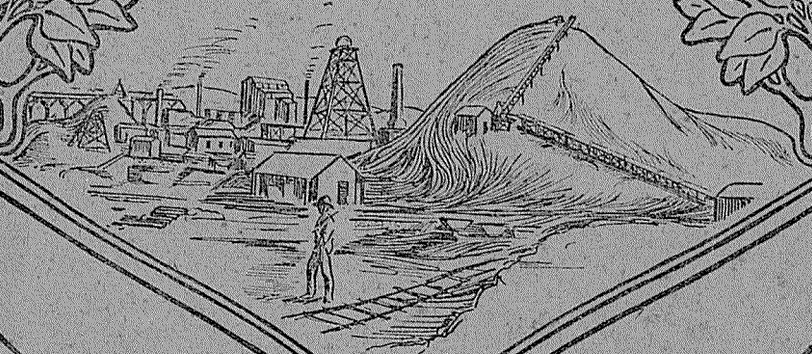
REPORT
OF THE
DEPARTMENT OF MINES
FOR THE YEAR
WESTERN · 1919. · AUSTRALIA



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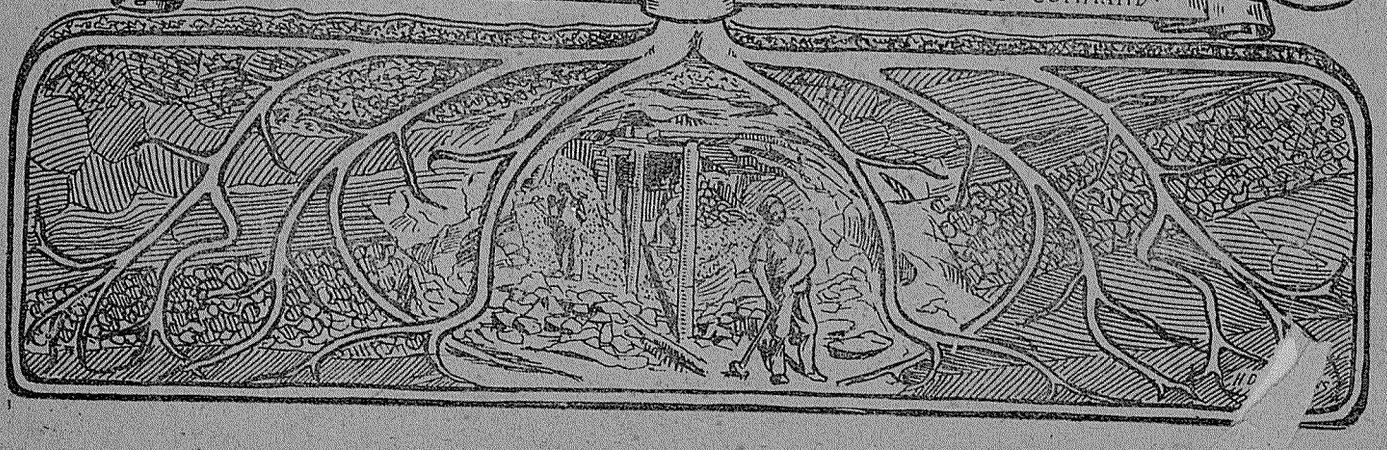
BY · HIS · EXCELLENCY'S · COMMAND ·



1920.

WESTERN AUSTRALIA.

REPORT

OF THE

DEPARTMENT OF MINES

FOR THE YEAR

1919.

Presented to both Houses of Parliament by His Excellency's Command.

[FOURTH SESSION OF THE TENTH PARLIAMENT.]

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ANNUAL REPORT OF THE DEPARTMENT OF MINES, WESTERN AUSTRALIA, 1919.

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DIVISION I.

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(not published)

STATE OF WESTERN AUSTRALIA.

Report of the Department of Mines for the State of Western Australia, for the Year 1919.

To the Hon. the Minister for Mines.

Sir,—

I have the honour to submit the Annual Report of the Department for the year 1919, with summaries of reports from the Wardens, and other officers, together with various comparative tables furnishing statistics relating to the Mining Industry of the State.

Reports from the officers controlling the various sub-Departments are also submitted.

I have, etc.,

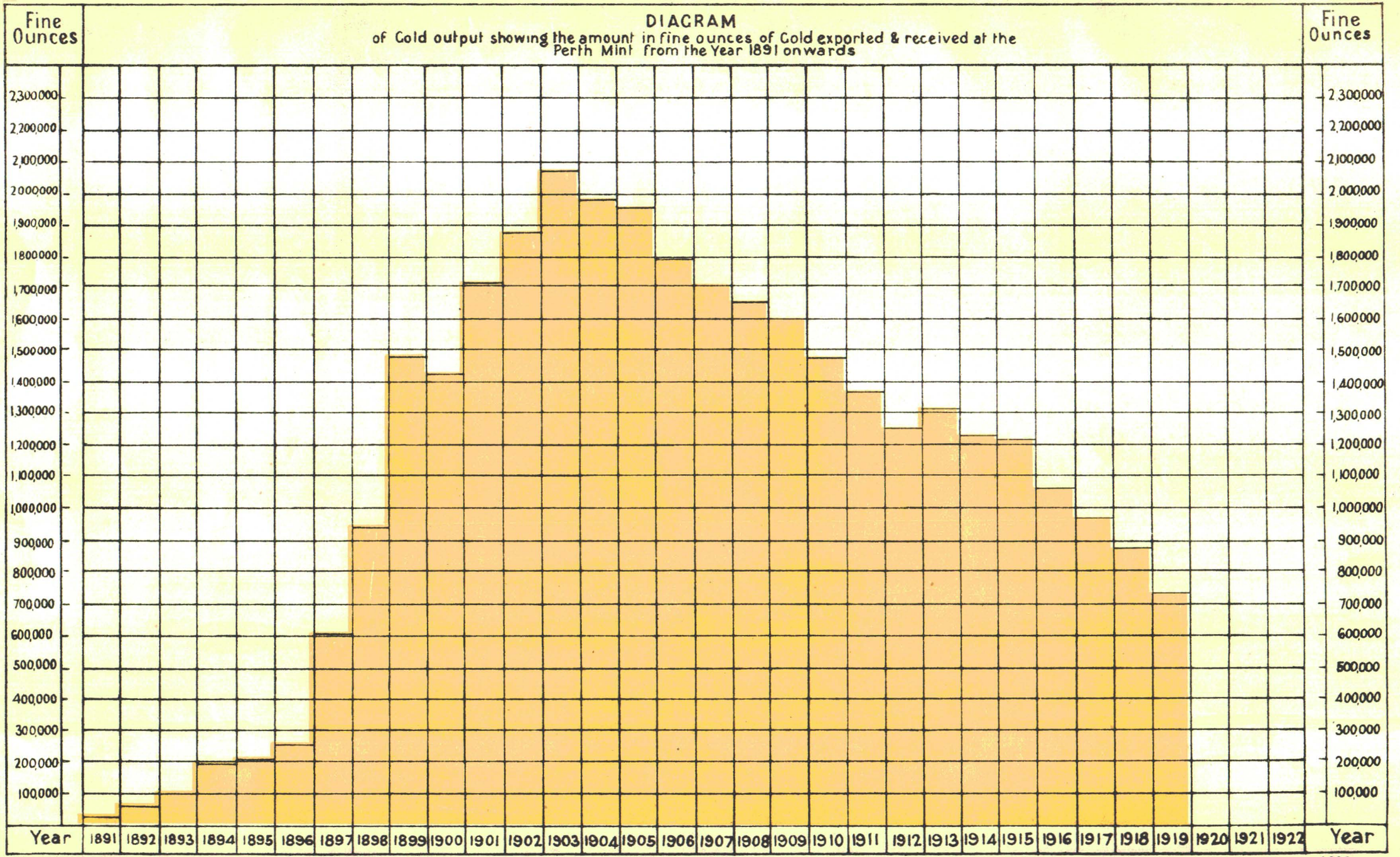
M. J. CALANCHINI,

Under Secretary for Mines.

Department of Mines, Perth, 31st March, 1920.

DIAGRAM

of Gold output showing the amount in fine ounces of Gold exported & received at the Perth Mint from the Year 1891 onwards



1919.

DIVISION I.

Summary by the Under Secretary for Mines.

PART I.—GENERAL REMARKS.

The value of the mineral output of the State for the year 1919 was £3,561,204, being £704,373 less than that for the previous year.

Copper ore exported showed a decrease of 1,188 tons, and copper ingot, matte, etc., a decrease of 474 tons.

Coal showed a substantial increase, also silver, but tin a small decrease.

The value of the gold yield was £3,118,113, being 87.56 per cent. of total output.

The value of the coal output was £270,355, copper £10,105, silver £55,342, and tin £47,269.

The dividends paid by mining companies amounted to £338,244, and in the preceding year £368,295, a decrease of £30,051.

The total dividends paid to the end of 1919 were £27,424,664.

To the same date the total mineral production was £147,732,633, and the total gold production £140,729,627.

GOLD.

The gold yield again shows a decline, being 142,445 fine ounces less than in 1918, which was 93,806 fine ounces less than for 1917.

The average value per ton of ore treated in the State as a whole has risen from 43 shillings in 1918 to 44.88 shillings in 1919, and in the East Coolgardie Goldfield, which produces over 57 per cent. of the State's reported yield, from 42.43 shillings to 48.61 shillings.

Comparing the tonnages of ore treated in 1918 and 1919, there is a decrease of 401,438 tons in the latter year, during which 1,289,899 tons were treated.

There were decreases in all the fields excepting Broad Arrow, Mount Margaret, Peak Hill, Pilbara, and West Pilbara, where there were increases of 15,035, 3,197, 2,984, 599, and 167 tons respectively. The largest decreases were in East Coolgardie, North Coolgardie, Murchison, Dundas, and Yilgarn.

Working costs show an increase, the average cost per ton of 2,000lbs. being, as published by the Chamber of Mines:—In 1914, 20s. 6d.; in 1915, 19s. 9d.; in 1916, 22s. 3d.; in 1917, 23s. 7d.; in 1918, 24s. 8d.; and in 1919, 26s. 2d. to 35s. 10d.

There were increases in the outputs of Kimberley, Peak Hill, Yalgoo, Mount Margaret, Broad Arrow, and North-East Coolgardie Goldfields; the others all recorded decreases.

The acreage held under mining lease for all minerals is 53,688, being an increase of 2,826 acres when compared with 1918.

The area leased for gold mining is greater by 310 acres, and for minerals by 2,516 acres. The area held under prospecting areas is 51,511 acres, including 37,356 acres for coal and oil. This is an increase of 35,148 acres on the area held in 1918, and does not include the acreage of several large temporary reserves which have been created and rights of occupancy granted on special terms to persons desirous of searching for oil. At the close of the year the approximate area comprised in such reserves was 49,000 square miles.

The number of men engaged in all classes of mining is 8,346; a decrease of 919 on the figures for 1918.

The number of men engaged in mining for minerals other than gold decreased by 371, the only increases recorded being in coal and asbestos mining.

In gold mining there was a decrease of 548 men.

The average value of gold produced per man employed on gold mines has fallen from £476.38 in 1918 to £412.28 in 1919.

The average tonnage raised per man was 183.72 tons, and in the previous year 223.28 tons.

In the East Murchison field there was a falling off, but in the vicinity of Lawlers one or two shows gave promise of good developments and more activity was apparent than had been in evidence for some time.

In the Wiluna district a steady output was maintained, and it is anticipated that shortly ample capital for the proper development of the large ore bodies known to exist there will be forthcoming.

In the Black Range district there was little change.

The Murchison field showed a decrease due principally to lessened outputs from a couple of the large mines at Meekatharra. In the Cue district there was a noticeable improvement and some new finds are promising.

The State plant at Cue, completed during the year, has been kept running since completion. In the Day Dawn district matters remained stagnant. In the Mt. Magnet district prospecting was active, particularly in the neighbourhood of Boogardie.

The Mount Margaret field had an improved output.

In the Mount Margaret district there was a slight falling off, notwithstanding an increased output from the Lancefield Mine, the outlying centres being very quiet.

In the Mount Morgans district there was also a decrease, mining throughout being almost stagnant.

In the Mount Malcolm district there was an increase consequent on an improved output from the Sons of Gwalia Mine, otherwise there was little change.

The Coolgardie field reported a decrease.

The various centres were quiet, but during the year a prospector named Ives, who had been equipped by the Department, reported a very promising discovery at a locality situated about 14 miles N.E. of Widgiemooltha. A considerable number of leases have been pegged and present indications are that another producing centre will be the result.

The North Coolgardie field had a decrease.

In the Menzies district there was a falling off, due to restricted outputs from the Sand Queen and Gladsome mines at Comet Vale consequent on their having to cease operations as a result of a large flow of water in the former, which flooded both. The Menzies Consolidated at Yundaga also reported a smaller production, although the tonnage treated was about the same.

At Mt. Ida one or two shows were being developed but nothing of note transpired.

In the Ularring district matters were extremely quiet, the Riverina South Mine having ceased operations. It is expected that this is only temporary and financial assistance is being rendered the mine by the Government.

In the Niagara and Yerilla districts no change was reported.

The North-East Coolgardie goldfield had an increase and there was a distinct revival of prospecting.

Efforts are being made to endeavour to locate deep alluvial by boring, and prospecting rights over large areas have been granted for that purpose.

The Broad Arrow goldfield had an increase. In the immediate vicinity of Broad Arrow there was a good deal of activity in prospecting, but in the outlying centres little change.

In the East Coolgardie goldfield the number of men engaged in mining was 3,093, and in 1918, 3,461, a decrease of 368. This goldfield gave employment to over 42 per cent. of the number of men engaged in gold mining, and the reported production during the year was 397,055 fine ounces, over 57 per cent. of the total reported yield.

The tonnage treated was 692,556 tons, being less than in 1918 by 358,331 tons. The yield showed a considerable falling off, mainly attributable to serious industrial troubles which caused a complete cessation of work for many weeks.

The average grades of the ore per ton improved from 42.43 shillings in 1918 to 48.61 shillings in 1919.

In the Yilgarn field there was a decrease owing to lessened outputs from some of the mines at Westonia, where developments have been far from satisfactory.

At Forrestonia the Department is assisting the prospectors in development work and also by the erection of a treatment plant, which should serve to prove the district. Crushing should commence about the middle of the New Year. In the other centres there was a good deal of prospecting but no developments of note were recorded.

In the Dundas field there was a decrease and nothing of note transpired.

The Phillips River field had a decrease and mining was very quiet. A good deal of financial assistance is being rendered to leaseholders by the Department and there should shortly be a considerable improvement.

In the Northern goldfields—Kimberley, West Pilbara, Ashburton, and Gascoyne—there was practically no change. In the Pilbara field a general improvement was noticeable, although there was a slight decrease in the output. The high cost of all requisites is a retarding factor, but developments in one or two of the mines give hope of an early revival.

TIN.

The quantity of tin exported was 318 tons, valued at £47,269; a decrease in tonnage on the preceding year of 97 tons, and in value of £29,683.

The Greenbushes tinfield produced 244.61 tons, valued at £34,959; a decrease in tonnage of 51.19 tons, and in value of £22,694; the Pilbara field 36.70 tons, valued at £5,871; a decrease in tonnage of 62.80 tons, and in value of £15,113. None was produced in any of the other fields.

TANTALITE.

One quarter of a ton of this mineral, valued at £75, was exported.

COPPER.

The value of the copper exported was £10,105, being £56,041 less than in 1918. The ore raised in the West Pilbara field was 1,030.78 tons, valued at £15,807; a decrease on the preceding year in tonnage of 813.41 tons, and in value of £13,154. The Whim Well mine was practically the only producer.

In the Phillips River field the production was 215.02 tons, valued at £4,993; a decrease on the preceding year in tonnage of 2,686.64 tons, and in value of £37,985. Copper mining has been exceedingly quiet in this field but financial assistance is being rendered leaseholders by the Government with a view to stimulating production. There is also a reasonable hope of capital being available shortly for the purpose of further developing and properly equipping some of the mines that were formerly big producers.

The Peak Hill field produced 14.39 tons, valued at £353; a decrease in tonnage of 61.89 tons, and in value of £2,127. The remoteness of the mines and consequent high cost of transport, together with the enhanced price of all commodities, retards their proper development.

The only other field producing was Murchison, with 16.81 tons, valued at £377; a decrease in tonnage of 61.53 tons, and in value of £1,417.

The average number of men engaged in copper mining was 72, and in 1918, 158.

COAL.

The output of coal for the year was 401,713 tons, being 64,674 tons more than in 1918.

There are six collieries at Collie producing coal, and excepting the Scottish, which is still in the development stage, all are opened up well and could with additional machinery considerably increase their outputs.

Boring operations with a view to proving the extent of known deposits will shortly be undertaken by the Government at Wilga, about 16 miles south of Collie and on the Irwin River, about 20 miles north-east of Mingenew.

The number of men employed, 726, is greater by 108 than in 1918, and the output per man was in 1918, 545 tons, and in 1919, 553 tons.

GRAPHITE.

Deposits of this mineral exist at Donnelly River, Kendenup, in the Plantagenet District, and Munglinup, between Ravensthorpe and Esperance. Not much work was done on any of the deposits, but a better demand for the mineral is likely in the near future, which will have a stimulating effect.

None of the mineral was exported.

OTHER MINERALS.

The quantity of silver obtained as a by-product and exported was 223,332 ounces, valued at £55,342, and in the preceding year 109,830 ounces, valued at £22,711; an increase of 113,502 ounces, and in value of £32,631.

Lead and silver lead to the amount of 248 tons, valued at £3,704, were exported, and in the preceding year 282 tons, valued at £3,045, also 1,780 tons of pig lead, valued at £48,462, and in the preceding year 5,489 tons, valued at £163,880.

Pyritic ore, amounting to 4,136 tons, valued at £4,919, was reported, and in the preceding year 2,252 tons, valued at £1,629.

No magnesite or arsenical ore was exported, but in the preceding year 62 tons of the former, valued at £225, and 679 tons of the latter, valued at £2,564, were sent away.

Small quantities of bismuth, corundum, mica, scheelite, and wolfram were produced, also 53 tons of asbestos, valued at £1,443.

MINING GENERALLY.

With the exception of the Northern Territory and Papua, which showed increases of 346 and 1,296 fine ounces respectively, all the Australian States recorded decreases. The New Zealand output was an enhanced one. The Western Australian production was 56.73 per cent. of the total for Australasia, and in the previous year 59.85 per cent.

The diminished output, although as in the previous year due to some extent to lessened outputs from certain of the large mines, was to a considerable extent caused by an industrial dispute, which resulted in practically suspending operations on most of the Kalgoorlie mines for several weeks. The discoveries at Hampton Plains and St. Ives have given a tremendous fillip to prospecting, and present indications are that some good mines will be the result.

In mining for base metals results have been satisfactory, and the question of the erection of central smelting works is now being considered.

The assistance to prospectors by loans of equipment and transport facilities has been extended by the granting of sustenance allowance in addition, where justified. The applications are dealt with by a board appointed by the Minister composed of departmental officers, representatives of the Mining Association, Leaseholders and Prospectors' Association, and Returned Soldiers' Association. It is intended to give that board statutory authority to enable it, in addition to its ordinary functions, to equip and send out one or more prospecting expeditions under its direct supervision. The whole of the Department's outfits, which have been considerably augmented of late, are in constant use.

The area held under prospecting areas for gold and minerals other than coal and oil, viz., 14,155 acres, is almost double the acreage held in the previous year, and indicates a most satisfactory state of affairs.

A considerable amount of assistance under the provisions of the Mining Development Act was again granted.

This assistance is given with the view to helping in the development of struggling mines, and particulars relative thereto will be found in the report of the State Mining Engineer, published as Division II. of this report.

Every application that has any reasonable hope of ultimate success is granted, in accordance with the Government's desire to encourage and foster the industry.

PART II.—MINERALS RAISED.

TABLE 1.

Quantity and Value of all the Minerals produced during 1918 and 1919.

	Description of Minerals.	1918.		1919.		Increase or Decrease for Year compared with 1918.	
		Quantity.	Value.	Quantity.	Value.	Quantity.	Value
			£		£		£
1.	Arsenical ore (exported), statute tons	697	2,564	...	...	— 697	— 2,564
2.	Asbestos (reported), statute tons	...	...	53	1,443	+ 53	+ 1,443
3.	Bismuth (exported), cwts.	...	...	1	15	+ 1	+ 15
4.	Coal (raised), statute tons	337,039	204,319	401,713	270,355	+ 64,674	+ 66,036
5.	Copper { Ore (exported), statute tons	1,643	24,877	455	9,740	— 1,188	— 15,137
	Copper { Ingot, Matte, etc. (exported), statute tons	478	41,269	4	365	— 474	— 40,904
6.	Corundum (exported), statute tons	...	...	1	1	+ 1	+ 1
7.	Gold (exported and minted), fine ounces	876,511	3,723,183	734,066	3,118,113	— 142,445	— 605,070
8.	Graphite (exported), statute tons	5	75	...	...	— 5	— 75
9.	Lead and silver lead (ore and concentrates exported) statute tons	282	3,045	248	3,704	— 34	+ 659
10.	Lead, Pig (exported), statute tons	5,489	163,880	1,780	48,462	— 3,709	— 115,418
11.	Magnesite (exported), statute tons	62	225	...	...	— 62	— 225
12.	Mica (exported), statute tons...	...	...	1	514	+ 1	+ 514
13.	Molybdenite (exported), statute tons	5	97	7	100	+ 2	+ 3
14.	Pyritic Ore (reported), statute tons	2,252	1,629	4,136	4,919	+ 1,884	+ 3,290
15.	Silver (exported), fine ounces...	109,830	22,711	223,332	55,342	+ 113,502	+ 32,631
16.	Tantalite (exported), statute tons	...	...	¼	75	+ ¼	+ 75
17.	Tin (exported), statute tons	415	76,952	318	47,269	— 97	— 29,683
18.	Tungsten Ore { Scheelite (exported), statute tons...	5	720	6	772	+ 1	— 52
	Tungsten Ore { Wolfram (exported), statute tons...	¼	31	½	15	+ ¼	— 16
	Total Values	...	4,265,577	...	3,561,204	...	—704,373

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.
	£	£	
1901	8,515,623	6,920,118	81·27
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	9,128,607	4,608,188	50·48
1914	8,406,182	3,970,182	47·23
1915	6,291,934	2,969,502	47·19
1916*	...	...	...
1917*	...	...	...
1918*	...	...	...
1919*	...	...	...
15 Years Total ...	137,824,649	96,686,077	70·15

*Particulars not at present available.

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 1919.

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

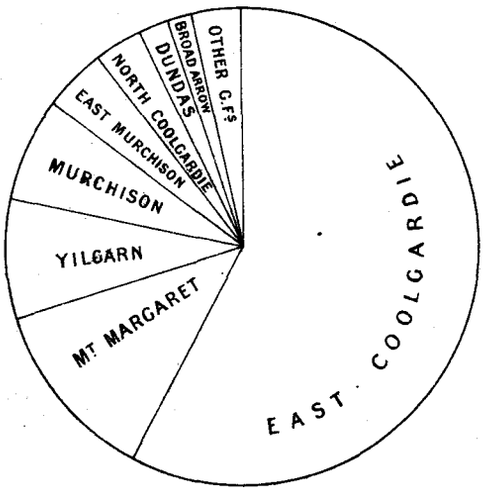


Fig 2. Gold produced from various Goldfields as given by the Export and Mint Returns.

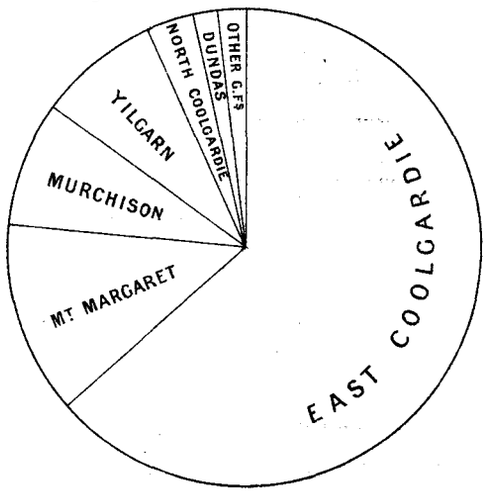


Fig 3. Value of Gold and other Minerals.

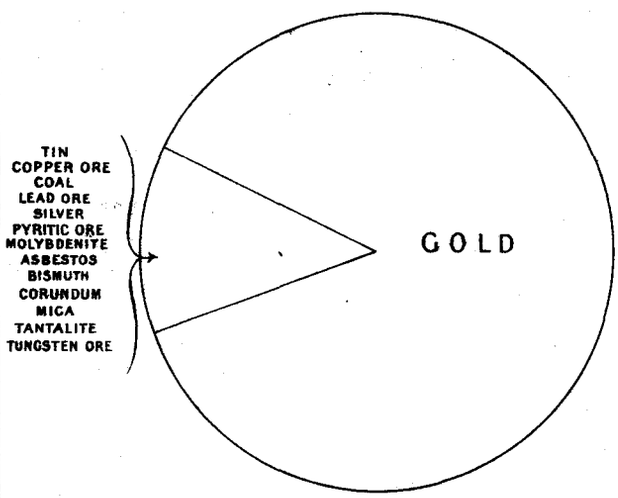


Fig 4. Value of Minerals other than Gold.

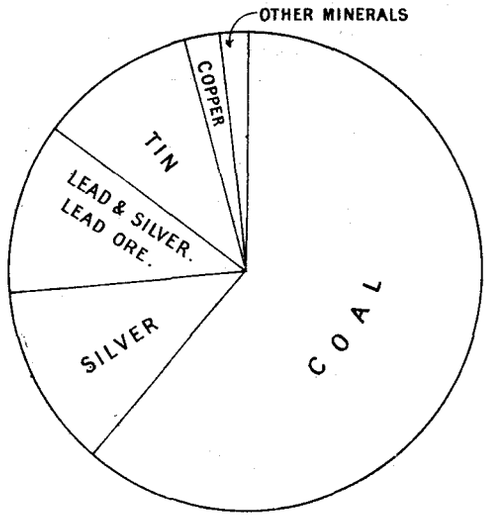


Fig 5. Areas of Land leased for Goldmining on various Goldfields.

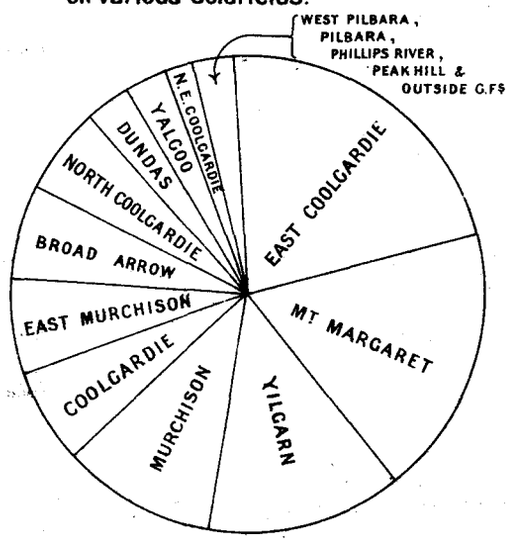
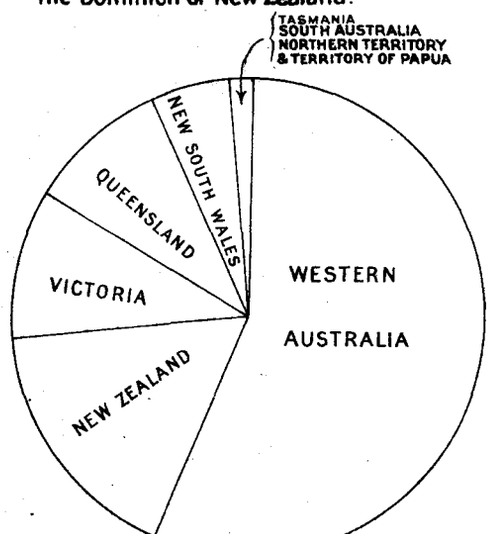
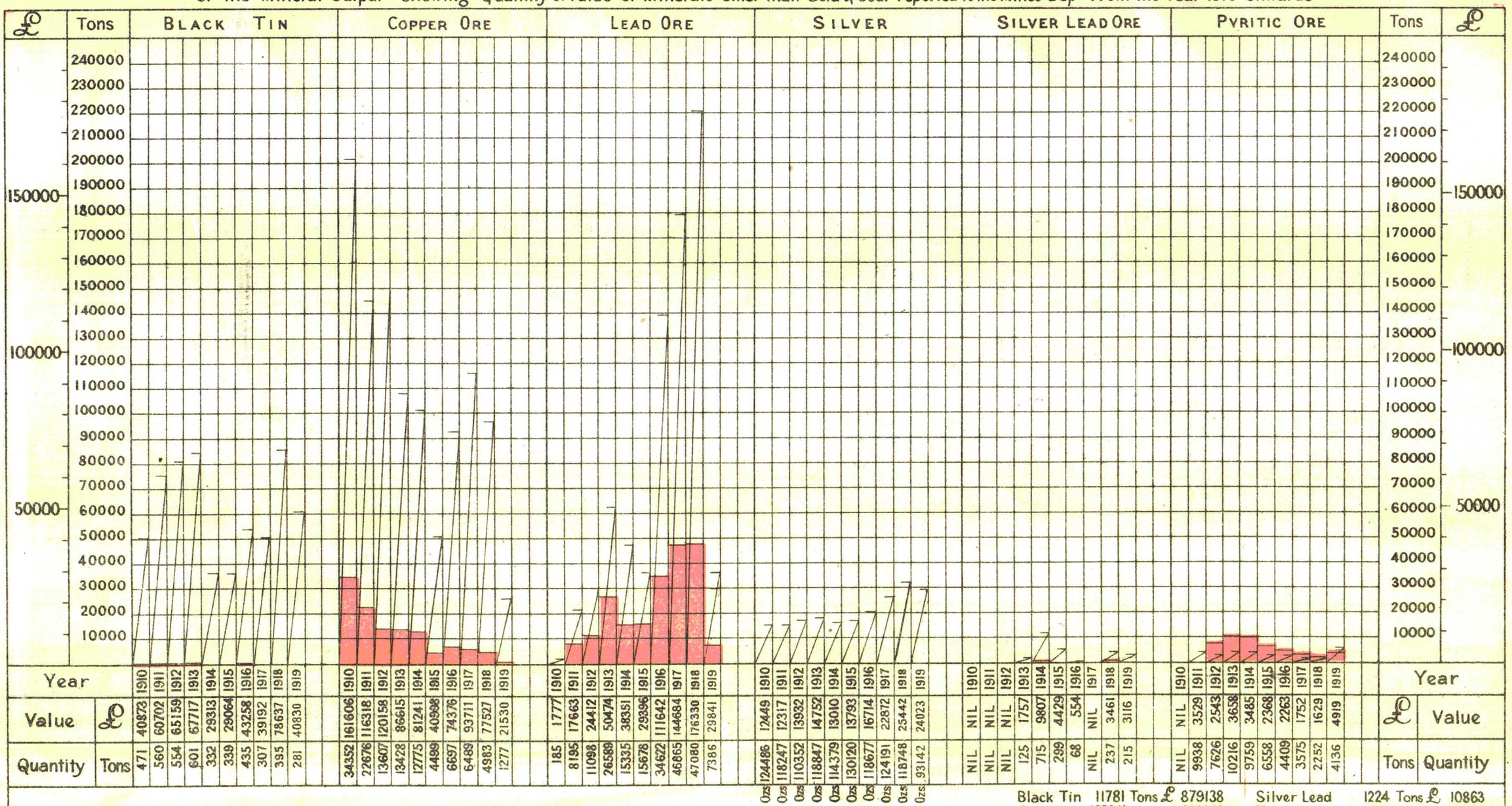


Fig 6. Output of Gold in the States of Australia and the Dominion of New Zealand.



DIAGRAM

of the Mineral Output - showing Quantity & Value of Minerals other than Gold & Coal reported to the Mines Dept from the Year 1910 onwards



NOTE. The Pink denotes Quantities produced and Diagonal lines Values thereof

Other Minerals not shewn above viz { Asbestos 53 Tons, Value £1443. Scheelite 319 " " £930. also reported in the year 1919.

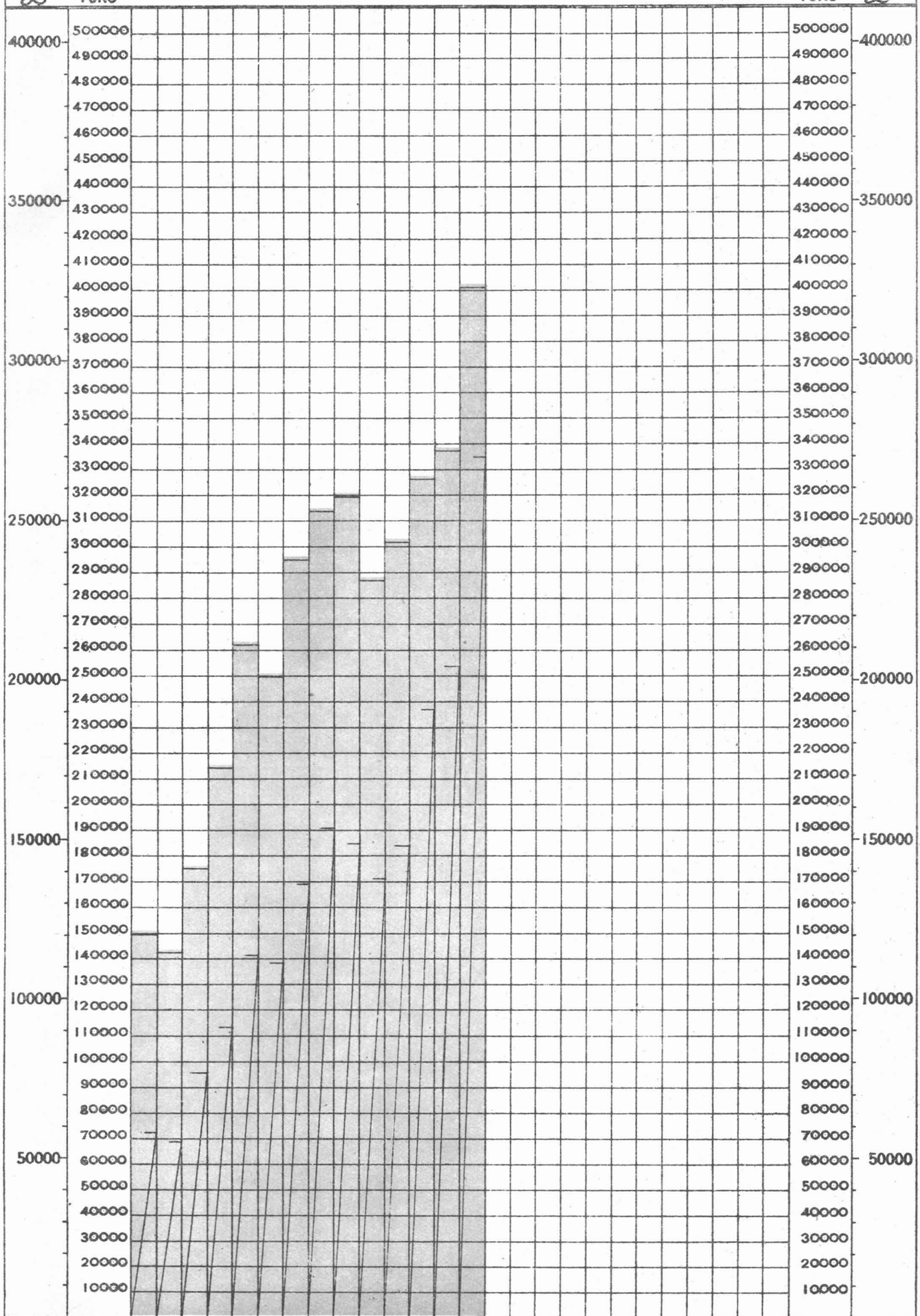
Previous to 1910 the Quantity & Value of various Minerals reported amounted to .....

Black Tin	11781 Tons	£	879138	Silver Lead	1224 Tons	£	10863
Copper	105041	"	688360	Tantalite	89	"	13486
Ironstone	57820	"	36695	Limestone	93706	"	18290
Lead	418	"	2034	Silver	951624 ozs		114386
Asbestos	43	"	1754	Total		£	1765006

1919.

