

Cosmopolitan Gold Mine.—The Western Mining Corporation ceased their operations on this mine at Kookynie and a party of tributers are engaged in working out the old stopes.

Paget Gold Mines of Edjudina, Ltd.—This company spent a considerable sum of money in developing and proving their leases at Edjudina. Mine development was carried out from four major points, viz. Neta Shaft, Neta Junction, Gawler and Senate Shafts. Operations included shaft sinking on the Senate shaft, and driving and crosscutting at the Gawler shaft on the No. 4 level.

Towards the end of the year all operations were discontinued pending further arrangements with the London directorate.

The Edjudina Gold Mines, Ltd., operating at Porphyry, had a disappointing year. Progress was considerably hampered by plant break-downs, necessitating numerous stoppages and continual overhaul.

These troubles, together with the low grade of the ore mined ($3\frac{1}{2}$ to $4\frac{1}{2}$ dwts.) and the absence of a cyanide treatment plant, have resulted in a slight loss on the year's operations, and it has been realised that some considerable expenditure is necessary on development and plant additions, repairs and renewals in order to operate on a profitable basis.

The mine was temporarily closed down at the end of the year in order to endeavour to finance the necessary additional expenditure.

The open-cut system of mining on this property has almost reached its limit, owing to the southerly pitch of the ore body and consequent heavier overburden to be removed, and other systems of mining are being discussed. Shaft-sinking on the southern end indicates the continuity of the ore body in that direction.

Mt. Margaret Goldfield.

The Sons of Gwalia, Ltd.—This important mine efficiently carried out the usual operations during the year. The tonnage crushed, at 136,522, was 9,000 tons more than in the previous year, while the gold won remained approximately the same with 45,687 fine ounces. The yield of the ore treated averaged 6.69 dwts. per ton.

Development figures for the year were: Diamond drilling 4,214 feet, shaft sinking 202 feet, crosscutting 849 feet, driving 1,869 feet, and rising and winzings 1,434 feet. The usual ore reserve figure of about five years' supply was maintained.

Mine ventilation was improved by bringing into operation a second large fan. The main shaft has now passed the 4,800 feet mark.

To speed up the transport of men and material, a big factor with a haulage of over 4,000 feet, a double skip haulage has been adopted, with the necessary safety factors taken into consideration. An auxiliary skip is attached to the lower end of the main skip by means of a chain when raising or lowering men at the change of shifts. Landing platforms are provided at the brace and plats so that both skips may be loaded simultaneously, without loss of time.

Lancefield (W.A.) Gold Mine, N.L.—This mine in mining and treating 113,342 tons for 34,477 ounces of fine gold approximately equalled its last year's output, the average yield being slightly lower at 6.06 dwts. per ton.

Diamond drilling 4,126 feet, driving 1,646 feet, and rising and winzings 1,602 feet, were the development figures reported for the year.

An arched inclined tunnel, 13 feet wide by 8 feet high, was driven downward from the No. 12 level on a gradient of 19 deg., and supported by bent steel rails, decked with lagging. Rises to the ore body were put through at intervals and connected by sub levels. Broken ore is loaded from the chutes on to a motor-driven conveyor belt and discharged into the main ore bin at the head of the incline. Driving of the tunnel proceeded at the same time, the spoil being drawn off by rope haulage.

In stoping, it was considered necessary to leave ore pillars at more regular intervals in order to support the hanging wall. By this means a large amount of ore remains locked up, perhaps irrecoverably.

The shortening of the ore body at the No. 13 level caused some concern, which was reflected in the share market. It is hoped, however, that this is only a temporary set-back and that further exploration will prove this to be so.

Cox's Find Gold Mine.—The Western Mining Corporation continued operations on this important new mine at Erlistoun. Development to the No. 3 Level proved the continuation of the wide, high-grade shoot of ore worked on the upper levels. Some difficulty was experienced in the mining of the oxidised ore owing to the friable and heavy nature of the ground, but 16,768 tons were mined and treated for a return of 14,042 ounces, a yield of 16.75 dwts. per ton.

The main shaft was sunk a further 126 feet while other development consisted of crosscutting 66 feet, driving 447 feet, and rising and winzings 294 feet.

King of Creation Gold Mine.—This mine, operating on a wide, low-grade ore body about 35 miles north of Laverton, changed over from dry crushing to wet crushing during the year, but the results of operations, which were confined to mining and treatment of ore above the 100ft. level, proved unsatisfactory and resulted in the closing down of the treatment plant.

Development is still in progress in the hopes of opening up new ore reserves.

Gladiator Gold Mine.—This mine, situated some three miles westerly from Laverton, again concentrated on development for the year, the work done amounting to diamond drilling 3,054 feet, shaft sinking 138 feet, crosscutting 429 feet, driving 1,402 feet, rising and winzings 534 feet. Two lodes were opened up and results are considered satisfactory.

East Murchison Goldfield.

The Emu Gold Mine at Lawlers, a subsidiary company of the Murchison Gold Development, Ltd., completed during the year development to the extent of diamond drilling 1,731 feet, shaft sinking 183 feet, crosscutting 858 feet, driving 1,643 feet, and rising and winzings 961 feet. The ore body was opened up on Nos. 5, 6 and 7 levels, exposing ore of an average width of six feet and an estimated assay value of 6 dwts. per ton. Considerable ore reserves of this grade are reported to have been opened up.

A treatment plant was completed during the year and contained the following units:—Jaw crusher, 20-head stamp battery, tube mill and classifier, classifier cones for separating out sands and slimes and thickeners.

Crushings put through the mill towards the end of the year are reported to show the plant mechanically efficient, the grade of ore up to estimate and the recovery of gold reasonably satisfactory.

Wiluna Gold Mines, Ltd.—The ore treated by this company for the year amounted to 599,567 tons and the gold production to 113,376 fine ounces, an average yield of 3.78 dwts. per ton.

The main shaft was sunk to the 2,150ft. horizon and the 1,800ft. level was developed. The total development footage accomplished for the year amounted to 29,130 feet.

The milling plant was modified to permit the production of a gold-antimony concentrate. The capacity of this plant is 60,000 tons per month.

In the smelting section, a second blast furnace was erected and brought into operation at the close of the year. Some setbacks were suffered during the year owing to smelter problems, but the management now feels that these will shortly be righted.

Some concern has been felt at the tailing off of widths and values on the lower levels, but with increased efficiency in mining methods and a higher percentage of gold extraction on the metallurgical side, the gold production has been kept up by treating a greater tonnage of lower grade ore.

Moonlight Wiluna Gold Mine.—On this mine the Adelaide Shaft was advanced 168½ feet to a total depth of 874 feet. No. 4 level was opened up at a depth of 830 feet. It is intended to continue sinking and to open up levels at 200 feet intervals.

The amount of ore mined for the year was 95,121 tons, which was treated at the plant of the Wiluna Gold Mines, Ltd., for a return of 26,375 fine ounces or 5.54 dwts. per ton.

In addition to shaft sinking, the following development and stope preparation work was carried out: Diamond drilling 5,644 feet, crosscutting 594 feet, driving 2,907 feet, and rising and winzings 1,974 feet.

A Richardson ventilation fan was installed on the Moonlight Shaft and other plant additions included an extra 200 tons fine storage bin, an extra 20,000 gallon tank for fresh water and a Cornish boiler for change room heating.

Expenditure was incurred to the extent of buildings, plant and machinery £6,060, treatment £103,739, underground £80,044 and general £10,642.

The average number of men employed was 147, 48 on the surface and 99 underground.

This mine appears to have a prosperous future.

Youanmi Gold Mine, Ltd.—During the year, unwatering operations were completed at the main shaft and levels cleared out. Development was carried out to the extent of: Diamond drilling 2,201 feet, shaft sinking 319 feet, crosscutting 956 feet, driving 2,244 feet, and rising and winzings 1,440 feet.

The oxidised section of the plant operated for the greater part of the year, 48,184 tons being raised and treated for a return of 11,153 fine ounces, an average yield of 4.63 dwts. per ton. It is anticipated that the sulphide unit of the treatment plant will be brought into operation early in 1938.

The average number of men employed for the year was 76 on the surface, and 140 underground; total, 216.

Swan Bitter Gold Mine.—This company treated 10,080 tons for 1,597 fine ounces, a yield of 3.17 dwts. per ton.

New lodes of higher grade than those at present being worked are reported to have been located.

Murchison Goldfield.

Ingliston Consols Extended.—This old mine carried out routine work for the year, mining and treating 30,815 tons of ore for a return of 5,367 fine ounces, or 3.48 dwts. per ton.

Development consisted of crosscutting 263 feet, driving 205 feet and rising and winzings 316 feet.

The average number of men employed was 67, 40 of whom were underground and 27 on the surface.

Ingliston South.—The Australian Mining Trust have ceased operations, having let the mine on tribute.

Triton Gold Mine.—A vigorous development policy included 364 feet of shaft sinking, driving 1,976 feet, crosscutting 663 feet, and rising and winzings 1,735 feet.

The depth of the main shaft at 31st December was 1,053 feet. The other development was carried out at all levels from the surface to the No. 8 level at 925 feet.

The year's output was 74,388 tons for 25,917 fine ounces, an average yield of 6.97 dwts. per ton.

An additional ball mill and classifier were added to the treatment plant, together with the necessary pumps, launders, etc., to handle an output of 9,000 tons per month as compared with a nominal 6,000 tons previously.

The power house building was also extended to provide for an additional Diesel driven alternator unit.

The average number of men employed was 236, of whom 164 worked underground and 72 on the surface.

Big Bell Gold Mines, Ltd.—Possibly the most interesting event of the past year was the entry into the ranks of producers of this mine, after nearly two years of methodical mine preparation and plant construction work.

Development work totalling 4,911 feet was carried out in shaft sinking, crosscutting, driving, rising and winzings, and on the 3rd October the plant, designed to treat 30,000 tons of ore per month, was practically completed and operations commenced. By the end of the year 85,958 tons were put through the mill for a return of 10,140 ounces of fine gold at an average yield of 2.36 dwts. per ton. Allowing for gold in process, which will no doubt bring the recoverable gold up to over 3 dwts. per ton in value, the result is a most satisfactory one.

The ore, which is broken from glory hole rises, is dropped to the 250ft. level, whence it is hauled in two 5-ton skips by a double drum electric hoist, powered by a 300-h.p. motor, and dumped into a 500-ton circular steel bin. The shaft also has a man cage compartment, with a 6ft. by 12ft. cage hoisted by a double drum electric hoist powered by an 80-h.p. electric motor.

The coarse crushing plant comprises two 36in. by 24in. jaw crushers, two 7D Ross feeders and two roll grizzlies. The ore is crushed to 4in. size and discharged, along with the undersize from the grizzlies, into a 30in. conveyor belt. This belt discharges into a surge bin, 160 tons capacity, at the secondary crushing plant, and is fed from this bin by two 3D Ross feeders on to double deck shaking screens, the oversize going to two No. 4 Symons cone crushers set to ½in. gauge. The discharge from the cones joins the undersize from the screens on a 24in. conveyor belt discharging into two circular steel mill bins, capacity 1,500 tons each.

From the mill bins the product goes to two 86-ball mills in closed circuit with rake classifiers. The classifier overflow goes to 8in. Wilfley pumps discharging to two bowl classifiers in closed circuit with two 86-ball mills. The overflow goes to the decant thickeners, 100ft. diameter and 14ft. deep. All the above plant, with the necessary machinery, was completed during the year.

The average number of men employed was 233 on the surface and 99 underground.

Mt. Magnet Gold Mines (Hill 60).—This mine carried out development work to the extent of: Driving 1,196 feet, crosscutting 122 feet, and rising and winzings 895 feet.

The tonnage treated for the year was 59,580 tons and the return of fine gold was 8,589 ounces, an average recovery of 2.88 dwts. per ton.

Additions to the plant for the year were as follows:—

- 1 750 cub. ft. Ruwolt compressor direct coupled to a 4-cylinder Ruston engine (Hill 60).
- 3 small friction winches (St. George Leases).
- 1 portable Ingersoll compressor (St. George Leases).
- 1 Pomona pump (St. George Leases).

The St. George and St. George West Leases have been taken over and the unwatering of the St. George main shaft is proceeding.

The average number of men employed was 46 on the surface and 56 underground, a total of 102.

Hill 50 Gold Mine.—This mine, operating at Boogardie, raised and crushed 23,878 tons during the year for a return of 6,689 fine ounces of gold. The average yield was 5.60 dwts. per ton. Little development work was done, 30 feet of shaft sinking and 60 feet of rising comprising the total.

The average number of men employed was 24 on the surface and 38 underground.

The prospects of this mine look promising and it should become a consistent producer.

Yalgoo Goldfield.

Rothsay Gold Mine.—The treatment plant of this mine is nearing completion and production is expected to commence during the first half of 1938.

Development for the year comprised: Crosscutting 51 feet, driving 143 feet, and rising and winzings 471 feet.

A new three-throw pump was installed and the water in the main shaft lowered to the No. 2 level. The No. 1 level was cleaned out and driving commenced on the north and south faces. A rise was put up from the No. 1 level, north of the main crosscut, to connect with No. 2 North shaft from the surface.

On No. 2 level the north and south drives were resumed and 30 feet of crosscutting west was completed at a point 60 feet north of the main crosscut.

Additions to the plant were as follows:—

- 1 New winding engine.
- 1 Circular steel ore bin, 800 tons capacity.
- 1 16in. conveyor belt from ore bin to mill ore bin.
- 1 Willley sand pump.
- 1 4ft. x 4ft. 10in. cone classifier.
- 1 4ft. 6in. x 15ft. rake classifier.
- 1 4ft. 7in. x 19ft. 9in. tube mill.
- 3 2in. sand pumps.
- 1 25ft. x 8ft. thickener and Dorreo pump.
- 1 12ft. x 7ft. thickener.
- 1 6in. x 6in. x 4in. Ingersoll Rand compressor.
- 1 6in. x 6in. x 4in. vacuum pump.
- 1 7-cell sub. A flotation machine.
- 1 Thwaites blower.
- 1 5ft. 4in. x 4in. rotary filter.
- 1 275 h.p. National Diesel engine.

Peak Hill Goldfield.

During the year Mr. H. Pegler discovered two rich lenses of ore on his property. He erected a small battery and crushed 342 tons for a return of 802 fine ounces of gold.

Pilbara Goldfield.

The Comet Mine at Marble Bar treated 4,790 tons of ore for a return of 6,822 fine ounces, a yield of 28.48 dwts. per ton. It is understood that the ore is of a somewhat refractory nature and the tailings contain considerably more than a normal percentage of the gold.

Development included: Shaft sinking 138 feet, crosscutting 415 feet, driving 566 feet, and rising and winzings 211 feet.

Three levels have been opened up, at 30 feet, 60 feet and 130 feet respectively and developments in the sulphide zone are reported to have borne out the promise of the almost phenomenally rich values exposed in the oxidised ore near the surface.

The treatment of the ore was commenced in February, the ore being carted a distance of approximately 8 miles to a battery capable of handling about 500 tons per month. A cyanide plant for the partial retreatment of the rich sands was put into commission later in the year.

While it is too early to predict, with any degree of confidence, the future life of this mine, yet the persistence of high values and widths into the sulphide zone is considered to be a favourable indication of permanence, and the discovery and subsequent working of the mine has been of immense importance to the district as a whole.

McKinnons—A considerable amount of prospecting has been carried out on this property, which is situated about ½ mile south from the Comet Mine and about 7 miles south-west from Marble Bar. A parcel taken from the various workings and crushed at the State Battery averaged 2 ounces per ton. A 5-head battery has been erected on the lease to treat this ore.

Lalla Rookh.—At this mine a programme of unwatering and sampling was carried out, a new head frame erected and additional machinery installed.

The mine was closed down at the end of the year, pending the erection of a treatment plant.

At the *Blue Spec*, in the Nullagine district a syndicate is working antimonial ore. Parcels of this ore crushed at the Mosquito Creek battery have given a very poor extraction over the plates, and the tailings could not be treated. A parcel of 8 tons shipped from Port Hedland for treatment in England early in the year yielded a good return both for the gold and antimony contents of the ore.

It is understood that the present syndicate has conducted experiments, using charcoal as a collecting agent for the gold content, with quite satisfactory results, and that they intend installing a treatment plant with which they anticipate obtaining a reasonable extraction of the gold content.

COAL MINING.

From the five producing mines at Collie a total output of 553,510 tons of coal was obtained for the year, valued at £340,444. The output decreased 11,565 tons compared with the previous year, but

the total value of the production was £18,880 in excess. The average number of men employed was 723, including 575 underground and 148 on the surface.

The individual tonnages and values of the output of the various mines were as follows:—

Mine.	Tons.	Value. £
Proprietary ..	187,871	121,511
Co-Operative ..	93,440	56,835
Cardiff	98,862	55,153
Stockton	96,838	57,466
Griffin	76,499	49,479

From a ventilation and safety standpoint the mines have received proper attention and conditions are satisfactory.

Development work has proceeded continuously, especially on the Proprietary, Co-operative and Stockton Mines, with encouraging results.

The position on the Stockton and Proprietary Mines, owing to extensive faulting, had for some time been viewed with some concern, but a series of surface bores at the Stockton has proved an area of coal that will considerably increase the life of the mine and it is probable that further boring may still add to this area.

At the Proprietary also development is being pushed ahead in the direction of a proved area. Development headings have a downthrow fault of about 20 feet and preparations are in progress to drive through this fault and locate the seam which is known to exist on its down throw side. This development involves a considerable amount of stone work, but is necessary as the major part of the coal lies beyond the fault.

At the Co-operative Mine development into the dips has opened up a fair area of coal of improved quality. The slant headings going to the rise have reached the fault line which cuts off the main slant haulage to which a connection through the fault will probably be made in the near future.

The prospects of this mine appear to be improving.

At the Cardiff Mine preparations are well in hand for the installation of a large main and tail rope haulage engine underground. This will considerably improve the rate of haulage of the coal to the surface, and an appreciable increase in the output is consequently anticipated.

The development at the Stockton mine has been somewhat disappointing in that the quality of the coal opened up was below the usual standard, being very high in ash content and therefore unfit for locomotive purposes. As a result of this a quantity of the coal had to be discarded.

Recently surface boring has disclosed a large area of coal of better quality, and preparations are in hand for working this portion.

There were no industrial disputes of any consequence during the year, although a large number of minor issues were settled without friction and with very little lost time.

The year's work has been satisfactory and the prospects for the ensuing year appear promising.

MINERALS OTHER THAN GOLD AND COAL.

The total value of minerals produced other than gold and coal showed a sharp rise during the year, the total value being £140,791 as against £113,580 in 1936.

The production of arsenic by the Wiluna Gold Mines, Ltd., showed a considerable falling off, its total value being £36,972, as against £62,460 during the previous year, although it still ranked first in the list.

Antimony on the other hand was produced in the form of concentrates to the value of £25,323. This is the first year for many years that this mineral has been produced in any appreciable quantity, the value of the total previous production for the State being only £1,828.

Silver showed a sharp rise over the preceding year, the total value of production being £20,596, an increase of £8,823 over the 1936 figure.

The value of tantalite exported almost doubled, being £16,846, an increase of £8,034 over the previous year. This is largely due to a rise in the price of this commodity, apparently amounting to about £250 per ton.

The value of the production of tin, lead and gypsum also increased, as shown in Part II., Table I., of the report of the Under Secretary for Mines.

The total number of men employed in the exploitation of these minerals was 239.

Lead.

The *Grand Junction Mine* at Galena was controlled by the Wiluna Gold Mines, Ltd., who railed the galena to Wiluna for use in their smelting plant.

A total of 5,813 tons of ore was broken for the year, but, owing to the rapid decline in the price of lead over the latter part of the year, it was decided to discontinue operations, as the metal could be bought at a lower cost in the open market than it could be mined at Galena. Mining was accordingly stopped in October and the plant dismantled.

Tantalite.

Wodgina.—Tantalite is mined here under the control of Tantalite, Ltd. The lode, in the form of a pegmatite vein, extends over a length of 2,500 feet. The maximum depth of stoping to date is about 40 feet.

A treatment plant erected on the property consists of a concentrating mill, capable of treating 30 tons per 8-hour shift, driven by a 70-h.p. Diesel engine, a jaw crusher, rolls, May jig, Huntington mill and two Wilfley tables. The tantalite concentrate is dried, sized and passed over a magnetic separator of the revolving drum type, which removes all iron ores and garnet sands. The tantalite is then taken to Port Hedland for shipment.

At *Tabba Tabba* a shaft has been sunk to a depth of 25 feet, connecting with an adit. A little driving has been done.

This is believed to be the only place in the world where the rare white tantalite (tantalite of aluminium) is worked. The ore is carted to Strelley, 13 miles distant, where it is treated.

Mica.

Considerable interest has been evinced in this mineral throughout the year. A company is working the Yinnietharra field, east of Carnarvon, and it is understood that a trial parcel has been shipped to London for valuation.

Some excellent samples of clear and slightly stained mica have been brought into the Department, notably from Ajana and a locality some 100 miles inland from Derby.

Advices from London indicate that good prices are available to the producer for properly dressed mica, provided that the quality is good.

GENERAL REMARKS.

It is pleasing to record that my anticipation that the output for 1937 would exceed that for 1936 has been realised and as a matter of fact, owing to the continued high prices of gold, the value of the gold yield in Australian currency has only once been exceeded in the history of the State, namely in the year 1903.

Reference to the table at page 32 shows that the increase in the gold yield for the year has been due not so much to the increased output of the old established mines as to the increased outputs of those which have only recently produced over 5,000 ounces of gold per annum.

It seems fairly safe to predict that the output for 1938 will be higher again and that the value of the gold won will constitute a record for the State.

The most important event for the year was the opening of the modern treatment plant at the Big Bell Mine, which gives promise of operating profitably for many years to come.

It seems fitting to again draw attention to the predominating position of the gold industry in the export trade of this State, as will be noted from the following figures:—

	Value in Australian Currency. £A.
Gold exported	8,743,755
Wool exported	3,449,236
Wheat exported	3,459,295

I will conclude by expressing my appreciation of the high standard of the work performed by the Assistant State Mining Engineer and all Inspectors of Mines. I also wish to express my thanks for the assistance rendered by all other officers of the Department.

RICHARD C. WILSON,
State Mining Engineer.

APPENDIX No. 1.

MINING DEVELOPMENT EXPENDITURE.

	£	s.	d.		£	s.	d.
Advances Outstanding 31st December, 1937—				Interest paid prior to 1937	26,743	6	6
Advances authorised prior to 1937 ...	243,680	4	5	Interest paid during 1937	177	19	4
Advances authorised during 1937 ...	50	0	0		26,921	5	10
	£243,730	4	5	Interest outstanding at 31st December, 1936	8,558	16	0
Principal Monies Advanced—				Interest outstanding at 31st December, 1937	9,166	15	4
Prior to 1937	220,056	13	11	Principal Monies Advanced	220,162	3	11
During 1937	105	10	0				
	£220,162	3	11	Less Principal Moneys re-			
Principal Monies Repaid (including Sale of Securities)—				paid	57,428	15	1
Prior to 1937	54,556	7	2	Less Bad Debts written off	151,603	1	6
During 1937	2,872	7	11		209,031	16	7
	£57,428	15	1	Principal Outstanding at 31st December, 1937	11,130	7	4
Bad Debts written back and Amounts Transferred—				Interest outstanding at 31st December, 1937	9,166	15	4
Prior to 1937	150,683	10	3		20,297	2	8
During 1937	919	11	3				
	£151,603	1	6				

APPENDIX No. 2.

Coal Mines Regulation Act, 1902-1926.

ANNUAL REPORT OF THE BOARD OF EXAMINERS FOR MINE MANAGERS, UNDER-MANAGERS AND OVERMEN.

Office of the State Mining Engineer,
Mines Department,
Perth, 12th April, 1938.

The Under Secretary for Mines:

Sir,

We submit herewith, for the information of the Hon. Minister for Mines, the Annual Report of the Board of Examiners for the year 1937.

Examinations for Certificates.

April Examination.—One candidate sat for the examination for Second Class Certificate of Competency and on consideration of the papers, the Board decided that his papers warranted a certificate being issued to him.

October Examination.—Three candidates sat for this examination: two for First Class Examination and one for Second Class Examination. After consideration of the papers, the Board decided that certificates should be issued to the three candidates.

Meetings.—Two meetings of the Board were held, viz., on 12th April, 1937, and 3rd November, 1937, to

consider the papers. Messrs. R. C. Wilson, Chairman, F. G. Forman and J. McVee being present at each meeting.

Copies of the papers set for examinations during the year are attached to this report. These papers were exchanged with kindred boards in England and the Eastern States.

We have the honour, etc.,

RICHARD C. WILSON,
State Mining Engineer (Chairman).

F. G. FORMAN,
Government Geologist (Member).

JAS. McVEE,
Inspector of Mines, Collic (Member).

The Coal Mines Regulation Act, 1902-1926.

EXAMINATION FOR SECOND CLASS CERTIFICATE OF COMPETENCY AS UNDER MANAGER OR OVERMAN.

Subject: ARITHMETIC.

Wednesday, 7th April, 1937: 9 a.m. to 11 a.m.

(1) Two seams of coal having a dip of 1 in 6 are 40 yards apart vertical from the floor of the upper seam to the roof of the lower seam. What will be the length of a level cross measure drift between the two seams?
(Possible Marks, 16.)

(2) Miners are working on day work and fill twelve skips of coal per shift per pair of miners, and are paid 20s. 1d. per shift. The skips are 4 feet long, 1ft. 6in. high and 3ft. wide. The average weight of coal that is topped above the skip is one-fifth of its total weight of coal. What is the cost per ton at the face? Assume 40 cubic feet of loose coal per ton.
(Possible Marks, 17.)

(3) The output of a group of collieries is 1,665,000 tons per annum. If 3,450 men are employed underground and each works on an average $4\frac{3}{4}$ shifts per week, what is the average output per man per shift? Give your answer in cwt. to the nearest third decimal.
(Possible Marks, 17.)

(4) Calculate the amount due to a miner at the end of a fortnight of 11 working days if he produced $6\frac{1}{2}$ tons per day at the rate of 2s. 9 $\frac{3}{4}$ d. per ton, allowing 7 $\frac{1}{2}$ per cent. for deductions.
(Possible Marks, 17.)

(5) A coal truck carries 8 tons of coal, and 42 cubic feet of coal equals 1 ton. How many trucks of coal could be filled from a heap of 112 cubic yards of coal?
(Possible Marks, 17.)

(6) Reduce 64 tons 3 cwt. 1qr. 16lb. to pounds, and express the quantity in tons and decimals.
(Possible Marks, 16.)

Subject: COAL MINES REGULATION ACT,
1902-1926.

Wednesday, 7th April, 1937: 11 a.m. to 1 p.m.

(1) Under what circumstances does it become necessary to withdraw the workmen from a mine or part thereof? If this has to be done what further steps have to be taken?
(Possible Marks, 25.)

(2) If a seam or mine is to be closed or abandoned, what steps must be taken to comply with the Coal Mines Regulation Act?
(Possible Marks, 25.)

(3) State the general stipulations concerning the storing and treatment of explosives at or in the mine.
(Possible Marks, 25.)

(4) Apart from the regular examination of working places what other parts of the mine require to be periodically examined?
(Possible Marks, 25.)

(5) The Act requires that manholes shall be provided. What are the stipulations regarding these?
(Possible Marks, 25.)

(6) What does the Coal Mines Regulation Act require regarding persons in charge of machinery?
(Possible Marks, 25.)

Subject: ROADWAYS.

Wednesday, 7th April, 1937: 3 p.m. to 5 p.m.

(1) Show by sketches how you would timber roadways where the following conditions prevail:—

(a) Lifting floor or pavement.

(b) Tender roof with strong sides.

(c) Heavy side pressure.

(Possible Marks, 25.)

(2) A heading has been set out by the surveyor. You are instructed to keep it straight and maintain an even gradient of 9in. per yard. How would you carry out these instructions?
(Possible Marks, 25.)

(3) A roadway is 10 feet wide and 7 feet high under the bars, and a fall occurred to a height of 20 feet above the rails. What precautions would you take before removing the debris? Describe in detail, with sketch, how you would make the road again fit for traffic.
(Possible Marks, 25.)

(4) Describe the different arrangements of laying rails in self-acting inclines. Show by rough sketches, how the rails are laid at the top and bottoms of the inclines, and also at the passing places, and state where fast and loose points are used.
(Possible Marks, 25.)

(5) Make a sketch showing a main and tail system of haulage with three branch roads. Show how each branch rope is operated and also the arrangements for the return wheel and the flat on the inbye end. The seam of coal is nearly level.
(Possible Marks, 25.)

(6) A main haulage road has to be widened for the purpose of laying a double road, roof and floor are good. Describe how you would arrange for carrying out the work.
(Possible Marks, 25.)

Subject: MINING OF COAL.

Thursday, 8th April, 1937: 10 a.m. to 1 p.m.

(1) It is found that the proportion of large coal being made in a seam under your charge is too low. What reasons can you give for such a state of affairs, and what suggestions can you make to reduce the amount of small coal? (Possible Marks, 28.)

(2) A colliery is deriving its full output from pillars. A panel of pillars is standing with practically all the headings and bords heavily fallen. Sketch and describe how you would proceed to open up roadways and extract the pillars which are 10 yards by 40 yards. The height of the seams is 5ft. 6ins. (Possible Marks, 29.)

(3) What do you consider is the most dangerous circumstance to guard against in connection with shot fring? Do you prefer clay or sand for *stemming*? Give the reason for your preference. (Possible Marks, 28.)

(4) In a mine where naked lights are permitted, what precautions would you take for the prevention of fires which might be caused by using such lights? (Possible Marks, 28.)

(5) You are given the appointment as Under Manager of a gassy, dry and dusty mine, with a very bad roof. What points would you lay down as essentials in your duties as regards your own action, and as to what you would expect of your subordinate officials? (Possible Marks, 29.)

(6) It has become urgently necessary to seal off a district in which heating has developed. Preparatory stoppings of brickwork have been built but are badly crushed. How would you proceed? (Possible Marks, 29.)

(7) Sketch a small district of bord and pillar workings showing the roads and pillars, and give the important dimensions. Under what conditions would you adopt this method of working? (Possible Marks, 29.)

Subject: VENTILATION AND DANGEROUS GASES.

Thursday, 8th April, 1937: 2 p.m. to 5 p.m.

(1) What is the object in splitting the air in a mine? To what general result is it conducive and how is it effected? (Possible Marks, 25.)

(2) Describe in minute detail how you would proceed to charge a shot hole and fire a shot in a mine in which firedamp is given off. (Possible Marks, 25.)

(3) Give two examples as to how you would ventilate the faces of two parallel headings, each say 12ft. wide with a 20-yard pillar between them. Make sketches to show the exact details of what you would propose to do. (Possible Marks, 25.)

(4) What are the principal impediments to the passage of an air current through the workings of a mine, and how can they be best ameliorated or removed? What part of the workings are most easily ventilated? (Possible Marks, 25.)

(5) In ventilating a district or panel of work subject to spontaneous combustion, what particular care would you exercise as to the course of the air, the volume, and the pressure or water gauge? (Possible Marks, 25.)

(6) Taking the specific gravity of air as 1, give the specific gravity of the gases usually met with in mines and state their composition and properties. State how they are rendered harmless to the workers. (Possible Marks, 25.)

(7) An airway line with semi-circular steel arches with straight legs is 10 feet wide and 8 feet high. If the velocity of the air current passing is 800 feet per minute, calculate the quantity. Further on in the same airway the arches are 8 feet wide and 6 feet high, calculate the velocity of the same current at this point. (Possible Marks, 25.)

(8) As Under Manager part of your duties will be to keep the ventilation records. Describe how you would carry out this important duty and how you would enter the records in the book kept at the mine for that purpose. (Possible Marks, 25.)

The Coal Mines Regulation Act, 1902-1926.

EXAMINATION FOR FIRST CLASS CERTIFICATE OF COMPETENCY.

Subject: ARITHMETIC.

Wednesday, 27th October, 1937: 9 a.m. to 11 a.m.

(1) The royalty paid per acre is £352 5s. 0d. The seam is 7 ft. 9 in. thick. Allowing 80 lbs. per cubic foot of coal, what is the royalty per ton of coal? (Possible Marks, 17.)

(2) Find—
(a) the square root of 19044, and
(b) the cube root of 2628072.

Show all your work. (Possible Marks, 17.)

(3) An electrically-equipped colliery producing 750 tons of coal per day for 250 days per annum is allowed as an equivalent of fuel free of royalty $5\frac{1}{2}$ lbs. of coal per unit of electricity used. If the proportion of the output free of royalty for the year amounts to $5\frac{1}{2}$ per cent., what was the consumption of the electric power in units? (Possible Marks, 17.)

(4) Calculate the quantity of workable coal in an area of 120 acres of coal-bearing land underlying which is a 7 feet seam of coal dipping 30 degrees from the horizontal. The specific gravity of the coal is 1.3. (Possible Marks, 16.)

(5) The basic rate for hewing coal has been subject to periodic increases of 15 per cent., 15 per cent., and $17\frac{1}{2}$ per cent. respectively, and then a reduction of $12\frac{1}{2}$ per cent. What is the existing percentage increase over the basic rate? (Possible Marks, 16.)

(6) A pump raises 850 gallons per minute continuously from the bottom of a shaft 290 yards in depth. If the cost of pumping be one penny per horse-power hour, what is the annual cost of pumping? Ignore the efficiency of the pump. (Possible Marks, 17.)

Subject: GEOLOGY.

Wednesday, 27th October, 1937: 11 a.m. to 1 p.m.

(1) Classify the various varieties of coal and state on what basis the classification is made. Mention the chief impurities found in commercial coals. (Possible Marks, 20.)

(2) Give a brief outline of the sequence of events which led to the formation of the Collie Coalfield. (Possible Marks, 20.)

(3) A coal seam is cut off by a fault in the working face. What indications would you look for to help you to determine which is the downthrow and which is the upthrow side of the fault.

Draw sketches of normal and reverse faults and indicate on them the dip and hade of the fault plane, the throw and heave, and the hanging wall and foot-wall side of the fault. (Possible Marks, 20.)

(4) Set out briefly your observations on the nature of the coal seams in the mine with which you are most familiar, with special reference to any changes which enable you to gauge the probable behaviour or nature of the coal ahead. (Possible Marks, 20.)

(5) Briefly describe the general appearance of the following rocks; state under what conditions they are probably formed and also their manner of occurrence (bedded sedimentary, intrusive igneous, etc.):—

Granite, Basalt, Fire-clay, Sandstone, Carbonaceous shale, Conglomerate and Arkose.

(Possible Marks, 20.)

Subject: MACHINERY.

Wednesday, 27th October, 1937: 3 p.m. to 5 p.m.

(1) Discuss the supply of electric power to a moving coal cutter. Deal with the question of switch gear, trailing cable and protection from danger to men and damage to plant. (Possible Marks, 16.)

(2) Direct current motors may be wound—"Series," "Shunt" or "Compound."

Show by simple diagrams what these terms mean and state briefly the characteristics of the three types of motor as applied to mining plant. (Possible Marks, 16.)

(3) The amount of water to be pumped up a shaft 700 feet deep is 500 gallons per minute in winter and 250 gallons per minute in summer. Electric power is

to be used. Reliability is important. Describe the type of pump that might be used and state which you would adopt, and in what number and capacity. Give reasons for your choice. (Possible Marks, 17.)

(4) Contrast compressed air and electricity as powers for use underground. In particular deal with the questions of convenience, safety and efficiency.

Name types of plant that can be worked by each kind of power better than by the other. (Possible Marks, 17.)

(5) Describe the essential parts of a main and tail haulage gear driven by an electric motor of 50 brake horse-power. What speed of rope would you arrange for? (Possible Marks, 17.)

(6) Describe the type of automatic tightening arrangement you would use for an endless rope hauling in a road dipping 1—10, 1,700 yards long. State where you would place the tightener. (Possible Marks, 17.)

Subject: MINING OF COAL.

Thursday, 28th October, 1937: 10 a.m. to 1 p.m.

(1) In boring from the surface, under what circumstances would you prefer—

- the rod method,
- the rope method?

Give your reasons. How is the turning movement given to the boring tool in the rope method? (Possible Marks, 25.)

(2) Two shafts are sunk to a depth of 800 yards. Coal is wound from the full depth of one of the shafts, but only from a depth of 500 yards up the other shaft.

Describe with sketches the arrangements you would make at each shaft in order to provide a second outlet for the men working at the respective depths. (Possible Marks, 25.)

(3) Describe the panel system of working for a mine liable to spontaneous combustion. The seam is 18 feet thick with a depth from the surface of 800 feet and is dipping 1 in 18. Fire damp is given off freely. Give details of how the panels should be formed, and why they should be so formed. (Possible Marks, 25.)

(4) As Manager you receive a report that spontaneous heating is suspected in a section of the mine. Describe in detail the steps you would take to make an investigation, and to eliminate possible elements of danger. (Possible Marks, 25.)

(5) A seam of coal is being worked adjoining an old colliery that is full of water. Give an account of all matters which should be investigated to ensure the safety of your workings. (Possible Marks, 25.)

(6) Sketch and describe how you would adequately secure the roof of an underground haulage chamber which is 16 feet wide, 40 feet long and 11 feet high. The walls are of brick and the roof at present held by cross baulks 14 inches thick, which, however, have sagged to a dangerous degree due to excessive roof pressure. It is essential that the haulage should run on day shift. (Possible Marks, 25.)

(7) A colliery is deriving its full output from pillars. A panel of pillars is standing with practically all the headings and bords heavily fallen. Sketch and describe how you would proceed to open up roadways and extract the pillars which are 12 yards by 40 yards. The height of the seam is 7 feet 6 inches. (Possible Marks, 25.)

(8) A prospecting heading strikes a fault which has a displacement greater than the thickness of the seam. Describe how you would proceed to prove the seam beyond the fault and decide—

- Whether the seam has been thrown up or down, and
- The amount of displacement.

(Possible Marks, 25.)

Subject: SURVEYING.

Thursday, 28th October, 1937: 2 p.m. to 4 p.m.

(1) List the adjustments you would make to a transit theodolite, giving briefly the reasons for making each, assuming that all the main adjustments necessary for ordinary mine surveying were required.

Describe fully the adjustment you would make to cause the line of sight (or collimation) to be at right angles to the horizontal axis of the telescope. (Possible Marks, 30.)

(2) The following tabulated data represents an underground traverse between two points A and B, which it is proposed to connect by an inclined drive. The difference in height between A and B is 50 feet. Calculate the bearing from A to B, the actual length of the drive required, and the angle of elevation at which you would start the drive from A.

Station.	Bearing.	Distance (links).
A — i	92° 30'	201·9
i — ii	45° 36'	240·6
ii — B	320° 42'	260·8

(Possible Marks, 30.)

(3) Complete and check the necessary data in the accompanying reproduction of a level-book page to enable a longitudinal section of the traverse to be plotted. What procedure would you adopt in the field to check the levels between two bench marks one (1) mile apart.

Back.	Inter.	For.	Rise.	Fall.	Reduced levels.	Distance.	Remarks
5·02					220	1m. 20chns. 00lks.	Bench mark
	4·16					20chns. 60lks.	
	7·91					21chns. 00lks.	
	8·53					21chns. 20lks.	
2·10		12·91				22chns. 00lks.	Change
	1·19					22chns. 10lks.	
	5·62					22chns. 20lks.	
	3·47					23chns. 00lks.	
4·72		11·86				24chns. 00lks.	Change
		6·10				25chns. 00lks.	

(Possible Marks, 20.)

(4) A, B, and C are three bore-sites, the height of ground level at each being 250, 270, and 230 feet respectively above sea-level. The depth to the surface of a coal seam below ground-level at bore A is 700 feet, at B, 550 feet, and at C, 450 feet. Assuming that the same coal-seam has been encountered in each bore, determine graphically the direction and amount of dip of the seam. Give the bearing of the direction of dip and also measure the angle of dip. Use a scale of 1 inch = 100 feet.

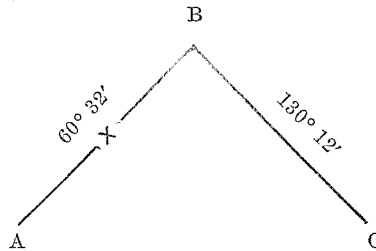
The sites have been fixed by the following bearings and distances:—

- A — B; 32°, 310 feet.
A — C; 92°, 400 feet.

(Possible Marks, 25.)

(5) On examining the centre line traverse of a proposed tramline route it is found that a curve of 30 chains radius is the one most suitable to use to avoid existing buildings, topographic irregularities, etc.

In the sketch below it is desired to join the lines AB and BC by a curve of 30 chains radius.



Compute—(a) The distance of the tangent point from the point of intersection B.
(b) The deflection angle.

The intersection point B is inaccessible, but the chainage of a peg X on line AB reads 2 miles 10 chains 66·4 links, and the calculated chainage of B is 2 miles 32 chains. State the distance and direction of the tangent point from the point X. Show the calculation you would make to determine the deflection angle for an oddment of 25 links in the final section of the curve. (Possible Marks, 25.)

(6) When using surveying instruments dependent on the magnetic needle for underground surveying, what precautions would you adopt to procure the maximum degree of accuracy? (Possible Marks, 20.)

Subject: VENTILATION AND DANGEROUS GASES.

Friday, 29th October, 1937: 10 a.m. to 1 p.m.

(1) Describe the hygrometer, mentioning its essential features. Give an example of the readings obtained in an actual case and show what use can be made of them. (Possible Marks, 25.)

(2) A colliery is ventilated by a single current of 48,000 cubic feet of air per minute with a water gauge of 2 inches at the fan drift. It is desired to split this air into three currents. Taking your own example of conditions give a list of all the appliances and arrangements you consider necessary and a brief account of the operation.

When the change has been accomplished how would you proceed to ascertain the results. (Possible Marks, 25.)

(3) State the properties and composition of the gases usually met with in coal mines. (Possible Marks, 25.)

(4) A quantity of 150,000 cubic feet of air is passing through a mine with a 3-inch water gauge. Calculate—

(a) The water gauge necessary to produce 200,000 cubic feet under the same conditions?

(b) What ventilating horse power is generated in each case? (Possible Marks, 25.)

(5) What is an anemometer. Give an example of its method of use from your own experience, and state the precautions necessary to insure correct results. (Possible Marks, 25.)

(6) How would you proceed to test for fire damp in the roadways and working faces of a fiery mine with a safety lamp. State the height of "cap" you would expect for each half per cent. of fire damp present. (Possible Marks, 25.)

(7) What are the principal impediments, natural and mechanical, to the passage of a current of air through the workings of a mine and how can they be best ameliorated or removed? What part of the workings are most easily ventilated? Give reasons for your answer to each part of the question. (Possible Marks, 25.)

(8) How is the ventilating current guided along its predetermined course? What appliances are used for this purpose? Make a sketch of a ventilating door as fixed on an underground haulage roadway, and give a description of it. (Possible Marks, 25.)

Subject: COAL MINES REGULATION ACT, 1902-1926.

Friday, 29th October, 1937: 2 p.m. to 4 p.m.

(1) What are the duties and responsibilities of a Manager under the Act? (Possible Marks, 22.)

(2) What does the Act require as to publication of Abstract of Act and copy of Special Rules? (Possible Marks, 21.)

(3) What are the stipulations of the Act concerning the support of roof and sides, and working places and roadways? (Possible Marks, 22.)

(4) Give in your own words sections of the Coal Mines Regulation Act dealing with single shafts, tunnels or outlets. (Possible Marks, 21.)

(5) State the provisions of the Act as to persons travelling on haulage roads. (Possible Marks, 22.)

(6) What are the restrictions as to employment under the Coal Mines Regulation Act? (Possible Marks, 21.)

(7) What are the provisions of the Act regarding Bath and Change rooms at a mine? (Possible Marks, 21.)

The Coal Mines Regulation Act, 1902-1926.

EXAMINATION FOR SECOND CLASS CERTIFICATE OF COMPETENCY AS UNDER MANAGER OR OVERMAN.

Subject: ARITHMETIC.

Wednesday, 27th October, 1937: 9 a.m. to 11 a.m.

(1) A pump delivers 650 gallons per minute. Owing to a break down the pump stands for 5 hours. After repairs are effected it is necessary to run the pump for fifteen hours before the water is reduced to the same level as before. What is the feeder of water in gallons per minute? (Possible Marks, 17.)

(2) A double road has to be laid for one and a quarter miles with rails 20 lbs. to the yard, and costing £24 per ton. What will be the cost assuming sleepers, dogs, and fish plates equal half the cost of the rails? (Possible Marks, 16.)

(3) A man worked a certain number of days per month. Half the time he averaged 15s. per day. One quarter of the time he averaged 18s. per day, and in the remaining six days he earned £5 12s. 0d. What was his pay for the month, and what was his daily average rate? (Possible Marks, 17.)

(4) What quantity of coal is contained in a square mile of coal seam 56 inches thick if the Specific Gravity be 1.280 and the strata level? (Possible Marks, 16.)

(5) A colliery produces 66 per cent. of the best coal and 34 per cent. of small coal, but 5 per cent. of the small coal is graded into nuts. The sale prices are 19s. best, 10s. 8d. small and 12s. 6d. nuts. What is the average profit or loss per ton if the average cost of the output be 11s. 6d. per ton in wagons? (Possible Marks, 17.)

(6) Seventy-five per cent. of an output is from pillar coal yielding 45 per cent. of smalls. The proportion of smalls from the solid places is 28 per cent. What is the percentage of smalls in the pit's output of 1,100 tons per day? (Possible Marks, 17.)

Subject: COAL MINES REGULATION ACT, 1902-1926.

Wednesday, 27th October, 1937: 11 a.m. to 1 p.m.

(1) What are the provisions of the General Rules as regards Coal Mines ventilation? (Possible Marks, 25.)

(2) Section 16 of the Coal Mines Regulation Act prohibits the use of single shafts, tunnels or outlets. Name any exceptions to these. (Possible Marks, 25.)

(3) Quote the rules pertaining to Signalling in Mines? (Possible Marks, 25.)

(4) What does the Act require in regard to reports about—

(a) Inspection of workings before commencing and during shifts?

(b) Inspection of machinery? (Possible Marks, 25.)

(5) What precautions are required when approaching a place likely to contain an accumulation of water or an area of unexplored or disused workings? (Possible Marks, 25.)

(6) What does the Act require in regard to—

(a) Firing of shots on dry and dusty haulage roads?

(b) Firing of shots in dry and dusty working places? (Possible Marks, 25.)

Subject: ROADWAYS.

Wednesday, 27th October, 1937: 3 p.m. to 5 p.m.

(1) With endless rope haulage up to a grade of 1 in 6, what precautions would you take to guard against accidents by clips slipping, breakage of rope, etc.? (Possible Marks, 25.)

(2) In a main road the bars have become too low owing to the quantity of loose debris lying on top of such bars. Describe in detail how you would replace them. The work is to be done at night time and the road ready for haulage next morning. (Possible Marks, 25.)

(3) What are the commonest causes of accidents on haulage roads, and how can they best be prevented?
(Possible Marks, 25.)

(4) Describe the various systems of haulage as applied to coal mining and state to what conditions each is best adapted.
(Possible Marks, 25.)

(5) As Under Manager of a Colliery you have decided to relay one of your main roads during the week end. Explain fully how you would undertake the work so that the fullest efficiency will be obtained from the men doing the work.
(Possible Marks, 25.)

(6) It is intended to make an endless rope jig in a place 400 yards long rising 1 in 27. What mechanical arrangements are necessary? Electricity and compressed air are available. Make a sketch giving full particulars.
(Possible Marks, 25.)

Subject: MINING OF COAL.

Thursday, 28th October, 1937: 10 a.m. to 1 p.m.

(1) You have to tunnel through a heavy and running fall. Describe how you would do so in a drive 10 feet wide and 7 feet high.
(Possible Marks, 29.)

(2) A seam is being opened on a mountain side having a dip of 1 in 23. The inflow of water is 120 gallons per hour in each of two faces. What preliminary methods would you adopt to remove this water as distinct from baling?
(Possible Marks, 28.)

(3) When working pillars describe the operation of drawing timber from a finished "lift," and state what precautions you would take in order that the work may be done as safely as possible.
(Possible Marks, 29.)

(4) What steps can be taken to prevent or reduce the production of coal dust in—
(a) the main roads,
(b) the subsidiary roads,
(c) at the faces?
(Possible Marks, 29.)

(5) A fire caused by shot firing at the face of a bord 20 yards up from the heading gets too large to put out by direct methods. What is the next best thing to do? Sketch and describe.
(Possible Marks, 29.)

(6) A down throw fault of 6 feet is met with in some working bords and runs parallel with the wheeling heading. What method would you adopt for winning the coal on the other side of the fault?
(Possible Marks, 28.)

(7) To what principal points would you direct your attention in order to increase as far as possible the output of coal per man from the faces?
(Possible Marks, 28.)

Subject: VENTILATION AND DANGEROUS GASES.

Thursday, 28th October, 1937: 2 p.m. to 5 p.m.

(1) Name and describe dangerous gases found in coal mines. How are they formed?
(Possible Marks, 25.)

(2) Give a description of a miner's safety lamp. Why is it called a safety lamp? What are the principal and essential parts of a safety lamp to fulfil the conditions of safety?
(Possible Marks, 25.)

(3) Sketch an air-crossing. Give the details of the materials you would use in its construction. To what point would you pay particular attention in order to ensure that the structure is satisfactory?
(Possible Marks, 25.)

(4) What, in your opinion, are the best methods of reducing the friction of air in mines?
(Possible Marks, 25.)

(5) How may a small percentage of CH₄, which is usually not explosive, be rendered so, and how may the spread of an explosion be prevented?
(Possible Marks, 25.)

(6) What are the advantages and disadvantages of splitting the air currents in a mine? What are the causes of inefficient ventilation and how can these be remedied?
(Possible Marks, 25.)

(7) Describe clearly how you would measure the quantity of air passing along a main roadway underground. What factors may cause a variation in the quantity of air passing at any given time?
(Possible Marks, 25.)

(8) How would you ventilate a stone drive in a gassy mine 200 yards in advance of the workings? Give particulars of plant and arrangements to secure the necessary efficiency.
(Possible Marks, 25.)

APPENDIX No. 3.

Mines Regulation Act, 1906.

(Regulation 17A.)

EXAMINATION FOR CERTIFICATE OF COMPETENCY AS UNDERGROUND SUPERVISOR.

Subject: MINING.

25th May, 1937.

Time allowed—Three hours.

Eight questions only to be answered.

Candidates should illustrate with sketches where possible.

1. A level is driven in ore, 8 feet wide. How would you prepare it for stoping? A brief description of each operation is required.

2. A lode is fifty feet west of a shaft in which the air is downcasting; describe how you would develop it, starting from the plat. Give attention to grade of ore, nature of country rock, and ventilation.

3. A lode is 12 feet wide and the walls and backs are only fairly good standing. What precautions would you take for safety in working—
(a) with rill stoping?
(b) with flat back stoping?

4. An old winze is down fifty feet; you are instructed to continue sinking. What would you do and what precautions would you take for the safety of the men employed?

5. Briefly describe how you would take out a cut from a development end, clean out the broken rock and leave the face ready to again start boring?

6. What precautions would you take to ensure that hoist ropes used underground are safe, and what sizes are generally used?

(a) How would you examine the rope?
(b) How is the shackle end treated?
(c) How is the rope fastened and coiled on the drum?

7. How would you timber a level—
(a) using sets?
(b) using stulls?

8. A crosscut has been driven fifty feet off a main level, and two drives north and south are being driven off the end of the crosscut. How would you ventilate the ends? Show by diagram with arrows the direction of the air currents in the main level, the crosscut, and drives.

9. What methods are generally adopted in gold mines to keep the air free from dust?

10. How would you construct a pent-house in a deep mine? Where are pent-houses needed, and why?

Subject: MINING LAW.

25th May, 1937.

Time allowed—One and a half hours.

All questions to be answered.

1. What provisions are made in the Mines Regulation Act regarding Rising and Winzing?

2. What is required by the Act in connection with aid to injured persons?

3. What are the regulations dealing with crib places?

4. What are the requirements of the Act in respect to Winding and Winding Ropes?

5. What are the methods of firing charges, prescribed in the regulations?

6. Describe fully the regulations with regard to clearing passes and shoots?

Subject: MINING.

12th October, 1937.

Time allowed—Three hours.

Eight questions only to be answered.

All questions are of equal value.

Candidates should illustrate with sketches where possible.

1. A crosscut has collapsed for a distance of 50 feet owing to an inrush of dry, free-running material. Describe how you would remove the crushed timbers and recondition the crosscut for use.
2. A vein is ten (10) feet wide, nearly vertical, and has good walls. A block between two levels 100 feet apart and two winzes 150 feet apart is to be stoped out. Explain fully how you would proceed with the work, and take out the whole block of ore, leaving the upper level intact. Describe how you would provide for efficient ventilation in the stope.
3. Describe how you would sink a prospecting shaft through 30 feet of soil and 50 feet of hard rock.
4. Show, by means of sketches, your ideas on the arrangement and order of firing of holes in—(a) the face of a drive, (b) a stope, (c) a shaft bottom. State the quantities of explosives you would use in each hole and describe the method of firing.
5. How would you carry out the work of sinking a main shaft below the present workings while the shaft is still in regular use for hauling ore, etc.?
6. Describe how you would carry out, in a wide lode, shrink stoping and flat-back stoping. What are the advantages of each method?
7. Describe how you would timber a level to provide for single and double haulage ways when the walls are—(a) good standing, (b) soft.
8. Explain the methods adopted to minimise dust underground. What do you consider to be the principal factor in minimising dust?
9. A winze, which is being sunk in shattered ground, makes 2,000 gallons of water per hour. How would you keep the winze free from water?
10. A winze has been sunk 50 feet below a level and an intermediate drive is to be driven in both directions from this winze. Describe, in full detail, with sketches, how you would provide for efficient ventilation in both ends.

Subject: MINING LAW.

12th October, 1937.

Time allowed—One and a half hours.

All questions to be answered.

1. Under what conditions may men be allowed to work underground on Sundays, and on what work may they be employed?
 2. In connection with the ventilation of mines, what is the maximum allowable—
 - (a) percentage of carbon dioxide in the air?
 - (b) dry bulb temperature?
 - (c) wet bulb temperature?
- Under what conditions may the specified dry bulb temperature be exceeded?
3. What steps must be taken to prevent the production of dust underground?
 4. What are the requirements of the Mines Regulation Act with regard to change houses?
 5. At what intervals, and how, shall winding ropes, cages, etc., and all winding appliances be examined?
 6. What conditions are laid down by the Mines Regulation Act with regard to—
 - (a) Rises in mines?
 - (b) Lighting fuses when blasting?
 - (c) Use of cyanide tailings for filling?
 - (d) Men working alone?

APPENDIX No. 4.

REPORT ON VENTILATION OF THE WILUNA GOLD MINES, JANUARY, 1938.

By E. E. BRISBANE, B.C.E. (Melb.), A.M.I.E. (Aust.), A.M.Inst.M.M., Ventilation Inspector Mines, Kalgoorlie.

The Wiluna Gold Mine was inspected on January 6th and four succeeding days. Measurements of the main air current were taken and these are set out on the accompanying diagram.

Conditions show some improvement over those prevailing during the summer months in other years, in that the main shaft has remained downcast, and that there is good movement of air in the crosscuts. The ventilation is still unsatisfactory in the following particulars:—

1. The wet bulb temperature in the lower levels of the West Lode is above 80° F.
2. The ventilating currents in this section of the mine are slight and variable.
3. Smoke from grizzly firing on the 1,200 level, East Lode, contaminates a great deal of the mine.

It was not possible to secure a good check between intake and return measurements. This may be explained by the usual inaccuracies in low velocity measurements and by the unstable condition of the currents in the lower portions of the West Lode. The ventilation door on the 1,200 level was frequently open on account of work nearby and this would affect measurements in the lower levels. The movement of skips, cages and ore trains also causes great fluctuations. In the diagram I have shown figures that have been checked by at least two measurements. The figures in brackets with dotted arrows represented values obtained at other times and some interpolations to indicate probable variations. The values obtained in October, 1937, are compared with those obtained in January, 1938, in the following table.

	Oct., 1937.	Jan., 1938.
East Lode fan	35,000	42,000
West Lode fan	39,000	42,900
Total (both fans) ..	74,000	84,900
Shaft downcast surface ..	36,000	15,460
East Lode intakes ..	20,500	18,900
West Lode intakes ..	38,750	30,830
Shaft to East Lode ..	20,500	12,300
Shaft to West Lode ..	16,500	3,160
Shaft downcast below 1,200	27,260	15,460

The main points arising from the comparison are set out below:—

1. There has been an increase in the total air handled by the fans.
2. There has been a decrease of about 50 per cent. in the downcast by Main Shaft.
3. The quantity flowing to the East Lode by crosscuts at 8, 9 and 10 levels has not altered to a great extent.
4. The quantity flowing from the shaft to the West Lode has decreased almost to zero.

Considering these points in order, it may be concluded that:—

1. That quantity flowing to East Lode should have increased by about 20 per cent. due to the speeding up of the East Lode fan. The increase in the quantity handled by the West Lode fan, in spite of the shaft being cut off by doors on No. 6 and No. 7 levels, indicated a larger opening in the East Lode than existed last October.
 2. It might have been expected that closing the doors to the shaft on No. 6 and No. 7 levels would cause an increase in the shaft downcast below this level. There has been a decrease of nearly 50 per cent. which again points to increased openings in the West Lode fan circuit.
 3. The East Lode fan draws about 7,000 c.f.m. out of a total of 19,000 c.f.m. by recirculation from the West Lode. The amount drawn from the shaft has decreased very little.
 4. The West Lode fan is getting practically the whole of its load at the No. 6 and No. 7 levels.
- Other considerations are:—
1. The flow in crosscuts to the West Lode on No. 9 and No. 10 levels has reversed.

2. The currents in winzes between No. 7 and No. 9 levels on the West Lode are unstable. There is a slight but definite upcast in the North end, but other winzes may be downcast, stationary, or variable. This indicates that the balance between the East and West fans is over in the West Lode instead of at the shaft.

From these considerations it is held that there is a greatly increased opening at the 1,200ft. level. The system has also been disturbed by the change of natural ventilation in favour of the East Lode intake as compared with the shaft and by the speeding up of the East Lode fan.

Any alteration to the system should aim at:—

1. The production of a greater suction in the lower levels of the West Lode.
2. Removing the smoke of grizzley firing at No. 7 level East Lode without allowing it to pass through the mine.

In addition to correcting the bad features of the existing system, a better balanced ventilation would be obtained and several winzes, which are now closed to prevent recirculation, should be upcast naturally if they are opened. This would decrease the total resistance of the mine.

Dealing first with the removal of smoke from No. 7 level East Lode. It has been stated that when the ventilation door on the 1,200 level was opened for experiment the smoke does not clear from the level. In order to find the cause of this a series of measurements were made in the manways to grizzlies along the No. 7 level and the results are tabulated below. Values in brackets are estimated.

Co-Ord.	Opening.	Quantity.	Remarks.
930' S.	Manway	1,920	Not working. Shoots empty.
	Grizzley	(2,000)	
	Grizzley	(2,000)	
1,025' S.	Manway	490 (500) (500)	Working
1,103' S.	Box Shoot	(2,000)	Empty strong downcast.
1,165' S.	Manway	<i>Nil</i>	Working.
1,251' S.	Manway	<i>Nil</i>	Not working.
1,355 S.	Manway	1,080	Working. Shoots full.
	Grizzley ....	....
	Grizzley ....	....
1,462'	Manway	840	Not working. Shoot full.
	Grizzley ....	....
1,530'	Manway	1,560	Not working. Shoots empty.
	Grizzley	(2,000)	
	Grizzley	(2,000)	
1,655'	Box Shoot	(2,000)	Empty strong downcast.
	Total	(18,890)	

The total flow obtained is considerably less than that required by measurements on the level, but as less than half the openings could be measured no agreement could be expected. It is apparent, however, that there are considerable openings on the North end and on the South, while no air can enter at the central portion on account of the ore lying in the stope.

When the ventilation door in the South end of the level is opened the East Lode fan draws from the South opening and the West Lode fan draws from the North opening. Smoke will hang about in the unventilated central portion.

The smoke might still be taken to the East Lode by opening the door connecting to the 850ft. winze. This would simply substitute the pull of the East Lode fan for that of the West Lode fan. The West Lode cross-cut should of course be closed.

The current circulating on this level (about 23,000 c.f.m.) is greater than necessary for the ventilation of the level. Taking the average suction of the level as 10ft. x 8ft. the velocity is 300 feet per minute, nearly. If the inlet could be concentrated in the South end the level would be swept out in three minutes. The 930 shoot could be easily blocked by a brattice in the cross-cut and a little rock put into the passes and other openings in the South end which are not required at present could be treated. The current could probably be reduced to 15,000 c.f.m. and still leave the level very well ventilated.

With No. 7 level intake to the West Lode fan blocked the flow on No. 6 level would increase. This could be regulated to 10,000 c.f.m. Better still, would be the installation of a separate fan to serve the northern stopes on the East Lode as recommended in a previous report, which would enable No. 6 level to be closed.

With the circulation of the West Lode fan diverted to the bottom levels, the quantity handled by the fan would decrease and it might then be possible to run the fan a little faster. At its present loading the fan speed could not be materially increased without going beyond the limits recommended by the makers.

The objection to the scheme outlined is that the quantity flowing to the East Lode fan at the bottom levels will decrease. There is, however, still a considerable margin here. The amount of air going to the East Lode is 19,000 c.f.m. and a diminution of say, 8,000 c.f.m. would still leave quite a fair current. Some winzes which are now closed might be opened and in the near future it may be possible to shift the ventilation door on the No. 7 level to about 1,500 co-ordinate and thus bring another winze into the circuit there.

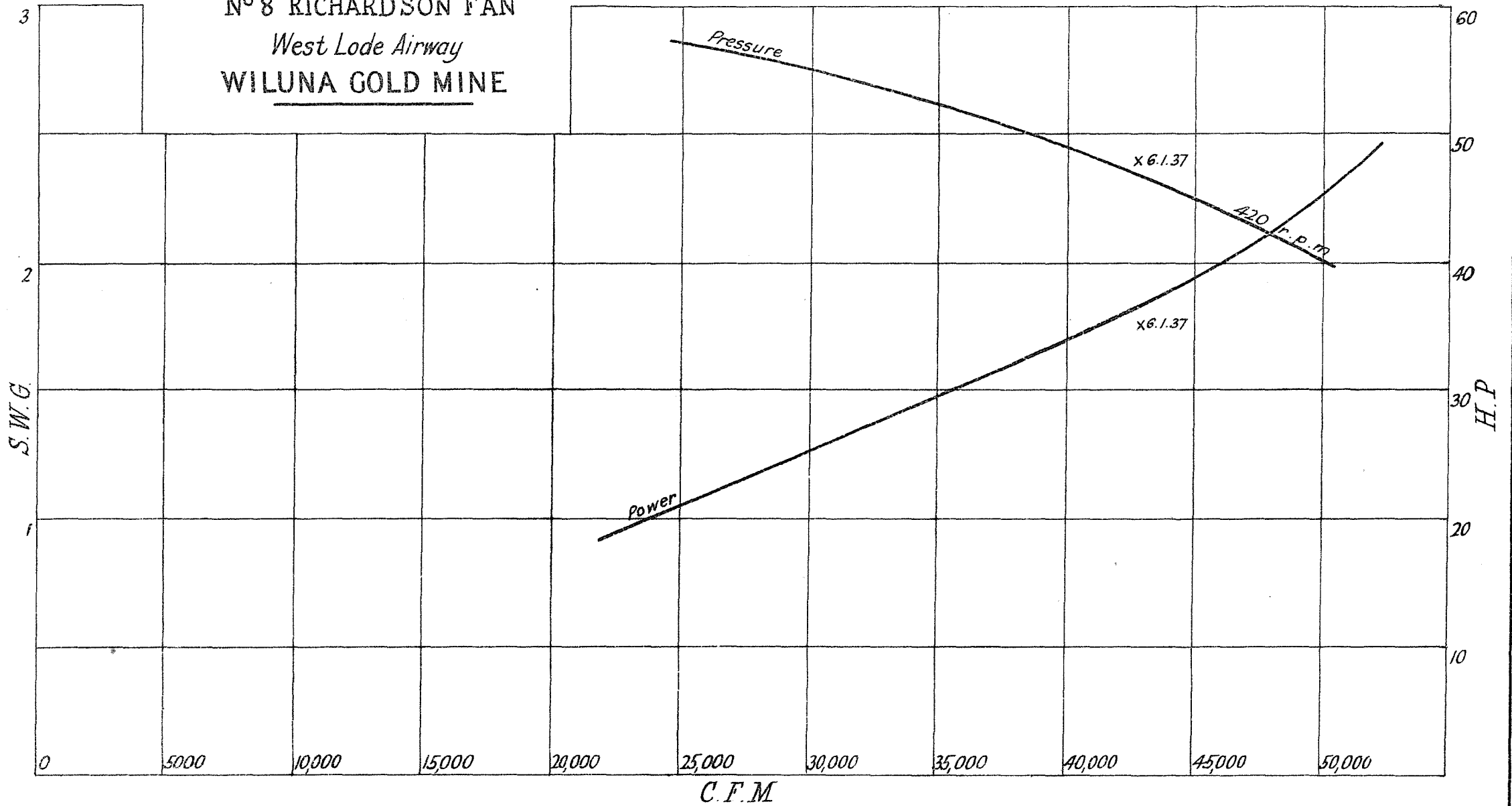
The East Lode fan is well able to deal with additional load, in fact its present load is too small for efficient operation.

Conditions on the No. 7 level might be greatly improved by some regulation of the firing. I have heard four rounds of from 6 to 10 shots fired in the space of half an hour. In such circumstances, even very good ventilation cannot produce even fair conditions. A great deal could be done to regulate the firing without any sort of prejudice to the work. For instance, when one party has popped all rocks on their grizzlies, there are probably other parties that can fire at the same time instead of boring perhaps three or four more pops and firing a quarter of an hour later.

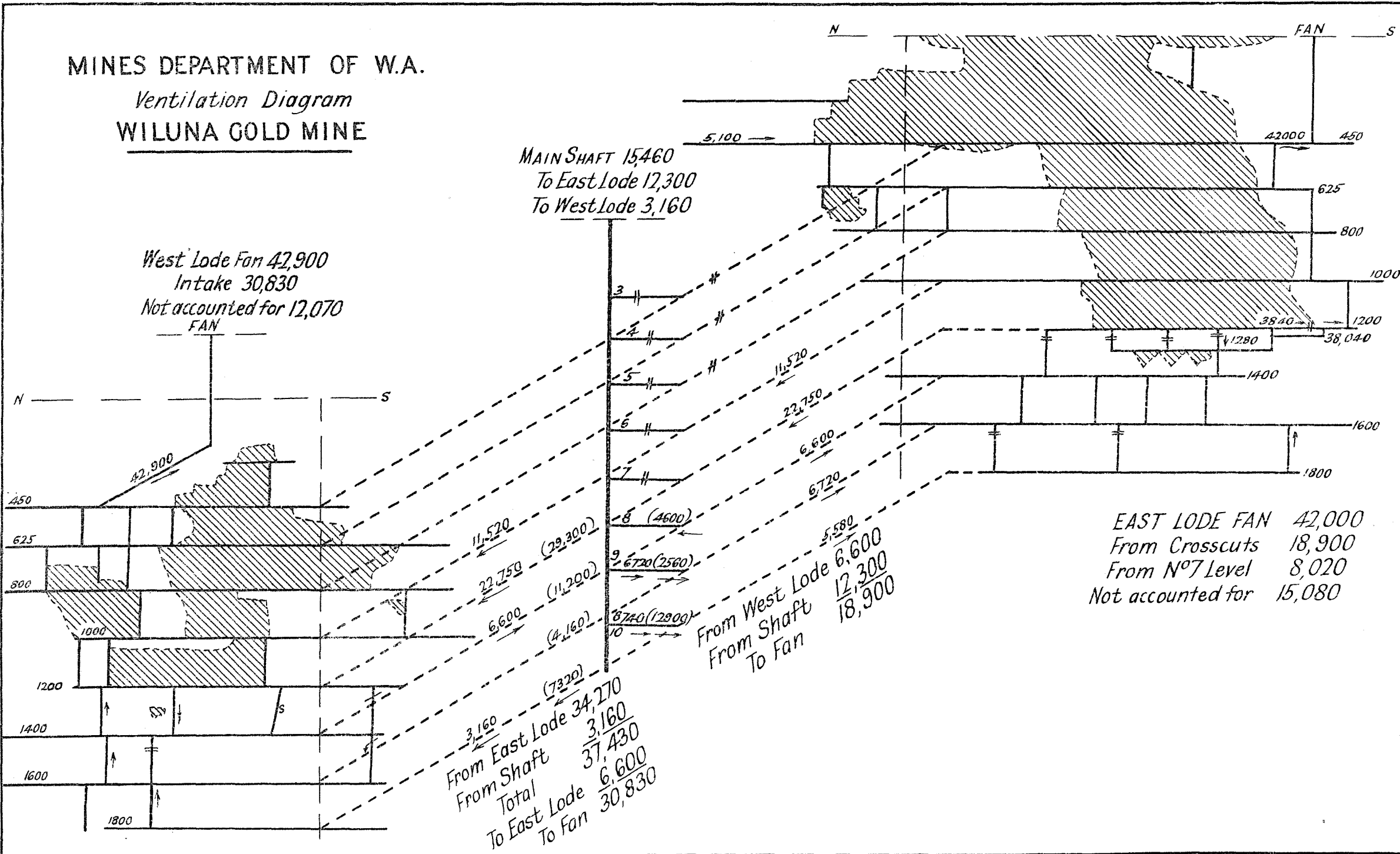
In my own view, the firing here might be restricted to definite times, say every hour, and the work could still be done efficiently. At the very least there should be some system and co-operation to prevent indiscriminate firing all through the shaft.

— MINES DEPARTMENT OF W.A. —

N° 8 RICHARDSON FAN
West Lode Airway
WILUNA GOLD MINE



MINES DEPARTMENT OF W.A.
Ventilation Diagram
WILUNA GOLD MINE



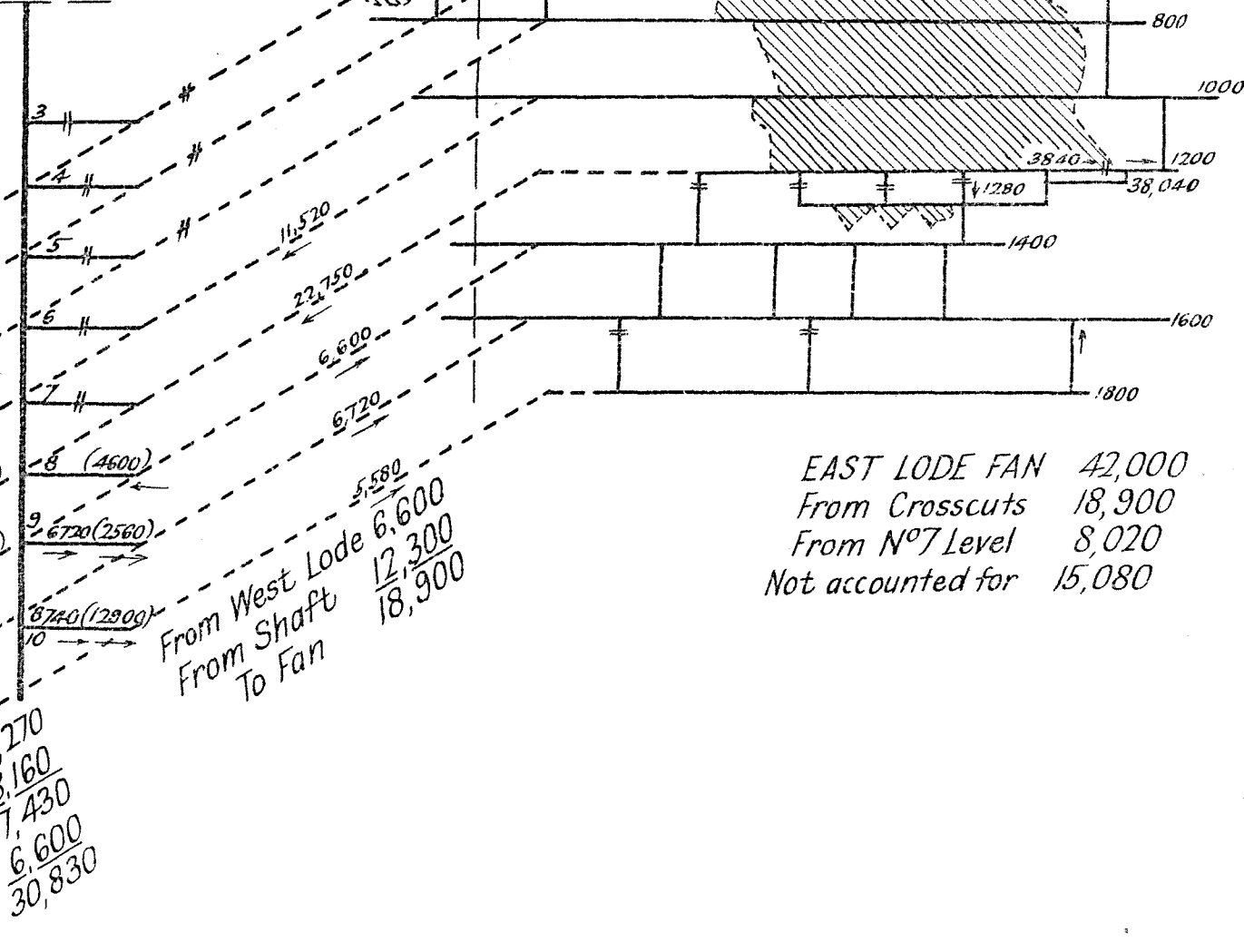
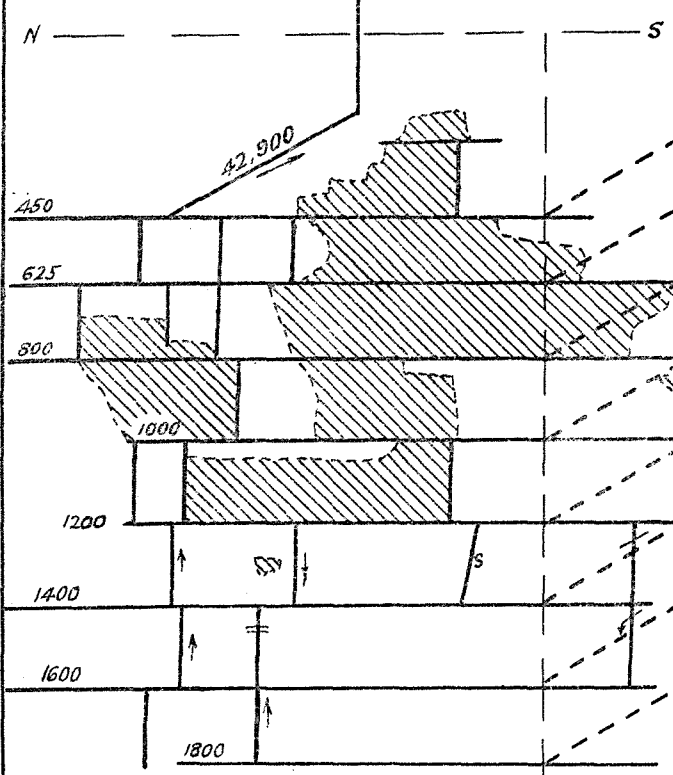
MAIN SHAFT 15,460
 To East Lode 12,300
 To West Lode 3,160

West Lode Fan 42,900
 Intake 30,830
 Not accounted for 12,070

EAST LODGE FAN 42,000
 From Crosscuts 18,900
 From N^o7 Level 8,020
 Not accounted for 15,080

3,160
 From East Lode 34,270
 From Shaft 3,160
 Total 37,430
 To East Lode 6,600
 To Fan 30,830

From West Lode 5,580
 From Shaft 6,600
 To Fan 12,300
 18,900



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DIVISION III.

Report of the Superintendent of State Batteries.

The Under Secretary for Mines.

I have the honour to submit for the information of the Hon. Minister my report on the operations of State Batteries for the year ending 31st December, 1937.

With a number of our larger customers acquiring their own plants it was considered likely that the tonnage handled would decrease but I am pleased to be able to report a slight increase over that crushed in 1936 and over 100,000 tons was exceeded for the third year in succession.

A comparison of the tonnage milled and cyanided for the last three years and the low record year of 1928 is as follows:—

	1928.	1935.	1936.	1937.
Tons Milled ...	16,271	108,360	102,086.25	102,800
Tons Cyanided	15,474	102,037	110,543	110,263
	31,745	210,397	212,629	213,063

The output since inception of the system till the end of 1937 is as follows:—

Production at Par—		
By Amalgamation ...	...	6,457,355.61
„ Sands ...	...	1,249,996.87
„ Slimes ...	...	265,256.11
„ Residues ...	...	9,862.09
Total at Par ...	...	£7,982,480.68

Gold Premium—		
By Amalgamation ...	...	1,149,556.27
„ Sands ...	...	369,770.28
„ Residues ...	...	530.43
Total Australian Currency		£9,502,337.66

Tons of Tin Ore Milled :		
Production—		
By Black Tin ...	...	93,833.96
„ Residues ...	...	572.20
		£9,596,743.82

ESTIMATED VALUE OF PRODUCTION.

The gold recovered by amalgamation is disposed of by the various customers, and for statistical purposes is valued at £3 12s. per ounce with fine gold at 85s. per ounce.

The estimated value of gold produced by amalgamation and from the cleans up of our tailing plants was 60,031.4 fine ounces, worth £545,835 (A) as against £563,006 (A) in 1936.

Only the Lake View and Star, Wiluna Gold Mines, and Great Boulder Proprietary exceeded this output for the year.

The total output for the last four years is valued at £2,176,027 in Australian currency.

VALUE OF ORE PER TON TREATED.

102,800.25 tons crushed produced 53,305.7 ounces bullion estimated to contain 45,184.85 fine ounces equal to 8.79 dwts. per ton. The average tailing value was 4.05 dwts. and the average head value of the ore 12.84 dwts. or 5s. 7d. per ton with gold at 85s. per ounce.

The average value for 1936 was 55s. 3d., the particulars of individual batteries are shown on Schedule 3 attached.

ESTIMATED PERCENTAGE RECOVERY.

The whole of the tailing produced was not treated and a small percentage is untreatable but allowing the average extraction obtained at all our plants, viz. 75.13 per cent., the recovery from tailing would be 3.042 dwts. per ton.

The estimated recovery is as follows:—

By Amalgamation ..	8.79 dwts.	68.4%
By Tailing Treatment ..	3.042 dwts.	23.8%
Total Extraction ..		92.2%

RECEIPTS AND EXPENDITURE.

Revenue from all sources amounted to £121,589 1s. 1d. and expenditure to £112,386 14s. 5d. showing a working surplus of £9,202 6s. 8d. as against £16,481 15s. 2d. in 1936.

Milling costs showed a slight reduction which was offset by a drop in revenue per ton. Tailing treatment cost remained at practically the same figure but the receipts per ton showed a falling off of 1s. 6d. due to the lower value of tailing treated.

MILLING.

Excluding Mt. Sir Samuel and Linden State Batteries, which are leased, and Jimble Bar and Darlot Batteries, which crushed no ore, one 20-head, five 10-head and 14 5-head batteries were in operation.

The total number of hours worked and the comparison with those for the previous year are as follows:—

	1937	1936
Hours run, including stops ..	91,642	93,781
Hours run, excluding stops ..	83,195	81,834

Number of Parcels and Tonnage Milled.—2,245 separate parcels were treated comprising 102,800.25 tons and averaging 45.75 tons per parcel. This average is higher than usual due to lower grade ore being worked to a greater extent with the necessity for larger tonnages.

As shown previously in this report, the tonnage crushed exceeded that for 1936 by 713.75 tons.

Batteries crushing over 6,000 tons for the year were as follows:—Kalgoorlie 15,277 tons, Coolgardie 10,764.25 tons, Ora Banda 9,335 tons, Meekatharra 6,534.25 tons, Cue 6,311 tons, Boogardie 6,020.25 tons, and four other batteries exceeded 5,000 tons. See Schedules I. and III.

Notable increases were at Marble Bar 5,116 tons crushed showing an increase of 746 tons, Ora Banda 9,335 tons, increase of 774 tons, and Laverton 5,205 tons, against 4,586.75 tons in 1936.

Stamp Duty.—The high average stamp duty of the previous year was slightly exceeded, the figures being 4.46 and 4.42 tons respectively.

Cost per Ton.—The milling cost per ton dropped from 14s. 0.1d. in 1936 to 13s. 5.7d.

Revenue.—Receipts per ton fell from 9s. 5.1d. to 9s. 2.2d. due to more time crushing and a better stamp duty.

Total Receipts and Expenditure.—Under the heading of milling the total receipts were £47,238 6s. Expenditure amounted to £69,270 3s. 7d., showing a working deficit of £22,031 17s. 7d., as against £23,411 2s. 1d. in 1936.

Tailing Treatment.

No treatment was undertaken at St. Ives and Jimble Bar, but Youanmi was re-equipped with a small 90-ton-a-week plant and all our batteries have tailing treatment facilities for the first time.

In all, nineteen plants treated 110,263 tons with a head value of 3.62 dwts., the average residue being .90 dwts. and the average extraction 75.13 per cent.

Comparative figures for 1936 and 1937 are as follows:—

Tons Treated.	Head Value.	Residue Value.	Extraction.	Value called at 85s. per ounce.	Value recovered at 85s. per ounce.	Shortage.	Cost per Ton.
1937— 110,263 ...	dwt. 3.62	dwt. .90	% 75.13	£ 63,664.4	£ 63,465.05	£ 190.34	s. d. 7 9.7
1936— 110,543.5	4.07	.92	77.39	74,108.7	74,425.16	Surplus. 316.46	7 9.1

It will be noted that the cost of treatment has remained stationary and that the value of the tailing treated is considerably lower. This is due partly to the fact that tonnage for the year included several thousand tons of residues retreated at Boogardie. The poor percentage extraction in this material has affected the general average extraction slightly.

It is pleasing to see the recovery so close to the call and it reflects credit on the officers concerned.

Special work has been done for the period on cyanide consumption and good results have been effected at several plants.

The average consumption per ton of tailing treating for the year was only slightly higher, notwithstanding the increased tonnage of refractory tailing treated.

I am pleased to state that the result of the segregation and treatment of the tailing at Mt. Ida, still better results materialised and at the present moment owners are being paid on a 70 per cent. extraction.

A good deal of research work has been undertaken especially in the clean-up, and good results with both manganese dioxide and nitric acid have been obtained and a reasonably priced bullion recovered.

At Marble Bar, another district where "copper" precluded the purchase of tailing until a few years ago, over 50 per cent. of the tailing produced for the year with an average value of 7.51 dwts. per ton was treated successfully.

Value of Tailing Produced.—Most of the tailing produced was treated, the balance being the hold-over from the previous year. Schedule 5 attached to this report segregates the tailing into three groups, *i.e.*, that over 2 dwts. 8 grs. called payable, under 2 dwts. 8 grs. and refractory.

A synopsis on the basis of 90 per cent. crushed is as follows:—

Purchased	....	47,694 tons	average value	6.26 dwts	51.5%
Not Purchased	....	39,686 "	"	1.39 "	42.0%
Refractory	....	5,140 "	"	4.75 "	5.55%

Part of these tailing under the head of refractory will be treated and owners paid on extraction. It is pleasing to note that the percentage so segregated has dropped from 7.1 per cent. in 1936 to 5.55 per cent.

Unfortunately, the percentage of tailing below 2 dwts. 8 grs. and other than refractory increased from 39.1 to 42.9 and the value dropped from 1 dwt. 11 grs. to 1 dwt. 9 grs. per ton.

Comparative Synopsis of Results at State Batteries for Twelve Months ended 31st December, 1936 and 1937.

	1936.			1937.		
	Tonnage.	Expenditure.	Revenue.	Tonnage.	Expenditure.	Revenue.
Milling	102,086.25	s. d. 14 0.2	s. d. 9 5.1	102,800.25	s. d. 13 5.7	s. d. 9 2.2
Tailing treatment ...	110,543	7 9.1	14 11.8	110,263	7 9.7	13 5.8

Receipts and Expenditure.

—	Tonnage.	Expenditure.			Revenue.			Profit.			Loss.		
		£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
Milling	102,800	69,270	3	7	47,238	6	0	...	...	...	22,031	17	7
Tailing	110,263	43,090	9	9	74,348	5	1	31,257	15	4	...	...	...
Tin Treatment ... ..	...	26	1	1	2	10	0	...	...	...	23	11	1
	213,063	112,386	14	5	121,589	1	1	31,257	15	4	22,055	8	8
Less Loss ... ..	...	...	...	...	...	...	...	22,055	8	8	...	...	...
Net Profit ... ..	...	...	...	...	...	...	...	9,202	6	8	...	...	...

CARTAGE SUBSIDIES.

Details of assistance granted under the above head to customers crushing at State and privately-owned batteries for the last three years are as follows:—

Year.	Tons Crushed.	State Batteries.			Private Batteries.		Total.
		Tons Claiming Subsidy.	Percentage of Ore Crushed.	Amount Paid.	Tons Claiming Subsidy.	Amount Paid.	
1935 ...	108,360	52,460	48.4	£ 17,121 5 10	12,748	£ 3,200 11 1	£ 20,321 16 11
1936 ...	102,086	43,946	43.05	12,416 2 6	13,541	3,648 13 0	16,064 15 6
1937 ...	102,800	30,625	29.8	11,202 16 0	8,786	2,900 8 6	14,103 4 6

The present regulations came into force at the beginning of February, 1937, and have been mainly instrumental in preventing the anticipated decline in tonnage crushed.

The amount paid to State Battery customers was £11,202 16s. as against £12,416 2s. 6d. in the previous year but the low grade ore receives most of the benefit under the present regulations especially that carted over long distances.

ERECTION AND RECONSTRUCTION.

The following is a list showing in some detail the work charged to Capital account:—

Bamboo Creek.—Producer gas plant and Tangye gas engine were replaced with a Rushton-Hornsby fuel oil engine and the plant generally overhauled early in the year, whilst three buildings have been erected for the accommodation of up to nine employees.

Marble Bar.—The engine foundation was reinforced by the addition of extra concrete.

Peak Hill.—Power, crushing plant and offices have been rebuilt whilst three buildings were erected for the accommodation of up to six employees.

Wiluna.—No. 2 Gates rock breaker was replaced with a similar reconditioned machine, etc.

Sandstone.—The old Hornsby gas engine was replaced with a reconditioned Tangye engine and various sections of the plant overhauled, while a new Crossley fuel oil engine was placed on the No. 1 well and 1000 feet of 3in. piping renewed in the pipe line.

Boogardie.—A 5 h.p. Lister fuel oil engine has been installed in the engine room for use when the plant is idle and a new six thirty ton vat tailing plant constructed.

Coolgardie, Cue and Kalgoorlie.—Homes for the leading hands at these three plants were erected under the supervision of the Public Works Department.

Ora Banda.—A new fourteen thirty ton vat tailing plant has been erected, whilst a 16in. x 9in. Ruwolt rock breaker, elevator and ore bins have been attached to the mill.

Mt. Ida.—The charcoal gas producer and 27 h.p. Tangye gas engine have been replaced with a fire-wood gas producer and 37 h.p. Tangye gas engine whilst the Phoenix Weir concentrating table has been replaced with the Wilfley table ex St. Ives. Material for three single men's camps is lying at this plant pending erection.

St. Ives.—Material for three single men's camps is lying at this plant pending erection.

An analysis of the expenditure is as follows:—

	£	s.	d.	£	s.	d.
General Loan Fund—						
Wages	1,647	18	3			
Government Utilities	614	18	0			
Other	1,488	7	2			
				3,751	3	5
Commonwealth Assistance, Metalliferous Mining—						
Wage	150	7	6			
Government Utilities	348	17	0			
Other	330	4	2			
				829	8	8
Assistance Gold Mining Industry—						
Wages	2,949	7	3			
Government Utilities	3,561	13	0			
Other	2,598	15	0			
				9,109	15	3
Total				£13,690	7	4

OBITUARY.

I very much regret having to record the loss of the late Mr. W. A. Longbottom, who died at Payne's Find on the 20th June, 1937, after slightly over 12

months' service with the Department as assistant and relieving manager at Payne's Find, Warriedar, Yalgoo, Sandstone and Coolgardie Batteries.

STAFF.

During the past year the following movements occurred:—

Bamboo Creek.—J. Duval returned from his leave and in June he took over the management of this and

Marble Bar from P. F. Hogg, who then took his accumulated and long service leave on completion of which he relieved W. J. Weekley at Wiluna and later at Cue, when this manager went on his accumulated leave.

Peak Hill.—E. Speering returned from his leave early in the year, thus relieving A. Hepworth, who had supervised the plant from Meekatharra.

Boogardie.—W. E. Eyres was relieved by the late W. A. Longbottom when he took his biennial leave early in the year.

Sandstone.—E. S. McKenzie returned from leave towards the end of March, thus relieving the late W. A. Longbottom.

Payne's Find.—F. J. Breusted took his leave about the middle of the year, being relieved by the late W. A. Longbottom and later by L. A. Thompson, who still remains on this circuit as assistant to F. J. Breusted at Yalgoo and Warriedar.

Kalgoorlie.—C. E. K. Smith took his leave early in the year, being relieved by Ed. Wann who also supervised Coolgardie.

Coolgardie.—Ed. Wann took leave in the first half of the year being relieved by Messrs. L. A. Thompson and the late W. A. Longbottom.

Ora Banda.—T. E. Prosser had his leave, being relieved by L. A. Thompson.

Varri.—J. Chegwiddden, leading hand at Meekatharra, has been for some months acting as manager during A. H. Cook's absence at Laverton.

ADMINISTRATION.

	£	s.	d.
Salaries	3,020	2	6
Inspection, including salary of inspector	1,053	4	10
Workers' Compensation	2,617	5	11
Motor Utility balance	171	13	4
Postage	100	0	0
Printing	180	5	10
Sundry fares	194	0	5
Balance brought forward from previous years	228	0	0
	<hr/>		
	£7,564	12	10

SUMMARY.

The tonnage milled showed a slight increase over that of the previous year notwithstanding several of our largest customers have been enabled to erect plants to treat their own ore.

The average value of the ore crushed declined only slightly from 55/3 to 54/7 per ton and the estimated production from £563,006 in 1936 to £543,835 for 1937.

Milling costs were reduced by 6½d. per ton and tailing costs remained stationary notwithstanding the increase in wages due to higher basic wage, certain concessions given to the employees by virtue of the industrial agreement between the Hon. Minister for Mines and the Australian Workers' Union and the increased tonnage crushed at batteries purchasing water from the Goldfields Water Supply.

The profit on working declined from £16,481 15s. 2d. to £9,202 6s. 8d. due to the reduced revenue in milling which, as mentioned previously in my report, was the result of greater efficiency in our milling plants enabling prospectors to take advantage of the fine crushing regulation and the decline in the value of tailing treated.

It is pleasing to note that the percentage of refractory tailing, *i.e.*, that which cannot be treated or which is paid for on a reduced extraction, has decreased from 7.1 to 5.5 per cent.

The output at State Batteries to the end of the year was estimated at £9,596,743.

CONCLUSION.

The year has been an important one as far as our employees have been concerned. For the first time in the history of State Batteries an industrial agreement covering our employees other than engine-drivers and firemen has been consummated with considerable concessions to the men concerned and is now working satisfactorily.

Housing accommodation for men in isolated places has been arranged at a cost of £1,010, and leading hands' cottages erected at Coolgardie, Kalgoorlie and Cue.

I would like to point out that the programme for the rebuilding or reconstruction of all our batteries is almost completed and that no great reduction in the cost of treatment can be looked for, especially as there is a general tendency for prices to harden with the corresponding increase in the basic wage.

Fourteen of our twenty-one batteries departmentally operated, are five stamp plants, situated mostly in isolated places. These small units are very expensive to run and if replaced by modern 10-head plants a saving of between £15,000 and £20,000 annually would be made. The capital cost would be approximately £100,000. The tonnage forthcoming at some centres would not warrant such expenditure, but the change-over should be made whenever the prospects are good.

It is my considered opinion that the new cartage subsidy regulations which came into force at the beginning of the year, apart from the saving in cost to the Government, have proved more equitable than the previous ones and directly encouraged the low grade show distant from crushing facilities. The prospects for the present year are satisfactory and the tonnage crushed to time of writing exceeds that for the same period of last year. The Pilbara Field shows greatly increased activity and at the present moment consideration is being given for increasing the plant at Marble Bar.

It is satisfactory to note that the Western Mining Corporation is using our Ora Banda battery, which was duplicated last year, for putting through large developmental parcels from its Waverley property and that the Blue Bird Company crushes its ore at regular periods at our Norseman plant. Large trial

parcels from the Gladiator gold mine have recently been crushed at our Laverton battery with a view to arriving at a suitable plant design.

All plants are in first-class condition, and where the ore supplies have warranted the erection of 10-head units such plants are as economical and up to date as any modern private plant.

All plants have been provided with concrete floors, which reduces losses from spillage to a minimum. Electric light is universal and most of the pumping units driven by independent electric motors, the power being produced by generators driven by wood gas producer gas engines burning local fuel except at four plants where local wood supplies have been depleted and at Youanmi which is motor driven, the current being obtained from the Youanmi mine. The four plants mentioned are equipped with modern crude oil engines.

Considering the varied nature of the ore treated, the estimated extraction of over 92 per cent. from an average head value of 12.84 dwts. and with an average tail value of 0.9 dwts. can be claimed as very satisfactory.

The importance of the system can be gauged from the fact that the output for the year was only exceeded by the Lake View and Star, Wiluna Gold Mines and the Great Boulder Proprietary.

In conclusion, I would like to place on record my appreciation of the very efficient and loyal service of the goldfields and head office staffs during the year.

D. F. BROWNE,
Superintendent of State Batteries.

4th May, 1938.

SCHEDULE 1.

Return showing Tons Crushed, Gold Yield by Amalgamation, Average per ton in Shillings, and Total Value without Premium for Year ended 31st December, 1937.

Battery.	Tons Crushed.	Gold Yield Bullion.	Value per ton, in Shillings and Pence.	Total Value without Premium.
		ozs.	s. d.	£
Bamboo Creek	2,755	1,365·30	35 8·1	4,915·08
Boogardie	6,020·25	4,414·40	52 9·3	15,891·84
Coolgardie	10,763·25	5,248·60	35 1·3	18,894·96
Cue	6,311	4,435·70	50 7·2	15,968·52
Kalgoorlie	15,277	5,405·20	25 5·6	19,458·72
Laverton	5,205·25	2,332·85	32 3·2	8,398·26
Marble Bar	5,116	2,763·90	38 10·7	9,950·04
Meekatharra	6,534·25	4,549·35	50 1·5	16,377·66
Mt. Ida	3,806·50	1,952·80	36 11·1	7,030·08
Norseman	3,274·75	3,561·75	78 3·6	12,822·30
Ora Banda	9,335	5,018·10	38 8·4	18,065·16
Payne's Find	5,537·75	3,356·05	43 7·5	12,081·78
Peak Hill	5,981·25	1,189·10	14 3·7	4,280·76
Sandstone	3,345·25	1,080·30	23 3	3,889·08
St. Ives	87·50	28·25	23 1·3	101·70
Warriedar	2,715·50	828·80	21 11·6	2,983·68
Wiluna	3,581·25	1,910·40	38 4·9	6,877·44
Yalgoo	2,292·50	1,449·05	45 6	5,216·58
Yarri	4,366	2,197·45	36 2·8	7,910·82
Youanmi	495	218·35	31 9·1	786·06
	102,800·25	53,305·70	37 4	191,900·52

SCHEDULE 2.

Tailing Treatment for 1937.

Battery.	Tonnage.	Yield.	Value.	Premium.	Total.
		Fine ozs.	£	£	£
Bamboo Creek	2,324	583·89	2,480·839	2,590·210	5,071·049
Boogardie	6,346	1,232·15	5,223·077	5,534·538	10,767·615
Coolgardie	12,298	1,329·80	5,647·664	5,968·297	11,615·961
Cue	6,685	1,356·95	5,762·024	6,086·392	11,848·416
Kalgoorlie	15,510	1,938·12	8,231·916	8,704·925	16,936·841
Laverton	4,290	613·89	2,608·306	2,763·045	5,371·351
Marble Bar	2,640	839·21	3,564·822	3,755·462	7,320·284
Meekatharra	7,920	1,391·13	5,908·299	6,248·624	12,156·923
Mt. Ida	3,212	694·60	2,949·862	3,104·888	6,054·750
Norseman	4,840	863·02	3,665·189	3,869·622	7,534·811
Ora Banda	9,945	1,209·78	5,137·851	5,413·311	10,551·162
Payne's Find	6,076	363·90	1,545·789	1,604·822	3,150·611
Peak Hill	7,333	324·89	1,380·036	1,448·264	2,828·300
Sandstone	3,672	442·85	1,880·876	1,983·191	3,864·067
Warriedar	2,480	309·76	1,315·698	1,386·974	2,702·672
Wiluna	2,220	457·61	1,943·395	2,023·849	3,967·244
Yarri	4,360	377·55	1,603·618	1,686·864	3,290·482
Yalgoo	2,550	199·37	846·794	894·505	1,741·299
Youanmi	2,130	319·82	1,358·441	1,410·970	2,769·411
	106,831	14,848·29	63,064·496	66,478·753	129,543·249

SCHEDULE 3.

Return showing Number of Parcels treated and tons crushed at State Batteries for Year ended 31st December, 1937.

No. of Parcels Treated.	Battery.	Tons Crushed.	Yield by Amalgamation, Bullion.	Yield by Amalgamation, Fine Gold.	Gross Contents of Tailing on 100% (including Refractory), Fine Gold.	Total Contents of Ore, Fine Gold.	Average per ton, Fine Gold.	Gross Value, per ton.
			ozs. dwt. grs.	ozs. dwt. grs.	ozs. dwt. grs.	ozs. dwt. grs.	dwt. grs.	£ s. d.
56	Bamboo Creek...	2,755	1,365 6 0	1,157 6 0	733 2 0	1,890 8 0	13 17	2 18 3
169	Boogardie	6,020-25	4,414 8 0	3,741 18 0	1,332 18 0	5,574 16 0	18 12	3 18 7
208	Coolgardie	10,763-25	5,248 12 0	4,449 17 0	1,939 5 0	6,389 2 0	11 20	2 10 3
164	Cue	6,311	4,435 14 0	3,757 12 0	1,611 1 0	5,368 13 0	17 0	3 12 3
359	Kalgoorlie	15,277	5,405 4 0	4,581 15 0	2,404 19 0	6,986 14 0	9 3	1 18 9
142	Laverton	5,205-25	2,332 17 0	1,977 9 0	960 3 0	2,937 12 0	11 6	2 7 9
149	Marble Bar	5,116	2,763 18 0	2,342 16 0	1,314 2 0	3,656 18 0	14 7	3 0 9
129	Meekatharra	6,534-25	4,549 7 0	3,856 6 0	1,500 8 0	5,356 14 0	16 9	3 9 7
60	Mt. Ida	3,806-50	1,952 16 0	1,655 6 0	1,082 4 0	2,737 10 0	14 9	3 1 1
125	Norseman	3,274-75	3,561 15 0	3,019 3 0	1,060 18 0	4,080 1 0	24 22	5 5 11
174	Ora Banda	9,335	5,018 2 0	4,253 12 0	2,213 12 0	6,467 4 0	13 20	2 18 9
66	Payne's Find	5,537-75	3,356 1 0	2,844 15 0	552 2 0	3,396 17 0	12 6	2 12 0
57	Peak Hill	5,981-25	1,189 2 0	1,007 19 0	352 8 0	1,360 7 0	4 13	0 19 3
67	Sandstone	3,345-25	1,080 6 0	915 14 0	570 6 0	1,486 0 0	8 21	1 17 8
2	St. Ives	87-50	28 5 0	23 10 0	22 15 0	46 5 0	10 12	2 4 7
57	Warriedar	2,715-50	828 16 0	704 11 0	529 6 0	1,233 17 0	9 2	1 18 11
69	Wiluna	3,581-25	1,910 8 0	1,619 7 0	995 14 0	2,615 1 0	14 14	3 2 0
94	Yalgoo	2,292-50	1,449 1 0	1,223 6 0	395 10 0	1,623 16 0	14 3	3 0 1
93	Yarri	4,366	2,197 9 0	1,862 14 0	520 5 0	2,382 19 0	10 21	2 6 2
5	Youanmi	495	218 7 0	185 1 0	229 9 0	414 10 0	16 18	3 11 2
2,245	Total	102,800-25	53,305 14 0	45,184 17 0	20,820 7 0	66,005 4 0	12 20-2	2 14 7
	Average	45-75	.....	0 8 18-9	0 4 1-3	.....	12 20-2	.....
	Average Value .....	.....	.....	£1 17s. 4d.	£50 17s. 3d.	.....	.....	£2 14 7

SCHEDULE 4.

Direct Purchase of Tailings.

Battery.	Tons Purchased.	Amount Paid.
		£ s. d.
Bamboo Creek	1,511 $\frac{1}{4}$	2,212 1 2
Boogardie	3,975 $\frac{1}{2}$	5,999 2 3
Coolgardie	4,973 $\frac{1}{4}$	3,394 3 11
Cue	3,812 $\frac{3}{4}$	5,831 18 1
Kalgoorlie	6,524 $\frac{1}{2}$	6,740 17 10
Laverton	3,044 $\frac{3}{4}$	1,993 17 2
Marble Bar	1,856	7,661 15 5
Meekatharra	3,957 $\frac{1}{2}$	4,562 6 6
Mt. Ida	1,781	1,620 12 2
Norseman	1,788	4,599 10 5
Ora Banda	5,949 $\frac{3}{4}$	5,523 1 0
Payne's Find	1,307 $\frac{1}{2}$	318 4 3
Peak Hill	473 $\frac{1}{2}$	423 15 3
Sandstone	1,768 $\frac{1}{2}$	1,379 5 9
St. Ives	78 $\frac{3}{4}$	52 13 9
Warriedar	1,015	1,005 4 0
Wiluna	2,316	2,304 6 11
Yalgoo	593	452 13 11
Yarri	1,037 $\frac{1}{2}$	783 15 2
Youanmi	391 $\frac{1}{4}$	845 5 4
	48,118 $\frac{3}{4}$	£57,704 10 3

SCHEDULE 5.

Return showing Tailings payable and unpayable and Gross Contents for Year ending 31st December, 1937.

Battery.	Tailing Payable.		Tailing Unpayable.		Refractory Tailing.		Totals.	
	tons.	ozs. dwts. grs.	tons.	ozs. dwts. grs.	tons.	ozs. dwts. grs.	tons.	ozs. dwts. grs.
Bamboo Creek	1,407	584 17 0	1,073	81 12 0	.....	.....	2,480	666 9 0
Boogardie	3,853	1,544 10 0	1,566	121 15 0	.....	.....	5,419	1,666 5 0
Coolgardie	5,084	1,306 11 0	3,890	336 10 0	713	119 18 0	9,687	1,762 19 0
Cue	3,789	1,327 18 0	1,824	118 8 0	67	18 6 0	5,680	1,464 12 0
Kalgoorlie	6,207	1,697 0 0	7,542	489 6 0	.....	.....	13,749	2,186 6 0
Laverton	2,566	688 1 0	2,126	184 16 0	.....	.....	4,692	872 17 0
Marble Bar	2,348	943 6 0	307	25 7 0	1,949	226 0 0	4,604	1,194 13 0
Meekatharra	3,979	1,099 7 0	1,627	138 19 0	274	125 14 0	5,880	1,364 0 0
Mt. Ida	1,709	425 4 0	508	37 3 0	1,207	521 9 0	3,424	983 16 0
Norseman	1,664	880 2 0	1,233	84 7 0	.....	.....	2,947	964 9 0
Ora Banda	5,764	1,798 2 0	2,638	214 5 0	.....	.....	8,402	2,012 7 0
Payne's Find	1,389	249 0 0	3,147	196 19 0	448	55 19 0	4,984	501 18 0
Peak Hill	481	130 11 0	4,903	189 17 0	.....	.....	5,384	320 8 0
Sandstone	1,774	418 16 0	1,236	99 13 0	.....	.....	3,010	518 9 0
St. Ives	79	20 14 0	.....	.....	.....	.....	79	20 14 0
Warriedar	885	324 0 0	1,513	138 18 0	45	18 6 0	2,443	481 4 0
Wiluna	2,722	863 11 0	500	41 13 0	.....	.....	3,222	905 4 0
Yarri	949	264 12 0	2,851	179 10 0	127	28 17 0	3,927	472 19 0
Yalgoo	654	173 3 0	1,098	79 11 0	310	106 17 0	2,062	359 11 0
Youanmi	391	204 13 0	54	3 19 0	.....	.....	445	208 12 0
Totals	47,694	14,943 18 0	39,686	2,762 8 0	5,140	1,221 6 0	92,520	18,927 12 0

SCHEDULE G.—MILLING AND TIN.

Statement of Receipts and Expenditure for Year ended 31st December, 1937.

Battery.	Tonnage Crushed.	Expenditure.									Receipts.		Profit.	Loss.
		Management.	Wages.	Stores.	Total Working Expenditure.	Cost per Ton.	Renewals and Repairs.	Sundries.	Gross Expenditure.	Cost per Ton.	Receipts.	Receipts per Ton.		
		£ s. d.	£ s. d.	£ s. d.	£ s. d.	s. d.	£ s. d.	£ s. d.	£ s. d.	s. d.	£ s. d.	s. d.	£ s. d.	£ s. d.
Bamboo Creek	2,755	303 4 3	1,255 9 8	689 15 4	2,248 9 3	16 3·8	262 6 2	192 6 11	2,703 2 4	19 7·5	1,460 8 0	10 7·2	....	1,242 14 4
Boogardie	6,020·25	321 12 0	2,090 10 11	789 16 8	3,201 19 7	10 7·4	182 17 2	482 13 6	3,867 10 3	12 10·1	2,740 9 11	9 1·2	....	1,127 0 4
Cue	6,311	257 9 6	1,315 10 4	904 15 1	2,477 14 11	7 10·2	413 7 4	495 12 1	3,386 14 4	10 8·7	3,179 2 3	10 0·8	....	207 12 1
Coolgardie	10,763·25	477 8 5	2,326 18 0	1,665 4 6	4,469 10 11	8 3·6	347 8 2	721 2 1	5,538 1 2	10 3·4	4,846 13 3	9 0	....	691 7 11
Jimble Bar	....	....	52 2 7	43 0 0	95 2 7	....	....	....	95 2 7	....	0 3 8	....	....	94 18 11
Kalgoolie	15,277	834 4 5	2,550 16 1	2,998 19 8	6,384 0 2	8 4·2	792 7 11	1,203 12 7	8,380 0 8	10 11·6	5,990 1 2	7 10·1	....	2,389 19 6
Laverton	5,205·25	378 1 3	1,221 10 1	463 0 0	2,062 11 4	7 11·1	185 5 8	312 14 4	2,560 11 4	9 10	2,327 17 10	8 11·3	....	232 13 6
Linden	....	....	....	....	....	....	....	....	....	....	61 2 3	....	61 2 3	....
Mt. Ida	3,806·50	209 2 9	1,904 3 11	1,159 13 0	3,272 19 8	17 2·3	433 8 6	278 18 9	3,985 6 11	20 11·2	1,852 9 5	9 8·7	....	2,132 17 6
Meekatharra	6,534·25	236 0 1	2,231 9 8	1,200 9 9	3,717 19 6	11 4·5	94 1 0	496 6 0	4,308 6 6	13 2·2	2,994 13 10	9 1·9	....	1,313 12 8
Marble Bar	5,116	497 14 6	2,205 7 7	995 0 0	3,698 2 1	14 5·4	253 14 7	382 1 0	4,333 17 8	16 11·3	2,539 6 0	9 11·1	....	1,794 11 8
Mulline	....	....	....	....	....	....	....	....	....	....	143 2 6	....	143 2 6	....
Mulwarrie	....	....	....	....	....	....	....	....	....	....	30 10 0	....	30 10 0	....
Mt. Sir Samuel	....	....	....	....	....	....	....	....	....	....	23 5 8	....	18 19 8	....
Norseman	3,274·75	346 16 6	1,392 14 0	773 3 9	2,512 14 3	15 4·1	250 16 0	255 7 4	3,018 17 7	18 5·2	1,698 2 7	10 4·4	....	1,320 15 0
Ora Banda	9,335	409 19 7	2,581 19 3	1,835 9 2	4,827 8 0	10 4·1	390 13 8	521 2 1	5,739 3 9	12 3·5	4,226 0 1	9 0·6	....	1,513 3 8
Peak Hill	5,981·25	314 19 1	1,770 9 8	619 2 7	2,704 11 4	9 0·5	369 3 2	382 4 6	3,455 19 0	11 6·6	2,121 2 7	7 1·1	....	1,334 16 5
Payne's Find	5,537·75	337 11 5	1,973 5 0	891 7 0	3,202 3 5	11 6·7	292 5 11	480 11 9	3,975 1 1	14 4·2	2,757 11 5	9 11·5	....	1,217 9 8
Quinns	....	....	....	....	....	....	....	....	....	....	5 0 0	....	5 0 0	....
Sandstone	3,345·25	330 5 9	1,415 9 1	1,130 16 0	2,876 10 10	17 2·3	424 0 2	318 13 1	3,619 4 1	21 7·6	1,599 9 5	9 6·7	....	2,019 14 8
St. Ives	87·50	14 0 0	103 1 0	75 13 2	192 14 2	43 9·5	....	18 18 5	211 12 7	48 1·1	46 14 11	10 7·5	....	164 17 8
Warriedar	2,715·50	161 2 4	891 13 2	423 15 1	1,476 10 7	10 10·4	228 14 4	175 3 8	1,880 8 7	13 10·1	1,329 3 1	9 9·4	....	551 5 6
Wiluna	3,531·25	143 7 1	890 16 4	393 19 4	1,428 2 9	7 11·7	643 9 0	357 18 3	2,429 10 0	13 6·8	1,858 3 10	10 4·5	....	571 6 2
Yalgoo	2,292·50	204 10 10	771 19 4	448 10 9	1,425 0 11	12 5·1	230 18 6	240 0 9	1,896 0 2	16 6·4	1,157 17 3	10 1·1	....	738 2 11
Yarri	4,366	292 7 11	1,654 3 8	732 1 0	2,678 12 7	12 3·2	326 6 10	355 12 4	3,360 11 9	15 4·7	1,979 7 9	9 0·8	....	1,381 4 0
Youanmi	495	69 12 8	206 16 4	32 1 8	308 10 8	12 5·5	73 11 4	138 13 3	520 15 3	21 0·4	270 7 4	10 11	....	250 7 11
Tin Plant—Greenbushes	102,800·25	6,189 10 4	30,806 5 8	18,265 13 6	55,261 9 6	10 9	6,194 15 5	7,813 18 8	69,270 3 7	13 5·7	47,238 6 0	9 2·2	258 14 5	22,290 12 0
	....	....	23 1 1	....	23 1 1	....	....	3 0 0	26 1 1	....	2 10 0	....	....	23 11 1
Total	102,800·25	6,189 10 4	30,829 6 9	18,265 13 6	55,284 10 7	....	6,194 15 5	7,816 18 8	69,296 4 8	....	47,240 16 0	....	258 14 5	22,314 3 1
Total Loss	....	....	....	....	....	....	....	....	....	....	....	....	....	258 14 5
														£22,055 8 8

SCHEDULE 7.—TAILING TREATMENT.

Statement of Receipts and Expenditure for Year ended 31st December, 1937.

Battery.	Tonnage Treated.	Expenditure.										Receipts.		Profit.	Loss.
		Management.	Wages.	Assays.	Stores.	Total Working Expenditure.	Cost per ton.	Renewals and Repairs.	Sundries.	Gross Expenditure.	Cost per ton.	Receipts.	Receipts per ton.		
		£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	s. d.	£ s. d.	£ s. d.	£ s. d.	s. d.	£ s. d.	s. d.	£ s. d.	£ s. d.
Bamboo Creek	2,324	77 2 10	746 8 10	49 5 8	213 2 8	1,086 0 0	9 4.1	44 8 8	103 17 0	1,234 5 8	10 7.4	2,626 18 11	22 7.2	1,392 13 3	....
Boogardie	9,778	255 3 9	1,569 19 1	229 2 7	681 7 2	2,735 12 7	5 7.1	68 7 11	381 2 8	3,185 3 2	6 6.1	5,582 1 10	11 5	2,396 18 8	....
Cue	6,685	242 4 1	1,407 17 0	98 8 0	656 18 4	2,405 7 5	7 2.3	33 1 7	294 2 11	2,732 11 11	8 2.1	5,483 3 7	16 4.8	2,750 11 8	....
Coolgardie	12,298	352 18 2	2,098 18 2	142 18 7	1,166 8 1	3,761 3 0	6 1.4	5 0 8	448 15 1	4,214 18 9	6 10.2	7,642 7 9	12 5.1	3,427 9 0	....
Kalgoorlie	15,510	253 12 7	2,711 10 5	299 16 8	1,211 12 1	4,476 11 9	5 9.2	68 8 3	636 0 10	5,181 0 10	6 8.1	10,433 16 8	13 5.4	5,252 15 10	....
Laverton	4,290	101 8 11	633 2 10	226 14 4	453 12 4	1,414 18 5	6 7.1	92 0 2	238 11 11	1,745 10 6	8 1.6	3,796 5 3	17 8.3	2,050 14 9	....
Mt. Ida	3,212	232 14 4	666 3 3	203 15 10	538 8 2	1,641 1 7	10 2.6	58 3 4	139 8 2	1,838 13 1	11 5.3	3,059 14 2	19 0.6	1,221 1 1	....
Meekatharra	7,920	285 19 1	1,652 6 5	93 0 7	601 17 11	2,633 4 0	6 7.7	23 19 10	369 13 11	3,026 17 9	7 7.7	7,452 5 6	18 9.8	4,425 7 9	....
Marble Bar	2,640	220 15 2	758 0 3	86 3 8	246 19 9	1,311 18 10	9 11.2	44 15 4	103 18 8	1,460 12 10	11 0.7	3,285 5 10	24 10.6	1,824 13 0	....
Norseman	4,840	216 3 9	1,044 15 1	101 6 1	457 7 10	1,819 12 9	7 6.2	51 9 7	240 18 9	2,121 1 1	8 9.1	3,499 4 5	14 5.5	1,378 3 4	....
Ora Banda	9,945	265 15 5	2,520 6 11	123 5 2	727 19 9	3,637 7 3	7 3.7	54 12 6	330 6 1	4,072 5 10	8 2.2	5,627 1 7	11 3.7	1,554 15 9	....
Peak Hill	7,333	282 2 2	1,125 9 1	50 4 9	810 2 3	2,267 18 3	6 2.2	4 19 1	275 19 8	2,548 17 0	6 11.4	2,500 0 2	6 9.8	....	48 16 10
Payne's Find	6,076	120 1 4	950 12 6	114 18 4	492 19 8	1,678 11 10	5 6.3	139 7 0	235 17 3	2,053 16 1	6 9.1	2,816 6 9	9 3.2	762 10 8	....
Sandstone	3,672	111 17 9	858 4 6	137 4 4	351 3 0	1,458 9 7	7 11.3	....	167 19 10	1,626 9 5	8 10.3	2,468 11 1	13 5.3	842 1 8	....
St. Ives	....	....	....	....	1 2 9	1 2 9	....	....	....	1 2 9	....	....	....	....	1 2 9
Warriedar	2,480	41 6 9	410 19 6	52 12 10	281 4 4	786 3 5	6 4	61 16 2	77 15 3	925 14 10	7 5.5	1,719 1 8	13 10.3	793 6 10	....
Wiluna	2,220	61 15 6	471 7 1	44 12 2	207 9 4	785 4 1	7 0.8	89 0 1	127 15 7	1,001 19 9	9 0.3	1,733 10 0	15 7.4	731 10 3	....
Yalgoo	2,550	47 5 8	591 1 4	109 17 8	353 4 4	1,101 9 0	8 7.6	80 8 8	125 15 11	1,307 13 7	10 3	966 4 1	7 6.9	....	341 9 6
Yarri	4,360	119 11 6	796 4 6	125 14 11	629 1 4	1,670 12 3	7 7.9	40 1 11	144 3 6	1,854 17 8	8 6	2,351 12 7	10 9.6	496 14 11	....
Youanmi	2,130	84 13 10	457 15 9	49 2 7	253 6 10	844 19 0	7 11.2	23 1 9	88 16 6	956 17 3	8 11.9	1,304 13 3	12 3	347 16 0	....
	110,263	3,372 12 7	21,471 2 6	2,338 4 9	10,335 7 11	37,517 7 9	6 9.6	983 2 6	4,589 19 6	43,090 9 9	7 9.7	74,348 5 1	13 5.8	31,649 4 5	391 9 1
														31,257 15 4	

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DIVISION IV.

Annual Progress Report of the Geological Survey of Western Australia for the Year ended 31st December, 1937.

The Under Secretary for Mines.

I have the honour to submit, for the information of the Hon. the Minister for Mines, my report on the operations of the Geological Survey for the year 1937.

STAFF.

The staff remains at the same numerical strength as last year; it consists of four field geologists, a technical assistant, a junior clerk and a messenger.

Mr. G. H. Armstrong, who was appointed to this branch on loan from the Education Department in 1936, was recalled to his teaching duties in February, and the position occupied by him was filled by the appointment of Mr. M. O'Halloran, B.Sc., who commenced duty on the 22nd March. Mr. O'Halloran resigned at the end of July, and the vacancy was filled by the appointment of Mr. K. R. Miles, B.Sc. (Hons.), who, until his present appointment, was a lecturer in Geology at the University of Western Australia. Mr. Miles commenced duty on the 11th October.

Miss B. M. Bowley, B.Sc., Technical Assistant, resigned in August, and Mrs. G. Blatchford, B.A., was appointed to the vacant position, commencing duty on the 25th October.

FIELD WORK.

Government Geologist.—At the end of January I spent several days at Ravensthorpe on an inspection of the Gem Mine. The opportunity was also taken of inspecting, as far as possible, other old gold and copper mines of the district.

From the 20th February to the 2nd March I was absent in Melbourne, where I attended, as a member, a meeting of the Executive Committee for the Aerial Geological and Geophysical Survey of Northern Australia. This meeting was for the purpose of preparing the Annual Report of the Survey for the year 1936, and to discuss the programme of field work for 1937.

During May I made a geological reconnaissance in the Kundana-Black Flag area, north-west of Kalgoorlie, accompanied by Mr. Ellis. This reconnaissance was necessary in order to assist in the correlation of the rocks of the Kalgoorlie district with those being studied by field parties in the Yilgarn Goldfield.

In June I visited the Royal Standard Gold Mine at Yuin in the Yalgoo Goldfield, in order to advise on the selection of bore sites for the exploration of the reef below the old workings.

At the end of August I visited Norseman in order to inspect a supposed iron ore deposit, and while in the Kalgoorlie district on this inspection I was able

to make inspections of the Spargo's Reward Gold Mine at Spargoville, and the Edjudina Mine at Yarri.

During part of September and October I was accompanied by Mr. Ellis on a general inspection of mining activities in the Gascoyne, Ashburton and Pilbara Goldfields. This inspection was made with the object of assisting prospectors in these portions of the State, who are seldom visited by members of the staff of the Geological Survey.

During November I paid a short visit to Greenbushes, in order to examine the possibilities of further development of the tin deposits in the "Deep Lead" system.

During December a short visit was paid to Manjimup in order to inspect a deposit of novaculite on the Perup River, east of Manjimup.

The remainder of my time was taken up with administrative and routine duties at Head Office.

H. A. Ellis, B.Sc., A.O.S.M., Geologist.—During January Mr. Ellis was engaged in the preparation of portions of the Annual Report for 1936, and in office work connected with the re-survey of the Yilgarn Goldfield. Towards the end of the month he proceeded to Southern Cross in order to complete field work at that centre, and returned to Head Office on the 9th February.

From the 10th February to the end of August he was occupied mainly with compiling plans and writing manuscript for Bulletin 97, descriptive of the geology of that portion of the Yilgarn Goldfield south of the Great Eastern Railway.

During this period he accompanied me on my visit to the Kundana-Black Flag area, and for some time was also engaged in preparing a mineral exhibit to be included in a general exhibition dealing with the primary and secondary industries of the State, which was organised in Perth during May.

He also spent one week of this period in field work in the Yilgarn Goldfield in order to clarify matters in doubt which appeared during the writing of the manuscript of the Yilgarn report.

Mr. Ellis accompanied me in September on my visit to the north-west part of the State, and during the latter part of October and early in November, was engaged in preparing plans and equipment for field work in the northern portion of the Yilgarn Goldfield, a re-survey of which it was proposed to commence as early as possible.

At the beginning of November Mr. Ellis commenced field work in the Yilgarn Goldfield, and returned to Perth on the 11th December. During this period he

was called on to make inspections at a new gold find six miles north of Riverina, and the Riverina Gold Mine in the North Coolgardie Goldfield.

R. A. Hobson, B.Sc. (Hons.), Geologist.—From January to August Mr. Hobson was engaged on the preparation of plans and the completion of his reports on field work carried out in the Yilgarn Goldfield during 1935 and 1936. During this period he made two brief visits to the Yilgarn Goldfield to obtain the latest information available on some of the mines which had been examined in the early part of the survey.

During September and October Mr. Hobson made preparations for field work in the Mt. Margaret Goldfield, and attended to routine duties in Head Office during my absence.

On the 30th October Mr. Hobson proceeded to Laverton in the Mt. Margaret Goldfield, and was engaged on field work in the Laverton district until the 17th December.

During the periods he was at Head Office, Mr. Hobson made a number of petrological examinations of rocks submitted to the Survey by members of the general public.

R. S. Matheson, B.Sc., Geologist.—During the whole of January Mr. Matheson was engaged in drafting work connected with the completion of the report on the re-survey of the Yilgarn Goldfield.

Early in February he made a geological examination of proposed dam sites on the North Dandalup River in the South-West district for the Water Supply Department.

The latter part of February and the whole period until August was taken up by Mr. Matheson in completing the manuscript of reports on the Yilgarn district in collaboration with Mr. Hobson.

One week during this period was occupied by a visit to the southern portion of the Yilgarn Goldfield in order to obtain up-to-date information on some of the mines.

From the 26th August to the 4th September Mr. Matheson made an investigation of the geology in the vicinity of the Clackline fireclay deposit. The remainder of the month was spent in making preparations for field work in the Mt. Margaret Goldfield.

On the 4th October Mr. Matheson proceeded to Laverton and was engaged until the end of November on field work in the Laverton district. During this period he paid a number of visits to Agnew, in the East Murchison Goldfield, in order to select bore sites for the Country Water Supply Department.

Mr. Matheson was occupied during December in writing a report on his inspection of the Lancefield Gold Mine.

M. O'Halloran, B.Sc., Geologist.—At the end of March Mr. O'Halloran made an inspection of the old "Deep Lead" at Siberia in the Coolgardie Goldfield, and for the greater part of May was engaged in an examination of the underground workings of the Lancefield Gold Mine at Beria in the Mt. Margaret Goldfield.

The remainder of his time was taken up in the collection of survey data for field work which it was proposed to carry out in the northern part of the Yilgarn Goldfield, and a portion of the Mt. Margaret Goldfield.

K. R. Miles, B.Sc. (Hons.), Geologist.—After his appointment on the 11th October until the 26th October, Mr. Miles was engaged at Head Office in compiling base maps and other data for field work in the Mt. Margaret Goldfield.

On the 26th October until the 17th December he was continuously engaged on field work in the Laverton district. He then returned to Head Office, and for the remainder of December was engaged in drafting work on the field plans, and also in petrological examination of rocks collected by the field party in the Laverton district.

HEAD OFFICE.

Miss B. M. Bowley, B.Sc., and Mrs. G. Blatchford, B.A., Technical Assistants.—Miss Bowley, and, after her retirement, Mrs. Blatchford, continued to perform the ordinary routine work of the office, and, as opportunity offered, made an advance with the compilation of a full index of the Survey's publications. The last index of Geological Survey Reports was published in 1910, as Bulletin 60, and progress has been made as rapidly as possible with a new index, which will give reference to all publications since that date.

Reports following on the work of the staff are attached, except where such are made for departmental purposes.

In conclusion, I take this opportunity of expressing my appreciation of the work and loyal support of each member of the staff during the past year.

F. G. FORMAN,
Government Geologist.

NOTES ON A RECONNAISSANCE OF THE GASCOYNE, ASHBURTON AND FORTESCUE DISTRICTS.

(F. G. FORMAN, B.Sc.)