DIAGRAM

Of the Coal Output – Shewing Quantity & Value as reported to Mines Dept from 1906 onwards



Year		1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919
Value	£	57998	55158	75694	90965	113699	111154	135857	153614	148684	137589	147823	191822	204319	270355
Quantity	Tons	149765	142373	175248	214302	262166	249890	295079	313818	319210	286666	301526	326550	337039	401713

1919.

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.					
	1918.	1919.	Percentage for each Goldfield.		Average Value of Gold per ton of Ore treated.	
			1918.	1919.	1918.	1919.
	fine ozs.	fine ozs.			shillings.	shillings.
1. Kimberley	15	**151**	·01	**·02**	...	...
2. Pilbara	3,748	**3,421**	·44	**·50**	224·55	**135·50**
3. West Pilbara	120	**95**	·02	**·01**	291·27	**29·02**
4. Ashburton	...	...	...	...	...	...
5. Gascoyne	...	...	...	...	...	...
6. Peak Hill	1,089	**2,255**	·13	**·33**	65·66	**42·40**
7. East Murchison	29,211	**27,414**	3·41	**3·98**	47·15	**50·14**
8. Murchison	63,285	**50,570**	7·39	**7·35**	60·57	**55·33**
9. Yalgoo	4,398	**4,788**	·51	**·70**	66·41	**95·46**
10. Mt. Margaret	85,347	**88,152**	9·97	**12·81**	31·65	**32·09**
11. North Coolgardie	36,830	**23,020**	4·30	**3·34**	56·54	**48·70**
12. Broad Arrow	4,126	**11,729**	·48	**1·70**	68·69	**43·84**
13. North-East Coolgardie	3,700	**5,472**	·43	**·80**	49·74	**147·03**
14. East Coolgardie	524,823	**397,055**	61·31	**57·69**	42·43	**48·61**
15. Coolgardie	7,963	**5,814**	·93	**·84**	62·86	**48·97**
16. Yilgarn	70,766	**54,003**	8·27	**7·85**	40·08	**32·87**
17. Dundas	15,950	**12,530**	1·86	**1·82**	43·82	**49·64**
18. Phillips River	4,479	**1,700**	·52	**·25**	126·08	**105·29**
State generally	196	**46**	·02	**·01**	...	...
Totals and averages	856,046	**688,215**	100·00	**100·00**	43·00	**44·88**

The total gold yield of the State is as shown in Table 1, being the amount of gold exported, and also that lodged at the Royal Mint, which total includes alluvial gold and gold not reported to the 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.

TABLE 4.

Number of Gold-producing Mines in the several Goldfields and Districts during 1918 and 1919.

Goldfield.	District.	1918.		1919.		Increase or Decrease.
		District.	Goldfield.	District.	Goldfield.	
Kimberley	... ...	...	...	...	...	...
Pilbara	Marble Bar	9	9	13	15	+ 6
	Nullagine	...		2		
West Pilbara	... ...	...	2	...	3	+ 1
Ashburton	... ...	...	...	...	...	...
Gascoyne	... ...	...	...	...	...	...
Peak Hill	... ...	...	9	...	8	— 1
East Murchison	Lawlers	11	31	6	24	— 7
	Wiluna	6		6		
	Black Range	14		12		
	Cue	15		16		
Murchison	Meekatharra	21	60	18	50	— 10
	Day Dawn	6		3		
	Mt. Magnet	18		13		
Yalgoo	... ...	...	16	...	15	— 1
Mt. Margaret	Mt. Morgans	12	41	10	31	— 10
	Mt. Malcolm	13		10		
	Mt. Margaret	16		11		
North Coolgardie	Menzies	15	30	11	23	— 7
	Ularring	6		4		
	Niagara	5		4		
	Yerilla	4		4		
Broad Arrow	... ...	...	15	...	9	— 6
North-East Coolgardie ...	Kanowna	11	13	6	8	— 5
	Kurnalpi	2		2		
East Coolgardie	East Coolgardie ...	46	48	42	42	— 6
	Bulong	2		...		
Coolgardie	Coolgardie	27	37	26	32	— 5
	Kunanalling	10		6		
Yilgarn	... ...	...	41	...	34	— 7
Dundas	... ...	...	18	...	17	— 1
Phillips River	... ...	...	16	...	13	— 3
State generally	... ...	...	...	...	1	+ 1
	Totals	...	386	...	325	— 61

TABLE 5.

Gold Yield from Registered Gold Mining Companies and Gold Mining Leases for the Years 1916, 1917, 1918 *and* 1919.

Goldfield	Registered Companies producing over 12,000 ozs.								Registered Companies producing under 12,000 ozs.								Leases, exclusive of Sundry Claims and Treatment.							
	1916.		1917.		1918.		1919.		1916.		1917.		1918.		1919.		1916.		1917.		1918.		1919.	
	No.	Fine ozs.	No.	Fine ozs.	No.	Fine ozs.	No.	Fine ozs.	No.	Fine ozs.	No.	Fine ozs.	No.	Fine ozs.	No.	Fine ozs.	No.	Fine ozs.	No.	Fine ozs.	No.	Fine ozs.	No.	Fine ozs.
Kimberley	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Pilbara	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	24	4,208	19	2,811	9	2,264	15	**2,449**
West Pilbara	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	508	3	249	2	81	3	**57**
Gascoyne	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	14	...	...	...	...	...	...
Peak Hill	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	12	1,601	9	1,328	9	921	3	**683**
East Murchison	1	18,362	1	14,591	...	...	1	**13,468**	8	11,154	5	8,302	6	19,967	3	**7,346**	33	8,440	35	6,703	25	6,676	20	**5,154**
Murchison	1	15,423	1	21,951	...	...	1	**14,500**	5	10,715	4	3,167	5	3,751	3	**1,734**	76	52,121	61	53,056	55	55,565	46	**28,928**
Yalgoo	...	...	...	...	...	...	...	...	3	3,705	1	1,788	1	311	1	**715**	24	3,397	19	3,696	15	3,718	14	**3,787**
Mt. Margaret	2	71,579	2	81,599	2	71,006	2	**77,265**	8	23,406	5	12,303	7	8,109	6	**6,918**	29	3,603	36	5,750	32	4,284	23	**2,357**
N. Coolgardie	1	14,134	1	12,531	1	12,845	...	...	6	13,029	5	11,059	7	13,502	7	**14,612**	42	12,584	31	7,019	22	7,449	16	**5,789**
Broad Arrow	1	12,674	...	...	...	...	...	...	...	...	1	9,398	1	287	2	**8,622**	23	6,888	22	6,048	14	2,739	7	**2,000**
N.E. Coolgardie	...	...	...	...	...	...	...	...	1	3,020	1	2,427	1	1,119	1	**60**	14	2,228	10	1,666	12	1,734	7	**4,874**
E. Coolgardie	9	524,189	9	508,073	10	482,906	10	**361,151**	12	18,673	14	14,880	11	4,019	8	**3,808**	28	27,409	29	26,290	27	28,532	24	**24,685**
Coolgardie	...	...	...	...	...	...	...	...	5	2,610	4	1,180	4	655	2	**679**	41	7,462	37	6,712	33	4,925	30	**3,507**
Yilgarn	2	54,647	2	45,197	2	34,203	2	**27,297**	10	18,212	7	19,208	8	24,789	3	**16,017**	46	9,417	38	9,393	31	7,884	29	**9,321**
Dundas	1	12,158	...	...	...	...	...	...	1	266	2	11,650	2	8,569	1	**5,466**	13	7,742	13	5,931	16	6,389	16	**6,034**
Phillips River	...	...	...	...	...	...	...	...	1	376	1	68	1	52	1	**37**	15	4,994	16	4,487	15	4,045	12	**1,579**
State generally	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	**46**
Total	18	723,166	16	683,942	15	600,960	16	**493,681**	60	105,166	50	95,424	54	85,130	38	**66,014**	424	152,616	378	141,139	317	137,565	271	**101,200**

TABLE 6.

Increase or Decrease in Output of certain producing Gold Mines in 1919 *as compared with* 1918.

Goldfield.	District.		Name of Mine.	Gold Production. 1918.	Gold Production. 1919.	Increase or Decrease for Year compared with 1918.
				Fine ozs.	Fine ozs.	Fine ozs.
Pilbara	Marble Bar ...	1.	Mt. Prophecy Leases	...	1,024·11	+ 1,024·11
East Murchison	Lawlers ...	2.	Waroonga G.M. Co., Ltd.	1,336·36	2,480·38	+ 1,144·02
Do. ...	Wiluna ...	3.	Moonlight Leases	1,593·14	856·62	— 736·52
Do. ...	do. ...	4.	Western Machinery Co., Ltd.	5,189·79	4,832·78	— 357·01
Do. ...	Black Range ...	5.	Yuanmi G.Ms., Ltd. (Youanmi)	13,304·65	13,468·00	+ 163·35
Murchison ...	Cue	6.	Big Bell	1,996·60	1,358·48	— 638·12
Do. ...	do. ...	7.	Light of Asia and Queen of the May Leases	3,209·79	3,085·13	— 124·66
Do. ...	do. ...	8.	Nigel	1,336·29	559·93	— 776·36
Do. ...	do. ...	9.	Turn of the Tide	572·40	456·77	— 115·63
Do. ...	Meekatharra ...	10.	Fenian Leases	18,306·33	15,256·08	— 3,050·25
Do. ...	do. ...	11.	Gwalia	5,694·13	596·64	— 5,097·49
Do. ...	do. ...	12.	Ingliston Consols Extended Leases ...	14,255·58	14,500·17	+ 244·59
Do. ...	do. ...	13.	Ingliston Leases	3,044·28	2,605·65	— 438·63
Do. ...	do. ...	14.	Waterloo	973·07	1,098·77	+ 125·70
Do. ...	Day Dawn ...	15.	Great Fingall Consolidated, Ltd.... ...	3,540·51	1,605·32	— 1,935·19
Do. ...	Mt. Magnet ...	16.	Gift	1,654·59	16·36	— 1,638·23
Yalgoo	... ...	17.	Carnation	802·01	1,742·00	+ 939·99
Do. ...	... ...	18.	Lake View: Payne's Find Development Co.. N.L.	310·58	715·48	+ 404·90
Mt. Margaret ...	Mt. Morgans ...	19.	Westralia Mt. Morgans Mines, N.L. ...	2,716·05	3,050·97	+ 334·92
Do. ...	Mt. Malcolm ...	20.	Sons of Gwalia, Ltd.	44,724·99	48,615·73	+ 3,890·74
Do. ...	Mt. Margaret	21.	Ida H. G.M. Co., Ltd.	4,916·37	3,206·88	— 1,709·49
Do. ...	do. ...	22.	Lancefield G.Ms., Ltd.	26,281·30	28,649·74	+ 2,368·44
North Coolgardie	Menzies ...	23.	Gladsome Leases	4,426·68	3,360·44	— 1,066·24
Do. ...	do. ...	24.	New Boddington G.M. Syndicate, Ltd. ...	1,940·20	...	— 1,940·20
Do. ...	do. ...	25.	Sand Queen G.Ms., Ltd.	6,977·09	2,406·24	— 4,570·85
Do. ...	do. ...	26.	Menzies Consolidated G.Ms., Ltd. ...	12,845·37	11,228·11	— 1,617·26
Do. ...	Ularring ...	27.	Riverina South G.M. Co., N.L.	3,764·37	502·67	— 3,261·70
Do. ...	Niagara ...	28.	Cosmopolitan No. 2: Western Machinery Co., Ltd	305·85	373·11	+ 67·26
Broad Arrow ...	... ...	29.	Associated Northern Blocks (W.A.), Ltd.	287·21	8,618·55	+ 8,331·34
Do. ...	... ...	30.	Oversight	117·42 *414·19	...	— 531·61
Do. ...	... ...	31.	Tara	... *463·41	383·53 *1,122·22	+ 1,042·34
North-East Coolgardie	Kanowna ...	32.	Kanowna	266·05	4,111·32	+ 3,845·27
Do. ...	do. ...	33.	North White Feather G.Ms., Ltd. ...	1,118·61	59·87	— 1,058·74
East Coolgardie	East Coolgardie	34.	Creswick Leases	847·17	1,094·49	+ 247·32
Do. ...	do. ...	35.	Waterfall Gold Mine Leases	2,486·75	1,700·04	— 786·71
Do. ...	do. ...	36.	Associated G.Ms. of W.A., Ltd.	25,471·37	23,036·76	— 2,434·61
Do. ...	do. ...	37.	Associated Northern Blocks (W.A.), Ltd.	22,323·08	24,766·65	+ 2,443·57
Do. ...	do. ...	38.	Golden Horseshoe Estates Co., Ltd. ...	77,104·39	47,651·10	— 29,453·29
Do. ...	do. ...	39.	Great Boulder Perseverance G.M. Co., Ltd.	48,351·58	37,260·78	— 11,090·80
Do. ...	do. ...	40.	Great Boulder Proprietary G.Ms., Ltd. ...	113,322·78	73,845·95	— 39,476·83
Do. ...	do. ...	41.	Idaho Leases	8,756·65 ...	6,870·34 *562·22	— 1,324·09
Do. ...	do. ...	42.	Ironsides North Leases	14,012·45	12,142·54	— 1,869·91
Do. ...	do. ...	43.	Ivanhoe Gold Corporation, Ltd.	81,392·34	63,486·43	— 17,905·91
Do. ...	do. ...	44.	Kalgurli G.Ms., Ltd.	19,715·59	15,575·93	— 4,139·66
Do. ...	do. ...	45.	Lake View and Star, Ltd.	40,348·63	30,257·61	— 10,091·02
Do. ...	do. ...	46.	North Kalgurli (1912), Ltd.	411·90	1,848·94	+ 1,437·04
Do. ...	do. ...	47.	Oroya Links, Ltd.	25,081·31	20,618·41	— 4,462·90
Do. ...	do. ...	48.	South Kalgurli Consolidated, Ltd. ...	29,795·41	24,651·20	— 5,144·21
Do. ...	do. ...	49.	Hannan's Reward, Ltd.	1,375·30 ...	850·43 *5·72	— 519·15
Coolgardie ...	Coolgardie ...	50.	Burbanks Birthday G.Ms., Ltd.	451·91	600·27	+ 148·36
Do. ...	Kunanalling ...	51.	Carbine Leases	1,124·81	379·98	— 744·83
Yilgarn ...	... ...	52.	Bullfinch Proprietary (W.A.), Ltd. ...	14,181·10	14,375·94	+ 194·84
Do. ...	....	53.	Great Victoria Leases	2,635·30	3,477·67	+ 842·37
Do. ...	... ...	54.	Edna May Central G.M. Co., N.L. ...	9,785·84	12,921·07	+ 3,135·23
Do. ...	... ...	55.	Edna May Consolidated G.M. Co., N.L. ...	6,277·49	...	— 6,277·49
Do. ...	... ...	56.	Edna May Deep Levels G.M. Co., N.L.	7,928·65	5,804·32	— 2,124·33
Do. ...	... ...	57.	Edna May G.M. Co., N.L.	20,021·79	10,196·68	— 9,825·11
Do. ...	... ...	58.	Transvaal Leases	1,498·32	2,208·00	+ 709·68
Dundas ...	... ...	59.	Mararoa G.M. Co., N.L.	8,542·38	5,466·09	— 3,076·29
Do. ...	... ...	60.	Viking No. 1 Leases	2,854·44	2,850·52	— 3·92
Phillips River ...	... ...	61.	Fair Play Leases	1,415·63	...	— 1,415·63
Do. ...	... ...	62.	Gem Consolidated Leases	1,082·55	412·68	— 669·87

* Dollied.

TABLE 7.

Averages of Gold Ore raised and treated, and Gold produced therefrom, per man employed on the several Goldfields of the State, during 1918 *and* 1919.

Goldfield.	1918.				1919.			
	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	38·33	22·16	99·51	57·53	**67·24**	**32·54**	**107·23**	**51·88**
3. West Pilbara	17·50	8·75	40·79	20·40	**101·00**	**50·50**	**34·69**	**17·35**
4. Ashburton	...	...	...	...	...	...	...	...
5. Gascoyne	...	...	...	...	...	...	...	...
6. Peak Hill	140·90	70·45	103·08	51·54	**366·13**	**175·74**	**182·72**	**87·71**
7. East Murchison	339·57	168·16	186·14	92·18	**320·81**	**152·46**	**189·35**	**89·99**
8. Murchison	215·45	122·43	149·89	85·18	**214·38**	**116·60**	**139·61**	**75·94**
9. Yalgoo	106·15	56·26	82·90	43·94	**73·64**	**39·97**	**82·74**	**44·91**
10. Mt. Margaret	464·72	261·23	170·93	96·09	**447·59**	**268·25**	**169·09**	**101·34**
11. North Coolgardie	217·86	113·16	144·00	74·80	**181·13**	**95·66**	**103·83**	**54·84**
12. Broad Arrow	39·87	24·17	22·32	13·80	**201·38**	**116·41**	**103·93**	**60·07**
13. North-East Coolgardie ...	150·47	82·07	86·43	47·15	**120·92**	**57·04**	**209·26**	**98·71**
14. East Coolgardie	550·49	305·22	274·71	152·32	**398·25**	**225·81**	**227·88**	**129·21**
15. Coolgardie	110·95	46·79	78·26	330·05	**62·38**	**30·30**	**35·95**	**17·47**
16. Yilgarn	298·80	177·72	140·97	83·85	**284·84**	**173·60**	**110·21**	**67·17**
17. Dundas	391·45	225·72	189·25	109·13	**247·18**	**139·49**	**144·45**	**81·51**
18. Phillips River	111·77	75·45	165·87	111·96	**80·37**	**47·11**	**99·62**	**58·40**
Total Averages	402·51	223·28	202·17	112·15	**327·30**	**183·72**	**172·92**	**97·06**

The average value of gold produced per man employed above and below ground was £476·38 in 1918 and £412·28 in 1919. The average tonnage of ore raised shows a decrease from 223·28 tons to 18·372 tons. The average tonnage raised per man is highest in the Mt. Margaret Field, viz., 268·25 tons, average value £430·46, the next being East Coolgardie Field with 225·81 tons, average value £548·85.

TABLE 8.

Output of Gold from the Several States of Australia, the Northern Territory, the Territory of Papua, and the Dominion of New Zealand during 1919.

State.	Output of Gold.	Value.	Percentage of total Output of Australasia.
	Fine ozs.	£	
1. Western Australia	734,066	3,118,113	56·73
2. Victoria	135,427	575,260	10·47
3. Queensland	121,030	514,103	9·35
4. New South Wales	65,839	279,666	5·09
5. Tasmania	7,686	32,650	·59
6. South Australia	3,224	13,696	·25
7. Northern Territory	873	3,707	·07
8. Territory of Papua	8,377	35,583	·65
9. New Zealand	217,315	923,095	16·80
Total	1,293,837	5,495,873	100·00

TABLE 9.

Dividends paid by Western Australian Gold Mining Companies during 1919 and Total to date.

(Compiled from information supplied by the Government Statistician's Office and the Chamber of Mines of W.A., Kalgoorlie.)

Goldfield.	Name of Company.	Capital.				Dividends.		
		Authorised	No. of Shares.	Par Value Shares.	Paid up to.	Paid in 1919.		Grand Total paid to end of 1919.
						No.	Total Amount.	
		£		£ s. d.	£ s. d.		£	£
Peak Hill ...	Various Companies ...	...	...	...	...	...	...	160,666
East Murchison...	Various Companies ...	...	...	...	...	...	...	437,968
Murchison ...	Various Companies ...	...	...	...	...	...	...	1,835,170
Mt. Margaret ...	Various Companies ...	...	...	...	...	...	...	1,431,576
North Coolgardie	Various Companies ...	...	...	...	...	...	...	575,032
North-East Coolgardie	Various Companies ...	...	...	...	...	...	...	82,971
East Coolgardie	Golden Horseshoe Estates Co., Ltd.	1,500,000	300,000	5 0 0	5 0 0	1	30,000	3,442,500
Do. ...	Great Boulder Proprietary G.Ms., Ltd.	175,000	1,750,000	0 2 0	0 2 0	3	196,875	5,663,050
Do. ...	Ivanhoe Gold Corporation, Ltd.	1,000,000	200,000	5 0 0	5 0 0	4	75,000	3,793,750
Do. ...	Kalgurli G.Ms., Ltd.	120,000	120,000	1 0 0	1 0 0	1	12,000	1,639,500
Do. ...	South Kalgurli Consolidated, Ltd.	150,000	250,007	0 10 0	0 10 0	1	9,375	180,625
Do. ...	Other Companies	...	...	...	...	...	...	7,045,578
Coolgardie ...	Various Companies ...	...	...	...	...	...	...	339,495
Yilgarn	Edna May G.M. Co., N.L. ...	25,000	42,850	0 10 0	0 10 0	7	14,994	325,649
Do. ...	Other Companies	...	...	...	...	...	...	176,634
Dundas	Various Companies ...	...	...	...	...	...	...	294,500
	Total Dividends paid during 1919	...	...	...	...	...	338,244	...
	Total Dividends paid to end of 1919	...	...	...	...	...	...	£27,424,664

TABLE 10.

Value of Gold Production and Percentage of Dividends paid.

Year.	Value of Gold Production.	Dividends paid by Gold Mining Companies.	Dividends % of Total Production.	Value of Gold Production by Gold Mining Companies only.	Dividends % upon Production by Gold Mining Companies.
	£	£	%	£	%
Prior to 1910 ...	91,780,564	20,322,890	22·14	...	...
1910	6,246,848	1,028,393	16·46	4,815,541	21·36
1911	5,823,075	826,976	14·20	4,628,666	17·87
1912	5,448,385	814,092	14·94	4,304,161	18·91
1913	5,581,701	910,326	16·30	4,528,106	20·10
1914	5,237,353	799,392	15·26	4,094,336	19·52
1915	5,140,228	792,317	15·41	4,109,254	19·28
1916	4,508,532	632,883	14·04	3,518,531	17·99
1917	4,121,645	590,856	14·34	3,310,536	17·85
1918	3,723,183	368,295	9·81	2,914,325	12·64
1919	3,118,113	338,244	10·85	2,337,433	14·23
Total ...	140,729,627	27,424,664	19·49	*38,560,889	*18·42

* Ten last years only.

TABLE 11.

Quantity and Value of Minerals, other than Gold and Coal, reported to the Mines Department during 1919.

Goldfield, District, or Mineral Field.	1919.		Increase or Decrease for Year compared with 1918.	
	Quantity.	Value.	Quantity.	Value.
	tons.	£	tons.	£
BLACK TIN.				
Pilbara Goldfield (Marble Bar District)	36·70	5,871	— 62·80	— 15,113
Greenbushes Mineral Field	244·61	34,959	— 51·19	— 22,694
Total	281·31	40,830	— 113·99	— 37,807
PYRITIC ORE.				
Mt. Margaret Goldfield (Mt. Morgans District)	4,135·93	4,919	+ 1,884·12	+ 3,290
COPPER ORE.				
West Pilbara Goldfield	1,030·78	15,807	— 813·41	— 13,154
Peak Hill Goldfield	14·39	353	— 61·89	— 2,127
East Murchison Goldfield	...	...	— 82·44	— 1,314
Murchison Goldfield	16·81	377	— 61·53	— 1,417
Phillips River Goldfield	215·02	4,993	— 2,686·64	— 37,985
Total	1,277·00	21,530	— 3,705·91	— 55,997
SILVER LEAD ORE.				
Ashburton Goldfield	214·76	3,116	— 22·72	— 345
LEAD ORE.				
Northampton Mineral Field.	7,385·70	29,841	— 39,693·98	— 146,489
TUNGSTEN ORES.				
SCHEELITE.				
North Coolgardie Goldfield	273·06	829	+ 273·06	+ 829
Coolgardie Goldfield	45·71	101	+ 45·71	+ 101
Total	318·77	930	+ 318·77	+ 930
ASBESTOS.				
Pilbara Goldfield (Nullagine District)	53 00	1,443	+ 53·00	+ 1,443
MAGNESITE.				
East Coolgardie Goldfield	...	...	— 105·25	— 334

The output of Black Tin shows decreases in tonnage of 113.99 tons, and in value of £37,807. In Pyritic Ore there were increases in tonnage of 1,884.12 tons, and in value of £3,290. In copper ore there was a decrease in tonnage of 3,705.91 tons, and in value of £55,997. Silver lead ore decreased in tonnage by 22.72 tons and in value £345, and lead ore decreased in tonnage by 39,693.98 tons, and in value £146,489. In tungsten ores the output of scheelite was 318.77 tons of a value of £930, there being none in the previous year; and the output of asbestos was 53 tons of a value of £1,443, whilst not any was produced in the previous year. There was no output of magnesite, whilst in the previous year 105.25 tons, valued at £334, was reported.

The production of tin was again confined to Pilbara and Greenbushes Fields, while copper ore came from West Pilbara, Peak Hill, Murchison, and Phillips River Goldfields. Pyritic ore came from Mount Margaret Goldfield. The production of silver lead ore was confined to Ashburton Goldfield, and of lead ore to Northampton Mineral Field. Scheelite came from North Coolgardie and Coolgardie Goldfields, while asbestos came from Pilbara Goldfield.

It will be observed that the figures in this table differ from those in Table 1. The figures above are those reported to the Department, and this table is published as an index to the amount of mining in each field named.

TABLE 12.

Quantity of Coal raised during 1918 and 1919, and estimated Value thereof, with 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	1918	337,039	204,319	154	464	726	545
	1919	401,713	270,355	183	543	740	553

The number of men employed at collieries has increased by 108, and the output increased by 64,674 tons.

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

TABLE 13.

Total Number and Acreage of Leases held for Mining on 31st December, 1918 and 1919.

Description of Leases.	1918.		1919.	
	No.	Acreage.	No.	Acreage.
Gold mining leases on Crown land	847	12,448	819	12,758
,, ,, ,, private property	...	...	...	...
Mineral leases on Crown land	284	38,282	285	40,783
,, ,, private property	4	132	5	147
	1,135	50,862	1,109	53,688

The total number of leases held for mining purposes decreased by 26 and the relative area increased by 2,826 acres, as compared with the year 1918. The number of leases for gold mining decreased by 28 and the area increased by 310 acres. The number of mineral leases increased by 2 and the area by 2,516 acres.

TABLE 14.

Number and Acreage of Gold-mining Leases in force each year for the Five Years ending the 31st December, 1919.

Goldfield.		District.		1915.		1916.		1917.		1918.		**1919.**		Percentage of Total Acreage.		Increase or Decrease for 1919 compared with 1918.		Goldfield.
Name.	Proclaimed.	Name.	Proclaimed.	Leases.	Acreage.	Leases.	Acreage.	Leases.	Acreage.	Leases.	Acreage.	Leases.	Acreage.	1918.	**1919.**	Increase.	Decrease.	
Kimberley ...	20–5–86	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	Kimberley.
Yilgarn	1–10–88	...	...	218	4,381	153	2,985	144	2,702	98	1,742	**94**	**1,697**	13·99	**13.30**	...	45	Yilgarn.
Pilbara	1–10–88	Marble Bar ...	6–11–96	24	223	18	169	17	169	13	115	**15**	**125**	1·30	**1·31**	4	...	Pilbara.
		Nullagine ...	6–11–96	10	89	10	90	8	78	5	48	**5**	**42**					
Ashburton ...	11–12–90	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	Ashburton.
Murchison... ...	24–9–91	Cue	7–12–94	24	242	29	323	46	539	30	378	**37**	**471**	**13·39**	**10·37**	...	334	Murchison.
		Meekatharra ...	7–12–94	98	1,317	80	1,052	60	819	56	713	**36**	**468**					
		Day Dawn ...	10–1–96	46	507	40	428	38	398	36	377	**19**	**215**					
		Mount Magnet ...	7–12–94	45	485	35	321	28	274	21	189	**16**	**169**					
Dundas	31–8–93	...	...	43	543	38	465	47	521	41	423	**37**	**416**	3·39	**3·26**	...	7	Dundas.
Coolgardie ...	6–4–94	Coolgardie ...	7–12–94	78	1,132	44	517	40	519	41	594	**43**	**723**	6·20	**6·88**	105	...	Coolgardie.
		Kunanalling ...	1–9–97	14	179	19	239	20	256	15	179	**13**	**155**					
East Coolgardie ...	1–10–94	East Coolgardie	7–12–94	149	2,028	153	2,186	157	2,269	129	1,836	**168**	**2,689**	15·51	**21·49**	811	...	East Coolgardie.
		Bulong	15–4–96	7	126	7	120	2	30	5	95	**3**	**53**					
Yalgoo	23–1–95	...	...	77	1,295	59	917	34	506	32	484	**26**	**375**	3·88	**2·94**	...	109	Yalgoo.
North Coolgardie	28–6–95	Menzies	15–4–96	42	609	49	752	42	582	37	522	**30**	**450**	6·69	**6·14**	...	50	North Coolgardie.
		Ularring	15–4–96	21	232	23	250	18	198	16	167	**15**	**183**					
		Yerilla	15–4–96	26	401	24	356	5	84	4	72	**5**	**78**					
		Niagara	1–4–97	8	95	11	155	7	108	5	72	**5**	**72**					
East Murchison ...	28–6–95	Lawlers	1–7–04	21	235	29	339	24	283	16	193	**14**	**169**	7·70	**6·78**	...	94	East Murchison.
		Black Range ...	1–7–04	62	787	44	597	36	493	22	365	**18**	**296**					
		Wiluna	1–3–10	23	365	27	437	31	524	24	401	**23**	**400**					
North-East Coolgardie	15–4–96	Kanowna ...	15–4–96	25	313	34	512	20	275	19	268	**14**	**207**	2·31	**1·80**	...	58	N.E. Coolgardie.
		Kurnalpi ...	15–4–96	4	42	4	38	3	32	2	20	**3**	**23**					
Broad Arrow ...	20–11–96	...	...	44	651	39	591	30	453	23	507	**47**	**829**	4·07	**6·50**	322	...	Broad Arrow.
Peak Hill ...	1–4–97	...	...	15	156	14	144	13	123	11	87	**11**	**90**	·69	**·71**	3	...	Peak Hill.
Mount Margaret	1–4–97	Mount Margaret	1–4–97	75	1,303	65	1,074	52	941	47	815	**38**	**712**	19·24	**17·46**	...	168	Mount Margaret.
		Mount Malcolm...	1–4–97	65	1,290	66	1,287	66	1,311	64	1,265	**57**	**1,232**					
		Mount Morgans...	2–4–02	18	286	9	167	24	384	19	315	**17**	**283**					
West Pilbara ...	1–11–95	... ...	...	3	36	3	42	3	36	2	12	**1**	**6**	·09	**·05**	...	6	West Pilbara.
Phillips River ...	14–9–00	...	...	12	185	11	176	11	176	13	182	**8**	**118**	1·46	**·92**	...	64	Phillips River.
Other Localities ...	...	...	...	...	...	...	...	...	...	1	12	**1**	**12**	·09	**·09**	...	...	Other Localities.
Gascoyne	15–4–97	...	...	4	28	2	16	1	6	...	...	...	...	...	...	...	...	Gascoyne.
Totals ...	... ...	... ...	...	1,301	19,561	1,139	16.745	1,027	15,089	847	12,448	**819**	**12,758**	100·00	**100·00**	Increase of 310		

Decrease for the year 1919: Leases 28, though relatively comprising an increase of 310 acres:—Taking into account all the goldfields, the largest percentage of the area leased for gold mining purposes is in the respective order, viz., East Coolgardie, 21·49; Mt. Margaret, 17·46; Yilgarn, 13·30; Murchison, 10·37; Coolgardie, 6·88; East Murchison, 6·78; Broad Arrow, 6·50; and North Coolgardie, 6·14.

Table 15.

Number and Acreage of Mineral Leases in force 31st December each year, for the Five Years ending 31st December, **1919.**

Mining District.		Sub District.		1915.		1916.		1917.		1918.		1919.		Increase or Decrease for 1919, compared with 1918.		Mining District.
Name.	Proclaimed.	Name.	Proclaimed.	Leases.	Acreage.	Leases.	Acreage.	Leases.	Acreage.	Leases.	Acreage.	Leases.	Acreage.	Increase.	Decrease	
Ashburton	11–12–90	...	...	8	177	6	79	6	79	5	69	4	45	...	24	Ashburton.
Murchison	24–9–91	Cue	7–12–94	4	96	1	18	...	...	2	63	7	222	159	...	Murchison.
		Meekatharra ...	7–12–94	...	...	1	12	1	24	...	...	...	...			
		Day Dawn ...	10–1–96	1	6	1	6	1	6	1	6	1	6			
		Mt. Magnet ...	7–12–94	...	...	...	...	...	...	...	...	...	...			
Greenbushes ...	7–4–92	...	...	39	574	35	522	33	492	51	644	27	409	...	235	Greenbushes.
Pilbara	16–6–92	Marble Bar ...	16–6–92	7	127	8	145	8	145	11	259	8	145	...	48	Pilbara.
		Nullagine ...	6–11–96	...	...	...	...	...	...	2	54	6	120			
Yalgoo	23–1–95	....	...	4	84	6	144	11	318	11	282	13	284	2	...	Yalgoo.
Yilgarn	22–3–95	...	...	1	3	...	...	1	48	...	...	...	...	...	...	Yilgarn.
Coolgardie	22–3–95	Coolgardie ...	22–3–95	1	9	1	9	1	9	1	10	2	28	18	...	Coolgardie.
		Kunanalling ...	1–9–97	...	...	...	...	...	...	...	...	...	...			
East Coolgardie ...	22–3–95	East Coolgardie	22–3–95	4	19	3	13	3	13	3	13	8	120	107	...	East Coolgardie.
		Bulong	15–4–96	...	...	...	...	...	...	...	...	...	...			
East Murchison ...	28–6–95	Lawlers	17–4–04	1	24	1	24	1	10	1	10	...	...	...	10	East Murchison.
		Black Range ...	1–7–04	...	...	...	...	...	...	1	6	1	6			
		Wiluna	1–3–10	1	10	1	10	...	...	...	...	...	...			
North Coolgardie ...	16–8–95	Menzies	15–4–96	...	...	...	...	...	...	...	...	...	...	...	...	North Coolgardie.
		Ularring	15–4–96	...	...	...	...	...	...	...	...	...	...			
		Yerilla	15–4–96	...	...	...	...	...	...	...	...	...	...			
		Niagara	1–3–97	...	...	...	...	...	...	...	...	...	...			
West Pilbara ...	1–11–95	...	...	12	470	19	642	17	606	15	550	14	540	...	10	West Pilbara.
Dundas	27–12–95	...	...	1	48	...	...	...	...	...	...	...	...	...	...	Dundas.
Collie	21–2–96	...	...	97	29,897	100	30,602	113	34,647	114	34,661	115	34,981	320	...	Collie.
North East Coolgardie	15–4–96	Kanowna ...	15–4–96	...	...	...	...	...	...	7	145	6	125	...	20	North-East Coolgardie.
		Kurnalpi ...	15–4–96	...	...	...	...	...	...	...	...	...	...			
Broad Arrow ...	20–11–96	...	...	...	...	1	20	1	20	...	...	...	...	...	...	Broad Arrow.
Northampton ...	1–1–97	Private Property	...	8	107	8	97	6	124	14	315	17	365	41	...	Northampton.
			...	2	68	1	48	2	72	3	84	3	75			
Peak Hill	1–4–97	...	...	9	255	11	300	15	351	9	225	8	183	...	42	Peak Hill.
Mt. Margaret ...	1–4–97	Mt. Margaret ...	1–4–97	...	...	...	...	...	...	...	...	...	...	...	53	Mt. Margaret.
		Mt. Malcolm ...	1–4–97	...	...	...	...	...	...	1	48	...	...			
		Mt. Morgans ...	2–4–02	6	134	4	74	4	74	4	74	3	69			
Gascoyne	15–4–97	...	...	...	...	...	...	...	...	...	...	...	...	...	...	Gascoyne.
Yandanooka ...	1–12–97	...	...	...	...	...	...	...	...	1	10	1	10	...	...	Yandanooka.
Phillips River ...	1–7–99	...	...	13	407	15	469	18	443	18	447	15	397	...	50	Phillips River.
Other localities ...	...	Private Property	...	11	428	13	544	16	572	12	391	29	2,728	2,361	...	Other Localities.
			...	...	...	1	48	1	48	1	48	2	72			
Totals ...	...	...	...	230	32,943	237	33,766	259	38,101	288	38,414	290	40,930	2,516	...	