A reconnaissance of the above districts during September and October was undertaken primarily with the object of assisting prospectors in these areas.

On the whole, the workings visited were not sufficiently advanced, or were of insufficient value, to justify detailed descriptions, but the following notes on the more important centres visited are published in order to provide early information on the deposits referred to. As the district generally is to be the subject of detailed examination by officers attached to the staff of the Aerial Geological and Geophysical Survey of Northern Australia during the 1938 field season, detailed examination of the deposits was in no case undertaken.

SILVERSHEEN ASBESTOS LEASES. ASHBURTON GOLDFIELD.

The Silversheen Asbestos Leases are situated about eight miles by road east of Meilga Station homestead, and west of Mt. Elizabeth.

The asbestos, which is of the chrysotile variety, is silvery white in colour, and is obtained in seams of good quality material up to 4 inches wide, the average width being perhaps one inch. It occurs as an alteration product of dolomitic limestones which belong to the Brumby Creek beds of the Nullagine Series.

These beds in the locality of the leases strike approximately east and west and dip at angles of from 10 to 12 degrees to the south, and unconformably overlies schists of the Ashburton Series, which in this locality have an approximate east and west strike, and almost vertical dips.

The asbestos occurs in the dolomitic limestones in flat dipping veins parallel to the bedding planes and in steep dipping joint planes, close to the contact of an intrusive dolerite dyke, which strikes north and south, and has a practically vertical dip. The metamorphic effect caused by the intrusion extends only a short distance out from the dyke contact, and consequently the asbestos veins are fewer, and decrease in width with increasing distance from the contact. Development work shows that the greatest distance from the dyke to which the asbestos extends is about 17 feet.

Up to the present time the greater part of the development has proceeded on the eastern contact of the dyke. Sufficient work has been done to prove that asbestos also occurs along the western contact. Present development consists of the sinking of several shallow shafts close to the eastern dyke contact, and the connection of two of these by drives, from which a certain amount of stoping is proceeding. The Main Shaft is about 60 feet deep.

The dimensions of the deposit at present being developed on the eastern side of the dyke are limited. Development has shown that asbestos is not likely to be found further out from the dyke than about 17 feet. On the north the asbestos-bearing beds are limited by the outcrop of the contact of their base with the underlying metamorphic schists. About 500 feet south of this contact the limestones are cut off by a fault parallel to their strike. This fault has an upthrow to the south, and the limestone beds on the southern side, subsequent to their displacement, have been removed by erosion. The greatest possible length of the deposit is, therefore, about 500 feet. The effect of the fault on the south dipping limestone beds has been to reverse their dip close to the fault contact, so that the limestone is now in the form of a shallow syncline. The depth of the deposit is, therefore, limited by the depth below the present ground surface of the trough of this syncline, which at present appears likely to be about 100 feet. The depth, of course, will be less than this towards the outcrop of the base of the limestones, and at the fault contact it is not likely to be much more than 80 to 90 feet.

The asbestos on the western dyke contact still remains to be developed, but here again the dimensions of any valuable deposit will be limited to the same dimensions in length and depth, and probably to a similar dimension in width to that mentioned above for the asbestos on the eastern contact. The width, of course, will depend on the intensity of the metamorphic effect of the intrusive dyke on this side.

A second occurrence of chrysotile also associated with an intrusive dyke, has been found about one mile west of the workings described above. Its quality and the average length of fibre available have not yet been fully ascertained.

There is still ample scope for further prospecting in the district, as chrysotile asbestos is likely to be found as an alteration product wherever the Brumby Creek limestones have been intruded by dyke rocks.

THE MELROSE AND BELVEDERE GOLD MINES AND VICINITY, MT. STEWART STATION, ASHBURTON GOLDFIELD.

The country in the vicinity of the Melrose Gold Mine belongs to the Ashburton Series of metamorphosed sediments, presumably Pre-Cambrian in age, striking approximately north-west and south-east. The rocks consist of greywackes, quartzites and grits, with occasional bands of dolomitic limestone. In places, the series is intruded by basic dykes.

The Melrose Gold Mine is situated at the foot of and on the western side of a low hill, the core of which consists of a large mass of "bucky" white quartz, from which a number of quartz reefs extend in the form of "fingers," which lie generally parallel to the planes of bedding and schistosity of the country rocks.

The ore body in the Melrose Gold Mine consists of one of these quartz extensions from the main mass which forms the core of the hill. The reef is developed on the surface for a length of about 190 feet. It strikes approximately north-west and south-east, parallel to the bedding planes of the enclosing country rocks, and dips to the north-east at an angle of 45 to 50 degrees. Inspection of the surface outcrop, the 50ft. level and the bottom of the main shaft, which is 105 feet deep, indicates that the ore body has a decided pitch to the east at an angle of about 45 degrees.

The reef was encountered in a drive from the main shaft at the 50ft. level, and has been stoped from a point about 15 feet south of the shaft for a length of about 40 feet over a width of from 18 inches to 2 feet. The stope extends for some 15 to 20 feet above the back of the drive. About 60 feet south of the shaft on the same level the reef widens out to some 12 or 15 feet, and this width continues as far as the south face of the drive, which is about 100 feet south of the shaft. The reef has also been cut by a shaft 60 feet deep, which is situated on the line of the reef about 130 feet south of the main shaft.

The quartz constituting the ore body is extremely vughy, and is highly stained with iron oxides. The vughs and the iron staining are due to the alteration in the oxidised zone of the large amount of pyrite (or marcasite?) with which the quartz in the sulphide zone is impregnated. Although no unaltered sulphides were observed in the main workings of the Melrose Mine, it was obvious from an inspection of similar stone from other workings in the close vicinity, which had penetrated the sulphide zone, that the main reef would also contain large quantities of iron sulphides at depth.

From the appearance of the stone, and from the statement made by those in charge of the mine that the gold was very fine, it seems almost certain that the reef as far as developed, is heavily secondarily enriched, and it is therefore to be expected that, with downward continuation of the ore shoot into the sulphide zone, the gold values will decrease considerably.

I was informed by those in charge of the mine that they have obtained an over-all recovery of about 8 to 10 dwts. of gold from those portions of the reef which have been worked, and they also state that the face of the south drive at the 50ft. level is worth about 5 dwts. of gold per ton. On the other hand, Renzio and Party, who are now working the Belvedere Mine, and who previously worked the Melrose Mine on tribute, informed me that the south face of the 50ft.

level is very poor, and that the average value of the reef in the southernmost shaft, which the present owners of the Melrose Mine consider to be 5 dwts., is not more than $3\frac{1}{2}$ to 4 dwts.

In the wide part of the reef at the 50ft. level, and in the stope above this section, it is significant that a large tonnage of quartz on the footwall side of the ore body, has not been mined.

I consider that the statement, by those in charge of the mine, of an over-all recovery of 8 to 10 dwts., is probably correct, but there is some doubt as to the continuation of these values further to the south.

If Renzio and Party are to be believed, the average grade south of present developments is not likely to be greater than from 3 to 4 dwts. My own observations lead me to believe that the values at present being obtained, are due to heavy secondary enrichment, and that there will be a considerable decrease in values below water level.

After examining the main workings, I made an inspection of a number of outcropping reefs in the vicinity, which were said to carry payable gold. Samples were taken in my presence from a number of these reefs and afterwards doliied. All the samples so treated, 6 in number, failed to show any trace of gold, with the exception of one, which revealed several colours.

In my opinion, there is little prospect of developing other ore bodies in the vicinity, comparable in size to the main workings of the Melrose, although it is possible that isolated short shoots may be found. One such, about 10 feet in length, and 8 to 10 feet in depth, has been worked over a width of 6 inches to a foot by Renzio and Party. Such possible small shoots could not be relied on to increase the tonnage available for treatment.

The Belvedere Leases are situated about eight miles east of the Melrose Gold Mine and in similar country. The ore body being worked by Renzio and Party, who hold the main leases, consists of quartz lenses and stringers up to 2 feet wide in places, which occupy a sheared or faulted zone cutting across the country, and striking about north and south with a steep dip to the west.

In Renzio and Party's main shaft the gold is found in quartz leaders, and also in the adjacent sheared rock material, which contains bunches of galena, cerussite and other altered lead minerals.

The ore bodies on these leases showed clear signs of secondary enrichment, and the gold values are likely to decrease if followed into the sulphide zone. Numerous other narrow quartz reefs and leaders in the vicinity are said to carry gold, but to what extent I was unable to judge as no samples were doliied.

Renzio informed me that he intended to install a three-head battery to treat the stone from his leases, and at the present time is boring in an adjacent creek bed, with the object of obtaining a water supply for crushing purposes.

A group of prospecting areas to the north of the Belvedere Leases was inspected, but the extremely narrow quartz leaders being worked on these by the holders are too narrow to be profitably mined. The prospectors are young men with no previous experience in mining, and in my opinion are wasting their time.

THE YAMPIRE GORGE CROCIDOLITE DEPOSITS, HAMERSLEY RANGE, NORTH-WEST DIVISION.

Yampire Gorge in the Hamersley Range carries a north flowing tributary of the Fortescue River and lies about 20 miles due south of Mulga Downs Station.

The Hamersley Range is made up of flat dipping sediments belonging to the upper part of the Nullagine series, presumably of late Pre-Cambrian age. The rocks exposed in Yampire Gorge consist predominantly of quartzites interbedded with siliceous or cherty ironstone. The deposits of crocidolite asbestos are everywhere associated with a banded ironstone which is highly siliceous and of a dark brown colour.

Bands of crocidolite occur at two horizons in the sedimentary beds. The lower horizon is close to the base of the cliffs of the Gorge, and contains a vein of crocidolite averaging about $2\frac{1}{2}$ inches in thickness and lying parallel to the bedding planes of the ferruginous ironstone in which it occurs. The crocidolite immediately overlies a thin bed of dark green massive rock, which by microscopic examination appears to have a composition identical to that of the fibrous crocidolite. This massive rock, which weathers to a dark brown colour, is thought to be identical with potential crocidolite, which is commonly associated with the fibrous variety in the deposits of the Cape Province of Africa.

The second crocidolite-bearing horizon lies at an elevation of about 200 feet above the base of the cliffs, and the crocidolite here occurs in a number of narrow parallel veins lying in the bedding planes of a ferruginous quartzite in an exactly similar manner to the asbestos in the lower horizon. In this upper horizon some half dozen veins of crocidolite varying in width from one inch to $\frac{1}{4}$ or $\frac{1}{8}$ of an inch are distributed through a ferruginous quartzite band over a width of about five feet, the aggregate thickness of crocidolite being about $4\frac{1}{2}$ inches.

My examination did not include all the prospecting areas being worked, but from information supplied to me in conversation with a number of prospectors I was able to form the opinion that all the crocidolite occurred in a manner similar to that described above.

A considerable amount of fibre is available in the cliff faces and can be won without much difficulty at the outcrop. It is doubtful, however, whether the narrow width of the veins will permit of these deposits being worked economically by underground methods, owing to the large amount of worthless rock material which would necessarily have to be removed in recovering the valuable fibre.

These deposits are interesting in that they appear to be similar in their mode of occurrence to the deposits of blue asbestos or crocidolite, in Africa. The asbestos in the Cape Province of Africa is commonly referred to as "Cape Blue," and is found in seams interbedded with the banded ironstone of the lower Griqua Town series of the Transvaal system, which is probably the equivalent in age to the upper part of the Nullagine series in Western Australia. These deposits are fully described in Memoir No. 12 of the Geological Survey of the Union of South Africa. The conclusion is there arrived at that the crocidolite is of sedimentary origin and has been formed by the metamorphism of ferruginous quartzites, which are postulated to have had an original composition peculiarly suited to the formation of crocidolite.

Although no determination of the chemical composition of the Hamersley Range ferruginous quartzites has yet been made, the striking megascopic resemblance and mode of occurrence of the rocks to the abovementioned published description, suggest that they are similar in all respects.

PROGRESS REPORT ON THE GEOLOGICAL SURVEY OF THE YILGARN GOLDFIELD (NORTH OF THE GREAT EASTERN RAILWAY).

(By H. A. ELLIS, B.Sc., A.O.S.M.)

The re-survey of that portion of the Yilgarn Goldfield situated south of the Great Eastern Railway having been completed in February, 1937, and the manuscript covering a report on the geology of that area compiled, the writer was instructed to continue the survey in that portion of the goldfield extending northwards from the Great Eastern Railway.

Field work was commenced by the writer and one field hand on November 8th, and continued until December 11th, when the field season ended.

During this period the boundaries of the Greenstone belt, extending from Hope's Hill northwards to Bullfinch, and a portion of the granitic and gneissic country westwards of the Bullfinch-Southern Cross Railway line were mapped.

The detailed knowledge of the structure of the schistose rocks obtained in the short period of investigation was insufficient to enable the broad geological structure worked out for the southern portion of the field to be correlated with that to the north. Further field work is necessary before this aim can be achieved. Several features of geological and economic importance noted during the survey of the southern part of the goldfield were found to recur in the northern part of the field so far investigated. Evidence available near the better exposed margins of the greenstone country confirms the conception of the processes of granitisation, the presence of which was suspected from an inspection of available outcrops near Southern Cross, and the occurrence of migmatites in some of the "rocks"^{*} situated some distance from the greenstone areas suggests that this process has been widespread.

Many of the bare "rocks" examined in the country west of Bullfinch are massive, fine, medium, and in places coarse-grained biotite granites, similar in all respects to the "rocks" of the southern part of the field. The impression gained so far of the granitic and gneissic country is that there are extensive areas of replacement gneisses showing structure lines contiguous to the margins of the greenstone belts, and that much of the sandplain country is of a similar nature. The granite "rocks" appear to represent bosses probably underlain by granite masses of batholithic dimensions.

In several places in the areas occupied by sandplain, sections are exposed showing the passage downwards from a sandplain surface through a ferruginous laterite to decomposed replacement gneiss. These occurrences tend to strengthen the conception of the origin of the sandplains formed during the survey of the southern portion of the field, namely, that they were largely residual soils overlying areas of rock of granitic or gneissic composition.

*"Rocks"—A term in common use to designate the numerous elevated or flat granite outcrops which occur throughout the district.

The relation of gold-mining centres to the geological structure established for the southern part of the field is exemplified in the case of the main Bullfinch Mine, which occurs in a steep northerly pitching dragfold in a band of ferruginous quartzite and associated amphibolite schists, the minor structures of the mine being associated with a major west limb dragfold structure in the amphibolite schists of the Greenstone Series. Dragfolds in the first outcrops of jaspilite north of the Bullfinch Mine show a steep southerly pitch, and this suggests the occurrence of a synclinal crossfold immediately north of Bullfinch. Unfortunately, a wide alluviated area devoid of outcrops adjoins the mine to the north and obscures the necessary confirmatory evidence.

The rock types noted so far in the greenstone series are similar lithologically to those of the Southern Cross area. Two areas of rocks of ultra-basic composition, one of which is similar in all respects to the anthophyllite schist which outcrops so prominently in New Zealand Gully, south of Southern Cross, have been identified for the first time in this district. The anthophyllite schist outcrops prominently on Loc. 415, 4 miles S.S.E. of Corinthian, and the other patch of ultra-basic rock evidenced by a siliceous, bouldery and sometimes schistose ferruginous outcrop, in which specks of chromite are freely scattered, occurs on Loc. 567, 4 miles N.W. of Corinthian.

Several small outcrops of fresh massive quartz-dolerite have been noted on Loc. 581 and near the 18 mile peg on the Southern Cross-Bullfinch road, just south of Bullfinch.

No detailed work on the mining groups was undertaken during the short field season, but it is intended to carry out this work in conjunction with regional geological survey during the 1938 field season.

THE RIVERINA GOLD MINE, RIVERINA (30 MILES WEST OF MENZIES, NORTH COOLGARDIE GOLDFIELD).

(By H. A. ELLIS, B.Sc., A.O.S.M., Geologist.)

INTRODUCTION.

An examination of the accessible workings of this mine was made on November 22nd and 23rd with the object of determining as far as possible the nature of occurrence of the auriferous bodies at present being worked in the mine.

It was possible to determine the pitch of the ore shoots, the faulting system which has dislocated the lodes, and the distribution of the lodes, and suggestions for the future development and prospects of the mine can now be made. During the examination the writer had the valuable help of Mr. N. Butcher, underground manager, and his careful observations made during the course of development work at the 300ft. and 400ft. levels greatly aided the progress of the examination.

The results of the inspection confirmed many of the conceptions of the geological features of the mine already held by the present management, and future development work should now proceed with some degree of confidence.

GENERAL GEOLOGY AND STRUCTURE.

The ore bodies consist of metasomatic replacements in well defined shear zones of considerable length in amphibolite schist, having a general north

and south strike and a practically vertical dip. The outcrop portions of the lodes have been worked in the past to a shallow depth, and in the oxidised zone the country has a schistose appearance, but becomes massive and jointed in depth. The country rock has all the appearance of being a metamorphosed doleritic lava which has been sheared in vertical planes in a general north and south direction, and subsequently mineralised along the shears for an average width of 4 to 5 feet over at least half a mile in length and 500 feet in depth as exposed in the mine workings.

The lodes are dislocated by several strong faults, and an intricate system of jointing has been set up in the wall rocks, along which pegmatite dykes, both large and small, have been injected. Some of these dykes cut the lodes without displacing them, and some occupy fault planes, along which movement of the lodes has taken place.

The mineralisation along the shears has resulted in the formation of a banded type of ore, very hard, in which silica and bands of partially replaced but silicified country rock predominate. Mineral sulphides and free gold occur, scattered unevenly through the banded ore, with local concentrations sometimes on one wall and sometimes on the other. Arsenopyrite, pyrite (pyrrhotite?) galena, zinc blende, and free gold were recognised, while chlorite, biotite and garnet, along with a dark coloured amphibole and silica, constitute the main non-metallic minerals seen in the ore. The lodes frequently have no defined walls, and mineralisation has proceeded some distance into the wall rock in some cases, the limits of payable ore having to be determined by sampling.

Granite outcrops in the flat country several miles to the east of the mine.

THE UNDERGROUND WORKINGS.

The workings from the north and south main shafts have been carried down to a depth of about 400 feet vertically, and stoping above this level has been carried out north and south from both shafts. In the northern workings only one lode has been found and worked, while in the south workings two parallel lodes, some 30 feet apart, have been mined. On the 300ft. level the ore channel has been proved to exist over a length of 2,600 feet and six ore shoots, totalling some 1,240 feet in stope length, have been found profitable to mine at this level.

The shear zones have been proved to carry payable values at the 400ft. level, and winzes down to the 500ft. level throughout the length of the workings have shown payable values and workable widths to this depth.

North of the new main shaft in the northern workings the lode has been cut off by a fault which has thrown the ore body to the west. The lode has been located in the north side of the fault at the 300ft. level, and its northerly continuation can now be followed for a considerable distance to the north under a line of old surface workings. Further north the lode will be found to be displaced to the east as indicated by a step across in this direction in the line of old surface workings. Development by driving in this direction has excellent prospects, as two known shoots are already indicated north of the new main shaft by surface workings.

The drive south on the bottom level of the north shaft encounters a faulted zone, and the lode is here

faulted to the east, south of the fault. As far as can be ascertained from the stoping, the ore shoots in the northern workings are practically vertical.

In the southern workings being developed from what is known as the south shaft, two parallel shears containing payable ore have been worked at the 400ft. level, the western one of which has been worked in the past from the surface down to No. 4 level in a southerly pitching stope. The shoots in these lodes pitch south at 45 degrees and are not directly opposite each other in the two parallel lodes, the western shoot being situated south of the shoot in the east lode at the 400ft. level, being thus arranged *en échelon*. A winze sunk on the western lode for 100 feet below the No. 4 level at the end of the south drive shows good values and payable width at the bottom according to mine plans. A short drive from the bottom of this winze shown on the mine plan is obviously off the shear zone.

SUGGESTED FUTURE DEVELOPMENT.

There are no geological structural problems facing the development of the mine and the nature of the ore bodies, the distribution of the ore shoots, and the proved length and depth of the structural features, namely, the shears, in which the ore bodies occur, make only the occurrence of payable values and widths at the 500ft. level the deciding factor in contemplating development work from this level.

The winzes already sunk to the 500ft. level reveal payable values and widths at individual points over the length of the ore channel already driven on (2,600 feet), and prospects of locating new shoots whilst driving north and south at this level are very encouraging.

The best immediate development work, having in mind the winning of ore and the proving of the ore bodies, could be undertaken by continuing the north drive from the No. 4 level at the south shaft, and the sinking of the new main shaft to 500 feet. In the latter case the winzes are already down and a large block of ore would be available for stoping.

The obvious necessity also exists for the sinking of the south shaft to 500 feet, and the driving of a level north on the east lode at the 500ft. level to connect with south drives from the same level from the new main shaft. The continuation of this level north from the new main shaft is also necessary, and besides greatly facilitating the economic haulage of ore, this work would, if undertaken, have very good prospects of revealing new shoots of ore.

GENERAL REMARKS.

The workings south of the south shaft are approaching a fault zone, but the displacement will not be great, and will probably be to the east, as indicated by surface workings in this direction.

In the mining operations associated with the joining of the new main shaft and the south shaft on a 500ft. level, no geological problems with which the present management is not familiar would be encountered. The shoots are not seriously displaced by faulting between the 400ft. and 500ft. levels as is revealed by the winzes from the 400ft. level, and while driving south and north on the proposed 500ft. level from the south shaft the two shear zones give excellent promise of the recurrence of south pitching ore shoots above and below those already worked south and north of the south shaft at the 400ft. level.

The prospects of this mine down to the 500ft. level as revealed by the nature of the ore shoots at the 400ft. level and the winzes down to 500 feet are shown to be very good in the present state of the workings, and there is no obvious geological reason why payable values should not be expected below the 500ft. level.

As a future underground prospecting campaign, parallel ore bodies which may not have outcropped could be sought for in the country rock by means of a diamond drill. A study of the manner of occurrence of the shoots already worked would have to play a large part in the location of these bore sites.

MORLEY'S FIND (SIX MILES NORTH OF RIVERINA AND 30 MILES WEST OF MENZIES, NORTH COOLGARDIE GOLD-FIELD).

(H. A. ELLIS, B.Sc., A.O.S.M., Geologist.)

Rich patches of gold bearing quartz have recently been found in this locality in a belt of folded sediments and greenstones of sedimentary origin underlying a soil-covered flat immediately east of a ridge of fresh amphibolite schist, which probably represents schistose basaltic or doleritic lavas. The regional strike of the schistosity is north and south, and the dip steep to the east. Steep opposed dips are frequent in the schistose amphibolites to the west indicating tight folding.

Extensive outcrops of fine grained biotite granite occur half a mile north-west of the main mining localities, and numerous smaller granite masses, pegmatite dykes, aplite dykes and barren quartz reefs traverse both the fresh looking greenstone and the weathered sediments in which the reefs occur.

The quartz reefs so far found to be gold bearing lie parallel to the planes of schistosity of the country rock, and are much faulted with pegmatite and aplite dykes frequently occupying the fault planes. In most cases the relation of the pegmatite dykes to the quartz reefs is clear, the dykes being younger than the gold bearing reefs, but in one instance, on Morley's P.A. No. 781U at the south end of the area, the relation of a particularly rich concentration of auriferous quartz to a pegmatite dyke in transverse contact with it is not so clear. Unfortunately, mining operations have destroyed much of the evidence which would have revealed the interrelation of these two bodies.

With the exception of the gold occurrences in Monkcom's P.A. No. 793U, and Morley's P.A. No. 781U at the north and south ends of the area respectively, the auriferous bodies are of the lenticular quartz reef variety occurring in shear planes on or near the axial plane of a tight fold varying in width from five feet to a few inches, with rich short shoots of gold bearing quartz showing the influence of secondary enrichment. The deepest workings seen were 50 feet, and in each case the high surface values had terminated at or before this depth. The pitch of the shoots at the north end of the area is at about 45 degrees to the south and coincides with the pitch of the quartz filled dragfold being worked on Monkcom's P.A. No. 793U.

In the workings on this latter P.A. the surface workings are in the tightly folded synclinal portion of a dragfold, and in a shaft 40 feet deep sunk 40

feet south of the open cut, an anticlinal crest of a quartz filled fold appears in the bottom of the shaft pitching south at about 45 degrees. The nature of this occurrence has been explained to the prospector and the best method of mining it by an inclined winze demonstrated to him. The possible recurrence of similar pitching quartz bodies below and above the one already being worked, taking into consideration the direction of the regional dip of the strata, was also stressed.

The two short, nearly horizontal shoots of quartz which gave sensational values in shallow workings just below the ground surface on Morley's P.A. No. 781U (to be converted to a Reward G.M.L.) were found on close examination to be occurring in the westerly dipping portion of a gentle dragfold, the upper limb of which has been eroded. In the more southerly of the two workings from which the specimen stone was taken, the western wall rocks, though highly weathered, disclosed one perfectly preserved dragfold, the axis of which was horizontal, and whose axial plane dipped steeply to the east, showing that the westerly dipping limb in which the auriferous quartz occurred unquestionably formed part of a gentle dragfold in an incompetent bed in a series of steep easterly dipping strata.

There were probably similar concentrations of auriferous quartz above those now worked out where the dip changed from west to east in the strata which have been eroded. The structure has almost certainly been repeated in the upward continuation of this fold, and if auriferous quartz had been deposited in it as seems most likely, then the gold has gone to form alluvial deposits to the east.

The more northerly of the shallow workings in which the rich stone was found appears to have a gentle southerly pitch, while the pitch of the more southerly workings appears to be horizontal. A slight change of pitch is indicated here. The westerly dipping bed has recently been found between the two worked out shoots, and although the wall rock is exactly similar, there is no gold-bearing stone in this central hole.

The concentration of values seems to be confined to the westerly dipping limb, and possible recurrences of gold ore may be found by prospecting along the strike north and south of the present workings or by sinking a winze in the easterly dipping beds below the worked out deposits in the hope that the dip will again change to the west with a deposition of quartz at or near the bends.

The pegmatite dyke seen at the south end of the south patch cutting across the shoot, and from which point the shoot extends in a northerly direction, may or may not have been responsible for the introduction of the auriferous quartz in the immediate vicinity. Insufficient evidence is as yet available from the present workings to determine this point. There is a considerable development of pegmatite and granite dykes in the vicinity, and none of the workings, either in the shaft sunk to cut a quartz reef north of the rich patches or in an open cut and trenches on the same reef, reveal the true manner of occurrence of the dykes.

The conception that the auriferous quartz is derived from a granite magma is considerably strengthened by the presence of good gold values

in quartz showing small flakes of biotite mica dollied from the reef on Butcher and Sheen's P.A. No. 787U to the north.

The several reefs so far opened up show that the high values obtained at the surface do not continue below 50 feet, that the shoots are short and of irregular value, and that the thickness of the reefs is extremely variable, both along the strike and down the dip. The deposition of gold in cellular portions of the quartz, as well as in joint planes in decomposed wall rock, indicates the influence of local enrichment due to solution and deposition of primary gold. Prospecting work done to date (November, 1937) shows that the country rock is liberally intersected with pegmatite and granite dykes and that the reefs are faulted.

The area is one admirably suited for the prospector, but the work recently done by the Riverina Gold Mining Company, who held sampling options on the areas, has shown that there is not sufficient thickness of quartz nor continuity of values at even shallow depths to meet the requirements of a mining company.

The flat soil-covered country south of Monkcom's P.A. No. 793U at the northern end of the locality, and east and north of Morley's P.A. No. 781U at the south end, through which a drainage channel runs in a south-easterly direction, is likely to contain alluvial gold, and offers excellent chances of giving payable results from a series of closely spaced hand bores sunk to bed rock.

KING OF CREATION GOLD MINE, MT. MARGARET GOLDFIELD.

(By R. A. Hobson, B.Sc. (Hons.).)

The King of Creation Gold Mine is situated approximately 36 miles north of Laverton, and two miles east of the Erlistoun Road. The operating company holds a mining reserve and four leases (2289T, 2141T, 2327T, 2224T). At the time of inspection (November, 1937) work was confined to lease number 2141T.

The rocks in the vicinity are mainly metamorphosed sediments, consisting of phyllites, graphitic schists and quartzites, with lenses of massive greenstone. The broad distribution of these rocks has not been mapped, but they are known to extend several miles eastward of the workings, and a lesser distance westward. In the workings they have a general north strike, and dip westward at steep angles.

Access to the main workings is by a vertical shaft, approximately 130 feet deep. North from the main shaft the Water Shaft and the North Shaft give access to smaller workings, which are not connected with each other.

DESCRIPTION OF ORE BODIES.

Main Workings.—The main workings consist of an open cut and two levels—at 96 feet and 145 feet respectively. The 96ft. level consists of three approximately parallel drives, having an *en echelon* arrangement and connected by crosscuts. Going south the drives are stepped west, and will be referred to as the East Parallel Drive (this drive is north of the Main Shaft), the Drive off Main Shaft, and the Main South Drive respectively. From about

the centre of the Main South Drive a winze gives access to the 145ft. level, at which level approximately 160 feet of driving has been done.

At the surface the open cut has a length of 270 feet, a maximum width of 40 feet, and an average width of 25 to 30 feet. The open cut extends to the 96ft. level, and has been the main source of ore crushed. At the 96ft. level the ore body has a stope length of 290 feet, and a maximum width of 40 feet. The ore body is of the lode type, and consists of quartzite, with minor quantities of phyllite, and varying quantities, frequently large, of vein quartz. Its strike and dip are parallel to that of the enclosing country, i.e., strike is north and dip west at steep angles. Best values are reported to be in vughy quartz or in open textured quartzite. At the south end of the open cut the lode formation is seen to continue at the surface for 150 feet, but values are reported to be unpayable.

Normal water level is at 100 feet, and therefore all ore from the open cut has come from within the zone of oxidation.

The lode formation at the 145ft. level is quite defined, but values are reported to be very erratic. Although this level is 45 feet below normal water level the rocks are still very weathered, and the zone of primary ore has not yet been reached. No work was in progress at this level at the time of inspection.

A structural control is not apparent from an examination of the present workings, but the general *en echelon* arrangement of the ore bodies suggests control by folding. There is nothing to suggest that the lode formation will not continue downwards, but the possibility of lower values being obtained in the primary ore due to the absence of secondary gold should be borne in mind.

Above the South Drive off the Main Shaft the ore body has a stope length of 100 feet, a maximum width of 10 feet, and an average width of approximately 8 feet. A continuation of this ore body north of the shaft consists of stringers of quartz in phyllite. No work was being done in this ore body at the time of inspection. In a winze and a crosscut, which intersected this lode formation 45 feet below the 96ft. level, values were found to be unpayable.

In the East Parallel Drive a large body of quartz has been driven on for 90 feet, but, except where originally intersected in the crosscut from the North Drive off Main Shaft, has been found to contain no values.

Water Shaft Workings.—The Water Shaft is 122 feet deep, and there are two levels at 60 and 100 feet respectively. Numerous small bodies of quartz have been intersected, but none have been stoped. A small quantity of ore has been obtained from an open cut, which is 70 feet long and has an average width of 6 to 7 feet.

North Shaft Workings.—The north shaft is 100 feet deep, and there are three levels at 40, 60 and 100 feet respectively. A quartz reef, striking and dipping parallel to the country, and having at the surface a length of 230 feet and an average width of approximately 8 feet, has been worked by an open cut to the 40ft. level, and stoped from the 100ft. level. The maximum stope length is 80 feet at the 100ft. level. Stopping is confined to the footwall portion of the reef, and there are also large quantities of quartz

in the drive south of the stope. Payable values were evidently confined to portions of the reef. No work was being done on this reef at the time of inspection.

PRODUCTION.

For the periods 1904-1913 and 1926-1937 Mines Department records show that 20,475 tons of ore have been crushed for a total of 4,464.84 ounces of gold, including only 11.66 ounces of specimen gold. From 1913-1926 no production is recorded. The average grade of the ore produced is therefore 4.4 dwts. An inspection of the yearly returns indicates that, except for 1904, the yearly average grade has not exceeded 9.4 dwts. gold per ton. The ore bodies are therefore to be regarded as of low grade.

CONCLUSIONS.

At the time of inspection work was confined to one ore body, from which the greater part of the ore crushed has been obtained. The average grade of the ore produced has been low. The present examination has not revealed any geological difficulties, and no reason is apparent why the lode formation should not continue downwards. The presence of the best values in vughy quartz or open textured quartzite is suggestive of secondary enrichment. No free gold, visible to the naked eye, is reported to be present in the ore body. All the ore so far produced has come from the zone of oxidation, and although the workings extend below normal water level the zone of primary ore has not yet been reached. Any general increase in values immediately above the zone of primary ore should be regarded as evidence of secondary enrichment, and values in the primary ore should be expected to drop away.

There appear to be no geological difficulties to complicate the testing of lodes immediately below the present workings.

REPORT ON THE CLACKLINE FIREBRICK CLAY PITS (SOUTH-WEST DIVISION).

(By R. S. Matheson, B.Sc.)

The brickyards embrace portions of Locations 18, 19, 171 and 172 (Lands Dept. Litho. 2A/40), and are situated on the north side of the Great Eastern Railway approximately one mile west of the Clackline Station.

GENERAL GEOLOGY.

The rocks of the area bear a striking resemblance to those of the Yilgarn System,* and consist of interbedded greenstones and erosion sediments which have undergone a high grade metamorphism. The main rock types are schistose greenstones, mica schists, sillimanite schists and garnet schists, and they have been intruded by granite and epidiorite dykes. The general strike is N.N.W. and the dip 70° W.S.W. The country has been highly folded and sheared, but too small an area was mapped to arrive at any reliable structural interpretation. Some evidence suggesting the existence of minor structure can be seen in the workings, but it could not be interpreted.

* G.S.W.A. Bulletin No. 97 in preparation.

Weathering has been the main process in the formation of the clays. The quality of the clay depends on the extent of weathering and the nature of the parent rock, and variations in quality are bound to occur vertically and along the strike of any rock band.

The following materials are used by the management in the production of the firebricks.

1. *Kaolinised Schistose Greenstone* (No. 1 Clay).—This material is puggy and white, and has a banded appearance due to the presence of black streaks. A gradation from this material, through biotite schist to only partly weathered greenstone schist, was observed. This alteration is identical with that seen by the writer in the underground workings of Marvel Loch Gold Development, N.L.** The kaolinised schistose greenstone is the predominant type of clay and its occurrence can be seen on the accompanying map (Plate I.).

2. *Kaolinised Dolerite* (No. 3 Clay).—This material is blocky, cream coloured, and contains scattered black specks, but there is no suggestion of banding. The clay is believed to be a weathering product of a dolerite dyke, because of its similarity to the decomposition products associated with the dolerite dyke outcropping in the creek, east-south-east of the north pit.

3. *Sillimanite Schist*. (No. 4 Clay).—The material is white to straw coloured, and sillimanite can be seen in the hand specimen. The sillimanite is a metamorphic mineral, and variations in the percentage of sillimanite in the rock are bound to occur.

4. *Kaolinised Mica Schist*.—The only occurrence of this material is in the crosscut off the east side of the north pit, and a gradation from white kaolin to hard mica schist was observed.

Mica schist is used in the manufacture of some bricks and at present is obtained from a point about one mile north of the brickyards. A band of mica schist occurs in the north pit and should be tested for its suitability in brick making as it is more conveniently located for cheap mining.

5. *Pegmatite*.—Decomposed pegmatite veins and stringers occur abundantly throughout the workings, and the material is being used as a "filler."

NORTH PIT.

The pegs, which were placed as guides for stripping the overburden from the useful clay bands, are shown on the map, but a little explanation is necessary.

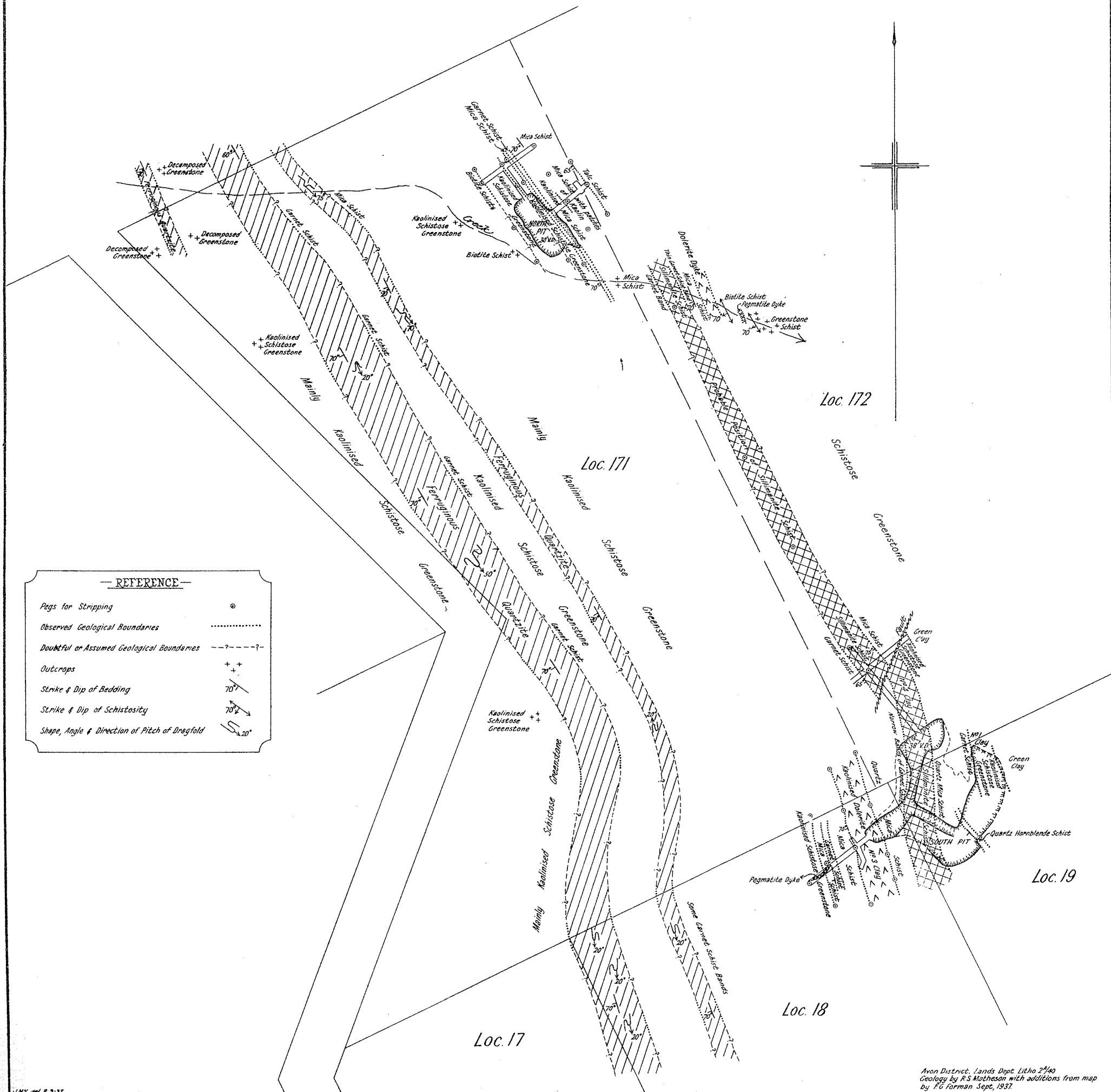
The kaolinised schistose greenstone band is divided by a fissure along the north drive, into two qualities of clay, and the position of the fissure at the surface has been pegged. The higher quality kaolin lies to the east of the fissure, and the quality decreases as the biotite schist, in the face of the west crosscut, is approached.

The kaolinised mica schist band in the crosscut from the east side of the pit is 18 feet wide, but apparently lenses out before the east crosscut from the north drive is reached.

** G.S.W.A. Bulletin No. 98 in preparation.

GEOLOGICAL MAP
 IN
 THE VICINITY OF
CLACKLINE FIREBRICK CLAYPITS

Scale 2 chains to an inch



Tale schist* is showing in the face of the crosscut from the east side of the pit, and the west boundary has been pegged at the surface. The extent and usefulness of the tale schist, however, has yet to be investigated.

SOUTH PIT.

No explanation of the pegging is necessary but a few other things must be mentioned.

Judging from surface evidence the width of the kaolinised schistose greenstone in the end of the crosscut off the west side of the pit is much greater than that already exposed in the crosscut.

The kaolinised dolerite (No. 3 Clay), owing to its mode of origin, may cut across the strike of the country or may not persist along the strike.

Sillimanite schist, which is thought to be the northerly continuation of the sillimanite schist in the south pit, was found outcropping in the creek near the north pit, and the probable position of the bed between these two places is shown on the map.

The green clays disclosed in the south pit are decomposition products of schistose greenstone and may be stained with nontronite. These clays are of little use commercially as they cause excessive shrinkage.

There is obviously some discrepancy in the mapping of the geology in the workings off the north end of the south pit, but only further development work will clear up this point. Since garnet is a metamorphic mineral, the garnet schist will occur sporadically, so that the absence of garnet schist in the north drive at the boundary of the sillimanite schist does not refute the presence of faulting as shown.

* This is now believed to be only a decomposition product of the mica schist.

LANCEFIELD GOLD MINE. MT. MARGARET GOLDFIELD. (By R. S. MATHESON, B.Sc.)

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GENERAL REMARKS.

The Lancefield Gold Mine is situated at Beria, approximately 5 miles north-north-west of Laverton, in the Mt. Margaret Goldfield.

The area is featureless, except for a gentle rise in the country to the south-east, towards the Mt. Crawford line of hills.

The Lancefield G.M. Co. holds twenty leases embracing an area of approximately 371 acres, and these are shown on the accompanying geological plan (Plate II.). Mining operations in the past have been carried out on G.M.L's. 715T, 806T, 2221T and 2225T, but at present (November, 1937), work is confined to the latter three leases. Preparations are being made to retreat accumulated tailings.

The mine has been one of the largest producers in the State, and from 1899 to 1937 1,221,166.98 tons of ore were treated for an average value of 7.34 dwts. of gold per ton. The production table appears as Appendix A. at the end of this report.

Wells are the source of an adequate supply of water for domestic and mining purposes, ground water level being generally from 50 to 70 feet below the surface. Timber for fuel and underground use is unobtainable in the vicinity of Beria, and supplies are at present being carted a distance of about 30 miles.

GENERAL GEOLOGY.

The country rocks in the vicinity of the mine consist of metamorphosed basic lavas and tuffs, which have an average strike N. 30° E. and an average dip 40° south-eastward, and these are referred to throughout the report under the general term "Greenstone." Interbedded with the greenstones are several bands of ferruginous quartzite or jaspilite of sedimentary origin. It has been impossible to determine whether these bands of jaspilite are separate horizons, or whether they represent one bed which has been repeated by folding. The rocks are highly folded, and have been intruded by granite and quartz porphyry. Mapped with the granite, and undifferentiated from it on Plate II., are large areas of gneiss, granitised greenstone, and hybrid rocks, which are considered to owe their origin to the replacement or assimilation of large portions of the greenstones by the invading granite. All the rocks are presumed to be of Pre-Cambrian age.

Exposures in the vicinity of the Lancefield Gold Mine are very poor owing to deep weathering, and large areas are entirely masked by alluvium. The true nature of the greenstones was only determined after examining the exposures in the mine workings and bore cores.

Areal mapping, now in progress, suggests that the Lancefield ore body is situated on the eastern limb of a south-easterly pitching anticline. The main structure is complicated by minor folds, one of which has an important influence on the Lancefield ore body, and is referred to further in the section of this report dealing with recommendations and conclusions. This fold is indicated at the surface by a marked change in strike, near the south-west corner of the Lancefield group of leases, from N. 30° E. to N. 35° W.

The easterly pitches of dragfolds observed in the underground workings of the Lancefield G.M. would not normally be expected in the south-easterly pitching structure described above, and are thought to be due to local crossfolding.

THE COUNTRY ROCKS.

Information concerning the country rocks is meagre, owing to the small amount of crosscutting in the mine, and the almost complete absence of petrological descriptions of the bore cores, which themselves are not now available for examination.

Footwall Country.—Massive, greyish, coarse-grained greenstone, grading through greenstone schist to tale schist, constitutes the major portion of the footwall country. The footwall country is thought to have originally consisted entirely of the massive type of greenstone, the schists having been produced from it by shearing. The degree of dynamic metamorphism determines the nature of the country rocks, and the presence of tale schist indicates areas which have undergone the greatest changes. This fact has been useful in interpreting some of the geological structures in the underground workings. The footwall rocks are believed to be mainly of tuffaceous origin, and they are very susceptible to mineralisation.

Hanging Wall Country.—Exploratory work in the hanging wall country has disclosed metamorphosed basic lava. In contrast to the greyish colour and sheared nature of the footwall country, the hanging wall country has a dark greenish colour and generally a blocky jointing. The hanging wall rocks are also remarkably free from mineralisation.

The hanging wall country has been penetrated in very few places in the underground workings, and is best exposed in a short south-east crosscut off the north drive, No. 5 level.

The core of bore No. 5 (new) was megascopically examined by Mr. K. R. Miles, and the hanging wall section of it was found to consist entirely of metamorphosed basic lava. The log of the bore is included in this report in the section on diamond drilling. The lava is bleached and schistose in places, and variations in grain size occur, indicating that there may be more than one flow.

Intrusives.—The greenstones have been intruded by quartz porphyry, and this rock is encountered in several places in the workings.

A quartz porphyry sill, showing assimilation and chilling at its contact, is intersected in the Nos. 9, 10 and 11 level crosscuts off the main shaft.

An underground diamond drill hole, bored south-eastward from the bottom of the inclined tunnel, intersected quartz porphyry in the footwall country below the No. 13 level, which is probably an offshoot from the sill encountered in the upper levels.

THE ORE BODY.

The Lancefield ore body occurs in the most conspicuous of the western jaspilite beds shown on Plate II., and has been formed by the mineralisation of the jaspilite and the injection of auriferous quartz veins presumably by solutions emanating from the granitic

magma. These quartz veins have penetrated the jaspilite, where it was fractured, sheared, and contorted, during folding.

The pay shoot occupies the full width of the jaspilite band, and has an average length of 560 feet and an average width of 20 feet. The general strike is N. 30° E., the dip 30 degrees in a direction S. 60° E., and the shoot pitches about 30 degrees in an easterly direction. The values are said to have been better on the hanging wall side of the ore body than on the footwall side, and the best values are generally in the vicinity of the quartz veins and stringers.

The main shoot has been stoped out from the surface to the No. 11 level (787 feet V.D.), and stoping is at present in progress between the No. 11 and No. 12 levels (860 feet V.D.).

The jaspilite has been mined in the past to a vertical depth of about 60 feet (reported* to have been the original ground water level) for some distance beyond the northern end of the main shoot. Abandonment of this section of the lode suggests that values became unpayable at depth, and that the stoped portion of this northern extension consisted of secondary enriched lode material overlying primary lode material with unpayable values. Owing to the inaccessibility of the upper levels, the oxidised zone could not be examined, but C. G. Gibson† states that—

“The zone of oxidation stops a little above the 200ft. level, there being a small percentage of sulphide in the stone from this level; below the sulphides come in heavily . . .”

At the No. 13 level (968½ feet V.D.) which is at present being developed, the ore shoot has a length of 110 feet, and an average width of 5 feet. These dimensions are considerably less than those at higher levels, and the reasons for this marked decrease in size of the ore body, and the possibility of its return to more normal dimensions at a greater depth, are discussed later in this report.** The lode material is, however, reported to show an improvement in values at the No. 13 level, which is an indication that the values will persist with depth.

Mineral Associations.—The principal gangue mineral in the ore is quartz, with minor amounts of calcite which occurs as veinlets, and graphite which, besides being disseminated through the lode, is occasionally found on the hanging wall of the ore body.

The sulphide minerals are pyrite, arsenopyrite, pyrrhotite, chalcopyrite and sphalerite. The two reports appearing as Appendices B and C to this report, and dealing with the mineragraphy of the Lancefield ore, were kindly made available by the manager of the Lancefield Gold Mine, Mr. Fox. They serve to show the close association of the gold with the sulphides, and to explain the difficulties of cyanide extraction.

STRUCTURAL CONTROL.

The Lancefield ore body is best described by reference to a plane parallel to the average strike and dip of the lode. The determined strikes and dips vary greatly throughout the mine workings, and referred to the reference plane the lode shows numerous

* Gibson, C. G., G.S.W.A. Bull. No. 24, p. 19.

† G.S.W.A. Bull. No. 24, p. 19.

** See page 71.

domes, basins and saddles, which have been formed by the intersection of two systems of folding, one set with an axis parallel to the pitch of the ore body, and the other practically horizontal.

If each system of folding is considered separately it is found that the ore body has been thrown by it into alternate anticlines and synclines, which have affected the width of the lode. The width of the lode is generally less at the crests of anticlines than in the troughs of the adjacent synclines. A study of conditions in the underground workings, under the influence of the two systems of folding combined, shows that the lode is thinner on the domes than in the adjacent basins. Owing to the lack of uniformity in the magnitude of the folding, the relation between lode widths and geological structure can only be recognised by comparing adjacent folds of similar magnitude. If the two systems of folding, and also the folds within each system, were of the same order of magnitude, the ideal case would be presented and the maximum lode widths would invariably occur in the basins, and the minimum lode widths on the domes.

A lack of assay plans for the greater part of the workings makes it impossible to correlate values and geological structure, but there is some suggestion that the basins, besides locally containing the greatest widths of ore, may contain the best values. The section of the lode embraced by co-ordinates 100' N. and 250' N., and between the No. 8 and No. 9 levels, is reported to have contained the greatest widths and the best values, and this is the largest basin in the mine.

The decrease in the dimensions of the ore body at the No. 13 level is thought to be due to its proximity to the crest of an anticline with a horizontal axis (see Plate V.). It might be argued that this decrease in length and width of the lode could possibly be due to a lensing out of the jaspilite lode formation. It seems much more probable as a result of actual inspection of the ore body, and the known wide distribution of the jaspilite, that the decrease in width and length of the ore shoot is due to the influence of a fairly strong anticlinal fold with a horizontal axis. No such exceptionally marked changes in the width and length of the lode have been produced by the anticlines belonging to this system, which were encountered in the higher levels, but the writer is of the opinion that the fold now being approached is of a greater order of magnitude than the preceding ones. It is not intended to imply that the No. 13 level is at the crest of this fold, but the crest is somewhere between this level and the point of intersection of the lode by the No. 5 bore (new).

The above interpretation of the structure is based on the following evidence:—

1. Dragfolds—

Small dragfolds belonging to both systems of folding are present in the workings, and the effect of geological structure on the width of the lode can be seen on a small scale in a few places.

2. Flattening in dip—

Between the No. 11 and No. 12 levels there is a noticeable steepening in the dip of the ore

body, but the dip flattens considerably as the No. 13 level is approached.

Further evidence for this flattening in dip in the vicinity of the No. 13 level was obtained from an underground diamond drill hole off the bottom of the inclined tunnel, which at the time of inspection (November, 1937), had passed through 102 feet of footwall country without encountering the lode. The general dip must be flatter here than it is at the No. 13 level (see Plate IV.).

3. Intense dynamic metamorphism—

In the winzes from the No. 11 and No. 12 levels more frequent changes in dip, associated with a thickening or thinning of the lode, are met with than in the upper levels.

The predominant type of footwall country between the No. 11 and No. 13 levels is tale schist, indicating more intense dynamic metamorphism than previously encountered.

4. Decrease in stope length.

The two systems of folding could easily cause the decrease in stope length at the No. 13 level. If an anticline with a horizontal axis crossed the pitching set of folds, there would be a tendency for the pitching synclines to close at the crest of the anticline and bring about a decrease in stope length.

5. Decrease in width of lode.

If the structure is anticlinal, the decrease in width of the lode at the No. 13 level conforms with the behaviour of the ore body observed in the higher levels.

6. Lode at depth.

The lode has been encountered on the pitch at a greater depth than the No. 13 level in bores Nos. 5, 6 and 7 (new), and a greater stope length than that at the No. 13 level is indicated. The shoot would be expected to regain gradually its original dimensions as the syncline succeeding the anticline inferred above is approached. (See Plate V.)

Faulting.—A vertical fault, which strikes north-westward and has slightly displaced the lode, is encountered in the long north drives throughout the workings, but it causes no serious obstacle to mining.

DIAMOND DRILLING.

The lode formation has been prospected at various depths by diamond drilling through the hanging wall country. In all, seventeen diamond drill holes have been put down, eight of which were drilled fairly recently. The presence of two sets of bores on the mine plans is rather confusing, particularly as the numbers overlap, and an attempt to clarify this has been made in the following table. The bores were all started vertically, but they have deflected up the dip, and the deeper the bore the greater is the deflection.

Unfortunately there are no petrological descriptions of the country encountered in these diamond drill holes, and in most cases the core has not been retained.

TABLE.

Old or New Bores.	Bore No.	Bore Depth.	Co-ordinates of Site.	Inclination.	Remarks.
Old	1	363	252' S. 497' E.	Vertical ...	Lode first encountered at 318ft. Value 42s. 26ft. wide
Old	2	335	92' S. 474' E.	Vertical ...	Lode at 288ft. Value 34s. 25ft. wide.
Old	3	360	387' S. 520' E.	Vertical ...	Lode at 307ft. Value 22s. 8ft. wide.
Old	4	380	531' S. 533' E.	Vertical ...	No lode.
Old	5	356	35' N. 591' E.	Vertical ...	Lode at 326ft. Value 20s. 14ft. wide.
Old	6	389	105' N. 449' E.	Vertical ...	Lode at 200ft. Value 3s. 2ft. wide.
Old	7	535	291' S. 641' E.	Vertical ...	Lode at 357ft. Value 38s. 12ft. 3in. wide.
Old	8	370	233' N. 569' E.	Vertical ...	Lode at 316ft. Value 32s. 12ft. wide.
Old	9	418	526' N. 641' E.	Vertical ...	Lode at 388ft. Value 28s. 18ft. wide.
New	1	996	229' N. 1,664' E.	Vertical ...	No lode.
New	2	967	498' N. 1,608' E.	Vertical ...	18ft. 6in. lode (from 924ft. to 942ft. 6in.).
New	3	1,236	734' N. 1,964' E.	Vertical ...	No lode.
New	4	335	766' N. 414' E.	Vertical ...	8ft. lin. lode (from 294ft. 5in. to 302ft. 6in.).
New	5	1,299	1,028' N. 1,899' E.	Vertical ...	11ft. 2in. lode (from 1,247ft. 5in. to 1,258ft. 7in.).
New	6	1,300	1,159' N. 1,830' E.	Vertical ...	10ft. 2in. lode (from 1,250ft. 10in. to 1,261ft.).
New	7	1,248	882' N. 1,934' E.	Vertical ...	10ft. 9in. lode (from 1,201ft. to 1,211ft. 9in.).
New	8	1,315	1,290' N. 1,758' E.	Vertical ...	10ft. lode channel (from 1,259ft. to 1,269ft.).

The values stated above are based on the old price of gold (£4 per ounce). The widths are not the true widths of the lode as all the bores cut through the lode obliquely.

The core of bore No. 5 (new) was megascopically examined by Mr. K. R. Miles, and as it is one of the deepest bores it should give a representative section of the country.

Log of Diamond Drill Bore No. 5 (new).

0' to 188'	No record.
188' .. 230'	Weathered fine-grained greenstone schist.
230' .. 266'	Slightly weathered greenstone schist.
266' .. 318'	Fine-grained greenstone schist with patches of more massive greenstone (probably sheared lava).
318' .. 413'	Dense greenstone with patches of schistose greenstone (lava).
413' .. 416'	Fine grained greenstone schist (probably sheared lava).
416' .. 462'	Dense greenstone (lava ?).
462' .. 475'	Fine grained greenstone schist.
475' .. 508'	Dense greenstone.
508' .. 518'	Massive fine grained greenstone, varying to medium grained greenstone.
518' .. 600'	Fine grained greenstone schist.
600' .. 666'	Massive dense greenstone (lava).
666' .. 674'	Massive dense greenstone (lava) (specimen at 671'), grades off to schistose greenstone.
674' .. 693'	Fine grained greenstone schist.
693' .. 703'	Dense greenstone with schistose bands.
703' .. 704'	Very dense dark greenstone band—edge of lava flow (?)
704' .. 716'	Dense greenstone with schistose bands.
716' .. 721'	Dense greenstone.
721' .. 750'	Medium grained greenstone partially schistose—varies to medium grained schistose greenstone.
750' .. 754'	Medium grained greenstone varying to amphibolite (?) (specimen at 754').
754' .. 763'	Massive medium grained greenstone with bands of schist.

763' .. 768'	Fine grained greenstone schist with more massive bands.
768' .. 777'	Fine grained greenstone schist.
777' .. 784'	Grades to medium grained partially sheared amphibolite.
784' .. 787'	Rather massive medium grained greenstone.
787' .. 825'	Fine grained greenstone schist.
825' .. 859'	Massive dense greenstone (lava) (specimen at 853')—with schistose bands and irregular quartz veinlets.
859' .. 915'	Fine grained schistose greenstone with more massive bands.
915' .. 922'	Massive fine grained greenstone (lava).
922' .. 930'	Fine grained greenstone schist, containing patches of actinolite schist.
930' .. 960'	Fine grained greenstone schist with irregular quartz veinlets generally mineralised.
960' .. 971'	Fine grained greenstone (lava) with local changes to schist.
971' .. 976'	Massive fine grained greenstone (lava).
976' .. 983'	Schistose fine grained greenstone (lava).
983' .. 989'	Massive fine grained greenstone (lava).
989' .. 1,082'	Fine grained greenstone schist (probably sheared lava).
1,082' .. 1,085'	Massive greenstone with muscovite pegmatite veinlet.
1,085' .. 1,245' 2"	Fine grained greenstone schist (sheared lava ?)—probably contains serpentine.
1,245' 2" .. 1,247' 5"	Mineralised fine grained greenstone schist (sheared lava ?)—probably contains serpentine (no values).
1,247' 5" .. 1,258' 7"	Lode material.
1,258' 7" .. 1,278'	Medium grained greenstone schist with patches of massive medium grained greenstone.
1,278' .. 1,279'	Quartz vein.
1,279' .. 1,335'	Medium grained greenstone schist with quartz stringers and local gradations into massive greenstone—in places strongly mineralised.
1,335'	End of bore.

Description by K. R. Miles, 8/11/37.

Summary.—The hanging-wall country appears to consist entirely of metamorphosed basic lava. The rock is generally massive and dark greenish in colour, but schistosity and bleaching are frequently developed. Variations in grain size also occur, indicating that there may be more than one flow.

Numerous irregular veinlets of quartz and calcite were intersected by the bore, but they were not recorded.

RECOMMENDATIONS AND CONCLUSIONS.

1. The lode is expected to be very lenticular, and in places perhaps entirely absent, between the No. 13 level and its intersection by bores Nos. 5, 6 and 7 (new). Nevertheless the prospects of the ore body regaining its original dimensions deeper down are promising, and the diagrammatic longitudinal section (Plate V.) shows its probable behaviour with depth.

Diamond drilling is strongly recommended on the pitch of the shoot to intersect it 300 feet below the present limit of prospecting, and an increase in length and width is expected, provided that the granite on the east (see Plate II.) has not replaced the lode channel. This is a possibility, and the dip of the granite contact is the deciding factor. The granite is, however, not true granite, but a granitised zone, and it is to be hoped that the action has been confined to the horizons which show granitisation at the surface.

2. There is good evidence for the existence of parallel jaspilite beds in the footwall country, and these should be prospected, particularly opposite the main shoot.

A parallel jaspilite band, 3 feet wide and showing mineralisation, was intersected in the crossect from the main shaft at the No. 8 level. Ore shoots may exist in this bed along the strike or down the dip. Underground diamond drilling would probably be the best method of prospecting, and initial drilling should be carried out westward from the large basin, in the main lode, between the No. 8 and No. 9 levels.

Mineralised outcrops of another jaspilite bed are exposed to the north-east of M.A. 15T, and samples from it are reported to have assayed from 1 to 2 dwts. gold per ton. Alluvium and tailings obscure any other outcrops of this bed, but it probably persists southwards through the leases. The prospecting of this jaspilite should not be neglected.

3. The area marked "A" on Plate II. embraces a sharp fold in the country which warrants prospecting. The area is devoid of outcrops, and whether or not the jaspilite exists in this place is problematical, but even if it is absent, auriferous quartz reefs may be present.

Auriferous quartz stringers and lode material, in talc schist are being mined at the "Beria Main Lode," G.M.L. 2216T, in this vicinity, but the workings are not in the most favourable position with regard to structure. The ore shoots occur in the noses of small folds. The presence of talc schist proves conclusively that the workings are in the Lancefield footwall country.

4. Small isolated, lenticular shoots of ore may exist in favourable structures along the strike of the main lode formation. Bore No. 9 (old) shows values below the No. 5 level, which were not encountered on that level, and this is probably an ore body of the type previously mentioned.

5. A jaspilite bed outcrops discontinuously, close to the granite contact, on the eastern side of Plate II., and it warrants prospecting due east of the main ore body. The jaspilite is dipping flatly towards the granite which is not a promising feature for its persistence with depth. It is characteristic of the jaspilites, however, that when intruded by granite they suffer bleaching over some distance, and as this bed appears to be the normal type the granite contact is probably dipping more or less parallel to it.

6. Prospecting should be done on the Mt. Crawford line of jaspilite, over the section extending from south-east to east of the Lancefield G.M. The intervening greenstone country is not without possibilities.

APPENDIX A.

Name of Lease or Company.	Mining Centre.	Lease No.	Period.	Alluvial.	Dolled and Specimens.	Ore Treated.	Gold Therefrom.	Total Gold.	Silver.
Lancefield G.M. Co., Ltd.	Beria	715T, 806T, 1206T, 1207T, 1483T, 1523T, 1524T, 1525T, 1542T, 1544T, 1548T	1899	fine ozs.	fine ozs.	long tons.	fine ozs.	fine ozs.	fine ozs.
Do. do.	do.	do. do.	1900	....	....	11,701.00	5,639.75	5,639.75	....
Do. do.	do.	do. do.	1901	....	....	16,847.00	6,256.55	6,256.55	....
Do. do.	do.	do. do.	1902	....	....	20,781.00	7,780.60	7,780.60	....
Do. do.	do.	do. do.	1903	....	....	21,928.00	7,068.29	7,068.29	....
Do. do.	do.	do. do.	1904	....	....	25,154.78	10,734.01	10,734.01	....
Do. do.	do.	do. do.	1905	....	....	47,693.00	15,383.22	15,383.22	430.81
Do. do.	do.	do. do.	1906	....	....	5,946.00	3,005.82	3,005.82	219.12
Do. do.	do.	do. do.	1907	....	....	61,906.00	25,993.20	25,993.20	3,420.32
Do. do.	do.	do. do.	1908	....	....	38,284.00	14,460.23	14,460.23	1,754.14
Do. do.	do.	do. do.	1909	....	....	46,961.00	19,458.08	19,458.08	3,258.87
Do. do.	do.	do. do.	1910	....	....	90,789.00	35,299.63	35,299.63	7,747.58
Do. do.	do.	do. do.	1911	....	....	95,305.00	37,505.50	37,505.50	8,189.85
Do. do.	do.	do. do.	1912	....	....	27,694.00	11,272.33	11,272.33	2,415.99
Kalgoorlie and Boulder Firewood Co., Ltd.	do.	do. do.	1914	....	....	10,977.00	2,954.97	2,954.97	417.18
Do. do.	do.	do. do.	1915	....	....	39,746.00	14,062.33	14,062.33	2,083.77
Do. do.	do.	do. do.	1916	....	....	21,079.00	7,985.81	7,985.81	863.06
Lancefield Gold Mines, Ltd.	do.	715T, 806T, 1206T, 1523T, 1524T, 1525T, 1542T, 2050T, 2051T	1916	....	....	47,062.00	16,744.38	16,744.38	3,057.41
Do. do.	do.	do. do.	1917	....	....	76,453.00	26,929.64	26,929.64	4,609.99
Do. do.	do.	do. do.	1918	....	....	71,157.00	26,281.30	26,281.30	3,909.27
Do. do.	do.	do. do.	1919	....	....	78,068.00	28,649.74	28,649.74	5,124.80
Do. do.	do.	do. do.	1920	....	....	78,235.00	25,565.79	25,565.79	3,345.36
Do. do.	do.	do. do.	1921	....	....	1,679.57	2,981.77	2,981.77	966.05
Do. do.	do.	do. do.	1922	....	....	22.44	23.01	23.01	....
Do. do.	do.	do. do.	1923	....	....	49.51	346.09	346.09	....
Do. do.	do.	do. do.	1924	....	....	3.26	1,610.64	1,610.64	0.70
Do. do.	do.	do. do.	1925	....	....	....	999.30	999.30	68.00
Do. do.	do.	do. do.	1926	....	....	0.27	1,000.57	1,000.57	....
Do. do.	do.	do. do.	1927	....	....	....	1,015.15	1,015.15	....
Do. do.	do.	do. do.	1928	....	....	....	598.01	598.01	....
Lancefield Leases	do.	715T, 806T	1928	....	....	....	191.30	191.30	....
Do. do.	do.	do. do.	1929	....	....	....	401.82	401.82	....
Do. do.	do.	do. do.	1931	....	....	135.00	14.50	14.50	....
Do. do.	do.	do. do.	1932	....	....	0.15	2.28	2.28	....
Lancefield (W.A.) Gold Mine, N.L.	do.	715T, 806T, 2221T, 2225T, 2232T, 2233T, 2234T, 2235T, 2236T, 2245T	1935	....	....	62,045.00	19,054.30	19,054.30	....
Do. do.	do.	do. do.	1936	....	....	104,355.00	34,747.19	34,747.19	....
Do. do.	do.	do. do.	1937	....	....	113,342.00	34,477.12	34,477.12	....
Total Production, 1899-1937				....	....	1,221,166.98	448,417.83	448,417.83	51,881.27

Grade of Ore = 0.367 fine ozs. gold per ton.
= 7.34 dwts. gold per ton.

APPENDIX B.

MINERAGRAPIC INVESTIGATIONS OF THE COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH.

University of Melbourne,
September 16th, 1936.

Report No. 80.

ORE AND MILL PRODUCTS FROM LANCEFIELD G.M., W.A.

Five samples of ore and mill products from the Lancefield Mine, at Beria, W.A., have been submitted for examination by the Lancefield Company.

1. *Ore*.—The sample of ore is a highly siliceous specimen with disseminated sulphides. Pyrite is the most abundant sulphide, and, in addition, arsenopyrite, pyrrhotite, chalcopyrite, and sphalerite are present. In places, arsenopyrite is intimately intergrown with pyrite, while pyrrhotite, sphalerite, and chalcopyrite may occur as inclusions in pyrite and arsenopyrite, as well as forming isolated particles in the gangue.

Gold particles, .010 x .006mm. and .019 x .006mm., have been observed as isolated particles in the gangue. A gold particle, .004 x .005mm., has been observed at the junction of a particle of pyrrhotite with the gangue, similar to that illustrated in fig. 1* (.011 x .009mm.). A large gold particle, .032 x .015mm., has been observed on the margin of pyrite embedded in gangue, while a small gold particle, .004 x .005mm., has been observed attached to a minute crystal of arsenopyrite in the quartz.

2. *Drill Core*.—The sample of drill core is highly siliceous, with disseminated sulphides. Pyrrhotite is the abundant sulphide, while sphalerite and chalcopyrite

are also more abundant than in the specimen of ore. Pyrite and arsenopyrite are also present. Gold particles, .002 x .022mm. and .004 x .004mm., have been observed isolated in quartz. A gold particle (fig. 1)* has been observed at the margin of pyrrhotite and quartz. Gold particles, .005 x .007mm. and .002 x .004mm., have been observed in narrow veins of sphalerite and chalcopyrite cutting pyrite.

3. *Flotation Tails*.—The sample of flotation tails is found to contain a small amount of sulphides. The predominant sulphide is pyrrhotite. Such particles of pyrite and arsenopyrite, as observed in the material, are attached to, or embedded in, particles of gangue. No gold has been revealed in the prepared sections. Occasional grains of hematite and magnetite are present.

4. *Flotation Concentrate*.—Pyrite is the predominant sulphide in the flotation concentrate, as well as in the specimen of ore. Arsenopyrite, pyrrhotite, chalcopyrite, and sphalerite are also present. A considerable number of gold particles have been observed in this concentrate. There are comparatively large flakes, .086 x .020mm., which are apparently free, as well as smaller particles, .010 x .008mm. An irregular shaped particle, apparently free, with a crumpled appearance, is illustrated in fig. 2,* where it appears on the surface of the section as two isolated areas. There are also a number of particles with attached fragments of sulphides. One of these is illustrated in fig. 3,* where pyrrhotite is attached to one side of the gold particle. A large particle of gold, .039 x .037mm., has a thin film of arsenopyrite on one edge, while another particle of gold, .014 x .023mm., has an attached particle of pyrite.

A number of particles of gold have not been exposed during crushing, and occur in the flotation concentrate

* Figures not available. (R.S.M.)

* Figures not available. (R.S.M.)

as inclusions in pyrite or arsenopyrite and, in one case (fig. 6*) in pyrrhotite. Fig. 4* illustrates an extremely minute inclusion of gold in pyrite, while fig. 5* illustrates gold at the margin of a composite grain of pyrite and quartz. A gold particle, .003 x .003mm., has been observed at the margin of an inclusion of pyrrhotite in pyrite, while fig. 6* illustrates a minute inclusion of gold, .003 x .002mm., in an inclusion of pyrrhotite in arsenopyrite.

5. *Calcine Residues.*—Very little sulphide persists in the calcined product, and such particles as can be found occur as inclusions in particles of gangue. No gold has been observed in the prepared section. There occur, however, numerous particles of iron oxide, which are more or less pseudomorphous after the particles of sulphide.

If a particle of pyrite, such as illustrated in fig. 4,* is converted by roasting into a solid particle of iron oxide, it is obvious that the included particle of gold will not be exposed. Unless such particles are disintegrated by the oxidation, the included gold will not be recoverable by cyanidation.

The silver-bearing mineral in the ore has not been recognised.

Fig. 1.*—Drill Core. Gold particles situated on the margin of a particle of pyrrhotite embedded in quartz. Mag. 450. The white squares illustrate the relative size of a 200-mesh I.M.M. Screen.

Fig. 2.*—Gold particle in flotation concentrate, isolated from sulphides. It appears on the surface of the section as two areas isolated in the mounting medium. Other grains in the field are pyrite. Mag. 370.

Fig. 3.*—Gold particles in flotation concentrate. A particle of pyrrhotite is attached to the left side of the gold. Mag. 700.

Fig. 4.*—Particle of pyrite in flotation concentrate containing a minute inclusion of gold. Mag. 500.

Fig. 5.*—Composite grain with dotted outline of quartz and pyrite in the flotation concentrate. Gold is included in the marginal part of pyrite. Mag. 370.

Fig. 6.*—Minute particle of gold in an inclusion of pyrrhotite in arsenopyrite. Flotation concentrates. Mag. 700.

(Signed) FRANK L. STILLWELL.

APPENDIX C.

DESCRIPTION OF SAMPLE.

Approximately 50 lbs. of roasted concentrates were received and analysis of a typical sample of the material gave the following results:—

Analysis.†

		%
Silica	(SiO ₂)	30.60
Alumina	(Al ₂ O ₃)	2.50
Titania	(TiO ₂)	0.11
Manganous oxide	(MnO)	0.10
Lime	(CaO)	4.26
Magnesia	(MgO)	2.24
Soda	(Na ₂ O)	0.08
Potash	(K ₂ O)	0.14
Water < 105° C.	(H ₂ O)	0.61
Water > 105° C.	(H ₂ O)	0.59
Carbon dioxide	(CO ₂)	1.10
Total sulphur	(S)	2.03
Sulphur trioxide	(SO ₃)	4.35
Sulphide sulphur	(S)	0.29
Total iron	(Fe)	36.00
Ferrous oxide	(FeO)	0.71
Total copper	(Cu)	0.37
Ammonia-soluble copper	(Cu)	0.09
Total arsenic	(As)	0.50
Total oxidised arsenic	(As as As ₂ O ₃ , As ₂ O ₅)	0.22
Arsenious oxide	(As ₂ O ₃)	0.17
Cobalt	(Co)	0.022
Zinc	(Zn)	0.45
Carbon	(C)	0.70

Assays.

The average head values of the small samples used in tests were as follows:—

Gold (Au)—91.50 dwts. per short ton of ore.
Silver (Ag)—37.96 dwts. per short ton of ore.

* Figures not available. (R.S.M.)

† Analysis carried out by the Imperial Chemical Industries.

MINERALS PRESENT.

Sulphide.—The material received contains a small amount of sulphides and examination of a flotation concentrate indicated that the principal sulphide was arsenopyrite; pyrite was also identified.

Carbon.—Carbonaceous material is present in the sample.

Gold.—Some free gold is present, mostly as fine grains and flakes. On examination, some of the particles were noted to be partly coated with iron oxides, but in no case was the coating such that difficulty might be expected in extracting this gold.

Silver.—A small amount of silver appears to be associated with gold as bullion, but from the results of tests it is considered that the majority of the silver content bears little or no relation to the gold content.

LANCEFIELD GROUP.

REPORT ON "BERIA MAIN LODE," G.M.L.
2216T, MT. MARGARET GOLDFIELD.

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

This G.M.L. is situated just south of the Lancefield leases (see plan accompanying Lancefield report). The ore-bodies here consist of three approximately parallel lodes in an area of finely schistose greenstone and talc schist, with lenses of a dense greenstone which weathers to fine clay. This country appears to be in all respects similar to the footwall country of the main Lancefield lode. In marked contrast to the Lancefield lode, however, the lodes and country here strike approximately N. 30°—40° W. and dip 50°—60° N.E. with local variations due to minor folding.

The lode material consists of mineralised schist, which may or may not contain stringers of ferruginous quartz. The distribution of values in the lode appears to be somewhat sporadic, but for the most part the lodes are confined to definite bands in the schist. Here and there the lodes pinch and make, reaching a maximum width of about 14 feet, under the control of a number of minor dragfolds which have a fairly steep northerly pitch.

At the time of inspection (November, 1937), the East Lode was the only one being worked, there being two accessible shafts (shafts A and B). The Middle Lode is no longer accessible, while no work has been done on the West Lode for the last five or six years.

The East Lode has been opened up to 110 feet, V.D., with levels at 70 feet and 102 feet. The tortuous nature of these drives clearly shows the change in strike of the lode due to the dragfolding. Towards the centre of the lode stoping has been carried on from both the 70ft. and 102ft. levels, and here the lode has an average width of about nine feet. In the upper level the stope rises for 18 feet over a length of 45 feet. The faces at the north-western ends of the 102ft. level and of a small drive at 90 feet, have passed through the nose of a small dragfold which is pitching in the direction N. 50° E. at an angle of 40 degrees. Values are reported to occur in a narrow band about one foot wide on the western side of the drives but not in the faces. To follow the lode the drive should be continued at about 45° west of its present direction.

The water level in the East Lode varies from 102 feet at the south-eastern end (shaft B), to 110 feet at the north-western extremity.

The West Lode has one accessible shaft, C., 50 feet, V.D., which leads to a short inclined winze opening into two large stopes. The first, which is approximately 60 feet long and 10 to 12 feet wide, was filled with water, which here reaches 70 feet V.D., so that the bottom of the stope could not be examined. It is understood, however, to extend to 100 feet V.D. The second stope which was reported to be of very similar dimensions to the first was inaccessible.

The average value of the lode material recently crushed is reported to have been 6 to 8 dwts. gold per ton. The fact that the values are poor at the surface but steadily improve with depth, with the best values occurring more or less close to the water level, points, I think, rather to the secondary nature of

the lode. Consequently too much optimism as to the possibility of the good values extending into the sulphide zone should not be entertained and will not be justified until further testing has been carried out below water level.

The position of this G.M.L., and the strike and dip of the country in relation to the main Lancefield lode (see plan accompanying Lancefield Report), strongly suggest that it is situated in an extension of the footwall country of the Lancefield lode. Traces of an outcrop of ferruginous quartzites, very similar in appearance to the surface outcrops of the Lancefield lode, occur in the north-western corner of the G.M.L., and it is suggested that these could well bear further investigation and prospecting.

LEGEND

Greenstone { Metamorphosed, Fine to Medium Grained Basic Lavas, Amphibolite Schists and Massive Amphibolite Rocks

Granite and Associated Rocks

Jaspilite

Quartz

REFERENCE TO SIGNS

Gold Mining Leases

Machinery Area

Tailings

Shafts

Buildings

Windmills

Wells

Drainage Channel

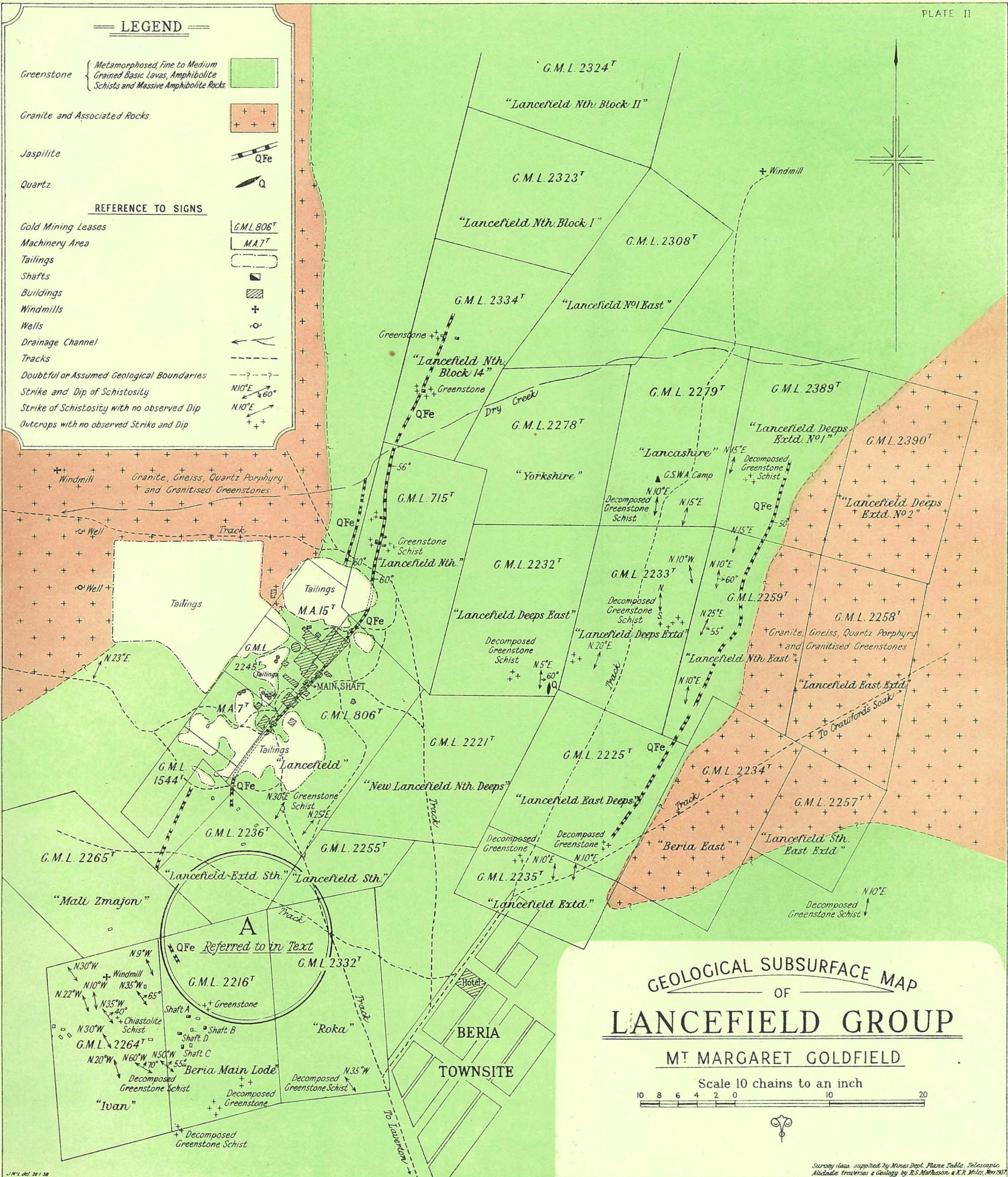
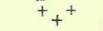
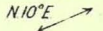
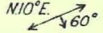
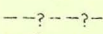
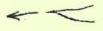
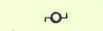
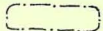
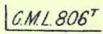
Tracks

Doubtful or Assumed Geological Boundaries

Strike and Dip of Schistosity

Strike of Schistosity with no observed Dip

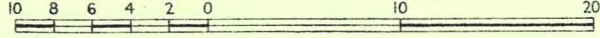
Outcrops with no observed Strike and Dip



GEOLOGICAL SUBSURFACE MAP OF LANCEFIELD GROUP

MT MARGARET GOLDFIELD

Scale 10 chains to an inch

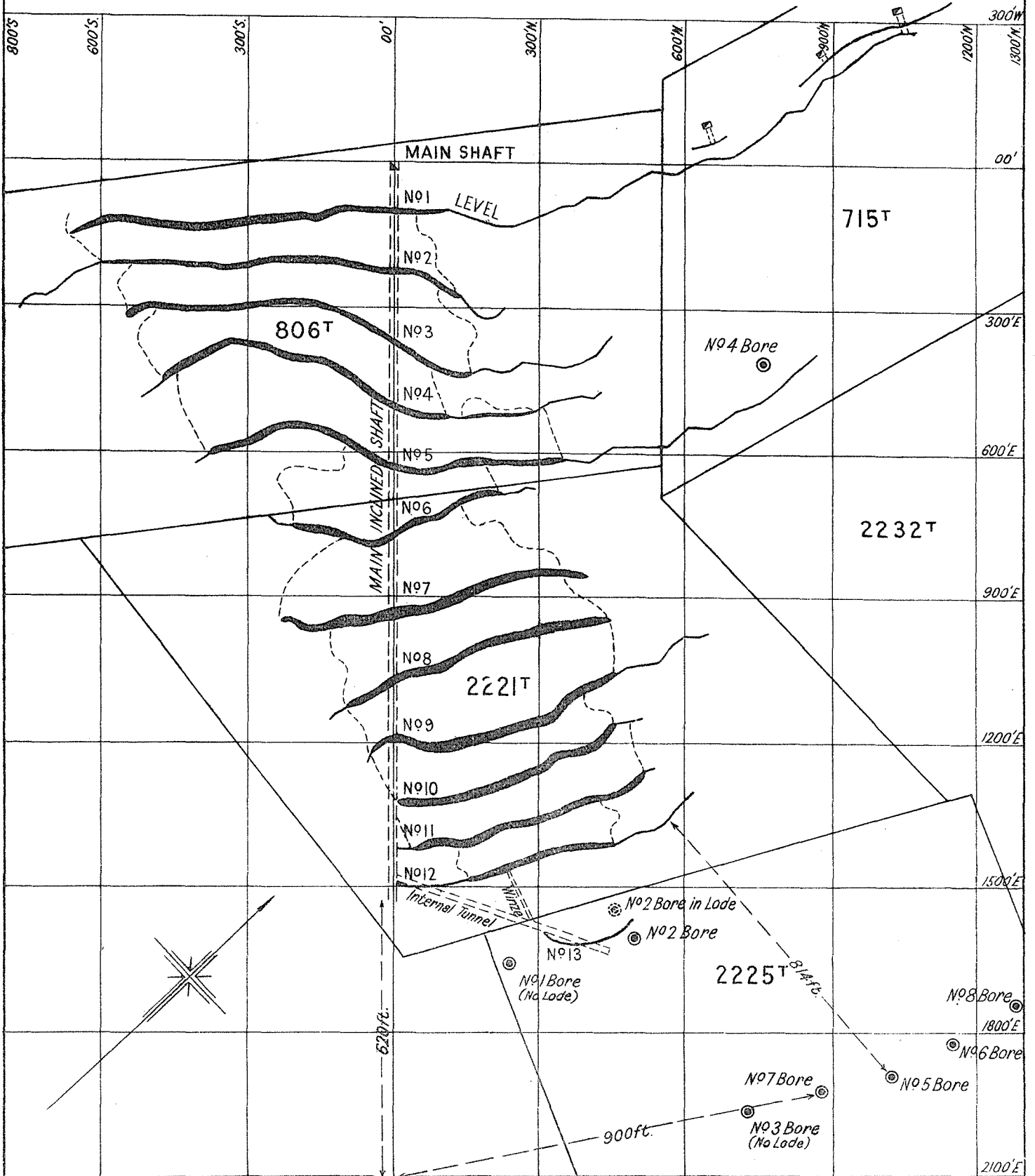


Survey data supplied by Mines Dept. Plane Table, Telescopic Alidade traverses & Geology by R.S. Matheson & A.R. Wills, Nov. 1887

PLAN OF LANCEFIELD GOLD MINE

PLATE III

Scale 280 feet to an inch



Note:— The sections of the Levels shown in solid black represent the stoped portions.

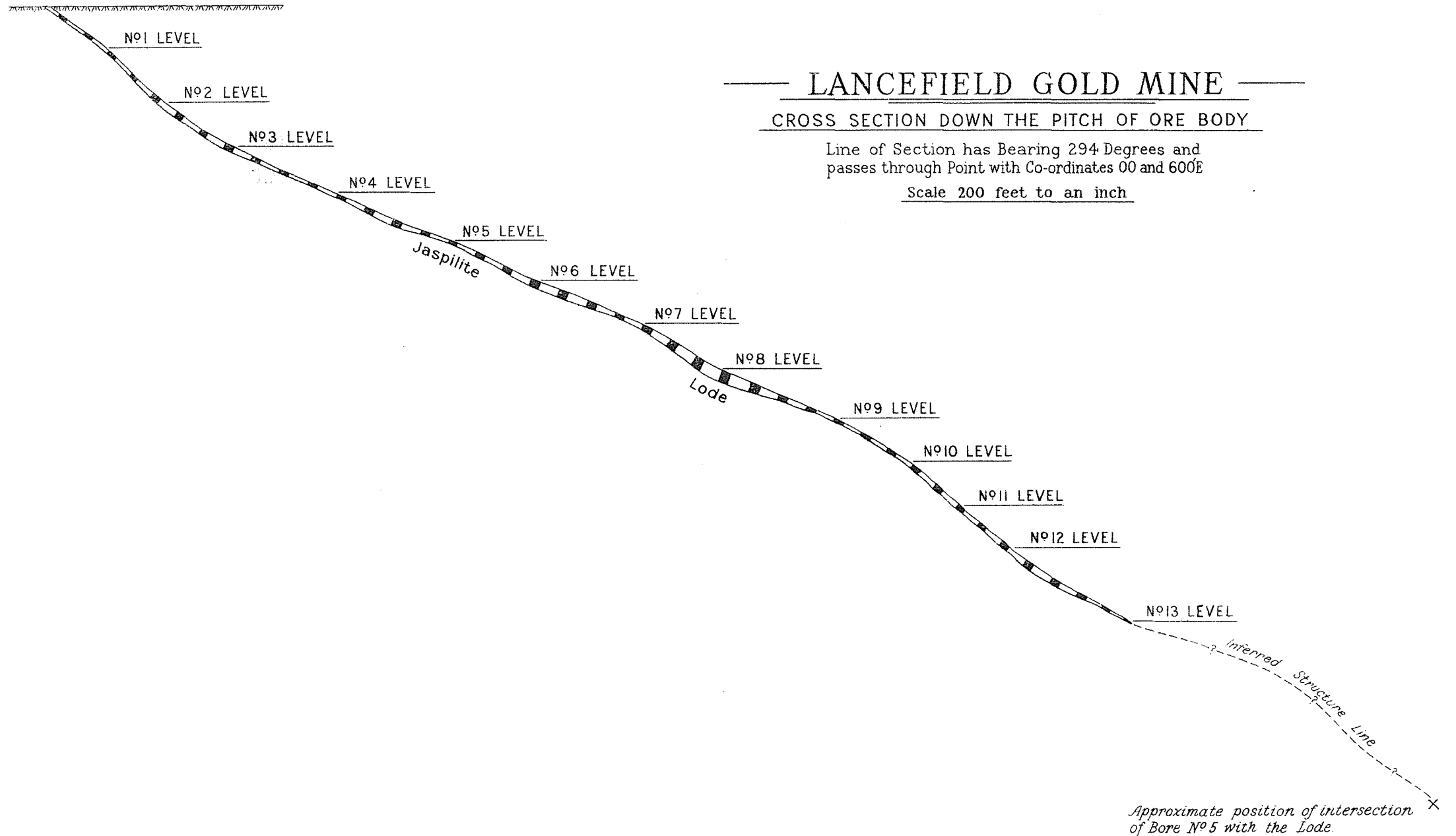
Plan supplied by Management. The stoping on N°12 Level and position of N°13 Level added by R.S. Matheson, Nov. 1937.

LANCEFIELD GOLD MINE

CROSS SECTION DOWN THE PITCH OF ORE BODY

Line of Section has Bearing 294 Degrees and passes through Point with Co-ordinates 00 and 600E

Scale 200 feet to an inch

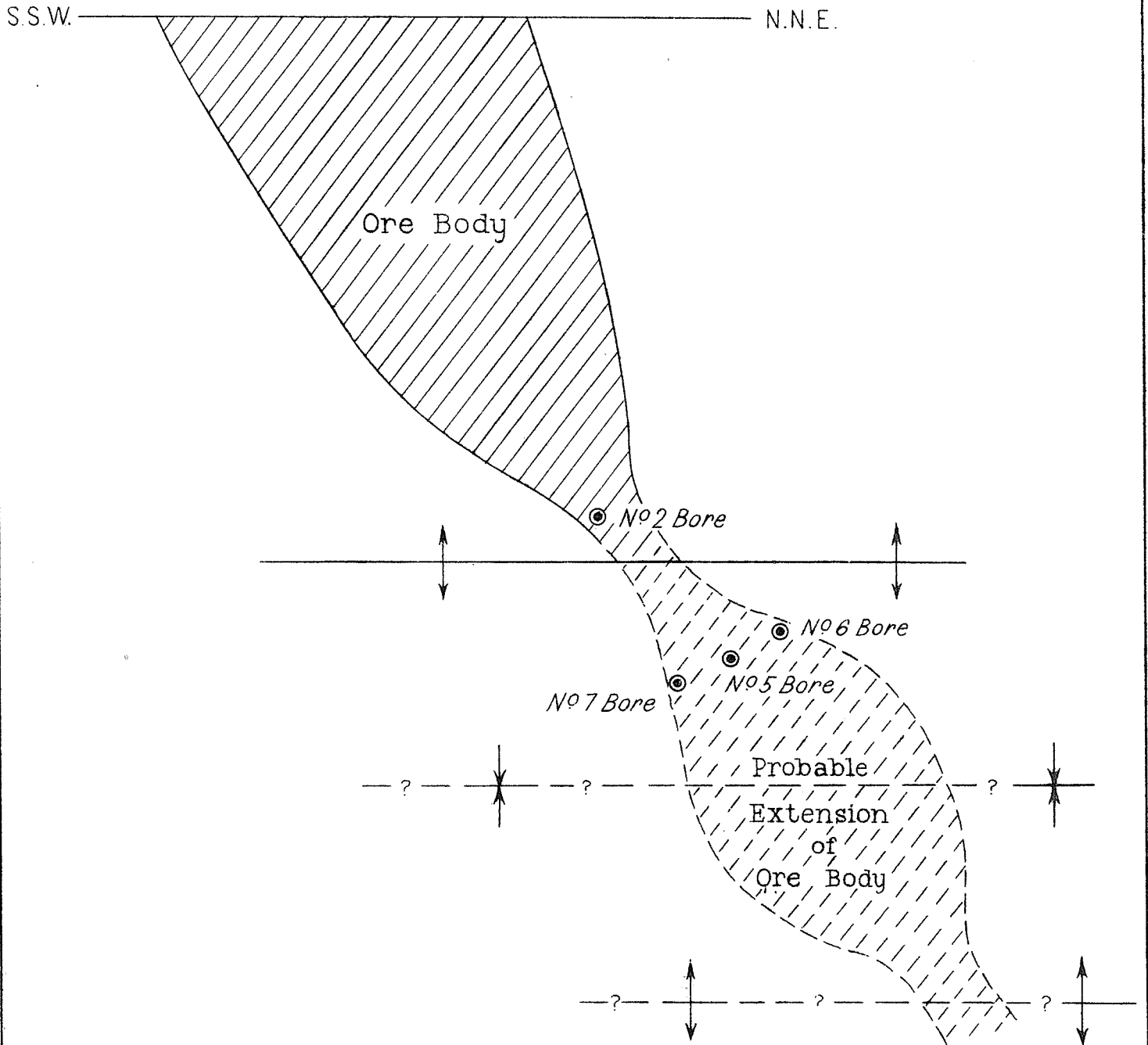


Approximate position of intersection of Bore No. 5 with the Lode.

Section by R.S. Matheson, Nov 1937
Widths of Lode are only approximate.

DIAGRAMATIC LONGITUDINAL SECTION
OF
LANCEFIELD ORE BODY

Not to Scale



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Transvaal System	63
Yampire Gorge Crocidolite Deposits	63
Yilgarn Goldfield	64
Yilgarn System	68

DIVISION V.

Annual Report of the Schools of Mines of W.A.

DIRECTOR'S REPORT, 1937.

KALGOORLIE SCHOOL OF MINES.

Enrolments.—The individual enrolment, exclusive of Correspondence Course students, reached a maximum of 617 as compared with 629 during 1936.

Correspondence Classes.—Correspondence Classes in Metallurgy I., Assaying I., and Mining I., which were instituted in 1936, were continued throughout the year and additional classes in Mine Sampling, Mining II., and Ore Dressing were commenced.

The enrolments during the year in these classes were as follows:—

Metallurgy I.	..	..	..	..	..	11
Assaying I.	..	..	..	..	..	17
Mining I.	..	..	..	..	..	24
Mine Sampling	..	..	..	..	..	8
Mining II.	..	..	..	..	..	8
Ore Dressing	..	..	..	..	..	13

A special examination for students in Mining I. was conducted at which 11 students were successful in passing. Correspondence Course students in Metallurgy and Assaying sat for the ordinary School of Mines examinations.

The class in Mining I. has been of great assistance to students in outside centres, enabling them to prepare for the Mines Department examinations for Underground Supervisor's Certificates of Competency.

It is proposed to extend the Correspondence Classes this year where it is possible to do so. It is difficult to arrange for practical work but the valued assistance given by the management of mines has minimised this difficulty considerably. All Correspondence Class work has been conducted on a self-supporting basis. The whole of the costs have been subscribed by the students and a contribution has been made to revenue and for equipment.

Revenue.—The revenue for the school year, not including Correspondence Course fees or Metallurgical Laboratory fees, has been £1,105.

The revenue from investigations conducted in the Metallurgical Laboratory amounted to £255, which has been paid into the Metallurgical Laboratory Trust Fund to meet maintenance and incidental costs in connection with the laboratory.

Staff.—At the end of 1936 Mr. G. S. Compton, Lecturer in Geology and Mining was granted long service leave and subsequently his services were made available on loan to Spargo's Reward Gold Mine, Lady Shenton Gold Mine and First Hit Gold Mine, until the end of 1938.

Mr. Compton's duties were taken over at the beginning of 1937 by Mr. K. A. Beatson, A.O.S.M.

At the beginning of 1937 two additional officers were appointed to the staff in place of part-time instructors. These officers were Mr. W. G. Stead, Instructor in Fitting and Turning, Internal Combustion Engines, and Engine-driving, and Mr. G. G. Lutz, B.E., Science Assistant.

During the year Master E. Tasker, who was appointed messenger, was transferred to the permanent staff as junior clerk.

As has been the case for the preceding two years, the members of the staff have had a strenuous year and all have given satisfactory service.

Public Assay Department.—This branch of the work of the school has again been largely availed of by prospectors. The number of free assays and mineral determinations carried out during the year was as follows:—

Assays for Gold	..	..	..	722
Assays for other metals	..	..	..	41
Mineral Determinations	..	..	..	97

860

In addition, the services of the staff have been made available to the Criminal Investigation Branch in connection with prosecutions instituted by the Gold Stealing Detection Staff. This assistance to the Police Department consists in assays and determinations of samples and the giving of expert evidence in court.

Metallurgical Laboratory.—During the year 33 applications for investigations into the treatment of ores and metallurgical products were received, 26 of which were completed and reports were issued on all completed investigations. In many cases these applications have been made by companies which were approaching the production stage and which required the metallurgical information necessary to enable the treatment plant to be designed by their engineers.

Several applications were cancelled for various reasons, the most important being the low gold content of the sample submitted.

In connection with this work, 1,455 assays for gold have been carried out, and 325 chemical analyses, not including routine tests of cyanide solutions.

The total revenue received in the form of fees for investigations has been £255.

The accommodation in the Metallurgical Laboratory is now becoming inadequate and steps should be taken as early as possible to make available the funds necessary for enlarging the laboratory, particularly for the purpose of transferring the dry-crushing units to a separate building to prevent contamination of samples by the dust produced during dry-crushing.

Mr. W. G. Clarke, Research Metallurgist, having completed ten years' service on the staff of the laboratory, has been granted three month's long service leave and will be absent from duty until the middle of May next.

Equipment.—The necessity for additional equipment, which was pointed out in my annual report for 1936, still exists, and it is hoped that in the near future additional equipment, particularly for the Fitting and Turning, Surveying and Petrology classes will be installed.

Jubilee Appeal Fund.—During the year an intensive course of training in internal combustion engines, both theoretical and practical, was given under the auspices of this scheme by Mr. Stead, while Mr. Beatson gave a series of lectures on geology, mineralogy, prospecting, mining, etc., to a group of youths who have since been prospecting under the same scheme.

Buildings.—Alterations to the old engine room have been made which will permit of much needed extension of the workshop and of the assay department of the Metallurgical Laboratory.

Plans have been prepared for the completion, in somewhat altered form, of the existing physics building, in accordance with the original Public Works Department plan and it is hoped that the building of these additional class rooms and offices will be put in hand at an early date.

Alterations have been made to a portion of the lighting and power circuits but alterations of the whole of these circuits is necessary.

In addition, it is necessary to paint white all interiors, both walls and ceilings, since this would result in better lighting of the rooms both by day and night. This work is long overdue.

Wiluna.—Classes were continued during the year with a satisfactory attendance. These were as follows:—Mathematics (three grades), Mechanical Drawing (two grades), Electrical Work, Surveying I., Mining I., Assaying I., Chemistry I., Physics I., Internal Combustion Engines. The lectures were

conducted in the Wiluna State School and the practical work in the laboratories and on the plant of the Wiluna Gold Mines. The thanks of the Department are extended to the management of these mines as without their interest and valuable assistance the practical work of the courses could not have been held.

Enrolment.—The number of individual students was 105 and the total class enrolments were 172. I anticipate that these numbers will be maintained and slightly increased when permanent buildings are provided.

Buildings and Equipment.—Satisfactory work cannot be maintained without permanent buildings and equipment. It is proposed at an early date to erect a building with provision for science laboratory, drawing room and engine room. When this building is erected and equipped more efficient work can be done than is possible at present. During the year many difficulties arose in connection with the practical work in chemistry, physics, drawing and engine work.

Staff.—The classwork is conducted by part-time lecturers drawn mainly from the professional staff of the Wiluna Gold Mine. They have carried out their duties during the year in a satisfactory manner, but under many difficulties.

Revenue.—An amount of £199 13s. was received as class fees during the year.

General.—The institution of classwork at Wiluna has enabled students from other gold mining centres to obtain wider experience and at the same time to carry on for a certain period their studies. At a later date, if funds are available and sufficient students enrol, it will be possible to further extend the classwork. Already applications for training in Geology, Assaying II. and Fitting and Turning have been received and these will be considered in due course.

A number of the Wiluna students sat for the School of Mines examinations in November and passed, a number of science students were unsuccessful because they were not able, with the equipment available and under the existing conditions, to do the work satisfactorily.

I thank you, sir, and the staff of the Department for your assistance during the year.

J. F. LYNCH,
Director School of Mines of W.A.

 DIVISION VI.

 Annual Report of the Inspection of Machinery Branch
 of the Mines Department for the Year 1937.

OPERATIONS UNDER THE INSPECTION OF MACHINERY ACT, 1921. ANNUAL REPORT OF THE CHIEF INSPECTOR OF MACHINERY AND CHAIRMAN OF THE BOARD OF EXAMINERS FOR ENGINE-DRIVERS, FOR THE YEAR ENDED 31st DECEMBER, 1937, WITH STATISTICS.

The Under Secretary for Mines.

For the information of the Hon. Minister for Mines, I submit the report of the Deputy Chief Inspector of Machinery on the administration of the Inspection of Machinery Act, 1921, for the year ended 31st December, 1937.

Although the number of boiler certificates issued was less than in 1936, it still exceeded the number issued in 1935. The reason for this decrease is given in the body of the report. The number of groups of machinery inspected showed an increase, but not so great as in 1936. There was again a decrease in the number of engine-drivers' certificates granted as compared with the years 1936 and 1935. This was only to be expected, as engine-drivers of all grades are now available in sufficient numbers to supply all demands.

The total number of serious accidents enquired into remained the same as for 1936, the accidents which proved fatal being one less than the previous year. Of the nine accidents included under the heading of Districts worked from Kalgoorlie, six, including three fatal, were caused by machinery on mines and have been dealt with in my report on the Mining Industry.

The financial position is again very good, a credit balance of £1,465 10s. 9d. being shown.

Important amendments to the Act were prepared for submission to Parliament, but unfortunately it was found that the amending Bill could not be introduced last session.

RICHARD C. WILSON,
 Chief Inspector of Machinery.

SECTION 1.

*Inspection of Boilers, New Construction,
 Maintenance, etc.*

The total number of boilers registered (including various types of unfired pressure vessels, such as steam-jacketed pans, sterilisers, digesters, vulcanisers, air and gas receivers, etc.), which, according to records were fit for use, was 4,193 on 31st December, 1937, compared with 4,121 on 31st December, 1936, making a net increase of 72.

The total number of boilers added to the register during 1937 was 119, including 3 second-hand boilers imported from other Australian States, 1 transferred from the jurisdiction of another authority in this State, 1 that had been previously condemned, which was reconditioned, and 114 new registrations, of which 25 were imported from the United Kingdom, 1 from Germany, 1 from United States of America, 33 from other Australian States, 1 from New Zealand (second-hand), 11 the origin of which has not been traced, and 42 made in this State. The number of boilers built in this State was approximately 37% of the total of new registrations, compared with 38% in 1936, 41% in 1935, 33% in 1934 and 14% in 1933. The types built in this State were Return Multi-tubular Stationary Underfired 3, Locomotive 1, Cornish 4, Lancashire 3, Air Receiver 28, Steam-jacketed Vessel 1, Vulcaniser 1, and Digester 1.

The number of boilers removed from the register during 1937 was 47: of these 5 are being used for water heating at atmospheric pressure, 37 were permanently condemned, 2 were exported out of the State, and 3 were transferred to other Government Departments in this State.

During the year, the number of thorough inspections made was 1864. This was 117 less than the number made during 1936. About 20% of this decrease is due to only one inspection in two years being carried out at the Wyndham Meat Works, which operated for only about six months each year. No visit was made during 1937. Practically the whole of the remaining decrease was due to a change of procedure which came into operation in September, 1937, with regard to vulcanisers which are heated from a central boiler. These are now considered as part of the boiler system, so that a separate certificate is not issued for each vulcaniser, but only one certificate for the boiler.

Inspections made of boilers under steam during 1937 numbered 90, which is 21 less than the previous year.

Boiler certificates issued numbered 1,870 for 1937 compared with 1,982 for 1936, that is, 112 less. The decrease in the districts worked from the head office in Perth was 105, which is accounted for by the reasons given above for the decrease in the number of thorough inspections.

The number of repair notices issued was 444, or 70 less than in 1936, but 17 more than in 1935.

Return No. 1 showing Classification of Types of New Boiler Registrations for the year ended 31/12/37.

Types.	Total.
Vertical Stationary	1
Vertical Multitubular Stationary .. .	2
Vertical Multitubular Portable .. .	1
Return Multitubular Stationary Underfired	6
Locomotive	2
Cornish	4
Water Tube	9
Lancashire	3
Digester	2
Air Receiver	61
Vulcanizer	13
Steam Jacketed Vessel	7
Sterilizer	2
Cooker	1
	114
Imported from United Kingdom .. .	25
Imported from Germany .. .	1
Imported from United States of America	1
Imported from Eastern States .. .	33
Imported from New Zealand .. .	1
Imported from unknown sources .. .	11
Made in the State of Western Australia	42*
	114

Return Multitubular Stationary Underfired	3
Locomotive	1
Cornish	4
Lancashire	3
Air Receiver	28
Steam Jacketed Vessel	1
Vulcanizer	1
Digester	1
	42*

Return No. 2—Showing Classification of Various Types of useful Boilers in Proclaimed Districts on 31st December, 1937.

Types of Boilers.	Districts worked from Perth.	Districts worked from Kalgoorlie.	Unproclaimed Areas.	Totals.	
				1937.	1936.
Lancashire .. .	38	59	....	97	98
Cornish .. .	85	498	....	583	584
Semi-Cornish .. .	11	37	....	48	49
Vert. Stat. .. .	296	359	....	655	666
" Port. .. .	68	15	....	83	83
" Mult. Stat. .. .	39	25	....	64	62
" " Port. .. .	23	3	....	26	26
" Pat. Tubular .. .	8	....	....	8	8
Loco Rect. Firebox Stat.	78	65	....	143	146
" " " Port. .. .	246	71	....	317	324
" Circ. .. .	142	8	....	150	150
Locomotive .. .	77	44	....	121	121
Water Tube .. .	122	122	....	244	238
Return Mult. Underfired Stat.	121	64	....	185	182
Return Mult. Underfired Port.	....	8	....	8	8
Return Mult. Int. Fired Stat.	38	12	....	50	50
Return Mult. Int. Fired Port.	2	....	....	2	2
Egg ended and other types not elsewhere specified	47	17	43	107	104
Digesters .. .	87	6	....	93	91
Air Receivers .. .	359	347	....	736	677
Gas Receivers .. .	4	....	....	4	4
Vulcanisers .. .	230	11	....	241	228
Steam Jacketed Vessels .. .	221	7	....	228	220
Total Registrations useful Boilers .. .	2,372	1,778	43	4,193	4,121
Total Boilers out of use, 31st December, 1937 .. .	1,019	1,261	....	2,280	2,097

Return No. 3—Showing Operations in Proclaimed Districts during year ended 31st December, 1937.

(BOILERS ONLY.)

	Districts worked from Perth.	Districts worked from Kalgoorlie.	Unproclaimed Areas.	Totals.	
				1937.	1936.
Total number of useful boilers registered .. .	2,372	1,778	43	4,193	4,121
New boilers registered during year .. .	86	28	....	114	146
Boilers reinstated .. .	....	1	....	1	....
Boilers converted .. .	....	5	....	5	1
Boilers Inspected—					
Thorough .. .	1,348	516	....	1,864	1,981
Working .. .	83	7	....	90	111
Boilers condemned during year—					
Temporarily .. .	24	1	....	25	27
Permanently .. .	18	18	1	37	6
Boilers sent to other States during year .. .	1	1	....	2	....
Boilers sent from other States during year .. .	2	1	....	3	7
Transferred to other Departments .. .	1	2	....	3	1
Transferred from other Departments .. .	1	....	....	1	7
Number of Notices for Repairs during year .. .	419	25	....	444	514
No. of Certificates issued, including those issued under Section 30 during the year	1,353	517	....	1,870	1,982

New Constructions.

Several small boilers, claimed to be suitable for supplying steam at pressures varying from atmospheric to sixty pounds per square inch, were imported into this State by various Australian makers. The design and construction of some types of these boilers, which were constructed from 1/8 in. plates, conformed to no recognised standard; also, in most cases, the fittings supplied with the boilers were of flimsy construction.

A few of these boilers were sold for use at atmospheric pressure, but it was subsequently found that the diameter of the steam pipe was so small that an accumulation of pressure could not be prevented, although the arrangement of the steam cocks was such that at least one branch was always open to the atmosphere. The agent and the owners of the boilers which had been sold were therefore notified that these boilers were not exempt from the provisions of the Act, and that they would have to be altered to comply with the minimum requirements of the Act. The makers were notified that in future all boilers of this type must comply at least with the minimum requirements of the S.A.A. Boiler Code, and be fitted in accordance with the Act.

Small boilers suitable for use by dairymen, bakers, etc., are now being constructed in this State, to more substantial designs with ample provision for inspection and cleaning, the minimum plate thickness of the shells being 1/4 inch. The majority of these boilers are fabricated by arc welding, and the designs have been tentatively approved, subject to alteration in the light of further experience.

Three Lancashire boilers, 32ft. x 8ft. 6ins. were built in Perth. The dished end plates were supplied by John Thompson, Ltd., Wolverhampton, England, otherwise the actual construction was completed in Perth. These are the largest boilers of the kind which have ever been constructed in this State.

A new firebox was constructed in Kalgoorlie for a road roller boiler. All the seams, with the exception of the foundation seam, were butt welded by the electric arc process. The crown girders were arc-welded to the firebox crown. All welded construction has been used for some considerable time by the South Australian Government Railways in the con-

struction of steel fireboxes for locomotives, but this is the first time this method has been used in West Australia.

One copper steam-jacketed vessel with welded seams was imported for a brewery from the Eastern States, and two have been made by a local firm for use in chemical processes where brazing would not be suitable. As the special deoxidised copper plates necessary for successful welding are now manufactured in Australia, this method of construction may become more common. In copper pipe and coil work, welding is superseding other types of joint.

Maintenance.

As usual, there were a few cases of neglect on the part of owners, which caused damage to their boilers through the use of unsuitable feed water, or through not taking steps to prevent oxygen corrosion where the feed water was otherwise good.

One new Babcock & Wilcox boiler was badly damaged by corrosion after only about three months' use. The owners had had previous experience of the corrosive nature of the feed water, and were strongly advised to instal a chemical treatment plant, but unfortunately, the type of treatment plant which was installed did not prevent corrosion, although it has given excellent results in other cases in preventing the formation of scale.

The tubes of two new Babcock and Wilcox boilers pitted through and had to be renewed after ten months' use. This is most unusual, and is hard to account for, because similar boilers have been in use for over thirty years, using the same Goldfields Scheme water under similar conditions, and now show very little deterioration, also the renewals of tubes have been few and far between. Condensers have since been installed, which should eliminate any further trouble.

A Lancashire boiler which had been working continuously except for periodical cleaning for a total period of about 28 years, without showing any signs of grooving at the flange of the flues to the end plates, became badly grooved in the last two years, presumably through having been only worked one shift per day. Boilers of this type will not stand sudden forcing with impunity.

Colloidal graphite has been used with good results in the case of feed waters which contain scale-forming matter, but are otherwise good. The graphite removes old scale besides preventing the formation of new scale.

SECTION II.

Explosions, Interesting Defects, etc.

An air receiver about 1ft. 6ins. diameter x 7ft., having an authorised working pressure of 100 lbs. per square inch burst, apparently from over pressure, due to the sticking of the safety valve. The valve was recessed and a ring of some composition was fitted in the recess to make an airtight connection with the raised ring seat. After the accident, the safety valve was attached to an air line at 350 lbs. pressure per square in., but failed to release, even after all the compression had been removed from the spring. Luckily, no one was injured, and the material damage was not very extensive. Many small safety valves of this type have since been found and replaced by valves having metal to metal valves and seats.

Several small safety valves having a gas thread connection for fitting to a pipe or vessel have been found to have a discharge diameter very much smaller than the nominal gas diameter. For instance, valves with $\frac{1}{2}$ in. gas thread connection have been found with a discharge diameter of less than $\frac{1}{4}$ inch. All safety valves should have the discharge diameter clearly stamped on them, so that the purchaser may know that he is getting the size of valve that he requires.

SECTION III

Inspection of Machinery.

The total number of groups of useful machinery on the register on 31st December, 1937, was 13,933, an increase of 1,008 groups for the 12 months.

The total number of groups of machinery inspected during 1937 was 10,852, an increase of 602 groups for the 12 months.

Notices issued to owners dealing with the guarding of or repairs to machinery numbered 429 during 1937, an increase of 31 over the previous year.

Return No. 4—Showing Classification according to Motive Power of Groups of Machinery in Use or likely to be Used in Proclaimed Districts and which were on the Register during the Year ended 31st December, 1937.

Classification.	Districts worked from Perth.	Districts worked from Kalgoorlie.	Totals.	
			1937.	1936.
No of groups driven by steam engines	560	526	1,086	1,084
No. of groups driven by oil engines	1,662	656	2,318	2,213
No. of groups driven by gas engines	86	178	264	245
No. of groups driven by compressed air	2	52	54	54
No. of groups driven by electric motors	7,631	2,575	10,206	9,324
No. of groups driven by hydraulic pressure	5	.....	5	5
	9,946	3,987	13,933	12,925

Return No. 5—Showing Operations in Proclaimed Districts during Year ended 31st December, 1937.

(MACHINERY ONLY.)

	Districts worked from Perth.	Districts worked from Kalgoorlie.	Totals.	
			1937.	1936.
Total registrations, useful machinery	9,946	3,987	13,933	12,925
Total inspections made	8,067	2,785	10,852	10,250
Certificates (bearing fees)	3,636	650	4,286	3,954
Certificates (steam, without fees)	105	16	121	186
No. of extension certificates issued under Section 42 of Act .....	.....	.....	.....	.....
Notices issued (machinery dangerous).....	411	18	429	398

The number of passenger lifts in service has increased by 13, and the goods lifts remain the same as last year. The number of permits granted during 1937 for the erection of lifts was 25, but only 17 were completed before the end of the year. One of these was a service lift, which are not included on the returns, and the remaining 3 were re-erections of existing lifts.

There were no persons injured by lift accidents. Three cases of overrunning were reported: one due to the switch holding in, one to a small screw falling

out of position and preventing the brake from being applied, while in the third case, no defect could be found, and it is surmised that the lift attendant forgot which floor he was at. The limit switch cam has been altered so as to prevent a similar accident happening. There was one case of overloading where the grippers acted. No one was hurt, but the car guides were slightly damaged.

Return No. 6 showing Classification of Lifts on 31st December, 1937.

Type.	How Driven.	Totals.	
		1937.	1936.
Passenger ...	Electrically driven ...	163	150
	Hydraulically driven ...	1	1
Goods ...	Electrically driven ...	105	105
	Hydraulically driven ...	3	3
	Belt driven ...	4	4
		276	263

SECTION IV.

Prosecutions Under the Act.

There were no prosecutions under the Act, other than proceedings taken to recover fees payable for inspections made.

SECTION V.

Accidents to Persons.

The Return No. 7 below only includes fatal accidents and those which caused the injured person to be incapacitated for a period of two weeks or more.

The total number of persons injured by accidents due to moving machinery, boilers as defined, or power plants, was 29 in 1937, or the same as for 1936. Of these accidents, 4 proved fatal, being one less than in 1936. These figures include 6 mining accidents, 3 of which proved fatal, all of these are included in the report of the State Mining Engineer. Accidents in timber mills which are subject to the provisions of the Timber Industry Regulation Act of 1926 are not included. None of these accidents present any peculiar features, and in most cases they could have been avoided had the injured person exercised reasonable care.

Return No. 7 showing Persons Killed or Injured by Boiler and Machinery Accidents in Proclaimed Districts during Year 31st December, 1937.

Numbers within brackets denote fatal accidents.

Class of Machinery.	Districts worked from Perth.	Districts worked from Kalgoorlie.	Total.
Metal Working—			
Wire Drawing Machine	1	...	1
Emery Wheel ...	1	...	1
Beater Tester ...	1	...	1
Sawmilling and Wood-working—			
Circular Saw ...	1	2	3
Buzzer ...	3	...	3
Shaping Machine ...	1	...	1

Return No. 7—continued.

Class of Machinery.	Districts worked from Perth.	Districts worked from Kalgoorlie.	Total.
General—			
Belting	1	2 (1)	3 (1)
Shafting	2 (1)	...	2 (1)
Mincer	1	...	1
Cement Mixer ...	1	...	1
Wiring Press ...	1	...	1
Pumps ... ..	...	2 (1)	2 (1)
Sand-paper Machine...	1	...	1
Gear Wheels ...	1	...	1
Cap-cutting Press ...	1	...	1
Steam Engine ...	1	...	1
Hemp Machine ...	1	...	1
Crushing Rolls ...	...	1	1
Suction Gas Engine...	...	1	1
Printing	1	...	1
Friction Winch ...	...	1 (1)	1 (1)
	20 (1)	9 (3)	29 (4)

SECTION VI.

Engine Drivers' Examinations and Kindred Matters.

The total number of certificates granted in 1937 was 496, compared with 591 in 1936, being a decrease of 95. There was a decrease in the number of all grades of certificates granted, with the exception of Internal Combustion Certificates, which increased by 38, and Traction, which showed no change.

Examinations were held as follows: Perth 4, Kalgoorlie 4, Leonora 2, Cue 2, Meekatharra 1, Bunbury 2, and Mt. Magnet 1. Examinations were held at all advertised centres except Geraldton.

The Board was occupied for 18 days, holding examinations, 24 days travelling, and 44 days dealing with applications, correcting examination papers and holding enquiries, etc. The applications received numbered 621, being 65 less than in 1936.

Complaints and Enquiries, etc.

Several complaints regarding the employment of uncertificated persons contrary to Section 53 of the Act, were enquired into, and where found necessary, action was taken to ensure that only duly certificated persons were employed.

There was no change in the personnel of the Board.

Return No. 8 showing total number of Engine-drivers' and Boiler Attendants' Certificates (all classes) Granted in 1937, compared with 1936.

	Number Granted.	
	1937.	1936.
Winding Competency, including certificates issued under Regulation 40 and Section 60 of the Act ...	45	71
First Class Competency, including certificates issued under Regulations 40 and 45 and Sections 60 and 63 of the Act	6	15
Second Class Competency, including certificates issued under Regulation 40 and Section 60 of the Act	76	87
Third Class Competency, including certificates issued under Regulations 40 and 45 and Sections 60 and 63 of the Act	83	121
Locomotive Competency	14	17
Traction Competency	2	2
Internal Combustion Competency	160	122
Crane and Hoist Competency	9	21
Boiler Attendant Competency	96	122
Interim ... ..	...	1
Copies	4	9
Transfer	1	3
Totals	496	591

SECTION VII.

General, Staff, Mileage, etc.

The Kalgoorlie Electric Power and Lighting Corporation, Ltd., is still extending its plant to cope with the demand for current from the mines. This plant is steam driven from B. & W. boilers working at 160 lbs. pressure. A steam turbine driving a 7,500 K.W. generator is in course of erection. A 5,000 K.W. set was installed in 1935 and a 3,000 K.W. set in 1932, each taking the place of generators which were driven by reciprocating engines.

The Kalgoorlie Municipal Council replaced their steam driven generators by Diesel driven sets during the year.

The Gold Mines of Kalgoorlie, Ltd., has practically quadrupled the power of its Diesel driven electric generating station.

Several electric winding engines were installed during 1937 to replace steam driven winders, and preparations are well advanced to make similar changes on other mines.

Steam driven air compressors are also being discarded in favour of new constant speed compressors driven either by synchronous electric motors, or solid injection oil engines.

Inspectorial Staff.

Two inspectors resigned during the year: one of them to leave the service, and the other to take up a more lucrative position in another branch of the service. There was some dislocation of the work of this branch before two new inspectors could be appointed, but all arrears of inspections were made up before the end of the year, thanks to the hearty co-operation of the remaining staff and the two new inspectors.

Clerical Staff.

There was no change in the clerical staff.

Mileage.

The total number of miles travelled by inspectors during 1937 was 68,999. This was 864 miles less than the distance travelled during 1936.

The decrease in the miles travelled by rail is due to the fact that, owing to the improved roads, a considerable saving of time can be effected in making special inspections by car instead of by rail. The decrease in the miles travelled by water is due to Wyndham not being visited during 1937. Average number of miles travelled per inspection decreased by .28 miles.

Return No. 9.—Showing Distances Travelled, Number of Inspections Made and Average Miles Travelled per Inspection for Year ended 31st December, 1937.

—	Rail Miles.			Road Miles.			Water Miles.			Total Miles.			Total Number Inspections.			Average Miles per Inspection		
	1937.	As compared with 1936.		1937.	As compared with 1936.		1937.	As compared with 1936.		1937.	As compared with 1936.		1937.	As compared with 1936.		1937.	As compared with 1936.	
		Increase.	Decrease.		Increase.	Decrease.		Increase.	Decrease.		Increase.	Decrease.		Increase.	Decrease.		Increase.	Decrease.
Districts worked from Perth	702	....	406	45,875	3,166	....	33	....	4,424	46,610	....	1,664	9,498	165	....	4.90	....	.27
Districts worked from Kalgoorlie ....	....	....	276	22,389	1,076	....	....	....	....	22,389	800	....	3,308	209	....	6.76	....	.41
Totals	702	....	682	68,264	4,242	....	33	....	4,424	68,999	800	1,664	12,806	464	....	5.38	....	= Average All Districts, 1937.
																5.66	....	= Average All Districts, 1936.
Increases or Decreases ....	....	Decrease 682	....	....	Increase 4,242	....	....	Decrease 4,424	....	....	Decrease 864	....	....	Increase 464	....	....	....	Average Decrease .28 mile per inspection.

SECTION VIII.

Revenue and Expenditure.

The total revenue for 1937 was £167 6s. 11d. more than for 1936. The expenditure also increased by £84 15s. 11d. The credit balance was £1,465 10s. 9d.

Return No. 10 —Showing Revenue and Expenditure for Year ending 31st December, 1937.

REVENUE.

—	1937.		1936.	
	£	s. d.	£	s. d.
Fees for Boiler Inspections	2,778	13 6	2,921	5 2
Fees for Machinery Inspections....	5,144	4 10	4,746	2 8
Engine Drivers' Fees	752	9 0	363	1 0
Incidentals	126	6 10	103	18 5
(Increase—£167 6s. 11d.)	8,801	14 2	8,634	7 3

EXPENDITURE.

—	1937.		1936.	
	£	s. d.	£	s. d.
Salaries	5,247	1 9	5,330	9 4
Incidentals	1,976	19 0	1,735	1 3
Engine Drivers	112	2 8	185	16 11
(Increase—£84 15s. 11d.)	7,336	3 5	7,251	7 6
Profit—£1,465 10s. 9d.				

I desire to thank all those who helped in achieving the satisfactory results of the year's work. Valuable assistance has been given by officers in other Government Departments in this State, and also officers of Government Departments of other States and the Commonwealth.

In particular I wish to thank all the officers of this Branch and the Mines Department for their hearty co-operation.

G. MOORE,
Deputy Chief Inspector of Machinery.

DIVISION VII.

Annual Report of the Chemical Branch, Mines Department, for the Year 1937.

The Under Secretary for Mines.

I have the honour to present, for the information of the Hon. Minister for Mines, my annual report for the year 1937.

Staff.—Several changes in the professional staff occurred during the year. Messrs. F. W. Steel, A.A.C.I., S. T. Evans, B.Sc., A.A.C.I., and A. E. M. Kildahl, A.A.C.I., retired. Mr. J. N. A. Grace, A.W.A.S.M., A.A.C.I., was promoted to a senior position in the Mineral Section, and Messrs. S. E. Terrill, B.Sc., A.A.C.I., A. G. Turton, B.Sc., and H. J. Manns, A.S.T.C., A.A.C.I., were appointed to permanent positions, and Mr. E. A. Rogerson, B.Sc., to a temporary position on the staff.

The heavy demands on the Laboratory continue and, as stated in my last report, additional staff is needed to deal with all the requests for investigation and advice submitted by Government Departments and semi-official organisations. At the same time more accommodation, equipment and funds will be necessary. The question of accommodation has already been discussed with the Government Architect, as the present building will soon be untenable. Recently the natural lighting has been still further reduced by the building of a new hospital laundry within 20 feet of our walls, and the vibration from their machinery resembles at times a minor earthquake, with disastrous results to our balances and other delicate instruments.

Nature of Work Done.—The total number of samples registered for investigation during the year was 6,004. The number of individual determinations greatly exceeds this figure, as a large proportion of the samples require a search for two or more constituents, up to as many as 15 in certain cases. For the North Australian Survey we examined 742 samples of ores, etc.

The samples received are classified in the accompanying table:—

TABLE SHOWING SOURCE AND ALLOCATION OF SAMPLES.