Increase for the year 1919: Leases 2, acres 2,516. In the Collie Mineral Field the largest area is held, viz., 34,981 acres worked entirely for coal; then follow West Pilbara, 540 acres, for Copper; Greenbushes 409 acres, for tin; Phillips River, 397 acres for copper; Northampton, 365 acres, for lead; Yalgoo, 284 acres, for molybdenite, and Pilbara 265 acres, for tin, tantalite and asbestos.

TABLE 16.

Number and Acreage of Mineral Leases in force on 31st December, 1919, showing Minerals for which they are worked.

Goldfield or Mineral Field.	District.	Mineral. Coal. Leases.	Coal. Acres.	Tin. Leases.	Tin. Acres.	Copper. Leases.	Copper. Acres.	Iron. Leases.	Iron. Acres.	Clay. Leases.	Clay. Acres.	Limestone. Leases.	Limestone. Acres.	Ochre. Leases.	Ochre. Acres.	Silver and Lead. Leases.	Silver and Lead. Acres.	Asbestos. Leases.	Asbestos. Acres.	Manganese. Leases.	Manganese. Acres.
Pilbara	Marble Bar	...	...	6	125	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Nullagine	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	6	120	...	...
West Pilbara	...	...	...	...	...	14	540	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Ashburton	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	35	...	...	...	...
Peak Hill	...	...	...	...	...	8	183	...	...	...	...	...	...	...	...	...	...	...	...	...	...
East Murchison	Lawlers	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Black Range	...	...	...	...	...	...	...	...	...	...	1	6	...	...	...	...	...	...	...	...
Murchison	Day Dawn	...	...	...	...	...	...	...	...	1	6	...	...	...	...	...	...	...	...	...	...
	Cue	...	...	...	...	1	18	...	...	...	...	...	...	3	114	...	...	...	...	...	...
	Yandanooka	...	...	...	...	1	10	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Yalgoo	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mt Margaret	Mt. Malcolm	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Mt. Morgans	...	...	...	...	3	69	...	...	...	...	...	...	...	...	...	...	...	...	...	...
East Coolgardie	East Coolgardie	...	...	...	...	...	...	1	6	1	2	...	...	2	2	...	...	1	48	2	50
Coolgardie	Coolgardie	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
North-East Coolgardie	Kanowna	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Phillips River	...	...	...	...	...	15	397	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Collie	...	115	34,981	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Greenbushes	...	...	...	27	409	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Northampton	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	(Private Property)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Outside Proclaimed Fields	...	6	1,920	...	...	2	84	10	440	...	...	...	...	...	...	...	...	...	...	...	...
	(Private Property)	...	...	...	...	...	...	1	48	...	...	...	...	...	...	...	...	...	...	...	...
	Totals	121	36,901	33	534	44	1,301	12	494	2	8	1	6	5	116	3	35	7	168	2	50

Goldfield or Mineral Field.	District.	Mineral. Sulphur. Leases.	Sulphur. Areas.	Alunite. Leases.	Alunite. Areas.	Tantalite. Leases.	Tantalite. Areas.	Lead. Leases.	Lead. Acres.	Beryl. Leases.	Beryl. Acres.	Graphite. Leases.	Graphite. Acres.	Molybdenite. Leases.	Molybdenite. Acres.	Mica. Leases.	Mica. Acres.	Potash. Leases.	Potash. Acres.	Total. Leases.	Total. Acres.
Pilbara	Marble Bar	...	...	...	...	2	20	...	...	...	...	...	...	...	...	...	...	...	...	8	145
	Nullagine	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	6	120
West Pilbara	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	14	540
Ashburton	...	...	...	...	...	...	...	1	10	...	...	...	...	...	...	...	...	...	...	4	45
Peak Hill	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	8	183
East Murchison	Lawlers	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Black Range	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	6
Murchison	Day Dawn	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	6
	Cue	...	...	...	...	...	...	...	...	3	90	...	...	...	...	...	...	...	...	7	222
	Yandanooka	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	10
Yalgoo	...	...	...	...	...	...	...	...	...	...	...	...	...	13	284	...	...	...	...	13	284
Mt. Margaret	Mt. Malcolm	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Mt. Morgans	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	69
East Coolgardie	East Coolgardie	1	12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	8	120
Coolgardie	Coolgardie	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	28	...	...	2	28
North-East Coolgardie	Kanowna	...	...	1	24	...	...	...	...	...	...	...	...	...	...	...	...	5	101	6	125
Phillips River	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	15	397
Collie	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	115	34,981
Greenbushes	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	27	409
Northampton	...	...	...	...	...	...	...	17	365	...	...	...	...	...	...	...	...	...	...	17	365
	(Private Proverty)	...	...	...	...	...	...	3	75	...	...	...	...	...	...	...	...	...	...	3	75
Outside Proclaimed Fields	...	...	...	...	...	...	...	...	...	...	...	7	211	1	48	3	25	...	...	29	2,728
	(Private Property)	...	...	...	...	...	...	...	...	...	...	1	24	...	...	...	...	...	...	2	72
	Totals	1	12	1	24	2	20	21	450	3	90	8	235	14	332	5	53	5	101	290	40,930

TABLE 17.

Number and Acreage of Miscellaneous Leases in force from 31st December, 1919.

Goldfield.	District.	Leases.										Total.	
		Tailings.		Tramway.		Water.		Machinery.		Residence.			
		No.	Acres.	No.	Acres.	No.	Acres.	No.	Acres.	No.	Acres.	No.	Acres.
Yalgoo	... ...	...	...	...	...	...	...	1	24	...	...	1	24
West Pilbara	... ...	...	...	2	25	...	...	...	...	...	...	2	25
East Murchison	Black Range	2	36	...	...	...	...	...	...	1	2	3	38
Murchison	Meekatharra	1	10	...	...	...	...	...	...	...	...	1	10
Mt. Margaret	Mt. Margaret	1	22	...	...	...	...	...	...	...	...	1	22
North Coolgardie	Menzies	1	12	...	...	2	6	...	...	...	...	3	18
East Coolgardie	East Coolgardie ...	19	379	...	...	2	47	3	21	1	2	25	449
Coolgardie	Coolgardie	1	6	...	...	1	13	...	...	...	...	2	19
Phillips River	... ...	...	...	2	3	...	...	...	...	...	...	2	3
	Total	25	465	4	28	5	66	4	45	2	4	40	608

TABLE 18.

Claims and Authorised Holdings, under "The Mining Act, 1904," and Regulations, existing on 31st December, 1918 and 1919.

Goldfield or Mineral Field.	District.	Prospecting Areas.				Water Rights.				Lode Claims.		Alluvial Claims.		Mineral Claims.	
		Number.		Acreage.		Number.		Acreage.							
		1918.	1919.	1918.	1919.	1918.	1919.	1918.	1919.	1918.	1919.	1918.	1919.	1918.	1919.
Northampton ...	... ...	18	5	271	81	...	...	...	...	...	...	...	...	...	...
Pilbara	Marble Bar ...	6	8	75	135	2	2	2	2	2	1	4	4	...	...
Do.	Nullagine ...	2	5	24	90	2	...	13	...	4	3	...	...	...	...
West Pilbara ...	... ...	1	1	9	18	2	1	7	5	...	...	...	...	...	...
Ashburton	... ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Peak Hill	... ...	6	7	137	123	5	5	18	18	...	...	...	...	...	...
East Murchison ...	Lawlers ...	9	13	126	179	...	10	...	15	1	...	...	11	...	...
Do.	Wiluna	11	8	183	123	7	6	12	11	...	...	...	...	...	...
Do.	Black Range ...	8	19	101	267	1	1	1	5	...	...	1	...	...	...
Murchison	Cue	11	29	136	391	3	5	13	18	...	...	...	...	...	...
Do.	Meekatharra ...	21	19	244	245	1	2	1	6	...	...	...	...	...	...
Do.	Day Dawn ...	6	14	70	195	13	5	34	18	...	...	...	...	...	...
Do.	Mt. Magnet ...	23	16	276	171	3	3	3	3	...	...	...	...	...	...
Yalgoo	... ...	32	19	475	315	...	...	...	...	...	...	...	...	...	...
Mt. Margaret ...	Mt. Morgans ...	7	12	93	139	8	9	11	12	...	...	...	...	...	...
Do.	Mt. Malcolm ...	13	11	196	136	25	24	192	182	...	...	...	...	...	...
Do.	Mt. Margaret ...	16	16	213	266	24	19	55	34	...	...	...	...	...	...
North Coolgardie ...	Menzies	19	27	240	333	6	4	20	17	...	...	...	...	...	...
Do.	Ularring	8	4	92	69	3	3	3	3	...	...	...	...	...	...
Do.	Niagara	5	2	66	19	2	1	2	1	...	...	...	...	...	...
Do.	Yerilla	6	10	78	141	5	6	7	8	...	...	...	...	...	...
Broad Arrow ...	... ...	47	62	666	1,032	11	9	27	25	...	...	...	...	...	...
N.E. Coolgardie ...	Kanowna ...	10	12	149	193	1	2	3	8	3	3	...	...	1	...
Do.	Kurnalpi ...	3	10	20	136	...	...	...	...	...	...	...	...	...	...
East Coolgardie ...	East Coolgardie...	55	139	800	2,605	9	9	31	34	7	8	2	2	...	...
Do.	Bulong	...	2	...	27	...	...	...	...	2	...	...	...	2	2
Coolgardie	Coolgardie ...	56	79	880	1,422	11	10	37	34	1	1	...	...	...	...
Do.	Kunanalling ...	7	13	102	216	8	7	44	42	...	...	...	...	...	...
Yilgarn	... ...	41	35	670	653	2	2	3	3	...	...	...	...	...	...
Dundas	... ...	21	39	251	442	12	10	74	67	2	...	...	...	...	...
Phillips River ...	... ...	13	8	213	132	2	...	22	...	...	...	...	...	...	...
Collie	... ...	1	1	3,000	3,000	...	...	...	...	...	...	...	...	...	...
Greenbushes ...	... ...	4	...	33	...	11	8	43	11	...	2	...	18	...	...
Gascoyne	... ...	...	...	...	...	...	...	...	...	6	...	32	...	...	...
Outside Proclaimed Fields	... ...	13	34	6,474	38,217	...	...	...	...	...	...	...	...	1	6
	Totals ...	499	679	16,363	51,511	179	163	678	582	28	18	39	35	4	8
Increase or Decrease for 1919 compared with 1918		+ 180.		+ 35,148		— 16		— 96		— 10		— 4		+ 4	

Goldfield or Mineral Field.	District.	Dredging Claims.		Residence Areas.		Business Areas.		Machinery Areas.		Tailings Areas.		Garden Areas.		Washing Areas.		Quarrying Areas.	
		1918.	1919.	1918.	1919.	1918.	1919.	1918.	1919.	1918.	1919.	1918.	1919.	1918.	1919.	1918.	1919.
Northampton ...	... ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Pilbara	Marble Bar ...	...	...	1	1	6	6	2	3	1	1	4	4	...	...	...	...
Do.	Nullagine ...	8	...	4	4	2	2	1	1	...	...	4	4	...	...	...	...
West Pilbara ...	... ...	...	...	4	6	15	12	1	1	...	...	3	3	...	...	...	...
Ashburton	... ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Peak Hill	... ...	...	...	...	3	...	...	3	3	2	3	...	...	...	...	...	...
East Murchison ...	Lawlers ...	...	...	...	1	...	...	...	3	...	6	1	2	...	...	...	...
Do.	Wiluna	...	...	...	...	...	...	...	...	...	...	3	3	...	...	...	...
Do.	Black Range ...	...	...	61	58	2	1	2	1	...	...	8	5	...	...	...	...
Murchison	Cue	...	...	6	5	3	3	...	...	...	...	1	1	...	...	...	...
Do.	Meekatharra ...	...	...	5	4	6	5	2	3	3	3	1	1	...	...	...	...
Do.	Day Dawn ...	...	...	9	11	4	1	...	...	...	...	2	2	...	...	...	...
Do.	Mt. Magnet ...	...	...	1	1	2	1	2	2	1	1	7	6	...	...	...	...
Yalgoo	... ...	...	...	4	3	14	11	4	3	...	...	...	...	...	...	...	...
Mt. Margaret ...	Mt. Morgans ...	...	...	...	...	...	...	4	4	1	1	6	3	...	...	...	...
Do.	Mt. Malcolm ...	...	...	...	...	4	3	...	...	3	2	14	14	...	...	...	...
Do.	Mt. Margaret ...	...	...	7	7	12	12	4	4	1	1	8	7	...	...	...	...
North Coolgardie ...	Menzies ...	...	...	21	19	10	10	3	3	6	5	6	6	...	...	...	...
Do.	Ularring ...	...	...	2	2	13	11	...	...	1	1	1	1	...	...	...	...
Do.	Niagara ...	...	...	...	...	...	...	1	1	2	2	...	...	...	...	...	...
Do.	Yerilla ...	...	...	...	...	3	3	...	...	...	...	1	1	...	...	...	...
Broad Arrow ...	... ...	...	...	...	...	13	5	2	1	4	3	...	...	...	...	...	...
N.E. Coolgardie ...	Kanowna ...	...	...	...	...	...	...	2	2	2	2	3	3	...	...	...	...
Do.	Kurnalpi ...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...
East Coolgardie ...	East Coolgardie...	...	...	1	1	3	3	2	3	3	3	23	23	...	...	...	1
Do.	Bulong	...	...	1	1	1	...	...	...	...	...	...	...	...	...	...	...
Coolgardie	Coolgardie ...	...	...	...	3	3	2	4	4	3	3	1	1	...	...	...	...
Do.	Kunanalling ...	...	...	2	2	2	2	2	1	...	...	...	...	...	...	...	...
Yilgarn	... ...	...	...	130	280	88	79	4	6	2	2	1	1	...	...	...	...
Dundas	... ...	...	...	...	...	...	...	3	4	3	2	2	2	...	...	...	...
Phillips River ...	... ...	...	...	...	...	...	...	2	...	2	...	5	...	...	...	...	...
Collie	... ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Greenbushes ...	... ...	11	17	33	30	1	1	3	2	...	2	17	15	6	2	...	...
Gascoyne	... ...	...	...	1	...	1	1	...	1	...	...	...	...	...	...	...	...
Outside Proclaimed Fields	... ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Totals ...	14	17	293	442	208	174	54	57	40	43	122	108	6	2	...	1
Increase or Decrease for 1919 compared with 1918		+ 3		+ 149		— 34		+ 3		+ 3		— 14		— 4		+ 1	

Last year the number of prospecting areas held was 499, the total acreage being 16,363, which included five areas of 9,240 acres for coal and oil.

This year the number held is 679, of a total acreage of 51,511, including fifteen areas of 37,356 acres for coal and oil.

TABLE 19.

Miners' Rights issued during 1918 and 1919.

Place of Issue.	Miners' Rights.		Place of Issue.	Miners' Rights.	
	1918.	1919.		1918.	1919.
Albany	17	20	Mount Morgans	33	...
Boulder	22	84	Mullewa	4	11
Bridgetown	12	...	Mulline	4	1
Broad Arrow	84	62	Nannine	43	23
Broome	1	...	Narrogin	3	7
Bullfinch	22	32	Norseman	87	95
Bunbury	1	3	Northampton	84	32
Busselton	10	4	Northam	3	3
Carnarvon	25	35	Nullagine	27	17
Collie	6	5	Onslow	13	5
Coolgardie	173	200	Ora Banda	50	32
Cue	140	163	Payne's Find	23	24
Derby	7	17	Peak Hill	27	36
Esperance	5	...	Perth	260	285
Geraldton	15	10	Port Hedland	4	9
Greenbushes	229	127	Ravensthorpe	64	38
Hall's Creek	19	15	Roebourne	30	38
Kalgoorlie	647	1,207	Sandstone	39	57
Kunanalling	10	...	Southern Cross	70	94
Lake Darlot	12	12	Wagin	1	...
Laverton	119	115	Westonia	249	218
Lawlers	34	40	Wiluna	26	34
Leonora	88	85	Wyndham	6	1
Linden	11	12	Yalgoo	44	47
Marble Bar	98	87	Yarri	8	6
Marvel Loch	22	29	York	16	4
Meekatharra	97	124	Youanmi	19	29
Menzies	166	157			
Mount Magnet	80	110	Total	3,409	3,901

TABLE 20.

Number and Acreage of Miners' Homestead Leases in force on 31st December, 1918 and 1919.

Goldfield.	District.	1918.		1919.		Increase.		Decrease.	
		Leases.	Acreage.	Leases.	Acreage.	Leases.	Acreage.	Leases.	Acreage.
West Pilbara	... ...	...	...	...	...	...	...	...	...
Greenbushes	... ...	8	834	9	854	1	20	...	...
Pilbara	Marble Bar ...	4	58	4	58	...	...	...	...
	Nullagine	...	...	...	...				
Dundas	... ...	29	1,447	27	1,425	...	...	...	...
Broad Arrow	... ...	2	40	2	40	...	...	...	...
Yilgarn	... ...	19	602	19	688	...	86	...	...
Mt. Margaret ...	Mt. Morgans ...	2	120	...	...	...	...	...	134
	Mt. Malcolm ...	4	1,039	4	1,039				
	Mt. Margaret ...	16	459	18	445				
	Cue	8	1,297	8	1,297				
Murchison ...	Day Dawn ...	9	128	7	98	...	...	3	48
	Meekatharra ...	17	1,908	16	1,890				
	Mt. Magnet ...	3	261	3	261				
Yalgoo	... ...	2	680	2	680	...	...	...	...
Coolgardie ...	Coolgardie	26	2,913	21	922	...	...	5	1,991
	Kunanalling ...	3	540	3	540				
East Coolgardie ...	... ...	91	2,766	89	2,379	...	...	2	387
Phillips River	... ...	155	21,729	151	20,733	...	...	4	996
Peak Hill	... ...	5	252	5	252	...	...	...	...
North-East Coolgardie ...	Kanowna	18	822	18	822	...	...	...	...
North Coolgardie	Menzies	8	719	9	729	1	10	...	...
	Yerilla	1	10	1	10				
	Niagara	1	20	1	20				
	Ularring	1	20	1	20				
East Murchison...	Lawlers	5	1,110	5	1,110	...	...	1	30
	Black Range ...	5	130	4	100				
	Wiluna	3	39	3	39				
	Total ...	443	39,921	430	36,451	...	...	13	3,470

As compared with the year 1918, the number of leases held has decreased by 13 and the area by 3,470 acres.

PART IV.—MEN EMPLOYED.

TABLE 21.

Average number of Men engaged in Mining during 1918 and 1919.

Goldfield.	District.	Reef or Lode.		Alluvial.		Total.	
		1918.	1919.	1918.	1919.	1918.	1919.
1. Kimberley	...	...	...	12	12	12	12
2. Pilbara	Marble Bar	34	43	9	12	43	55
	Nullagine	30	19	17	21	47	40
3. West Pilbara	...	4	4	6	9	10	13
4. Ashburton	...	3	3	4	4	7	7
5. Gascoyne	...	2	2	4	4	6	6
6. Peak Hill	...	20	25	3	2	23	27
7. East Murchison	Lawlers	51	53	1	...	52	53
	Wiluna	75	77	...	...	75	77
	Black Range	187	173	1	...	188	173
	Cue	117	143	4	4	121	147
8. Murchison	Meekatharra	474	380	13	9	487	389
	Day Dawn	53	37	2	7	55	44
	Mt. Magnet	81	89	...	1	81	90
9. Yalgoo	...	100	105	...	1	100	106
10. Mt. Margaret	Mt. Morgans	96	108	2	7	98	115
	Mt. Malcolm	472	450	3	3	475	453
	Mt. Margaret	309	308	6	4	315	312
	Menzies	334	299	11	9	345	308
11. North Coolgardie	Ularring	96	47	3	5	99	52
	Niagara	32	25	5	3	37	28
	Yerilla	27	38	4	4	31	42
12. Broad Arrow	...	207	173	31	12	238	185
13. North-East Coolgardie	Kanowna	66	41	8	6	74	47
	Kurnalpi	11	12	4	2	15	14
14. East Coolgardie	East Coolgardie	3,418	3,049	13	19	3,431	3,068
	Bulong	25	18	5	7	30	25
15. Coolgardie	Coolgardie	168	237	28	36	196	273
	Kunanalling	62	80	16	17	78	97
16. Yilgarn	...	844	804	...	...	844	804
17. Dundas	...	137	140	...	...	137	140
18. Phillips River	...	40	29	...	1	40	30
State generally	...	...	10	...	...	...	10
Total—Gold Mining	...	7,575	7,021	215	221	7,790	7,242
MINERALS OTHER THAN GOLD.							
Tin	Greenbushes	207	154	*19	*5	226	159
	Marble Bar	5	2	*61	*48	66	50
Copper	West Pilbara	62	31	...	...	62	31
	Phillips River	68	25	...	...	68	25
	Peak Hill	28	16	...	...	28	16
Pyritic Ore	Mt. Morgans	19	18	...	...	19	18
Lead Ore	Northampton	297	73	...	...	297	73
	Ashburton	12	1	...	...	12	1
	State generally	73	...	...	...	73	...
Coal	Collie River	618	726	...	...	618	726
Graphite	State generally	4	...	...	...	4	...
Magnesite	Bulong	2	...	...	...	2	...
Asbestos	Nullagine	...	5	...	...	...	5
Total—Other Minerals	...	1,395	1,051	80	53	1,475	1,104
GRAND TOTAL	...	8,970	8,072	295	274	9,265	8,346

*Classified elsewhere as employed at mines.

TABLE 22.

Average Number of Men employed at Mines during 1919.

Mineral.	Above ground.	Under ground.	Total.	Percentage of total men employed.	Increase or decrease compared with 1918.
Coal	183	543	726	8·94	+ 103
Copper	41	31	72	·89	— 86
Gold	3,080	3,941	7,021	86·41	— 554
Lead	19	55	74	·91	— 308
Pyritic Ore	5	13	18	·22	— 1
Tin	*203	6	209	2·57	— 83
Asbestos	4	1	5	·06	+ 5
Graphite	...	...	...	...	— 4
Magnesite	...	...	...	...	— 2
Total	3,535	4,590	8,125	100·00	— 925

*As the tin obtained is principally "stream tin" the average number of alluvial workers has been, in this case, included in the heading "above ground."

The above table deals with men working their own mines, or employed on wages, and is compiled from returns furnished to the Department by mine-owners.

TABLE 23.

Average Number of Men employed at Gold Mines during 1919, classified according to the several Goldfields and the proportion of Men employed in each Goldfield.

Goldfield.	Above Ground.	Under Ground.	Total.	Increase or Decrease compared with 1918.	Percentage of total men employed.	
					1918.	1919.
1. Kimberley	...	...	...	...	...	...
2. Pilbara	32	30	62	— 2	·84	·88
3. West Pilbara	2	2	4	...	·05	·06
4. Ashburton	1	2	3	...	·04	·04
5. Gascoyne	2	...	2	...	·03	·03
6. Peak Hill	13	12	25	+ 5	·26	·36
7. East Murchison	159	144	303	— 10	4·13	4·32
8. Murchison...	296	353	649	— 76	9·57	9·24
9. Yalgoo	48	57	105	+ 5	1·32	1·50
10. Mt. Margaret	347	519	866	— 11	11·58	12·33
11. North Coolgardie	193	216	409	— 80	6·46	5·83
12. Broad Arrow	73	100	173	— 34	2·73	2·46
13. North-East Coolgardie	28	25	53	— 24	1·02	·76
14. East Coolgardie	1,328	1,739	3,067	— 376	45·45	43·68
15. Coolgardie	163	154	317	+ 87	3·04	4·52
16. Yilgarn	314	490	804	— 40	11·14	11·45
17. Dundas	61	79	140	+ 3	1·81	1·99
18. Phillips River	12	17	29	— 11	·53	·41
State generally	8	2	10	+ 10	...	·14
Total	3,080	3,941	7,021	— 554	100·00	100·00

TABLE 24.

Alluvial Gold Workers.

Goldfield.	1918.	1919.	Increase or Decrease compared with 1918.
1. Kimberley	12	12	...
2. Pilbara	26	33	+ 7
3. West Pilbara	6	9	+ 3
4. Ashburton	4	4	...
5. Gascoyne	4	4	...
6. Peak Hill	3	2	— 1
7. East Murchison	2	...	— 2
8. Murchison	19	21	+ 2
9. Yalgoo	...	1	+ 1
10. Mt. Margaret	11	14	+ 3
11. North Coolgardie	23	21	— 2
12. Broad Arrow	31	12	— 19
13. North-East Coolgardie	12	8	— 4
14. East Coolgardie	18	26	+ 8
15. Coolgardie	44	53	+ 9
16. Yilgarn	...	...	...
17. Dundas	...	...	...
18. Phillips River	...	1	+ 1
Total	215	221	+ 6

TABLE 25.

RATE OF WAGES IN THE MINING INDUSTRY.

Table showing Wages payable to Workers in Gold-mining and Copper-mining Industries under various Awards of the Court of Arbitration and Industrial Agreements up to the 31st December, 1919.