Source, Department, etc.	Section 1. Foods, Drugs and Toxicology.	Section 2. Mineralogy and Geo- chemistry.	Section 3. Agriculture and Water Supply.
Mines—State Batteries ...	1	999	5
State Mining Engineer ...	...	87	1
Geological Survey ...	...	41	...
Government Chemical Laboratory ...	60	44	10
Explosives Branch ...	20	...	...
School of Mines ...	...	1	...
Miscellaneous ...	...	1	...
Health—Commissioner of Public Health ...	160	1	7
Hospitals ...	283	...	1
Agriculture ...	85	1	574
Public Works ...	2	...	98
Metropolitan Water Supply ...	2	...	846
Treasury—Government Stores	163	...	1

TABLE SHOWING SOURCE AND ALLOCATION OF SAMPLES—
continued.

Source, Department, etc.	Section 1. Foods, Drugs and Toxicology.	Section 2. Mineralogy and Geo- chemistry.	Section 3. Agriculture and Water Supply.
Police—Criminal Branch ...	181	...	...
Liquor Inspection Branch ...	26	...	...
Factories ...	6	...	...
Forests ...	12	...	86
Lands ...	...	...	6
Chief Secretary's—Aborigines... State Insurance ...	...	...	2
Local Governing Bodies ...	2	...	2
Railways ...	1	...	...
Employment and Industrial Development ...	1	2	2
Dairy Products Marketing Board Museum ...	2	...	...
Premier's ...	...	2	...
Public Pay ...	19	958	382
Public Free ...	10	794	13
Totals ...	1,036	2,932	2,036
Grand Total ...	6,004		

The most numerous groups of materials dealt with in each section were:—

Section I.

Anaesthetic ether	271
Human poisoning exhibits	181
Human milks	56
Jams	36
Animal nutrition deficiency samples	36
Miscellaneous drugs	34

Section II.

Ores and tailings for gold assay	1,943
Minerals for determination	642
Ores for silver assay	271
Ores for lead assay	221
Ores for copper assay	196
Ores for iron assay	105

(N.B.—These numbers overlap to some extent.)

Section III.

Water	688
Sewage	546
Soils	290
Wheat	140
Sand (for concrete)	87
Fertilisers	64

An extremely wide range of subjects has been dealt with in examining samples submitted and giving advice on matters referred to us without samples.

Fees.—On 1st January, 1937, a new scale of fees for work done in the Laboratory for the public came into operation. With the establishment of private

consulting chemists in the city, and the great increase in official work required, it was felt that the Government was no longer justified in carrying out investigations for private individuals indiscriminately and often at very low charges. The long established policy of the Government is still, however (1) To institute scientific investigations at its own expense where matters involve the health of a community or the general interests of an industry, or the establishment of a new important industry; (2) To assist prospectors for gold and other valuable minerals by free assays and mineral determinations; (3) To assist the development of agriculture by charging one-third fees for analyses required by farmers for the proper conduct of their business.

Library.—This has been starved for the past ten years and has become out of date in several directions. A small grant from the Commonwealth Metalliferous Fund will enable us this year to bring it more up to date in regard to mineralogy and mineral technology, but funds are urgently needed to bring the other sections of our library up to date.

The votes granted us for "Books, Chemicals and Apparatus" during the last ten financial years have been:—

Year.	Vote £	Percentage reduction.
1928-29	850	Standard
1929-30	850	Standard
1930-31	750	12
1931-32	400	53
1932-33	400	53
1933-34	500	41
1934-35	500	41
1935-36	600	29
1936-37	700	18
1937-38	650	24

Our vote is therefore still below the recognised depreciation rate of 22½ per cent. below standard.

Foods and Condiments.—Amongst the 191 samples of these examined were samples of butter, bread, baking powder, cheese, chutney, essences, flour, fresh fruit, jam, jelly crystals, minced meat, meat extract, tinned oysters, olive oil, pickles, sausages, sugar, sauces, tinned fish, tripe, vinegar and wheatmeal. The most unsatisfactory item was a series of "wholemeal breads," twelve of which were all found to be overloaded with refined white flour, the maximum quantity of which permitted by Food and Drug Regulation 14 (3A) is 10 per cent.

Requests were made for several additional dyes to be added to the list of those permitted to be used in foodstuffs. On the recommendation of the Advisory Committee only one, "Edicol F.C.S. (sunset yellow)," was added to the approved list.

A survey is being made of the ascorbic acid (Vitamin C) content of local fruit. For this purpose fresh fruit of a large number of different kinds, grown when obtainable in different soils, have been examined. In every case the figures obtained have agreed closely with those obtained in other parts of the world, oranges and large yellow guavas being so far found to be the richest in this valuable constituent, whilst loquats are totally devoid of it. A complete survey of local fruits is to be continued over a number of years.

Milk.—Bovine milk is only dealt with in a small number of cases, chiefly referee cases, by this Laboratory. As the result of some years' experience of the determination of the freezing point as a means

of detecting adulteration, Regulation 27 (1) under the Health Act was amended on the recommendation of the Advisory Committee to read "Its freezing point shall not lie between zero Centigrade and 0.540deg. C. below zero as determined by the Winter method."

A disputed case dealing with alleged adulteration of milk and decided in the Local Court may have very serious effects on the future control of adulteration, as well as raising the general question of the function of a referee, and the weight to be put upon his reports. The prosecuting authority's chemist submitted figures indicating adulteration, the milk vendor's chemist submitted figures indicating a normal unadulterated milk. The Government Analyst was called in as a referee, and submitted figures for the third portion of the original sample identical with those submitted by the prosecution, yet because the whole three reports (including that of the vendor's analyst) did not agree, the vendor was given "the benefit of the doubt" and the case was dismissed. Under such circumstances the true function of a referee is disregarded, and a vendor has only to submit a substituted sample to his chemist, or employ a venial or unreliable analyst to escape punishment every time. Owing to the imperfect sealing of the tripartite sample substitution is not impossible.

Toxicology and Occupational Disease.—A record number of toxicological exhibits in connection with 78 cases, mostly of suicide or attempted suicide, have been dealt with. These are considered in detail in the Toxicologist's report attached. There were again two fatal cases of children getting access to carelessly protected poison or dilute poison-containing medicine, dispensed for adults but too strong, in large dosage, for children.

Six samples of air from various working places have been examined for carbon monoxide and other poisonous gases or fumes. One was from the Midland Junction Railway Workshops, another from the East Perth Power House. Various samples of urine from workmen engaged in plants where arsenic or lead fume was prevalent have been examined for those elements.

Animal poisoning cases, intentional or accidental, accounted for 31 samples.

Commonwealth Council for Scientific and Industrial Research.—I still continue to act as one of the State Government representatives on the local committee of this body. The members have been greatly helped in their arduous and honorary duties by the visit this year to the State of two members of the Executive, Sir George Julius and Professor A. E. V. Richardson. They showed a very lively interest in scientific problems affecting local industries and were most helpful in suggestions and promises of assistance for their solution. They were accompanied by Mr. H. E. Wimpey, who was specially interested in the possibility of obtaining in Australia raw material for the contemplated aircraft industry.

Northern Australian Survey.—This aerial, geological and geophysical survey has been assisted by the examination of 742 mineral samples. Assays were made of them for gold, silver, lead or copper, and many mineral determinations made. The only novelty amongst the latter was some highly weathered triphylite (phosphate of lithium, iron and manganese) collected at Mt. Dockrell, Kimberley.

Mineral Determinations.—Of the 642 mineral specimens sent in for classification and information regarding commercial possibilities, a number of more

than passing interest are referred to in Mr. Bowley's report which is attached. Amongst them several have been recorded in the State for the first time, viz.:—

Simpsonite: a new fluo-tantalate of sodium, calcium and aluminium. Full details of this mineral will shortly be published. It is associated with an alteration product provisionally named *Metasimpsonite*. Locality: Tantalite Mine, Tappa, N.W.

Beudantite: Hydrous sulphato-arsenate of lead and iron. Locality: Belvedere Gold and Lead Mine, Mt. McGrath.

Plumbojarosite: Hydrous sulphate of lead and iron. Locality: Belvedere Mine, Mt. McGrath, N.W.

Bindheimite: Hydrous antimonate of lead. Localities: Mt. Amy and Gorge Creek, N.W.

Beidellite: Hydrous silicate of magnesium, aluminium and iron. Locality: McCarthy's Diggings, near Bange-mall, N.W.

Triphylite: Phosphate of lithium, iron and manganese. Associated with several undetermined alteration products. Locality: Mt. Dockrell, Kim.

Carminite: Hydrous arsenate of lead and iron. Associated with other lead ores and scorodite (hydrous arsenate of iron). Locality: Hardey River, N.W.

Calcosamaraskite: Niobate of calcium, yttrium, uranium and radium. Locality: Hillside Station, N.W.

It is to be remarked that of this notable list of unusual minerals, not previously known in the State and mostly not in the Commonwealth, eight out of nine come from the north-west region, which must be looked upon as one of the most remarkable mineral regions of the world. Besides a large number of minerals of great rarity it has previously yielded six not known elsewhere in the world, viz., hydrothorite, maitlandite, nicolayite, pilbarite, tanteuxenite, and tantalopolyrase.

Petalite, Londonderry.—This very rare silicate of lithium and aluminium was first recorded in the State from M.L. 72 (now M.L. 80) worked for commercial felspar at Londonderry, where a very small specimen was discovered in 1933. Hearing that the quarry had been greatly enlarged in the last two years, I visited it in October of this year, and found that a very large quantity of petalite had been encountered and thrown on to the waste dump as being obviously not commercial felspar. Many tons of it, of the highest degree of purity, were visible on the dump and in the north face of the quarry. A detailed description of the occurrence is being prepared for publication. It is now worth while experimenting to see if petalite cannot be put to some industrial use.

Meteorites.—Three new meteorites have been examined during the year. They are all composed wholly of iron-nickel alloys, with sulphide, phosphide and carbide of iron. They have been given the locality names of Gundaring (S.W.), Kumerina (N.W.), and Wonyulganna (N.W.). The first is still in private hands, but the two last will eventually be shown permanently in the Perth Museum.

Bauxite.—This is a rock consisting largely of gibbsite (hydrated oxide of aluminium) which is the chief source of the commercial metal. In view of the proposal to start smelting aluminium in Australia some further investigations of our bauxite deposits have been made. These occur scattered through the Darling Ranges from Moora-Ballidu on the north to Northcliffe-Denmark on the south, an area 350 miles long by 25 to 50 miles wide. Pure gibbsite contains

65 per cent. of alumina (oxide of aluminium), and ores used for smelting abroad usually run from 50 to 60 per cent. Our bauxites are of lower grade than this, but several which are over 40 per cent. are worth considering as sources of aluminium, provided cheap caustic soda is available for preliminary concentration. Bauxites of this grade have been found at Boddington, Clackline, Dwellingup, Glen Forrest, Hoddy's Well, Kalamunda, Mahogany Creek, Quindaning, Sawyers Valley, Toodyay, Wannamal, Wongan Hills and Woorloo. The richest ores yet found have been at Sawyers Valley (Alumina 51.8 per cent.), Toodyay (51.0) and Glen Forrest (50.7).

Tantalum Ores.—A phenomenal rise has occurred in the price of these ores, for some as yet unexplained reason. In twelve months the price has risen from below £1000 a ton to above £2000. The search for them particularly in Pilbara has been intensified and the number of samples of tantalite and suspected tantalite submitted to us for determination and assay has correspondingly increased. The chief use for the metal in the past has been for rayon spinnarets and sulphuric acid concentrating basins. The sudden rise in price points to some new use having been found for the metal. Up till recent years Pilbara has produced the major portion of the world's supply, but Uganda threatens now to equal it in productivity.

The ore now exported from Pilbara is mainly manganotantalite, but contains minor amounts of several other minerals, the whole being blended to carry not less than 60 to 65 per cent. of tantalum oxide Ta_2O_5 , representing 49 to 53 per cent. of tantalum metal. The Pilbara manganotantalite ranges from 52 to 78 per cent. of tantalum oxide. Manganocolumbite, a poorer ore (20 to 51 per cent.), is used as a diluent, and several richer ores as "sweeteners." The chief of these are simpsonite (70 to 75 per cent.), microlite (72 to 77 per cent.) and tapiolite (75 to 85 per cent.). Simpsonite occurs only at Tappa, and tapiolite mainly at Strelley, but microlite has been found at a number of localities including Strelley, Tappa, McPhees Range, Wodgina, Kangan, Hillside and Western Shaw.

The specific gravity method devised by myself for the approximate determination of the percentage of tantalum oxide in tantalites and columbites, has been extensively used and has saved a large amount of time. Details of it have been published in the *Journal of the Royal Society of Western Australia*, Vol. XXIII.

Trace Elements in Animal and Plant Nutrition.—The spectographic investigations begun in the previous year, led this year to a very important discovery, viz., the cause and hence the prophylactic and cure for the serious Gingin sheep disease known as enzootic ataxia. Briefly it was found that whereas previously the disease had been suspected to be due to lead poisoning, it was proved in fact to be due to copper deficiency. This was especially noticeable in the livers, those of healthy animals showing 20 to 100 times as much copper, as those affected with the disease. A similar condition was found in regard to the blood and milk. It was proved by the field officers of the Agricultural Department that a small supplement of copper prevented and checked the

disease. A remarkable fact recorded was that chemically pure ammonium chloride given to the sheep with the idea of curing the supposed lead poisoning had no curative effect whatever, but a commercial ammonium chloride, later shown to be appreciably contaminated with copper, was distinctly beneficial.

The whole story of the discovery is given in a paper by H. W. Bennetts and F. E. Chapman entitled "Copper deficiency in sheep in W.A.: A preliminary account of the aetiology of enzootic ataxia of lambs and an anaemia of ewes."

The chief trace elements looked for in regard to the irregular growth of exotic pines (*P. radiata* and *pinaster*) were zinc and manganese, spraying with solutions of zinc sulphate having been found to have a tonic effect on young backward trees. A number of samples of apple leaves were examined also for their copper content.

Cereals.—Owing to the acquisition by the Agricultural Department of a Brabender mill, the number of wheats milled in this laboratory is not as great as previously. The most important wheat sample was that composite one blended by the Chambers of Commerce to represent the fair average quality (f.a.q.) of the wheat grown and exported in the season 1936-7. Full details of this, which was of good "hard white" quality, are given in Mr. Hoare's report below. Altogether during the year we examined 140 samples of wheat, 51 of flour, and 22 each of bran and pollard (sharps).

Fertilisers.—A high percentage (91 per cent.) of the samples of commercial fertilisers registered under the Act continued to conform to the guaranteed composition. Calcium superphosphate, by far the most important fertiliser on the market, continues to be of high uniform quality. The most frequent complaints are levelled at "blood and bone," used freely by the market gardeners. Some brands are constantly varying in the relative proportions of nitrogen and phosphoric oxide, and in the proportion of ammonium sulphate added to make good any deficiency of organic nitrogen.

Metropolitan Water Supply and Sewerage.—The Advisory Committee, of which I am a member, which for many years dealt only with water supply, has been considering this year the metropolitan sewerage also. Except for a somewhat high mineral content the various sources of water supply continue to be satisfactory. The increase of the Canning Dam to impound 4,000 million gallons before this summer commenced has removed all source of anxiety in regard to quantity available for the immediate future. The water in this dam averages in parts per million: total salts, 260; chlorine, 115; sulphate (SO_4), 11; carbonate (CO_3), 18; pH, 6.3.

A large number of samples of sand and cement used in the construction of the dam have been examined at regular intervals. Comparative tests have also been made of the resistance to weak saline solutions of the local Portland cement and an imported "ciment fondu." Regular analyses are being made of the small amount of water which finds its way through the Canning Dam.

One of my chemists has devoted the greater part of his time to the close study of the sewage treatment works at Subiaco and Swanbourne, where for successful coagulation and digestion the pH of the fluid

has to be kept within a narrow range of hydrogen ion concentration. So far the separation into a commercially valuable sludge, and a non-putrescible effluent has been highly successful. Three re-surveys of the ocean for a radius of half a mile round the outlet again showed a very satisfactory state of rapid and extreme dilution and aeration within a radius of a few hundred yards.

Country Water Supplies.—The main goldfields water supply is regularly examined for quality. The introduction on a large scale of cement-lined and solid concrete pipes has resulted in a permanent rise in pH figure from under seven at the Mundaring reservoir to over 9 at Kalgoorlie. It has been found that the first water passing through new pipes becomes highly alkaline by solution of calcium hydroxide. After the immediate surface of the lining has been leached the pH figure drops to a fairly constant 8.5 to 9.5, which is perfectly harmless and not unpalatable.

The ground waters reached by wells up to 150 feet in depth continue to be the main source of individual supplies throughout the interior of the State. These are rarely quite fresh and rise in salinity to that of sea water or more. The problem is therefore constantly presented to us as to what can be safely done with a more or less saline water struck in a new drilling, prior to permanent well sinking. Our standards of total salinity which are safe for the various kinds of stock, when on dry feed, have stood the test of time. They are:—

For horses and pigs—maximum 450 grains per gallon.

For cattle—maximum 700 grains per gallon.

For sheep—maximum 900 grains per gallon.

It is much more difficult to decide what is the limit for continuous or occasional consumption by man, and for the irrigation of various commercial crops. To arrive at some finality in regard to the latter, a survey of waters now in use for irrigation is being made. Already it is apparent that a high degree of salinity, up to at least 250 grains per gallon, will be tolerated under local conditions by tomatoes, lucerne, cauliflowers, celery, silver beet and several other plants of economic importance. The decision in regard to human beings is still a serious problem, especially in the Murchison region, where the equivalent of several grains of sodium nitrate is present in each gallon of many of the well waters. Hardened miners are drinking regularly in places water with anything up to 300 grains of total salts, and 5 grains of sodium nitrate per gallon. H. St.J. Philbey, in his book, "The Empty Quarter," records camping and travelling under the most arduous conditions in Southern Arabia for two weeks on a well water carrying 527 grains of anhydrous salts per gallon. This, however, was only done with serious discomfort to himself, even after partially correcting the osmotic and inflammatory effects by making an infusion in it of tannin from tea, coffee and a local herb. The actual composition of the water was—

	Grains per gallon.
Sodium chloride	238.7
Sodium sulphate	79.8
Magnesium sulphate	70.7
Calcium sulphate	115.5
Calcium carbonate	22.4
	<hr/>
	527.1

Red Rain.—On the 10th February a violent north-easterly gale raised clouds of fine red dust on the eastern side of the Darling Ranges and rain falling in Perth was heavily charged with it for nearly an hour. The dust, a fine ferruginous clay, must have come from at least 50 miles away, much of it probably from more distant sources. In the course of a 40-years residence in Perth, this is the first time I remember such an occurrence.

Publications.—The following scientific papers were published by members of the staff:—

- F. E. Chapman (with H. W. Bennetts)—“Copper deficiency in sheep in Western Australia: a preliminary account of the aetiology of enzootic ataxia of lambs and an anaemia of ewes.” *Aust. Veterinary Jour.*, 13, p. 138-149.
- G. E. M. Dean (with L. W. Samuel)—“Western Australian F.A.Q. Wheat.” *Jour. Dept. Agr., W.A.*, 14, p. 279-283.
- G. E. M. Dean (with L. W. Samuel)—“Bran and Pollard.” *Jour. Dept. Agr., W.A.*, 14, p. 309-310.
- E. S. Simpson—“Contributions to the Mineralogy of Western Australia.” Series X., *Jour. Roy. Soc. W.A.*, 23, p. 17-36.
- B. L. Southern (with L. J. H. Teakle)—“Peat Soils and related soils of Western Australia.” Parts 1 and 2. *Jour. Dept. Agr., W.A.*, 14, p. 332-358, 404-424.

EDWARD S. SIMPSON, D.Sc., B.E., F.A.C.I.,
Government Mineralogist and Analyst.

Perth, 8th February, 1938.

SECTION I.—FOODS, DRUGS AND TOXICOLOGY.

By H. E. HILL, A.I.C., A.A.C.I.

During the year 1036 samples were examined, compared with 845 in 1936. This is a record for this section of the laboratory, the next highest being 880 samples in 1932. The increase was mainly due to the large number of samples of ether submitted for test, but was accounted for partly by the increased number of toxicological specimens.

The chief classes of work performed were as follow:—

Foods.—The number of foods submitted for analysis was 197, which was a decrease compared with the previous year, when 232 samples were examined. One hundred and twelve (112) samples were submitted by the Government Tender Board in connection with the allocation of contracts and the testing of supplies for Government institutions. Most of the remainder were from the Department of Public Health. The following table summarises some of the principal items of foodstuffs examined. These samples do not represent the results of systematic sampling, owing to the smallness of their numbers and their varied origin, some being taken by inspectors under the Health Act and others being foods submitted for tender or actually supplied to Government institutions. They indicate however, that a greater number and variety of foodstuffs might well be taken over a wide area of the State and submitted to tests.

Foodstuff.	No. of samples received.	No. below standard.	Remarks.
Vinegar	15	3	Wrongly labelled “malt” vinegar, or shortage of contents.
Jam	36	17	Misleading labelling, deficiency in total soluble solids or addition of colouring matter.
Jelly crystals	21	2	Insufficiency of gelatine.
Essences of lemon and vanilla	15	3	Low vanillin content and contamination with dirt or kerosene.
Sauces and pickles	15	3	Bad pickling of vegetables and poor flavour.
Bread (wholemeal)	12	12	Not wholemeal as defined in the Food and Drug Regulations.
Tripe	4	1	Preservatised with a boron compound.
Olive oil	4	1	Substitution of arachis oil.
Minced meat	4	4	Preservatised.

Most of the milks received (23) were from the Woolooloo Sanatorium. Only one “umpire” sample was received, this being in connection with a prosecution instituted by a local authority for milk alleged to be considerably below standard in both fat and solids not fat. At the original hearing the defendant produced an analysis of his portion of the sample, made by a private analyst, which differed considerably from that of the inspector’s sample, and indicated that the milk was well above the standard. The defence cast doubts on the thoroughness of mixing of the original bulk sample by the inspector. The magistrate then ordered that the third sample be analysed by this department. The analysis confirmed the result obtained by the local authority’s analyst, the two showing perfect agreement, thus proving beyond doubt that the mixing had been thorough, and that the milk was faulty. Without hearing any further evidence, however, it was decided that there was some doubt about the mixing of the sample and the case was dismissed.

The large proportion of jams which were rejected is due to the adoption, for the purpose of Government supplies, of the standard of not less than 68 per cent. of total soluble solids, which is substantially that agreed upon in England by the Food Manufacturers’ Federation and a Committee of the Society of Public Analysts. This is not a high standard, being applicable in England to both first and second quality jams, yet many jams examined in this laboratory fail to attain it. In addition a number of mixed jams were found to contravene the Food and Drug Regulations in that they did not contain at least fifty per cent. of the fruit first named in the label (which is invariably the choicer and more expensive). Samples of loganberry and of gooseberry jam were found to be artificially coloured.

In view of the importance which is assigned in some quarters to wholemeal bread in the diet, and the publicity which it has received, the following tables may be of interest. These show the results of analyses made for the Commissioner of Public Health of a number of the wholemeal breads on the local market. The breads are classified according to the descriptions supplied to the inspectors by the vendors when purchased.

No.	“WHOLEMEAL.”					
	24	25	28	33	34	35
Water	38.50	39.10	37.70	41.40	38.50	42.10
Fat	1.67	1.60	2.49	1.57	3.25	1.73
Protein (N x 5.7)	8.72	8.06	8.70	8.46	7.24	8.22
Fibre	0.94	0.91	0.86	0.81	0.94	1.12
Mineral matter	2.18	2.37	1.91	2.05	2.25	1.83
Carbohydrate (by difference)	47.99	47.96	48.34	45.71	47.82	45.00
	100.00	100.00	100.00	100.00	100.00	100.00
Digestible calories per 100 grams.	242	238	251	231	249	228

A further five samples were variously described as follows:—

No. 26.—“Wholemeal with small quantity plain (white) flour.”

No. 30.—“Half wholemeal, half ordinary flour, coloured with molasses.”

Nos. 27, 32.—“White flour 150 lbs., gristed wheatmeal 35 lbs., pollard 25 lbs.”

No. 31.—“Special wheatmeal plus extract of malt.”

No.	26	30	27	32	31
	%	%	%	%	%
Water	37.70	38.90	35.00	37.80	37.50
Fat	1.30	1.26	1.66	1.61	2.15
Protein (N x 5.7)	8.56	7.79	8.60	7.79	7.82
Fibre	0.26	0.38	0.82	1.03	0.74
Mineral matter	1.81	1.83	2.27	2.29	2.13
Carbohydrate (by difference)	50.37	49.84	51.65	49.48	49.66
	100.00	100.00	100.00	100.00	100.00
Digestible calories per 100 grams	247	242	256	244	249

The percentage of whole wheat flour used in the baking of these breads was calculated on the assumption that 100 per cent. whole wheat bread contains 2.50 per cent. of fibre calculated on a water-free basis (West Australian 1937 F.A.Q. Wheat 2.75 per cent.). The following results were obtained:—

Description.	No.	Crude Fibre calculated on water-free basis.	Whole Wheat Flour present.	Deficiency.
		%	%	%
“Wholemeal”	24	1.53	61.2	38.8
	25	1.49	59.6	40.4
	28	1.38	55.2	44.8
	33	1.38	55.2	44.8
	34	1.53	61.2	38.8
	35	1.93	77.2	22.8
Various (see above)	26	0.42	16.8	83.2
	30	0.62	24.8	75.2
	27	1.27	50.8	49.2
	32	1.66	66.4	33.6
	31	1.18	47.2	52.8

If the figure for fibre in the West Australian 1937 F.A.Q. wheat had been taken the deficiency would have appeared greater.

Since white or “patent” flour contains only about 0.1 per cent. of fibre, the deficiencies shown in the table represent the approximate amounts of white flour used in the making of these “wholemeal” breads. Wholewheat or whole-meal bread is defined in the Food and Drug Regulations of the West Australian Health Act as bread made from whole-wheat flour (itself the product of grinding wheat without any process of sieving), with the addition of not more than ten per cent. of added (white) flour. A deficiency over 10 per cent. in any sample in the above table therefore constitutes an infringement of the regulations.

It is well known, of course, that bakers find it necessary to add plain white flour to some extent to whole-meal flour in order to make the resultant loaf palatable, but large additions such as some of those shown are distinct breaches of the regulations. Such breads cannot be described as whole-meal or even approximately whole-meal breads. The introduction of standards for whole-meal and modified whole-meal breads seems highly desirable, since that section of the public which is desirous of eating such breads is entitled to receive what it asks for, and to know what it is getting.

Drugs.—Three hundred and five (305) samples of drugs were examined during the year, which is an increase of 205 over the previous year. Two hundred and seventy-one (271) of these, however were ether samples examined for the Perth Hospital in connec-

tion with supplies for anaesthetic purposes. Of these 86 did not comply with the requirement of the British Pharmacopoeia regarding freedom from peroxides. Many of the samples were received during February and March when, owing to shipping troubles, there was a shortage of supplies in the State. All existing stocks had to be drawn upon regardless of age, and in order to safeguard patients it was decided to test each individual lot. Naturally a considerable proportion failed and the bad ones were rejected. Out of 159 samples so tested 66 failed to comply with the B.P. test.

Other drugs examined, totalling 34 in all, included tincture of opium, extract of glycyrrhiza, Parrish’s food, ether soap, mercurochrome, mercury ointment and thyroid extract tablets, none of which complied with the legal requirements. In addition we tested aspirin and A.P.C. tablets purchased at “chain stores,” formalin, tincture of digitalis, zinc ointment, atropine and morphine tablets, Epsom salts tablets, and solution of ichthyol and glycerine, all of which did comply.

Toxicology.—A record year has been experienced in this section of the work. Altogether two hundred and twelve (212) exhibits and specimens were examined in connection with cases of poisoning or supposed poisoning of human beings and animals. Of these 181, received in connection with 78 human cases, were submitted by hospitals or the police acting on the instructions of district coroners.

Poison was detected in 52 cases. Many of these were suicides, and evidence at a number of inquests was given by Mr. Malloch or myself. The poisons found fall into the following groups:—Lysol and other phenolic poisons 13 cases, cyanide 11, strychnine 7, alcohol (including methylated spirit) 4, arsenical preparations 3, phenobarbitone 2, carbon monoxide 2, methyl salicylate, A.B.C. liniment, eucalyptus oil, formalin, lead, morphine, iodine, copper sulphate, chloral and potassium permanganate, one each. In 27 cases negative results were obtained. There were two fatal cases again this year in which young children obtained access to poisons, carelessly left within their reach. In one case strychnine alkaloid was consumed, in the other medicinal strychnine-containing tablets.

Some attention has been given to chemical methods for diagnosing drunkenness in connection with motor-accidents and offences against the traffic laws. Although in some medical circles the value of such tests to determine the concentration of alcohol in the blood and urine, with a view to estimating the degree of drunkenness, is looked upon with scepticism; nevertheless the tests have considerable value. Various chemical and medical workers have shown by experiment that the concentration of alcohol in the blood and urine is a definite indication of the minimum quantity of liquor consumed, and some consider that it is an index to the alcoholic condition of the individual. The test, when carried out with proper precautions, is certainly absolute and final as an indication of whether or not any alcohol at all has been taken, and also shows whether an abnormally large amount has been consumed. It is being freely used in police laboratories in England, on the Continent, and in New South Wales. Work done in this laboratory during the year has shown that there are accurate methods of determining alcohol in the body fluids. In one local case where a person known to be con-

siderably under the influence of liquor was run over and killed after lying on the road, the concentration of alcohol in the blood was found to be 170 milligrams per 100 millilitres, and in the urine 290 milligrams per 100 millilitres, indicating a considerable degree of drunkenness.

In connection with the poisoning of animals, thirty-one (31) specimens were received. Some of these were baits laid by persons with the object of poisoning domestic animals, and others consisted of viscera of animals poisoned or suspected of being poisoned. In one case a cow died and others were affected as a result of the discharge of cyanide-containing waste liquor from a factory on to an adjacent paddock.

Industrial Toxicology.—The number of samples examined in this connection is increasing and, together with visits made to factory and other premises by Mr. J. C. Hood, who is an honorary inspector under the Factories Act, takes up an appreciable part of the time of the section. During the year a visit was paid to the Midland Junction Railway Workshops, where conditions in the blacksmiths' shop were investigated, and, after samples of air had been taken and analysed, recommendations as to ventilation, etc., were made. Evidence was also given by Mr. Hood before the State Arbitration Court in connection with the claims of fitters working on the extensions to the East Perth power house for an allowance on account of the alleged effect of deleterious gases discharged from the adjacent smoke stacks and ash pits. Various samples examined during the year for substances which might be harmful to workers comprised metallic printing powders (2), air (6), paint materials (3), leather preservative and insecticidal lotion. Eleven (11) urines taken from workers engaged in occupations where lead and arsenic are encountered were also examined.

Spectrographic and Microchemical Analysis.—Several departments submitted samples during the year in connection with problems of animal and plant nutrition. A large part of Mr. Chapman's time is occupied with spectrographic analysis and gradually, with the aid of the extra equipment purchased, valuable experience and standards of reference are being built up. By means of the spectrograph the cause of *Enzootic Ataxia* or Gingin sheep disease, locally known as rickets, was definitely established by Mr. Chapman, working in conjunction with Dr. H. W. Bennetts of the Department of Agriculture. It was shown to be due to a serious deficiency of copper, in the affected animals. After the large discrepancy in copper content of the livers of affected and healthy animals had been detected in the spectrograms, the actual amounts were determined microchemically, using the method of Sylvester and Lampitt (Analyst 1935, 60, 376). A summary of the results obtained is as follows:—

	Normal Animals (sheep and lambs).	Affected Animals (sheep and lambs).
Copper content of livers (parts per million)—		
Range	120—360	3—8
Average	222	6
Copper in whole liver—		
mgn.	2.7—41.0	0.05—1.10

Other materials examined for various trace elements—livers of cows and sheep affected with Denmark disease and "falling disease" (cobalt, copper and general spectrographic examination), pine trees and seedlings in connection with nutritional experiments on the cultivation of young pine trees (zinc and general spectrographic examination). It

has been found by officers of the Forestry Department that spraying the young trees in certain areas with weak solutions of zinc sulphate (and to a lesser degree certain other salts) gives a good response as regards growth and colour of the needles. Analyses were made during the year and others are proceeding to discover the fate and distribution of the zinc, and to determine the amount normally present in healthy and affected trees.

Investigation of Natural Products.—When time has permitted some chemical investigation of vegetable products of interest has been carried out. A start was made with a preliminary survey of the Vitamin C (ascorbic acid) content of various West Australian fruits. The citrus fruits, including beside the more ordinary varieties, the mandarin orange, kumquat, citron and lime, have already been examined, as also have the cape gooseberry, large yellow guava, loquat, English mulberry and passion fruit.

Up to date it has been found that local fruits are within the range, and up to the standard as regards ascorbic acid content, of the same kinds grown and examined elsewhere. A sample of North-West large yellow guavas, according to the titration method used, contained 110 milligrams of ascorbic acid (Vitamin C) per 100 grams. This is higher than oranges which usually range from 40 to 80 milligrams per 100 grams of juice. On the other hand, it was found that local loquats contain no ascorbic acid at all.

Some further work has been done on the pigment in the rhizome of the black kangaroo paw (*Macropidia fuliginosa*). A very similar pigment has also been extracted from the dark bluish-black spots which are frequently seen on the leaves of the ordinary tall red kangaroo paw (*Anigoxanthos manglesii*). Both these pigments show the characteristic colour changes (blue, violet and red tints with alkalis and acids), and some of the solubilities of anthocyanins. Indications are, however, that they do not exist in the plant in the sugar-combined (anthocyanin) state but are anthocyanidins, which is unusual. Several grams of each in an impure form have been obtained and it is hoped to continue the work in the near future.

Three mallet barks were examined during the year as to tannin content for commercial purposes.

Miscellaneous Samples.—These included human milks (56) for the Department of Public Health and various infant health clinics, cattle dips (25), soaps, polishes and cleaning materials in connection with contracts for Government supplies (32), explosives (20), salts (10), urinary calculi (2), ambergris (two genuine samples of the black variety found at Calgarup and Rottnest respectively), tallow (3), benzol (2), phenyle (4), dyes (3), algae, bran, paint, oyster shell, water and wood one each.

Twenty-six (26) samples of liquors were examined for the Police Department (inspection of licensed premises). Nineteen of these comprised most of the beers on the local market. In addition to the usual analysis these were examined for contamination with heavy metals and arsenic, and for preservatives. They were found to be free from these substances and there were no serious infringements of the Health Act Food and Drug Regulations noted.

Miscellaneous Investigations, Advice, etc.—A considerable amount of information and advice has been given to various Government departments and to members of the public in matters on which this section possesses special knowledge.

SECTION II.—MINERALOGY, MINERAL TECHNOLOGY AND GEOCHEMISTRY.

By H. BOWLEY, F.A.C.I.

TWO thousand nine hundred and thirty-two (2,932) samples were entered for examination during the year, an increase of 322 on the previous twelve months. The number of separate constituents estimated in these samples totalled 4,319.

The gold assays made were approximately the same as in the previous year but there was an appreciable falling off in the number of tin assays.

The main increases were—mineral determinations 642 (307), silver assays 271 (31), lead assays 221 (5), copper assays 196 (32), titanium assays 86 (nil), iron assays 105 (21), tantalum assays 83 (38), tungsten assays 22 (1). The figures in parentheses are those for last year.

Seven hundred and forty-two (742) samples were submitted by the North Australian Geological Survey and 85 samples were forwarded by the company examining the iron deposits at Yampi.

This section was shorthanded from the 4th April, the date Mr. Kildahl commenced his leave prior to retirement until Mr. H. J. Manns, A.S.T.C., A.A.C.I., started duty as chemist and assayer on 30th July.

The conditions in the mineral section are still unsatisfactory and cramped whilst the lighting is such that it is almost impossible to match colours or perform any important optical work during the greater part of the day owing to the blocking of outside light by a new building recently erected for the hospital authorities almost on the boundary of this block. Although the removal of fumes was somewhat improved by the construction of separate flues to the fume cupboards, the working conditions in the laboratory are far from satisfactory and can only be remedied by the installation of a complete scheme of ventilation which will continually draw in fresh air and remove the noxious vapours as they are formed.

Gold Assays.—Nineteen hundred and forty-three (1,943) gold assays were made during the year. Of these 947, or 205 less than the previous year, consisted of battery tailings received from the State Batteries Branch for check and umpire assays, the latter totalling 166. The North Australian Survey submitted 545 samples for the determination of their gold content. Prospectors forwarded 290 gold samples for assay under Free Assay Regulations. Of the balance 87 samples were received from the State Mining Engineers Branch and 55 samples were paid for by the general public.

Copper Assays.—The necessity for determining the copper content of tailings from Government batteries and the renewed interest in the search for copper deposits was responsible for the increased number of copper assays made during the year. Of the 196 samples received 71 were tailing samples from gold ores crushed at various State batteries throughout the State; 55 however were from the Mt. Ida plant which with one exception contained copper varying from a trace (under 0.002%) to 0.8%. 24 samples were examined for the North Australian Survey and 23 were classified as Public Pay samples. The number of free assays made totalled 78.

Lead Ores.—The rise in the price of lead during the year stimulated prospecting for lead ores in the Ashburton district where several interesting minerals were discovered. These are dealt with later under miscellaneous minerals.

173 out of 221 samples dealt with were forwarded by the North Australian Geological Survey from the following localities: Braeside (N.W. Div.); Narlarla and Mt. Amherst (Kim. Div.). 28 samples were received from prospectors.

Iron Ores.—One hundred and five (105) samples were entered for iron assay. Of these 85 were bore samples of iron ore (haematite) from Koolan Island, Yampi (Kim. Div.). Zircon was recognised in small amounts in all the samples from this area whilst the titanium present appears to be present as ilmenite.

High grade limonite ore was represented by a series of samples from the Tenindewa district (Mur. Div.). These averaged Fe_2O_3 79.44%; SiO_2 4.18%; ignition loss 12.66%.

Tin Ores.—The determination of the tin content of tantalum bearing ores accounted for most of the 97 tin assays made during the year. The North Australian Geological Survey submitted 7 samples of quartz veins with cassiterite and wolfram and abundant scorodite from the King Sound Mine at Clara Hill (Kim. Div.) for tin and tungsten assay, also 9 samples of the tin bearing pegmatite at Dyasons Creek (Kim. Div.) for tin assay only. Of the samples submitted by prospectors, a concentrate consisting of ilmenite, cassiterite, quartz and some zircon from Willow Springs (S.W. Div.) assayed 13.5% of metallic tin.

It is interesting to note in regard to some samples of tin and tantalum bearing lodestuff from McPhees Range (N.W. Div.) that whenever spodumene occurred in the ore the concentrate was poor in tin and high in tantalite.

Tantalum Ores.—The demand that has recently arisen from tantalum, particularly its use in regard to armaments, has no doubt been responsible for the high price now being offered for tantalum bearing ores. Although it has not been possible for me to definitely ascertain the price now being paid for these ores, I have every reason for believing that it is in excess of £2,000 per ton for ores containing not less than 65 per cent. of tantalite oxide. The assay for tantalum and niobium is somewhat long and tedious and in order to cope with the increased number of parcels coming forward and so that time could be found to examine samples for prospectors endeavouring to develop new supplies, it was found necessary to limit the number of assays that could be made of sales parcels for established producers. In the case where a departmental assay certificate was essential in order to effect a sale it was arranged that the samples should represent larger parcels than formerly.

In all, 83 assays for tantalum were made during the year representing an increase of 45 over last year's figures. As in the past the majority of the samples came from various localities in the Pilbara district and consisted mainly of manganotantalite and manganocolumbite associated in some cases with microlite, tapiolite and the new alkali calcium aluminium fluotantalate Simpsonite. Cassiterite is

invariably associated with these ores. It should be possible by a judicious blending of the ores in this area to considerably increase the output of ore containing over 65 per cent. of tantalie oxide.

Tantalum-bearing ores were received also from the following localities outside the Pilbara district.

A concentrate from Mt. Dockrell (Kim. Div.) contained manganocolumbite intergrown with microlite to the extent of 25.8 per cent. The associated minerals were cassiterite (48.1%), quartz and various silicates (26.1%). Four other samples, after the removal of minerals under 4.2 specific gravity, contained:—

	A	B	C	D
	%	%	%	%
Cassiterite ..	75.8	70.7	7.4	61.8
Manganocolumbite	24.1	26.9	87.2	33.6

A glassy manganotantalite from Gibraltar (Cen. Div.), having a specific gravity of 6.91, contained 82.33% of tantalie and niobic oxides with 1.53% of titanium oxide and 0.36 uranium oxide.

Manganocolumbite and manganotantalite were received from Mercer's Find, Londonderry (Cen. Div.). Individual pieces ranged in specific gravity from 5.63, representing Ta_2O_5 19.2; Nb_2O_5 61.2 per cent. to 7.49, indicating Ta_2O_5 76.9; Nb_2O_5 8.31.

A fragment of a crystal of a black lustrous mineral from Greenbushes (S.W. Div.) having the appearance of tapiolite and showing a slight intergrowth of quartz contained approximately 85 per cent. of tantalie oxide and one of niobic oxide.

Antimony Ores.—It is surprising, in view of the hostilities in China, the largest producer of antimony, that a greater interest has not been shown in local antimony deposits. Only six samples were received during the year, all of which were auriferous antimony ores from old abandoned mines in the Pilbara Division consisting of quartz with antimony sulphide and oxides carrying up to 3 ozs. of gold per ton.

Burnt Lime.—Nineteen (19) samples of the burnt lime delivered at the Government crushing plants throughout the State were checked during the year. The figures obtained in these samples for total calcium oxide after ignition ranged from 82.78 to 88.65 per cent., and satisfied the Government Tender Board Specification for Builders' Lime. In four cases, however, the loss on ignition exceeded the amount allowed (viz. 15%) for lime when sampled and sealed on delivery on the job. Burnt limes showing an ignition loss over 15 per cent. should be viewed with suspicion as the high figure may be due either to the fact that the lime has been exposed too long to the weather or that it is underburnt.

Assay Weights.—Thirty-eight (38) assay "riders" supplied from local stocks for official use were compared with National Physical Laboratory Standards. Seven milligram riders tested in May were underweight to the extent of from one to three per cent. but three of the four supplied in December were found to be accurate whilst the other one proved to be one per cent. overweight.

The position regarding local supplies of centigrain riders is the same as last year, not one of the weights supplied proved to be correct. In all, 27 were tested, the error ranging from 2 to 6 per cent. high.

Brown Coal.—Nannup (S.W. Div.) A sample of brown coal of better quality than that found in most parts of the State was received from 6½ miles from Nannup. It contained—Moisture 15.31%; Volatile matter, 37.31%; Mixed Carbon 34.51%; Ash 12.87%.

Mineral Determinations.—This important activity of the section was again responsible for occupying a considerable amount of the time of the staff of this section. Six hundred and forty-two (642) samples were dealt with under this heading against 307 for the previous year. A number of the more interesting minerals recognised are dealt with under Miscellaneous Mineral Notes.

Miscellaneous Mineral Notes.

Allanite (hydrous silicate of lime, iron, cerium and aluminium). Yule River (N.W. Div.) and Cooglegong (N.W. Div.).

A mixture of allanite and a manganiferous garnet, which were very difficult to separate owing to their intimate intergrowth and close specific gravities, was received from the Yule River 10 miles west of Tambourah.

For details of the Cooglegong (N.W. Div.) mineral see under Gadolinite.

Arsenopyrite (sulpharsenide of iron). Field's Find (Mur. Div.) The bright metallic mineral present in appreciable amounts in an auriferous lode-stuff from P.A. 1892, 5 miles west of Field's Find, is arsenopyrite.

Axinite (hydrous borosilicate of iron, calcium and aluminium). Weld Range (Mur. Div.). Greyish massive and crystalline axinite associated with quartz was recorded from this locality.

Beidellite (hydrous silicate of aluminium and magnesium). McCarthy's Patch (N.W. Div.). A yellow waxy mineral forming thin crusts on an auriferous quartz proved to be a clay-like mineral approaching beidellite in refractive index and to some extent in chemical composition but containing much more magnesium than the type mineral, it appears to be intermediate between beidellite and montmorillonite. It has been provisionally classified as the former.

Beudantite (sulphato-arsenate of lead and iron). Mt. McGrath (N.W. Div.). This mineral and the associated plumbojarosite occur as minute yellowish rhombohedral crystals in a quartzose ferruginous schist containing anglesite, cerussite, malachite and calcite.

This is the first time this mineral has been recorded in the State.

Bindheimite (hydrous antimonate of lead and iron). Mt. Amy (N.W. Div.), and Gorge Creek (N.W. Div.). This very rare mineral was recognised for the first time in this State from these two localities. In both cases it occurs as a canary yellow amorphous powder with a high refractive index in a lead ore consisting of cerussite and anglesite.

Bismutosphaerite (bismuth carbonate). Melville (Mur. Div.). The mottled greenish yellow to brown minerals present in a pegmatite from P.A. 1988 at Melville consisted of an intimate mixture of bismutosphaerite with vanadinite.

Calciosamarskite (a compound of calcium, yttrium, uranium, niobium and tantalum). Hillside Station (N.W. Div.). Greyish white pebbles of calciosamarskite formed 80 per cent. of a sample of detrital material from 4 miles N.W. of Hillside Station. The associated minerals were microlite, quartz, felspar and some undetermined rare earth minerals.

Carminite (hydrous arsenate of lead and iron). Wyloo Station (N.W. Div.). Reddish massive carminite was present in lead ores from 2 miles south of

Log Hut on the Hardey River, Wyloo Station. In one specimen it was associated with massive green scorodite, quartz and anglesite. The associated minerals in other specimens were scorodite, beudantite, anglesite and galena. This is the first record of the occurrence of carminite in this State.

Gadolinite (hydrous silicate of beryllium, iron and yttrium). Cooglegong Crossing (N.W. Div.). An interesting and complex concentrate from 4 miles east of Cooglegong Crossing consisted of black glassy gadolinite coated with a brown decomposition product (32%), brownish black allanite (16%), yttrio-tantalite (4%), pale yellow monazite (2%) and 46% of silicate minerals.

Manganite (hydrous manganese oxide). Bonnie Downs (N.W. Div.). This mineral occurs as fine-bladed crystals with a metallic lustre in vugs in psilomelane.

Microlite (fluotantalate of sodium and calcium). Pilgangoora (N.W. Div.). An alluvial tantalum ore from this locality consisted of pebbles of microlite showing in most cases a small core of unaltered tapiolite.

For Hillside (N.W. Div.) mineral. See under Cal-siosamarskite.

Monazite (phosphate of cerium, etc.). Hillside (N.W. Div.). See under Calciosamarskite.

Plumbojarosite (basic sulphate of lead and iron).—Mt. McGrath (N.W. Div.). See under Beudantite.

Struverite (titano-tantalate of iron).—Donovan's Find, near Smithfield (S.W. Div.) A sample of detrital material consisting of struverite (70%), cerussite (20%), quartz (5%) and tourmaline (5%) was received from Donovan's, 16 miles from Bridgetown.

Triphylite (phosphate of lithium, iron and manganese). Mt. Dockrell (Kim. Div.). A brown phosphatic mineral from 8 miles east of Mt. Dockrell is probably an altered manganiferous variety of triphylite. A partial analysis gave—

P ₂ O ₅ %	Li ₂ O %	MnO %	FeO %
38.29	.74	18.81	24.06

Vanadinite (lead chloro-vanadate).—Melville (Mur. Div.). See under Bismutosphaerite.

Yttrotantalite (tantanlate and niobate of yttrium).—Hillside (N.W. Div.). Glassy yttrotantalite, impregnated with white opaque alteration products, in the form of pebbles up to 9 grams in weight, from 10 miles west of Hillside Station contained approximately 55 per cent. of tantalic oxide. Another sample from the same locality contained about equal amounts of yttrotantalite and cassiterite.

Wulfenite (lead molybdate).—Comet Vale (Cen. Div.). An auriferous lodestuff from Crown Lands south of the Gladstone Mine at Comet Vale contained a small amount of wulfenite but no tungsten bearing minerals.

Mineral Analyses.—Complete mineral analyses were made of the following:—

Minerals.

Almandine, Nevoria; Antigorite, Meilga; Bauxite, Toodyay and Quindaning; Beidellite, Bangemall; Beudantite-Plumbojarosite, Mt. McGrath; Hypers-thene, Greenhills; Petalite, Londonderry; Tantalite, Gibraltar.

Rocks.

Anthophyllite rock, Mt. Palmer; Cordierite-anthophyllite rock, Clackline; Grossularite hornstone, Meiers Find (Mt. Palmer); Sillimanitic Clay, Clackline.

SECTION III.—AGRICULTURE, WATER SUPPLY AND SEWERAGE.

By A. J. HOARE, A.A.C.I.

Two thousand and thirty-six samples were entered for examination during the year, of these twenty-three had to be carried over into the next year.

Staff.—Mr. S. T. Evans, B.Sc., A.A.C.I., who was appointed to the permanent staff in January, resigned from his position in July, having received an appointment with the Council for Scientific and Industrial Research in Adelaide. Mr. A. G. Turton, B.Sc., was appointed to the temporary staff in May and to the permanent staff in July. Mr. E. A. Rogerson, B.Sc., joined the staff as a temporary chemist in August.

Soils.—The number of soils received for analysis totalled 290; of these 230 were submitted by the Department of Agriculture. These samples were received from Lake King area (soil survey); Salmon Gums area (soil survey); Bridgetown (die-back in apple trees); Peel Estate (swamp soils); Swan district (vineyards). The Forests Department submitted 42 soil samples for chemical analysis, these were all in connection with the growth of young pine trees and were collected from the plantations at Pardelup, Myalup, Ludlow and Mundaring. Six soils were received from the Lands Department, and the balance were sent in by farmers, graziers and market gardeners.

Fertilisers.—The total number of samples received during the year was 64. Of these 44 were official samples submitted by the Inspector of Fertilisers, of which 91 per cent. complied with the regulations under the Act. The other 22 samples consisted of superphosphate supplied under contract to the various State research stations and farms; farmyard manure, floraphos, wattle leaves used by the banana growers at Carnarvon as a mulch, and samples of guano from islands off the coast, and from caves at Coorow.

Fodders.—Only twelve samples were examined during the year, comprising six of Tangier Pea, three of Subterranean Clover and three of Cape weed.

Waters.—The total number received during the year was 688, of which 48 were from the Metropolitan Water Supply Department, collected from the various sources of supply (reservoirs and streams) to the metropolitan area. These waters were all of good potable quality. The same Department also submitted 144 samples of ocean water taken at and near the sewage ocean outfall, these will be dealt with under sewage.

The Department of Works and Labour submitted 99 samples, comprising country town supplies, trial bores for stock purposes, several from streams, also regular samples from the Mundaring reservoir and the Mt. Charlotte reservoir, Kalgoorlie.

Farmers, stock owners and market gardeners submitted 326 samples; unfortunately a fair number of them were too saline to be used for any purpose. The balance of the samples were sent in by various other Government departments, also country Road Boards, mining companies and manufacturers.

Sewage.—The total number of samples entered for the year was 546, these were taken from the Swanbourne and Subiaco treatment works; this work takes up the full time of Mr. Allsop the advising chemist. The number of ocean water samples collected at the sewage outfall north of the Cottesloe beaches, totalled 144. As in the previous year, no indication of pollution could be detected a few hundred yards from the outlet of the sewer.

Zante Currants.—Thirty-six samples of currants grown under different fertiliser treatments, sent in by the Fruit Branch of the Agricultural Department for the estimation of sugar, were found to range from 77.6 to 88.8 per cent. of invert sugar calculated on a dry basis. The original moisture ranged from 66.4 to 72.0 per cent.

Cement and Sand.—The Metropolitan Water Supply Department submitted two samples of cement and 87 of sand. The cements were a local portland and an imported "Ciment fondu" to be tested for the action of weak acids and sulphate solutions on them.

The sands were submitted to a mechanical analysis to determine their suitability for use in the construction of the Canning Dam.

Lime and Limestone.—Eight samples were received during the year, five of these being limes supplied under contract to the sewage treatment works. These were all of unusually poor quality and not fit to be used for sewage treatment.

Apple Leaves.—The Department of Agriculture forwarded twenty-eight samples of leaves taken from trees at Bridgetown, Mt. Barker and Karragullen. Some of the trees were suffering from a die-back disease, others were normal. Fourteen of these samples were examined for copper, and the balance were submitted to general chemical analysis.

Pinus pinaster.—The Forests Department sent in 42 samples of pines from the nurseries at Wonnerup and Stirling for moisture determination. Each sample contained ten young trees which had to be placed in a fine mesh wire basket and dried until constant in weight at a temperature of not more than 95°C.

Trade Wastes.—Eight samples were collected by Mr. Allsop for the Engineer for Metropolitan Water Supply, four of these were wastes from dye works, the balance from professional photographers premises. These samples were examined with a view to estimating their detrimental effect on concrete sewers. It was considered that, as the dilution of the wastes with the large volume of sewage in the sewers was very great, their detrimental effect would be negligible.

Miscellaneous Investigations.—Several odd samples were dealt with, such as: an incrustation on the sprinklers of a roof cooling system; an incrustation from the roof of the drainage tunnel Canning Dam; kopi (powdery gypsum); "Plumbite" a proprietary compound, said to be suitable for lining tanks containing dilute acids; concrete lining from a water

main; glaze slip solution used at the Calyx pottery works; mud deposit from a water main; "Clegris" a proprietary compound used for clearing pipe blockages; "Faltex" another proprietary compound, said to increase the strength of cement and also make it waterproof; phosphate rock; material from a waste pipe and a deposit on the stem of a pea plant. These were all submitted by various Government departments.

Brans and Pollard.—Twenty-two samples were received, eleven of which were submitted by the Inspector under the Feeding Stuffs Act. These were taken from commercial flour mills, and with one or two exceptions yielded figures within the limits of variation allowed under the Act. The balance of the samples came from the same department, some were for feeding value, others for moisture, crude fibre and total ash.

Flour.—Fifty-one samples were analysed during the year. With the exception of one, they were sent in by the Department of Agriculture for chemical analysis or Pelshenke test. Sixteen of the flours were from wheats milled in this laboratory, and collected from State Research Stations. Twenty-eight were from the Royal Show wheats milled by an officer of the Agricultural Department in a Brabender wheat mill.

The balance of the samples were flours milled in local commercial mills.

Wheat.—The number of wheat samples received during the year totalled 140. The samples comprised 65 from research stations, seven from private firms for moisture estimation, one West Australian f.a.q. sample, and 67 in connection with the Royal Agricultural Society's wheat-growing competitions.

Some of the wheats from the research stations (16 in all) were milled in the experimental mill. F.A.Q. wheats from the Eastern States were not received this year.

The figures obtained for the local F.A.Q. sample are as follow:—

Lab. No.	2180	
Sample	F.A.Q.	
Mark	West Australia	
	1936-37	
Condition and Size	Even, plump, sound grain.	
<i>Grain Analysis.</i>		
Moisture (per cent.)	11.60	
Bushel weight (lbs.)	Dirty 63, Cleaned 63½	
Weight of 1,000 grains (grams)	38.67	
Milling character	Firm	
Date milled	26-4-37	
Flour, 1st extraction (per cent.)	63.3	
Flour, 2nd extraction (per cent.)	8.4	
Total Flour (per cent.)	71.7	
Bran (per cent.)	18.5	
Pollard (per cent.)	9.8	
<i>Wheat Meal Analysis.</i>		
Protein (Nit. x 5.83) (per cent.)	10.77 (11.20% at 10% moisture)	
Ash (per cent.)	1.40 (1.45% at 10% moisture)	
Pelshenke time (minutes)	36	
Specific protein quality	3.2	
<i>Flour Analysis.</i>		
Lab. No.	2212	2953
Moisture (per cent.)	12.76	11.96
Protein (Nit. x 5.7) (per cent.)	9.61	11.43
Strength water absorption (per cent.)	53.5	54.0
Gluten Wet (per cent.)	25.92	25.46
Gluten Dry (per cent.)	9.02	9.63
Ash (per cent.)	.57	.99
Maltose figure, K.J. (per cent.)	1.64	2.44
Original pH	6.6	6.7
Buffer value, Pelshenke	1.3	1.1
Flour colour—Pekar A	4.5	4.0
" " B	4.0	3.0
" " C	4.5	3.0
Petrol figure, K.J.	7.8	8.4

Analysis are reported on a standard moisture basis of 13.5 per cent.

DIVISION VIII.

Annual Report of the Chief Inspector of Explosives for the Year 1937.

The Under Secretary for Mines.

I have the honour to submit, for the information of the Honourable the Minister for Mines, in compliance with section 45 of the Explosives Act, 1895, my report on the working of the Branch for the year 1937.

The year under review, owing to the development of the gold mining industry, has been responsible for the importation of the largest quantity of explosives that has entered the State within a period of one year. In 1904 the quantity of high explosives imported into Western Australia was 4,301,240 lbs., this being the previous peak year for the quantity of explosives used in this State. The importations during 1937 exceeded the above figure by 554,660 lbs.

Table No. 1 gives particulars of the explosives imported into the State during the year, while table

No. 2 shows a comparison of the various explosives imported during the past five years.

TABLE No. 1.

Importations of Explosives into Western Australia during 1937.

Explosive.	Quantity.
Gelignites	1,800,900 lbs.
Gelatine Dynamite	2,930,650 lbs.
Blasting Gelatine	15,200 lbs.
Permitted Explosives	105,550 lbs.
Powder, Blasting and Pellet	120,000 lbs.
Miscellaneous	3,600 lbs.
Total	4,975,900 lbs.
Detonators (No.)	3,860,000
Fuse (yards)	7,449,600

TABLE No. 2.

Comparison of Explosives imported into Western Australia during the past five years.

Explosives.	1933.	1934.	1935.	1936.	1937.
	lbs.	lbs.	lbs.	lbs.	lbs.
Gelignites	1,125,700	1,411,900	1,519,050	1,007,050	1,800,900
Gelatine Dynamite	797,950	1,432,650	1,453,750	2,457,450	2,930,650
Blasting Gelatine	314,350	143,700	175,050	72,500	15,200
Permitted Explosives	149,750	75,350	111,800	70,300	105,550
Powder, Blasting and Pellet	127,500	146,250	110,000	151,250	120,000
Miscellaneous ... .. .	...	...	...	5,000	3,600
Totals	2,415,250	3,209,850	3,459,650	3,763,550	4,975,900
Detonators, No.	3,310,000	2,644,000	4,316,000	2,673,000	3,860,000
Fuse, Yards	3,770,400	4,322,000	4,704,000	6,926,400	7,449,600

Again, have Messrs. Nobel (Australasia) Proprietary, Ltd., found it necessary to provide further storage accommodation on the Woodman's Point Explosives Area, and to meet the demand, have, during the year, erected three new magazines on that reserve.

In order to provide proper facilities for handling explosives in and out of these buildings, it was necessary for the Department to lay down another half mile of railway line.

Very extensive repairs and the building up of the protecting mounds surrounding the magazines were found necessary and a commencement of this work was made during the latter part of the year.

The explosives imported into the State arrived in twenty shipments and on being submitted to tests for stability and sensitiveness, gave satisfactory results, and were therefore passed and allowed to go into consumption.

The following table, No. 3, gives the number of tests and analyses made during the year.

TABLE No. 3.

Tests and Analyses made during 1937.

Heat Tests	1,998
Fuse Tests	692
Tests for Velocity of Detonation	137
A.D.C. Tests	8
Fireworks Tests	75
Complete Analyses	20
Miscellaneous	20
Tests of Detonators	16

The distribution of explosives in the different classes of industry in which explosives are used, was as follows, Table IV.:-

TABLE IV.
Distribution and Consumption of Explosives during 1937.

	Lbs. used.	Percentage of total.
Gold Mining	4,186,850	94.0
Coal Mining	46,400	1.0
Lead and other base metals	15,400	0.3
Quarrying	107,100	2.4
Agricultural	32,850	0.8
Government Departments — Railways, Public Works and Water Supply ..	51,150	1.3

Inspections have been made of all premises licensed under the Act for the storage of explosives. As a result of these inspections it was not found necessary to institute legal proceedings against any of the owners or licensees, but the following table, No. V., gives particulars of explosives which were found to be in a condition which rendered them unsafe or unfit for use and storage and were accordingly destroyed. The table also includes a quantity of explosives damaged by water during transport to Western Australia and had to be destroyed:—

TABLE V.
Destruction of Explosives during 1937.

Date.	Place.	Kind.	Reason for Destruction.
14-2-37	Fremantle	5lbs. Monobel Powder	Absorption of moisture.
9-3-37	do.	3lbs. Gelignite	Exudation.
12-3-37	Lamington	1lb. Gelignite; 5 detonators	At request of owner.
10-6-37	Fremantle	350lbs. Gelignite, A.N. "50"; 50lbs. Gelignite, A.N. "60"	Damaged by water during transport.
13-4-37	do.	50lbs. Gelignite	Absorption of moisture.
18-5-37	Kalgoorlie	175lbs. Gelignite	do. do.
27-5-37	do.	10lbs. Gelignite	Chemical deterioration.
12-8-37	Fremantle	60lbs. Monobel Powder; 20lbs. Gelignite	Damaged by water during transport.
5-8-37	Nannine	20lbs. Gelignite	Chemical deterioration.
11-8-37	Marble Bar	15lbs. Gelignite	do. do.
25-8-37	Onslow	10lbs. Gelignite	do. do.
30-8-37	Geraldton	200 detonators	Absorption of moisture.
26-10-37	Williams	5lbs. Gelignite	do. do.
28-10-37	Gnowangerup	5lbs. Gelignite	do. do.
29-10-37	Albany	750 Electric Detonators	Chemical deterioration.
4-11-37	Collie	15lbs. Monobel Powder	Absorption of moisture.
3-11-37	Kalgoorlie	100lbs. Gelignite	do. do.

The extensive area of Western Australia in which explosives are used, naturally involves a great deal of travelling, and motor transport only has made it possible to efficiently and economically do this with the small staff.

The numbers of the various licenses issued for the storage and sale of explosives are given in Table No. 6:—

TABLE NO. VI.
Licenses issued during 1937.

Magazines on Government Reserves	50
Magazines used by Government Departments	39
Magazines on Private Property	53
Store Licenses—	
Mode (a)	105
Mode (b)	—
Fireworks only	298
Importation Licenses	2

There were nine explosives added to the list of explosives authorised for importation and storage in the State, during the year.

T. N. KIRTON,
Chief Inspector of Explosives.

4th May, 1938.

WESTERN



AUSTRALIA

DEPARTMENT OF MINES

MINING STATISTICS
1937

MINING STATISTICS TO 31st DECEMBER, 1937.

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TABLE I.

COMPARISON OF TONNAGE OF ORE TREATED AND GOLD YIELD REPORTED TO THE MINES DEPARTMENT FOR YEARS 1930 TO 1937, INCLUSIVE.