Locality in which Award or Agreement has effect.	Date of Award or Agreement.	Term.	Miner (hand labour) in shafts.	Miner (hand labour) in rises.	Miner (hand labour) in winzes.	Miner (hand labour) in all other places.	Millman in Charge.	Rousterman in Charge.	Slimes Charger.	Slimes Platman (offsider).	Ropeman.	Men on Cracker.	Men on Dams.	Rock Drill Men, and Chuckmen in Shafts.	Rock Drill Men, and Chuckmen in rises.	Rock Drill Men, and Chuckmen elsewhere.	Rock Drill Men in winzes.	Miners (Hammer and Drill men).	Miners (wet ground, extra allowance) per shift.	Bracemen and Platmen.	Skipmen.	Mullockers and Shovellers.	Shoveller.	Truckers.	Men working in Cyanide Vats and Filterpress Men.	Man in Charge of Dam.	Timbermen.	Surface Labourers.	Boiler Cleaners.	Horse Drivers (including looking after horses).	Drill and Tool Sharpeners.	Mechanics' Labourers.	Oilers and Greasers.	Riggers.	Firemen.	Pipe Fitters (underground).	Pitmen.	Fitters, Turners, and Blacksmiths.	Patternmakers.	Planers, Slotters, and Shapers.	Radial Drillers.	Electricians.	Motor Attendants.	Linemen.	Engine-driving: Locomotive.	Engine-driving: Surface Winding Engines.	Engine-driving: All other classes of Engines.	Engine-driving: Overtime, Week Day, Up to 4 hours.	Engine-driving: Overtime, Week Day, After 4 hours.	Hours of Work per week: Men on Surface (one shift).	Hours of Work per week: Shiftmen and underground workers.
			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.	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.	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.	s. d.	s. d.	s. d.				
Abbotts ... ... (1)	27th February, 1903 ...	29th January, 1903, to 29th July, 1904 ...	...	...	...	...	...	...	...	...	...	...	...	15 6	15 0	11 4	...	13 6	0 10	13 0	...	12 4	...	12 4	13 0	...	14 4	11 10	13 6	12 10	14 9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	47
(2)	19th November, 1904 ...	29th July, 1904, to 31st January, 1906 ...	...	...	...	...	...	...	...	...	...	...	...	15 0	14 6	13 10	...	13 0	0 10	12 6	...	11 10	...	11 10	12 6	...	13 10	11 4	13 0	12 4	14 3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	47
(3)	30th August, 1910 ...	30th August, 1910, to 30th August, 1911 ...	...	...	...	...	...	...	...	...	...	...	...	{15 4 / 15 0}	14 10 / 14 6	14 2 / 13 10	...	13 4 / 13 0	... / 0 10	... / 12 6	...	12 6 / 11 10	...	12 6 / 11 10	13 6 / 12 6	...	15 0 / 13 10	12 6 / 11 4	13 0 / ...	13 6 / 12 4	14 3 / ...	{12 6 / 12 4}	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	47
† (4)	31st May, 1916 ...	31st May, 1916, to 30th May, 1919 ...	15 0	14 6	14 2	13 10	15 0	15 0	15 0	13 4	14 6	13 6	13 6	15 10	15 4	14 8	15 0	....	1 2	13 6	...	¶13 0	...	¶13 0	13 6	...	15 0	12 6	15 0	13 6	15 0	13 0	...	...	...	...	15 0	...	...	...	...	...	...	...	...	...	...	...	...	48	47
Black Range ... (1)	4th July, 1905 ...	1st August, 1905, to 1st August, 1906 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	{13 4 / 12 10 / 12 4}	1 3	12 4	...	11 4	...	11 4	12 4	...	14 0	10 10	12 6	11 10	13 4	...	...	...	...	...	13 0	...	...	...	...	...	...	...	...	...	...	...	...	48	47
(2)	13th July, 1905 ...	1st August, 1905, to 1st February, 1907 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	13 6	14 6	...	...	...	...	...	...	...	...	...	...	48	...
(3)	17th May, 1907 ...	1st June, 1907, to 31st May, 1910 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	{15 0 / 14 0 / 13 4}	1 3	13 3	...	12 0	...	12 0	13 10	...	15 0	11 8	14 0	12 8	14 4	...	...	...	...	...	15 0	...	...	...	...	...	...	...	...	...	...	...	...	48	47
(4)	20th May, 1908 ...	20th May, 1908, to 31st May, 1910 ...	...	...	...	...	...	...	...	...	...	...	...	15 4	14 10	14 2	...	....	1 3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	47
(5)	14th August, 1908 ...	8th August, 1908, to 31st May, 1910 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	15 8	15 0	1¼	1½	{47 and 48}	...
Broad Arrow, Paddington to Kanowna (1)	19th December, 1904 ...	19th December, 1904, to 19th June, 1906 ...	...	...	...	...	...	...	...	...	...	...	...	14 4	13 10	13 4	...	11 8	1 8	11 8	...	10 6	...	10 6	11 8	...	13 4	10 0	11 10	11 0	12 8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	47
(2)	13th July, 1905 ...	1st August, 1905, to 1st February, 1907 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	13 0	14 0	...	...	...	...	...	...	...	...	...	...	48	...
* (3)	15th July, 1919 ...	1st April, 1919, to 31st March, 1922 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	{12 3 to 14 3}	...	...	...	12 9	...	{12 9 to 13 3}	...	...	...	...	...	...	...	12 9	...	{15 3 to 16 3}	15 3 to 15 9	13 3 to 14 9	a1¼	b1½	47 & 48	...
Bullfinch ... * (1)	28th July, 1911 ...	28th July, 1911, to 2nd August, 1911 ...	...	...	...	...	...	...	...	...	...	...	...	14 4	13 10	13 4	...	{12 8 / 11 8}	...	11 8	...	11 0	...	11 0	...	...	13 4	10 0	...	11 8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	47
Bulong ... ... (1)	13th July, 1905 ...	1st August, 1905, to 1st February, 1907 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	13 0	14 0	...	...	...	...	...	...	...	...	...	...	48	...
(2)	13th July, 1905 ...	1st August, 1905, to 31st December, 1905 ...	...	...	...	...	...	...	...	...	...	...	...	14 4	13 10	13 4	...	11 8	...	11 8	...	10 6	...	10 6	11 8	...	13 4	10 0	...	...	...	...	10 6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	47
Burtville ... ... *	4th September, 1909 ...	6th September, 1909, to 7th March, 1911 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	13 4	1 3	13 4	...	13 4	...	13 4	13 4	...	...	13 4	...	14 4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	47	47
Comet Vale ... ... ‖	14th March, 1912 ...	14th March, 1912, to 14th March, 1913 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	14 10	14 2	1¼	1½	47	...
Cue-Nannine ... (1)	27th February, 1903 ...	29th January, 1903, to 29th July, 1904 ...	...	...	...	...	...	...	...	...	...	...	...	14 6	14 0	13 4	...	12 6	0 10	12 0	...	11 4	...	11 4	12 0	...	13 4	10 10	12 6	11 10	13 9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	47
*(2)	17th October, 1904 ...	29th July, 1904, to 30th January, 1906 ...	...	...	...	...	...	...	...	...	...	...	...	14 6	14 0	13 4	...	12 6	0 10	12 0	...	11 4	...	11 4	12 0	...	13 4	10 10	12 6	11 10	13 9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	47
† (3)	18th December, 1908 ...	1st January, 1909, to 1st January, 1910 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	{15 10 and 14 10}	14 2	1¼	1½	{47 and 48}	...
* (4)	15th July, 1919 ...	1st April, 1919, to 31st March, 1922 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	{11 6 to 13 6}	...	...	...	12 0	...	{12 0 to 12 6}	...	...	...	...	...	...	...	12 0	...	{14 6 to 15 6}	14 6 to 15 0	12 6 to 14 0	a1¼	b1½	47 & 48	...
Dundas ... ... (1)	29th June, 1903 ...	29th June, 1903, to 1st March, 1904 ...	...	...	...	...	...	...	...	...	...	...	...	14 4	13 10	13 4	...	11 8	1 8	11 8	...	10 8	...	10 8	11 8	...	13 4	10 0	11 8	11 0	12 6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	46	46
(2)	16th December, 1904 ...	16th December, 1904, to 16th June, 1906 ...	...	...	...	...	...	...	...	...	...	...	...	15 0	14 6	14 0	...	{12 4 / 13 10 / 12 4}	1 8	12 4	...	11 4	...	11 4	12 4	...	14 0	10 10	12 6	11 10	13 4	11 10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	47
(3)	13th July, 1905 ...	1st August, 1905, to 16th June, 1906 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	14 0	13 0	1¼	1½	48	...
(4)	13th July, 1905 ...	1st August, 1905, to 1st February, 1907 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	13 6	14 6	...	...	...	...	...	...	...	...	...	...	48	...
(5)	16th June, 1910 ...	15th June, 1910, to 15th June, 1913 ...	...	...	...	...	...	...	...	...	...	...	...	14 8	14 2	13 8	...	{13 0 / 12 6 / 12 0}	1 8	12 0	13 8	11 2	...	11 2	12 0	...	13 8	10 8	12 2	11 8	13 0	11 8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	47
(6)	16th June, 1910 ...	16th June, 1910, to 16th June, 1911 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	14 4	13 8	1¼	1½	{47 and 48}	...
* (7)	11th December, 1913 ...	11th December, 1913, to 10th December, 1916	...	...	...	...	...	...	...	...	...	...	...	14 8	14 2	13 8	...	{13 0 / 12 6 / 12 0}	...	12 0	13 8	11 4	...	11 4	12 0	...	13 8	10 9	12 2	11 9	13 4	11 8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	47
Gindalbie	10th November, 1908 ...	16th November, 1908, to 16th November, 1911	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	14 10	14 2	1¼	1½	{47 and 48}	...
Higginsville	5th October, 1906 ...	1st November, 1906, to 1st May, 1908 ...	...	...	...	...	...	...	...	...	...	...	...	15 0	14 6	14 0	...	{13 4 / 12 10 / 12 4}	1 8	12 4	...	11 4	...	11 4	12 4	...	14 0	10 10	12 6	11 110	13 4	11 10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	47
Ida H. ... ... (1)	8th October, 1917 ...	1st August, 1917, to 27th November, 1918 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	13 3	...	{13 3 to 13 9}	...	...	...	...	...	...	...	...	...	...	18 0	...	...	...	...	...
* (2)	15th July, 1919 ...	1st April, 1919, to 31st March, 1922 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	{12 9 to 14 9}	...	...	...	13 3	...	{13 3 to 13 9}	...	...	...	...	...	...	...	13 3	...	{15 9 to 16 9}	15 9 to 16 3	13 9 to 15 3	a1¼	b1½	47 & 48	...
Kagloorlie ... ... (1)	2nd September, 1902 ...	2nd September, 1902, to 2nd March, 1904 ...	...	...	...	...	...	...	...	...	...	...	...	14 4	13 10	13 4	...	11 8	...	11 8	...	10 6	...	10 6	11 8	...	13 4	10 0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	48
* (2)	5th March, 1904 ...	1st March, 1904, to 1st September, 1905 ...	...	...	...	...	...	...	...	...	...	...	...	14 4	13 10	13 4	...	11 8	...	11 8	...	10 6	...	10 6	11 8	...	13 4	10 0	...	...	...	...	10 6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	47
* (3)	5th March, 1904 ...	1st March, 1904, to 1st September, 1905 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	11 0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	...
* (4)	5th March, 1904 ...	1st March, 1904, to 1st September, 1905 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	11 8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	...
* (5)	5th March, 1904 ...	1st March, 1904, to 1st September, 1905 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	11 8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	...
(6)	13th July, 1905 ...	1st August, 1905, to 1st February, 1907 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	13 0	14 0	...	...	...	...	...	...	...	...	...	...	48	...
* (7)	18th November, 1905 ...	1st September, 1905, to 1st January, 1907 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	11 8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	...
(8)	9th December, 1905 ...	1st September, 1905, to 1st Januray, 1907 ...	...	...	...	...	...	...	...	...	...	...	...	14 4	13 10	13 4	...	11 8	...	11 8	...	10 6	...	10 6	11 8	...	13 4	10 0	...	...	...	...	10 6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	47
* (9)	7th December, 1905 ...	1st September, 1905, to 1st January, 1907 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	{10 0 / 10 6 / 11 0}	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	...
* (10)	31st August, 1907 ...	31st August, 1907, to 30th June, 1909 ...	...	...	...	...	...	...	...	...	...	...	...	14 4	13 10	13 4	...	11 8	...	11 8	...	11 0	...	11 0	...	...	13 4	10 0	...	...	...	...	10 6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	47
* (11)	31st August, 1907 ...	31st August, 1907, to 30th June, 1909 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	11 8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	...
* (12)	31st August, 1907 ...	31st August, 1907, to 30th June, 1909 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	11 8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	...
*(13)	31st August, 1907	31st August, 1907, to 30th June, 1909 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	{10 0 / 10 6 / 11 0}	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	...
*(14)	10th March, 1910 ...	10th March, 1910, to 30th September, 1912 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	{15 0 and 14 0}	13 4	...	...	{47 and 48}	...
* (15)	10th March, 1910 ...	10th March, 1910, to 30th September, 1912 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	11 8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	...
* (16)	10th March, 1910 ...	10th March, 1910, to 30th September, 1912...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	11 8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	...
* (17)	10th March, 1910 ...	10th March, 1910, to 30th September, 1912 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	{10 0 to 15 0}	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	...
* (18)	10th March, 1910 ...	10th March, 1910, to 30th September, 1912 ...	...	...	...	...	...	...	...	...	...	...	...	14 4	13 10	13 4	...	11 8	...	11 8	...	11 0	...	11 0	...	...	13 4	10 0	...	...	...	...	10 6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	47
Kalgoorlie (Engineers) ‖ (19)	14th December, 1911 ...	14th December, 1911, to 30th September, 1912	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	15 0	16 0	...	...	...	...	...	...	...	...	1	1½	48	...
* (20)	7th August, 1913 ...	16th April, 1913, to 16th April, 1916 ...	...	...	...	...	...	...	...	...	...	...	...	14 4	13 10	13 4	...	11 8	...	11 8	...	11 2	...	11 2	...	...	13 4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	47
* (21)	7th August, 1913 ...	16th April, 1913, to 16th April, 1916 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	11 8	...	...	10 9	...	...	...	{10 9 to 15 0}	10 9	...	12 0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	...
* (22)	8th November, 1913 ...	16th April, 1913, to 16th April, 1916 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	{15 0 and 14 0}	13 4	...	...	{47 and 48}	...
* (23)	22nd May, 1914 ...	22nd May, 1914, to 16th April, 1916 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	15 0	16 0	14 0	13 4	...	...	...	...	...	...	...	...	...	...
* (24)	25th March, 1914 ...	25th March, 1914, to 16th April, 1916 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	15 0	11 8	13 4	...	...	...	...	...	...	...
* (25)	1st February, 1919 ...	1st February, 1919, to 31st January, 1922 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	15 0	...	...	48	47
* (26)	15th July, 1919 ...	1st April, 1919, to 31st March, 1922 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	{11 3 to 13 3}	...	...	...	11 9	...	{11 9 to 12 3}	...	...	...	...	...	...	...	11 9	...	{14 3 to 15 3}	14 3 to 15 3	12 3 to 13 9	a1¼	b1½	47 and 48	...
Kanowna (For Miners' rates see "Broad Arrow," etc.)	10th November, 1908 ...	16th November, 1908, to 16th November, 1911	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	14 0	13 4	1¼	1½	{47 and 48}	...
Kunanalling	21st February, 1910 ...	21st February, 1910, to 30th September, 1912	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	14 10	14 2	1¼	1½	{47 and 48}	...
Lawlers and Mt. Sir Samuel (1)	10th July, 1905 ...	1st August, 1905, to 1st February, 1907 ...	...	...	...	...	...	...	...	...	...	...	...	13 4	12 10	12 4	...	{12 8 / 12 4 / 12 0}	1 3	12 0	12 0	11 4	...	11 4	11 8	...	13 0	10 10	12 0	11 10	13 4	11 0	11 0	11 8	11 8	11 0	12 6	...	...	...	...	...	...	...	...	...	...	...	...	48	47
(2)	13th July, 1905 ...	1st August, 1905, to 1st February, 1907 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	13 6	14 6	...	...	...	...	...	...	...	...	...	...	48	...
Leonora, Kookynie Laverton, etc. (1)	28th February, 1903 ...	28th February, 1903, to 28th August, 1904 ...	...	...	...	...	...	...	...	...	...	...	...	16 0	15 6	15 0	...	13 4	...	13 4	15 0	11 8	...	11 8	13 4	...	15 0	11 8	15 0	12 8	15 0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	47
(2)	28th February, 1903 ...	28th February, 1903, to 28th August, 1904 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	17 0	15 6	1¼	1½	47	...
(3)	16th December, 1904 ...	29th August, 1904, to 28th February, 1906	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	15 9	14 6	1¼	1¼	47	...
(4)	19th December, 1904 ...	29th August, 1904, to 28th February, 1906 ...	...	...	...	...	...	...	...	...	...	...	...	15 0	14 6	14 0	...	12 4	1 8	12 4	14 0	11 6	...	11 6	12 4	...	14 0	11 0	12 6	12 0	13 4	12 0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	47
(5)	15th July, 1905 ...	1st August, 1905, to 28th February, 1906 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	11 8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	...
(6)	13th July, 1905 ...	1st August, 1905, to 1st February, 1907 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	13 0	14 0	...	...	...	...	...	...	...	...	...	...	48	...
† (7) (a) (b)	19th January, 1909 ...	15th January, 1909, to 1st January, 1910 ...	...	...	...	...	...	...	...	...	...	...	...	{15 0 / 14 8}	14 6 / 14 2	14 0 / 13 8	...	12 4 / 12 0	1 8 / 1 8	12 4 / 12 0	14 0 / 13 8	11 6 / 11 2	...	11 6 / 11 2	12 4 / 12 0	...	14 0 / 13 8	11 0 / 10 8	12 6 / 12 2	12 0 / 11 8	13 4 / 33 0	{12 0 / 11 8}	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	47
†(8) (a) (b)	19th January, 1909 ...	15th January, 1909, to 1st January, 1910 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	{14 8 / 14 4}	14 0 / 13 8	1¼	1½	{48 and 47}	...
*(9)	15th July, 1919 ...	1st April, 1919, to 31st March, 1922 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	{12 9 to 14 9}	...	...	...	13 3	...	{13 3 to 13 9}	...	...	...	...	...	...	...	13 3	...	{15 9 to 16 9}	15 9 to 16 9	13 9 to 15 3	a1¼	1½b	{47 and 48}	...
Marvel Loch ... (1)	27th January, 1910 ...	1st February, 1910, to 1st February, 1911 ...	...	...	...	...	...	...	...	...	...	...	...	13 6	13 0	12 6	...	10 1	1 8	10 10	...	10 10	...	10 10	10 10	...	12 0	10 6	...	11 6	12 6	...	...	...	10 6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	47
(2)	21st October, 1912 ...	21st October, 1912, to 31st May, 1914 ...	...	...	...	...	...	...	...	...	...	...	...	14 0	13 6	13 0	...	{12 6 and 11 6}	1 8	11 6	...	11 0	...	11 0	11 4	...	13 0	10 6	...	11 0	12 6	11 0	...	...	11 6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	47
Meekatharra (see "Abbotts")																																																				
Menzies ... ... (1)	28th February, 1903 ...	28th February, 1903, to 28th August, 1904 ...	...	...	...	...	...	...	...	...	...	...	...	15 2	14 8	12 4	...	12 6	1 8	12 6	...	11 4	...	11 4	12 6	...	14 2	10 10	...	...	14 2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	47
(2)	28th February, 1903 ...	28th February, 1903, to 28th August, 1904 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	16 0	14 6	1½	1¼	47	...
(3)	16th December, 1904 ...	29th August, 1904, to 28th February, 1906 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	15 5	14 0	1¼	1½	47	...
(4)	19th December, 1904 ...	29th August, 1904, to 28th February, 1906 ...	...	...	...	...	...	...	...	...	...	...	...	14 9	14 3	13 9	...	12 0	1 8	12 0	...	11 0	...	11 0	12 0	...	13 9	10 6	12 0	11 10	13 0	11 6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	47
(5)	13th July, 1905 ...	1st August, 1905, to 28th February, 1906 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	11 8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	...
(6)	13th July, 1905 ...	1st August, 1905, to 1st February, 1907 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	13 0	14 0	...	...	...	...	...	...	...	...	...	...	48	...
Mt. Magnet ... ... † (1)	18th December, 1908 ...	1st January, 1909, to 1st January, 1910 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	14 0	13 4	1¼	1½	{47 and 48}	...
† (2)	28th November, 1909 ...	17th November, 1909, to 16th November, 1910	...	...	...	...	...	...	...	...	...	...	...	14 6	14 0	13 4	...	12 6	0 10	12 0	...	11 4	...	11 4	12 0	...	...	10 10	12 6	11 10	13 9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	47
Mt. Morgans ... * (1)	17th August, 1903 ...	16th July, 1903, to 28th August, 1904 ...	...	...	...	...	...	...	...	...	...	...	...	16 0	15 6	15 0	...	13 4	1 8	13 4	15 0	11 8	...	11 8	13 4	...	15 0	11 8	15 0	12 8	15 0	13 4	...	13 4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	47
* (2)	16th December, 1904 ...	29th August, 1904, to 28th February, 1906 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	15 9	14 6	1¼	1½	47	...
(3)	19th December, 1904 ...	29th August, 1904, to 28th February, 1906 ...	...	...	...	...	...	...	...	...	...	...	...	15 0	14 6	14 0	...	12 4	1 8	12 4	14 0	11 6	...	11 6	12 4	...	14 0	11 0	12 6	12 0	13 4	12 0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	47
(4)	13th July, 1905 ...	1st August, 1905, to 28th February, 1906 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	11 8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	...
(5)	13th July, 1905 ...	1st August, 1905, to 1st February, 1907 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	13 0	14 0	...	...	...	...	...	...	...	...	...	...	48	...
† (6)	19th January, 1909 ...	15th January, 1909, to 1st January, 1910 ...	...	...	...	...	...	...	...	...	...	...	...	14 8	14 2	13 8	...	12 0	1 8	12 0	13 8	11 2	...	11 2	12 0	...	13 8	10 8	12 2	11 8	13 0	11 8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	47
† (7)	19th January, 1909 ...	15th January, 1909, to 1st January, 1910 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	14 4	13 8	1¼	1½	{47 and 48}	...
Northampton ... † (1)	12th June, 1914; Amendment 10th Oct., 1916	1st June, 1914, to 1st June, 1917	...	...	...	...	...	...	...	...	...	...	...	13 7	13 1	12 5	...	...	...	12 5	...	...	11 3	11 3	...	11 9	14 0	10 9	13 1	12 0	13 5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	{47 and 48}	47
Norseman (see "Dundas.")																																																				
Nullagine	16th January, 1905 ...	1st February, 1905, to 1st February, 1907 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	14 2	1 6	{14 2 and 13 4}	...	...	...	13 4	14 2	...	16 8	13 4	...	...	16 8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	‡16 8	‡15 0	...	...	44	44
Peak Hill ... ... (1)	27th February, 1903 ...	29th January, 1903, to 29th July, 1904 ...	...	...	...	...	...	...	...	...	...	...	...	15 6	16 0	15 4	...	14 6	0 10	14 0	...	13 0	...	13 4	14 0	...	15 4	12 10	14 6	13 10	15 9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	47
(2)	19th November, 1904 ...	29th July, 1904, to 31st January, 1906 ...	...	...	...	...	...	...	...	...	...	...	...	15 6	15 0	14 4	...	13 6	0 10	13 0	...	12 0	...	12 4	13 0	...	14 4	11 10	13 6	12 10	14 9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	47
(3)	6th December, 1906 ...	1st October, 1906, to 1st October, 1909 ...	...	...	...	...	...	...	...	...	...	...	...	15 0	14 6	13 10	...	13 0	1 3	12 6	...	11 10	...	11 10	12 6	...	13 10	11 4	13 0	12 4	14 3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	47
Southern Cross ... (1)	13th July, 1905 ...	1st August, 1905, to 1st February, 1907 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	12 0	13 0	...	...	...	...	...	...	...	...	...	...	48	...
Whim Creek (Copper) ...	14th August, 1912 ...	14th August, 1912, to 14th June, 1913 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	{15 0 / 14 2§ / 13 4}	1 8	13 4	...	13 4	...	13 4	...	...	15 0	13 4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Wiluna ... ... (1)	13th July, 1905 ...	1st August, 1905, to 1st February, 1907 ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	13 6	14 6	...	...	...	...	...	...	...	...	...	...	48	...
(2)	6th December, 1908 ...	1st January, 1907, to 1st January, 1910 ...	...	...	...	...	...	...	...	...	...	...	...	15 6	15 0	14 4	...	13 6	1 3	13 0	13 0	12 4	...	12 4	13 0	...	14 4	11 10	13 6	12 10	14 9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	...
Youanmi	22nd July, 1912 ...	22nd July, 1912, to 7th May, 1915 ...	...	...	...	...	...	...	...	...	...	...	...	15 4	14 10§	14 2	...	{15 0 / 14 0§ / 13 4}	1 3	13 6	...	12 8	...	12 8	13 10	...	15 0	11 8	14 0	12 8	14 4	13 4	...	...	13 4	...	15 0	...	...	...	...	...	...	...	...	...	...	...	...	48	¶ 47
Do.	23rd March, 1917 ...	22nd March, 1917, to 21st March, 1920 ...	15 0	14 6	14 2	13 10	15 0	15 0	15 0	13 4	15 0	13 6	13 6	15 10	15 4	14 8	15 0	15 0	...	13 6	...	13 0	...	...	13 10	15 0	15 0	12 6	15 0	13 6	...	13 0	...	...	...	...	15 0	...	...	...	...	...	...	...	...	...	...	...	...	...	...

* Industrial Agreement. † Award continues in operation until amended or rescinded by Court. ‡ Hours of labour for engine-drivers and battery feeders agreed to at 47 per week. § Rises in winzes. ‖ Award and Agreement. ¶ Underground only. *a* First two hours. *b* After two hours.

PART V.—ACCIDENTS.

TABLE No. 26.

MEN EMPLOYED IN MINES KILLED AND INJURED IN MINING ACCIDENTS DURING 1918 AND 1919.

A.—*According to Locality of Accident.*

Goldfield.	Killed.		Injured.		Total Killed and Injured.	
	1918.	1919.	1918.	1919.	1918.	1919.
1. Kimberley	...	...	...	...	...	...
2. Pilbara	...	...	...	...	...	...
3. West Pilbara	...	...	...	...	...	...
4. Ashburton	...	...	...	...	...	...
5. Gascoyne	...	...	...	...	...	...
6. Peak Hill	...	...	...	1	...	1
7. East Murchison	1	1	14	19	15	20
8. Murchison	2	1	31	13	33	14
9. Yalgoo	...	...	1	...	1	...
10. Mt. Margaret	4	4	97	107	101	111
11. North Coolgardie	2	...	11	7	13	7
12. North-East Coolgardie	...	...	...	...	...	...
13. Broad Arrow	...	1	...	5	...	6
14. East Coolgardie	12	11	380	319	392	330
15. Coolgardie	...	1	...	...	...	1
16. Yilgarn	1	5	5	4	6	9
17. Dundas	...	1	...	1	...	2
18. Phillips River	1	...	3	...	4	...
MINING DISTRICTS—						
Northampton	...	...	2	1	2	1
Yandanooka	...	...	...	...	...	...
Greenbushes	...	...	1	...	1	...
Collie	2	1	139	118	141	119
Swan	...	...	...	1	...	1
Kendinup	...	...	...	...	...	...
Roelands	...	...	...	...	...	...
Total	25	26	684	596	709	622

From the above table it will be seen that the total number of fatal accidents for the year 1919 was one more than for 1918. The number of injured shows a decrease of 88 compared with the preceding year. Details of these accidents will be found in the report of the State Mining Engineer, published as Division II. to this report.

B.—*According to Causes of Accidents.*

	1918.		1919.		Comparison with 1918.	
	Fatal.	Serious.	Fatal.	Serious.	Fatal.	Serious.
1. Explosives	...	17	1	7	+ 1	— 10
2. Falls of Ground	9	72	12	58	+ 3	— 14
3. In Shafts	4	12	4	15	...	+ 3
4. Miscellaneous—Underground	7	417	5	370	— 2	— 47
5. Surface	5	166	4	146	— 1	— 20
Totals	25	684	26	596	+ 1	— 88

Of the fatal accidents 25 occurred in gold mines and one in a coal mine. The death rate per 1,000 men employed on Gold Mines was 3·12 as against 3·04 in 1918.

TABLE No. 27.

Deaths of Persons employed at Mines from Accidents during 1918 *and* 1919.

	1918.						1919.					
	Number of Persons killed.			Death Rate per 1,000 men employed.			Number of Persons killed.			Death Rate per 1,000 men employed.		
	Above Ground.	Under Ground.	Total.	Above Ground.	Under Ground.	Total.	Above Ground.	Under Ground.	Total.	Above Ground.	Under Ground.	Total.
Coal Mines	1	1	2	6·49	2·16	3·24	1	...	1	5·46	...	1·38
Men employed...	(154)	(464)	(618)	...	...	...	(183)	(543)	(726)	...	...	...
Gold Mines	4	19	23	1·11	4·52	2·95	3	22	25	·91	5·58	3·45
Men employed...	(3,588)	(4,202)	(7,790)	...	...	...	(3,301)	(3,941)	(7,242)	...	...	...
Other Mines	...	...	...	...	...	...	...	...	...	...	...	...
Men employed...	(517)	(340)	(857)	...	...	...	(272)	(106)	(378)	...	...	...
Total for all Mines	5	20	25	1·17	3·99	2·70	4	22	26	1·06	4·79	3·12
Total number of men employed	(4,259)	(5,006)	(9,265)	...	...	...	(3,756)	(4,590)	(8,346)	...	...	...

TABLE No. 28.

Deaths of Persons employed at Quarries from Accidents during 1918 *and* 1919.

Mining District.	Number of Persons employed.						Number of Persons killed.						Death Rate per 1,000 men employed.					
	Above Ground.		Under Ground.		Total.		Above Ground.		Under Ground.		Total.		Above Ground.		Under Ground.		Total.	
	1918.	1919.	1918.	1919.	1918.	1919.	1918.	1919.	1918.	1919.	1918.	1919.	1918.	1919.	1918.	1919.	1918.	1919.
Swan ...	140	239	...	...	140	239	...	...	...	...	...	...	...	...	...	...	...	...
Roelands ...	60	6	...	...	60	6	...	...	...	...	...	...	...	...	...	...	...	...
Total ...	200	245	...	...	200	245	...	...	...	...	...	...	...	...	...	...	...	...

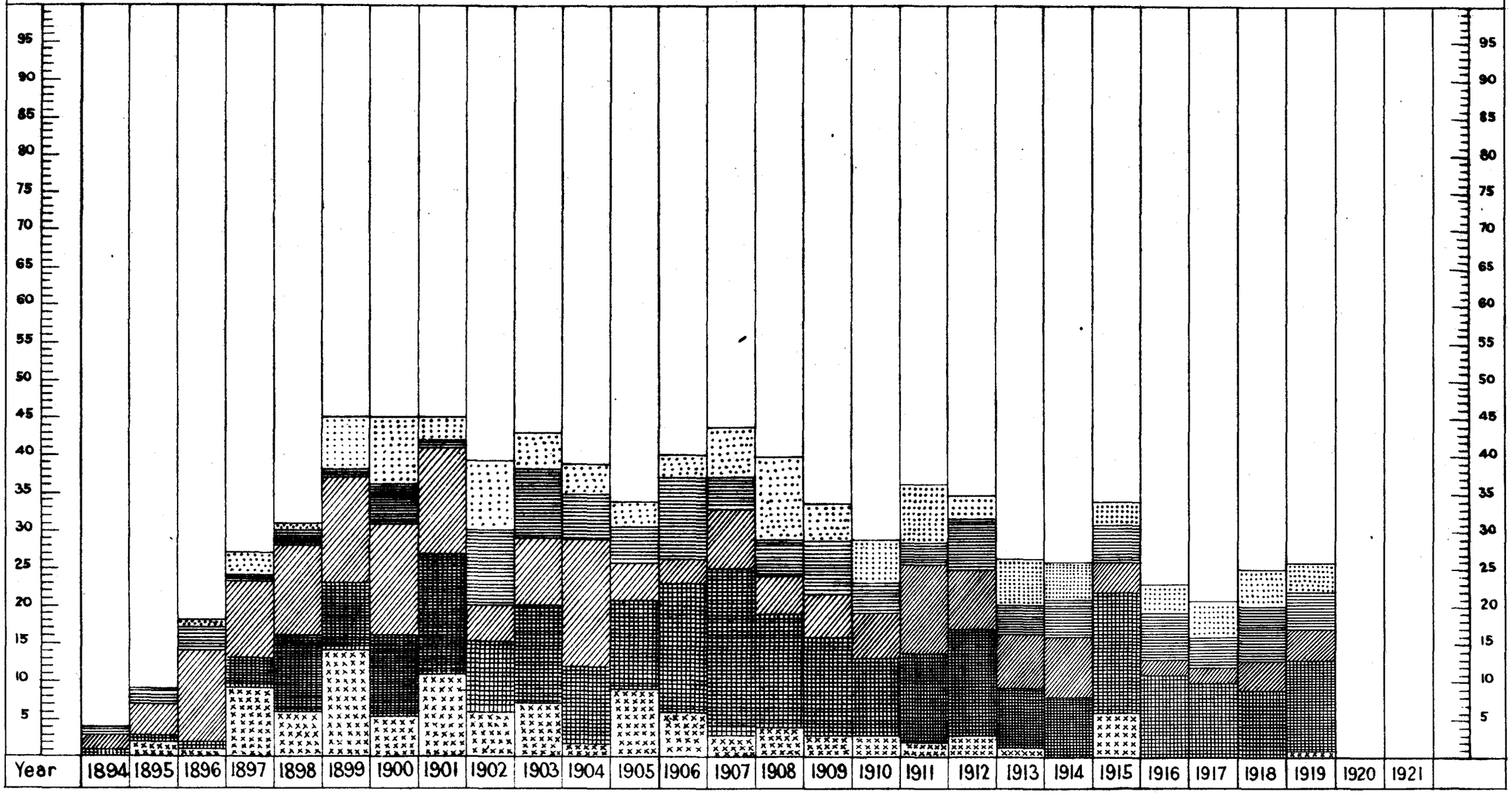
TABLE No. 29.

Deaths from Accidents of Persons employed in Gold Mines during 1919, *and the Death Rate per* 1,000 *men employed and per* 1,000 *tons of Gold Ore raised during* 1918 *and* 1919. (*Number of men taken as in Table No.* 23, *not including Alluvial Gold Workers.*)

Goldfield.	Number of Deaths.			Death Rate per 1,000 men employed.				Number of Deaths per 1,000 tons of Gold Ore raised.	
	1919.			1919.			1918.		
	Above Ground.	Under Ground.	Total.	Above Ground.	Under Ground.	Total.	Total.	1919.	1918.
1. Kimberley	...	...	...	...	...	...	...	...	...
2. Pilbara	...	...	...	...	...	...	...	...	...
3. West Pilbara	...	...	...	...	...	...	...	...	...
4. Ashburton	...	...	...	...	...	...	...	...	...
5. Gascoyne	...	...	...	...	...	...	...	...	...
6. Peak Hill	...	...	...	...	...	...	...	...	...
7. East Murchison	...	1	1	...	6·94	3·30	3·19	·022	·019
8. Yalgoo	...	...	...	...	...	...	...	...	...
9. Mt. Margaret	1	3	4	2·88	5·78	4·62	4·56	·017	·017
10. North Coolgardie	...	...	...	...	...	...	4·09	...	·036
11. North-East Coolgardie ...	...	...	...	...	...	...	...	...	...
12. Broad Arrow	...	1	1	...	10·00	5·78	...	·050	...
13. East Coolgardie	1	10	11	·75	5·75	3·59	3·49	·016	·011
14. Coolgardie	1	...	1	6·13	...	3·15	...	·104	...
15. Murchison	...	1	1	...	2·83	1·54	2·76	·013	·022
16. Yilgarn	...	5	5	...	1·02	6·22	1·18	·035	·007
17. Dundas	...	1	1	...	12·66	7·14	...	·051	...
18. Phillips River	...	...	...	...	...	...	25·00	...	·331
Total	3	22	25	·97	5·58	3·56	3·04	·019	·014

The number of deaths per 1,000 men employed shows a slight increase from 3·04 in 1918 to 3·56 in 1919, and that per 1,000 tons of gold ore raised shows a slight increase also, being ·019 as against ·014 for the preceding year.

DIAGRAM SHEWING THE NUMBER OF DEATHS FROM ACCIDENTS ARRANGED IN FIVE CLASSES, IN THE MINES OF WESTERN AUSTRALIA DURING THE YEARS 1894 AND ONWARDS.



1919.

Part V. Table 26B.

PART VI.—STATE AID TO MINING.

The number of State batteries existing at the end of the year was 32.

From inception to the end of 1919, gold and tin to the value of £5,244,648.53 have been recovered from the State plants. 1,237,006.19 tons of auriferous ore have been treated and have produced £4,319,458.68 worth of gold by amalgamation; £627,277.62 worth by cyanidation; £195,905.32 worth by slimes treatment; £9,353.37 worth from residues; and 79,276.75 tons of tin ore produced tin to the value of £92,081.22, and in addition a sum of £572.32 has been recovered from residues.

During the year the gold ore treated was 40,290.75 tons for 27,026.88 ozs. of bullion.

The working expenditure for all plants for the year totalled £38,995 15s. 5d., and the revenue £29,071 4s. 11d., which shows a loss of £9,924 10s. 6d. in the year's operations.

The capital expenditure since the inception of the scheme has been £378,213 12s. 7d.—£286,232 19s. 11d. from General Loan Fund and £91,981 1s. 8d. from Consolidated Revenue.

The cost of administration for the year was £3,577 18s. 8d., as against £3,556 2s. 6d. for 1918.

The working expenditure from inception to the end of the year exceeds the revenue collected by £91,280 13s.

GEOLOGICAL SURVEY.

The work of the Geological Survey, full details of which will be found in the report of the Government Geologist which is appended, has been carried out along the usual lines despite a further reduction in the *personnel*, resulting from the resignation of one officer and the transfer of another to the office of the State Mining Engineer.

The work of the year included field investigations in such portions of the State as gave promise of being of economical importance, in addition to laboratory work in connection with potash supplies, ochres, glass sands, salt, gypsum, clays, etc., as well as petrological determinations, etc., required by the field staff in connection with the problems arising out of their field work.

ASSISTANCE UNDER MINING DEVELOPMENT ACT, 1902.

The following statement shows the sums advanced during the year 1919 under "The Mining Development Act:"—

	£	s.	d.
Advanced in aid of mining work and equipment of mines with machinery	7,711	1	6
Subsidies paid on stone crushed for the public	318	13	3
Boring	352	10	4
Providing means of transport and equipment to prospectors ..	2,327	12	8
	£10,709	17	9

In addition to the above, amounts totalling £1,893 10s. 6d. were expended from Mining Development Vote on various matters for the assistance of mining, such as water supply, subsidies to assist carting of ore long distances, and subsidies for development work done below 100 feet level in small mines, and rebates to prospectors working low grade mines. The subsidies paid on stone crushed for the public, amounting to £318 13s. 3d. are subsidies paid to owners of plants crushing for the public, the conditions being that they crush at fixed rates; in most cases a further requirement being imposed as to purchasing or treating tailings. The ore crushed at such plants during the year amounted to £2,851 tons. The receipts under the Mining Development Act exclusive of interest payments amount to £2,834 19s. 7d., and include—

	£	s.	d.
Refunds of advances	2,064	13	2
Sales of securities	645	6	5
Miscellaneous refunds	125	0	0

PART VII.—REMARKS ON THE GOLDFIELDS AND MINERAL DISTRICTS AND SUMMARIES OF THE WARDENS' AND OTHER OFFICERS' REPORTS.

ASHBURTON GOLDFIELD.

No gold or copper was reported from this field. Silver-lead ore to the extent of 214.76 tons, valued at £3,116, was produced, and in the preceding year 237.48 tons, valued at £3,461; a decrease in tonnage of 22.72 tons and in value of £345. Apart from the silver-lead mine at Uaroo there is practically no other mining on the field.

BROAD ARROW GOLDFIELD.

The output of gold was 11,729 fine ounces, and in the preceding year, 4,126 fine ounces; an increase of 7,603 fine ounces. A good deal of prospecting took place in the immediate vicinity of Broad Arrow, but elsewhere matters remained quiet.

COLLIE COAL FIELD.

The output of coal for the year was 401,713 tons, and for the preceding year 337,039 tons; an increase of 64,674 tons.

Six collieries were producing and on the whole have worked fairly regularly. With additional plant the majority of them could greatly augment their outputs. Prospecting has been systematically carried out by the East Collie Coal Coy. on prospecting areas held by it, and the results so far are encouraging. The outlook for the field is very promising.

COOLGARDIE GOLDFIELD.

The output of gold was 5,814 fine ounces and in the preceding year 7,963 fine ounces, a decrease of 2,149 fine ounces.

Scheelite, to the extent of 45.71 tons, valued at £101, was also produced. In the Kunanalling District there was practically no change, the few mines there operating with about the same results. The Gibraltar Centre had a slight revival.

At Widgiemooltha there was also some activity and indications are promising. At a locality known as "Ives' Find," situated about 14 miles north-east of

Widgiemooltha, a very promising discovery was made during the year, and a considerable number of leases have been lodged. It is hoped and anticipated that another producing centre will be the result.

DUNDAS GOLDFIELD.

The output of gold for the year was 12,530 fine ounces, and in the preceding year 15,950 fine ounces; a decrease of 3,420 fine ounces.

There was little or no change in this field and no indications of any early improvement.

EAST COOLGARDIE GOLDFIELD.

The output of gold was 397,055 fine ounces, and in the preceding year, 524,823 fine ounces; a decrease of 127,768 fine ounces.

The lessened gold output is mainly attributable to industrial troubles, which caused a cessation of work for a time, and the production for the months of November and December fell to 7,000 ounces. There were no developments of importance at any of the large mines, but in September a number of gold-mining leases were pegged on Blocks 48 and 50—freehold properties belonging to an English company known as Hampton Uruguay, Limited. Developments on some of the leases have been most encouraging, and the result is that capital for opening them up has been readily forthcoming, and a considerable revival in mining the result. The outlook at the close of the year was most encouraging.

In the Mount Monger district there was also a good deal of prospecting.

EAST MURCHISON GOLDFIELD.

The output of gold was 27,414 fine ounces, and for the preceding year 29,211 fine ounces, a decrease of 1,797 fine ounces.

No copper was reported, but in the preceding year the production was 82.44 tons, valued at £1,314.

In the Lawlers District there was some improvement in the vicinity of Lawlers itself, one or two shows being actively worked, but elsewhere matters were quiet.

In the Wiluna District mining generally was quiet. At Wiluna there was a steady output from the Gwalia Consolidated.

It is anticipated that the coming year will see the introduction of ample capital to open up and develop known ore bodies existent at Wiluna, which should result in a substantial increase to the gold yield.

From Mt. Keith a small production was recorded. In the Black Range District there was no change.

GASCOYNE GOLDFIELD.

The only mining in this field was the working of a few mining tenements for mica. The deposits are stated to be good, but the remoteness of the locality and consequent high cost of all requisites retards development.

GREENBUSHES MINERAL FIELD.

The output of black tin was 244.61 tons, valued at £34,959, and in the preceding year 295.80 tons, valued at £57,653; a decrease in tonnage of 51.19 tons and in value of £22,694.

There were no developments calling for special mention, but the dredging operations maintained the average of work and output. The price of tin showed a steady improvement throughout the year.

KIMBERLEY GOLDFIELD.

The output of gold was 151 fine ounces, and in the preceding year 15 fine ounces; an increase of 136 fine ounces. This was all won by alluvial miners. Apart from them the only other mining was on a prospecting area on McPhee's Creek, where a considerable amount of work was done, but nothing so far discovered. Towards the end of the year several parties had begun to prospect in this neighbourhood.

MT. MARGARET GOLDFIELD.

The output of gold was 88,152 fine ounces, and in the preceding year 85,347 fine ounces; an increase of 2,805 fine ounces.

In addition, 4,135.93 tons of pyritic ore, valued at £4,919, were raised, and in the preceding year 2,251.81 tons, valued at £1,629; an increase in tonnage of 1,884.12 tons, and in value of £3,290.

In the Mt. Margaret District there was a small decrease in spite of an enhanced output from the Lancefield Mine. A good deal of prospecting is being carried out.

In the Mt. Morgans District there was a slight decrease, and mining was quiet.

In the Mt. Malcolm District there was an increase accounted for by an improved output from the Sons of Gwalia Mine. No new discoveries were reported, although a good many prospectors were operating.

MURCHISON GOLDFIELD.

The output of gold was 50,570 fine ounces, and in the preceding year 63,285 fine ounces; a decrease of 12,715 fine ounces.

Copper, to the extent of 16.81 tons, valued at £377, was produced, and in the preceding year 78.34 tons, valued at £1,794; a decrease in tonnage of 61.53 tons, and in value of £1,417. In the Meekatharra District there was a decrease, attributable principally to lessened output from two mines. Outside Meekatharra mining was very quiet. In the Cue District there was a slight falling off, but, generally speaking, an improvement is noticeable. The State plant erected at Cue has been a great boon to prospectors, and has crushed continuously since it commenced operations in October. At a locality known as "Reedy's," situated about 33 miles north-east from Cue, there have been some very encouraging developments, which promise to continue.

In the Day Dawn District there was no improvement.

In the Mount Magnet District there was a falling off, but prospecting was active, particularly in the neighbourhood of Boogardie, and an improvement is anticipated.

NORTHAMPTON AND YANDANOOKA MINERAL FIELDS.

No minerals were reported from Yandanooka.

In the Northampton Field the output of lead ore was 7,385.70 tons, valued at £29,841, and in the preceding year 47,079.68 tons, valued at £176,330; a decrease in tonnage of 39,693.98 tons, and in value of £146,489.

The depression in the lead market during the year had a very adverse effect on this field, and caused a suspension of operations at many of the mines. Towards the close of the year activity was again becoming apparent, and, provided shipping facilities are available, an early improvement should result.

NORTH COOLGARDIE GOLDFIELD.

The output of gold was 23,020 fine ounces, and in the preceding year 36,830 fine ounces; a decrease of 13,810 fine ounces. Scheelite, to the extent of 273.06 tons, valued at £829, was also produced. This came from the Comet Vale centre. In the Menzies District there was a decrease, due principally to a falling off in production from the Sand Queen and Gladsome Mines at Comet Vale, which were flooded out. At Yunndaga the Menzies Consolidated also had a reduced output, although the tonnage treated was about the same. At Mt. Ida only a few shows were being developed.

In the Ularring District mining was very quiet, the Riverina South Mine having ceased crushing early in the year. It is expected that this is only temporary and that production will be resumed shortly. The company owning this mine is being financially assisted by the Government. In the Niagara and Yerilla Districts there was practically no change.

NORTH-EAST COOLGARDIE GOLDFIELD.

The output of gold was 5,472 fine ounces, and in the preceding year 3,700 fine ounces; an increase of 1,772 fine ounces. Mining in this field has been very quiet, but the development of the alunite deposits has continued and a good deal of the product placed on the market. Towards the end of the year applications were filed for large areas comprising deep alluvial ground, on which it was proposed to carry out extensive boring operations. The results will be awaited with considerable interest.

PEAK HILL GOLDFIELD.

The output of gold was 2,255 fine ounces, and in the preceding year 1,089 fine ounces; an increase of 1,166 fine ounces. Copper ore, to the extent of 14.39 tons, valued at £353, was produced, and in the preceding year 76.28 tons, valued at £2,480; a decrease in tonnage of 61.89 tons, and in value of £2,127. Mining in this field remained quiet.

PHILLIPS RIVER GOLDFIELD.

The output of gold was 1,700 fine ounces, and in the preceding year 4,479 fine ounces; a decrease of 2,779 fine ounces. The production of copper was 215.02 tons, valued at £4,993, and in the preceding year 2,901.66 tons, valued at £42,978; a decrease in tonnage of 2,686.64 tons, and in value of £37,985. Mining was very quiet in this field, but the Government has been endeavouring to stimulate production by rendering financial assistance to small leaseholders in every case where prospects warranted it. There is a strong possibility of capital being forthcoming in the new year for reopening the large mines, which have been idle for a considerable time. The field is a good one and must prove so eventually.

PILBARA GOLDFIELD.

The output of gold was 3,421 fine ounces, and in the preceding year 3,748 fine ounces; a decrease of 327 fine ounces. Black tin, to the amount of 36.70 tons, valued at £5,871, was raised, and in the preceding year, 99.50 tons, valued at £20,984; a decrease in tonnage of 62.80 tons, and in value of £15,113, also 53 tons of asbestos, valued at £1,443.

A general all round improvement was noticeable, and in a couple of instances where the Government is rendering financial assistance, the prospects are very encouraging. The Warden calls attention to a remarkable achievement by Captain Donald McLeod, a returned soldier, who lost his right hand and portion of his right arm in France, working a prospecting area at Lalla Rookh. He raised single-handed and without the assistance of any artificial devices, 61 tons of ore, which returned him 65 ounces over the plates. In the Nullagine District, a deposit of asbestos is being actively developed. High costs of all requisites is a retarding factor in this field.

WEST PILBARA GOLDFIELD.

The output of gold was 95 fine ounces, and in the preceding year 120 fine ounces; a decrease of 25 fine ounces.

Copper ore, amounting to 1,030.78 tons, valued at £15,807, was produced, and in the preceding year 1,844.19 tons, valued at £28,961; a decrease in tonnage of 813.41 tons, and in value of £13,154.

Apart from the Whim Well Copper Mine there is little mining in this field.

WEST KIMBERLEY MAGISTERIAL DISTRICT.

During the year the State Mining Engineer visited Yampi Sound for the purpose of examining and reporting on the iron deposits in the locality. The publication of his report has called attention to their great value, and will undoubtedly result in their being exploited in the near future.

YALGOO GOLDFIELD.

The output of gold was 4,788 fine ounces, and in the preceding year 4,398 fine ounces; an increase of 390 fine ounces.

Mining in this field, excepting at Payne's Find, from whence came the bulk of the gold produced, has been somewhat quiet.

Owing to the absence of a market for Molybdenite, the leases in the Warriedar District held for working that mineral have been mostly under exemption.

YILGARN GOLDFIELD.

The output of gold was 54,003 fine ounces, and in the preceding year 70,766 fine ounces; a decrease of 16,763 fine ounces. This is attributable to a falling off in production from some of the mines at Westonia, in which developments have been of a somewhat unsatisfactory nature. At the other centres a good deal of prospecting was undertaken, but nothing of note reported. At Forrestonia the Government is erecting a plant for the prospectors which will prove the locality. Crushing should be commenced about the middle of the coming year.

TABLE 30.

Value of Mining Machinery and Number of Stamps and other Mills erected on the 31st December, 1919, compared with the previous Year.

Goldfield.	District.	Value of Mining Machinery.		Batteries, Number of Stamps.		Mills.															
						1918.								1919.							
		1918.	1919.	1918.	1919.	Prospecting.	Ball.	Griffin.	Huntington.	Puddlers.	Other Crushers.	Flint.	Grinding Pans.	Prospecting.	Ball.	Griffin.	Huntington.	Puddlers.	Other Crushers.	Flint.	Grinding Pans.
		£	£																		
1. Kimberley	... ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2. Pilbara	Marble Bar	8,164	11,918	38	38	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Nullagine	30,478	29,806	25	25	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1
3. West Pilbara	... ...	2,550	2,350	40	40	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	2
4. Ashburton	... ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5. Gascoyne	... ...	1,100	1,100	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6. Peak Hill	... ...	7,122	6,643	40	40	...	...	...	...	...	2	...	...	...	...	...	...	...	2	...	...
7. East Murchison ...	Lawlers	13,644	13,304	65	65	...	...	...	...	...	2	...	...	...	...	...	...	...	2	...	1
	Wiluna	52,191	50,872	85	90	1	...	...	...	...	1	1	5	...	...	...	...	...	1	1	5
	Black Range ...	100,418	99,708	80	80	...	1	...	...	...	...	2	3	...	1	...	...	...	...	2	4
	Cue	40,955	33,239	65	75	...	...	...	...	...	3	...	1	...	...	...	...	...	2	...	4
8. Murchison	Meekatharra ...	129,062	118,916	112	97	...	...	...	...	1	8	2	12	...	...	...	...	1	4	2	15
	Day Dawn	161,210	21,200	60	60	...	...	...	...	...	4	...	4	...	...	...	...	...	3	...	10
	Mt. Magnet	18,195	16,248	35	35	1	1	...	...	...	1	...	...	1	1	...	...	1	...	...	1
9. Yalgoo	... ...	27,028	25,810	70	70	...	...	...	...	...	1	...	5	...	...	...	...	...	1	...	5
10. Mt. Margaret	Mt. Morgans	13,860	13,998	60	60	...	...	...	...	...	...	...	3	...	...	...	...	...	...	...	3
	Mt. Malcolm	248,582	246,552	127	127	...	...	...	...	...	4	4	13	...	...	...	...	...	3	4	15
	Mt. Margaret	48,717	47,678	70	60	...	6	...	1	...	2	...	15	...	6	...	1	...	3	...	14
	Menzies	55,648	44,777	105	95	...	...	...	1	...	2	...	19	...	...	...	1	...	2	...	20
11. North Coolgardie ...	Ularring	31,000	30,512	40	40	...	...	...	...	...	1	1	2	...	...	...	...	...	1	1	2
	Niagara	6,761	6,299	50	50	...	1	...	...	...	1	...	3	...	1	...	...	...	1	...	3
	Yerilla	4,219	3,656	30	25	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1
12. Broad Arrow	... ...	65,411	4,841	45	45	...	1	...	3	3	1	...	10	...	1	...	3	3	2	...	10
13. North-East Coolgardie	Kanowna	11,333	12,898	85	85	...	...	...	1	...	1	...	2	...	...	...	1	...	1	...	2
	Kurnalpi	150	150	5	5	1	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...
14. East Coolgardie ...	East Coolgardie ...	1,366,849	1,323,236	535	540	1	40	13	5	3	46	33	166	1	41	15	5	5	46	33	170
	Bulong	8,000	...	20	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15. Coolgardie	Coolgardie	33,916	32,568	196	143	...	...	...	1	...	5	...	7	...	...	...	1	...	1	...	7
	Kunanalling	7,300	6,970	40	35	...	...	...	...	...	...	...	2	...	...	...	...	...	1	...	2
16. Yilgarn	... ...	211,893	176,201	197	187	...	2	...	...	...	2	4	21	...	...	...	...	...	4	2	25
17. Dundas	... ...	25,100	24,305	65	65	...	...	...	...	...	5	...	9	...	...	...	...	...	...	...	14
18. Phillips River	... ...	10,600	10,600	45	45	2	...	...	...	...	1	...	...	2	...	...	...	...	1	...	...
State generally	... ...	30,000	30,000	...	...	...	1	...	...	...	1	...	...	...	1	...	...	...	1		...
Total Gold-extracting Machinery		2,771,456	2,446,355	2,431	2,323	7	53	13	12	7	95	47	305	5	52	15	12	10	82	45	336
Total Machinery, other than Gold-extracting ...		301,317	381,823	5	5	...	...	1	1	1	26	...	...	...	...	1	1	1	33	...	...
TOTAL MINING MACHINERY		3,072,773	2,828,178	2,436	2,328	7	53	14	13	8	121	47	305	5	52	16	13	11	115	45	336

PART VIII.—EXISTING LEGISLATION.

At the close of the year the Acts in force relative to mining were:—

1. "The Mining Act, 1904."
2. "Mining Act Amendment Act, 1919."
3. "Sluicing and Dredging for Gold Act, 1899."
4. "Mines Regulation Act, 1906."
5. "Coal Mines Regulation Act, 1902."
6. "Mining Development Act, 1902."
7. "Mines and Machinery Inspection Act, 1911."
8. "Mines Regulation Act Amendment Act, 1915."

"The Mining Act Amendment Act, 1919," deals with the question of an inflow of water to a mine from any other mine, and provides for powers of intervention by the Minister. It was passed during the year.

The following alterations, etc. regarding Regulations were gazetted:—

Under "The Mining Act, 1904"—

An amendment of Regulation 8.

Under "Mines Regulation Act, 1906"—

An addition to General Rule 44.

Under "Coal Mines Regulation Act, 1902" (Part I. Accident Relief Fund)—

An amendment of Regulation 4.
An amendment of Regulation 11a.
An additional Regulation 11b.
An additional Regulation 11c.

PART IX.—INSPECTION OF MACHINERY.

The Chief Inspector of Machinery reports that the number of useful boilers at the end of the year 1919 totalled 2,926 as against 2,993 total for the preceding year, showing a decrease, after all adjustments, of 67 boilers.

Of the total 2,926 useful boilers, 1,515 were out of use at the end of the year; 1,349 thorough and 145 working inspections were made, and 1,329 certificates were issued.

Permanent condemnations totalled 53, and temporary condemnations 47. There were no conversions, but 33 boilers were exported.

The total number of machinery plants in use was 6,043 against 5,697 for previous year, showing an increase of 346. Inspections made total 3,462, and 3,462 certificates were granted.

122 applications for enginedrivers' certificates were received and dealt with, and 101 certificates, all classes, were granted, as follows:—

First Class Competency (including certificates issued under Regulation 27 and Section 63 of the Act)	3
Second Class Competency (including certificates issued under Regulation 27 and Section 63 of the Act)	23
Third Class Competency (including certificates issued under Regulation 27 and Section 63 of the Act)	43
Locomotive Competency	15
Traction Competency	6
Interim	4
Copies	7
Total	101

Total mileage travelled was 40,970, of which 15,380 were by rail, 25,584 by road, and six by water.

PART X.—SCHOOL OF MINES.

During this, the sixteenth year of the School's existence, the good progress reported last year has been well maintained.

The attendance was excellent, and now that the war is happily ended, early consideration is to be given to the question of providing additional facilities and accommodation. Owing to the growth of the preparatory classes this has become imperative, otherwise a greater number than is now in attendance could not be accommodated. The system of free assays for prospectors has been continued, and during the year a total of 528 assays and determinations was made. Naturally this is a considerable help to prospectors.

CONCLUSION.

In dealing with the operations of the various departments, I have only briefly commented on the principal items. Full and detailed information will be found in the reports of the various officers controlling, published as Divisions II. to VII. of this report.

In conclusion, I desire to acknowledge the support received from all officers of the Department during the year.

M. J. CALANCHINI,
Under Secretary for Mines.

Department of Mines,
Perth, 31st March, 1920.

DIVISION II.

REPORT OF THE STATE MINING ENGINEER FOR THE YEAR 1919.

The Under Secretary for Mines, Perth.

Office of the State Mining Engineer,
Perth, 31st January, 1920.

Sir,—

For the information of the Hon. the Minister, I have the honour to forward my report for the year 1919.

INSPECTION OF MINES UNDER "THE MINES REGULATION ACT, 1906," AND "THE COAL MINES REGULATION ACT, 1902."

During 1919 the distribution of districts among the Inspectors of Mines and their number and personnel remained unaltered from the previous year, except that the head-quarters of Inspector Crabb were removed from Coolgardie to Southern Cross.

REPORTS OF INSPECTORS OF MINES.

Annual reports have been supplied by the various Inspectors of Mines, as follows (in somewhat abridged form):—

Report of Mr. W. M. Deeble, Inspector of Mines, Cue.

I have to report that although mining has been very quiet in this district during the past year there have been several very promising finds made towards its close, and it is quite possible for one of these to give mining a different aspect in its vicinity during the coming year.

At the north end of this district mica and asbestos have been reported as found in payable quantities, but as they are both a considerable distance to the north of Peak Hill I have not had an opportunity to examine them.

Copper.—During September last I visited a new find of copper approximately 260 miles slightly east of north of Meekatharra. The copper contents of the lode are high, but it is doubtful if the average is sufficient to bear the expense of carting by road a distance of close on 300 miles to Meekatharra, and then railage to the coast. The road to the north coast is said to be worse and the cost of cartage more expensive. Copper has been found from this place south for a distance of about 100 miles, and although high-grade copper has been found in several places it is not likely to develop into a mining district until the cost of transit is considerably reduced.

Peak Hill.

There has been practically no alteration to report at this place. The old Peak Hill mine on which a stamper mill and pans were erected last year has been troubled by shortage of water for crushing purposes, and this has seriously affected the place.

Holden's Find.

The Waterloo G.M. has only been able to keep going one shift throughout the year owing to the limited supply of water for milling purposes. The dry season has affected the whole of the district and the country to the north.

Meekatharra.

There are a fair number of men engaged working small shows in this district, but in no case has anything been found that seems to indicate that it will develop into a mine of any size. The following are the main gold producers:—

Fenian G.M.—The average number of men engaged during the year was 116, and a tonnage of 25,590 short tons treated for a yield of 15,324.99 fine ounces, value £65,086 13s. 3d. This makes the total production to 31st December, 1919, of 299,219 short tons for 235,532.52 fine ounces, value £1,000,248 1s. The lowest level in the mine is 1,150 feet, and the production of over one million pounds from above that depth must be considered a very fine result.

Ingliston Consols Extended G.M.—This mine is north and adjoining the Fenian, and the workings in the latter mine indicate what may be expected in this one below the present workings. Taking the dip of chute it would indicate that this mine will have to sink to at least 1,300 feet depth to encompass the ore in the main chute, which means that there is every probability of five more levels being included in the mine. An average of 86 men were engaged during 1919, and a tonnage of 26,593 treated for a return of £61,317 9s. 11d. The main shaft is 1,024 feet in depth and the lowest level 900 feet. The grade of ore in the 900 feet level is reported to be slightly higher than in the higher levels, but work was stopped in this level owing to it having been converted into a cistern to enable the shaft to be sunk comparatively dry. The development in this mine is in the satisfactory position of being well ahead of the mill.

Gwalia G.M.—An average of twelve men have been engaged in this mine during the year, and a tonnage of 147 treated for a yield of 596.63 fine ounces. During the latter part of the year winding machinery was erected and development work done.

Marmont G.M.—For various reasons very little work has been done during the year on this mine, and only 65 tons were treated for a yield of 95.15 ounces.

Ingliston G.M.—During the past year 35 men have been engaged constantly, and 2,715 tons milled for a yield of 2,950 ozs. 13 dwts.

Globe G.M.—Two returned soldiers have been working on this show, and from 120 tons obtained 97.82 fine ounces over the plates.

Nannine.—There were a few men prospecting around this district, and the main work done during the year was on Bayley's Island. The dry season enabled the prospectors to sink on the edge of lake, and with the aid of a small gas engine and pump they have reached a depth of twenty feet. The object is to test if there is a deep lead going into the lake, but up to the present nothing has been proved. The Nannine G.M. crushed 54 tons for 44.95 ounces, and obtained 92.10 ounces by dollying.

Culculli.

A small but rich tonnage has been crushed from this district during the year.

The Turn of the Tide G.M.—40 tons crushed for 456.77 ounces.

Culculli G.M.—38½ tons crushed for 295.40 fine ounces. These are the highest yields. From floaters found on either side of the leader being worked I am satisfied that there are parallel leaders carrying high values yet to be found.

Reedy's.

Situated about six miles south of Culculli this district has been the centre of attraction around here for some time. The lodes are large and the gold contents fine, and fire assays show considerably higher values than one would expect after testing the material in the ordinary way with the dish. Up to the end of the year the lode material in the Emu lease has been treated direct by cyanide and an average of 16s. per ton obtained. On December 31st two parcels were cleaned up at the Cue State Mill for the following results:—37½ tons for 19 ozs. 5 dwts. from over the plates, average 10 dwts. 16 grs. per ton with 6 dwts. 15 grs. in sand; second parcel 22 tons for 21 ozs. 11 dwts., equal to 19 dwts. 14 grs. per ton, sands 9 dwts. 15 grs. As the lode is large and can be easily and cheaply worked this must be highly payable; up to the present no other crushing has been brought in.

Tuckanarra.

At the end of the year some specimen stone was found at this place which on dollying returned 23.80 fine ounces gold. Approximately 14 miles west of Tuckanarra two prospectors, Hambleton and Carter, obtained specimens from the cap of a reef which dollied 96.70 ounces fine gold; practically no further work has been done on either of these places since, as the prospectors went for a trip to Perth. The latter place is certainly very promising, and as dry-blowers have since found stone showing gold it indicates there must be another parallel reef carrying payable ore. I have been told by prospectors that some very rich floaters were found about twenty years ago six miles north of Hambleton and Carter's, and between Junga Pool and where the Rabbit-proof Fence is, but the reef was never located.

Cue.

The Light of Asia is the main producer and has been employing 46 men. The ore treated was 3,443 tons for 3,185.10 ounces.

Since the State Mill started public treatment, fourteen parcels of ore have been crushed for prospectors in the Cue locality.

Big Bell G.M.—At the beginning of the year this mine was so hampered by shortage of water that the owners decided to try to secure an adequate supply by boring. It is now thought that such a supply has been found about 2½ miles from the mine, and the work of erecting pumping plant and laying pipe line is in progress.

Pinnacles.

Very little mining has been done at this place of late. One party, Kelly and Hill, crushed 20½ tons for a yield of 92 ozs. 12 dwts.

Tuckabianna.

Mining is very quiet at this place also; the two last crushings put through were from Nigel G.M., 160 tons for 559.93 ozs., Cameron & Ward 69 tons for 30.10 fine ounces.

Day Dawn.

Very little mining is being done outside that of the Great Fingall G.M. tributers. During December one party brought in a parcel of 78 tons taken from near the old Rifle Range, which returned 209 ozs. 15 dwts., and the sand assayed 16 dwts. 5 grs.

Lake Austin.

Occasionally rich dabs are found at this place. During December, C. Bartlow dollied 57 ozs. 10 dwts. of gold and Daniel Bros. & Gordon found about 5 cwt. of specimens, from which they will probably get over 400 ozs. of gold.

The Moyagee G.M., about five miles from Austin, has nearly 100 tons of high grade stone broken, and the owners expect to be able to crush at Cue State Mill at an early date.

Mt. Magnet.

Mining in this district is mostly carried on by men working their own shows; although small patches have been found during the year, nothing worth recording was located.

Report of Mr. A. W. Winzar, Inspector of Mines, Sandstone.

EAST MURCHISON AND PARTS OF THE MOUNT MARGARET AND YALGOO GOLDFIELDS.

Practically no change has taken place in the Fields for the year. The gold output shows a small decline on the previous year's total. Generally speaking, there appears to be a revival of interest around the different centres, probably due to the presence of parties of prospectors and the cessation of the war. Parties of prospectors, consisting of returned soldiers assisted by the Repatriation Department and the Prospecting Board, are operating through the Fields. The excessive price of mining stores and food tends to retard the industry, especially in the far-out places where freights add so much to the costs. Complaints have been general on the poor quality of the 50 per cent. gelignite, which is not favoured for any class of ground, being too weak for hard country, whilst in soft rock there is a tendency for some of the cartridges to remain unexploded.

The general condition of the mines is good, the ventilation and sanitation being well looked after, and the working places and appliances kept as safe as possible. The Mines Regulation Act has been observed by both managers and men, and no prosecutions were found necessary.

Black Range District.

A few new finds were reported, small returns being obtained from some of them, but in most cases they were of little importance. A small patch was found by Cameron & Weekley at a place locally known as "Micky the Priest's." Messrs. Prendergast and mate opened up a quartz hæmatite formation near the State Battery, obtained two small crushings therefrom, and had to leave it. Some prospecting is now being done on the east end of the areas, and fair prospects are being obtained. The Black Range West G.M. pumped the water out and closed down; the mine is equipped with unsuitable plant to cope with the water. The local representative of the company expects to again start operations towards the middle of the coming year.

The total yield from the district was 13,573ozs. from 17,240 tons.

Nancy's Reward did a lot of development work and a quantity of ore was opened up, but not of sufficient value to break under existing circumstances. The owners will endeavour to get below water level in the near future; 139 tons were crushed for 240ozs.

Entente crushed 185 tons for 163ozs., development is now being pushed ahead.

The Comedy King crushed 130 tons for 328ozs. Development work on this mine has been satisfactory; a fair amount of stone is in sight, though it is hard to get owing to the values being confined to a small section of a large quartz reef.

The Havilah treated 126 tons for 156ozs.; the reef is exceedingly hard and a machine drill has to be used. The owner is at present treating some sands with satisfactory results.

Youanme Centre:—

The Yuanmi G.M. obtained the bulk of the ore in the district. Development work has been fairly satisfactory, and it is confidently expected to open up new bodies of ore in the near future. The diamond drill was used with satisfactory results on the south end of the leases, and work is being commenced there. The ore treated was of high grade and showed an increase on the 1918 value.

The United crushed 457 tons for 95ozs.; prospects have improved since the last crushing.

The Red, White, and Blue crushed 145 tons for 122ozs., and obtained 102ozs. from treatment of sands.

Barrambie and Birrigrin.—A little prospecting was done at Barrambie, and from the Pelerin at Birrigrin 60 tons were crushed for 94ozs.; no work is being done at this centre at the present time.

Lawlers District shows small increase in the gold yield, being 557ozs. in excess of 1918. The centre is looking well, and should show a further improvement in the coming year.

The Waroonga crushed 9,469 tons and obtained 2,474ozs; no new developments have taken place. It is the intention of the manager to take the water out to the No. 3 level. All the ore treated so far has come from above the No. 2. A cyanide plant is being erected to treat the accumulated sands and slimes, of which there are 45,000 tons.

The Queen returned 1,080ozs. from 643 tons; this includes 379ozs. from sands treatment. The mine is under offer to a company, and is looking very well at present, the width of reef being 3ft. 6in., worth 30dwts. Underhand stoping is carried out owing to the hard nature of the rock. The present depth is 140 feet and the chute is lengthening and improving in width as depth is obtained. *The Donegal* is being worked by the owners of the Queen and they intend putting in a pumping plant.

At Sir Samuel and Darlot very little work has been done for the year. At the former place 166 tons were crushed for 78ozs., and at Darlot 220 tons for 100ozs., and 58ozs. were dollied.

At Kathleen Valley the Yellow Aster shows an increase in grade, 374ozs. being obtained from 494 tons; the mine looks well, with a fair amount of ore in sight.

Wiluna District shows a small decrease on the 1919 figures; practically no change has taken place in the prospects of the place. At the Diorite eight men are prospecting. Pola and Mosman have 200 tons at grass estimated at over the ounce. A large body of quartz and lode material exist on the property, and portion only of the reef is taken, the stone left behind is said to assay 9dwts. The nearest well is seven miles away and is about 150 feet to water; the scarcity of water hampers prospecting operations.

The Moonlight returned 857ozs from 2,168 tons. The tribute party has thrown up the mine, which is now being further tested.

The Violet is still being worked on tribute by Mr. Dawson and 9,979 tons were crushed for 4,247ozs.; there appears to be a large quantity of ore in sight.

The Zig-zag crushed 90 tons for 180 ozs. and has a fair quantity of ore at grass, most of which has come from near the surface.

At Mt. Keith, the Aurora has about three months' work to deplete the present stopes. The mine proved very disappointing at the bottom level, the stone not living down, an intermediate level had to be put in to get at the ore. 785 tons were crushed for 533ozs.

The Missdeal crushed 422 tons for 311ozs. The owners reckon they can see about 12 months' work ahead of them, and are pushing on with developments. There are two parties prospecting around and they are getting gold.

MT. MARGARET GOLDFIELD.

Wilson's Patch:—

The Great Western started operations during the year. The 10-stamp mill was put in order, being practically rebuilt and equipped with rock-breaker, elevator, bins, and self-feeders; a Cornish lift was put in the main shaft. The power to work the plant is obtained from a gas engine and wood producer. The plant worked well, but, unfortunately, the cam shaft broke and only 5 stamps could be worked. A crushing of 787 tons yielded 108ozs.; this material was taken from small shafts about the leases; no ore has been taken from the main shaft, where the best values are showing.

Ashton and Party put through a crushing of 140 tons for 66ozs., whilst D. Mackey got 7dwts. per ton from 16 tons.

At the *Victory*, Mt. Clifford, two men have been working continuously. 22 tons were crushed for 54ozs. The present prospects have improved, and good gold is showing at 120ft.

YALGOO GOLDFIELD.

Mt. Gibson.—Very little work has been done in this centre; most of the crushings proved disappointing. The Golden Harp has been kept working above water level, and it is the intention of the owner to put in a pumping plant. 141 tons were crushed for 97 ozs. All the leases are practically at a standstill.

The Boni Venture is being prospected by a tunnel driven into the hill, the formation has been driven on for about 30 feet, and the manager seems well satisfied with the prospects.

Warriedar shows a very low yield for the year. The Highland Chief crushed 102 tons for 63 ozs.; the Ironclad 215 tons for 75 ozs., and the Mug's Luck 133 tons for 84 ozs. The prospects of the centre improved towards the end of the year. A large quantity of rock was broken on the Molybdenite leases at Mulgine, and some good grade mineral obtained, work was suspended towards the end of the year.

Rothesay.—A few prospectors are working. The Woodley's Reward has been sampled with satisfactory results, and an endeavour is being made to get capital in to work the mine.

Payne's Find.—This centre shows an improvement for the year: 2747 tons were crushed for 3,541 ounces. The Carnation returned 1,741 ounces from 998 tons; Lake View 715 ounces from 695 tons; The Orchid 722 ounces from 603 tons, and the Sweet William 27 ounces from 203 tons. All the leases looked well at the end of the year.

Nyounda.—The Gnow's Nest lease has been worked with very good results. The reef is exposed for several hundred feet, and contains payable gold in the outcrop. A shaft has been sunk 60 feet, and the reef driven on for 70 feet, showing a fair width of stone of good value; a water shaft has been sunk, the reef passed through being three feet wide of good value. A five-head mill has been carted on to the lease, and will be erected towards the middle of the present year.

Report of Mr. H. P. Rockett, Inspector of Mines, Leonora.

Herewith I present my annual report for the year ending 1919.

Prospectors.—In addition to many sandalwood prospectors there are a number of prospecting parties scattered throughout my district, but to date nothing has been opened up which looks like developing into an important mine.

Salt gathering or mining on a commercial scale is a new industry in this district. From Lake Raeside, and about seven miles S.E. from Leonora, about 90 tons were collected and sold last summer for £450. This summer no salt was mined as the conditions were unfavourable. The salt was very clean, and when ground fine made excellent table salt. It is said to assay 97 per cent. Na Cl.

General.—Underground inspections were made in 103 mines as often as possible, necessitating travelling approximately 10,000 miles. Mining is very quiet in my district, and there has been a falling off in the yield due to a number of causes, including the failure of established mines, such as the Sand Queen, Gladsome, and the Ida H., to the rush of men to Hampton Plains, and to the high price of sandalwood. As regards the Ida H., I am sorry to say I have little hope that it will re-open for a long time to come, if ever. The Gladsome-Sand Queen lode, however, is very well worth re-opening (perhaps best as one mine), and no doubt work will be resumed on this lode in the near future. The rise in the price of sandalwood has given an extraordinary impetus to surface prospecting. At a first glance it would seem that because underground prospecting on very small shows has practically ceased for the time being at some old-established centres as the result of men having in most cases gone sandalwooding, that industry is replacing prospecting. So it is, temporarily, but it must be remembered that the great majority of sandalwooders are prospectors first, from choice, and sandalwooders afterwards from (frequently) compulsion. It is said that there are in my district well over a hundred men, chiefly miners, engaged sandalwooding. Looking for "floaters," alluvial and lodes, is second nature to most of them, and they spend half their time in prospecting in reality while ostensibly sandalwooding. Some go so far as to carry panning dishes with them much of the time while looking for sandalwood, and many have noted places which they intend to try for gold when the supply of sandalwood fails, as it must do within two years or less. Most of the money earned at sandalwooding will eventually be used for prospecting.

Comet Vale.—In May last, at about the 840 level in the Sand Queen Mine, a drill hole tapped a very heavy flow of water and the mine was flooded, and work underground had to cease. Owing to faulty arrangements the water was allowed to overflow from the Sand Queen into the Gladsome, causing that mine to cease operations in September.

The only other gold producer of consequence at Comet Vale is the Happy Jack mine, on which very little work was done for the year.

Goongarrie has seen a slight revival of prospecting, and one or two very rich patches were found, such as 463 ounces from the Little Grace, but no consistently payable lode is being worked at present.

Menzies.—Mining is very slack indeed. At the Menzies Consolidated mine the main shaft was sunk 200 feet to a total depth of 1,700 feet. A crosscut is being driven which it is expected will open up about 40,000 tons of ore. The majority of the other mines in the locality, viz., the Lady Shenton, Warrior, Crusoe, and Crusoe North, have given their owners good returns, but nothing sensational has been found.

The main workings of the Lady Shenton have been abandoned for the time being while some development is being done in an adjacent shaft.

After yielding a little over 200 tons of 60s. ore, the pay shoot in the Crusoe North (Lady Sherry) was cut off by a fault, and some time was lost driving along the fault-plane before the continuation of the shoot was found. It is expected that over 400 tons will be taken out this year.

Davyhurst.—The 2,400 tons of 6s. stone raised from the Little Dele comprised the whole of the ore raised this year.

Mulwarrie.—About 80 tons were raised worth 40s. per ton.

Ularring.—58 ounces from the Red Leap was the total for that locality.

Mulline.—The Young Australian was sold to a Melbourne syndicate; the yield for the year was 78 ozs. It is proposed to use rock drills for ore-breaking in the near future.

Riverina.—At the Riverina South the main shaft workings were allowed to fill with water early in the year. The yield, 502 ozs., was obtained from ore mined on the north end of the lease almost exclusively.

Mt. Ida.—500 tons from Mr. Bremner's Boody Rat mine yielded 112 ozs. The lode varies in width from 4 to 16 feet and is continuous for at least 400 feet in length, so there may be a future ahead of the show. The plucky Unexpected South syndicate has not had the success it deserves. The lode at the 350 feet level was not wide enough to pay; exploratory work is now being done at the 250 feet level.

Niagara.—In this neighbourhood the chief producers were the Cosmopolitan with 68 ozs. obtained from 113 tons, the Cosmopolitan No. 2 with 373 ozs. from 365 tons, and the Two D's with 79 ozs. from 610 tons.

Edjudina.—This district was very unfortunate during the year, the best yield being 95 ozs. from 70 tons from G. McCoy's P.A. No. 709, and the next best being 68 ozs. from 113 tons from the Neta. About a dozen parties are working on the line of lode, and a small syndicate has taken over the Golden Lizard lease, and is now erecting winding and unwatering plant.

Linden.—The principal mines are the Torquay (Devon), Bindah, Democrat, and Grand Junction, which together produced over 1,100 ounces. The Bindah has erected a 5-head mill, and for the last

three months of the year crushed 1,100 tons, yielding 293 ounces by amalgamation. There are a good many prospector-sandalwooders in this locality.

Yundamindera.—Mining is very quiet.

MT. MARGARET GOLDFIELD.

Leonora.—The Sons of Gwalia mine yielded 486,508 ozs., being an increase of 4,000 ozs. over last year's output. This mine holds fourth place in importance amongst the gold producers in the State, and employs over 400 men. The filling scheme inaugurated during 1918 is now in full operation, and has already resulted in rendering available many thousands of tons of ore formerly inaccessible.

Mertondale, Pig Well, and Randwick.—There are a few prospectors in these centres, but their total output does not exceed 100 ounces.

Eulaminna.—The Westralia Copper Co.'s mine, formerly Anaconda, yielded 3,313 tons of copper ore valued at £4,962, and the Nangaroo mine, belonging to the same company, produced 190 tons valued at £259. The Nangaroo has been equipped with winding and pumping plants, and promises to open up well during 1920.

A little work was done on the Rio Tinto mine, but the results were not satisfactory.

Messrs. Adams and party, working the southern continuation of the Hill's Proprietary lode in the old Princess Alex lease, have a very promising show. The lode is six feet wide at the 160ft. level. The only available return to date is 86 ozs. from 129 tons. The property is likely to be purchased by a strong syndicate, and a much greater yield may be expected for 1920.

Australia United.—247 ozs. were obtained in a rich patch from seven tons by dollying, principally.

Mt. Morgans.—The Westralia Mt. Morgans mine produced 8,000 tons of ore, carrying 2,975 ozs. of gold. Very large ore reserves have been developed during the year, and there is not likely to be any decrease in gold produced in the next two or three years.

The only other mine working at Morgans is the Millionaire, from which 17 ozs. were obtained.

Mt Margaret.—The Mt. Morven closed down after producing 150 tons of 6 dwt. stone.

Burtville.—The Nil Desperandum produced 100 tons of 2½oz. stone, and the Golden Bell 12 tons of ounce stone. No other gold was obtained at this centre during the year, and there are not more than 10 men in the locality.

Erlistoun.—Some prospecting has been done on the Baneygo line, and a party broke some 50 tons in the Baneygo South. Pan assays indicate that the stone is payable, and the owners are now engaged erecting a 5-head battery on the Baneygo, some ¾ mile distant. It is thought that the value of the gold to be recovered from stone from the Baneygo South and dumps in the vicinity will more than cover the cost of erecting the battery. It is proposed to unwater the Baneygo mine later and examine it.

Duketon.—From the Great Dolerite over 100 ozs. of bullion were recovered by dollying, and the Haematite yielded over 200 ozs. of bullion. A little prospecting was done near the Famous Blue, and also some eight miles East from Duketon.

Laverton.—As a result of a series of misfortunes, in the shape of breakages and failures of portions of the plant, combined with a shortening of ore shoot, the Ida H. is now shut down. For over 800 feet the shaft passes through old stopes, which are now flooded to within 300 feet of the surface, and it is not expected that operations will be resumed in the main workings in the near future.

The Lancefield mine looks well, and there is no present indication of the likelihood of any falling off in the output. Many minor alterations and improvements have been made to the plant during the year, and some 200 men find employment on the lease and woodline.

The Beria Main Reef ceased crushing after putting through 347 tons. The exact recoverable value of the ore is not known, as portion of the mill residue still remains for treatment. The Augusta was unwatered to the No. 4 level, but so far the prospects of the lease do not seem bright.

The Mary Mac worked intermittently, but is again in full swing. It is expected that the mine will reach the profit-earning stage during the coming year.

Report of Mr. J. Crabb, Inspector of Mines, Southern Cross.

YILGARN GOLDFIELD.

Westonia.—Mining operations were fairly active, and although the Edna May and Edna May Consolidated closed down during the latter part of the year, the output of gold compared favourably with that of the previous year.

At the Edna May Central the main incline shaft was continued to a depth of 566 feet, and a crosscut commenced from the bottom level to intersect the different lodes.