Goldfield.	District.	1937.		1936.		1935.		1934.		1933.		1932.		1931.		1930.	
		Ore treated.	Gold.	Ore treated.	Gold.	Ore treated.	Gold.	Ore treated.	Gold.	Ore treated.	Gold.	Ore treated.	Gold.	Ore treated.	Gold.	Ore treated.	Gold.
		Tons (2,240lbs.).	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Tons (2,240lbs.).	Fine ozs.
Kimberley	.....	94-00	397-23	84-00	323-40	136-00	390-49	.....	225-02	.....	182-29	.....	63-70	.....	1-54	.....	62-97
Pilbara	Marble Bar	13,283-50	11,898-70	7,320-30	8,188-50	6,945-00	5,338-02	6,547-75	4,880-10	4,174-60	4,590-79	3,164-00	3,712-86	2,802-25	3,933-15	1,153-00	2,252-26
Do.	Nullagine	936-50	1,275-74	2,118-55	1,602-37	1,690-75	1,075-81	55-50	440-48	79-00	317-40	5-00	227-14	5-00	60-90	.....	15-66
Ashburton	.....	494-00	245-23	328-00	308-77	204-00	131-98	.....	70-16	.....	34-55	5-00	11-58	.....	25-61	.....	3-33
Gascoyne	.....	.....	11-66	.....	.....	.....	24-62	.....	71-44	.....	20-00	.....	.....	.....	4-37	.....	11-21
Peak Hill	.....	6,233-75	2,607-11	7,421-27	2,108-47	7,453-00	1,738-14	10,200-85	3,074-59	7,104-50	3,094-14	6,653-30	2,190-72	6,986-45	3,049-58	1,940-50	1,074-33
East Murchison	Lawlers	10,720-00	3,664-77	1,388-25	1,479-69	2,716-50	1,958-18	1,245-50	2,005-65	1,096-00	1,176-32	1,061-50	1,075-72	28-55	890-80	44-28	478-11
Do.	Wiluna	701,087-43	143,335-93	566,186-25	119,633-58	480,666-00	114,241-03	501,388-75	129,335-44	441,197-50	118,384-12	336,427-85	99,953-67	210,942-25	60,808-31	1,151-25	784-53
Do.	Black Range	65,933-94	16,077-59	26,329-03	6,672-80	12,162-87	3,961-02	7,819-70	5,810-26	8,020-50	4,501-57	7,086-50	4,713-01	3,433-77	1,952-42	524-25	1,190-55
Murchison	Cue	166,301-56	41,797-35	82,833-32	31,107-13	50,402-58	13,148-17	7,442-10	5,953-13	8,058-50	5,437-42	5,308-75	3,253-20	3,900-68	2,777-65	3,301-90	2,299-54
Do.	Meekatharra	59,275-65	17,368-28	57,086-24	17,432-97	60,213-72	18,776-53	61,248-87	16,015-95	56,139-97	15,903-81	47,875-00	15,213-14	37,323-76	16,289-68	32,197-00	14,658-15
Do.	Day Dawn	5,763-00	2,233-36	2,080-75	1,220-14	2,858-06	840-59	2,837-00	1,080-03	2,392-50	1,281-57	2,488-03	1,639-53	1,946-09	3,870-24	1,166-89	1,312-88
Do.	Mt. Magnet	93,372-45	24,933-86	69,025-00	18,733-03	54,050-05	12,331-63	9,477-44	4,345-25	11,445-79	5,483-62	9,063-72	5,303-60	6,203-52	3,220-33	4,593-04	2,855-46
Yalgoo	.....	16,338-85	7,464-46	12,703-25	6,807-92	18,859-55	7,693-24	10,374-35	6,421-22	9,094-50	5,175-89	10,650-50	5,426-14	8,447-25	3,686-48	2,828-75	2,191-14
Mt. Margaret	Mt. Morgans	4,283-00	3,314-12	6,192-50	3,473-78	10,000-15	4,286-23	2,926-25	1,990-66	3,319-63	2,229-17	2,407-50	1,123-45	738-20	697-32	370-55	587-94
Do.	Mt. Malcolm	140,724-50	49,086-49	128,784-66	47,290-18	100,213-20	37,802-41	124,358-50	44,013-73	128,986-10	44,504-49	129,475-00	43,456-81	108,907-30	42,057-11	103,976-00	38,453-03
Do.	Mt. Margaret	140,421-50	52,522-62	122,174-55	44,738-84	66,629-25	22,854-15	7,993-06	4,774-50	4,248-75	2,885-21	2,477-40	1,106-08	1,707-75	731-34	893-00	423-63
North Coolgardie	Menzies	38,527-71	20,943-07	24,004-96	12,156-82	7,946-63	6,389-83	7,418-95	6,640-67	4,296-00	5,132-60	2,408-01	3,241-68	1,981-75	4,533-78	9,958-73	5,868-57
Do.	Ularrring	16,624-00	8,240-39	2,756-04	3,154-35	1,228-88	1,054-17	3,281-78	3,932-84	1,006-50	3,761-03	722-00	838-92	571-50	606-72	264-24	206-27
Do.	Niagara	4,101-30	2,638-95	2,663-28	1,418-62	3,587-70	1,782-23	1,435-20	777-29	746-75	580-33	1,047-00	709-23	905-65	570-00	167-20	354-31
Do.	Yerilla	19,894-50	3,838-61	19,174-75	5,673-63	2,385-55	1,787-91	2,788-83	2,111-19	1,514-50	1,122-09	1,914-49	1,594-34	1,642-50	1,535-45	589-50	599-15
Broad Arrow	.....	35,330-84	18,910-47	32,629-46	19,582-01	23,106-25	13,636-83	12,881-73	8,070-74	11,572-00	10,723-64	9,506-30	8,281-05	6,746-12	4,915-99	4,618-00	2,465-00
N.E. Coolgardie	Kanowna	1,625-05	1,344-65	2,955-00	1,954-65	2,149-44	1,673-52	2,244-54	1,765-67	1,211-50	992-90	993-34	728-81	609-42	539-76	104-12	480-24
Do.	Kurnalpi	414-65	1,189-78	458-26	210-46	886-25	493-47	1,322-75	1,152-98	129-30	124-92	164-89	234-00	248-88	154-50	178-39	178-39
East Coolgardie	E. Coolgardie	1,180,479-02	428,288-36	1,079,393-02	397,530-31	897,633-10	305,773-25	897,986-99	333,433-36	819,836-86	359,172-72	703,960-03	364,999-80	530,298-74	337,367-69	458,950-91	458,488-30
Do.	Bulong	1,417-50	886-76	2,183-91	950-78	3,202-75	1,176-29	1,773-11	841-31	1,024-00	535-75	847-14	619-51	728-72	471-95	154-30	136-87
Coolgardie	Coolgardie	22,101-85	12,480-46	16,649-06	10,582-73	17,773-91	11,575-52	16,296-29	10,063-11	13,642-25	9,436-86	10,390-60	7,499-53	10,456-52	8,809-93	3,139-44	2,890-88
Do.	Kunanalling	9,325-82	5,527-32	11,550-18	5,886-09	6,365-61	4,835-15	2,789-22	1,617-24	2,208-85	1,379-85	2,787-05	1,771-44	2,798-33	1,446-81	1,680-25	816-41
Yilgarn	.....	150,647-55	74,929-67	111,175-52	49,533-13	41,628-16	28,491-76	45,476-10	25,989-64	33,619-06	22,355-86	22,208-55	14,778-42	16,241-14	9,293-71	8,564-20	6,372-87
Dundas	.....	128,624-00	48,238-71	91,603-87	31,130-93	43,921-00	19,009-56	20,268-00	12,432-52	8,551-00	4,238-09	4,489-00	2,501-41	6,382-50	3,276-97	2,636-20	2,014-49
Phillips River	.....	4,572-50	1,225-61	2,059-82	1,247-76	2,112-06	1,250-81	2,976-00	1,007-72	4,059-00	1,388-65	1,071-10	617-05	97-25	163-89	185-00	140-54
Outside proclaimed Goldfield	.....	657-75	371-63	121-00	237-88	404-00	627-78	76-25	427-49	273-35	804-20	429-25	554-34	95-00	117-60	37-35	100-08
Totals	.....	3,039,607-67	1,007,288-84	2,492,034-05	852,421-72	1,909,831-97	646,149-82	1,772,931-36	639,871-38	1,588,978-76	636,928-27	1,327,020-66	599,420-77	982,162-71	518,044-96	645,344-35	419,767-09
Value at £4 4s. 11-45d. per ounce	.....	£4,278,688	5s. 7d.	£3,620,854	19s. 9d.	£2,744,668	4s. 3d.	£2,717,999	2s. 4d	£2,705,497	11s. 8d.	£2,546,175	19s. 0d.	£2,200,513	14s. 0d.	£1,783,056	2s. 5d.

TABLE II.

PRODUCTION OF GOLD AND SILVER FROM ALL SOURCES, SHOWING IN FINE OUNCES THE OUTPUT AS REPORTED TO THE MINES DEPARTMENT DURING 1937, AND THE TOTAL PRODUCTION TO DATE.

(Note.—Lease numbers in brackets indicate that the holding was voided during the year.)

(Note.—# denotes mainly derived from treatment of tailings.)

Kimberley Goldfield.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1937.					TOTAL PRODUCTION.				
			Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.	Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.
			Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.
Hall's Creek ...	...	Voided leases and sundry claims	...	...	...	...	...	...	517.55	540.44	...
Mt. Dockrell ...	95 ...	Irish Lass ...	...	13.66	94.00	72.63	...	13.66	94.00	72.63	...
	85 ...	Western Lead ...	...	...	...	...	...	...	...	2.43	...
		Voided leases and sundry claims	...	...	...	...	...	...	264.00	656.77	...
Ruby Creek ...	...	do. do. do.	...	...	...	...	...	...	12,784.50	9,562.41	...
The Brockman ...	...	do. do. do.	...	...	...	...	...	...	3,814.75	3,224.73	...
The Mary ...	...	Voided leases ...	...	...	...	...	...	...	399.00	210.03	...
The Panton ...	...	Voided leases and sundry claims	...	...	...	...	...	...	37.70	153.71	...
		<i>From Goldfield generally:—</i>										
		Reported by Banks and Gold Dealers ...	310.94	...	...	...	...	...	5,838.90	...	1.54
		Total ...	310.94	13.66	94.00	72.63	5,838.90	13.66	17,912.25	14,424.69

Pilbara Goldfield.

MARBLE BAR DISTRICT.

Bamboo Creek ...	856 ...	Bulletin ...	...	...	217.00	49.78	...	...	5.05	1,590.00	512.01	...
	870 ...	Expectation ...	...	...	9.00	14.85	...	13.54	18.24	147.00	924.34	...
	850 ...	Federation ...	...	...	...	...	...	...	...	242.00	512.12	...
	866 ...	Greater Bonnie Doon (1935), Limited	...	...	284.00	157.50	...	...	...	1,549.00	645.77	...
	866 ...	(Bonnie Doon)	...	...	...	...	...	...	...	204.00	78.03	...
	707 ...	Kitchener ...	...	...	729.00	297.98	...	...	...	7,940.00	12,743.36	...
	(921) ...	Mickey ...	...	...	101.00	15.89	...	...	...	302.00	63.35	...
	740, 794 ...	Mt. Prophecy leases	...	...	526.00	284.29	...	...	...	5,491.50	6,312.22	...
	740 ...	(Mt. Prophecy)	...	...	...	...	...	...	1.11	1,040.50	1,898.07	...
	794 ...	(Perseverance)	...	...	...	...	...	...	...	290.50	584.21	...
	817 ...	Prince Charlie	...	...	58.00	166.48	...	...	3.68	1,524.75	2,566.37	...
	907 ...	Princess May	...	...	159.00	47.77	...	...	4.87	282.50	214.27	...
	865 ...	Queen ...	...	...	341.00	100.85	...	...	...	791.00	416.49	...

	924	...	True Blue	...	...	144.00	11.90	...	...	...	207.00	20.84	...
	(954)	...	Twenty Ounce	...	...	45.00	5.41	...	...	...	45.00	5.41	...
		...	Voided leases	...	...	...	...	...	...	527.61	15,837.10	23,839.30	...
		...	Sundry claims	...	...	148.00	48.25	...	8.97	307.83	3,569.35	2,611.24	...
Boodalyerrie		...	Voided leases and sundry claims	...	...	...	...	...	...	299.23	120.25	587.86	...
Lalla Rookh	931	...	Ellerin	...	...	33.00	23.84	...	...	...	47.00	43.44	...
	861	...	Lalla Rookh	...	...	...	...	...	...	...	267.50	478.55	...
		...	Voided leases and sundry claims	...	...	59.00	18.77	...	...	4.78	11,218.50	11,839.21	574.01
Marble Bar	930	...	Alexander	...	...	349.00	61.13	...	...	...	406.00	82.60	...
	927, 934, etc.	...	Comet G. Mines, Ltd.	...	...	4,790.00	6,821.63	...	...	...	4,790.00	6,821.63	...
	927	...	(Halley's Comet)	...	...	...	...	...	...	...	331.00	996.37	...
	934	...	(Stirling Castle)	...	...	24.00	6.57	...	...	...	24.00	6.57	...
	943	...	Coongan River	...	...	128.00	21.60	...	...	...	128.00	21.60	...
	854	...	Coongan Star	...	...	214.00	80.95	...	...	...	1,006.00	1,994.02	...
	981	...	Gwalia	...	...	12.00	11.69	...	...	...	12.00	11.69	...
	(940)	...	Hilda's Chance	...	...	15.00	24.69	...	...	...	15.00	24.69	...
	912	...	Homeward Bound	...	...	112.00	39.63	...	...	...	777.00	348.71	...
	914	...	Jo Jo	...	...	50.00	41.25	...	...	...	295.00	234.60	...
	926	...	Leviathan	...	4.60	475.00	136.01	...	...	4.60	615.00	202.09	...
	(944)	...	Lucknow Central	...	...	37.00	3.05	...	...	...	37.00	3.05	...
	(952)	...	My Chance	...	...	78.00	60.27	...	...	...	78.00	60.27	...
	845, 869	...	Outward Bound leases	...	...	442.00	275.35	...	...	...	981.80	647.35	...
	845	...	(Outward Bound)	...	...	...	...	...	...	...	1,543.50	1,873.91	...
	869	...	(Outward Bound East)	...	...	...	...	...	...	...	30.00	26.79	...
	979	...	Repcater	...	...	20.00	14.50	...	...	...	20.00	14.50	...
	909	...	Stray Shot	...	...	18.00	13.02	...	...	...	62.00	27.84	...
	922	...	Tom Thumb	...	...	72.00	23.45	...	...	...	235.00	132.52	...
	851, 844	...	Viking leases	...	...	116.00	52.82	...	...	...	1,058.00	797.03	...
	844	...	(Anglo-French)	...	...	...	...	...	...	...	467.00	706.25	...
	851	...	(Viking)	...	...	...	...	...	...	...	34.50	45.52	...
	929	...	Wingello G.Ms., N.L.	...	...	271.00	109.53	...	...	...	271.00	109.53	...
		...	Voided leases	...	...	...	...	...	...	181.87	22,787.45	28,704.79	...
		...	Sundry claims	...	...	1,257.00	481.30	...	65.71	158.31	13,363.64	10,078.75	...
North Pole		...	Voided leases and sundry claims	...	...	...	...	...	...	...	598.50	470.08	...
North Shaw	925	...	Big Bertha	...	...	88.00	32.91	...	...	...	209.00	85.38	...
		...	Voided leases and sundry claims	...	...	...	...	...	10.37	567.06	1,013.95	1,020.39	...
Pilgangoora	879	...	Birthday Gift	...	...	...	...	...	8.34	...	408.00	68.74	...
	873	...	Boolarina	...	...	...	...	...	...	...	95.00	31.38	...
		...	Voided leases and sundry claims	...	...	...	...	...	169.39	8.13	944.60	230.16	...
Sharks	868	...	Mt. Ada	...	...	107.00	85.96	...	...	...	845.50	1,059.91	...
	961	...	Mt. Florence	...	...	20.00	31.22	...	...	...	20.00	31.22	...
		...	Voided leases and sundry claims	...	...	162.50	154.83	...	162.10	25.90	979.00	1,446.70	...
Talga	915	...	North Star	...	...	132.00	140.56	...	...	...	281.00	460.21	...
		...	Voided leases and sundry claims	...	...	114.00	86.28	...	64.70	154.48	2,609.65	2,398.80	...
Tambourah		...	do. do. do.	9.47	1.22	422.00	169.21	...	89.52	355.68	3,188.25	3,332.04	...
Warrawoona		...	do. do. do.	...	...	652.00	199.66	...	70.98	603.97	13,166.34	21,561.84	...
Western Shaw		...	do. do. do.	...	...	20.00	8.02	...	22.34	67.47	1,285.00	1,032.52	...

TABLE II.—Production of Gold and Silver from all sources, etc.—continued.

PILBARA GOLDFIELD—continued.

MARBLE BAR DISTRICT—continued.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1937.					TOTAL PRODUCTION.				
			Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.	Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.
			Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.
Wyman's Well ...	...	Voided leases and sundry claims	...	...	52·00	5·34	...	...	85·98	1,196·65	1,725·77	...
Yandicoogina ...	874 ...	Uncle Tom Voided leases and sundry claims	...	...	86·00 95·00	45·28 51·64	...	...	379·11	303·00 3,184·95	321·20 6,369·16	...
		<i>From District generally:—</i> Sundry parcels treated at:										
		State Battery, Bamboo Creek Cyanide Plant ...	...	...	...	*499·99	...	...	...	...	*6,736·27	79·90
		Lallah Rookh Cyanide Plant ... ..	...	...	...	...	...	...	...	...	*186·65	...
		State Battery, Marble Bar Cyanide Plant ...	...	...	...	*759·54	...	...	...	12·00	*3,980·18	...
		Various Works ... ..	...	...	...	...	...	...	...	237·95	*1,204·91	...
		Reported by Banks and Gold Dealers	90·97	...	...	...	...	13,479·66	422·09	...	...	...
		Totals	100·44	5·82	13,283·50	11,792·44	...	14,170·87	4,187·05	132,652·68	174,622·64	653·91

NULLAGINE DISTRICT.

Eastern Creek ...	251L 253L	Rose Shamrock Voided leases and sundry claims	...	...	40·00 60·00 29·00	26·10 48·88 33·33	...	...	11·96	40·00 60·00 5,593·50	26·10 48·88 10,127·98	...
Elsie ... ..	...	do. do. do.	...	...	...	...	...	...	...	630·50	1,781·57	...
McPhee's Creek ...	...	do. do. do.	...	...	15·50	51·13	...	...	...	189·50	270·66	...
Middle Creek ...	230L 229L 231L	All Nations Barton Blue Spec Voided leases and sundry claims	...	...	...	...	...	...	...	160·75 47·50 445·50 8,058·40	60·20 37·76 232·03 9,466·74	...
Mosquito Creek ...	234L 235L 252L 236L	Alrema Beatrice Marjie Western Voided leases and sundry claims	...	...	9·00 14·00 13·00 343·50	5·16 7·84 81·08 148·43	...	...	1·07	139·00 390·00 46·00 31·00 190·13	32·98 129·70 194·54 9·62 16,089·00	...
Nullagine ... ..	...	do. do. do.	...	...	11·00	7·23	...	210·64	243·75	11,864·55	21,140·39	...
Twenty-mile Sandy	...	do. do. do.	...	...	...	...	...	33·10	23·75	8,917·35	12,277·39	...

<i>From District generally:—</i>															
Sundry parcels treated at:															
							*54·63					*54·63			
							*333·16					*333·16			
										112·50		*5,770·12			
												24·77			
						264·85	13·34			8,111·73	77·59				
						264·85	13·34	936·50	997·55		8,356·54	547·61	47,379·79	78,108·22	28·67

Ashburton Goldfield.

Mt. Edith				Sundry claims								5·00	3·97			
Mt. Mortimer				do.						364·63	315·64			74·47		
Paulsens	41			Belvedere No. 2			9·88				9·88					
	32			Melrose				468·00	151·93			796·00	398·32	5·63		
				Sundry claims			14·79	26·00	55·40		14·79	230·00	124·12			
Uaroo				Voided leases										7,713·22		
<i>From Goldfield generally:—</i>																
				Reported by Banks and Gold Dealers						8,588·95	16·59		7·12			
				Totals			13·23	24·67	494·00	207·33		8,953·58	356·90	1,031·00	533·53	7,793·32

Gascoyne Goldfield.

Bangemall				Voided leases and sundry claims						88·97	39·77	387·00	517·29	
<i>From Goldfield generally:—</i>														
				Reported by Banks and Gold Dealers			11·66			495·01	1·80			
				Totals			11·66			583·98	41·57	387·00	517·29	

Peak Hill Goldfield.

Egerton	554r			Pegasus				326·00	749·82			326·00	749·82		
				Voided leases and sundry claims				16·00	52·16			6,050·02	2,751·81		
Horseshoe				do. do. do.				74·00	34·24		15·70	2,791·00	920·68	2,188·44	2·00
Jimblebar				do. do. do.							13·79	238·70	8,574·30	3,136·11	·58
Mt. Fraser				do. do. do.				22·00	18·00		88·28	40·61	753·25	627·18	
Mt. Seabrook	542r, 541r			Mt. Seabrook Gold Mines, Ltd.				75·75	77·50				75·75	77·50	
	541r			(Mt. Seabrook No. 1)								5·05	236·50	251·42	
	542r			(Mt. Seabrook No. 2)									56·50	29·17	
				Sundry claims				14·00	7·34				696·60	631·59	

TABLE II.—Production of Gold and Silver from all sources, etc.—continued.

PEAK HILL GOLDFIELD—continued.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1937.					TOTAL PRODUCTION.				
			Alluvial.	Bollied and Specimens.	Ore treated.	Gold therefrom.	Silver.	Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.
			Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.
Peak Hill	512P ...	Atlantic ...	...	...	575.00	46.51	...	...	...	2,173.75	270.82	...
	510P ...	Atlantic North ...	...	...	60.00	52.73	...	...	...	444.00	275.75	...
	552P ...	Bobby Dazzler ...	...	63	80.75	14.52	...	63	...	80.75	14.52	...
	507P ...	Central ...	...	...	932.75	65.47	...	...	...	2,825.50	191.46	...
	511P ...	Commercial ...	...	...	87.50	88.28	...	...	...	2,702.75	470.23	...
	448P ...	Evening Star ...	...	16-40	26.00	20.35	...	70.17	...	6,447.50	4,698.14	...
	514P ...	Jasper Bar ...	...	...	203.00	66.11	...	...	...	789.25	742.97	...
	553P ...	Morning Star ...	...	...	419.50	49.15	...	...	...	419.50	49.15	...
	508P ...	Mt. Pleasant ...	...	...	98.00	33.88	...	...	...	758.00	292.07	...
	506P ...	No. 1 North ...	...	...	550.75	118.35	...	...	...	4,511.70	984.80	...
	492P ...	North Star ...	...	...	1,535.50	116.53	...	23.20	52.05	8,416.50	1,033.81	...
	(521P) ...	Stella Ray ...	...	5.15	532.00	40.91	...	6.76	2.11	2,864.00	294.37	...
		Voided leases and sundry claims	...	5.01	605.25	140.02	...	60.40	1,096.67	530,070.18	247,486.61	2,285.63
Ravelstone	...	Voided leases and sundry claims	...	...	...	...	...	...	101.64	4,773.45	3,400.85	...
Wilgeena	...	do. do. do.	...	...	...	...	...	...	23.54	128.50	146.79	...
Wilthorpe	...	do. do. do.	...	...	...	...	...	...	...	136.00	46.64	...
Yowereena	...	do. do. do.	...	...	...	...	...	...	...	78.00	222.73	...
		<i>From Goldfield generally:—</i>										
		Sundry Parcels treated at:										
		Pegler's Cyanide Plant ...	...	...	...	...	...	...	...	...	94.15	...
		Hein's Cyanide Plant ...	...	...	...	37.87	...	...	...	...	37.87	...
		Westralia Tailings Treatment, Ltd. ...	...	...	...	572.52	...	...	...	...	685.93	23.12
		State Battery, Jimblebar, Cyanide Plant ...	...	...	...	...	...	...	...	...	865.09	...
		State Battery, Peak Hill, Cyanide Plant ...	...	...	...	136.40	...	...	3.05	15.00	5,068.58	...
		Various Works ...	...	...	...	...	...	...	...	30.00	3,978.33	...
		Reported by Banks and Gold Dealers ...	...	...	...	...	...	...	...	...	...	...
		Totals ...	...	...	6,233.75	2,538.66	...	2,251.01	422.51	585,353.98	281,794.70	2,311.33

East Murchison Goldfield.

LAWLERS DISTRICT.

Bronzewing	...	...	Voided leases and sundry claims	...	...	...	...	...	...	476.00	326.09	1.94	
Cork Tree	...	...	do. do. do.	...	...	...	...	...	55.40	3,780.00	3,302.19	...	
Kathleen Valley	(1301)	...	Mt. Pascoe South	...	...	10.00	7.37	...	...	.64	46.50	32.18	...
			Voided leases and sundry claims	1.01	4.29	289.50	66.54	...	5.54	664.88	80,413.25	49,222.88	...	
Lawlers	(1244)	...	Daisy Queen	...	...	174.00	35.43	...	...	...	174.00	35.43	...
	1249, 1236, 1240	...	Emu Gold Mines, Ltd.	...	...	9,712.00	2,276.87	...	...	...	9,712.00	2,276.87	...
	1236	...	(Waronga G.Ms., Ltd.)	...	...	...	...	...	...	...	...	*1,103.80	...
	1240	...	(Waronga West)	...	...	...	...	...	...	...	...	*35.84	...
	1249	...	(Waronga Extended)	...	...	...	...	...	13.02	...	168.50	77.29	...
	1256	...	Leinster	...	...	...	...	...	...	...	20.00	1.65	...
	(1280)	...	Right Bower	...	...	80.00	6.92	...	...	...	123.00	14.29	...
	1306	...	Selina	...	...	20.00	4.12	...	...	...	20.00	4.12	...
			Voided leases and sundry claims	47.71	...	369.50	117.31	...	332.66	1,049.40	1,296,732.20	498,621.17	14,350.93	
Sir Samuel	1305	...	Mt. Harris	...	...	37.50	21.80	...	...	...	222.50	145.31	...
	1238	...	Vanguard	...	...	...	*5.23	...	...	...	296.00	174.29	...
	(1239)	...	Westralia	...	...	...	...	...	...	...	1,307.50	547.28	...
			Voided leases and sundry claims	...	23.04	27.50	8.23	...	50.42	423.17	272,356.80	143,035.10	10,225.28	
<i>From District Generally :-</i>														
Sundry Parcels treated at :														
			Maund's Cyanide Plant	...	...	...	2.31	...	...	...	...	2.31	...
			State Battery, Sir Samuel, Cyanide Plant	...	...	...	*129.81	...	...	...	43.50	*2,103.76	...
			McPherson's Cyanide Plant	...	...	...	*458.96	...	...	...	.03	*3,189.62	...
			Nil Desperandum Cyanide Plant	...	...	...	*259.62	...	...	...	...	*384.25	...
			White's Cyanide Plant	...	...	...	*91.48	...	...	...	...	*1,206.56	1.03
			Various Works	...	...	...	...	...	...	...	1,699.50	*23,548.57	935.06
			Reported by Banks and Gold Dealers	...	79.80	4.09	2.83	...	6,250.33	99.84	.05	9.84	...	
			Totals	...	128.52	41.42	10,720.00	3,494.83	...	6,651.97	2,293.33	1,667,591.33	729,400.89	...

WILUNA DISTRICT.

Coles	628J	...	Blackadder	...	...	716.50	129.18	...	...	...	716.50	129.18	...
			Voided leases and sundry claims	...	...	534.25	188.84	...	...	...	3,235.75	1,267.93	...
Collavilla	...	...	do. do. do.	...	...	...	...	...	...	...	1,548.00	517.75	...
Corboys	359J	...	Corboys Reward North	...	...	...	...	...	...	...	1,454.75	1,067.56	...
	(467J)	...	Merrington Consols	...	...	27.50	39.61	...	...	...	185.50	82.58	...
	435J	...	Old Toscana	...	...	86.00	72.31	...	...	...	448.00	281.48	...
	627J	...	Vinaurum	...	...	254.50	550.41	...	...	...	254.50	550.41	...
	433J, 434J	...	Waratah Gold Mines, N.L.	...	...	96.00	50.64	...	...	...	108.00	405.58	...
	433J, 434J	...	(Waratah leases)	...	...	...	...	...	...	...	308.00	233.62	...
			Voided leases and sundry claims	...	...	384.50	257.04	...	17.36	1.25	8,912.35	7,012.51	5.00
Gum Creek	...	...	do. do. do.	...	1.36	8.50	6.35	...	...	1.36	1,759.25	716.62	...

TABLE II.—Production of Gold and Silver from all sources, etc.—continued.

EAST MURCHISON GOLDFIELD—continued.

WILUNA DISTRICT—continued.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1937.					TOTAL PRODUCTION.					
			Alluvial.	Dolled and Specimens.	Ore treated.	Gold therefrom.	Silver.	Alluvial.	Dolled and Specimens.	Ore treated.	Gold therefrom.	Silver.	
			Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.	
Mt. Eureka ...	(621j), (622j)...	Wonga Wal Mining Co. ... ..	...	...	5.00	3.31	...	...	...	68.50	39.86	...
		Voided leases and sundry claims	...	...	147.75	73.84	...	...	...	597.25	503.97	...
Mt. Keith ...	629j	Comtesse ... ..	...	...	37.75	97.82	...	...	...	37.75	97.82	...
		Coolgardie Brilliant, N.L. ... ..	...	...	350.00	35.53	...	...	...	350.00	35.53	...
		(Pomme d'or G.M. Co., N.L.) ... ..	...	...	58.75	23.77	...	...	6.35	4,841.75	1,929.04	...
		Wiluna South ... ..	...	...	29.00	51.33	...	...	...	124.75	143.61	...
		(Waldecks G.M. Co.) ... ..	...	...	...	...	...	...	...	449.50	407.97	...
464j, etc. ...	...	Voided leases and sundry claims	...	105.89	257.00	150.74	...	4.81	202.29	11,565.25	9,155.40	...
New England ...	587j	Bill's Find ... ..	...	...	...	...	...	...	...	166.00	219.58	...
		Lowlands ... ..	...	...	387.50	222.31	...	...	...	1,003.00	617.55	...
		Simm's Find ... ..	...	...	140.00	99.63	...	...	...	479.00	679.43	...
		Voided leases and sundry claims	...	...	380.75	180.84	...	...	63.32	4,414.75	2,897.43	...
Wiluna	(432j)	Brilliant ... ..	...	...	27.50	15.07	...	...	...	1,218.75	233.64	...
		Brilliant Extended ... ..	...	3.39	230.25	66.78	...	...	3.39	1,103.50	342.54	...
		Brilliant Reduced ... ..	...	...	166.75	27.95	...	...	...	166.75	27.95	...
		Florence No. 3 ... ..	...	...	898.25	214.73	...	...	...	1,921.75	407.57	...
		Jubilee ... ..	...	...	...	...	...	...	...	1,156.75	655.83	...
		Moonlight Wiluna G.Ms., Ltd. ... ..	...	...	95,120.93	26,375.50	...	...	...	98,733.43	27,528.14	...
		Prior to transfer to present holders	...	...	...	...	...	...	...	36,975.50	14,174.75	...
		North Brilliant Reduced ... ..	...	...	46.25	13.94	...	...	...	46.25	13.94	...
		Palmer's Puzzle ... ..	...	...	160.50	43.41	...	...	...	386.75	93.78	...
		Wiluna G.Ms., Ltd. ... ..	...	...	599,567.00	113,376.43	...	...	...	3,109,837.00	735,313.16	...
		Prior to transfer to present holders	...	...	...	...	...	...	...	341,730.57	133,457.92	89.32
		Voided leases	565.19	134,717.25	78,045.85	124.00
		Sundry claims	28.66	968.75	267.25	...	105.39	211.51	21,643.15	9,456.20	.33
<i>From District generally:—</i>													
Sundry Parcels treated at:													
Corboy's Reward North Cyanide Plant ... ..			...	...	...	...	...	...	...	...	*456.04	...
Toscana Cyanide Plant ... ..			...	...	...	*239.08	...	...	...	...	*1,436.71	...
State Battery, Wiluna, Cyanide Plant ... ..			...	...	...	*322.41	...	...	592.00	*20,314.86	218.70	...
Various Works ... ..			...	...	...	...	...	...	...	...	*781.64	12.68
Reported by Banks and Gold Dealers ... ..			.58	...	...	...	...	39.83	41.87	...	...	...
Totals ... ..			.58	139.30	701,087.43	143,196.05	...	167.39	1,096.53	3,793,257.50	1,051,732.93	450.03

BLACK RANGE DISTRICT.

Barrambic	972B, 976B	Sheelite leases	89.25	96.05	...	...	...	89.25	96.05	...
	972B	(Sheelite)	...	...	...	...	...	105.50	108.88	...
	976B	(Sheelite North)	...	...	...	...	...	92.75	92.83	...
		Voided leases and sundry claims	...	...	...	3.53	180.25	18,055.97	17,013.06	125.60
Bellehambers	...	do. do. do.	...	...	...	...	111.80	492.52	648.45	...
Birrigrin	...	do. do. do.	15.75	6.75	...	...	996.08	14,530.48	16,324.31	...
Curran's Find	...	do. do. do.	60.00	8.58	...	18.24	252.27	9,250.75	3,899.88	...	
Erroll's	...	do. do. do.	68.00	70.83	...	20.70	551.40	15,135.25	9,924.37	...	
Hancock's	...	do. do. do.	693.25	160.81	...	4.21	6,650.92	38,248.50	35,558.64	55.72	
Maninga Marley	(1031B)	Bulletin	156.50	93.78	...	...	...	359.25	180.71	...
		Voided leases and sundry claims	202.40	42.06	...	...	353.36	63,179.38	49,997.56	22.55
Montague	967B, 998B	North End leases	3,993.00	578.37	...	...	...	16,673.45	2,499.85	...
	953B, 1002B	Swan Bitter G.M. Co., N.L.	10,080.00	2,298.95	...	...	5.78	28,237.25	8,400.39	...
		Voided leases and sundry claims	117.75	35.67	...	...	165.48	13,674.75	10,227.46	...
Nungarra	1032B	Two Mile	56.25	8.09	...	...	...	138.50	22.62	...
		Voided leases and sundry claims	428.75	67.15	...	76.21	2,410.40	15,910.65	7,644.18	...	
Sandstone	959B	Bonny Note	...	...	...	...	136.06	537.75	686.59	...
	1017B	Hacks	...	...	...	...	...	16.00	1.67	...
	958B	Lady Mary	304.00	150.51	...	...	...	3,979.25	3,681.92	...
	(1030B)	Lady Rini	384.10	73.85	...	...	...	696.60	138.59	...
	(1011B)	Sonny Boy	48.75	7.09	4.25	...	4.25	411.00	119.64	...	
		Voided leases	...	...	...	4.75	3,611.46	689,876.72	443,371.70	11,754.22
		Sundry claims	617.25	101.99	...	41.17	1,370.23	12,620.15	6,290.71	...	
Youanmi	1046B	Camberra	235.00	84.35	...	...	...	235.00	84.35	...
	960B, etc.	Youanmi G.Ms., Ltd	48,183.94	11,152.88	944.26	...	...	55,829.47	12,574.96	1,017.81
	960B	(Youanmi)	...	...	...	...	...	38.50	3.91	...
		Voided leases and sundry claims	200.00	95.63	...	1.43	145.71	364,641.03	178,445.32	4,608.55	
<i>From District generally :-</i>											
Sundry Parcels treated at:											
North End Cyanide Plant			...	*660.00	...	...	...	...	*2,856.67	...
State Battery, Sandstone, Cyanide Plant			...	*142.22	...	...	...	244.00	*20,171.64	59.53
State Battery, Youanmi, Cyanide Plant			...	*135.22	...	...	...	40.00	*5,106.99	...
Various Works			...	...	...	...	...	37.00	*6,325.89	...
Reported by Banks and Gold Dealers			2.51	...	...	1,435.51	50.84	...	20.38	...
Totals			6.76	65,933.94	16,070.83	944.26	1,605.75	16,996.29	1,363,376.67	842,520.17	17,643.98

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Murchison Goldfield.

CUE DISTRICT.

Big Bell	2050, 2057, etc.	Big Bell Mines, Ltd.	85,958.00	10,140.03	3,305.09	85,958.00	10,140.03	3,305.09
	2050	(Little Bell)	...	...	...	...	4.49	579.75	60.95	...

TABLE II.—Production of Gold and Silver from all sources, etc.—continued.

MURCHISON GOLDFIELD—continued.

CUE DISTRICT—continued.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1937.					TOTAL PRODUCTION.						
			Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.	Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.		
			Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.		
Cuddingwarra	(2172) ...	Asiatic ...	...	...	49.25	11.53	...	...	...	49.25	11.53	...
	2182 ...	Desert Gold ...	...	...	79.25	40.59	...	...	...	79.25	40.59	...
	2175 ...	Golden Gate ...	...	...	299.00	110.31	...	...	...	314.75	123.35	...
	2090 ...	Shaughraun ...	...	...	97.00	14.92	...	...	1.50	481.00	107.11	...
		Voided leases and sundry claims	...	152.90	308.35	215.59	...	19.56	435.66	107,106.45	59,910.11	109.71		
Cue	(2088) ...	Mug's Luck ...	...	...	173.75	26.11	...	...	...	491.25	160.67	...
	2173 ...	New Salisbury Plain ...	...	...	390.00	146.31	...	...	...	547.50	193.44	...
	(2112) ...	Primrose ...	...	...	64.25	25.40	...	...	...	208.00	142.83	...
	2084 ...	Trovato di Pietro ...	...	...	245.00	194.24	...	...	1.77	1,715.50	952.18	...
		Voided leases and sundry claims	...	28.36	1,798.75	531.12	...	205.90	1,243.64	317,132.13	234,450.65	66.63		
Eelya	...	do. do. do.	...	...	46.75	22.08	...	...	110.64	1,746.40	2,494.34	...
Mindoolah	...	do. do. do.	...	...	90.00	11.92	...	3.07	28.77	10,505.60	6,741.46	42.97
Reedy	2092 ...	Culeulli North ...	...	...	232.25	496.84	...	...	...	405.75	608.83	...
	1977, etc.	Triton Gold Mines, N.L. ...	...	...	74,388.00	25,917.22	2,584.36	...	...	174,452.00	59,960.24	5,772.31
		Prior to transfer to present holders	...	...	...	...	...	...	...	14,492.50	7,073.36	5.00
	2121, etc.	Turn of the Tide G.Ms., Ltd. ...	...	...	1,142.18	1,336.02	...	...	...	2,117.68	1,548.79	...
		Voided leases and sundry claims	...	...	245.50	253.98	...	169.59	305.26	4,469.55	8,118.18	...
Tuckabianna	(2067) ...	Buttercup No. 2 ...	...	...	59.00	10.39	...	...	...	3,754.75	705.07	...
	2130 ...	Garibaldi ...	...	6.24	54.78	98.50	...	...	6.24	103.13	492.36	...
	2174 ...	Vienna ...	...	...	47.50	15.43	...	...	...	73.00	25.36	...
		Voided leases and sundry claims	...	...	29.25	14.43	...	24.06	421.06	10,258.60	7,152.92	...
Tuckanarra	2079 ...	Batchelor ...	...	...	25.50	25.40	...	...	17.95	357.50	309.44	...
	2176 ...	Kingfield ...	...	1.82	93.00	79.91	...	...	1.82	142.00	139.23	...
		Voided leases and sundry claims	...	...	338.00	152.35	...	129.88	3,761.26	27,226.63	31,452.83	172.77
Weld Range	...	do. do. do.	...	...	47.25	57.38	...	...	27.54	1,621.25	1,221.10	...
		From District generally:—												
		Sundry Parcels treated at:												
		Cue State Battery Cyanide Plant ...	...	...	...	*1,307.29	91.93	...	...	12.75	*13,293.37	91.93
		Tuckanarra State Battery Cyanide Plant ...	...	...	...	*182.48	...	...	...	518.50	*5,183.43	...
		Various Works ...	...	...	...	...	...	...	...	6,925.52	*29,371.15	1,147.77
		Reported by Banks and Gold Dealers ...	...	...	162.56	7.32	...	2,470.49	71.76	...	18.82	...
		Totals	162.56	197.02	166,301.56	41,437.77	5,981.38	3,022.55	6,439.36	773,845.94	482,203.72	10,714.18

MEEKATHARRA DISTRICT.

Abbott's ...	1804s ...	Blue Horse ...	100.50	87.60	...	...	100.50	87.60	...
	1799s ...	Mt. Vranizan ...	328.25	248.60	...	...	476.75	353.89	...
	1726s ...	Murchison King ...	23.25	13.20	...	...	326.00	768.35	...
		Voided leases and sundry claims	499.00	296.79	...	31.74	38,151.12	39,052.36	...
Burnakura ...		do. do. do.	...	...	12.51	3,320.54	39,486.50	31,101.47	26.90
Chesterfield ...		do. do. do.	13.25	3.25	29.02	461.95	7,552.06	8,128.63	.80
Gabanintha ...	1759s ...	Lillian Extended ...	9.12	32.29	...	9.12	402.00	192.97	...
	(1801s) ...	Mountain View ...	109.00	50.86	...	2.77	109.00	50.86	...
	1725s ...	New Brew ...	70.75	136.96	...	...	285.75	431.96	...
		Voided leases and sundry claims	289.00	54.72	16.78	164.65	24,697.50	15,067.83	815.57
Garden Gully ...	1719s ...	Sabbath ...	34.75	63.01	...	...	234.50	323.41	...
		Voided leases and sundry claims	362.25	247.00	26.36	80.29	31,721.51	22,815.00	1,102.59
Gum Creek ...	1663s ...	Koldarra Rose ...	...	...	25.27	176.82	4,524.08	4,329.49	...
		Voided leases and sundry claims	...	...	...	...	40.00	99.18	...
Holden's ...	1551s ...	New Waterloo ...	353.00	122.56	...	.99	751.00	215.13	...
		Voided leases and sundry claims	25.00	5.14	164.95	67.07	17,018.15	6,680.75	...
Jillawarra ...		do. do. do.	...	...	173.02	1,284.72	1,781.30	3,003.50	...
Meeka Pools ...		do. do. do.	...	...	...	2.84	345.15	287.65	...
Meekatharra ...	1735s ...	Halcyon Extended ...	98.28	98.42	...	98.28	678.25	108.58	...
	1466s ...	Havcluck ...	...	...	...	...	1,738.30	1,612.07	...
	1559s ...	Ingliston ...	1.03	167.87	...	1.03	513.05	557.07	...
	1542s, etc. ...	Ingliston Albert's leases ...	...	...	...	...	2,062.70	1,026.71	...
	475s, 515s, etc. ...	Ingliston Consols Extended leases (Ingliston Consols Extended)	20,815.00	5,366.89	...	...	831,599.22	349,294.91	...
	475s ...	(Fenian leases)	...	...	...	...	1,536.25	4,248.25	.30
	477s, 814s ...	Ingliston South ...	5,001.36	2,922.12	...	...	322,317.69	273,278.92	...
	1539s ...	Meekatharra Central Gold, N.L. (Lady Central leases)	457.00	368.48	...	11.06	16,274.61	12,815.17	...
	1576s, 1547s ...	Mickey Doolan ...	82.50	8.68	...	...	2,125.00	818.86	...
	1547s, 1576s ...	Mines Selection of W.A., Ltd. ...	117.01	1,152.66	...	117.01	2,951.42	5,198.33	...
	1633s ...	Prior to transfer to present holders	...	...	...	46.99	82.50	8.68	...
	530s, 580s, etc. ...	Mopoke ...	...	...	...	...	60,709.17	43,858.26	...
	580s, 533s, etc. ...	Peter Pan ...	498.00	44.95	...	...	533.25	139.90	...
	1577s ...	Phar Lap ...	714.75	644.15	...	...	498.00	44.95	...
	1800s ...	Prohibition G.M. Co., Ltd. (Prohibition)	5,561.00	1,050.18	...	...	2,512.75	1,490.12	...
	1571s ...	Rough up ...	123.25	18.71	...	...	5,978.75	1,116.43	...
	1529s ...	Voided leases and sundry claims	13.18	146.50	233.59	1,369.52	29,422.00	4,971.30	...
	1574s ...	...	...	...	...	...	5,919.25	726.61	2,454.74
Mistletoe ...		Voided leases and sundry claims	...	...	123.29	1,072.09	436.75	488.24	...
Mt. Maitland ...		do. do. do.	13.50	9.45	...	...	374.50	293.52	...
Munara Gully ...		do. do. do.	3.35	58.00	12.37	33.13	13,795.00	6,695.64	...
Nannine ...	1564s, 1700s, etc. ...	Aladdin G.M., Ltd. ...	6,332.50	497.13	...	...	12,297.50	1,014.93	...
	1564s, 1700s ...	Prior to transfer to present holders	...	...	...	...	3,925.15	510.32	...
	1580s ...	Caledonian ...	23.00	15.04	...	...	233.75	136.44	...

TABLE II.—Production of Gold and Silver from all sources, etc.—continued.

MURCHISON GOLDFIELD—continued.

MEEKATHARRA DISTRICT—continued.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1937.					TOTAL PRODUCTION.				
			Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.	Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.
			Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.
Namnine—continued	(1645X) ...	Champion ... ..	...	...	24.50	10.15	...	...	...	55.00	25.42	...
	(1644X) ...	Champion South ... ..	...	...	27.75	5.71	...	...	...	57.75	17.62	...
	1746X ...	Jubilee ... ..	...	...	...	...	...	...	39.64	53.55	377.38	...
	1715X ...	Namnine Mine ... ..	...	...	...	...	...	...	...	11.00	8.88	...
	1582X ...	Pearl ... ..	...	...	200.00	27.23	...	...	...	847.00	289.42	...
	1716X ...	Pearl South ... ..	...	...	...	...	...	...	...	30.00	11.33	...
	1809X ...	Sandboy ... ..	...	22.11	...	75.78	...	...	22.11	...	75.78	...
	1805X ...	Tetbury Gold Mine ... ..	...	11.17	7.02	30.27	...	...	11.17	7.02	30.27	...
		Voided leases and sundry claims	...	66.12	207.55	184.53	...	135.24	1,467.29	97,728.20	72,930.09	167.45
Quinn's	1634X, 1635X, etc.	Commonwealth East leases ... ..	...	...	1,619.00	465.48	...	...	...	5,986.00	1,906.30	...
	1699X ...	Nowthanna Central ... ..	...	...	21.50	56.59	...	...	...	208.75	144.96	...
		Voided leases and sundry claims	...	101.28	210.27	102.08	...	22.37	2,462.68	27,691.83	13,159.95	90.70
Ruby Well	1808X ...	Hillview ... ..	...	43.46	18.00	58.34	...	...	43.46	18.00	58.34	...
		Voided leases and sundry claims	...	...	...	...	...	1,015.87	409.39	7,910.25	4,597.55	...
Stake Well	...	do. do. do.	...	...	63.50	22.10	...	31.91	234.85	22,177.10	10,090.60	...
Star of the East	...	do. do. do.	...	...	...	...	...	...	...	27,371.62	20,400.37	...
Yaloginda	1807X ...	Rocklee ... ..	...	...	25.75	24.09	...	...	...	25.75	24.09	...
		Voided leases and sundry claims	...	23.16	991.60	365.56	...	80.92	2,394.81	34,194.96	17,732.44	8.68
		<i>From District generally:—</i>	...	...	...	...	...	...	...	...	...	...
		Sundry Parcels treated at:	...	...	...	...	...	...	...	...	...	...
		State Battery, Meekatharra, and Cyanide Plant	...	...	19.00	*1,035.76	...	...	...	48.00	*17,766.98	19.00
		J. Heine's Cyanide Plant	...	...	...	*226.00	...	...	...	...	*226.00	...
		Various Works	...	...	...	...	...	...	...	172.75	*6,071.35	342.17
		Reported by Banks and Gold Dealers	225.73	48.60	...	9.49	...	11,045.37	132.26	...	12.13	...
		Totals	225.73	557.81	59,275.65	16,584.74	...	13,136.47	15,570.27	2,087,183.75	1,214,977.50	5,028.90

DAY DAWN DISTRICT.

Day Dawn	641D ...	Crene D'or ... ..	...	58.68	197.50	470.16	...	...	58.68	325.00	716.49	...
	647D ...	Klondike ... ..	...	78.27	86.50	98.71	...	...	78.27	86.50	98.71	...
	639D ...	Lone Hand ... ..	...	...	125.50	109.31	...	...	...	319.25	372.10	...
	573D ...	Mountain View ... ..	...	...	...	...	...	...	94.05	1,406.78	1,444.70	...

	640D	New Ballarat ... ..	...	...	18-00	3-41	...	...	...	149-50	76-47	...
	576D	New Fingall ... ..	...	...	9-50	7-71	...	6-12	6-84	1,288-00	628-16	...
		Voided leases and sundry claims	4-99	12-43	519-50	149-29	...	206-74	1,021-56	1,925,727-79	1,225,113-29	169,210-44
Lake Austin	536D, 585D	Lake Austin Eureka G.M., N.L. (Eureka) ... ..	...	...	8-00	2-81	...	...	...	508-00	40-83	...
	536D	New Golconda Mines, N.L. ... ..	...	...	...	...	...	...	1,297-51	145-26	3,748-25	...
	586D, 577D, etc.	Prior to transfer to present holders	...	...	4,540-00	1,043-30	...	...	...	5,020-77	1,237-75	...
	577D, 586D	Voided leases and sundry claims	...	...	...	...	...	660-99	2,165-59	32,635-01	46,423-25	...
Mainland	...	do. do. do.	...	...	21-25	3-99	...	5-15	3,994-18	8,503-07	25,555-95	...
Pinnacles	642D	Baby Mine ... ..	...	...	16-00	15-09	...	...	...	29-50	25-24	...
	594D	Dalmatia ... ..	...	...	...	...	...	...	...	270-25	47-45	...
	599D	Eclipse ... ..	...	...	203-00	101-69	...	...	...	448-75	166-56	...
		Voided leases and sundry claims	...	12-44	18-25	10-95	...	4-90	1,653-44	19,924-57	10,732-82	...
	<i>From District generally:—</i>											
		Sundry Parcels treated at Various Works	...	...	...	...	...	...	16-61	940-75	1,741-97	...
		Reported by Banks and Gold Dealers	47-36	2-77	...	...	...	1,853-60	33-02	...	77	...
	Totals		52-35	164-59	5,763-00	2,016-42	...	2,737-50	10,595-32	1,998,172-50	1,318,294-46	169,210-44

MOUNT MAGNET DISTRICT.

Jumbulyer	...	Sundry claims	1-74	...	205-50	192-00	...	1-74	...	205-50	192-00	...
Leamonville	1343M	Canterbury ... ..	...	...	73-25	18-11	...	...	...	96-50	21-02	...
	(1283M)	Welcome ... ..	...	...	49-00	35-28	...	...	12-79	877-02	238-31	...
		Voided leases and sundry claims	...	1-22	554-20	156-36	...	19-14	3,302-88	152,191-30	129,090-69	458-82
Mt. Magnet	1334M	Black Cat ... ..	...	...	576-30	427-15	...	...	2-12	878-05	942-19	...
	1351M	Bonny Venture ... ..	...	12-94	...	...	...	...	23-08	16-00	43-70	...
	1251M	Broken Bond ... ..	...	131-96	645-25	484-58	...	...	219-69	976-50	1,273-09	...
	1255M	Edward Carson ... ..	...	...	2,521-00	2,964-14	...	...	...	4,119-25	5,049-47	...
	1286M	Evening Star ... ..	...	...	186-50	132-67	...	...	36-37	235-32	740-35	...
	1332M	Fine Cut ... ..	...	...	51-50	35-83	...	...	...	90-25	83-24	...
	1271M, 1273M	Foster's Leases ... ..	...	...	...	...	...	1-43	...	1,569-75	150-91	...
	1287M	Havelock ... ..	...	...	70-75	21-61	...	...	...	872-25	240-81	...
	1320M	Hesperus Dawn ... ..	...	50-93	27-50	36-69	...	...	56-49	42-00	42-49	...
	1353M	Hill Crest ... ..	...	...	41-00	6-39	...	...	...	41-00	6-39	...
	1282M	Hill 50 G.M., N.L. ... ..	...	...	23,878-00	6,688-76	...	...	...	28,219-00	7,959-42	...
	1361M	Jupiter ... ..	...	...	33-00	27-63	...	...	...	33-00	27-63	...
	1358M	Lady Isobel ... ..	...	...	84-50	21-34	...	...	...	84-50	21-34	...
	1333M	Lady Jean ... ..	...	...	33-25	26-60	...	...	...	90-50	206-88	...
	1242M	Lucky Hit ... ..	...	...	147-00	30-35	...	...	...	1,876-75	484-18	...
	1339M	Mars ... ..	...	...	302-00	44-14	...	...	...	526-00	90-48	...
	1256M	(Morning Star) ... ..	...	...	...	...	...	...	...	110-25	32-04	...
	1215M, 1254M, etc.	Mt. Magnet G.Ms., Ltd. ... ..	...	...	59,580-00	8,588-61	...	...	...	166,903-00	27,819-74	...
	1254M	(Golden Age) ... ..	...	...	...	...	...	...	45-00	258-03	556-84	...
	1215M	(Hill 60) ... ..	...	...	...	...	...	...	...	25,457-00	11,620-09	...
	1274M	Nathan ... ..	...	...	661-50	55-64	...	...	...	3,169-50	559-01	...
	1246M	Neptune ... ..	...	713-22	77-40	492-97	...	...	713-22	317-15	967-85	...
	1281M	Saturn ... ..	...	...	103-00	11-60	...	...	...	677-50	86-52	...
	1322M	Three Boys ... ..	...	72-55	14-75	88-03	...	...	72-55	66-28	257-68	...
	1357M	Wind Bag ... ..	...	...	82-00	9-43	...	...	...	82-00	9-43	...
		Voided leases and sundry claims	11-70	15-19	2,597-30	734-41	...	147-35	10,263-47	424,353-70	242,380-90	714-36

TABLE II—Production of Gold and Silver from all sources, etc.—continued.

MURCHISON GOLDFIELD—continued.
MOUNT MAGNET DISTRICT—continued.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1937.					TOTAL PRODUCTION.				
			Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.	Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.
			Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.
Mt. Magnet East	...	Voided leases and sundry claims	...	...	...	...	...	63.29	801.75	5,940.53	3,240.04	...
Moyagee ...	1355M ...	Moyagee ...	...	...	333.75	485.17	...	...	...	333.75	485.17	...
		Voided leases and sundry claims	...	...	255.25	376.74	...	2.83	135.00	6,527.85	9,175.45	...
Paynesville ...	1342M ...	Lady Maud ...	...	...	61.00	21.50	...	...	...	132.00	39.98	...
	1245M ...	Milgoo Mine...	...	...	10.00	18.50	...	...	...	190.50	502.98	...
		Voided leases and sundry claims	...	...	101.50	26.62	...	3.36	2,138.17	947.84	1,897.73	...
Winjanguo ...	1360M ...	Buccaneer ...	...	76.40	...	...	...	...	76.40	...	...	...
		Sundry claims ...	...	100.11	15.50	1.15	...	...	100.11	15.50	1.15	...
		<i>From District generally:—</i>										
		Sundry Parcels treated at:										
		Boogardie State Battery Cyanide Plant	...	...	...	*1,443.33	...	...	...	92.51	*25,059.83	...
		Murchison M. and T.T. Plant	...	...	...	*5.85	...	...	...	18.06	*6,646.12	...
		(Lennonville State Battery)	...	...	...	...	...	...	...	...	...	...
		Various Works	...	...	...	...	...	...	...	25.00	*10,780.89	1.00
		Reported by Banks and Gold Dealers	21.85	14.87	...	...	...	1,952.28	37.04	...	12.38	...
		Totals	35.29	1,189.39	93,372.45	23,709.18	...	2,191.42	18,036.13	828,658.39	488,946.41	1,174.18

Yalgoo Goldfield.

Bilberatha ...	1139 ...	Blayncy's Gold Mine	...	...	100.00	98.24	...	...	...	100.00	98.24	...
		Voided leases and sundry claims	...	1.31	387.50	97.74	...	...	6.64	3,093.05	1,484.15	...
Carlaminda ...	1095 ...	Reliance ...	...	...	217.00	75.31	...	1.28	...	707.50	255.60	...
		Voided leases and sundry claims	...	...	35.00	36.86	...	...	...	2,156.32	1,030.61	3.30
Field's Find ...	907, etc.	Brown's Reward leases	...	...	...	...	...	...	...	4,840.55	3,876.07	...
	1116 ...	Field's Find No. 2 South	...	...	...	...	...	...	...	108.50	16.01	...
	1115 ...	Rose Marie ...	...	...	306.00	144.56	...	...	...	508.50	211.97	...
		Voided leases and sundry claims	...	...	172.00	19.30	...	5.77	392.79	42,719.30	28,863.18	...
Goodingnow ...	1122 ...	Adeline ...	...	...	40.75	40.97	...	...	.59	76.75	61.92	...
	1063 ...	Ark ...	...	...	71.00	38.94	...	...	...	315.50	147.41	...
	1102 ...	Aster ...	...	...	386.00	156.50	...	...	...	838.50	308.66	...
	1025 ...	Carnation ...	...	...	1,803.00	1,293.88	...	...	...	4,949.55	5,098.50	...
	1049 ...	Lake View ...	...	...	378.00	77.88	...	...	...	3,260.00	1,633.09	...

	1121	...	Lake View West	...	...	15.00	3.56	...	...	...	15.00	3.56	...
	1124	...	Marigold	...	...	204.00	100.93	...	...	...	294.00	165.24	...
	1090	...	Orchid	...	...	1,748.50	963.16	...	...	...	3,507.00	1,992.90	...
	1098	...	Princess May	...	...	276.00	76.62	...	...	...	587.50	174.28	...
	1085	...	Sweet William	...	...	172.00	59.56	...	...	2.97	480.00	178.72	...
		...	Voided leases and sundry claims	...	4.53	26.43	461.25	134.75	...	299.23	427.56	40,131.06	42,616.56	...
Gullewa	1123	...	Golden Stream	...	...	240.00	55.59	...	...	...	299.50	77.28	...
	1096	...	King Solomon's Mines, Ltd.	...	...	1,072.10	423.02	...	...	...	1,236.10	496.81	...
	(1060)	...	Monarch	...	...	90.00	7.60	...	...	...	90.00	7.60	...
	1047	...	Mugga King	...	...	1,530.00	439.60	...	2.35	...	2,493.50	908.49	2.35
	1065	...	Shenandoah	...	...	818.00	206.64	...	...	...	1,246.00	536.73	...
		...	Voided leases and sundry claims	...	...	158.50	30.36	...	...	171.23	26,874.75	16,963.73	...
Kirkalucka	(1118)	...	April Fool	...	...	42.25	25.57	...	...	...	61.25	45.10	...
		...	Sundry claims	...	...	27.25	10.61	...	...	4.14	227.05	117.33	...
Messenger's Patch	1010, 1011	...	Gnow's Nest leases	...	...	48.00	*207.86	...	...	7.71	1,828.75	1,549.28	...
		...	Voided leases and sundry claims	...	7.71	124.00	36.95	...	463.12	655.78	38,236.11	26,795.56	1,083.01	
Mt. Farmer		...	do. do. do.	...	...	8.75	3.57	...	...	...	231.50	117.38	...
Mt. Gibson		...	do. do. do.	...	...	...	...	...	...	33.06	1,202.85	1,147.86	...
Ninghan		...	do. do. do.	...	...	...	...	...	...	...	334.75	124.69	...
Noongal	1137	...	City of Melbourne	...	...	313.00	216.50	...	...	...	313.00	216.50	...
	1138	...	Continental	...	...	89.50	295.07	...	...	...	89.50	295.07	...
	1020	...	Don Bradman	...	...	76.00	6.03	...	...	...	241.50	40.40	...
	1136	...	East Victory	...	...	120.50	91.99	...	...	...	120.50	91.99	...
	953	...	Revival	...	...	60.00	7.08	...	...	...	2,307.75	1,102.89	...
		...	Voided leases and sundry claims	...	...	456.00	197.24	...	42.43	331.71	10,189.80	5,083.11	...
Nyounda		...	do. do. do.	...	...	99.00	23.83	...	...	221.91	787.00	273.66	...
Pinyalling		...	do. do. do.	...	...	150.00	52.63	...	...	3.95	3,182.10	1,332.25	...
Retaliation		...	Alma May	...	...	337.00	129.51	...	...	...	695.75	353.25	...
	1023, etc.	...	Atlas Gold Mines, Ltd.	...	...	933.75	211.53	...	...	...	1,876.25	492.27	...
	1023	...	(Hayes Reward)	...	...	...	...	...	...	...	117.50	52.30	...
	1127	...	Winifred	...	...	34.00	4.90	...	...	...	34.00	4.90	...
		...	Voided leases and sundry claims	...	...	55.00	13.74	...	...	...	1,618.00	824.64	...
Rothsay	1013, 1014, etc.	...	Rothsay Gold Mines, N.L.	...	...	...	...	...	...	...	7,595.00	2,285.68	...
	1013, 1014, etc.	...	Prior to transfer to present holders	...	...	...	...	...	...	...	415.50	176.15	...
		...	Voided leases and sundry claims	...	...	118.00	54.76	...	...	...	14,877.75	5,865.17	...
Wadgingarra		...	do. do. do.	...	...	70.50	19.73	...	...	...	2,326.41	1,055.87	...
Warda Warra	1142	...	Mistake	...	...	146.00	102.68	...	...	...	146.00	102.68	...
	(1108)	...	Mistake	...	...	263.00	111.72	...	...	...	570.00	155.37	...
	1001, (1040)	...	Western Queen (1936), N.L.	...	...	220.00	29.53	...	...	...	1,430.00	586.32	...
	1001, 1040	...	Western Queen leases	...	...	...	...	...	...	...	8,403.00	4,958.42	...
		...	Voided leases and sundry claims	...	...	20.00	8.77	...	...	...	985.25	394.57	...
Warriedar	1081	...	Highland Chief	...	...	300.50	58.78	...	...	...	925.50	121.99	...
		...	Voided leases and sundry claims	...	...	465.75	79.62	...	...	2.84	20,254.60	6,099.01	7.30

TABLE II.—Production of Gold and Silver from all sources, etc.—continued.