The Edna May Consolidated treated a large quantity of ore, which gave an average return of 27s. per ton by amalgamation. After paying compensation to the Edna May and the Edna May Central for drainage, no profit was made. Serious trouble in the form of a creep developed in the vicinity of the main shaft, and in consequence the mine was temporarily closed down.

At the Edna May Deep Level mine good progress was made, and the outlook of the property is said to be very satisfactory.

A large concrete dam was constructed at the 480ft. level for the purpose of preventing any inflow of water from the Edna May workings. A barrier pillar was also left between the Edna May and the Edna May Deeps immediately below the 480ft. level for the purpose of also damming the water that flows into the Edna May.

At the Golden Point a considerable amount of prospecting work has been done in what was taken to be the same belt or ore channel as the Edna May Central lode occurs in. Latterly most of the work has been done at the 140ft. level, where a reef has been opened up for a length of about 100 feet. This reef is reckoned to average 8in. in width, and to contain a little over 1 oz. per ton.

A good deal of prospecting work by crosscutting was done at the Edna May Consolidated Extended, which was assisted by the Government, but nothing of any value was discovered.

Forrestonia.—Very little prospecting work was done at this centre owing to unsatisfactory crushing facilities, but in consequence of the Department deciding to erect a suitable battery there renewed interest is being taken in the district, and I feel sure that before long quite a number of the old abandoned shows will be again worked. In order to develop and expand our mining industry the Department, in my opinion, cannot adopt any better means than providing suitable mills in districts that offer the

slightest prospect of success. The erection of a mill at Forrestonia will encourage men to again prospect the surrounding country for many miles, which I venture to say would never be looked at if no such facility for crushing were provided.

Parker's Range.—Several parcels of ore obtained from the White Horseshoe and Miners' Dream were treated at the Spring Hill battery with very satisfactory results.

Burbidge.—At the Great Victoria about 11,000 tons of ore were treated at a total cost of mining and milling of 6s. 6d. per ton.

At the Bronco G.M. a five-head mill has been erected, and crushing operations were commenced during the latter part of the year. Although mining and milling was done at a very low cost, hardly sufficient gold was won to pay working expenses. It is thought, however, that better results will be obtained.

Nevoria.—The Never Never G.M. was given a further trial by a small party, and fairly satisfactory results were obtained from some blocks of ore that were left near the surface.

The Golden Buterfly G.M. Company exercised its option on the Banker, which is situated a little South from the Never Never. The prospects of the property are considered to be very satisfactory. The lode has been proved for a length of 230 feet, and to contain about 15 dwts. per ton.

Marvel Loch.—No developments of much consequence occurred in this centre; the outlook, however, is more promising, and I expect to see a rather marked improvement during the coming year.

The Huntington mill to be erected on the Undaunted will enable the owners to deal profitably with the large low-grade lode they have been working for some time. The mill will be capable of treating from 1½ to 2 tons per hour, and as it is reckoned they will be able to mine and mill for a total cost of about 10s. per ton, a good profit should be made. The ore is estimated to contain an average of 5dwt. per ton.

Kennyville.—A considerable quantity of ore has been produced and treated at the Great Leviathan, but little or no profit has been made.

Southern Cross.—During the latter part of the year the Transvaal Mine, which was being worked by Leggo & Co. for arsenical ore, closed down, and a large number of men were thrown out of employment.

At the Dawn Mine the Mt. Rankin Co. erected a pumping and hoisting plant for the purpose of testing the value of the large lode that was cut in the main shaft some years ago, but after unwatering the workings nothing was done beyond an examination being made.

Bullfinch.—There is no change to report at this centre.

COOLGARDIE GOLDFIELD.

Coolgardie.—From Griffiths' Mine ore yielding 3 dwts. per ton by amalgamation at the State battery enabled the owner to make a small profit. The latest parcel of 1,491 tons gave a return of 3 dwts. 1 gr. per ton.

Various other prospecting shows were worked with highly profitable returns.

Gibraltar.—Good developments occurred at the Lloyd George, Limerick, and the Carlton, consequently the district appears much more promising than it has done for some time past.

Ives' Find.—Large lodes containing payable quantities of gold are reported to have been discovered about 20 miles easterly from Widgemooltha.

About 11 miles south from Ives', Strike and party are opening up a line of lode which in places is reckoned to contain a little over 1oz. per ton. Adjoining Strike's claim on the western boundary, French and party are working on what appears to be the continuation of Strike's lode. Prospects up to 10dwt. per ton are being obtained in lode material that can be traced for a considerable distance.

Carbine.—Returns from the Carbine Mine were somewhat below the previous year's return. From Fury's claim 138 tons were treated for a return of 61ozs.

DUNDAS GOLDFIELD.

Norseman.—There was a slight decrease in the output of gold compared with the previous year's return.

Encouraging developments occurred in the property adjoining the Mararoa G.M., which is being worked by the Norseman Prospecting Syndicate. Very satisfactory results have also been obtained from the Red White and Blue G.M.

Report of Mr. W. F. Greenard, Inspector of Mines, Kalgoorlie.

EAST COOLGARDIE, NORTH-EAST COOLGARDIE, AND BROAD ARROW GOLDFIELDS.

A systematic routine inspection in the above goldfields has been maintained throughout the year. The work of inspection is allotted, two or three mines to each inspector, changing the inspectors weekly so as to maintain a complete check of the work.

Special attention is given to the testing of safety hooks on cages, and the examination of ropes and their lubrication. It has been found impossible to comply with the requirements of Section 32, para. 30 and 31 in their entirety; as the shafts get deeper the tremendous surge in ropes compels the testing of cages on a specially constructed frame so they can be adjusted for greater safety.

The storage of dynamite and detonators, and the handling of same in the workings have been constantly under supervision. During the year we proceeded against the Ivanhoe Gold Corporation for a breach of the Regulations in not supplying boxes of an approved type for the carrying of dynamite into stopes, but failed to obtain a conviction. The case has, undoubtedly, drawn mine managers' and miners' attention to the requirements, and the necessity of complying with the Mines Regulation Act.

The filling of stopes has been insisted on, and their height has, in some cases, been reduced. This was rendered necessary through the mines arriving at a stage when extra care was necessary. In the Great Boulder, Golden Horseshoe, and Ivanhoe Mines there is a considerable amount of side pressure which is causing all parties considerable anxiety, and everything possible is being done to resist this pressure, in the shape of timber and filling.

During the year there have been several snaps of pillars in the Great Boulder, which made a considerable noise and caused the immediate vicinity to tremble. Of course this must be expected; wherever mining has been carried on in length and depth similar conditions have arisen.

Air receivers have been tested and examined in accordance with the requirements of the Mines Regulation Act and amendments.

Dust underground has been continually under control; back holes and shrinkage stopes are troublesome, but the continual pressure exercised by inspectors has had a good effect, and damping is general throughout.

During the year the ventilation of mines has been under the supervision of Mr. Inspector Phoenix, and in consequence the Boulder Mines show much improvement in this direction.

Mining Development.—The Great Boulder Mine has done considerable lateral boring above the 2,300 feet level for parallel lodes carrying values. No sinking of main shafts has been done during the year. There is a considerable reserve of ore to draw from above the 2,500 level.

The Golden Horseshoe Estates, Ltd., is now down 3,200 feet, where the No. 4 Lode is being developed. This mine has large reserves, and the development in a southerly direction should considerably increase its reserve tonnage.

The Ivanhoe Gold Corporation, Ltd., Main Shaft is down 3,600 feet. No further development has been done. At this level the greenstone schist met in the crosscut coming in from the Great Boulder boundary is of a highly encouraging nature; as it is the country in which all the productive ore has been mined in this ore channel, it is highly probable the Great Boulder Company will diamond drill for pay values into their territory at the depth of 3,600 feet; could payable values be located at this depth a new life would be given to the area.

The Lake View and Star, Ltd., has been worked in part by tributers, the Company working only certain parts of the leases held. This mine requires energetic development.

The Oroya Links and Brown Hill Mines are being worked by tributers. The development of the Eclipse Lease, belonging to the Oroya Company, will be shortly put in hand; this lease has good possibilities.

The Great Boulder Perseverance Mine is still being worked by tributers; the Company has now exhausted the "shrink stopes" of all broken ore, and the salvaging of the mine is in progress. The desire of tributers to remove pillars and bridges to a dangerous extent causes Inspectors a considerable amount of work.

At Williamstown and the North End of the Kalgoorlie Field good prospecting has been continually carried out on a number of leases. The Corn Cob and Mayman's Consols are opening up well, showing good values in large and well-defined ore bodies. There are also a number of other leases in the vicinity, which yielded good returns during the year. These were specially referred to in Mr. Inspector Irwin's report.

At Broad Arrow, Ora Banda, Bardoc and Siberia, good development work has been proceeded with, and a fair quantity of good payable ore won in the various districts, which have been specially mentioned in Mr. Inspector Gourley's report.

At Kanowna the Red Hill Claim, owned by Martin and Co., has continued to give good returns from a flat reef. Development on this hill has been extended during the past year, and there is every reason to anticipate good values being obtained from other leases in the vicinity during the coming year. A company is now testing the deep alluvial ground; the finding of a pay-getter would give a tremendous impetus to searching in other localities for deep leads, which undoubtedly exist.

In the Bulong district very little work has been done; several parties are prospecting.

There have been inquiries about the Old Queen Margaret Mine, with a view to re-opening it, which may fructify in the future.

In the Mount Monger district several good crushings were obtained from Creedon's Welcome Lease, the Daisy and the Dinnie; these leases contain small reefs, carrying high values.

In the early part of this year McCahon and party, McLellan and party, and Pilkington and party were successful in locating rich ore prospects in a chloritic talc formation, about two miles south-easterly from Creedon's Homestead, of which more should be heard during 1920.

The Lass o' Gowrie, the Mt. Monger Proprietary the Great Hope, the Lass o' Gowrie East, and Hinchcliffe's Lease, further east of the Lass o' Gowrie, have located rich ore, showing gold, coarse and fine, to the naked eye. Width and values cannot be determined even approximately until shafts have been sunk at least 50 feet, together with crosscutting and driving on the course of the chloritic formation. The values showing in the shallow prospecting shafts extending over a mile in length are unquestionably promising, and are some of the best surface prospects located by prospectors for many years.

The Hampton Plains Mining Area has received a large amount of attention. Development is being vigorously carried on. The Celebration Mine has a crosscut at 50 feet, with the lode 25 feet wide, also crosscut at 100 feet, where the lode is 20 feet wide. At the 100 feet a large quantity of crosscutting and driving on the lode has been done, while the prospecting shaft has been sunk to the 200 feet level, where crosscutting is now in progress.

The Celebration Junction and Celebration South have done a considerable amount of sinking and driving without success; the lode is large but values are reported low.

The Mutooroo has developed remarkably well—three shafts are now down 100 feet each, and high values were located at 50 feet and 100 feet. The high values in a large formation of this character are extremely promising.

The Jubilee Group are working on two large formations, carrying values of a very encouraging nature, and if the values now showing are maintained at the 100 feet, with a good length of payshoot, these properties should be good producers.

The Melbourne Hope, Golden Victory, and Golden Hope are all on the same ore-channel as the Celebration, Mutooroo, and Jubilee, and large lode formations have been disclosed, carrying values. Development work is being vigorously carried out on all these properties.

The White Hope Mine has a very large sulphate lode, which has been disclosed for 15 to 18 feet, in several costeens through the 24 acre lease. Four shafts have been sunk in the lode, ranging from 40 feet to 70 feet in depth; one ounce values and over have been published from these developments. The lode gives promise of developing into a very large and sound mining proposition, after the Boulder type of mine.

Prospecting is being rigorously carried on in every mining centre controlled by this office. There is an optimistic feeling amongst the prospectors, and it may be reasonably anticipated that some good mines will be located from the present mining activity.

Report of Mr. E. J. Gourley, Inspector of Mines, Kalgoorlie.

Alunite at Kanowna.—I have visited the claims being worked frequently during the year to keep in touch with developments.

Potash Queen, Mrs. Wyatt's.—Several shafts have been sunk and crosscuts put out, but water level being at 30 feet, and the alunite of poor quality, this area has been abandoned.

Wyatt's.—They have unfortunately lost two of their shafts on account of heavy rains, and also a considerable amount of ore which was stowed in the workings. Three new shafts have been sunk to the West of the collapsed workings, and owing to the small quantity and quality of low value, the lease has not been worked for some time. A quantity of clay has been sent away, but I do not know for what purpose. I am informed that the price is 50s. per ton on rails at Kanowna. The supply appears to be exhausted, for I notice that during October and up to December a quantity has been taken away from Prowle's and Fletcher's Prospecting Areas further North.

McKinley's.—The chief source of supply for roasting has been mined from this lease, and two shafts have been sunk to a depth of 60 feet; the vein has been driven on North and South for a total distance of 170 feet just above water level. North of the prospecting shaft, about 70 feet, the alunite has cut out and a change of country rock, stained with iron and stratified, came in; so far no alunite has been discovered in it. Nodules of alunite are still being discovered in the South drive, but attention has been concentrated on the vein driven on from the prospecting shaft, and stoping on this for a short distance below to water, and over this level, about 350 tons of alunite have been mined. To get this I estimate it has been necessary to mine five times more mullock than ore. Stopes are now up to within 35 feet of the surface, but no ore of any extent is showing in the back. However, from the adjoining claim held by Ross and Cairnduff on the West some very good alunite has been mined, and as the ground between these two holdings has not been prospected at all, there is every promise of this area opening up payable bodies of alunite. Ross and Cairnduff, also Willmott on the Western boundary of this flat, have not worked their areas for the past three months.

Prowle and Party.—One shaft has been sunk to a depth of 65 feet, and crosscutting and driving have been done at 45 feet and 65 feet, and alunite mined at both levels, but of low grade; they are now sinking a shaft 150 feet East to try and cut Fletcher's run of ore, but down to 25 feet only a few small nodules have been discovered.

Fletcher's.—Two men have been working this continuously during the year, and 200 feet of crosscutting has been done, also driving at 50 feet and at 70 feet; no ore of any consequence has been obtained below 70 feet or above the 35 feet level, so that the ore bodies appear to occur between these two levels. A good quantity of ore has been obtained—approximately 5 tons per week for two men, and at the present time these faces are looking well; this ore is also on the low side for potash contents.

Trenfield and Party.—A shaft was sunk to a depth of 45 feet on the adjoining area North-East, and a few tons of alunite of good values were obtained, but the nodules being very far apart, the shaft was abandoned.

McCann and Party.—Three shafts have been sunk on this area, and in November Wyatt purchased an interest, and has since been working; his alunite is high in potash, but his party does not work continuously.

Breakaways.—Two men have been at work on the area formerly reserved, and have sunk a shaft to 18 feet, crosscutted West for 30 feet, and intersected three veins, averaging 8 inches, which assay 95 per cent. alunite; the area looks very promising.

Gold Mines, Red Hill.—Messrs. Martin, Ball and party, working at a depth of 60 feet on the Kanowna Lease, have had two very rich crushings from flat leaders in hard quartz-porphyry rock, and have 300 tons at grass at the present time of high value. The rich ore occurs in shoots, and lies close up to a big fault, which runs through the hill; this claim has been placed under option for six months to some Melbourne mining men, who have started to deepen two shafts.

Kanowna Consols.—This lease, formerly known as the Ballarat and Sunbeam Lease, has been worked by Willmott and Son. Stoping from the 300 feet level upwards, payable ore has been mined from a quartz reef averaging about 10 inches in width for a length of 150 feet, the last crushing being taken out of an underhand stope below the 300 feet level, and averaging 4 ounces to the ton for 24 tons. This lease is also under option, and they propose to sink the Ballarat shaft a further depth of 100 feet. A winding engine and small air compressor have been erected.

Golden Valley.—Mr. Robinson has erected a 5-head stamp mill driven by a gas engine, and has a 4in. pump at work draining the mine. He has started crushing, but so far only on dumps previously mined by the late owners. Portion of this plant was shifted from the Moonlight Lead.

White Feather Group.—These mines have been under exemption for the past year, but the air compressor on the main reef is supplying air for the Red Hill mines.

Waverley.—This district has been visited on two occasions, and very few men are employed.

Ahearn and Party are at work on the Missouri Mine, and have broken out above the 50 feet level about 1,000 tons, which have averaged about 5 dwts., and they are still breaking ore.

Cullen and Sons are still working on the Siberia Reward, and have obtained two small parcels of ore of good value during the year.

Correll and Co. have been working on the Siberia Consols, but on account of the price of kerosene they have stopped work in the bottom levels, and on my last visit were opencutting down to a depth of 20 feet with rich ore showing in places.

Calanchini and Williams, two returned soldiers, are at work on the old Camperdown Lease, but up to the time of my last visit nothing payable had been discovered.

Christmas Reef.—Four dryblowers are making a living in the old gullies, and four men are at work looking for contact leaders, two of which have obtained small quantities of rich ore.

Ora Banda.—The mines owned by the Associated Gold Mines have been worked by the company for the first nine months, and during the last three

months a tribute has been let to the former employees. The chief development work done is sinking a winze below No. 4 level to 60 feet, and driving a level both ways off this about 50 feet; these drives are being extended and a leading stope taken off on payable, but very erratic values. Work in other parts of the Gimlet mine is confined to stoping over the backs of No. 4, 3, and 2 levels in the company's stopes. The only work being done on the Victorious lease is drawing off ore from shrink stopes, and two men are working on tribute in the oxidised ore body around the old open cut.

Gimlet South.—Values have been low, and the 10-stamp mill has only been working part time; the ore has been drawn chiefly from old pillars.

Murphy and Party.—This syndicate has been working on the old Stirling Lease, now held as a Prospecting Area, and have broken a large parcel of low grade ore, which they expect to be payable.

Lady Evelyn.—During the year I examined this mine and recommended assistance be given the syndicate to enable them to purchase a boiler and rock-drill, also repair the air compressor. This was completed in October and work resumed, but after three cuts had been fired in the winze they stopped work and took out a small crushing from further north; owing to reconstruction of the party work is at a standstill.

Grant's Patch.—Duggeon and party have obtained some rich ore from their lease, but have lost the rich chute and stopped work.

Dark Horse.—Four parties of returned soldiers have prospected around this district at different intervals with no success. However, Ziegler and party have picked up good values in the footwall of the old stope where the rich patch was discovered, and have 20 tons at grass.

Bardoc.—This centre has been very quiet, and except for the Zorastrian, where some rich small parcels have been obtained, the prospectors, who have done a lot of work, have had no luck; four parties only have been at work.

Mulgabbie.—Two visits have been paid to this district, and no new parties have been out there; however, on what is known as the telluride leader, four parties of two men each have been doing development work, and a very small quantity of gold has been won, yet they are satisfied to continue working.

Thurston and party have abandoned the Reward Claim pegged by them at the Pinnacles, about eight miles West of Mulgabbie; there is some gold there, but not rich enough to pay owing to the distance from a mill, and the quantity not being sufficient to warrant machinery being erected.

Kurnalpi.—The gold returns have been very small, but a good deal of prospecting work is being done by returned soldiers equipped by the Government and assisted by Repatriation. Graham and Ellis have been doing development work on their leases, and the Success Battery has been put in order to crush the overburden from Burglar's Gully, and also small parcels for the prospectors. I have also visited two parties at the 6-mile, but no payable values had been discovered. Gessner and Huffa have returned to their old claim from which they obtained rich returns a few years ago.

Kalgoorlie Mines.—During the year my work has been confined to the principal mines, and development work has been restricted to a great extent from a variety of causes, chief of which I think has been the high price of mining stores, and the difficulty of obtaining same.

There have been two or three rock movements; the most serious happened during the time the miners were out on strike, and the effect can be seen at the 2,500 feet level in the crosscut from Edward's shaft and for about 400 feet south, along the Horseshoe boundary and also along the 2,500 feet level. In the Horseshoe a good deal of damage was done to the timbers, and the pillar between the two mines is shattered, but only a small quantity of rock has come down; both levels are now being timbered afresh. Careful attention has been given to the stopes in all the mines, and owing to side weight and the stopes from most levels in the Boulder being beaten out to near the levels, the ground above is heavy and requires a large amount of timber. This is being done by toms and pigstyes, and we are endeavouring to reduce the height of stope being taken off, so that should the back come away it will not leave the stope too high.

In the Horseshoe the stopes have been giving some trouble, especially the 27, 28, and 29 feet, on account of the ore body bursting frequently and bringing off big flakes of ore, and frequent inspections have been made.

In the Ivanhoe there has not been so much trouble, but in the North sections towards Hamilton shaft the timbers are showing heavy pressure, and have had to be renewed and repaired continuously. The stopes, with the exception of the 19 Section 6, which is very wide and heavy, have not caused any serious trouble.

In the Perseverance, Lake View and Star, Australia, South Kalgurli, and Kalgurli, the stopes have not given any trouble, but attention has been given to shrink stopes; the amount of ore drawn off being limited to prevent the back from becoming too high.

Dry mills have been visited on numerous occasions, and the dust has been kept down satisfactorily. Ropes have been examined and cut according to Regulations, and cages tested; one was condemned, as the test was not satisfactory.

I have also inspected the air receivers, after being cleaned out, on the principal mines.

Report of Mr. S. Irwin, Inspector of Mines, Kalgoorlie.

Golden Ridge District.—Mining operations have been successfully continued in the Golden Ridge Mine during the year by the syndicate that acquired this property from the company. The shoot of gold on the No. 2 East reef at the 200 feet level has been exhausted. Prospecting work is in progress on the South boundary of the lease at the 100 feet level, and blocks of payable stone have been encountered which are believed to be intact to the 200 feet level. The water has been allowed to rise to the 300 feet level on account of the heavy expense of keeping the mine unwatered below this depth.

The South Blocks lease adjoins the Golden Ridge Mine on its south boundary, and is worked by O'Brien and party, but results to date have not been satisfactory.

Elsie May.—This lease has been taken up again, and gold found in a lode West of the old workings on the surface. A crosscut is being driven at the 100 feet level west to prove values at this point.

Boorara.—Several leases are still being worked here, but results have not been satisfactory, as the values have been somewhat patchy and erratic.

Mount Monger District.—About 30 men have been employed on the different leases in this locality, and nearly all leases were payable propositions. The leaders are rather small but are very rich, and most of the crushings are worth 5 to 10 ounces per ton; the country incasing these leaders is chiefly kaolin, and is easily worked.

Idaho and Star of Aberdare.—This mine has been worked continuously (excepting during the strike period), and an average of 20 men are employed. This mine is equipped with a 10-head stamp battery and cyanide plant, and is producing regular payable returns.

Chaffers, Hannans Star, and Lake View Mines.—A number of men are employed on this group of mines, and according to published monthly reports the returns have been on the low side, but with the present bonus on gold there should be a profit over working costs. A number of tributers are also working blocks of ground that would not pay the company to work themselves.

Great Boulder Perseverance G.M.—The management of this mine early in 1919 completed emptying shrink stopes of reserve ore, and the property was then placed in the hands of the liquidator to sell. The proposed sale did not eventuate, and a considerable number of tributers are employed working on the various lodes throughout the mine, some of whom have been very successful, and the company, instead of showing a very small monthly profit and sometimes a loss, have increased their returns considerably, which enabled the directors to declare a dividend.

Oroya Links. This group of mines, consisting of Eclipse, Oroya North, South Blocks, and Brown Hill Leases have a considerable number of men employed on the tribute system, and the Ball mill treatment plant is taxed to its utmost capacity, treating ore from the different tribute parties. Louden and party on the South Blocks are operating on a well-defined sulphide lode at a depth of 300 feet from the surface; the shoot of ore is about 100 feet in length by about 7 feet wide, and worth from an ounce to 30dwts. per ton. This party have recently erected a Cornish boiler, 3-drill compressor, and geared winding-engine, which should enable them to work the lode more systematically and economically.

Ironsides Norrth Mine.—A well-defined lode is being worked on the Union Jack section of this mine above the 300 feet level, and a fair amount of payable ore is mined. The Union Jack shaft has recently been unwatered to the 400 feet level, and a connection is to be made at this depth with the Ironsides North workings, which will improve conditions considerably.

Williamstown Leases.—Mayman's Consols, Sassella Bros. Lease No. 4499E, and Hamilton's Lease: Well-defined lodes have been opened up in these leases at a depth of 150 feet, and values are reported to be payable. Sassella Bros. have been working lease No. 4499E successfully for the past 10 years, and a winz sunk down 43 feet below the 180 feet level proved the lode at this point to be worth an ounce to 30 dwts. per ton, with only one wall showing.

Croesus South.—Several parties of prospectors are working on this lease, also on a number of leases North, including Maritana Hill, and some of them are on payable gold.

Hannan's Reward.—Hunt Bros. have the whole of this mine on tribute, and are employed taking out pillars above the 80 feet level on southern boundary.

Cassidy's Hill, Fair Play, and Creswick Leases, on the North of the Golden Mile are all being worked with small parties of men, but no development of any importance has been discovered.

Regular visits of inspection have been carried out on the above mines, and work has proceeded in accordance with the Mines Regulation Act.

Report of Mr. W. Phoenix, Inspector of Mines, Kalgoorlie.

My inspections have been directed mainly to ventilation. During the past year general details have been gone into, and many improvements made in various mines. The sectional area of the return airways has been enlarged, the results being very satisfactory and showing the importance of having large and unobstructed passes.

A great deal of work has been done in making air connections to stopes, and work is still in progress. It has been found necessary to have more than one connection to each stope in order to get the best result possible, particularly where much firing is being done.

Work has also been directed to keeping the intake shafts as dry as possible, so as to allow of employees working in a reasonable amount of comfort.

Air receivers were carefully examined and kept within the requirements of the Mines Regulation Act. The explosives used are a fair quality, and every provision is made to safeguard the men.

The indifference shown by the employees in the past of blocking airways and keeping air doors opened where they should be kept closed has been overcome to some extent, and in some cases a well-trained mine official has been put in charge of this important branch of mining.

Generally speaking, many improvements have been made, and the future work will be concentrated to the upper portion of these deep mines, enlarging the area of all return airways.

Report of Mr. J. McVee, Inspector of Mines, Collie.

There are six collieries producing coal, viz.:—Proprietary, Co-operative, Cardiff, Westralian, Premier, and Scottish.

With the exception of the Scottish Colliery, which is still in the developing stage and only driving the main tunnel, all the other mines are opened out well, and could with additional machinery increase their outputs considerably.

The total amount of coal produced from the field during the year was 401,711 tons, valued at £270,355, as against 336,799 tons valued at £205,890 produced in 1918, an increase of 64,912 tons. Of this amount the Government Railways took 227,368.4 tons large coal, 5,824.8 tons nuts, and 56.4 tons of smalls. Tramways took 27,965.7 tons smalls, a total of 271,215 tons; the balance being sold as bunkering and private trade.

The average number of men employed during the year was 704, as against 617 in 1918. The amount of coal produced per man was 570.6 tons. On the whole the mines have worked fairly regularly dur-

ing the year, and the prospects for the coming year are promising, and the output should be considerably increased.

Prospecting has been carried out in a systematic manner by the East Collie Coal Company, who are boring to the south of the Premier leases, and have proved several seams of coal varying in thickness from 3 feet to 9 feet 6 inches, so that probably mining operations will be commencing shortly on this area.

Ventilation.—The ventilation of the mines has been fairly well maintained, and as a rule attempts were made to improve any defects pointed out.

Report of Mr. R. C. Wilson, Inspector of Mines, Perth.

The mines in the Northampton, Greenbushes, and Phillips River Districts, and the quarries in the Swan District were regularly inspected. Special visits were made to Dongarra to report on the Gypsum deposit, and to Two Peoples Bay to report on the marsh gas emanations.

NORTHAMPTON MINERAL FIELD.

Owing to the reduced price of lead and the high freight charges the Fremantle Trading Company closed down the Smelter at Fremantle early in the year, and suspended operations on their mines. With the exception of Kirtons South Mine at Northampton and the Three Sisters Mine at Ajana, the mines have been idle most of the year. Recently, however, the price of lead began to rise, and has continued to do so steadily till it is now higher than at any period during the war, and a large output may be expected during the present year.

At Northampton the development of the 220 feet level in the Kirtons South mine was continued with fair results.

At Ajana on the Three Sisters mine a good deal of development was done by Mr. Trude, who took a working option over the property. The mine developed very satisfactorily at the 100 feet level, and he recently exercised the option and purchased the property. I understand that a treatment plant is shortly to be erected.

The Surprise mine was idle during the greater portion of the year, but is now being actively worked again. The mine continues to develop most satisfactorily at the 100 feet level, and the owners are about to construct a tramway from the mine to the Ajana Siding, to provide cheap transport for their lead concentrates. They have also purchased Mr. Meacham's lease, which adjoins them on the south side. On Block 7 Messrs. Thring and Green are sinking a new shaft on the lode with very encouraging results.

GREENBUSHES MINERAL FIELD.

Considerable mining activity was noticeable at Greenbushes throughout the year, particularly with regard to dredging and sluicing operations. As many as 16 dredges were operating till recently, when a few of them had to suspend operations owing to a shortage of water. More attention is now being given to lode mining than at any period in the last few years, and the results of recent work in this direction have been very satisfactory.

On the Cornwall lease enough soft ore is being obtained at a shallow depth to keep the South Cornwall plant running. The lodes on this lease and on the adjoining leases, the Returned Soldier and the Hillgrove, are all looking well. At the Kapanga mine a large ore body is being opened up at the 70 feet level, said to be worth 14lbs. of tin to the load.

RAVENSTHORPE DISTRICT.

Mining has been very quiet in this district, very little copper ore has been sent to the smelter, and gold mining has also declined. A reasonable amount of development work is now in progress by parties receiving Government assistance.

At Ravensthorpe the mines controlled by Mr. Neil McNeil are practically idle, there being only one small tribute party at work in the Cattlin mine, and another on the Elverdton group of leases.

Encouraging results have been obtained on the Queen line of lode, and at the Ironclad mine, and a rich crushing was taken from the old Bridgetown lease.

At Kundip the Fair Play has continued to yield rich sulphide ore. The Gem mine is developing rather satisfactorily at the 100 feet and 140 feet levels. At the Harbour View mine an underlay shaft has been enlarged and converted into a main haulage shaft. A head gear has been erected, and a winding winch installed. Shaft sinking will now be proceeded with. At the Gem Consolidated the main underlay winze has been continued, and a block of ore is being developed below the 343 feet level. The Hillsborough continued to produce a small tonnage of ore.

SWAN MINING DISTRICT.

With the exception of the Greenmount quarry, which has closed down, the principal quarries have worked continuously throughout the year. The brickworks, which are quarrying shale for brick making, are particularly busy at the present time.

MINING ACCIDENTS.

The mining accidents for the year 1919 are tabulated in tables 26, 27, 28, and 29, with the previous year's totals for comparison, and forwarded herewith for inclusion in your Annual Report, together with diagram of the fatal accidents year by year, and their causes.

The following table shows the total number of fatal accidents recorded as having occurred on mines, whether to persons employed on the mines or not for the last five years:—

——	1915.	1916.	1917.	1918.	1919.
Total fatal accidents on mines reported	36	23	21	28	27
Less accidents to persons not engaged in mining, deaths in mines due to natural causes, and accidents to persons which were not due to their occupation as miners	2	2	...	3	1
Fatal accidents to men engaged in mining	34	21	21	25	26
Total men engaged in mining (average)	12,253	10,903	10,041	9,265	8,346
Accident death rate per 1,000 men engaged in mining	2·77	1·93	2·09	2·70	3·12

Table 26 classifies the accidents according to causes, from which it will be noted that during 1919 twenty-six persons were killed, and five hundred and ninety-six seriously injured, as compared with twenty-five killed and six hundred and eighty-four seriously injured during the previous year. The diagram shows graphically the totals of fatal accidents year by year since 1891.

Table 27 shows the death rate per 1,000 persons employed on surface and underground in gold, coal, and other mines, the general average rate for 1919 being 3.12 as against 2.70 for 1918. The rate per 1,000 are based upon the figures in table No. 21 (Annual Report Under Secretary for Mines, 1919), which shows a grand total for 1919 of 8,346 men employed at mines above and under ground, inclusive of alluvial workers.

Table 28 gives the average number of men employed above and under ground at quarries, and the death rate per 1,000 persons employed therein. The total number of men employed during 1919 was 245 as against 200 for 1918, and the death rate for both years was nil.

Table 29 summarises all the fatal accidents for 1919 above and below ground in gold mines only, with rates per 1,000 men employed and per 1,000 tons of ore raised, similar figures for 1918 being given for comparison. The number of men on which these rates are based is taken from table 23 (Annual Report, Under Secretary for Mines, 1919), and does not include alluvial workers.

In the following table all fatal and serious accidents reported to this office during 1919 are classified according to the gold or mineral field in which they occurred, and also according to causes, the totals from each cause for 1918 being shown for comparison:—

——	Explosives.		Falls of Ground.		In shafts.		Miscellaneous Underground.		Surface.		Machinery.		Total.	
	F.	S.	F.	S.	F.	S.	F.	S.	F.	S.	F.	S.	F.	S.
1. E. Coolgardie ...	...	2	5	32	2	7	3	188	1	80	1	10	12	319
2. Mt. Margaret ...	...	...	1	9	1	6	1	72	1	15	...	5	4	107
3. Murchison ...	...	...	1	1	...	...	...	10	...	2	...	...	1	13
4. E. Murchison ...	...	...	...	1	...	...	1	12	...	5	...	1	1	19
5. Coolgardie ...	...	...	...	...	...	...	...	...	1	...	...	...	1	...
6. Yilgarn	...	1	4	...	1	...	...	...	...	...	...	3	5	4
7. N. Coolgardie ...	...	...	...	1	...	1	...	4	...	1	...	...	...	7
8. N.E. Coolgardie ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9. Broad Arrow ...	...	...	1	1	...	...	...	1	...	1	...	2	1	5
10. Dundas	1	1	...	...	...	...	...	...	...	...	...	...	1	1
11. Pilbara	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12. Peak Hill ...	...	...	...	...	...	1	...	...	...	...	...	...	...	1
13. Yalgoo	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14. Phillips River ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15. Collie	...	2	...	13	...	...	...	83	1	20	...	...	1	118
16. Greenbushes ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17. Northampton ...	...	...	...	...	...	...	...	...	...	1	...	...	...	1
18. West Pilbara ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19. Swan	...	1	...	...	...	...	...	...	...	...	...	...	...	1
20. Ashburton ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21. Roelands ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22. Kendinup ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Total for 1919 ...	1	7	12	58	4	15	5	370	4	125	1	21	27	596
Total for 1918 ...	...	17	9	72	6	12	7	417	3	141	3	26	28	685

FATAL ACCIDENTS.

Hereunder is a brief description of each fatal accident which occurred during 1919:—

Explosives.

At the Mararoa Gold Mine, Dundas Goldfield, two men were engaged boring in the stope when the drill came in contact with an unexploded charge and caused an explosion, killing one of the men and injuring the other. Prior to the explosion there was nothing to show that there was an unexploded hole; apparently the top of an old hole must have been blown off, leaving the lower end still charged. The coroner's jury brought in a verdict of accidental death, with no blame attachable to anyone. (274/20.)

In Shafts.

At the Great Boulder Perseverance Gold Mine, East Coolgardie Goldfield, a braceman was killed. Deceased was caging a truck at the North compartment, but owing to his having neglected to shut the gate the truck, carrying him with it, fell down the South compartment. The coroner's jury found that he came to his death through accidentally falling down the shaft. (712/19.)

Whilst ascending the shaft of the Trafalgar Gold Mine, Yilgarn Goldfield, the mine manager fell from the ladder and was killed. As he had recently recovered from influenza, the accident was probably due to his becoming giddy and overbalancing. The coroner's jury brought in a verdict of accidental death, with no blame attachable to anyone. (2144/19.)

At the Lancefield Gold Mine, Mt. Margaret Goldfield, a man was killed through the skip running down on to him whilst he was working at the bottom of the inclined shaft. From the evidence taken at the inquest it would appear that the winding rope was badly corroded internally, but the defect was not visible from the outside, and on breaking, the skip ran away and crashed through the penthouse to the bottom of the shaft. Just before the rope broke it was noticed to be flattening, and the underground manager went down the other compartment of the shaft to remove the man at the bottom, but the rope broke while he was going down, and the skip dashed past him. The coroner's jury returned a verdict of accidental death, with no blame attributable to any person. (1622/19.)

At the Great Boulder Perseverance Gold Mine, East Coolgardie Goldfield, a man left the skip to go to the knocker line, but instead of going to the south compartment, in a moment of preoccupation opened the gate of the middle compartment and walked into the shaft. The evidence taken at the inquest showed that ten minutes before the accident the gate was shut, but after the occurrence it was found open. The coroner's jury found that deceased came to his death by falling from the 1,100 feet plat, and added the following rider:—"We consider that there should be some arrangement on the gates that would ensure their remaining closed when this plat is not being used for caging, and we also consider that there should be a permanent light on such plat when the electric lights go out of order for any reason." It was shown that the electric light on the plat had gone out of order and not been replaced, but that there was a fair amount of light from the plat on the opposite side of the shaft. The door was an automatically closing door of approved type (See prosecutions hereunder for action in regard to insufficient lighting). (186/19.)

Falls of Ground.

At the Great Boulder Proprietary Gold Mine, East Coolgardie Goldfield, one man was killed and another seriously injured through a piece of ground, which had been tested by them, coming away from the back of the stope, which was well secured. The coroner's jury found that no blame was attachable to any person. (1418/19.)

Two elderly miners met their death through a heavy fall of rock whilst they were barring down loose stone at the Great Boulder Proprietary Gold Mine, East Coolgardie Goldfield. Every precaution appears to have been taken to secure the ground previous to the accident. The coroner's jury returned a verdict of accidental death, with no blame attachable to anyone. (1923/19.)

At the Transvaal Gold Mine, Yilgarn Goldfield, a man working night shift was found dead the following morning. There was no witness of the accident, but the Inspector of Mines came to the conclusion that deceased had been struck by a stone falling from the back of the stope. Action was taken against the manager for breach of the Regulations as to men working alone (see Prosecutions). The coroner's jury brought in a verdict of accidental death, drawing attention to the fact of deceased not having been visited in accordance with the Regulations. (410/19.)

One man was killed and another slightly injured at the Light of Asia Gold Mine, Murchison Goldfield. At the time of the accident the men were cutting a piece off a prop before placing it in position to secure the back, when a heavy fall of stone fell on deceased completely burying him; on recovery of the body life was found to be extinct. The coroner's jury brought in a verdict of accidental death, with no blame attachable to anybody. (1459/19.)

At the Great Boulder Proprietary Gold Mine, East Coolgardie Goldfield, a man was killed through a fall of ground occurring whilst he was engaged in barring down. The piece of ground which fell had been previously examined, and was considered safe. The coroner's jury found that deceased came to his death from the effects of injuries received at the 1,500 feet stope. (857/19.)

Whilst firing out the stone at the 2,500 feet level of the Golden Horseshoe Gold Mine, East Coolgardie Goldfield, a heavy fall occurred killing one of the men. The coroner's jury returned a verdict of accidental death. (823/19.)

At the Christmas Patch Gold Mine, Broad Arrow Goldfield, a man was killed through a portion of the hanging wall falling on him. The fall was due to soapy heads in the wall. The coroner's jury brought in a verdict of accidental death, with no blame attachable to anyone. (1058/19.)

One man was killed and another seriously injured at the Lancefield Gold Mine, Mt. Margaret Goldfield, through a heavy fall of ground occurring in the south stope at the 800 feet level. A verdict of "death through fall of rock whilst working at the 800 feet level south stope" was given by the coroner's jury. (1263/19.)

A regrettable accident resulting in the death of three men occurred at the Edna May Consolidated Gold Mine, Yilgarn Goldfield. The coroner's jury brought in the following verdict:—"The deceased came to their death accidentally by a fall of ground which came away from the granite bar between No. 1 and No. 2 levels. We find that there is no blame attachable to the company or its servants." 2429/19.)

Miscellaneous Underground.

At the Yuanmi Gold Mine, East Murchison Goldfield, a man was missed, and on a search being made his dead body was found in the chute of a mullock pass. The coroner's jury brought in a verdict of death through accidentally falling down a mullock pass, no blame being attachable to anyone. (723/19.)

A fatal accident occurred at the South Kalgurli Gold Mine, East Coolgardie Goldfield, to a trucker. From the evidence it would appear that deceased being thirsty returned to the plat for water and a few minutes after another trucker heard groans, and on investigation found deceased had fallen into the ore bin, receiving injuries from which he died shortly after being rescued. The coroner's jury returned a verdict of death through accidentally falling into ore bin at 1,200 feet level, there being no evidence to show which opening he fell through. The place was considered quite safe prior to the accident. (1259/19.)

A man was killed at the South Kalgurli Gold Mine, East Coolgardie Goldfield, through the breakage of a winding rope. The rope in use was frayed, and it had been decided to cut and splice it before the next shift. At the time of the accident some drills were being lowered in a bucket, and on the rope breaking deceased, who was working underneath, was struck by the bucket. The coroner's jury returned a verdict of death from injuries received by a bucket falling on him through the breaking of a defective rope. The jury considered that the management should not have allowed the rope to be used. The manager was proceeded against and fined (see Prosecutions). (1884/19.)

At the Sons of Gwalia Gold Mine, Mt. Margaret Goldfield, a man received fatal injuries by being hit by a blunt steel drill. Deceased was warned that the steel was being thrown down, and told to stand clear and replied telling them to throw it down. He evidently thought himself quite safe, but a rebounding steel must have hit him. The coroner's jury gave a verdict of accidental death, with no blame attachable to anyone. (1932/19.)

A man was killed through falling into an ore bin at the Great Boulder Perseverance Gold Mine, East Coolgardie Goldfield. Deceased was engaged trucking ore into the bin, and apparently overbalanced while attempting to get a large rock out of the truck. The coroner's jury returned a verdict of accidental death, with no blame attachable to anyone. (1941/19.)

Surface (including Machinery).

At the Burbanks Birthday Gift Gold Mine, Coolgardie Goldfield, a man met his death through the piece of timber he was standing on breaking, causing him to fall a distance of 30 feet. Death was instantaneous. The piece of timber was cross-grained. The coroner's jury brought in a verdict of accidental death, no blame attributable to any person. (1121/19.)

While demolishing a mud brick building on the Lancefield Gold Mine, Mt. Margaret Goldfield, a man was killed through one of the walls falling on him. The coroner's jury gave a verdict of accidental death, with no blame attachable to anybody. (348/20.)

A fatal accident occurred at the Co-operative Colliery, Collie Coalfield. On coming out of the mine the manager, under-manager, and electrical engineer decided to ride round the tramline; the manager took charge of the engine, and while driving at excessive speed the front wheels left the rails and the engine turned over, pinning the manager between the cab and ground, death being instantaneous; the other men escaped uninjured. The coroner's jury returned a verdict of accidental death, adding the following rider:—"That in our opinion no one should drive the engine other than the engine driver." (2680/19.)

OTHER ACCIDENTS.

In addition to the above the following fatal accident was reported but was not classified as a mining accident, as deceased was not an employee of the mine, and his death was not due to his occupation as a miner.

At the Hannans Star G.M., East Coolgardie Goldfield, the body of a man was found in an open cut. From the evidence adduced at the inquest it would appear that deceased fell into the open cut while intoxicated. The open cut was fenced. The coroner's jury returned a verdict of "Found dead in open cut, but not sufficient evidence to show how he came by his death." (2621/19.

SERIOUS ACCIDENTS.

(Under Section 26 of "The Mines Regulation Act, 1906," the term "serious" is applied to all accidents which render the sufferer incapable of performing his ordinary duties in or about a mine for a period of 14 days or more.)

Of the 596 accidents during 1919 319 were recorded from the East Coolgardie Goldfield, but only 36 cases were breakages of the larger bones, permanent injury to limbs, or injuries likely to have lasting disabling effects. The balance were injuries of a less serious nature, such as bruises, cuts, broken and crushed fingers and toes, scalds, burns, poisoned cuts, shocks, smaller dislocations, strains, wrenches, jars, etc., but sufficiently serious to require the injured person to be absent from his work for fourteen days or more.

EXPLOSIONS AND EXPLOSIVES.

Under the above classification seven men met with serious injury during 1919. In one instance an explosion occurred before the man had reached a safe distance, and in three cases explosions occurred through boring into old holes. One man was hurt through an explosion of a detonator, one by an explosion of gunpowder, and one through a charge exploding before the injured man had got away to a safe distance owing to his waiting to pour water into the hole for tamping after he had lit the fuse.

FALLS OF GROUND.

Fifty-eight serious accidents were reported to be due to falling ground during 1919. In thirteen cases the injuries were received while the men were engaged in pulling down loose ground after firing. In the remaining 45 cases the injuries were due to ground falling on men, or their being struck by falling stones or coal in various parts of the mines.

IN SHAFTS.

During 1919 fifteen men met with serious injuries while working in shafts. In two instances the accidents were due to winding ropes breaking, in four to stones falling or rolling down shafts, and five were due to men allowing limbs to project and come in contact with the shaft timbers while riding in cages and skips. In one instance the engine-driver lowered a skip on to a man through failure to reverse his engine; while in another a man became entangled in some hose attached to an ascending bucket; one man was struck by a passing skip, and one had his foot jammed.

MISCELLANEOUS UNDERGROUND.

370 accidents were recorded as "Miscellaneous Underground" during 1919. In 107 cases the injuries were received while handling and loading trucks and skips, through fingers and bodies being jammed against chutes and other trucks, toes and feet run over, bodies struck by upsetting of trucks, men slipping and straining themselves while trucking, or lifting derailed trucks or material into trucks, and so on, the injuries being mostly wrenches, sprains, bruises, jars, fractures of fingers and toes, and cuts. In 81 cases the injuries were due to falling and rolling loose rocks and stones, such as runs of ore and mullock, while shovelling, or stones running down rills and ore chutes, and 14 men received severe cuts and bruises while handling sharp stones. Fifty men were injured handling rock drills, coal-cutting machines, and parts of same, and four by the stages on which machines were erected collapsing. Other falls in the workings from stages and ladders, in rills, passes, and so on, caused injury to 27 persons, and 24 were hurt by falling tools and pieces of machinery. Flying splinters of stone and steel were responsible for 29 men being injured, and 17 were hurt while handling timber, while three men were injured falling down ore passes. The remaining 14 cases were due to various accidental causes—jarring of hands and feet, blows from tools, strains, and so on.

SURFACE (INCLUDING MACHINERY).

146 men received serious injuries while working on the surface. Three men were burnt and three scalded in various ways; 14 sustained injuries from falls in the course of their work; 19 were hurt by trucks and skips, by being jammed or struck by

them, by them capsizing, or by the men sustaining strains while working them. Flying splinters injured nine men; falls of timber and pieces of machinery while being handled accounted for 48 cases of injury; 20 cases were caused by machinery in motion, seven of these being caused by handling belts in motion. Six men were hurt by being struck by stones or coal; four received injuries through falling from stages and ladders; six men were struck by tools they were using falling or slipping; and two men were kicked by horses. Four men received injuries while attending to filter presses; and one man sustained serious injury through falling into a cavity caused by a subsidence of ground due to old workings (2089/19). Other causes of seven accidents were strains from lifting heavy weights, slight shock from touching electric connections, splash of slime in eye and cuts from sharp tins.

WINDING MACHINERY ACCIDENTS.

(Without serious injury to persons).

During the year a number of accidents to winding machinery were reported, of which brief particulars are now given hereunder.

OVERWINDING.

Whilst hauling ore at the Sons of Gwalia G.M. an engine-driver overwound the engine owing to part of the depth indicator being worn out. The bridle of skip struck and broke the wooden bearers under pithead wheel; the broken part was replaced by a new one. (864/19.)

At the Menzies Consolidated G.M. an engine-driver hauled the cage to pithead and caused slight damage to the engine. (378/19.)

An engine-driver overwound the skip in the west compartment of James's shaft of the Lake View and Star G.M., the safety hook acted and no damage was done. (378/19.)

An engine-driver at the Sons of Gwalia mine raised the north skip too high and lowered the south one too low and failed to reverse the engine; consequently the south skip was lowered instead of raised, and a skipman knocked down and slightly injured. The case was investigated by the Board of Examiners and considered to be a mishap. (1918/19.)

ACCIDENTS TO SKIPS AND CAGES IN SHAFTS.

At the Sons of Gwalia G.M. the south skip, full of ore, became derailed about the No. 10 level and knocked out several shaft timbers, one of which fell into the north compartment and derailed the ascending north skip. Careful examination of the south skip and road failed to show the cause of the derailment. Excessive speed may have been the cause, but was denied by the engine-driver. (863/19.)

While an engine-driver was raising the south skip at the Sons of Gwalia G.M., the clutch bands broke. (378/19).

At the Menzies Consolidated G.M. an engine-driver hauled the cage to the pithead and caused slight damage to the engine. (378/19.)

Two men were being lowered from the 100ft. level of the Bullfinch G.M. when the bar link broke. The cage was examined prior to the accident and appeared all right. No injury was sustained by two men in the cage. (1156/19.)

At the Yuanmi G.M. the top section of the head gear was torn off, bearers split and fractured, bolts sheared, truck door bent and skids broken, shackle bolts bent and skid at north end of compartment broken, through a truck becoming tipped in the cage. (815/19.)

At the Lancefield G.M., through some cause unknown, the south skip was derailed while ascending the inclined shaft. (378/19.)

ACCIDENTS TO WINDING ROPES.

Breakages of winding ropes occurred at the following mines:—Ida H., Golden Horseshoe, and Golden Ridge. (378/19, 1048/19, and 2357/19.)

MISCELLANEOUS ACCIDENTS.

At the Yuanmi G.M. the crosshead of the engine was cracked through, a small lubricator cover becoming detached and falling on to the track of the crosshead. (428/19.)

PROSECUTIONS FOR BREACHES OF "THE MINES REGULATION ACT, 1906," AND REGULATIONS.

Seven persons were proceeded against during 1919 for breaches of the Act and Regulations.

Section 32.

General Rule (3), *paragraph* (*g*).—The manager of a mine was fined £5 with costs for failure to enforce the Regulations, and a miner was fined £2 with costs for neglecting to use a tin or canister for carrying explosives into a mine. (2605/18.)

General Rule (33):—Action was taken against a manager for neglecting to provide a suitable light at a plat where a fatal accident occurred; a fine of £5 with 5s. costs was inflicted. (186/19.)

General Rule (34).—A manager was fined £2 with costs for failure to provide a ladder in a shaft. (2264/19.)

Section 48.

For failure to supply plans of mines proceedings were instituted against two managers, one case was withdrawn as plans were put in, but in the other case a fine of £10 with 4s. costs was inflicted. (2411/17.)

Regulation 2.

A miner met his death whilst working alone, and the manager of the mine was proceeded against for a breach of Regulation 2, which requires that men working alone must be visited at intervals of not more than two hours. A fine of £1 with 3s. costs was inflicted. (410/19.)

THE COAL MINES REGULATION ACT, 1902.

Two persons were proceeded against during 1919.

General Rule 1.—For neglecting to maintain proper ventilation in a mine the proprietors were proceeded against, and fined £5 with costs. (427/19.)

General Rule 56.—A miner lighted a shot before tamping the hole, with the result that an explosion occurred while he was pouring in water for tamping; he was fined £1 with costs. (427/19.)

EXEMPTIONS FROM SECTION 31, SUBSECTION 4 OF THE MINES REGULATION ACT, 1906.

Twenty-seven persons were granted exemption certificates during 1919, twenty-one being for mines in the East Coolgardie, two in the Coolgardie, one in the N.E. Coolgardie, and three in the East Murchison Goldfields.

Before issue of certificates applicants were examined in each case by the District Inspector of Mines on the particular machinery for which the certificate was required, and the inspector satisfied himself that they were competent to handle it. The raising or lowering of men is not allowed on this certificate.

SUNDAY LABOUR IN MINES.

During the year 1919, permits to work on Sundays were given to two gold mines and six coal mines, one of the gold mines being granted permission on five, and one of the coal mines on two, separate occasions.

These permits were issued for the performance of work which could not be done while the ordinary work of the mines was in progress, such as relaying roads and flats, brushing roof, cleaning tunnels, altering turns on haulage roads, etc., etc.

AMENDMENTS AND ADDITIONS DURING 1919 TO THE REGULATIONS UNDER "THE MINES REGULATION ACT, 1906," "THE MINES REGULATION AMENDMENT ACT, 1915," "THE COAL MINES REGULATION ACT, 1902," "THE COAL MINES REGULATION ACT, 1915," AND "THE MINING DEVELOPMENT ACT, 1902."

Mines Regulation Act, 1906.—Cancellation of exemption of Westonia Mines from Section 41, Subsection (1). (Gazetted 19/3/1919.)

Additional General Rule under Regulation 4 to be No. 44, relating to lighting fuses when blasting. (Gazetted 7/5/1919.)

Exemption from Section 41, Subsection (1), to Whim Well Copper Mines regarding hours of labour. (Gazetted 17/12/1919.)

Mining Development Act, 1902.—Regulations relating to advances on alunite. (Gazetted 12/3/1919.)

Cancellation of Regulations for treatment of auriferous copper ores at State Smelting Works, Phillips River, and substitution of amended Regulations. (Gazetted 2/4/1919.)

Amendment of Clause 1 of Regulations relating to advances on alunite. (Gazetted 16/4/1919.)

Cancellation of Regulations relating to advances on alunite. (Gazetted 16/7/1919.)

Extension for one year of Regulations gazetted 25th August, 1911, relative to subsidies in connection with production of merchantable mica and manufactured mica goods. (Gazetted 20/8/1919.)

Development of Mining.—Public notice relative to advances on alunite. (Gazetted 18/7/1919.)

Extension of bonus for production of graphite for 12 months. (Gazetted 2/10/1919.)

"The Coal Mines Regulation Act, 1902."—Amendments and additions to Regulations 4, 11a, 11b, and 11c under Part 1, relating to Accident Relief Fund. (Gazetted 27/9/1919.)

PHILLIPS RIVER SMELTING WORKS.

Report of the Manager, Mr. Richard Shepherd, dated 15th July, 1920.

Owing to the decline in the price of copper at the beginning of the year, and the continued high cost of stores and materials, the delivery of ore for treatment at the Smelter practically ceased for several months. The total ore output of the field for the year was only 1,306.3491 tons, containing 49.193 tons Cu and 1533.51 ozs. Au. This small tonnage and the disproportionately high gold values, compared with copper, rendered it inadvisable to run the furnace for both metallurgical and commercial reasons, so the works remained closed throughout the year.

Even if these adverse conditions had not obtained the lack of mining development at depth, mentioned in previous reports, would inevitably have reduced the ore supply below the scale of commercial smelting operation.

With the object of resuscitating the field, advances from the Mines Development Vote to fifteen of the claim-holders were sanctioned by the Hon. the Minister, and £1,689 7s. 6d. paid as loans to thirteen of them during the year. Advances were made on the basis of footage driven and sunk, having due regard for the depth and hardness of the ground passed through.

The total shaft sinking for the year was 670 feet, the rate of payment for which varied from 23s. 10d. to 60s. per foot. Excluding the work done on the "Ard Patrick" and "Gem Consolidated" G.M. Leases, whose main trouble was in dealing with heavy flows of water, there were 557 feet of shaft sinking, loans upon which averaged 31s. 9d. per foot. There was also 100 feet of driving and crosscutting done on four of the holdings at an average loan advance of 27s. 11d. per foot.

No fresh discoveries of importance were made, but development work was hardly far enough advanced to expect results at the end of the year.

ADVANCES ON ORES.

The policy of making advances on ores, and selling the latter on account of ore-producers, was continued during 1919, but owing to the depressed state of the base metals market, little ore of such metals was being raised anywhere in the State. The Department has a representative on the Australian Metal Exchange, and is thereby enabled to obtain registration of sales of ore for prospectors and other ore-producers who may desire to export their product. The slackness of production, however, is shown by the fact that only one sale outside Australia, of a parcel of pig lead, weighing 11¾ tons, was registered during the year.

Advances were made on various ores in accordance with the following statement:—

ADVANCES ON ORES.

Statement of Transactions for Year 1919.

MISCELLANEOUS MINERALS.

Mineral.	File.	Tonnage.	Amount advanced.	Expenses in shipping.	Balance of proceeds remitted to owners.	Total amount realised.
			£ s. d.	£ s. d.	£ s. d.	£ s. d.
Copper Ore	179/19	5·2920	...	11 6 10	4 2 8	15 9 6
Do.	218/19	7·4650	115 0 0	15 5 2	38 12 8	168 17 10
Do.	731/19	6·9283	85 0 0	17 12 8	53 8 11	156 1 7
Do.	1496/19	4·5569	...	20 4 0	6 0 10	26 4 10
Do.	1440/19	112·2790	941 0 0	245 4 7	167 0 10	*a* 1,353 5 5
Do.	1496/19	33·5060	323 0 0	78 12 11	39 18 8	*a* 441 11 7
Do.	1955/19					
Do.	2223/19	146·1046	953 0 0	146 6 1	207 3 9	*a* 1,306 9 10
Do.	2308/19					
Do.	2788/19	48·4898	275 0 0	56 8 11	10 13 0	*a* 342 1 11
Do.	154/20	113·3533	613 0 0	72 0 5	58 16 10	*a* 743 17 3
Do.	155/20					
		477·9749	3,305 0 0	663 1 7	585 18 2	4,553 19 9
Lead Ore	35/19	17·3361	...	...	206 4 10	206 4 10
Do.	636/19	9·8335	50 0 0	6 3 3	157 0 0	213 3 3
Do.	344/19	19·6245	98 0 0	8 12 6	342 14 6	449 7 0
		46·7941	148 0 0	14 15 9	705 19 4	868 15 1
				Treatment Charges.		
Scheelite	1216/18	...	274 8 3	...	...	...
	Advances during 1918...		415 6 9			
			689 15 0	*b* 138 19 4	1 14 1	830 8 5
Do.	1216/18	...	20 0 0	*b* 38 7 3	8 8 8	66 15 11
Do.	1216/18	...	2 18 9	Proceeds	not to	hand.
			712 13 9	177 6 7	10 2 9	897 4 4

a Advance of £75 per ton by Smelting Company. Balance available when copper sold. *b* Scheelite treated at State Ore Dressing Plant, Coolgardie. (The advances during 1918 were not entered in the report for that year and are now included.)

LOANS AND SUBSIDIES UNDER "THE MINING DEVELOPMENT ACT, 1902," AND FROM THE MINING DEVELOPMENT VOTE.

The transactions under this heading are shown in tabulated form in Appendix No. 2 hereunder.

Districts visited.—During 1919 the press of office work was so great that very little time could be spent by myself in visiting mining districts. Short visits were made, however, to Kalgoorlie, Ravensthorpe, Greenbushes, and Collie. In July I attended the Copper Conference in Melbourne with the Hon. the Minister for Mines, and in October and November went to Broome and Yampi Sound, where the huge iron ore deposits on Koolan and Cockatoo Islands were examined. A report on these has since been published in Bulletin form.

ASSISTANT STATE MINING ENGINEER.

The work of this office has increased so much of late years, mainly on account of the increasing demand for State assistance in all branches of development of the mineral resources of the country, and the large number of cases in which loans have been made for the purpose of assisting the mining industry have required so much attention and inspection, that it became necessary to appoint an Assistant State Mining Engineer, and in April, 1919, Mr. T. Blatchford, B.A., was transferred from the Geologi-

cal Survey Branch. His report of work done during 1919 is as follows:—

"For the year ending 31st December, 1919, my chief duties were in connection with the administration of existing loans and subsidies previously granted to mining companies and prospecting parties under the conditions set out in the Mining Development Act. A considerable number of inspections were also made and reports furnished on fresh applications under this Act. Each case received due consideration, and where there was a possibility of the venture being successful, help was almost invariably granted, provided the applicant was prepared to provide £1 for £1 with the Government, either in cash or an equivalent in labour. One of the most important applications in this connection was one put forward at a public meeting held in Kalgoorlie on 30th January, when it was suggested that a company be formed with a capital of £10,000 to test the North end of the Kalgoorlie belt, the Government to subsidise the company to the extent of £2 for each £1 subscribed by the latter. Arrangements were ultimately made to the effect that if the company subscribed £5,000, Government assistance to a similar amount would be forthcoming. For a report on this subject see Appendix (1).

"Two lengthy inspections were made of the mines in the Yilgarn and Yalgoo goldfields. Reports were furnished on all the mines in these two fields to which advances had been made, and also on any others which came under my notice.

"To curtail travelling expenses, the work was carried out with the local Inspector of Mines, while he was on his district round, and I desire here to express my thanks for the help given by these officers, whose local knowledge was often very valuable.

"Short visits in connection with advances were also made to the Northampton lead mines, and to three gold mines in the North Coolgardie goldfield.

"Two important mining problems arose during the year in connection with the flooding of mines by exceptional flows of underground water.

"At Comet Vale, whilst working in a winze at the 600 feet level in the Sand Queen mine a flow of water was struck which evidently reached the workings of the adjoining Gladsome mine.

"A more serious position was also caused by an underground water supply at Westonia. For a considerable time the Edna May mine had been pumping from 40,000 to 60,000 gallons of water per hour. Towards the end of the year it became evident that the mine would close down from want of ore. The question arose as to whether the adjoining mines would be able to cope with the flow, and in the case of flooding what the results would be. To handle the problem it was evident that concerted action was necessary, and to bring such action into effect a short Act was passed giving the Minister for Mines full powers to enter, provide plant, make use of existing pumping plant and machinery, or acquire same, etc.; all expenses to be apportioned between the various owners of the several mines concerned. The full text of this Act may be found on page 47 of the amended Mining Act of 1904.

"In the case at Westonia, Professor Whitfeld was called in to consult, and it was finally arranged to advance certain moneys to the Edna May Central Mine to defray the extra pumping charges incurred, conditionally that the company carried on deeper development in their own mine at the 421 feet level, and at the 566 feet level through the "Deep Level" ground. Also that certain bodies of ore were mined from the "Consolidated" mine. As the "Deep Level" mine had incurred considerable expense in cementing their main shaft, and at the time were comparatively a dry mine, there was no call made on them for pumping charges. The result of these arrangements has been that the development in "Edna May Central" has gone along steadily up to the present at the 421 feet level, and, if successful as regards quantities of ore and grade, pumping plant will probably be installed sufficient to cope with the present supply and any possible future increase. Unfortunately this will be necessary to enable the ore to be mined which has been developed, but whether developments will warrant the expenditure still remains doubtful.

"Up to the end of the year no action has been taken to unwater the Sand Queen mine.

"Due primarily to the war with Germany, a scarcity of potash for fertilising and other purposes occurred throughout the world. An attempt was made during the year under review to produce potash in appreciable quantities from the treatment of alunite ore derived from the Kanowna deposits. In the first place advances were made to the prospectors on any ore they raised at so much per unit of available potash. When this ore had accumulated to some 300 tons, a roasting plant was rented in Kalgoorlie and the ore treated, with the result that some 200 tons of ore, containing 4.5 per cent. of readily soluble potash in the form of potassium sulphate, was produced. After this experimental run, roasting was discontinued for two reasons, one being that the ore supplies were too erratic and insufficient to keep the Edward's furnace, which was being used, running full time, the other reason being that the grade of the ore was too low to produce a payable product with the falling price in potash. In the meantime experiments conducted in the laboratory proved that by the addition of an alkali, such as quicklime, to raw alunite the potash was liberated quite readily, and with much less expense. To utilise any alunite which may be produced, this appears to be the proper treatment, viz., crush fine without roasting, add quicklime in sufficient quantities to liberate the potash. At the present moment pot experiments on various plants are being conducted to obtain actual comparative results between alunite thus applied and ordinary potash fertilisers."

I have etc.,

A. MONTGOMERY,
State Mining Engineer.

Appendix No. I.

Report on the "North end of the Kalgoorlie Belt," with special reference to the possibilities ther for further development.

Introduction.—The object of the present report is to set out, in as abbreviated form as possible, the chief features which have a bearing on the present subject, so that a general survey may be made of the whole. For this reason maps have been collected or prepared setting out the geological boundaries of the various rocks, the known ore channels, and important underground workings. The statistics of the gold returns have not only been put on the maps, but also arranged in accordance with their natural occurrence. As a very complete Bulletin (*Bulletin* 69, by F. R. Feldtman, published 1916) with maps and plans has already been issued quite recently by the Geological Survey, this report has been used as a basis for the present one, the information contained therein being recent enough to fulfil all requirements. The statistics, however, have been brought up to the end of the year 1917.

Geology.—Without going into the minute details of a complete petrological classification as set out in the Bulletin previously referred to, the rocks of the area, however, must be considered briefly, in that they have a direct bearing on the gold occurrences. Plate XII. shows very detailed mapping, but the main divisions are really two, the "Newer" intrusive rocks occupying the central position of the map, and bounded by the "Older" series on the west and east.

The "Newer" series is the favourable rock for the occurrence of gold. The reason for this is undoubtedly due to the fact that in the compensating earth movements most of the "Newer" and little of the older series broke down under earth pressure, and thus lines of weakness were established forming zones suitable for ore deposition. In the older series this physical change is absent, except occasionally along the contact with the "Newer" series, hence gold occurrences in the older rocks are comparatively rare. A simple subdivision of the "Newer" series eliminates a considerable area of barren or unsheared rock, and brings to the fore the more altered zones. Thus while the dark green belt (symbol A) is practically barren, the adjoining strip lying immediately to the east is the most productive of any. Incidentally it might be mentioned here that this rock is the counterpart of the quartz dolerite rock of the Boulder Belt. The other members of the "Newer" series may be considered collectively, for though several small areas are barren, they are almost negligible. By such a process of elimination the probable area for prospecting in the north end of the belt is reduced to one of some 12,000 feet in length by 3,000 feet in width, and if the quartz dolerite be chosen as being the most favourable, a further reduction of area for exploitation could readily be made to one third that size.

SHEAR ZONES OR ORE CHANNELS IN THE "NEWER" SERIES.

The shear zones in the "Newer" series possess a pronounced parallelism, striking in a N.N.W., S.S.E. direction, with a steep dip to the west. Even the main ones are not usually continuous, in some instances being broken for considerable distances. In addition minor shear zones occur, sometimes roughly parallel, and probably represent cross fractures between two main lines. They may be roughly classified into four groups: of these the westernmost represented by the Golden Zone and Golden Dream lodes. South of the latter there is a big gap, though the jaspers and graphitic schists running between Mount Charlotte and Williamstown probably represent a southern continuation. The next zone runs parallel with the eastern edge of the main albite porphyry dyke, and is represented by the Mystery and Red, White, and Blue lodes. A southern continuation is probably the barren lodes in the Hidden Secret North and the Hidden Secret and Hidden Secret South lodes. The longest and probably strongest line represented by the main jasper joins this shear zone here, and extends north through the Devon Consols, Ivy and Sir John leases. At its northern end the fourth line strikes towards the third, north of the North Collier G.M. South of this lease it appears to be broken for a short distance, and is then occupied by the Westralia United line of lode, then comes the roughly N. and S. formation of the Isabel, Creswick, and A.W.A., United mines with its numerous spurs in the older greenstones. In addition to this there are some barren shear zones, but these almost invariably strike north and south, and by this alone can usually be separated from the N.N.W., S.S.E. productive zones.

LODES.

The lodes, or ore deposits, may be summed up briefly under the following headings:—

Primary Ore Deposits—

A. Lode formations—

(a) quartzose;

(b) schistose.

B. Cross quartz veins.

Secondary Ore Deposits—

A. Impregnations in zone of oxidation.

B. Detrital deposits, alluvial, etc.

PRIMARY ORE DEPOSITS.

Primary quartzose lode formations are rare, only one example being known, viz., the Golden Zone Hannan's North line.

Schistose lode formations are common, the chief known occurrences are as follows:—

1. Those at the junction of the older and younger greenstones. As a rule these are low grade, and only payable at the intersections with lode formations of the fine-grained greenstones. At such junctions shoots of ore occur as in the Creswick Isabel mines.

2. There are several schistose lodes or shear zones in the quartz dolerite greenstone rock, but the gold is not derived from the schistose portion of the lode, but from the numerous quartz veins contained therein.

3. Schistose lodes are best developed in the portion of the field in the dolerite greenstones, *e.g.*, Fair Play, Hidden Secret, and Hidden Secret South.

In the Fair Play the lenticular rich shoots are dependent on cross faulting, and the noted shoot of the Hidden Secret is traceable to the intersection of two lodes. The other portions of the lodes in this class of rock are as usual low grade.

4. An important class of schistose lodes is found along the junction of the albite porphyries and encasing greenstones. Good examples of the class are the Hyman, Mystery, Little Wonder, Lone Hand, and Red, White, and Blue mines. The walls of lodes of this kind are ill-defined, and apparently the gold contents are chiefly in cross quartz veins, which are of very common occurrence. Secondary gold is not uncommon in more recent shear zones in the lode.

THE CROSS QUARTZ VEINS.

These are very abundant, particularly in the quartz dolerite and dolerite greenstones. Though persistent in length and depth, they are usually not more than a fraction of an inch up to four inches in thickness. In instances they are so numerous that they form vein systems rather than simple veins. Their best development perhaps is to be seen in the group of mines in the southern end of the quartz dolerite belt—Mount Charlotte, Hannan's Reward, Cassidy's Hill, etc. Unfortunately they can only be profitably worked in the oxidised zone, for below this they "freeze" on to the country rock, which makes mining operations on them by themselves too expensive to be profitable.

SECONDARY ORE DEPOSITS.

The gold in many of the schistose lodes has not been original, but derived from other sources, hence the term secondary. A good example of this migration of the metal is to be found in the Reward Mt. Charlotte mine, where the cross quartz veins near the lode channel have been practically robbed of all their gold, and the encasing lode enriched to such an extent as to be rendered payable. This only applies to the oxidised zone. This action has an important bearing on the question at issue, for probably it will discontinue at greater depth, and though the cross quartz veins will be gold-bearing in depth (values were proved in the Hannan's Reward mine in these cross veins by boring far below the oxidised zone), they will probably be unprofitable in the sulphide zone for reasons already stated, therefore the possibilities are that neither the lode itself nor the quartz veins will retain a value below the oxidised zone sufficiently high to be payable.

From the recorded mining statistics it will be found that the Golden Zone lode proper produced 60,412 tons for 17,061 ounces, average 5.6 dwts. per ton. (These returns only include gold from Golden Zone won prior to end of 1908.) The southern extension of this line, including the Hannan's Reward, Mount Charlotte, etc., produced 515,245 tons for 142,042 ounces, average 5.5 dwts. per ton; the second, or Hidden Secret line, 64,559 tons for 38,547 ounces, average 11.9 dwts. per ton; number three, the Devon Consols Ivy line 37,834 tons for 15,477 ounces, average 8.1 dwts. per ton; and the fourth, Westralia United Isabel and Creswick line 93,905 tons for 32,288 ounces, average 6.8 dwts. per ton. These averages are low enough, but even then it must be remembered that they are as a whole inflated by the returns from rich shoots and small picked rich crushings of prospectors.

DEVELOPMENT WORK.

Taken as a mining area, the amount of prospecting and development carried out in the centre under review is very extensive, particularly in the oxidised zone. Some first class development has also been done at lower depths, *e.g.*, Golden Zone and A.W.A. United. The extent of this work can be readily seen on the accompanying plan marked (1). As a matter of fact the development work is so extensive, and the grade of ore so low, that at first sight it appears a hopeless task to suggest any further expenditure in this direction. Most of the area certainly warrants no further extensive investigation. There are, however, two propositions which may be worthy of consideration. In the first place the quartz dolerite belt in the vicinity of the Golden Zone has not been pierced from side to side, some 300-400 feet east and west still remaining unexploited. If the Hannan's North shaft were unwatered by Mr. Raven and party it might, in my opinion, be advisable to put two bores in at the end of the 400 feet crosscuts (*vide* plan), and thus clear the matter up whether there are any more parallel lodes to the Hannan's North Golden Zone line.

As in this area, the main lode is a more or less continuous one, and not one of the low grade varieties with or without rich shoots; boring is quite legitimate, particularly if such favourable conditions as above indicated were available.

The other suggestion is the advisability of prospecting by boring, or far more preferably by shallow cross-cutting the area under Williamstown. This area is favourably situated geologically, and is the most, if not the only unexploited portion of the belt.