YALGOO GOLDFIELD—continued.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1937.					TOTAL PRODUCTION.				
			Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.	Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.
			Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.
Yalgoo ... ..	...	Voided leases and sundry claims	...	...	191.50	28.65	...	...	26.79	8,617.25	10,919.56	...
Yuin	1082	Royal Standard Voided leases and sundry claims	...	...	888.00	199.09	...	...	131.82	2,091.00	542.94	...
		<i>From Goldfield Generally:—</i>										
		Sundry Parcels treated at:										
		Revival Cyanide Plant ... ..	...	...	...	*70.60	...	...	...	...	*565.64	...
		Payne's Find State Battery Cyanide Plant ...	...	...	...	*276.37	...	...	...	38.50	*3,064.35	...
		Warriedar State Battery Cyanide Plant ...	...	...	...	*77.13	...	...	...	...	*6,088.99	...
		Yalgoo State Battery Cyanide Plant ... ..	...	...	...	*82.22	...	...	...	...	*671.24	...
		Shenandoah Cyanide Plant ... ..	...	...	...	*93.48	...	...	...	...	*237.19	...
		Various Works ... ..	...	...	...	...	...	...	9.42	664.00	*2,131.66	26.67
		Reported by Banks and Gold Dealers	10.55	1.65	...	...	...	862.54	37.27	...	...	...
		Totals	15.08	40.07	16,338.85	7,409.31	2.35	1,683.79	2,458.76	340,347.10	220,723.70	1,252.76

Mt. Margaret Goldfield.

MOUNT MORGANS DISTRICT.

Australia United...	...	Voided leases and sundry claims	...	...	...	...	...	...	2,492.61	17,064.94	25,473.28	1.76
Eucalyptus ... ..	...	do. do. do.	...	13.73	175.00	88.68	...	...	3,304.80	2,473.60	4,124.16	...
Korong ... ..	...	do. do. do.	...	...	...	...	...	17.95	107.20	3,162.28	3,833.74	...
Linden	396F, etc. ...	Bindah Gold Mines, Ltd. ... ..	...	...	386.00	60.88	...	...	...	386.00	60.88	...
	396F, etc. ...	(Bindah leases) ... ..	...	...	...	...	...	...	...	478.00	80.41	...
	494F	Local Lady ... ..	...	...	54.00	23.73	...	...	...	213.00	83.52	...
	484F	Mount Celia ... ..	...	...	123.00	98.14	...	...	...	664.00	198.32	...
	502F	Star of the Sea ... ..	...	...	77.00	52.05	...	...	...	77.00	52.05	...
		Voided leases and sundry claims	...	27.10	637.75	1,193.74	...	112.44	692.63	68,075.41	51,243.29	.68
Mt. Howe ... ..	...	Sundry claims ... ..	...	...	...	...	...	...	...	79.00	55.75	...
Mt. Margaret	954H	Mt. Margaret Mission ... ..	...	...	110.00	40.44	...	...	...	110.00	40.44	...
	418F, 432F ...	Westralia Renown Mines, N.L. ... ..	...	...	69.25	91.98	...	...	...	1,388.25	630.98	...
	418F, 432F ...	(Mt. Margaret Mines, N.L.) ... ..	...	...	...	...	...	...	...	890.25	332.37	...
		Voided leases and sundry claims	...	...	7.50	1.06	...	25.59	99.24	7,261.99	4,762.31	12.55

Mt. Morgans	501F ...	V's United ...	...	...	68.75	28.44	...	...	...	68.75	28.44	...
	5F, 399F, 400F, etc.	Westralia Renown Mines, N.L.	...	...	257.00	301.87	...	...	...	5,696.00	1,883.10	...
	5F, etc.	(Westralia Mt. Morgans Mines, N.L.) ... Voided leases and sundry claims	...	...	...	...	...	...	16.66	773,736.18	352,288.77	5,552.63
					104.50	32.80	...	20.79	390.63	60,020.79	33,209.19	77.86
Murrin	395F ...	Arthur Rymer ...	...	...	334.00	84.05	...	...	8.42	3,576.25	670.89	...
	479F ...	Golden Treasure New ...	...	...	323.00	68.75	...	...	...	444.25	131.08	...
	482F ...	Hill End ...	...	...	866.00	246.04	...	...	...	1,390.75	852.18	...
	490F ...	Margaret Joyce ...	...	...	48.50	39.77	...	...	...	101.50	87.36	...
	493F ...	Star ...	...	...	71.00	15.68	...	...	...	71.00	15.68	...
			Voided leases and sundry claims	260.00	160.71	...	61.58	667.65	133,656.00	104,980.25	29.60
Redcastle	...	do. do. do.	...	...	18.75	7.65	...	4.49	540.12	4,309.02	4,458.96	...
Yundamindera	491F	Landed at Last ...	...	...	...	...	...	...	...	199.75	37.53	...
		Voided leases and sundry claims	...	...	292.00	101.91	...	...	183.28	76,892.60	52,118.85	5.82
<i>From District generally:—</i>												
Sundry Parcels treated at:												
		Linden State Battery Cyanide Plant ...	...	3.51	...	*301.71	...	...	6.78	263.29	*7,626.15	...
		Rymer's Cyanide Plant ...	...	...	...	*58.22	...	...	...	...	*675.33	...
		Various Works ...	...	...	...	...	...	...	...	1,257.81	5,238.32	99.97
		Reported by Banks and Gold Dealers ...	170.92	1.06	...	...	...	2,485.00	67.54	10.30	56.69	...
Totals			170.92	45.40	4,283.00	3,097.80	...	2,727.84	8,577.56	1,164,017.96	655,330.27	5,780.87

MOUNT MALCOLM DISTRICT.

Cardinia	...	Voided leases and sundry claims	...	34.22	141.00	14.30	...	18.12	1,686.61	2,562.49	3,911.53	...
Diorite	1750c	Wotan ...	...	...	63.50	205.15	...	...	...	63.50	205.15	...
		Voided leases and sundry claims	...	...	227.50	120.24	...	11.21	1,060.98	37,946.83	35,379.42	24.05
Dodger's Well	...	Voided leases and sundry claims	...	...	9.00	4.36	...	.95	86.22	2,813.55	2,840.75	...
Lake Darlot	1727c	Corboy's Pinnacles Reward ...	...	...	...	...	...	...	...	68.00	52.35	...
	(1728c)	Freeman's Find ...	...	...	32.00	89.46	...	...	...	67.00	124.77	...
	(1729c)	Wilkinson ...	...	...	65.50	61.28	...	...	...	174.25	176.61	...
		Voided leases and sundry claims	...	...	71.50	86.57	...	67.68	5,033.13	72,658.05	53,704.95	2.60
Leonora	1754c	Gold Blocks ...	...	...	307.00	123.44	...	...	...	307.00	123.44	...
	1594c	Leonora Central G.M. Co., N.L. ...	...	...	...	2.94	...	...	...	2,529.00	92.45	...
	(1751c)	New Moon ...	...	...	58.50	29.93	...	...	...	58.50	29.93	...
	1701c	New Year Gift ...	...	...	...	...	...	...	...	34.50	3.60	...
	190c, etc.	Sons of Gwalia, Ltd. ...	...	...	136,522.00	45,686.94	3,785.73	...	...	4,222,698.67	1,820,416.45	123,711.94
		Prior to transfer to existing holders	...	...	...	...	...	...	...	109,081.00	55,989.21	8.66
	1557c	Tower Hill ...	...	...	63.00	14.49	...	...	.58	143.05	46.36	...
	1757c	Trump Creek ...	...	12.17	35.00	151.65	...	...	12.17	35.00	151.65	...
	Voided leases and sundry claims	...	...	346.50	113.72	...	30.31	2,183.24	175,350.50	98,237.99	10.71	
Malcolm	...	do. do. do.	...	...	47.50	6.20	...	5.75	80.46	66,662.00	50,092.48	...
Mertondale	...	do. do. do.	...	...	338.50	109.67	...	1.82	63.04	90,706.21	62,829.64	1,497.58

TABLE II.—Production of Gold and Silver from all sources, etc.—continued.

MT. MARGARET GOLDFIELD—continued.

MT. MALCOLM DISTRICT—continued.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1937.					TOTAL PRODUCTION.				
			Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.	Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.
			Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.
Mt. Clifford ...	1725c ...	Bannockburn ...	...	...	585.00	228.44	...	...	9.61	870.00	315.92	...
	1761c ...	Marionette ...	...	...	33.00	26.13	...	...	...	33.00	26.13	...
	1749c ...	Northwind ...	...	...	154.50	113.33	...	...	...	204.50	126.68	...
		Voided leases and sundry claims	...	...	242.50	138.98	...	53.98	1,894.31	10,906.06	18,473.85	...
Pig Well ...	...	do. do. do.	...	...	31.50	14.27	...	...	34.61	16,464.97	15,898.93	63.68
Randwick ...	1753c ...	Lady Doris ...	...	...	122.00	31.08	...	...	...	122.00	31.08	...
	1760c ...	Mighty Splash ...	...	...	197.00	86.15	...	...	...	197.00	86.15	...
	1601c, etc. ...	Randwick Mines Amalgamated, Ltd. ...	...	...	22.00	9.58	...	...	...	98.50	37.08	...
		Voided leases and sundry claims	...	...	500.00	89.42	...	66.57	403.51	10,420.79	9,940.99	...
Webster's ...	...	do. do. do.	...	...	28.50	11.47	...	67.14	16.52	24,273.20	15,764.30	...
Wilson's Creek ...	...	do. do. do.	...	...	...	...	...	...	4.24	448.00	214.88	...
Wilson's Patch ...	1748c ...	Chien D'or ...	...	...	334.00	50.85	...	...	...	424.00	76.01	...
		Voided leases and sundry claims	...	...	146.50	72.97	...	4.68	149.95	29,586.26	14,230.69	1.05
		<i>From District generally:—</i>										
		Sundry Parcels treated at:										
		Park & Hunt's Cyanide Plant ...	...	...	...	*264.24	...	...	...	...	*758.58	...
		K. Courcier's Cyanide Plant ...	...	...	...	*16.73	...	...	...	...	*16.73	...
		W. H. Wright's Cyanide Plant ...	...	...	...	*63.09	...	...	...	...	*63.09	...
		Merton's Reward North Cyanide Plant ...	...	...	...	*185.26	...	...	...	...	*433.34	...
		Reefer Cyanide Plant ...	...	...	...	*691.40	22.38	...	...	...	*691.40	22.38
		Various Works ...	...	...	...	...	...	...	...	789.50	20,000.60	123.15
		Reported by Banks and Gold Dealers ...	...	...	85.28	41.09	...	3,164.41	224.54	9.50	32.04	...
		Totals ...	85.28	87.48	140,724.50	48,913.73	3,808.11	3,492.62	12,943.72	4,878,806.38	2,281,827.20	125,465.80

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MOUNT MARGARET DISTRICT.

Burtville ...	2138r ...	Nil Desperandum	5.30	80.25	105.01	5.30	1,171.87	2,676.07	...
	2315r ...	Sailor Prince ...	...	...	203.00	47.81	...	...	...	412.00	109.37	...
	(2341r)	Sailor Prince South ...	...	...	148.00	39.47	...	...	...	578.25	246.54	...
		Voided leases and sundry claims	...	...	273.25	156.41	...	4.19	574.81	72,879.34	108,214.44	275.27

Duketon ...	2404T ... (2366T) ...	Hematite ... Re Union ... Voided leases and sundry claims	...	2.89	6.00	26.75	...	...	2.89	6.00	26.75	...
				155.57	160.00	166.06	27.23	3.54	3,434.21	32,027.42	22,994.06	27.23
Eagle's Nest ...	...	do. do. do.	...	...	363.00	43.95	...	11.45	601.44	1,409.75	1,524.98	...
Erlistoun ...	(2338T) ... (2339T) ... 2141T, etc. ... 2141T, etc. ... 2402T ... 2383T ... 2345T, etc. ... 2345T ... 2374T ...	Gladys ... Gloria ... King of Creation G.Ms., Ltd. ... Prior to transfer to existing holders ... Midas ... Nungul ... Western Mining Corporation, Ltd. ... (Morgood) ... Westralia Tasmania ... Voided leases and sundry claims	...	...	76.00	55.02	...	...	...	325.75	226.38	...
				...	34.25	11.20	...	...	...	142.25	57.67	...
				...	5,848.00	980.57	11.00	...	...	5,848.00	980.57	11.00
				...	168.25	87.75	...	...	...	13,723.00	3,199.66	...
				...	...	...	...	...	...	168.25	87.75	...
				...	...	...	...	...	...	37.75	6.38	...
				...	16,768.00	14,042.15	680.33	...	...	23,767.00	20,454.38	879.76
				...	...	...	...	...	...	119.25	140.97	...
				...	25.75	5.81	...	...	...	25.75	5.81	...
			2.22	6.69	338.25	157.84	...	1,181.65	165.03	32,111.36	21,671.82	...
Euro ...	(2376T) ...	Euro ... Voided leases and sundry claims	...	...	87.25	29.46	...	...	...	265.25	95.36	...
				...	31.75	19.60	...	...	111.66	92,568.25	38,188.90	...
Laverton ...	2260T ...	Australian Mechanised Prospecting Co., Ltd. (Just in Time) ... Beria Main Lode ... Fairfield ... Ida H. Leases ... Lancefield (W.A.) Gold Mine, N.L. ... Prior to transfer to present holders ... Pinnacles ... White Horse ... Voided leases and sundry claims	...	...	26.25	5.15	...	...	...	26.25	5.15	...
	2260T ...			...	...	...	...	...	...	308.75	66.35	...
	2216T ...			...	370.00	67.22	...	...	...	740.25	123.40	...
	2373T ...			...	24.75	33.73	...	...	...	56.50	87.56	...
	2229T ...			...	344.75	53.20	...	...	...	2,986.25	430.30	...
	715T, etc. ...			...	113,342.00	34,477.12	...	...	...	279,742.00	88,278.61	...
	715T, etc. ...			...	...	...	...	...	...	941,424.98	360,139.22	51,882.27
	2382T ...			...	65.25	8.88	...	...	...	114.75	16.66	...
	2322T ...			...	137.75	70.49	...	...	...	295.00	124.12	...
				...	784.00	198.95	...	230.47	3,443.42	472,134.24	268,952.67	4,674.69
Mt. Barnicoat ...	2288T, etc. ... 2254T ... 2313T ...	New Ida Leases ... Ulalla ... White Hope ... Voided leases and sundry claims	...	...	...	29.00	13.46	...	...	27.75	12.04	...
				...	213.00	14.25	...	...	...	356.50	85.32	...
				...	330.00	43.67	...	...	...	493.00	40.55	...
				...	...	...	...	...	...	1,200.50	518.98	...
Mt. Shenton ...	...	do. do. do.	...	...	89.75	39.74	...	...	...	283.25	225.22	...
<i>From District generally :-</i>												
Sundry Parcels treated at :												
	State Battery, Laverton ...		...	...	...	*387.89	...	...	...	97.50	*4,667.77	15.64
	Ida H Tailings Syndicate Plant ...		...	...	...	*342.51	...	...	...	...	*4,095.35	...
	Tasker's Cyanide Plant ...		...	...	...	*295.82	...	...	...	...	*1,631.98	...
	Mary Mac Tailings Treatment Plant ...		...	...	...	*266.20	...	...	...	...	*629.72	...
	Various Works ...		...	...	...	...	...	...	...	157.00	9,921.74	...
	Reported by Banks and Gold Dealers ...		37.60	8.42	...	...	...	2,346.55	58.23	...	10.08	...
Totals			39.82	178.87	140,421.50	52,303.93	718.56	3,777.85	8,396.99	1,978,099.96	960,988.83	57,765.86

North Coolgardie Goldfield.

MENZIES DISTRICT.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1937.					TOTAL PRODUCTION.				
			Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.	Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.
			Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.
Comet Vale ...	5590z ...	King of the Hills ...	...	...	...	...	...	...	...	...	7.08	...
	5591z ...	Post Town ...	...	...	21.00	2.81	...	...	...	21.00	4.88	...
	5217z, 5476z, etc.	Sand Queen-Gladsome Mines, N.L. ...	...	...	16,837.00	4,828.55	...	...	...	42,080.00	13,953.35	2.14
	5217z, 5476z ...	Prior to transfer to present holders Voided leases and sundry claims	...	...	...	...	...	...	...	75,754.50	59,007.25	1,505.65
			...	...	...	...	...	...	459.93	150,165.88	120,206.30	3,839.28
Goongarrie ...	...	do. do. do.	...	20.15	10.00	8.09	...	47.40	3,171.90	29,380.81	20,118.94	...
Menzies ...	5539z ...	(Aeroplane) ...	...	...	...	...	...	...	...	151.50	174.25	...
	5543z ...	Black Swan ...	...	...	317.88	179.94	9.08	...	...	520.63	807.43	9.08
	5676z ...	Coronation ...	...	...	83.00	92.35	...	...	...	83.00	92.35	...
	5628z ...	Donegal Sligo ...	...	...	78.00	45.84	...	...	...	605.00	401.70	...
	5662z ...	Dreadnought ...	...	...	234.00	95.11	12.90	...	...	246.00	113.40	12.90
	5511z, etc.	First Hit G.M., Ltd. ...	...	...	8,376.70	6,830.52	1,038.96	...	...	13,723.20	10,756.39	1,374.30
	5511z ...	(First Hit) ...	...	...	...	...	...	...	...	1,672.75	4,687.69	...
	5542z ...	Good Block lease ...	...	...	40.00	119.44	...	...	4.45	784.50	1,047.83	...
	(5645z) ...	Goodenough ...	...	...	48.00	9.92	...	...	...	115.00	34.93	...
	5484z ...	Happy Warrior G.M., N.L. ...	...	...	...	...	...	...	...	285.96	132.77	...
	5549z ...	Lady Harriet ...	...	...	100.00	21.31	...	...	...	221.00	64.18	...
	5673z ...	Lady Kathleen ...	...	...	14.00	41.95	...	...	...	14.00	41.95	...
	5575z, etc.	Lady Shenton Gold Mines (1934), N.L. ...	...	...	7,623.00	4,983.96	1,176.68	...	...	14,087.00	8,630.99	1,413.61
	5592z ...	Lorna May ...	...	...	58.00	13.18	...	...	...	141.75	52.86	...
	5520z ...	Mignonette ...	...	...	...	...	...	...	...	148.50	182.44	...
	5548z ...	Miss Dolly ...	...	...	11.75	10.78	...	...	...	89.50	247.91	...
	(5661z) ...	Pharoah ...	...	...	10.00	4.30	...	...	1.01	20.00	30.19	...
	5666z ...	Spion Kop ...	...	...	73.50	56.44	...	...	...	95.75	72.21	...
	5663z ...	Springfield ...	...	...	38.00	11.62	...	...	...	62.00	18.82	...
	5584z ...	Sydney ...	...	...	...	...	...	...	...	153.00	415.27	...
5484z ...	Warrior ...	...	...	62.00	36.79	...	...	...	1,753.00	835.97	...	
	Voided leases and sundry claims	...	5.95	433.43	403.84	...	94.17	1,580.21	928,159.99	728,194.16	12,118.22	
Mt. Ida ...	5626z ...	Bungarra ...	...	...	345.00	71.62	...	...	...	2,223.00	365.37	...
	5658z ...	Carida ...	...	...	117.20	137.70	...	...	...	170.95	207.86	...
	5668z ...	Federation ...	...	...	...	...	...	...	...	85.00	194.31	...
	5667z ...	Golden Ridge ...	...	...	117.50	128.38	...	...	...	604.00	401.03	...
	5685z ...	Golden Ridge North ...	...	...	86.00	35.19	...	...	...	86.00	35.19	...
	5551z, etc.	Mt. Ida Gold Mines, Ltd. ...	...	...	1,354.75	928.21	...	...	...	2,249.50	1,552.66	19.78
	5674z ...	Quin Hill ...	...	...	247.50	72.91	...	...	...	247.50	72.91	...
	5671z ...	Temora ...	...	...	266.50	103.02	...	...	...	558.00	238.27	...
5537z ...	Timoni ...	...	...	...	...	...	...	...	1,512.75	737.95	...	

	5597z ...	Unexpected ...	...	...	214·00	27·52	...	...	...	271·00	42·02	...
	5675z ...	White Horse	...	...	10·00	4·74	...	...	...	10·00	4·74	...
		Voided leases and sundry claims	...	...	1,252·00	615·35	...	48·14	112·73	71,363·20	75,208·47	106·63
Twin Hills	5677z ...	Twin Hills South	...	...	48·00	35·80	...	...	...	48·00	35·80	...
		Voided leases and sundry claims	...	...	...	...	...	...	...	307·60	309·27	...
	<i>From District generally :-</i>												
	Sundry Parcels treated at :												
		Howell's Cyanide Plant	...	...	...	*104·10	...	...	...	...	*104·10	...
		Lady Harriet Cyanide Plant	...	...	...	*577·58	...	...	...	279·50	*10,877·86	30·00
		Quinlan's Cyanide Plant	...	...	...	*180·56	...	...	...	...	*1,415·14	...
		Mt. Ida State Battery Cyanide Plant	...	...	...	...	...	...	...	1,866·25	*5,370·61	...
		Parry's Cyanide Plant	...	...	...	*36·93	...	...	...	...	*36·93	...
		Thompson's Cyanide Plant	...	...	...	*11·48	...	...	...	...	*573·75	...
		Various Works	...	...	...	...	...	...	...	2,512·30	*33,015·90	1,813·40
		Reported by Banks and Gold Dealers	...	49·14	...	...	...	1,297·71	264·17	35·00	7·72	...
		Totals	...	49·14	26·10	38,527·71	20,867·83	2,237·62	1,487·42	5,594·40	1,344,964·77	1,101,141·35	22,244·99

ULARRING DISTRICT.

Davyhurst	1015u ...	Enterprise G.Ms., N.L.	...	...	...	...	...	...	...	100·00	21·55	...
	1051u ...	Golden Pole	...	...	244·50	81·27	...	...	...	727·09	231·85	...
	1071u ...	Golden Red	...	...	42·00	20·14	...	...	...	42·00	20·14	...
	(1042u)	Great Hope	...	...	370·00	141·32	...	...	...	733·50	342·61	...
	1040u ...	Lights of Israel	...	...	245·00	115·98	...	...	...	735·00	260·72	...
	1016u ...	New Callion	...	...	...	...	...	...	...	240·00	49·29	...
	(1027u)	Rosalie	...	...	90·00	19·70	...	...	...	1,205·00	250·44	...
	1033 ...	Waihi	...	...	17·00	2·23	...	...	...	86·50	29·11	...
		Voided leases and sundry claims	...	...	472·50	198·20	...	2·93	182·40	166,245·67	127,986·81	5,403·14
Mulline	1066u ...	Lady Mabel	...	...	15·00	20·12	...	...	...	39·00	63·72	...
	1073u ...	Lanarkshire	...	...	331·00	34·55	...	...	...	331·00	34·55	...
	1068u, 1070u...	Riverina G.Ms., Ltd.	...	...	13,822·00	5,564·55	...	...	...	13,822·00	5,564·55	...
	1074u ...	Two Chinamen	...	...	23·50	243·86	...	...	...	23·50	243·86	...
		Voided leases and sundry claims	...	49·45	642·50	445·93	...	...	441·44	110,041·36	110,182·83	531·44
Mulwarrie	(1061u)	Oakley	...	...	104·00	41·17	...	...	...	344·50	190·99	...
		Voided leases and sundry claims	...	...	...	...	...	...	113·62	21,097·28	27,940·32	38·47
Ularring	...	do. do. do.	...	...	205·00	43·33	...	...	563·34	9,858·60	13,842·93	...
	<i>From District generally :-</i>												
	Sundry Parcels treated at :												
		Howell's Cyanide Plant	...	...	...	*7·27	...	...	...	...	*94·38	...
		Golden Pole Cyanide Plant	...	...	...	*315·33	...	...	...	...	*2,759·42	...
		Waihi Cyanide Plant	...	...	...	*324·37	...	...	...	...	*1,151·82	...
		State Battery Mulline Cyanide Plant	...	...	...	*387·42	...	...	...	639·99	*15,756·71	...
		State Battery Mulwarrie Cyanide Plant	...	...	...	*156·66	...	...	...	613·18	*6,111·16	...
		Various Works	...	...	...	...	...	...	15·82	205·15	*722·41	...
		Reported by Banks and Gold Dealers	...	21·19	6·85	...	...	74·79	34·65	...	5·78	...
		Totals	...	21·19	56·30	16,624·00	8,163·40	...	77·72	1,351·27	327,130·32	313,857·95	5,973·05

TABLE II.—Production of Gold and Silver from all sources, etc.—continued.

NORTH COOLGARDIE GOLDFIELD—continued.

NIAGARA DISTRICT.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1937.					TOTAL PRODUCTION.				
			Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.	Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.
			Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.
Desdemona	...	Voided leases and sundry claims	...	...	94.50	52.24	...	...	16.11	11,413.95	8,327.56	12.04
Kookynie	868g ...	Altona ...	3.35	72.71	...	...	...	3.35	79.74	11.50	12.86	...
	819g, etc. ...	Cosmopolitan Mines, N.L. ...	...	...	2,637.55	1,479.22	...	...	...	2,637.55	1,479.22	...
	819g, etc. ...	(Cosmopolitan South Extended) ...	...	...	...	...	...	...	...	1,942.73	1,327.93	...
	872g ...	Margory ...	...	...	370.00	147.86	...	...	...	370.00	147.86	...
	(874g) ...	New Cumberland ...	...	...	30.00	33.40	...	...	...	109.00	67.76	...
	810g, 811g ...	Two D's leases ...	...	...	...	*97.08	...	...	...	1,590.00	652.93	...
	(881g) ...	Victoria ...	...	...	67.00	28.74	...	...	...	67.00	28.74	...
	...	Voided leases and sundry claims	...	...	120.50	42.32	...	56.74	367.40	741,688.23	394,675.05	5,375.97
Niagara	873g ...	Peter Pan ...	...	...	103.00	33.15	...	...	...	302.00	91.53	...
	...	Voided leases and sundry claims	...	...	134.50	38.79	...	28.10	201.76	97,344.16	59,459.72	...
Tampa	809g ...	Fortune ...	...	...	...	...	...	...	...	95.25	211.17	...
	(880g) ...	Tranquil Toiler ...	...	...	21.00	42.86	...	...	...	69.25	130.68	...
	900g ...	Waratah ...	...	...	212.50	329.41	...	...	...	212.50	329.41	...
	...	Voided leases and sundry claims	...	21.02	310.75	208.12	...	28.21	321.72	55,123.40	25,869.38	174.24
	<i>From District generally:—</i>											
	Sundry Parcels treated at:											
	Actons Cyanide Plant ...		...	...	...	*.60	...	...	...	...	*.60	...
	Various Works ...		...	...	...	...	...	...	...	1,220.50	*15,923.54	41.17
	Reported by Banks and Gold Dealers ...		8.08	...	...	...	...	1,541.33	813.23	...	63.53	...
	Totals		11.43	93.73	4,101.30	2,533.79	...	1,657.73	1,799.96	914,197.02	508,799.47	5,603.42

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YERILLA DISTRICT.

Edjudina	1078R ...	Ace of Hearts	67.75	14.91	611.50	331.55	...
	1201R ...	Edjudina Perseverance	38.00	37.37	38.00	37.37	...
	(1179R) ...	Eureka ...	...	...	113.50	25.59	...	...	...	231.50	71.09	...
	1134R ...	Ingall ...	...	...	61.00	19.82	...	...	...	90.00	29.83	...
	1010R, 1011R ...	(Neta leases) ...	...	...	...	...	...	...	...	738.75	559.80	...
	1123R ...	Seventy-two ...	...	...	72.00	43.39	...	...	...	175.75	117.67	...
	...	Voided leases and sundry claims	...	...	16.50	5.46	...	...	45.33	38,912.78	46,445.84	37.79
Patricia	1080R, 1081R ...	Kimberley Oil Options, N.L. ...	...	...	146.00	161.43	...	...	...	4,012.75	5,196.05	25.40
	...	Voided leases and sundry claims	...	...	...	...	...	...	...	78.25	30.61	...

Pingin	...	...	do.	do.	do.	...	...	183.25	94.54	...	...	198.38	19,794.64	13,550.67	...
Yarri	...	1126R, etc.	Edjudina G.M. Co., N.L.	...	...	...	...	14,714.00	1,865.97	160.31	...	...	29,891.00	4,197.37	448.52
		1126R	(Chateau Tanunda)	...	...	...	...	...	...	...	...	...	124.50	38.89	...
		1189R	East West Gold Reefs	...	...	...	...	59.50	35.25	...	...	...	185.25	83.60	...
		1174R	Mt. Wallbrook	...	...	...	...	850.00	59.79	...	...	...	1,313.75	140.06	...
		1200R	Selborne	...	...	...	...	522.75	60.10	...	...	...	522.75	60.10	...
		1162R, 1187R	Wallaby Central leases	...	...	...	...	1,037.25	170.43	...	...	...	1,037.25	170.43	...
		1187R	(Wallaby)	...	...	...	...	94.00	12.36	...	...	...	108.00	14.58	...
		1162R	(Wallaby Central)	...	...	...	...	136.00	16.44	...	...	...	700.00	267.49	...
			Voided leases and sundry claims	...	...	...	...	795.50	217.59	...	7.17	92.88	48,327.35	24,198.29	2.00
Yerilla	...	...	do.	do.	do.	...	3.75	76.75	32.68	...	19.30	3,138.05	18,751.51	14,213.84	13.93
Yilgangie	...	1159R	Big Wonder	...	...	...	...	268.00	21.04	...	...	...	321.50	28.04	...
		1193R	Melody	...	...	...	...	70.00	71.02	...	...	...	102.50	204.67	...
		1194R	Yilgangie King	...	...	...	...	59.00	71.33	...	...	...	59.00	71.33	...
		1176R	Yilgangie Queen	...	...	...	...	130.75	284.53	...	...	...	599.25	1,327.11	...
			Voided leases and sundry claims	...	...	...	9.38	383.00	131.34	...	121.67	87.58	1,843.30	1,461.52	...
			<i>From District generally :-</i>													
			Sundry Parcels treated at:													
			Yarri State Battery Cyanide Plant	...	...	...	...	...	*334.54	...	...	...	271.50	*6,137.74	3.50
			Various Works	...	...	...	...	...	...	2.17	...	...	642.25	*6,049.24	...
			Reported by Banks and Gold Dealers	...	...	37.89	...	...	...	.67	1,108.32	159.59	...	1.12	...
			Totals	...	...	37.89	13.13	19,894.50	3,787.59	...	1,253.63	3,721.81	169,484.58	125,035.90	531.14

Broad Arrow Goldfield.

Balgarrie	...	...	Voided leases and sundry claims			...	...	...	...	...	10.94	94.05	6,631.25	5,317.53	1.38
Bardoc	...	(2108w)	A.I.	...	...	...	...	10.00	2.27	...	...	...	61.00	12.81	...
		2102w	Despatch	...	...	...	...	89.50	21.92	...	...	...	286.25	79.24	...
		2127w	Ora Munda	...	...	250.69	...	30.04	160.07	...	...	262.07	30.09	169.19	...
		2145w	Two Up	...	...	...	...	476.00	110.30	...	...	...	476.00	110.30	...
		2079w	Wycheproof	...	...	...	...	426.00	147.42	...	...	11.45	899.00	386.03	...
		1833w, 2089w	Zoroastrian leases	...	...	...	...	1,288.00	251.59	...	...	23.25	1,910.45	501.26	...
			Voided leases and sundry claims	...	...	...	...	610.89	219.13	...	54.22	2,687.83	83,026.80	57,589.88	203.60
Black Flag	...	2149w	Bellevue Gold Mine	...	...	...	...	42.00	34.72	...	...	...	42.00	34.72	...
		2128w	King Edward	...	...	...	...	16.50	17.26	...	...	1.22	16.50	17.26	...
		2154w	Pirates Mine	...	...	...	...	65.00	13.07	...	...	...	65.00	13.07	...
		2137w	Royal Standard	...	...	...	...	50.00	36.25	...	...	...	85.50	47.70	...
			Voided leases and sundry claims	...	...	...	...	362.98	162.60	...	738.80	602.13	47,797.84	29,109.86	...
Broad Arrow	...	2153w	Blew Bar	...	...	...	...	76.00	19.34	...	...	...	76.00	19.34	...
		2083w	Broad Arrow Consols	...	...	99.02	...	47.84	293.96	...	...	179.73	189.64	532.45	...
		(2138w)	Daisy	...	...	...	...	...	4.45	...	...	...	.17	30.02	...
		(2134w)	Donelda	...	...	...	...	55.00	35.14	...	...	...	103.00	105.72	...
		1996w	Doris	...	...	...	...	4.00	10.47	...	...	...	37.50	86.38	...
		2039w	Golden Arrow	...	...	...	...	796.00	70.62	...	...	...	2,628.00	300.40	...
		2074w	Golden Basin No. 7	...	...	...	...	2,450.00	312.92	...	...	...	4,401.00	603.90	...
		2115w	Golden Crown	...	...	...	...	20.02	17.75	...	...	...	38.04	49.17	...
		1958w	Grace Darling	...	...	...	...	145.00	46.93	...	...	...	1,611.75	1,361.30	...

TABLE II.—Production of Gold and Silver from all sources, etc.—continued.

BROAD ARROW GOLDFIELD—continued.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1937.					TOTAL PRODUCTION.				
			Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.	Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.
			Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.
Broad Arrow—cont.	2148w ...	Lady Betty ... ..	...	...	61.80	13.16	...	...	...	61.80	13.16	...
	2136w ...	Mt. Pleasant ... ..	...	...	340.00	99.55	...	...	...	472.00	117.89	...
	1771w ...	North Duke ... ..	...	...	...	...	...	...	1,533.79	192.80	628.42	...
	1933w ...	(Oversight Tara United) ... ..	...	...	...	...	...	...	1,131.72	380.54	822.18	...
	2106w ...	Trump ... ..	...	10.26	10.00	10.92	...	...	108.44	31.76	418.65	...
	2151w ...	Vesuvio ... ..	...	...	413.50	183.97	...	...	...	413.50	183.97	...
		Voided leases and sundry claims	...	139.61	1,364.27	800.45	...	1,052.74	8,762.84	139,993.95	114,053.24	18.85
Canegrass ...	2028w ...	Big Four ... ..	...	...	12.00	2.34	...	...	...	169.00	113.59	...
		Voided leases and sundry claims	...	...	150.50	27.76	...	...	234.56	1,105.30	828.58	...
Carnage ...	...	do. do. do.	...	...	419.00	164.86	...	176.04	659.31	3,628.58	2,877.84	...
Cashman's ...	2046w ...	Lady Evelyn ... ..	...	...	156.00	47.53	...	...	1.17	207.00	72.16	...
		Voided leases and sundry claims	...	...	166.50	49.17	...	67.51	832.99	8,800.65	7,272.28	...
Christmas Reef ...	...	do. do. do.	...	15.96	338.25	176.88	...	...	249.15	2,603.19	1,825.78	...
Fenbark ...	(2121w) ...	Mt. Hardy ... ..	...	...	83.50	29.19	...	...	4.42	176.50	48.65	...
		Voided leases and sundry claims	...	...	109.66	27.47	...	...	...	3,295.52	2,410.21	...
Grant's Patch ...	(1941w, 1979w)	Bent Tree leases ... ..	...	...	342.25	45.68	...	...	...	4,563.75	1,285.19	...
	1936w ...	Dundas G.Ms., N.L. ... ..	...	...	655.00	126.89	...	...	...	2,751.00	838.71	...
	1936w ...	(Wentworth) ... ..	...	...	...	...	...	...	...	4,642.00	1,689.27	...
	1962w, 1966w, etc.	Ora Banda Amalgamated Mines, Ltd.	...	...	16,495.00	8,308.73	...	...	...	29,688.00	15,593.15	...
	1962w, 1966w, etc.	Prior to transfer to present holders	...	...	...	...	...	...	...	12,424.50	9,540.07	...
	1953w ...	Wentworth South ... ..	...	...	57.50	9.54	...	...	...	1,001.50	266.94	...
		Voided leases and sundry claims	...	.97	452.50	123.38	...	...	577.98	2,816.39	1,711.25	...
Ora Banda ...	1336w, 1399w, etc.	Associated Northern Ora Banda, N.L.	...	...	...	...	...	...	...	51.00	8.38	...
	1336w, 1399w, etc.	Prior to transfer to present holders	...	...	...	...	...	...	...	315,958.95	123,252.22	1,664.70
	(2116w) ...	Mighty Atom ... ..	...	...	98.50	38.65	...	...	...	311.50	126.56	...
	2117w ...	Missed Chance ... ..	...	...	303.00	283.96	...	...	...	598.00	386.35	...
	(1983w) ...	Ora Banda South ... ..	...	...	95.00	24.36	...	...	...	675.75	232.40	...
	1944w, 1943w, etc.	Ora Banda United Mines, Ltd.	...	...	405.75	19.46	...	...	...	1,930.25	60.66	...
	(1371w), 1944w, etc.	Prior to transfer to present holders	...	...	...	...	...	...	...	76,612.22	14,630.93	...

	2092w	...	P.W.B.	...	...	114.50	56.01	...	...	...	633.50	348.83	...
	2142w	...	Wotan	...	...	82.00	123.69	...	...	...	119.00	180.26	...
		...	Voided leases and sundry claims	...	3.86	847.75	233.41	...	...	986.41	29,029.35	13,920.15	...
Paddington	2122w	...	George and Mary	...	...	173.15	44.36	...	...	...	183.15	45.86	...
	2059w, 2109w	...	Lochinvar Gold Mines, Ltd.	...	...	223.50	12.15	...	...	...	223.50	12.15	...
	2059w	...	(Paddington North)	...	...	...	...	...	...	...	52.00	9.50	...
	2114w	...	Lone Oak	...	...	30.00	33.83	...	8.58	...	75.00	89.96	...
	2105w	...	Minnie Palmer	...	...	2,401.00	140.36	...	...	...	4,468.00	268.11	...
	(1985w)	...	Mt. Corlac	...	...	68.80	13.00	...	...	...	248.05	116.73	...
	2060w	...	Paddington Gift	...	...	113.50	16.74	...	...	...	199.25	29.51	...
		...	Voided leases and sundry claims	...	...	251.89	400.56	...	7,271.88	288.40	188,909.03	90,379.66	18.96
Riches Find	(2146w)	...	Black Cat	...	...	29.09	245.04	...	...	...	29.09	245.04	...
	2147w	...	Golden Belle	...	...	75.50	87.09	...	...	...	75.50	87.09	...
	2129w, etc.	...	Western Mining Corporation, Ltd.	...	...	82.50	80.63	...	...	...	82.50	80.63	...
	2129w	...	(Three Eights)	...	...	237.25	537.22	...	...	...	328.75	640.11	...
	(2125w)	...	Yellow Belle	...	...	24.50	31.48	...	...	...	24.50	31.48	...
		...	Sundry claims	...	49.80	246.25	330.47	...	...	117.11	739.50	1,182.57	...
Siberia	...	...	Voided leases and sundry claims	...	...	132.50	133.04	...	290.13	3,690.69	46,856.76	43,266.66	...
Smithfield	2139w	...	Mountain Maid	...	...	162.50	41.24	...	...	...	254.96	118.60	...
		...	Voided leases and sundry claims	...	...	434.41	96.02	...	...	23.79	2,047.09	735.38	...
	<i>From Goldfield generally :-</i>													
	Sundry Parcels treated at:													
		...	Associated Northern Cyanide Plant	...	...	...	*527.57	272.60	...	...	...	*3,100.97	1,596.92
		...	Black Flag Cyanide Plant	...	...	...	*401.36	...	...	...	...	*1,719.39	...
		...	Golden Arrow Cyanide Plant	...	...	...	*259.01	...	...	...	...	*761.95	...
		...	Minnie Palmer Cyanide Plant	...	...	...	*38.80	...	...	...	...	*38.80	...
		...	Mitchell's Cyanide Plant	...	...	...	*188.72	...	...	...	...	*463.49	...
		...	Pearce's Cyanide Plant	...	...	...	*388.13	...	...	...	...	*571.24	...
		...	Peat's Cyanide Plant	...	...	...	*9.89	...	...	...	...	*18.24	...
		...	Ross's Cyanide Plant	...	...	...	*14.04	...	...	...	...	*14.04	...
		...	Rustand's Cyanide Plant	...	...	...	*37.43	...	...	...	...	*37.43	...
		...	Ora Banda State Battery Cyanide Plant	...	...	...	*1,009.14	...	...	...	72.05	*10,960.80	...
		...	Various Works	...	...	...	...	...	2,275.66	1.24	16,854.02	*35,591.05	278.85
		...	Reported by Banks and Gold Dealers	...	186.88	17.82	10.00	2.79	9,406.75	87.03	48.43	34.35	...	
		...	Totals	...	186.88	587.99	35,330.84	18,135.30	272.60	21,353.25	23,152.77	1,057,522.66	602,936.24	3,783.26

North-East Coolgardie Goldfield.

KANOWNA DISTRICT.

Gindalbi	...	...	Voided leases and sundry claims	...	.98	855.50	282.08	...	...	698.97	46,783.05	41,605.68	38.31
Gordon	1532x	...	Sirdar	...	...	263.00	32.25	...	...	...	461.75	129.27	...
	1534x	...	Star of Gordon	...	...	49.75	50.69	...	...	...	49.75	50.69	...
		...	Voided leases and sundry claims	...	...	8.00	13.37	...	...	767.26	49,674.48	17,447.76	...
Kalpini	...	...	do. do. do.	...	...	42.75	8.03	...	24.70	286.32	14,648.50	7,594.48	.07
Kanowna	1535x	...	Golden Eagle	...	...	22.00	34.90	...	...	...	22.00	34.90	...
		...	Voided leases and sundry claims	...	77.76	384.05	178.56	...	117.82	6,584.92	704,633.12	390,128.52	2,483.74

TABLE II.—Production of Gold and Silver from all sources, etc.—continued.

NORTH-EAST COOLGARDIE GOLDFIELD—continued.

KANOWNA DISTRICT—continued.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1937.					TOTAL PRODUCTION.				
			Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.	Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.
			Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.
Mulgarrie	Voided leases and sundry claims	...	...	...	...	...	1,229·92	8,145·51	4,821·78	...	
Six Mile	do. do. do.	...	7·29	...	...	...	1,634·36	906·25	929·56	...	
		<i>From District generally :—</i>										
		Sundry Parcels treated at :										
		Carlson's Cyanide Plant ...	...	...	...	*275·93	...	...	...	*1,837·51	...
		Beavis's Cyanide Plant ...	...	...	...	*72·95	...	...	...	*111·68	...
		Fox's Cyanide Plant ...	...	...	...	*12·71	...	...	...	*12·71	...
		Job's Cyanide Plant ...	...	...	...	*199·63	...	...	...	*565·81	...
		Various Works ...	...	...	...	...	...	330·42	867·52	158,919·05	149,294·35
		Reported by Banks and Gold Dealers ...	96·08	1·44	...	...	...	105,226·61	34·55	96·25	...
		Totals ...	96·08	87·47	1,625·05	1,161·10	...	105,699·55	12,103·82	984,243·96	614,660·95	

KURNALPI DISTRICT.

Jubilee ...	(444κ) ...	Evelyn Gladys ...	...	...	192·75	29·08	...	...	...	261·75	44·40	...
		Voided leases and sundry claims	...	...	...	...	...	25·57	158·65	2,804·75	1,858·78	...
Kurnalpi ...	445κ ...	Lady Mary ...	...	...	...	4·50	...	...	...	90·00	29·83	...
	(443κ) ...	Old Harriet ...	...	...	...	13·86	...	...	...	976·50	1,107·13	...
		Voided leases and sundry claims	...	162·50	117·00	87·98	...	674·54	3,586·04	6,546·62	4,630·51	6·27
Mulgabbie ...	...	do. do. do.	...	388·28	104·90	456·13	...	6·50	3,067·40	453·85	8,878·76	4·95
		<i>From District generally :—</i>										
		Sundry Parcels treated at :										
		Success Battery ...	...	...	...	3·08	...	...	...	45·00	192·66	...
		Various Works ...	...	...	...	...	...	...	...	56·50	193·15	...
		Reported by Banks and Gold Dealers ...	44·37	...	...	...	...	11,894·29	67·08	...	2·35	...
		Totals ...	44·37	550·78	414·65	594·63	...	12,600·90	6,879·17	11,234·97	16,937·57	11·22

East Coolgardie Goldfield.

EAST COOLGARDIE DISTRICT.

Binduli	5802E	Belle of Kalgoorlie ... ..	...	141.75	14.90	...	...	...	211.75	22.61	...
		Voided leases and sundry claims	...	8.75	5.46	...	...	11.88	3,690.62	1,419.18	...
Boorara	5486E	Olympian ... ..	...	112.75	70.32	...	...	...	416.00	374.55	...
		Voided leases and sundry claims	...	337.75	45.99	...	49	532.84	309,012.39	173,057.48	408.36
Boulder	5630E	Argennum ... ..	...	14.75	4.44	...	...	...	97.25	21.08	...
	5540E, etc. ...	B.A.N.Z. Mines, Ltd. ... ..	...	148.25	52.69	...	...	...	148.25	52.69	...
	5465E	Birthday Gift ... ..	...	136.00	71.36	...	...	...	4,540.64	1,261.51	...
	5690E, (66E) ...	Boulder Perseverance, Ltd. ... ..	...	110,170.68	42,221.10	12,249.78	...	...	1,012,642.65	528,170.82	138,251.18
	(66E)	Prior to transfer to present holders	...	...	...	...	...	...	3,306,942.88	1,841,159.00	203,821.43
	5556E	Brown Hill Extended ... ..	...	73.00	13.94	...	...	...	141.50	25.94	...
	5759E	Forty-five East ... ..	...	138.75	32.43	...	...	...	400.00	157.63	...
	5472E	Golden Key	11.16	22.00	3.91	...	18.27	16.81	169.25	82.64	...
	5521E, etc. ...	Golden Mile Block 45, N.L. ... ..	...	292.75	88.05	...	...	...	621.75	145.88	...
	5586E	Golden Mile Croesus ... ..	...	39.00	11.48	...	...	...	39.00	11.48	...
	(5488E), (5523E)	Golden Mile Croesus Consolidated G.M., N.L.	...	230.00	70.11	...	...	...	459.00	186.68	...
	(5488E)	(New Croesus) ... ..	...	...	...	...	...	1.69	381.00	213.88	...
	5691E, 5409E, 5692E, 5715E, etc.	Gold Mines of Kalgoorlie, Ltd. ... ..	...	30,431.91	16,971.20	3,996.10	...	...	58,918.86	35,578.40	6,547.34
	5691E, 5470E, etc.	Prior to transfer to present holders (Blue Gap leases) ... ..	...	...	...	...	...	542.13	431,944.28	517,789.54	4,844.50
	5517E	(Iron King) ... ..	...	55.00	26.38	...	...	...	87.50	31.03	...
	5408E, 5409E, etc.	(True Blue and Brownhill leases)	...	256.25	87.34	...	...	1.00	4,058.72	4,544.02	...
	5232E, 5502E ...	(North Boulder (Kalgoorlie) G.M., N.L.)	...	2,551.37	1,295.95	...	...	...	5,231.21	3,347.79	...
	5232E, 5502E ...	(New North Boulder leases) ... ..	...	...	...	...	...	...	750.75	322.53	...
	5232E	(Old Bank of England) ... ..	...	...	...	...	...	...	1,200.07	1,006.35	...
	5696E, 5699E, etc.	Great Boulder Proprietary G.M., Limited	...	188,120.00	72,477.89	27,970.28	...	...	5,156,242.36	4,020,422.06	510,263.87
	5478E, 5490E ...	Imperial Gold Mines, Ltd.	3.77	269.25	134.69	...	...	5.22	1,835.75	748.78	...
	5345E, etc. ...	Kalgoorlie Enterprise Mines, Ltd. ... ..	...	3,014.67	1,163.67	130.30	...	...	7,919.64	2,969.50	130.30
	5708E, (15E), etc.	Prior to transfer to present holders	...	...	...	...	...	...	15,320.68	8,957.01	...
		Lake View and Star, Limited ... ..	...	542,330.00	167,271.73	5,238.67	...	...	3,177,905.55	1,235,794.78	83,529.39
		Prior to transfer to present holders	...	...	...	...	...	8.49	15,791,843.88	9,149,047.13	1,348,055.82
	5159E, etc. ...	Lake View South (G.M.K.) Ltd. ... ..	...	689.00	107.46	...	...	...	5,595.88	3,362.36	...
	5513E, etc. ...	Lake View South Extended, N.L. ... ..	...	...	...	...	...	...	656.50	176.67	...
	(5469E)	New Kalgoorlie, N.L. ... ..	...	...	*305.91	...	...	...	375.50	*1,282.76	2.00
	5405E, 5701E, etc.	North Kalgurli (1912), Limited	24.96	140,467.76	55,173.35	16,548.52	...	40.70	678,924.10	259,225.65	23,190.04
	5434E	Prior to transfer to present holders	...	...	...	...	43.99	...	4,018,436.01	2,815,911.21	97,625.03
	5434E	North Kalgoorlie Central Gold, N.L. ... ..	...	333.00	79.77	...	...	...	1,843.25	445.00	...
	5429E, etc. ...	(Hillside) ... ..	...	...	...	...	...	...	675.05	158.46	...
		North Kalgoorlie United Mines, Ltd. ... ..	...	...	...	...	...	...	1,740.76	319.41	...
		Prior to transfer to present holders	...	...	...	...	...	...	131.74	76.74	...
	5539E	Oroya East ... ..	...	...	...	...	...	...	59.25	4.54	...
	5855E	Paringa Junction South ... ..	...	10.75	3.20	...	...	...	10.75	3.20	...
	5782E, 5456E, (392E)	Paringa M. & E. Co., Ltd. ... ..	...	15,305.22	6,998.09	...	...	...	22,762.06	9,996.42	...

TABLE II.—Production of Gold and Silver from all sources, etc.—continued.

EAST COOLGARDIE GOLDFIELD—continued.

EAST COOLGARDIE DISTRICT—continued.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1937.					TOTAL PRODUCTION.				
			Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.	Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.
			Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.
Boulder—continued	5456E ...	(Paringa Extended) ...	...	...	211·75	60·36	...	...	...	4,739·15	1,946·61	...
	(392E) ...	Prior to transfer to present holders	...	...	...	...	...	...	...	43,936·56	20,493·38	...
	1208E, etc. ...	South Kalgurli Consolidated, Ltd. ...	...	...	70,947·00	21,129·70	...	...	...	1,796,109·25	785,876·18	15,071·52
	1208E, etc. ...	Prior to transfer to present holders	...	...	...	...	...	...	...	1,344,254·70	531,792·77	17,722·97
	5466E ...	South Star ...	...	...	115·75	57·55	...	...	...	115·75	57·55	...
	5552E ...	Trafalgar ...	...	...	...	...	...	...	...	12·00	2·40	...
		Voided leases and sundry claims	...	...	910·00	117·84	...	134·48	12,197·86	629,679·33	475,912·61	6·83
Cutter's Luck ...		Sundry claims ...	...	1·59	182·00	27·24	...	...	114·90	597·40	223·04	...
Feysville ...		Voided leases and sundry claims	...	...	16·00	3·28	...	...	260·35	1,369·06	943·94	...
Hampton Plains ...	P.P.L. 9 ...	Celebration G.M. Co., N.L. ...	...	...	21,669·00	3,676·82	...	...	...	61,399·75	15,092·12	...
	P.P.L. 86 ...	Golden Hope, N.L. ...	...	...	5,319·00	1,724·00	...	...	...	5,319·00	1,724·00	...
	P.P.L. 1 ...	Consolidated Gold Areas ...	...	...	162·00	54·65	...	...	...	30,012·53	12,541·79	...
	P.P.4, 252 and 289	Mount Martin ...	...	...	1,039·00	212·15	...	...	...	14,256·00	5,472·47	...
	P.P.L. 279 ...	Mutooroo ...	...	...	1,790·00	368·67	...	...	...	2,976·00	602·54	...
	P.P.L. 277 ...	New Hope ...	...	...	8,325·00	1,707·67	...	...	...	23,857·25	5,404·16	...
		Voided leases ...	...	...	...	...	...	4,565·62	203·94	49,092·69	20,871·27	69·60
		Sundry claims and leases ...	...	...	3,574·56	548·06	...	2·68	24·25	34,476·66	6,733·61	...
Kalgoorlie ...	5455E ...	Argument ...	...	...	295·75	39·42	...	...	24·91	1,690·72	600·38	...
	5735E ...	Bonnie Lass ...	...	...	43·50	15·49	...	...	...	135·00	38·29	...
	5449E, 5739, etc.	Broken Hill Proprietary Co., Ltd. ...	...	...	22,096·00	10,363·27	1,843·28	...	...	84,814·76	36,177·78	1,843·28
	5739E ...	(Golden Star) ...	...	...	378·50	30·96	...	...	...	882·00	91·45	...
	5460E ...	(Kalgoorlie Star) ...	...	...	...	...	...	...	...	145·75	75·36	...
	5531E ...	Cassidy's Hill ...	...	...	...	*116·77	...	...	·79	243·50	135·04	...
	5565E, 5664E, etc.	Charity leases ...	...	...	...	...	...	...	·33	127·75	26·23	...
	5565E ...	(Jolly Bill) ...	...	...	25·25	1·87	...	...	...	35·50	3·64	...
	5838E ...	Corncob ...	...	...	14·75	2·95	...	...	...	14·75	2·95	...
	(5719E), (5720E)	Fair Play & Golden Group, N.L. ...	...	...	76·00	12·83	...	...	...	436·50	70·81	...
	5510E ...	Golden Dream ...	...	...	...	...	...	...	...	361·74	103·34	...
	5737E ...	Golden Mile Channel ...	...	·97	561·00	40·52	...	...	·97	1,428·25	105·98	...
	5512E ...	Golden Mile North ...	...	...	86·50	7·87	...	...	...	392·75	79·78	...
	5684E ...	Green Goddess ...	...	...	74·75	5·68	...	...	...	101·50	13·86	...
	5519E ...	Hannan's Enterprise ...	...	...	...	...	...	...	...	362·00	79·80	...
	4547E, 4548E ...	Hannan's Hill Amalgamated, N.L. ...	...	...	506·00	95·63	...	...	...	695·75	198·84	...
	4547E, 4548E ...	Prior to transfer to present holders	...	...	...	...	...	...	5·72	47,525·85	13,719·48	...
	5625E ...	Kapai ...	...	...	...	...	...	...	...	281·00	65·75	...

	5530E	Kapai North								120.75	21.63	...
	5528E	Kiora							18.97	53.50	37.07	...
	5549E	Maritana Hill								381.50	42.12	...
	5437E, (5736E)	North End Extended	45.40	67.25	9.95				312.23	151.55	249.42	...
	5852E	Pedestal		73.00	45.08					73.00	45.08	...
	5468E	Phar Lap		33.00	29.85					302.50	253.73	...
	5415E	Return	5.42	250.00	28.15			5.64	2,290.25	336.86	...	
	5716E	Two B's		96.77	40.07					121.02	47.64	...
		Voided leases and sundry claims	.55	339.75	34.95		474.89	10,336.31	1,014,064.87	418,190.32	44,017.12	...
Wombola	5740E	Big Bull		37.33	329.24					121.08	732.83	...
	5688E	Caledonian		228.25	131.05					376.75	307.04	...
	5798E	Capitol		167.50	84.03					216.75	109.93	...
	5497E	Daisy		292.00	427.66					664.75	1,525.25	...
	5689E	Haoma		575.25	173.18					914.75	807.00	...
	5500E	Happy-go-lucky		56.50	50.30					462.75	497.75	...
	5616E	Leslie		268.25	156.18					519.75	804.76	...
	5829E	Lurgan		204.25	51.10					237.75	73.90	...
	5741E	Maria		168.75	29.53					194.75	47.82	...
	5493E	Milano		383.00	1,058.55				1,438.00	3,430.57	...	
	5734E	M.L.S.		541.25	298.68					996.50	580.26	...
	5850E	Pauline		10.50	43.24					10.50	43.24	...
	4766E	Pericles G.M., Ltd.		18.00	5.29			358.11	4,239.53	19,132.85	...	
	5795E	Transvaal		24.75	11.92					67.75	46.88	...
	5796E	Twenty Grand		213.00	136.80					290.50	210.69	...
	5525E	Xmas Flat		104.25	12.74					306.50	248.41	...
		Voided leases and sundry claims	4.83	2,138.25	671.07			2,255.86	24,664.76	24,858.67	...	
	<i>From District generally:—</i>											
	Sundry Claims						11,014.57	465.61	5,440.46	2,541.10	...	
	Sundry Parcels treated at:											
	Curnow & Broadbent Cyanide Plant				*123.27						*232.26	...
	Golden Horseshoe Cyanide Plant				*15,889.96	2,170.90					*123,058.18	63,141.58
	Gold Recovery Syd. Cyanide Plant				*356.47						*3,766.84	...
	Lakeside Retreatment Plant				*281.99	436.73					*1,256.53	1,277.10
	Mt. Monger Cyanide Plant				*261.44						*261.44	...
	Polkinghorne's Cyanide Plant				*75.47						*75.47	...
	Kalgoorlie State Battery Cyanide Plant			8.75	*1,591.26					8.75	*10,576.39	...
	Various Works				*86.82		384.36	64.70	40,673.27	*255,552.50	12,604.81	
	Reported by Banks and Gold Dealers		285.94	58.06	60.00		15,488.95	9,197.01	103.50	908.53	...	
	Totals		285.94	156.71	1,180,479.02	427,845.71	70,584.56	32,123.30	37,011.32	39,390,288.22	23,467,676.34	2,572,424.07

BULONG DISTRICT.

Balagundi		Voided leases and sundry claims			10.00	3.39		3.51	2,679.52	1,755.69	1,927.96	12.92
Bulong	1305x (1277x), etc. ...	Glenview		54.85	31.75	33.96			54.85	31.75	33.96	...
		Good Hope leases			61.75	14.30				1.80	3,015.00	666.98
		Voided leases and sundry claims	.83	184.34	938.50	221.23		1,763.40	9,935.85	111,779.98	101,023.84	...
Majestic		do. do. do. ... ..		.28	82.25	14.85		62.33	214.58	3,038.74	1,547.42	...
Morelands		Sundry claims ... ..							.13	159.00	53.31	...
Mt. Monger		Voided leases and sundry claims						215.60	2,771.39	1,816.90	1,564.58	...

TABLE II.—Production of Gold and Silver from all sources, etc.—continued.

EAST COOLGARDIE GOLDFIELD—continued.

BULONG DISTRICT—continued.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1937.					TOTAL PRODUCTION.				
			Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.	Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.
			Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.
Randall's ...	...	Voided leases and sundry claims	.25	1.47	20.50	5.75	...	20.70	64.20	34,931.35	11,442.13	...
Taurus ...	...	do. do. do.	...	...	80.75	39.50	...	114.75	55.58	2,877.10	1,688.25	...
Trans Find ...	Loc. 41, 309 ... (1304y) ...	Dawn of Hope ... Mt. Juglah ... Voided leases and sundry claims	...	2.87	120.00	92.07	...	...	2.87	321.00	163.96	...
			...	...	22.00	3.05	...	...	...	22.00	3.05	...
			...	...	50.00	11.28	...	...	5.93	1,638.92	1,170.17	...
		<i>From District generally:—</i>										
		Sundry Parcels treated at:										
		Blair's Cyanide Plant ...	...	...	...	*.28	...	...	...	...	*.28	...
		Davis Cyanide Plant ...	...	...	...	*101.73	...	...	...	...	*104.00	...
		Thompson's Cyanide Plant ...	...	...	...	*26.18	...	...	...	...	*481.70	...
		Various Works ...	...	...	...	...	...	...	...	6,102.15	5,848.25	...
		Reported by Banks and Gold Dealers ...	74.30	...	...	...	...	25,007.57	61.70	.01	4.01	...
		Totals ...	75.38	243.81	1,417.50	567.57	...	27,187.86	15,848.40	167,489.59	127,723.85	12.92

Coolgardie Goldfield.

COOLGARDIE DISTRICT.

Bonnievale ...	4600 ...	Melva Maie ...	...	...	37.00	94.75	...	...	...	1,306.00	2,842.35	...
	4600 ...	(Kunanalling Gold, N.L.) ...	...	...	...	...	...	...	...	614.50	1,099.21	11.63
	5522 ...	Lucky Hit ...	...	...	396.50	174.34	...	...	...	608.50	259.34	...
	5321 ...	Westralia Extended ...	...	...	9.00	4.48	...	...	...	65.50	20.42	...
		Voided leases and sundry claims	...	...	225.70	100.94	...	...	178.28	356,206.77	192,426.99	...
Bulla Bulling ...	...	do. do. do.	...	...	24.00	11.01	...	5.21	15.98	1,930.57	1,160.60	...
Burbanks ...	T.L. No. 3 (63H)	Australian Machinery & Investment Co., Ltd.	...	...	...	*558.18	86.31	...	...	...	*558.18	86.31
	5417 ...	Bernard Frank ...	...	...	...	...	...	...	...	13.00	1.75	...
	5545 ...	Boshter ...	...	...	153.00	90.53	...	...	...	193.00	107.41	...
	5433 ...	Burbanks Deeps ...	...	...	63.00	39.64	...	...	...	63.00	39.64	...
	(5529) ...	Cheapside ...	...	...	50.00	20.19	...	...	...	107.00	36.63	...
	5588 ...	Commonwealth ...	...	...	10.00	9.75	...	...	...	10.00	9.75	...
	(5524) ...	Coronation ...	...	...	85.00	12.90	...	...	...	140.00	23.73	...
	5320 ...	Golden Arch ...	...	...	77.00	12.43	...	...	10.15	496.35	154.58	...
	5473 ...	Grosmont ...	...	...	480.00	90.91	...	...	...	1,040.00	259.11	...
	5382 ...	Ivan ...	...	...	54.00	57.86	...	...	...	148.00	207.93	...

	5263	...	Lord Bobs	...	...	188.00	111.26	...	...	8.59	1,311.00	578.77	...
	5432	...	Main Stay	...	...	...	...	...	1.54	1.10	262.00	103.25	...
	5443	...	New Gift	...	.59	203.00	79.30	...	...	.59	268.00	106.58	...
	5503	...	Royal Standard	...	...	488.50	85.51	...	...	...	768.50	169.46	...
	5250	...	Vice Regal	...	...	398.00	118.85	...	...	1.91	1,709.00	670.18	...
		...	Voided leases and sundry claims	...	...	330.50	146.58	...	64.78	782.30	420,191.71	309,856.43	521.06
Cave Rocks	5553	...	Blue Spec	...	...	381.75	57.10	...	...	...	481.75	70.85	...
		...	Voided leases and sundry claims	...	49.33	258.00	64.55	...	...	49.33	2,416.50	507.11	...
Coolgardie	(5556)	...	Australasia	...	...	17.00	9.88	...	...	...	17.00	9.88	...
	(5508)	...	Booloroo	...	...	18.00	2.52	...	...	...	154.00	17.13	...
	5557	...	Caledonia	...	...	265.00	102.34	...	...	...	265.00	102.34	...
	(5560)	...	Cleopatra	...	2.74	40.00	7.32	...	...	2.74	40.00	7.32	...
	5297, etc.	...	Consolidated Gold Mines of Coolgardie, Ltd.	...	...	...	...	...	...	...	75.00	22.92	...
	5297, etc.	...	Prior to transfer to present holders	...	...	...	...	...	...	4.55	1,946.35	547.45	3.22
	(5390)	...	Garden Gully	...	...	20.00	2.20	...	...	...	111.00	12.28	...
	5585	...	Gleasons	...	...	45.00	18.21	...	...	...	45.00	18.21	...
	5468	...	Golden Queen	...	...	1,023.00	568.97	...	...	...	1,190.00	749.10	...
	5218	...	Great Western	...	...	...	...	...	...	...	99.30	613.20	...
	5577	...	Iron Duke	...	...	42.00	42.12	...	...	...	42.00	42.12	...
	(5465)	...	Keystone	...	...	18.00	1.89	...	...	...	125.50	17.66	...
	5571	...	Lady Grace	...	...	264.00	94.44	...	...	...	264.00	94.44	...
	5277	...	Lady Theresa	...	...	24.00	26.46	...	...	...	216.00	205.11	...
	5384	...	Lindsay's Gold Mine	...	...	...	...	...	...	...	116.00	45.82	...
	5579	...	Manolive	...	...	13.50	101.83	...	...	...	13.50	101.83	...
	5269	...	Master Key G.M.	...	...	125.00	9.78	...	...	...	363.50	51.64	...
	5578	...	Once More	...	...	30.00	3.02	...	...	...	30.00	3.02	...
	5256, 5309, etc.	...	Phoenix Gold Mines, Ltd.	...	...	...	...	...	...	...	...	...	...
	5256, 5309, etc.	...	Prior to transfer to present holders	...	...	...	...	...	...	2.74	167.56	237.80	...
	5225	...	Queen Extended	...	...	81.00	11.61	...	...	63.83	714.15	297.76	...
	5407	...	Rose Hill United	...	...	118.50	24.02	...	...	...	170.50	29.87	...
	5523	...	Rose of Erin	...	...	48.00	13.40	...	...	...	48.00	13.40	...
	5573	...	Teri-Bus	...	...	206.50	14.90	...	...	...	206.50	14.90	...
		...	Voided leases and sundry claims	...	11.45	147.23	1,091.50	509.79	1,498.20	6,887.51	618,129.76	344,457.60	.96
Eundynie	5509	...	Brilliant	...	...	160.00	30.08	...	...	...	217.50	57.67	...
	5287	...	Eundynie	...	.94	627.00	318.99	...	.92	11.79	1,269.25	1,197.16	...
		...	Voided leases and sundry claims	...	...	47.00	9.27	...	...	10.18	30,470.64	15,287.65	1.75
Gibraltar	5217	...	Lloyd George	...	...	606.00	191.51	...	...	14.69	2,902.88	2,322.76	...
		...	Voided leases and sundry claims	...	...	139.00	42.78	...	...	66.04	34,389.95	17,561.84	...
Gnarlbine	(5485)	...	Great Gnarlbine	...	2.01	...	1.03	...	...	3.01	127.50	65.58	...
	5574	...	Phaeton	...	...	93.50	32.42	...	...	...	93.50	32.42	...
		...	Voided leases and sundry claims	...	...	173.00	94.19	...	...	15.84	2,636.35	1,466.85	...
Hampton Plains	P.P.L. 119	...	Golden Eagle	...	...	183.00	119.59	...	...	7.63	1,255.09	1,787.74	...
		...	Voided leases and sundry claims	...	118.87	23.00	24.10	...	...	525.52	9,285.50	8,056.32	...
Higginsville	5444	...	Daughter of Erin	...	...	918.00	1,142.07	...	...	...	1,382.25	1,558.46	...
	5387	...	Erin Extended Gold Mine	...	...	59.50	9.44	...	...	...	59.50	9.44	...
	5496	...	Sons of Erin	...	...	160.00	26.56	...	...	...	881.00	147.22	...
	5272	...	Sugar Gum	...	...	2,062.00	155.80	...	...	...	2,726.50	275.59	...
	5293, etc.	...	Two Boys	...	...	1,330.00	757.40	...	...	...	5,035.00	2,564.58	...
		...	Voided leases and sundry claims	...	...	212.00	40.79	...	...	328.08	35,276.43	16,323.56	134.79

TABLE II.—Production of Gold and Silver from all sources, etc.—continued.

COOLGARDIE GOLDFIELD—continued.

COOLGARDIE DISTRICT—continued.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1937.					TOTAL PRODUCTION.				
			Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.	Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.
			Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.
Larkinville ...	5365 ...	Green Linnet ...	...	...	11.25	3.49	...	...	...	11.25	3.49	...
	5236 ...	Ground Lark ...	...	...	239.00	267.85	...	...	3.87	1,706.91	2,974.99	...
		Voided leases and sundry claims	...	1.34	...	...	...	22.77	60.72	186.00	239.17	...
Logan's Find ...	5200, etc. ...	Crescent Gold Mines, Ltd. ...	...	...	173.25	56.88	...	...	...	173.25	56.88	...
	5200, etc. ...	Prior to transfer to present holders	...	...	...	...	...	...	...	468.06	379.16	...
	5561 ...	Frankson ...	...	...	346.00	44.25	...	...	...	346.00	44.25	...
	5552 ...	Groper ...	...	...	9.00	4.53	...	...	...	9.00	4.53	...
	5324 ...	Spargo's Reward G.M. (1935), N.L. ...	...	...	2,513.00	260.77	...	...	...	3,035.00	460.75	...
	Voided leases and sundry claims	...	...	109.40	21.83	...	...	9.41	1,059.90	519.42	...	
Londonderry ...	5402 ...	Christmas Box ...	...	...	509.50	376.76	...	...	1.37	1,969.50	1,948.99	...
		Voided leases and sundry claims	...	...	47.50	50.55	...	...	53.22	30,015.52	20,717.78	...
Mungari ...		do. do. do. ...	...	...	72.25	21.80	...	1.77	125.53	1,471.51	637.37	...
Paris ...	5311, etc. ...	Lister's C.M. ...	...	...	1,011.00	580.49	...	...	...	2,752.00	1,463.41	...
	5514 ...	Paris ...	...	...	50.00	21.63	...	...	...	97.00	37.59	...
	5530 ...	Paris Extended ...	...	...	341.00	160.13	...	...	...	397.00	184.43	...
	5500, etc. ...	Saltbush ...	...	...	...	...	...	...	...	113.00	24.16	...
		Voided leases and sundry claims	...	...	52.00	13.30	...	...	4.30	1,993.25	493.31	...
Red Hill ...		do. do. do. ...	10.86	4.85	97.00	38.41	...	15.29	1,631.59	42,059.17	31,720.88	...
Ryan's Find ...		do. do. do. ...	...	...	...	...	...	.44	155.85	380.35	...	
St. Ives ...	(5195), etc. ...	Clifton leases ...	...	...	678.00	309.18	...	...	...	2,462.25	963.61	...
	(5195), etc. ...	Prior to transfer to present holders	...	...	...	...	...	...	...	7,244.40	3,565.36	...
	5406 ...	Idough ...	7.27	1.56	...	.93	...	7.27	43.60	838.75	202.40	...
	4720, etc. ...	Ives Reward Gold Mines, N.L. ...	...	...	...	.64	...	...	...	19,511.66	6,079.18	...
	4720, etc. ...	(Lake View Reward leases)	...	...	...	...	...	...	...	883.25	544.64	...
	(5487) ...	Victory ...	...	...	72.75	20.79	...	...	...	241.75	47.19	...
	Voided leases and sundry claims	...	...	40.75	25.38	...	265.88	992.69	9,117.56	4,999.09	...	
Wannaway ...	(5506) ...	Argyle ...	...	...	10.00	8.38	...	...	...	35.00	13.11	...
		Voided leases and sundry claims	...	...	27.25	15.69	...	...	186.20	2,293.02	1,932.11	...
Widgiemooltha ...	(5294) ...	Aussie ...	...	5.45	28.00	4.07	...	...	157.35	170.05	231.44	...
	5332 ...	Banquet ...	...	...	44.75	31.80	...	...	20.74	262.75	202.95	...
	5576 ...	Cardiff Castle ...	...	...	59.00	5.28	...	...	...	59.00	5.28	...

5451	...	Host Group	...	...	55.00	12.48	...	...	...	55.00	12.48	...
5319	...	Imperial	...	...	579.00	68.52	...	...	...	2,496.50	465.71	...
		Voided leases and sundry claims	...	10.00	731.25	136.07	...	54.02	1,291.14	23,292.01	13,746.64	17	
<i>From District generally :-</i>													
Sundry Parcels treated at :													
		Coolgardie State Battery Cyanide Plant	...	...	...	*1,269.54	...	...	...	771.01	*25,327.28	9.65
		Saltbush Cyanide Plant	...	...	...	*77.64	...	...	...	...	*77.64	...
		Imperial Battery Cyanide Plant	...	...	...	*19.22	...	...	...	26.00	*329.35	...
		State Battery, St. Ives Cyanide Plant	...	...	...	...	...	...	...	60.50	*1,920.03	...
		Parry's Cyanide Plant	...	...	...	*224.62	...	...	...	...	*494.47	...
		A. Collins Cyanide Plant (Burbanks)	...	...	...	*19.77	...	...	...	...	*19.77	...
		A. Collins Cyanide Plant (Coolgardie)	...	...	...	*416.26	...	...	...	...	*1,013.51	...
		T. E. James Cyanide Plant	...	...	...	*123.18	...	...	...	...	*123.18	...
		C. B. Frank Cyanide Plant	...	...	...	*136.90	...	...	...	...	*141.49	...
		H. A. Frank Cyanide Plant	...	...	...	*267.58	...	...	...	...	*357.08	...
		Widgiemooltha Cyanide Plant	...	...	...	*143.99	...	...	...	...	*511.25	...
		Ives Reward Cyanide Plant	...	...	...	...	...	...	...	...	*479.05	...
		Various Works	...	...	...	...	...	7.75	...	3,811.11	*18,679.35	223.06
		Reported by Banks and Gold Dealers	...	331.47	10.77	...	1.07	...	13,785.67	695.28	38.25	...	
		Totals	...	361.05	355.68	22,101.85	11,763.43	86.31	15,731.07	14,269.83	1,704,598.10	1,072,526.95	992.60

KUNANALLING DISTRICT.

Carbine	(952s)	Abundance	...	...	185.00	10.38	...	...	...	185.00	10.38	...
	(922s)	Bower Bird	...	...	85.00	3.00	...	...	...	288.00	43.58	...
	(33s), 970s	Carbine	...	...	...	...	...	...	...	9,037.00	4,764.34	...
	(33s), 970s, etc.	Carbine leases	...	...	...	...	...	687.98	51,991.86	39,862.25	...	
	917s	Homeward Bound	...	...	433.00	56.29	...	...	...	1,775.50	279.75	...
	(935s)	Providence	...	...	586.00	73.21	...	...	...	1,293.50	207.59	...
	978s	Wotan	...	...	51.00	52.35	...	...	...	51.00	52.35	...
		Voided leases and sundry claims	...	...	1,388.75	236.28	...	136.08	89.66	7,809.93	4,720.44	...
Chadwin	958s	Argosy	...	...	125.25	201.09	...	...	...	446.25	556.34	...
		Voided leases and sundry claims	...	...	264.00	121.96	...	6.31	38.25	4,049.30	4,342.65	2.50
Dunnsville	982s	Min Min Light	...	476.52	21.00	397.14	...	...	476.52	21.00	397.14	...
	983s	Neta	...	...	22.50	22.07	...	...	...	22.50	22.07	...
		Voided leases and sundry claims	...	688.18	179.66	289.69	...	2.82	1,048.23	18,839.46	9,274.40	...
Jourdie Hills		do. do. do.	...	...	64.00	29.37	...	1.86	55.52	29,484.99	20,149.03	28.45
Kintore	902s	New Haven	...	...	312.50	76.54	...	...	...	1,011.25	372.95	...
	979s	Newminister	...	...	199.00	105.51	...	...	...	199.00	105.51	...
	(981s)	Robbin	...	20.65	23.00	5.38	...	...	20.65	23.00	5.38	...
		Voided leases and sundry claims	...	77	399.25	100.74	...	118.57	234.56	46,883.02	33,805.32	...
Kundana		do. do. do.	...	...	...	...	...	...	503.50	77.86	...	
Kunanalling	928s	Gouldburn	...	...	...	...	...	...	...	169.00	44.93	...
	914s	Kioro	...	...	1,347.00	458.89	...	...	...	5,136.00	1,753.63	...
	903s, etc.	Kunanalling Gold, N.L.	...	...	2,006.00	1,331.03	...	...	...	5,596.50	4,780.63	...
	903s, etc.	Prior to transfer to present holders	...	...	...	...	...	...	...	690.00	850.41	12.78
	984s	Last Chance	...	...	13.00	42.20	...	...	...	13.00	42.20	...
913s	New Australia	...	...	...	...	...	...	...	2,946.19	1,730.36	8.86	

TABLE II.—Production of Gold and Silver from all sources, etc.—continued.

COOLGARDIE GOLDFIELD—continued.

KUNANALLING DISTRICT—continued.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1937.					TOTAL PRODUCTION.					
			Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.	Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.	
			Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.	
Kunanalling—contd.	977s	Peter Pan ... ..	...	...	76.00	135.83	...	...	...	108.00	191.15	...
	980s	Pinkus ... ..	...	3.11	...	...	...	3.11	...	...	...	...
	934s	Premier Gold Mine	9.28	...	...	...	...	53.23	...	...	...	...
	645s	Star of Fremantle ... ..	...	...	...	...	...	32.67	...	5,625.50	4,258.88	...
	945s	Sydney Mint ... ..	...	13.51	1,118.50	158.35	...	...	13.51	1,419.50	277.62	...
		Voided leases and sundry claims	2.94	5.81	415.41	213.01	...	214.62	2,474.99	111,472.04	89,352.90	18.84	...
		<i>From District generally:—</i>											
		Sundry Parcels treated at:											
		Barnfield's Cyanide Plant	11.00	*95.20	11.00	*95.20
		Various Works	42.23	...	1,771.26	4,966.13
	Reported by Banks and Gold Dealers ... ..	...	82.08	8.96	...	...	725.24	16.89	...	2.38	...	...
	Totals		94.30	1,217.51	9,325.82	4,215.51	...	1,333.63	5,159.87	308,873.05	227,395.75	71.43	

Yilgarn Goldfield.

Blackborne's ... ..	...	Voided leases and sundry claims	...	...	41.00	5.82	...	...	...	1,609.00	413.94	...
Bullfinch	3345	Copperhead ... ..	...	...	518.00	156.59	...	...	...	4,799.32	1,453.73	...
	3378	Copperhead Deeps ... ..	...	...	2,186.15	576.01	...	...	...	8,348.65	3,035.35	...
	3337, 3458	Easter Gift Leases ... ..	...	...	865.00	297.89	...	...	...	1,022.00	341.50	...
	3337, 3458	Prior to transfer to present holders	...	...	...	...	...	...	48.03	3,594.26	1,169.82	...
	3400	Frances May ... ..	...	...	926.05	388.13	...	...	7.74	7,348.05	3,046.62	...
	3397	Goldfinch ... ..	...	...	1,178.00	520.12	...	...	6.73	4,322.53	2,160.15	...
	(3839)	Gordon ... ..	...	...	16.50	14.08	...	...	...	16.50	14.08	...
	3753	Lady Agnes ... ..	...	...	130.00	57.38	...	...	...	236.00	129.33	...
	3812	Little Hill ... ..	...	...	19.00	27.16	...	...	...	27.00	45.96	...
	3825	Mistletoe ... ..	...	...	506.00	299.20	...	...	...	596.00	347.53	...
	3709	Peter Pan ... ..	...	...	29.50	27.15	...	...	...	64.50	77.95	...
	10PP	Reynold's Find ... ..	...	...	256.00	92.40	...	...	...	536.25	301.31	...
	3350	Rising Sun ... ..	...	2.30	1,089.50	1,027.01	...	...	2.30	6,843.03	4,626.65	...
	(3838)	Star of Hope ... ..	...	...	20.00	10.02	...	...	...	32.00	15.45	...
	3451	Volcano ... ..	...	...	92.50	108.57	...	...	5.34	367.50	469.68	...
	Voided leases and sundry claims	...	...	365.00	183.15	...	7.48	30.84	487,498.82	182,704.05	27,833.41	...
Corinthian	34PP	Badaglo ... ..	...	...	150.00	233.62	...	...	...	150.00	233.62	...
	3398	Corinthian ... ..	...	...	1,698.00	535.64	...	...	...	6,655.75	2,255.12	...
	3425	Corinthian North ... ..	...	...	462.00	137.62	...	...	...	2,447.00	1,135.69	...

	3415	Deliverence	103.00	38.54			952.10	1,602.69		
		Voided leases and sundry claims	49.00	32.33		.68	135,492.85	29,862.82		
Eenuin	3871	Eenuin Daisy	22.00	17.52			22.00	17.52		
	(3841)	Hill End	31.00	17.22			31.00	17.22		
	3787	Morning Glory					52.00	116.97		
		Voided leases and sundry claims	147.50	123.39		9.39	1,771.66	1,648.37		
Forresteria		do. do. do.					1,512.00	413.10		
Golden Valley	(3847)	Bondsman	22.50	12.40			22.50	12.40		
	(3763)	Great Willow	115.00	65.11			330.00	225.95		
	(3811)	Kathleen	10.00	2.69			70.00	23.30		
	3843	Marguerite	58.00	70.34			58.00	70.34		
	3768	North Radio No. 1	51.00	66.73			157.00	288.82		
	3822	Queen Marie	12.00	9.43			77.00	72.01		
	3248, etc.	Radio Deeps leases	888.00	613.31			4,019.58	5,603.89		
	2994, etc.	Radio leases	829.00	1,286.70		2.70	11,820.30	32,466.34	7.43	
	3855	Southern Queen	113.50	75.32			113.50	75.32		
		Voided leases and sundry claims	3.18	241.50		4.58	81.53	14,601.11	13,670.12	2.00
Greenmount	3525	Transvaal North					129.00	31.57		
		Voided leases and sundry claims				46.45	25.89	126,089.72	32,011.38	944.50
Holleton	3428	Holleton	200.00	127.05			1,009.25	439.30		
	3312	North End leases					38,210.50	11,660.54		
		Voided leases and sundry claims	367.00	95.37		13.08	3,590.55	1,184.19	31.79	
Hope's Hill	(3419), etc.	Cora's Mine		*165.08			955.00	376.71		
	(3406)	Hill View	186.00	22.17			264.00	47.68		
	3414	Pilot	2,895.00	401.13			10,065.00	1,841.84		
		Voided leases and sundry claims	.86	113.00		5.04	107.13	134,281.07	37,066.68	1.00
Kennyville	3667	Battler Gold Mine	1,916.00	510.97			3,478.00	898.16		
	3766	Golden Arrow		11.77			136.00	50.04		
	3432, etc.	Leviathan Amalgamated G.Ms., Ltd.	159.00	101.32			6,471.50	2,620.33		
	3845	Rainbow	118.00	17.03			118.00	17.03		
	(3830)	Victoria	1,270.00	218.58			1,270.00	218.58		
	(3831)	Vinto-La	79.00	9.28			79.00	9.28		
		Voided leases and sundry claims		339.50		23.82	39,639.63	17,211.34	.59	
Koolyanobbing	3514	Chadwick's Reward	404.55	178.71			874.05	453.67		
		Voided leases and sundry claims		14.00		.26	1,084.00	568.97		
Marvel Loch	(3393)	Bohemia	1,324.00	476.14			3,294.00	1,589.86		
	3675	Christmas Gift	75.00	82.45		59.31	399.50	616.42		
	13PP	Cricket	130.00	27.06			1,241.00	748.65		
	11PP	Edward's Reward	280.00	195.39			2,080.00	2,016.32		
	3515	(Election)					240.00	30.94		
	3899	Eveless Eden	45.00	24.72			45.00	24.72		
	3512	Evelyn Molly	771.00	157.03			3,391.00	777.33		
	3541	Four Threes	84.00	107.74		2.18	350.50	698.97		
	3724	Frances Firness	991.00	539.81			1,634.00	1,305.97		
	3824	Ganymedes	571.00	397.90		1.24	661.00	493.79		
	3683	Golden Cube	306.00	202.35		12.65	346.00	205.40		
	3707	Grand National	693.00	114.68			2,883.00	497.44		
	3832	Ireland	116.00	12.60			170.00	18.95		
	3431	Lenodo	679.00	121.25			1,185.00	240.27		

TABLE II.—Production of Gold and Silver from all sources, etc.—continued.

YILGARN GOLDFIELD—continued.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1937.					TOTAL PRODUCTION.				
			Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.	Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.
			Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.
Marvel Loch—contd.	3431	(Jacoletti G.M. & Battery Co., Ltd.) ...	...	...	...	...	...	996·00	169·64	...
	3542	Jacoletti South ... ..	...	...	234·00	27·59	...	705·00	87·43	·14
	3781	Jacoletti West ... ..	...	...	60·00	8·03	...	60·00	8·03	...
	3394	(Iron Channel) ... ..	...	...	...	...	...	1,185·00	197·25	...
	3828	Jester ... ..	...	·97	85·00	24·94	...	139·00	46·75	...	
	3390	(Just in Time) ... ..	...	...	...	...	...	1,180·00	215·95	...
	3718	Kurrajong ... ..	...	...	1,125·00	580·14	...	1,613·00	866·83	...
	3434	Lady Gladys ... ..	...	...	320·00	45·14	...	1,651·00	600·28	...
	33pp	Lady Luck ... ..	...	...	99·00	67·62	...	134·00	74·68	...
	24pp	Lady Mary ... ..	...	...	22·00	23·80	...	231·00	134·91	...
	3413	Marvel Loch ... ..	...	...	607·00	109·75	...	1,216·00	248·98	...
	3423, etc.	Marvel Loch Gold Development, N.L.	...	...	38,798·00	5,541·87	707·06	71,806·00	10,553·96	961·92
	3423, etc.	Prior to transfer to present holders	...	...	...	...	...	1,185·00	215·67	...
	3856	Marvel Loch North ... ..	...	...	349·00	48·16	...	349·00	48·16	...
	3837	Maydo ... ..	...	...	27·00	15·90	...	71·00	34·59	...
	3459	May Queen ... ..	...	...	50·00	81·62	...	1,335·00	4,048·02	...
	3840	Midas ... ..	...	...	38·00	50·06	...	38·00	50·06	...
	3835	Mountain King ... ..	...	...	265·00	168·89	...	285·00	188·22	...
	3861	Mountain Queen ... ..	...	...	140·00	57·85	...	140·00	57·85	...
	3866	Mountain Queen Extended ... ..	...	...	118·00	15·16	...	118·00	15·16	...
	3846	Mountain Queen South ... ..	...	...	536·00	366·63	...	536·00	366·63	...
	3491	New Democrat ... ..	...	...	103·00	134·02	...	165·00	152·12	...
	3404, etc.	New Yilgarn G.M., N.L.	...	...	222·00	49·33	...	222·00	49·33	...
	3404, etc.	Prior to transfer to present holders	...	...	572·00	189·12	8·24	2,302·30	1,309·21	95·53
	3456	(Newry) ... ..	...	...	...	...	...	70·00	15·46	...
	3468	Prince George ... ..	...	...	...	...	...	1,409·00	117·84	...
	(3690)	Pro Patria ... ..	...	...	47·00	8·31	...	47·00	8·31	...
	(3690)	(Pro Patria Gold Mines, Ltd.) ... ..	...	...	...	...	...	88·00	16·64	...
	3382	Salvation ... ..	...	...	415·00	145·57	...	1,454·00	1,136·77	...
	12pp	Sunshine ... ..	...	...	1,195·00	645·19	...	3,396·00	1,669·65	...
	3816	Watsonia ... ..	...	...	201·00	38·19	...	302·00	73·86	...
		Voided leases and sundry claims	·19	...	1,454·05	393·19	...	11·35	215·23	505,336·70	152,693·21	773·44
Mt. Jackson	3860	Allen's Find	28·22	186·00	191·34	28·22	186·00	191·34	...
	3895	Blue Peter ... ..	...	...	675·00	136·34	...	675·00	136·34	...
	3449	Die Hardie ... ..	...	...	24·00	19·07	...	312·00	248·20	...
	(3803)	Glen Esk ... ..	...	...	12·00	6·58	...	12·00	6·58	...
	3857	Golden Reef ... ..	...	...	54·00	76·32	...	54·00	76·32	...
	3859	Great Unknown ... ..	...	...	204·00	51·49	...	204·00	51·49	...
	3889	Lake Barlee ... ..	...	...	25·00	7·88	...	25·00	7·88	...
	3418, etc.	Mt. Jackson Gold Mines, N.L.	...	...	2,013·00	1,579·08	...	5,333·00	5,622·35	...
	3418	(Clamps Central) ... ..	...	...	...	...	...	40·00	182·57	...

	3893 ...	Trump ...			26.00	21.23				26.00	21.23	
	3821 ...	Mt. Jumbo ...			774.00	175.64				1,245.00	392.37	
	(3804) ...	North Yilgarn ...			54.50	59.96				612.50	261.46	
	(3844) ...	West Wickham ...			94.50	30.94				94.50	30.94	
		Voided leases and sundry claims		.41	1,828.00	673.36		6.44	167.75	47,433.38	32,474.29	2,306.02
Mt. Palmer	3544, etc.	Yellowdine Gold Development, Ltd.			48,894.50	40,061.39				75,944.50	52,903.14	
	3544, etc.	Prior to transfer to present holders								1,564.65	2,540.71	
		Voided leases and sundry claims		57.86	21.00	6.77		1,643.48	7.50	335.00	343.62	
Mt. Rankin	3555 ...	No Trumps ...			195.00	66.55				900.50	197.91	
		Voided leases and sundry claims			6.00	3.09		3.84	5.20	987.00	239.76	
Parker's Range	(3716) ...	Black Cat ...			14.00	9.48				87.00	199.69	
	3801 ...	Blue Hills ...			15.00	3.44				65.00	14.09	
	3520 ...	Centenary ...			105.00	198.69				341.00	272.94	
	3854 ...	Cinderella ...		.42	132.75	28.07		.42		132.75	28.07	
	(3823) ...	Cinderella ...			40.00	15.37				214.00	49.44	
	3411 ...	Constance Una ...								306.25	489.04	
	3401 ...	Dulcie Jean ...			29.00	17.36				384.50	340.86	
	3460 ...	Fortuna lease ...			310.00	119.40				804.00	216.99	
	3873 ...	Golden Lighthouse ...			18.00	9.75				18.00	9.75	
	3872 ...	Golden Venture ...			15.00	18.07				15.00	18.07	
	3779 ...	Janetta ...			89.00	58.84				124.00	137.91	
	(3827) ...	L.S.D. ...			70.00	14.35				308.00	58.85	
	(3849) ...	Miner's Dream ...			18.00	31.34				18.00	31.34	
	3671 ...	Mundy Hills 1 ...			75.00	14.65				367.00	85.50	
	3452 ...	Pomeranian ...			160.00	92.65				1,245.00	729.74	
	2801 ...	Scots Greys ...			9.00	3.71				1,677.00	602.00	
	(3384) ...	Snowdrop ...			34.00	15.85				101.00	56.87	
	3858 ...	Snowdrop ...			250.00	109.16				250.00	109.16	
	3702, etc.	Southern Cross Options Co., Ltd.			188.00	38.31				188.00	38.31	
	3702 ...	(New Hope) ...								209.00	48.91	
	3815 ...	Spring Hill No. 5 ...			914.00	190.31				1,213.00	242.66	
	3813 ...	Spring Hill No. 6 ...			1,175.00	249.51				1,615.00	373.54	.45
	(3814) ...	Spring Hill No. 7 ...			8.00	2.65				21.00	12.40	
	3818 ...	Triumph ...			279.00	49.53				334.00	61.76	
	(3540) ...	White Horseshoe ...			45.00	7.95				130.00	38.73	
		Voided leases and sundry claims		1.20	.56	1,044.00	338.02	6.59	111.85	42,964.00	23,307.47	.04
Southern Cross	3568, etc.	Nil Desperandum ...			222.00	73.34				376.00	115.57	
	3473 ...	Queen Ann ...			382.50	77.80				1,105.50	205.30	
	3770, etc.	Southern Cross United Mines, Ltd.			10,120.00	819.72				10,407.50	890.79	
	(3802) ...	Tarcoola ...			10.00	1.83				49.00	12.19	
	(3637) ...	Tarcoola North ...			105.50	25.69				176.50	44.11	
	3444, (3526)	Yellowdine Gold Options, N.L.			270.00	498.71				5,494.25	1,411.54	
	3444 ...	(Three Boys) ...								398.50	224.35	
		Voided leases and sundry claims		.13	1.87	259.50	44.56	22.97	889.34	440,699.29	214,539.48	364.41
Westonia	3556 ...	Contemptible ...			16.75	13.15				73.25	58.74	
	3308, etc.	Edna May (W.A.) Amalgamated G.Ms., N.L.			4,460.00	1,470.89	62.17			4,460.00	1,470.89	62.17
	3308, etc.	Prior to transfer to present holders								4,092.00	2,867.26	
	(3388) ...	Les Trios ...			93.00	24.30				561.25	178.22	
	(3797) ...	Westonia ...			21.25	11.21				145.75	47.14	
		Voided leases and sundry claims			68.00	25.06		9.51	64.46	447,178.59	316,126.78	21.78

TABLE II.—Production of Gold and Silver from all sources, etc.—continued.

YILGARN GOLDFIELD—continued.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1937.					TOTAL PRODUCTION.				
			Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.	Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.
			Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.
<i>From Goldfield generally:—</i>												
Sundry Parcels treated at:												
		Battler Cyanide Plant ... ..	...	...	...	*232·08	...	...	...	...	*232·08	...
		Butcher Bird Cyanide Plant ... ..	...	...	...	*281·89	...	...	...	...	*1,918·30	...
		Copperhead Cyanide Plant ... ..	...	...	...	*1,878·92	...	...	...	...	*8,880·93	...
		Dulcie Jean Cyanide Plant ... ..	...	...	...	...	...	...	...	...	*59·11	...
		Golden Arrow Cyanide Plant ... ..	...	...	...	*211·90	...	...	...	...	*241·08	...
		Howlett's Battery and Cyanide Plant ... ..	...	...	...	*1,398·44	...	...	110·00	...	*8,247·00	...
		Ivermay Cyanide Plant ... ..	...	...	...	*18·91	...	...	...	...	*18·91	...
		Mt. Jackson Cyanide Plant ... ..	...	...	...	*145·50	...	...	...	...	*773·40	...
		North End Cyanide Plant ... ..	...	...	...	*287·91	...	...	...	...	*2,105·44	...
		Passmore's Cyanide Plant ... ..	...	...	...	*63·73	...	...	...	...	*369·52	...
		Pilot Cyanide Plant ... ..	...	...	...	*567·18	...	...	...	...	*2,611·83	...
		Radio Deeps Cyanide Plant ... ..	...	...	...	*317·74	...	...	...	...	*671·05	...
		Scots Greys Cyanide Plant ... ..	...	...	...	*122·26	...	...	...	...	*678·03	...
		Southern Cross Cyanide Plant ... ..	...	...	...	*259·42	...	...	...	...	*430·08	...
		Sunshine Cyanide Plant ... ..	...	...	...	*154·28	...	...	...	...	*264·75	...
		Triumph Cyanide Plant ... ..	...	...	...	*282·06	...	...	...	...	*344·29	...
		L. C. Wesley Cyanide Plant ... ..	...	...	...	*106·93	...	...	...	...	*106·93	...
		Various Works ... ..	...	...	...	...	...	...	156·78	...	48,407·30	36·54
		Reported by Banks and Gold Dealers	5·10	2·86	...	...	...	282·45	54·71	...	4·89	...
		Totals	64·90	115·76	150,647·55	74,749·01	777·47	2,050·86	1,985·81	2,797,645·72	1,319,668·35	33,443·16

Dundas Goldfield.

Buldania ... ..	...	Voided leases and sundry claims ... ..	...	...	38·75	4·53	...	...	39·55	1,652·32	1,426·09	...
Dundas ... ..	...	do. do. do. ... ..	...	...	34·00	15·47	...	...	389·82	5,443·98	2,668·84	...
Norseman	1488	Abbotshall ... ..	...	...	...	...	...	...	...	234·50	41·59	...
	1382, etc.	Blue Bird Gold Mines, N.L. ... ..	...	...	593·00	1,948·06	...	...	...	593·00	1,948·06	...
	1382, etc.	Prior to transfer to present holders ... ..	...	...	...	...	...	...	...	651·25	1,141·90	...
	(1485)	Break O'day ... ..	...	...	9·50	4·92	...	...	...	9·50	4·92	...
	1319, etc.	Central Norseman Gold Corporation, N.L. ... ..	...	...	48,896·75	12,784·94	40,334·21	...	...	69,199·75	18,625·15	56,819·59
	1319, etc.	Prior to transfer to present holders ... ..	...	...	...	...	...	...	...	16,382·71	13,939·02	2,049·45
	1490	Commercial Gold Mine ... ..	...	...	48·75	14·74	...	...	...	83·25	23·47	...
	1452	Cumberland Central ... ..	...	...	48·00	4·90	...	...	...	221·75	59·44	...
	1462	Cumberland Central West ... ..	...	...	...	...	...	...	...	118·00	36·75	...
	(1482)	Grand View ... ..	...	...	52·00	8·71	...	...	...	154·00	19·34	...
	1364	Lady Mary ... ..	...	...	...	...	...	...	...	99·00	15·45	...

	1347, etc.	...	Lady Miller G.Ms., N.L.	...	...	...	...	...	...	...	824.87	130.14	...
	1347	...	Prior to transfer to present holders	...	...	...	...	...	...	...	805.00	216.37	...
	1453, etc.	...	Norseman Developments, N.L.	...	...	201.00	64.00	101.00	...	...	201.00	64.00	101.00
	1453	...	(Lady Evelyn)	...	...	409.00	103.50	...	...	...	462.00	116.96	...
	1315, etc.	...	Norseman Gold Mines, N.L.	...	...	76,069.00	30,771.00	40,030.00	...	...	204,183.00	80,662.15	74,141.54
	1315, etc.	...	Prior to transfer to present holders	...	...	...	...	...	...	...	2,656.75	669.38	...
	(1423)	...	Norseman Lake View	...	...	181.25	33.77	...	5.08	...	252.50	47.91	...
	1427	...	Northern Star Extended	...	...	9.50	2.88	...	...	...	40.50	9.68	...
	1317, etc.	...	O.K. Gold Mines, N.L.	...	...	...	65.00	...	...	8.34	4,686.25	3,930.96	...
	1422	...	Onka Paringa	...	...	285.25	343.97	...	...	...	607.00	1,252.54	...
		...	Voided leases and sundry claims	...	14.29	1,279.00	376.83	...	1,018.20	13,688.68	912,791.38	596,272.46	34,960.29	
Peninsular	1506	...	Peninsular	...	...	451.75	262.96	...	...	...	451.75	262.96	...
		...	Voided leases and sundry claims	...	...	17.50	24.77	...	...	17.61	8,010.39	4,927.22	...
<i>From Goldfield generally :—</i>														
Sundry Parcels treated at :														
		...	Hockey and Mitchell's Cyanide Plant	...	...	...	*32.77	23.36	...	...	...	*79.42	45.04
		...	Princess Royal Cyanide Plant	...	...	...	*240.51	182.32	...	...	...	*691.34	487.83
		...	Davies' Cyanide Plant	...	...	...	*258.25	100.00	...	...	...	*258.25	100.00
		...	State Battery, Norseman	...	...	...	*848.53	...	...	...	405.39	*17,018.30	885.41
		...	Various Works	...	...	...	...	...	...	54.52	483.14	*11,123.46	657.20
		...	Reported by Banks and Gold Dealers	...	5.42	3.99	...	...	1,080.29	40.27	47.50	11.43	...
		...	Totals	...	5.42	18.28	128,624.00	48,215.01	80,770.89	2,103.57	14,238.79	1,231,751.43	757,694.95	170,247.35

Phillips River Goldfield.

Hatter's Hill	244	...	Sunday Gift	...	...	117.00	82.25	...	...	...	198.00	166.38	...
		...	Voided leases and sundry claims	...	...	425.50	149.82	...	74.91	26.07	4,617.65	2,903.31	...
Kundip	211	...	Gem Restored	...	...	...	...	...	...	...	916.50	297.56	...
	247	...	Little Mary	...	...	2,204.00	222.85	...	...	...	2,204.00	222.85	...
	M.L. 370	...	North Harbour View	...	...	...	...	...	...	...	35.27	†22.16	...
		...	Voided leases and sundry claims	...	...	578.00	81.07	...	201.90	629.01	73,334.19	57,624.60	3,812.69
Mt. Desmond		...	do. do. do.	...	...	...	...	...	...	1.40	9.00	†3,938.27	†6,942.60
Ravensthorpe	212	...	Bridgetown	...	...	89.50	39.76	...	...	...	320.50	103.39	...
	(234)	...	Bullrush G.M. Co., N.L.	...	...	52.00	12.14	...	...	...	175.99	114.34	...
	245	...	Jim Dunn	...	...	355.00	69.35	...	...	...	535.00	109.23	...
	IPP	...	Westeria	...	...	217.00	53.29	...	...	...	443.00	135.73	...
		...	Voided leases and sundry claims	...	...	522.50	199.69	16.99	163.96	148.40	27,990.83	†28,033.69	†4,421.71
West River		...	do. do. do.	...	...	...	...	...	...	...	...	†13.63	†34.50
<i>From Goldfield generally :—</i>													
Sundry Parcels treated at :													
		...	Daw & Toleman's Cyanide Plant	...	...	...	*16.77	...	...	...	...	*130.01	...
		...	Floater Cyanide Plant	...	...	12.00	*115.09	...	...	...	12.00	*229.11	...
		...	King's Cyanide Plant	...	...	...	*8.94	...	...	...	...	*196.85	...
		...	Maori Queen Cyanide Plant	...	...	...	*170.58	...	...	...	...	*234.59	...
		...	Various Works	...	...	...	...	...	...	...	...	*923.07	493.66
		...	Banks and Gold Dealers	...	4.01	...	...	...	158.95	11.47	...	...	...
		...	Totals	...	4.01	4,572.50	1,221.60	16.99	599.72	816.35	110,791.93	95,398.77	15,705.16

† Includes gold and silver from smelting copper ore.

TABLE II.—Production of Gold and Silver from all sources, etc.—continued.

Outside Proclaimed Goldfield.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1937.					TOTAL PRODUCTION.						
			Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.	Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.		
			Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.		
Burracoppin ...	5PP ...	Benbur ...	...	...	...	...	...	...	...	...	...	...	...	...
	13PP ...	Christmas Gift ...	...	...	8.25	3.31	...	...	...	226.25	156.83	...	...	...
		Sundry claims ...	...	...	...	...	...	...	...	364.25	203.74	...	...	...
Donnybrook ...	...	Voided leases and sundry claims	5.42	...	50.00	3.47	...	28.66	37.83	1,732.80	831.94	15.18	...	...
Little Wongan ...	...	Sundry claims ...	...	...	...	...	...	...	...	80.75	6.39	...	...	...
Jimperding ...	...	Voided leases and sundry claims	...	...	13.00	1.54	...	240.67	37	77.10	20.05	...	...	...
Late West Pilbara	56H, etc. ...	Weerianna G.Ms. ...	...	...	520.00	55.23	...	...	...	744.00	131.16	...	...	...
		Voided leases and sundry claims	...	...	...	...	...	210.69	182.18	19,322.71	22,110.76	1,331.07	...	...
		Reported by Banks and Gold Dealers	10.76	.92	66.50	65.78	...	5,975.45	149.57	103.50	227.33	...	...	...
Mt. Browne ...	...	Sundry claims ...	...	13.76	...	...	...	...	13.76	...	...	...	...	...
Sussex ...	...	do. ...	...	...	...	...	...	1.89	...	...	...	...	...	...
		<i>From State generally :—</i>												
		Sundry Parcels treated at :												
		Fremantle Smelter ...	...	...	...	...	...	...	...	...	1,476.97	737.74	...	...
		Weerianna Cyanide Plant ...	...	...	...	10.18	...	...	...	...	10.18	...	...	...
		Various Works ...	...	...	...	...	...	...	...	27.00	*6,796.27	30,394.19	...	...
		Sundry Specimens ...	...	...	...	...	...	4.24	56.85	...	...	...	...	...
		Reported by Banks and Gold Dealers	60.11	138.51	...	2.64	...	558.01	601.90	...	106.26	59.99	...	...
		Totals ...	76.29	153.19	657.75	142.15	...	7,019.61	1,042.46	23,105.96	32,600.33	32,538.17	...	...

TABLE III.

RETURN SHOWING TOTAL PRODUCTION REPORTED TO THE MINES DEPARTMENT, AND RESPECTIVE DISTRICTS AND GOLDFIELDS FROM WHENCE DERIVED, TO 31ST DECEMBER, 1937.

Goldfield.	District.	DISTRICT.						GOLDFIELD.					
		Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Total Gold.	*Silver.	Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Total Gold.	*Silver.
		Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.	Fine ozs.
Kimberley ...	...	...	...	...	...	...	...	5,838.90	13.66	17,912.25	14,424.69	20,277.25	...
Pilbara ...	Marble Bar ...	14,170.87	4,187.05	132,652.68	174,622.64	192,980.56	653.91	} 22,527.41	} 4,734.66	} 180,032.47	} 252,730.86	} 279,992.93	} 682.58
	Nullagine ...	8,356.54	547.61	47,379.79	78,108.22	87,012.37	28.67						
Ashburton ...	...	...	...	...	...	...	...	8,953.58	356.90	1,031.00	533.53	9,844.01	7,793.32
Gascoyne ...	...	...	...	...	...	...	...	583.98	41.57	387.00	517.29	1,142.84	...
Peak Hill ...	...	...	...	...	...	...	...	2,755.98	4,901.52	585,353.93	281,794.70	289,452.20	2,311.33
East Murchison ...	Lawlers ...	6,651.97	2,293.33	1,667,591.33	729,400.69	738,345.99	25,782.88	} 8,425.11	} 20,386.15	} 6,824,225.50	} 2,623,653.79	} 2,652,465.05	} 43,876.89
	Wiluna ...	167.39	1,096.53	3,793,257.50	1,051,732.93	1,052,996.85	450.03						
	Black Range ...	1,605.75	16,996.29	1,363,376.67	842,520.17	861,122.21	17,643.98						
Murchison ...	Cue ...	3,022.55	6,439.36	773,845.94	482,203.72	491,665.63	10,714.18	} 21,087.94	} 50,641.08	} 5,687,860.58	} 3,504,422.09	} 3,576,151.11	} 186,127.70
	Meekatharra ...	13,136.47	15,570.27	2,087,183.75	1,214,977.50	1,243,654.24	5,028.90						
	Day Dawn ...	2,737.50	10,595.32	1,998,172.50	1,318,294.46	1,331,627.28	169,210.44						
Yalgoo ...	Mt. Magnet ...	2,191.42	18,036.13	828,658.39	488,946.41	509,173.96	1,174.18	} 1,683.79	} 2,458.76	} 340,347.10	} 220,723.70	} 224,866.25	} 1,252.76
						
Mt. Margaret ...	Mt. Morgans ...	2,727.84	8,577.56	1,164,017.96	655,330.27	666,635.67	5,780.87	} 9,998.31	} 29,918.27	} 8,020,924.30	} 3,898,146.30	} 3,938,062.88	} 189,012.53
	Mt. Malcolm ...	3,492.62	12,943.72	4,878,806.38	2,281,827.20	2,298,263.54	125,465.80						
	Mt. Margaret ...	3,777.85	8,396.99	1,978,099.96	960,988.83	973,163.67	57,765.86						
North Coolgardie ...	Menzies ...	1,487.42	5,594.40	1,344,964.77	1,101,141.35	1,108,223.17	22,244.99	} 4,481.50	} 12,467.44	} 2,755,776.69	} 2,048,834.67	} 2,065,783.61	} 34,352.60
	Ularring ...	77.72	1,351.27	327,130.32	313,857.95	315,286.94	5,973.05						
	Niagara ...	1,657.73	1,799.96	914,197.02	508,799.47	512,257.16	5,603.42						
	Yerilla ...	1,258.63	3,721.81	169,484.58	125,035.90	130,016.34	531.14	} 21,353.25	} 23,152.77	} 1,057,522.66	} 602,936.24	} 647,442.26	} 3,783.26
						
Broad Arrow ...	...	...	...	...	...	...	...	} 118,300.45	} 18,982.99	} 995,478.93	} 631,598.52	} 768,881.96	} 2,533.34
N.E. Coolgardie ...	Kanowna ...	105,699.55	12,103.82	984,243.96	614,660.95	732,464.32	2,522.12						
	Kurnalpi ...	12,600.90	6,879.17	11,234.97	16,937.57	36,417.64	11.22	} 59,316.16	} 52,859.72	} 39,557,777.81	} 23,595,400.19	} 23,707,576.07	} 2,572,436.99
East Coolgardie ...	East Coolgardie ...	32,128.30	37,011.32	39,390,288.22	23,467,676.34	23,536,815.96	2,572,424.07						
	Bulong ...	27,187.86	15,848.40	167,489.59	127,723.85	170,760.11	12.92						
Coolgardie ...	Coolgardie ...	15,731.07	14,269.83	1,704,598.10	1,072,526.95	1,102,527.85	992.60	} 17,064.70	} 19,429.70	} 2,013,471.15	} 1,299,922.70	} 1,336,417.10	} 1,064.03
	Kunanalling ...	1,333.63	5,159.87	308,873.05	227,395.75	233,889.25	71.43						
Yilgarn ...	...	...	...	...	...	...	...	2,050.86	1,985.81	2,797,645.72	1,319,668.35	1,323,705.02	33,443.16
Dundas ...	...	...	...	...	...	...	...	2,103.57	14,238.79	1,231,751.43	757,694.95	774,037.31	170,247.35
Phillips River ...	...	...	...	...	...	...	...	599.72	816.35	110,791.93	95,398.77	96,814.84	15,705.16
State generally ...	...	...	...	...	...	...	...	7,019.61	1,042.46	23,105.96	32,600.33	40,662.40	32,538.17
		...	...	...	...	...	...	314,144.82	258,428.60	72,201,396.41	41,181,001.67	41,753,575.09	3,297,161.17

* By product in the treatment of auriferous ore, with exception of yield from Ashburton G.F. and State generally.

TABLE IV.

TOTAL OUTPUT OF GOLD (BULLION AND CONCENTRATES ENTERED FOR EXPORT AND GOLD RECEIVED AT THE ROYAL MINT, PERTH), FROM 1ST JANUARY, 1886, TO 31ST DECEMBER, 1937; SHOWING IN FINE OUNCES THE QUANTITY CREDITED TO THE RESPECTIVE GOLDFIELDS.

Year.	Export.	Mint.	Total.	Export.	Mint.	Total.
	KIMBERLEY.			PILBARA.		
	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.
Prior to 1936	22,422.06	8,632.81	31,054.87	147,302.43	187,102.87	334,405.30
1936 ... ..	...	311.83	311.83	...	9,057.34	9,057.34
1937 ... ..	...	364.09	364.09	...	12,836.23	12,836.23
Total	22,422.06	9,308.73	31,730.79	147,302.43	208,996.44	356,298.87
	^a WEST PILBARA.			ASHBURTON.		
Prior to 1936	4,351.11	26,760.61	31,111.72	4,104.96	2,550.19	6,655.15
1936 ... ..	...	...	...	...	310.84	310.84
1937 ... ..	...	...	...	...	266.93	266.93
Total	4,351.11	26,760.61	31,111.72	4,104.96	3,127.96	7,232.92
	^b GASCOYNE.			^c PEAK HILL.		
Prior to 1936	304.55	968.06	1,272.61	41,102.62	191,574.95	232,677.57
1936 ... ..	...	3.51	3.51	...	2,066.22	2,066.22
1937 ... ..	...	16.50	16.50	...	2,085.61	2,085.61
Total	304.55	988.07	1,292.62	41,102.62	195,726.78	236,729.40
	EAST MURCHISON.			MURCHISON.		
Prior to 1936	230,882.91	1,918,442.71	2,149,325.62	1,458,084.41	2,236,648.10	3,694,732.51
1936	356.66	109,468.76	109,825.42	27,695.60	38,658.81	66,354.41
1937	2,824.25	141,790.81	144,615.06	27,222.02	58,354.76	85,576.78
Total	234,063.82	2,169,702.28	2,403,766.10	1,513,002.03	2,333,661.67	3,846,663.70
	^d YALGOO.			^e MT. MARGARET.		
Prior to 1936	11,528.21	135,337.70	146,865.91	611,459.14	3,054,569.82	3,666,028.96
1936	85.10	10,003.11	10,088.21	6,460.04	82,542.12	89,002.16
1937	46.64	7,562.69	7,609.33	14,558.87	84,776.51	99,335.38
Total	11,659.95	152,903.50	164,563.45	632,478.05	3,221,888.45	3,854,366.50
	^f NORTH COOLGARDIE.			^g BROAD ARROW.		
Prior to 1936	262,388.44	1,780,723.79	2,043,112.23	121,985.78	271,616.30	393,602.08
1936	46.46	25,166.87	25,213.33	63.76	18,365.40	18,429.16
1937	167.60	35,858.75	36,026.35	79.82	20,904.18	20,984.00
Total	262,602.50	1,841,749.41	2,104,351.91	122,129.36	310,885.88	433,015.24
	^f NORTH-EAST COOLGARDIE.			^f EAST COOLGARDIE.		
Prior to 1936	235,728.35	447,266.93	682,995.28	6,808,284.95	17,340,407.40	24,148,692.35
1936	17.15	1,773.68	1,790.83	14,649.91	389,729.73	404,379.64
1937	17.81	1,683.71	1,701.52	14,087.36	410,360.95	424,448.31
Total	235,763.31	450,734.32	686,487.63	6,837,022.22	18,140,497.08	24,477,520.30
	^h COOLGARDIE.			YILGARN.		
Prior to 1936	661,920.68	924,514.55	1,586,435.23	216,235.17	1,073,643.61	1,289,878.78
1936	93.85	20,409.24	20,503.09	109.76	44,212.10	44,321.86
1937	55.49	20,659.01	20,714.50	135.29	64,473.09	64,608.38
Total	662,070.02	965,582.80	1,627,652.82	216,480.22	1,182,328.80	1,398,809.02
	ⁱ DUNDAS.			^j PHILLIPS RIVER.		
Prior to 1936	113,946.22	668,940.32	782,886.54	40,195.24	50,601.67	90,796.91
1936	5,375.94	36,655.24	42,031.18	...	1,591.98	1,591.98
1937	12,385.31	65,078.06	77,463.37	...	1,131.80	1,131.80
Total	131,707.47	770,673.62	902,381.09	40,195.24	53,325.45	93,520.69
	¶ DONNYBROOK.			STATE GENERALLY.		
Prior to 1936	282.21	557.53	839.74	18,287.84	27,036.09	45,323.93
1936 ... ..	...	...	...	70.35	856.43	926.78
1937 ... ..	...	...	...	66.45	796.16	862.61
Total	282.21	557.53	839.74	18,424.64	27,688.68	47,113.32

^a Prior to 1st May, 1898, included with Pilbara and abolished 12th July, 1929. ^b Prior to March, 1899, included with Ashburton. ^c From 1st August, 1897. ^d Prior to 1st April, 1897, included with Murchison. ^e From 1st August, 1897. ^f Prior to 1st May, 1896, included with Coolgardie. ^g From 1st September, 1897. ^h Declared 5th April, 1894, to which date included with Yilgarn. ⁱ Prior to 1893 included with Yilgarn. ^j Prior to 1902, included in State generally. ¶ Abolished 4th March, 1908.

TABLE V.

TOTAL OUTPUT OF GOLD BULLION, CONCENTRATES, ETC., ENTERED FOR EXPORT AND RECEIVED AT THE PERTH BRANCH OF THE ROYAL MINT.

Year.	Export.	Mint.	Total.
	fine ozs.	fine ozs.	fine ozs.
1886 to 1929	10,987,594.38	26,899,852.59	37,887,446.97
1930	1,753.09	* 415,765.00	417,518.09
1931	1,726.66	508,845.36	510,572.02
1932	3,887.07	601,674.33	605,561.40
1933	2,446.97	634,760.40	637,207.37
1934	3,520.40	647,817.95	651,338.35
1935	9,868.71	639,180.38	649,049.09
1936	55,024.58	791,183.21	846,207.79
1937	71,646.91	928,999.84	1,000,646.75
Total	11,137,468.77	32,068,079.06	43,205,547.83

* Accumulated differences in calculations adjusted by addition of 1,148.88 fine ozs.

The estimated value of the above production (calculated prior to 1930 at £4.24773, 1930 at £4.2477 and subsequently at £4 4s. 11.45d. per fine ounce) amounted to £183,525,473 17s. 1d. ; in addition premiums on sales of gold during 1920-1924 and 1930-1937 were received totalling approximately £21,530,564. The bonus paid under the Commonwealth Gold Bounty Act, 1930, was £161,448, bringing the gross estimated value of gold won up to £A205,217,486.

TABLE VI.—MINERALS OTHER THAN GOLD.

GENERAL RETURN OF ORE AND MINERALS, OTHER THAN GOLD, SHOWING THE QUANTITY PRODUCED AND THE VALUE THEREOF AS REPORTED TO THE MINES DEPARTMENT FROM THE RESPECTIVE GOLDFIELDS AND MINERAL FIELDS, DURING 1937, AND PREVIOUS YEARS.

Period.	ANTIMONY.								FELSPAR.		GLAUCONITE.			
	Pilbara Goldfield.		E. Murchison Goldfield.		State generally.		Total.		Coolgardie Goldfield.		State generally.			
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.		
Prior to 1935	....	£	....	£	....	£	....	£	1,040	£	1,973	775	£	3,875
1935	....	....	....	....	21	491	....	491	4,208	8,437	308	1,540	....	....
1936	....	....	....	....	....	....	....	....	2,840	5,680	219	1,095	....	....
1937	20	150	*674	25,173	....	....	....	694	2,900	5,801	165	825	....	....
Total	20	150	674	25,173	21	491	715	25,814	10,997	21,891	1,467	7,385	....	....

* By-product for Moonlight Wiluna G.Ms.

Period.	ASBESTOS.								GYPSUM.							
	Ashburton Goldfield.		Pilbara Goldfield.		State generally.		Total.		Yilgarn Goldfield.		State generally.		Total.			
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.		
Prior to 1935	2	189	1,160	53,633	853	20,333	2,015	74,155	6,243	6,243	35,319	£	51,037	41,562	£	57,280
1935	....	....	....	....	141	2,889	141	2,889	487	487	4,975	£	6,401	5,462	£	6,888
1936	....	....	34	770	122	2,520	156	3,290	455	455	6,206	£	7,114	6,661	£	7,569
1937	8	770	20	1,180	14	*	42	1,950	479	479	8,594	£	9,330	9,073	£	9,809
Total	10	959	1,214	55,583	1,130	25,742	2,354	82,284	7,664	7,664	55,094	£	73,882	62,758	£	81,546

* Not available.

Period.	TIN.												
	Pilbara Goldfield—Marble Bar District.				Greenbushes Mineral Field.					Total.			
	Quantity.			Value.	Quantity.			Value.	Quantity.			Value.	
	Lode.	Stream.	Total.		Lode.	Stream.	Total.		Lode.	Stream.	Total.		
*Prior to 1935	372.62	5,511.20	5,883.82	543,612	350.96	10,757.71	11,108.67	986,063	724.18	16,273.78	16,997.96	1,510,126	
1935	....	55	55	80	....	17.32	17.32	2,360	....	17.87	17.87	2,440
1936	....	4.60	4.60	677	....	21.85	21.85	2,784	....	26.45	26.45	3,461
1937	....	2.77	2.77	500	....	24.19	24.19	7,098	....	26.96	26.96	7,598
Total	372.62	5,519.12	5,891.74	544,899	378.05	10,821.07	11,199.12	978,305	751.27	16,345.06	17,096.33	1,523,625	

Period.	TANTALITE.											
	Northampton Mineral Field.		State generally.		Total.		*ARSENIC.		COAL.			
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.		
Prior to 1935	14.49	157.31	171.80	29,864	....	3.94	3.94	2,009	14.49	161.25	175.74	31,873
1935	7.35	....	7.35	2,859	....	....	....	....	7.35	....	7.35	2,859
1936	11.00	3.36	14.36	7,120	....	....	....	....	11.00	3.36	14.36	7,120
1937	19.66	....	19.66	29,011	....	....	....	....	19.66	....	19.66	29,011
Total	52.50	160.67	213.17	68,854	....	3.94	3.94	2,009	52.50	164.61	217.11	70,853

* Includes 4.72 tons, value £300; .15 tons, value £15; and 1.60 tons, value £16, the produce of Cue and Coolgardie Districts and Yilgarn Goldfield respectively.

Period.	LEAD ORE.						*ARSENIC.		COAL.						
	Northampton Mineral Field.		State generally.		Total.		Wiluna District.		Collie Coalfield.						
	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.	Tons.	Value.					
Prior to 1935	408,667	£	1,270,141	107	£	1,529	408,774	£	1,271,070	4,932	£	88,766	11,610,727	£	7,777,630
1935	....	....	....	....	....	....	....	....	....	3,728	£	67,108	537,188	£	318,012
1936	1,535	2,223	....	....	....	1,535	2,223	3,470	62,460	565,075	331,566	....	....	....	....
1937	6,163	7,243	....	....	....	6,163	7,243	2,054	36,972	553,510	340,444	....	....	....	....
Total	416,365	1,279,617	107	1,529	416,472	1,281,146	14,184	255,306	13,272,500	8,767,652	....	....	....	....	....

* By-product from Ore treated by Wiluna G.Ms., Ltd.

TABLE VI.—Minerals other than Gold—continued.

Period.	COPPER ORE.													
	West Kimberley Goldfield.		Pilbara Goldfield.				West Pilbara Goldfield.		Ashburton Goldfield.		Peak Hill Goldfield.		East Murchison Goldfield.	
			Marble Bar District.		Nullagine District.								Lawlers District.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
tons.	£	tons.	£	tons.	£	tons.	£	tons.	£	tons.	£	tons.	£	
Prior to 1935	109	1,709	33	386	14	480	82,745	748,482	351	6,408	1,015	32,212	238	4,364
1935	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1936	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1937	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	109	1,709	33	386	14	480	82,745	748,482	351	6,408	1,015	32,212	238	4,364

Period.	COPPER ORE—continued.									
	Murchison Goldfield.		Yalgoo Goldfield.		Northampton Mineral field.		Yandanooka Mineral field.		Mt. Margaret Goldfield.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	tons.	£	tons.	£	tons.	£	tons.	£	tons.	£
Prior to 1935	1,024	11,236	39	413	24,019	119,451	172	1,889	47,861	230,846
1935	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1936	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1937	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	1,024	11,236	39	413	24,019	119,451	172	1,889	47,861	230,846

Period.	COPPER ORE—continued.										LIMESTONE.							
	North Coolgardie Goldfield.		East Coolgardie Goldfield.		Phillips River Goldfield.		State generally.		Total.		Murchison Goldfield.		Yilgarn Goldfield.		State generally.		Total.	
	Menzies District.		E. Coolgardie District.								Cue District.							
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
tons.	£	tons.	£	tons.	£	tons.	£	tons.	£	tons.	£	tons.	£	tons.	£	tons.	£	
Previous to 1935	6	51	51	330	95,727	588,115	19	249	253,423	1,746,621	298	772	2,548	1,607	90,859	15,911	93,705	18,290
1935	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1936	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1937	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	6	51	51	330	95,727	588,115	19	249	253,423	1,746,621	298	772	2,548	1,607	90,859	15,911	93,705	18,290

Period.	IRONSTONE.								DIAMONDS.		EMERALDS.		MAGNESITE.		MANGANESE.	
	West Pilbara Goldfield.		E. Coolgardie Gf.		State generally.		Total.		Pilbara Goldfield.		Murchison Goldfield.		East Coolgardie Goldfield.		Peak Hill Goldfield.	
			E. Coolgardie D.						Nullagine District.		Cue District.		Bulong District.			
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
tons.	£	tons.	£	tons.	£	tons.	£	carats.	£	carats.	£	tons.	£	tons.	£	
Previous to 1935	100	300	450	247	57,280	36,148	57,830	36,695	.....	24	18,373	1,609	825	1,053	77	436
1935	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1936	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1937	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	100	300	450	247	57,280	36,148	57,830	36,695	.....	24	18,373	1,609	825	1,053	77	436

TABLE VI.—Minerals other than Gold—continued.

Period.	SILVER LEAD ORE.						TUNGSTEN ORES.											
	Pilbara Goldfield.		Ashburton Goldfield.		Total.		WOLFRAM.		SCHEELITE.									
	Marble Bar District.						State generally.		North Coolgardie Gf.		Broad Arrow Goldfield.		Coolgardie Gf.		Dundas Goldfield.		Total.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Previous to 1935	195	3,658	2,974	35,796	3,169	39,454	265.89	1,295	407	942	3	175	86	155	.4	10	496.4	1,282
1935	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
1936	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
1937	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Total	195	3,658	2,974	35,796	3,169	39,454	265.89	1,295	407	942	3	175	86	155	.4	10	496.4	1,282

Period.	FIRECLAY.		GADOLINITE.	
	Collie Mf.		Pilbara Goldfield.	
			Marble Bar District.	
	Quantity.	Value.	Quantity.	Value.
Previous to 1935	1,051	738	1	112
1935	....	....	....	....
1936	....	....	....	....
1937	....	....	....	....
Total	1,051	738	1	112

NOTE.—As the collection of Statistics of Minerals other than Gold commenced during 1899, the total production from the different localities can only be approximately estimated by the Customs Records.