In conclusion, in case of a misunderstanding arising, I would like to state here that both these recommendations have been made tentatively, and only in the sense that they are the most probable development schemes, provided money is to be spent in some portion of the North End area. There is, however, one side of the question worthy of consideration, viz., that if the work as suggested be carried out, it might reasonably be considered that in a general way prospecting is at an end for this area. Of course, specific cases will probably continue to arise, but these can be dealt with on their individual merits.

(Sgd.) T. BLATCHFORD,
Asst. Government Geologist.

7th March, 1919.

Appendix 2.

SUMMARY OF EXPENDITURE FROM MINING DEVELOPMENT VOTE.

FROM 1ST JANUARY TO 31ST DECEMBER, 1919.

	£ s. d.	£ s. d.
Advances in aid of Mining Work and Equipment—		
Flag Gold Mine, Ravensthorpe	9 4 0	
Colreavy and Party, Forrestonia	257 10 0	
Unexpected Gold Mine, Mt. Ida	313 10 0	
Mt. Rankin Gold Mine, N.L., Southern Cross	711 19 9	
J. Thompson, Southern Cross	102 11 0	
T. J. Gallagher, Northampton	25 0 0	
Munn and Hodgson, Yerilla	496 18 10	
Cummings and Fox, Magnet	669 6 6	
Quistini and Kinnane, Broad Arrow	70 2 6	
Edna May Con. Extended G.M. Co., Westonia	353 0 0	
C. A. Barratt, Broad Arrow	150 0 0	
McOmish, Walton, and Lauritz, Laverton	44 0 0	
Keeley, Henderson, & Kuhlmann, Phillips River	165 0 0	
Edna May Golden Point, Westonia	76 8 1	
W. F. Smith, Phillips River	124 10 0	
Dunn and Parkinson, "Gem Consolidated," Phillips River	250 0 0	
Hamilton and Congdon, Phillips River	26 5 0	
Bird and Taylor, Ravensthorpe	116 5 0	
C. Grant, Mt. Iron Gold Mine, Kundip	46 5 0	
Lady Evelyn Gold Mine, Ora Banda	216 14 2	
Hyne and Pittaway, Marvel Loch	62 18 3	
Bryan and Party, "Ardpatrick," Kundip	103 5 2	
Johnston and Stennett, Ravensthorpe	28 0 0	
Clarkson and Sons, Ravensthorpe	15 0 0	
Harbour View, Kundip	114 4 0	
Credo Gold Mine, Broad Arrow	142 2 3	
Bonnie Venture, Yalgoo	97 2 10	
Polson Bros., Southern Cross	200 0 0	
Westgarth and Party, Kalgoorlie	150 0 0	
Lalla Rookh, Marble Bar	1,169 14 4	
Thring, Waun, and Dwyer, Northampton	462 18 7	
Hastedt, Robt., and party, Leonora	600 0 0	
G. H. Howlett, Southern Cross	150 0 0	
Dower and McOmish, Laverton	115 6 3	
Nicholas and McKay, Southern Cross	6 0 0	
Manjimup Prospecting Syndicate	20 0 0	
W. Foley, Subsidy, Golden Valley	15 0 0	
Emes and Jones, Kalgoorlie	35 0 0	
Miscellaneous Expenditure—		
Pre. Investigations, Sampling Mines	296 14 11	
Maintenance of Securities	25 9 8	
Subsidy towards Cost of marketing Asbestos	276 17 6	
Boring—		
East Collie Coal Mining Company, Ltd.	341 0 3	
J. Johnstone, Irwin River	11 10 1	
Providing Transport and Equipment for Prospectors—		
Prospecting—Purchase of Horses, Camels, Equipment, etc.	2,327 12 8	
Subsidies Development Work—	£ s. d.	
Comedy King G.M., Sandstone	9 12 0	
F. W. Howard, "Aurora," Mt. Keith	36 15 0	
L. J. Meatchem, Sandstone	23 15 0	
W. O'Grady and G. S. Gunning	50 0 0	
E. Thomas	13 13 0	
E. A. Bennett	6 15 0	
	140 10 0	

SUMMARY OF EXPENDITURE FROM MINING DEVELOPMENT VOTE, ETC.—*continued.*

	£ s. d.	£ s. d.
Subsidies to Batteries, crushing for Public—		
Lang, S. C., 1,031½ tons, Golden Valley	128 18 9	
Garland, J. P., 218 tons, Holden's Find	29 17 6	
Mandelstam, A. S., 138 tons, Edjudina	10 7 0	
Patterson, W. A., 219¼ tons, Parker's Range	21 18 6	
Howlett, G. H., 476 tons, Southern Cross	35 14 0	
Connolly, P. A., 216 tons, Mt. Gibson	27 0 0	
Harbour View Gold and Copper Co., 150 tons, Ravensthorpe	15 0 0	
Watson, R., 246 tons, Darlot	18 9 0	
Havercroft, D., 35 tons	13 2 6	
Rose Grant, W., 122 tons	18 6 0	
		318 13 3
Subsidies, Carting Long Distances to Batteries—		
Coombe, J. A.		1 19 9
Rebates to Prospectors crushing at State Batteries (War Rates)		1,126 4 11
Rebates *re* Water Supply		25 13 9
		£12,603 8 3
Advances Refunded—		
Havilah Development G.M.	76 16 1	
Elverdton	177 19 5	
Red, White, and Blue	69 5 10	
Yellow Aster	202 6 7	
Sunrise	542 11 3	
Aurum	31 1 8	
Aurora	200 8 11	
Shamrock	13 4 0	
Little Dele	600 0 0	
Neta	0 19 5	
St. Patrick	150 0 0	
		2,064 13 2
Recovered from Sale of Securities—		
Rocklee	35 0 0	
Southern Cross G.M.	200 0 0	
Klondyke Boulder	20 0 0	
Try It	286 0 2	
Pyx G.M.	3 0 0	
Phoenix	17 6 3	
Kingdom Come	60 0 0	
Randwick	11 0 0	
Champion South	3 0 0	
Eclipse	10 0 0	
		645 6 5
Miscellaneous Refunds—		
Fraser's G.M.		125 0 0
		£2,834 19 7

THE MINING DEVELOPMENT ACT, 1902.—ADVANCES WRITTEN OFF TO 31ST DECEMBER, 1919.

	£ s. d.	£ s. d.
Previously reported	29,991 15 6	
Year 1919	35 0 0	
		30,026 15 6

MINING DEVELOPMENT EXPENDITURE

Advances Outstanding, 31st December, 1919.

	Name of Lease, Mine, or Borrower.	No. of Lease.	District.	Amount authorised.	Principal Moneys advanced		Principal Moneys		Interest		Total Principal and Interest outstanding at 31st December, 1919.
					Previous to 1919.	During 1919.	Repaid, including Sale of Securities, etc.	Balance outstanding.	Paid.	Outstanding.	
	A.—PIONEER MINING AND PROSPECTING.			£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
90/12	Alicia	254F	Mt Morgans	245 0 0	195 0 0	...	...	195 0 0	4 2 6	54 14 8	249 14
1359/19	Ard Patrick	197	Phillips River	480 0 0	...	338 0 8	...	338 0 8	2 6 6	340 7	
2315/16	Augusta	2058T	Laverton	150 0 0	...	150 0 0	...	150 0 0	...	3 12 0	153 12
472/16	Aurora	201J	Mt. Keith	320 0 0	320 0 0	...	225 2 2	94 17 10	14 8 4	4 0 7	98 18 5
807/19	Barratt, C. A.	...	Mulgarrie	300 0 0	...	150 0 0	...	150 0 0	...	4 0 1	154 0 1
141/19	Bird & Taylor	...	Phillips River	150 0 0	...	116 5 0	...	116 5 0	...	1 14 5	117 19 5
367/18	Bulletin	795	Marble Bar	600 0 0	402 10 7	...	...	402 10 7	24 5 2	21 8 5	423 19 0
909/12	Brittania	953M	Mt. Magnet	150 0 0	114 12 6	...	43 10 0	71 2 6	...	9 4 6	80 7 0
1326/19	Bonnie Venture G.M. Co., Ltd.	...	Yalgoo	350 0 0	62 17 2	134 1 1	...	196 18 3	...	11 1 6	207 19 9
2229/15	Colreavy & party	2909	Forrestonia	630 0 0	246 0 0	313 0 0	...	559 0 0	3 10 7	28 2 4	587 2 4
2257/12	Champion South	817, 1039N	Nannine	400 0 0	400 0 0	...	353 0 0	47 0 0	29 11 8	19 19 8	66 19 8
353/19	Clarkson & Sons	...	Ravensthorpe	150 0 0	...	34 10 0	...	34 10 0	...	0 4 10	34 14 10
1500/18	Credo G.M. Syndicate, N.L.	1825W	Broad Arrow	500 0 0	...	142 2 3	...	142 2 3	...	1 2 10	143 5 1
3166/09	Emily	1510	Day Dawn	400 0 0	372 1 9	...	...	372 1 9	...	44 7 10	416 9 7
2208/08	Elverdton	...	Ravensthorpe	3,500 0 0	3,498 17 10	...	3,261 18 11	236 18 11	441 13 10	8 3 8	245 2 7
1444/12	Eclipse	1047X	Gindalbie	498 19 1	498 19 1	...	262 5 0	236 14 1	62 8 11	...	236 14 1
1846/17	Edna May Consolidated Extended, N.L.	3081	Westonia	750 0 0	...	353 0 0	...	353 0 0	...	8 12 11	361 12 11
965/15	Edna May Golden Point, N.L.	...	Westonia	200 0 0	...	76 8 1	...	76 8 1	...	...	76 8 1
1884/18	East Collie Coal Mining Co., Ltd.	...	Collie	1,000 0 0	...	341 0 3	...	341 0 3	...	4 14 0	345 14 3
801/18	Foley, Wm.	M.L. 44	Arrino	100 0 0	54 5 0	15 0 0	...	69 5 0	1 2 6	4 4 1	73 9 1
3594/09	Globe G.M.	912N	Nannine	500 0 0	444 12 9	...	145 18 2	298 14 7	77 17 10	15 8 1	314 2 8
3056/15	Golden Spinifex G.M. Syndicate, Ltd.	2035T, 2044T	Laverton	750 0 0	162 15 0	...	...	162 15 0	...	10 13 1	173 8 1
642/11	Glideaway	2272	Yilgarn	200 0 0	140 0 0	...	...	140 0 0	24 1 10	3 10 7	143 10 7
2656/17	Gallagher, H. J.	M.L. 145	Northampton	50 0 0	...	25 0 0	...	25 0 0	...	1 5 2	26 5 2
2118/16	Gem Consolidated	...	Phillips River	600 0 0	...	250 0 0	...	250 0 0	...	3 16 11	253 16 11
185/19	Great Leviathan	570	Yilgarn	300 0 0	...	102 11 0	...	102 11 0	...	6 5 4	108 16 4
4689/06	Havilah	345B	Black Range	600 0 0	553 2 1	...	371 8 11	181 13 2	140 18 9	5 6 2	186 19 4
1963/16	Hassell & others (Flag)	136-7-8	Phillips River	3,500 0 0	3,080 3 9	...	...	3,080 3 9	...	177 9 6	3,257 13 3
4738/09	Hawk	725G	Desdemona	120 0 0	116 12 2	...	22 5 11	94 6 3	3 7 10	...	94 6 3
310/19	Harbour View Gold and Copper Co., Ltd.	M.L. 52, 94	Phillips River	1,000 0 0	...	222 17 4	...	222 17 4	...	1 12 1	224 9 5
1507/19	Hines & Adams	P.A.	Marvel Loch	100 0 0	...	62 18 3	...	62 18 3	...	0 15 8	63 13 11
2826/19	Hamilton & Congdon (Flag)	...	Phillips River	150 0 0	...	26 5 0	...	26 5 0	...	0 6 4	26 11 4
3681/16	Ironclad	M.L. 367	Ravensthorpe	300 0 0	198 12 6	...	...	198 12 6	...	5 15 7	204 8 1
319/12	Jupiter	771	Mt. Magnet	401 0 0	401 0 0	...	109 14 1	291 5 11	5 0 0	45 11 3	336 17 2
350/19	Johnston & Stennett	...	Ravensthorpe	150 0 0	...	50 10 0	...	50 10 0	...	0 8 2	50 18 2
2825/07	Kingdom Come	M.L. 112	Northampton	204 14 0	204 14 0	...	60 0 0	144 14 0	5 8 6	15 11 0	160 5 0
4548/11	Klondyke Boulder	604	Warrawoona	1,000 0 0	999 10 7	...	163 5 6	836 5 1	34 5 4	150 12 7	986 17 8
2186/14	Kirkland, A. G.	M.A. 12N	Nannine	500 0 0	500 0 0	...	336 9 11	163 10 1	20 17 4	12 12 5	176 2 6
3681/16	Kuhlmann & Buckie (Ironclad)	...	Ravensthorpe	150 0 0	...	100 10 0	...	100 10 0	...	1 4 1	101 14 1
2489/18	Lady Evelyn	1289W	Ora Banda	300 0 0	...	216 14 2	...	216 14 2	...	2 8 3	219 2 5
3507/13	Loader & Nevill	711	Yalgoo	200 0 0	135 0 0	...	43 16 8	91 3 4	31 1 4	2 7 9	93 11 1
2167/14	Lake View Extended	4536E	...	1,050 0 0	892 15 5	...	650 0 0	242 15 5	...	54 11 1	297 6 6
4000/05	Mindeloo	1518	Mindoolah	300 0 0	198 17 0	...	10 0 0	188 17 0	...	8 1 1	196 18 1
2126/11	Mt. Rankin Gold Mines, N.L.	2416	Yilgarn	535 6 3	535 6 3	...	...	535 6 3	40 14 1	26 15 3	562 1 6
1491/18	Mt Rankin Gold Mines, N.L.	3135/6	Yilgarn	1,000 0 0	200 0 0	711 19 9	...	911 19 9	0 8 3	47 8 4	959 8 1
2937/17	Mitchell & Judd	...	Coolgardie	500 0 0	500 0 0	...	...	500 0 0	...	...	500 0 0
1825/19	Mt. Iron	198	Kundip	200 0 0	...	70 0 0	...	70 0 0	...	0 16 1	70 16 1
2341/18	Munn & Hodgson	1053R	Yerilla	575 0 0	...	496 18 10	...	496 18 10	...	18 5 10	515 4 8
928/17	Manjimup Prospecting Syndicate	...	Manjimup	50 0 0	30 0 0	20 0 0	...	50 0 0	...	3 7 1	53 7 1
2565/18	Mac's Lucky Ridge	2103T	Mt. Lucky	75 0 0	...	44 0 0	...	44 0 0	...	1 1 1	45 1 1
174/13	Nevill, P. W.	680	Yalgoo	500 0 0	330 0 0	...	...	330 0 0	...	31 2 3	361 2 3
1375/17	Nooka Lead Mining Co., N.L.	M.L. 142	Northampton	500 0 0	500 0 0	...	...	500 0 0	...	47 10 5	547 10 5
1042/19	Nicholas & Mackay	3190	Yilgarn	300 0 0	...	6 0 0	...	6 0 0	...	0 2 6	6 2 6
3292/13	Pearl	1095	Mt. Magnet	76 0 0	76 0 0	...	...	76 0 0	...	19 17 0	95 17 0
289/13	Pyx G.M.	789B	...	600 0 0	571 4 8	...	16 0 7	555 4 1	12 14 5	24 15 0	579 19 1
3612/15	Premier Coal Mining Co., N.L.	260/2, 363/6, 271	Collie	500 0 0	500 0 0	...	1 1 10	498 18 2	56 0 6	43 17 1	542 15 3
2397/18	Quistini & Kinnane	P.A.	Broad Arrow	75 0 0	...	70 2 6	...	70 2 6	...	1 14 9	71 17 3

MINING DEVELOPMENT EXPENDITURE—*Advances Outstanding 31st December, 1919*—continued.

	Name of Lease, Mine, or Borrower.	No. of Lease.	District.	Amount authorised.	Principal Moneys advanced		Principal Moneys		Interest		Total Principal and Interest outstanding at 31st December, 1919.
					Previous to 1919.	During 1919.	Repaid, including Sale of Securities, etc.	Balance outstanding.	Paid.	Outstanding.	
	A.—PIONEER MINING, ETC.—*continued.*			£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
3409/12	Rupe & Young	M. Area	Nannine	848 17 5	848 17 5	...	500 0 0	348 17 5	...	24 13 5	373 10 10
461/17	Shamrock	8718	Kunanalling ...	150 0 0	74 11 10	...	13 4 0	61 7 10	5 16 9	1 12 10	63 0 8
977/12	South Cornwall	567	Greenbushes ...	1,170 2 0	1,170 2 0	...	26 0 0	1,144 2 0	...	...	1,144 2 0
2376/10	Stanley G.M.	1271X	Kanowna	150 0 0	112 0 0	...	...	112 0 0	...	39 14 8	151 14 8
3212/15	Sunset	1300X	Kanowna	500 0 0	500 0 0	...	...	500 0 0	...	...	500 0 0
97/15	Scots Greys	2801	Yilgarn	400 0 0	200 0 0	200 0 0	...	400 0 0	...	38 11 11	438 11 11
1462/19	Smith, W. F.	... ...	Phillips River ...	300 0 0	...	158 5 0	...	158 5 0	...	2 3 1	160 8 1
413/17	Unexpected Gold Mines	5454Z, 5290Z ...	Mt. Ida	750 0 0	286 10 0	313 10 0	...	600 0 0	4 9 5	24 6 11	624 6 11
2426/11	V's United	271F	Mt. Morgans ...	672 2 0	578 16 1	...	170 0 0	408 16 1	3 19 5	34 14 1	443 10 2
2427/11	Westralia Tasmania	1665T, 1745T ...	Erlistoun	300 0 0	300 4 9	...	51 0 0	249 4 9	90 2 8	74 15 7	324 0 4
1807/09	Wheal May	Loc. 6	Northampton ...	302 4 6	302 4 6	...	40 0 0	262 4 6	5 15 9	14 9 8	276 14 2
2416/99	Yellow Aster	... ...	Lawlers	600 0 0	500 11 0	...	458 7 5	42 3 7	39 17 5	1 19 4	44 2 11
1055/19	Westgarth & Gaynor	M.L. 113E, 117/8E, M.A. 68E	Kalgoorlie ...	150 0 0	...	150 0 0	...	150 0 0	...	0 12 4	150 12 4
936/18	Rainbow G.M. Co., N.L.	P.A.	Coolgardie	180 0 0	45 0 0	...	...	45 0 0	...	3 15 3	48 15 3
	Totals ...	... ...	... ...	...	22,354 7 8	5,461 9 2	7,334 9 1	20,481 7 9	1,183 16 11	1,285 8 9	21,766 16 6
	B.—ASSISTANCE IN ERECTING BATTERIES AND TREATMENT PLANTS TO BE USED FOR CRUSHING FOR THE PUBLIC.										
2120/09	Battlesville Mine	931R	Yundamindera ...	1,063 16 2	1,063 16 2	...	...	1,063 16 2	99 2 9	387 3 8	1,450 19 10
5651/10	Butcher Bird	1933	Yilgarn	1,560 17 9	1,560 17 9	...	17 16 2	1,543 1 7	137 3 10	116 1 6	1,659 3 1
...	Butcher Bird	... ...	... ...	302 16 5	302 16 5	...	...	302 16 5	...	8 4 11	311 1 4
5947/10	Chunderloo	1048N	Nannine	2,032 12 8	1,730 10 2	...	424 9 2	1,306 1 0	...	218 16 2	1,524 17 2
3145/12	Donovan's Find	768	Jacoletti	1,150 0 0	1,000 10 0	150 0 0	0 10 0	1,150 0 0	235 13 0	162 10 7	1,312 10 7
3155/11	Great Victoria Leases	719, 944/5, 1229	Southern Cross ...	2,000 0 0	1,643 3 0	...	1 7 9	1,641 15 3	608 1 8	40 9 1	1,682 4 4
1343/07	Hodder, E.	M.A. 64	Randall's	253 3 2	253 3 2	...	148 18 0	104 10 2	6 8 4	35 11 3	140 1 5
388/17	Great Western	1496O	Mt. Malco'm ...	600 0 0	...	600 0 0	...	600 0 0	...	29 13 10	629 13 10
562/15	Lalla Rookh	112, 786, T.A. 10	Marble Bar ...	2,500 0 0	...	1,169 14 4	...	1,169 14 4	...	30 15 4	1,200 9 8
2985/13	Mandelstam, A. S.	1011R	Edjudina	200 0 0	200 0 0	...	17 11 7	182 8 3	43 10 8	5 2 5	187 10 10
4416/11	Malcolm Prospecting Co.	1175O	Malcolm	1,550 0 0	1,550 0 0	...	...	1,550 0 0	410 6 10	718 17 0	2,268 17 0
363/12	McCahon & party	... ...	Mt. Ida	400 0 0	400 0 0	...	...	400 0 0	...	27 14 5	427 14 5
2911/10	Phœnix	622N	Quinn's	250 0 0	250 0 0	...	39 12 0	210 8 0	17 12 1	17 5 11	227 13 11
1353/10	Red, White, and Blue	641B	Curran's Find ...	2,676 9 0	2,676 9 0	...	224 12 2	2,451 16 10	785 15 4	74 15 7	2,526 12 5
919/14	Rocklee G.M.	... ...	Yaloginda	350 0 0	350 0 0	...	43 0 0	307 0 0	12 2 0	21 14 1	328 14 1
2253/11	Ravensthorpe Battery Co.	... ...	Ravensthorpe ...	1,300 0 0	1,038 8 2	...	25 0 0	1,013 8 2	...	326 1 2	1,339 9 4
4726/11	Southern Cross and Southern Cross South	1067Y, 1076Y ; W. R. 27Y	Bulong	1,000 0 0	1,650 0 0	...	1,342 12 3	307 7 9	31 12 6	202 8 10	509 16 7
3551/10	Randwick	9780	Malcolm	584 14 0	577 3 5	...	54 4 6	522 18 11	...	45 3 5	568 2 4
4222/07	Star of Fremantle	6458	Kunanalling ...	325 0 0	320 10 0	...	0 10 0	320 0 0	97 1	27 14 4	347 14 4
3362/11	Spring Hill	721	Parker's Range ...	655 16 5	655 16 5	...	19 2 0	636 14 5	350 4 4	92 7 7	729 2 0
3971/15	Triplicate	1914	Murchison ...	500 0 0	608 17 7	...	66 13 10	542 3 9	25 10 8	38 1 0	580 4 9
1525/13	Thring Bros. & Dwyer	127	Northampton ...	2,050 0 0 200 0 0 500 0 0	2,028 12 9 200 0 0 ...	... ... 462 18 7	31 17 4	1,996 15 5 200 0 0 462 18 7	423 6 7	113 17 3 15 13 7 8 14 1	2,110 12 8 215 13 7 471 12 8
	Totals ...	... ...	... ...	...	20,060 14 0	2,382 12 11	2,457 11 9	19,985 15 2	3,284 10 2	2,764 17 0	22,750 12 2
	C.—BORING.										
...	Mt. McMahon	... ...	... ...	...	474 7 8	...	...	474 7 8	...	...	474 7 8
...	Irwin River	... ...	... ...	...	158 18 11	11 10 1	...	170 9 0	...	...	170 9 0
	Totals ...	... ...	... ...	...	633 6 7	11 10 1	...	644 16 8	...	...	644 16 8
...	A.—PIONEER MINING AND PROSPECTING ...	... ...	... ...	...	22,354 7 8	5,461 9 2	7,334 9 1	20,481 7 9	1,183 16 11	1,285 8 9	21,766 16 6
...	B.—ASSISTANCE ERECTING BATTERIES, ETC.	... ...	... ...	...	20,060 14 0	2,382 12 11	2,457 11 9	19,985 15 2	3 284 10 2	2,764 17 0	22,750 12 2
...	C.—BORING	... ...	... ...	...	633 6 7	11 10 1	...	644 16 8	...	...	644 16 8
	Totals ...	... ...	... ...	...	43,048 8 3	7,855 12 2	9,792 0 10	41,111 19 7	4,468 7 1	4,050 5 9	45,162 5 4

Annual Report of the Board of Examiners for Colliery Managers' and Under Managers' Certificates under "The Coal Mines Regulation Act, 1902."

The Secretary for Mines, Perth, W.A.

Office of the State Mining Engineer,
Mines Department,
Perth, 28th April, 1920.

Sir,

The Annual Report of the Board of Examiners for 1919 is submitted for the information of the Hon. the Minister for Mines.

Two ordinary meetings were held, the first being in April, and the second in October, 1919.

At the October meeting, Mr. T. Blatchford (Assistant State Mining Engineer) took the chair in the absence of the Chairman (Mr. A. Montgomery).

Examinations for First and Second Class Certificates of Competency.

Two examinations were held during 1919.

In April Mr. A. J. Stibbs sat for examination for a First Class Certificate of Competency, and came up for further oral examination before the full Board in October, after which a First Class Certificate of Competency was issued to him.

Mr. G. Crawford sat for examination for a Second Class Certificate of Competency in October, but failing to gain the requisite number of marks for a pass, no certificate was issued.

Mr. H. Colbran was granted a West Australian First Class Certificate of Competency on his English First Class Certificate of Competency and West Australian testimonials.

Reciprocity with New South Wales.

This question was brought before the Board by Mr. Jas. Leitch, who stated that the New South Wales Board refused to issue a Certificate on his West Australian Certificate; the matter is being inquired into by the Chairman of the Board.

Copies of Papers set for examinations attached hereto.

We have, etc.,

A. MONTGOMERY,
State Mining Engineer, Chairman.

A. GIBB MAITLAND,
Government Geologist, Member.

JAS. McVEE,
Inspector of Mines, Member.

F. A. LANE, Secretary.

THE COAL MINES REGULATION ACT, 1902.

Examination for First Class Certificates of Competency.

SUBJECT: ARITHMETIC.

Wednesday, 2nd April, 1919, 10 a.m. to 11 a.m.

Possible marks.		
15	(1.)	A Colliery produces and sells 4,000 tons of coal per week, eight per cent. of this quantity is sent out of the colliery as small coal, and the remainder as large; at the pit bank a further 15 per cent. of small coal is screened from the large. The selling price of the large coal is 12s. 6d. per ton, and of the small 6s. per ton; what is the average selling price of the 4,000 tons?
15	(2.)	Into a cistern one-third full of water 31 gallons are poured and the cistern is found to be half full. What is its capacity?
15	(3.)	A sum of money amounts in three years at 5 per cent. compound interest to £926 2s., what would be its amount in five years?
15	(4.)	A coal heap 12 yards high measures 20 yards by 8 yards at the top and 28 yards by 15 yards at the bottom, what would be the weight of the coal assuming the S.G. to be 1·25 and the coal to weigh 60 per cent. of coal in the solid?
25	(5.)	Extract the sq. root of 1657059849 and the cube root of 48228544.
15	(6.)	A clause in a lease requires 72 per cent. of the coal to be left in the first working. If the average length of the pillars is 30 yards what width will they require to be left in order to comply with the terms of the lease? Bords 8 yards, cut thros. 3 yards wide.
100		

SUBJECT: SURVEYING.

Wednesday, 2nd April, 1919, 11 a.m. to 1 p.m.

40	(1.)	Give a concise description of the instruments required in Colliery Surveying and state their uses.
30	(2.)	How many tons of coal per acre will there be in a seam 3 feet 9 inches thick, dipping at an angle of nine degrees after allowing 20 per cent. deduction for faults, etc.
35	(3.)	Plot the following survey: (1) N. 86½° W. 474 links. (2) N. 44¼° W. 163 links. (3) N. 11½° E. 322 links. (4) N. 83¾° E. 291 links. (5) S. 7½° E. 515 links. (6) S. 3¼° W. 171 links. (7) S. 86½° E. 169 links. (8) Give the bearing and distance to tie the survey.
35	(4.)	Describe the methods used for enlarging or reducing the working plan of a colliery. Why does the Coal Mines Regulation Act, 1902, make provision for keeping Mine plans, and how may plans be permanently preserved?
30	(5.)	Describe the methods you would employ in conducting underground levelling operations, with a level and staff.
30	(6.)	Enumerate the usual steps taken in connecting surface and underground surveys.
200		

SUBJECT: GEOLOGY.

Wednesday, 2nd April, 1919, 2 p.m. to 4 p.m.

20	(1.)	Describe briefly how the accumulation of vegetable matter becomes converted into coal. Enumerate the different kinds of coal and their characteristics.
15	(2.)	What are faults? Enumerate the different points in connection with them. How may faults be detected on the surface?
15	(3.)	Define the terms "heave," "want," dolerite, limestone and unconformity.
15	(4.)	What are the characteristic fossils associated with the Permo-Carboniferous Coals of Australia?
15	(5.)	Explain how you would set about proving an area over or under which coal has been proved to exist or is expected to occur at workable depths.
20	(6.)	Give a succinct account of the salient geological features of any coal field with which you are acquainted, and illustrate it by a geological section of the field.
100		

SUBJECT: THE COAL MINES REGULATION ACT, 1902.

Wednesday, 2nd April, 1919, 4 p.m. to 5 p.m.

Possible marks.	
	What does the Coal Mines Regulation Act require as to—
12	(1.) Employment of persons below ground ?
12	(2.) Persons in charge of machinery ?
12	(3.) Appointment of manager of mine ?
14	(4.) The providing of signalling and manholes for travelling planes worked by machinery ?
14	(5.) Ventilation of mines ?
12	(6.) Persons not to be employed getting coal without experience ?
12	(7.) Notice of accidents to Inspector ?
12	(8.) Firing shots on a dry and dusty haulage road ?
100	

SUBJECT: MACHINERY.

Thursday, 3rd April, 1919, 10 a.m. to 1 p.m.

30	(1.) Describe a double pole switch for making and breaking a continuous current circuit. Make sketches showing how the switch works, and how it is connected to the conductor wires.
30	(2.) What is a relay in electric language ? How are relays used in connection with electric bell circuits, and for what reason ?
35	(3.) Describe a suitable arrangement of plant for a self acting underground incline, where the skips have to be raised, and lowered on a grade of 1 in 5.
35	(4.) Describe various steps that can be taken to economise the consumption of steam and coal at a colliery, mentioning the sort of plant installed for this purpose, and briefly describing two.
20	(5.) Describe the precautions you would take in fixing the cables in a mine for an electric coal cutting service to avoid risk of accident to persons employed in the mine.
30	(6.) What type of electric pump would you instal to raise 800 gallons of water from a depth of 600 feet in a vertical shaft ? Describe fully.
35	(7.) The speed of an electric motor is 720 revolutions per minuute and on the motor shaft there is a pinion having 30 double helical teeth the pitch circle being 10 inches diameter. The motor is to drive a counter shaft running at 240 revolutions per minute, state number of teeth and the diameter of pitch circle of the toothed wheel required for the counter shaft.
30	(8.) What is the strain on rope that hauls 14 skips each 22 cwt. full, up a grade of 1 in 10 400 yards long ? Take K as 1/28th. If journey is done in 2½ minutes calculate B.H.P. and indicated horse-power when modulus is 70 per cent. Rope 14lbs. per fathom direct haulage.
30	(9.) Calculate pressure to handle of a double purchase winch when handle is 16in. long, pinions 10 and 12-teeth, spur wheels 60 and 80-teeth, barrel 9in. diameter, weight 4 tons, modulus 75 per cent.
25	(10.) Explain how you would change a haulage rope end for end.
300	

SUBJECT: MINING OF COAL.

Thursday, 3rd April, 1919, 2 p.m. to 5 p.m.

30	(1.) Sketch and describe how you would take out coal pillars 8 yards by 40 yards with average roof. What are the chief points to aim at, and what to avoid in order that as little coal and timber may be lost as possible ?
30	(2.) Describe and sketch a landing at the surface of a sinking shaft.

Possible marks.	
30	(3.) Show by sketches how information furnished by bore holes may be misleading.
30	(4.) In which mine in longwall workings would you require the stronger packs ? (*a.*) Seam with hard roof ? (*b.*) Seams with roof which falls ? State why.
30	(5.) In working a seam of coal known to be liable to spontaneous combustion show by sketch how you would lay out the workings so as to limit the area that would be affected by a fire, and state what preparation you would make to deal with an outbreak promptly.
30	(6.) In above question (5) what ordinary precautions should be taken in the course of their daily work— 1st By the officials of the district ? 2nd By the workmen ?
30	(7.) Make a sketch showing at least six working places in any colliery you are familiar with, show how the roof is supported, and mode of ventilation.
30	(8.) Make neat sketches and describe the arrangements you would make at a shaft bottom 18 inches diameter to deal with an output of 1,800 tons in eight hours.
30	(9.) Express your opinion as to the advisability of extracting pillars in close proximity to railway reserves. If coal seam worked is 9ft. thick and 250ft. deep how close to railway reserve would you carry your pillar workings, reserve being one chain on each side of centre line of railway ?
30	(10.) Describe in detail the arrangements you would adopt for firing shots in sinking a shaft 2,000 feet to 3,000 feet deep.
300	

SUBJECT: VENTILATION AND DANGEROUS GASES.

Friday, 4th April, 1919, 10 a.m. to 1 p.m.

30	(1.) If the total quantity of air is equal to 100,000 cubic feet per minute, what quantity will pass in splites of the following dimensions :— (*a.*) 6ft. x 12ft. x 2,000 yds. ? (*b.*) 5ft. x 12ft. x 1,000 yds. ? (*c.*) 8ft. x 8ft. x 1,500 yds. ?
30	(2.) Describe minutely how you would arrange to ventilate a single heading driven in solid ground so as to restrict as little as possible the quantity of air passing through the district.
30	(3.) Sketch and describe a barometer, a thermometer, and hygrometer. State the purpose for which each is used in or about a mine.
30	(4.) State the chemical composition and properties of air, firedamp, and carbonic acid gas. What means would you adopt to detect the presence or absence of the two latter in the air of a mine ?
30	(5.) What method of ventilation lessens the danger of an explosion and reduces friction ? State your reasons.
30	(6.) How should a fan be located with reference to the top of the air shaft ? Which do you prefer, direct or belt driven fans ? Give reasons.
30	(7.) Express the following gaseous mixture in terms of air, black damp, etc. :— Oxygen 15·4, CO_2 4·22, CO 1·07, CH_4 ·56, N 78·75.
30	(8.) Calculate W.G. when depth of shaft is 1,000ft. deep, temperature at up-cast 120° and at down-cast 65°, barometer 30in.
30	(9.) How much firedamp would have to be given off to foul a current of 96,000 cubic feet of fresh air per minute sufficiently to allow the presence of gas to be detected by the ordinary safety lamp ?
30	(10.) In an airway 72 sq. ft. in sectional area, the velocity of the air is 550ft. per minute, what will be the velocity of this current where the area is reduced to 60 sq. ft. ?
300	

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

SUBJECT: VENTILATION AND DANGEROUS GASES.

Wednesday, 8th October, 1919, 10 a.m. to 11·30 a.m.

Possible marks.

50 (1.) If the horse-power producing ventilation is 30·06 and the water gauge reads 1·95 inches, how many cubic feet of air per minute will be circulating in the mine?

50 (2.) Supposing there are two airways, one 6ft. x 12ft., and the other 9ft. x 9ft. in section, how much more air will pass in one than the other with the same pressure?

50 (3.) Describe in detail how you would remove a body of gas from a pair of rise headings.

50 (4.) In a mine giving off 2,000 cubic feet of CH_4 per minute the volume of air entering the mine is 60,000 cubic feet per minute; what is the percentage of gas in the return current? Would you consider this percentage of gas dangerous?

50 (5.) If the ventilation of a mine is insufficient how may it be increased without increasing the power?

50 (6.) Show how to ventilate the workings in the accompanying plan, with due regard to haulage, etc.

300

SUBJECT: MINING OF COAL.

Wednesday, 8th October, 1919, 11·30 a.m. to 1 p.m.

50 (1.) In widening and heightening a drive for the purpose of making an engine flat the roof being heavy on the old timbers, describe and sketch how you would proceed.

50 (2.) Sketch and describe the general lay out of a district in any local mine with which you are acquainted in which coal cutting machines are in use. Show sufficient places to keep one machine going, the position of the electric cables, and the method in which you would lay out your roadways in order to get the highest possible efficiency from your machines.

50 (3.) Two stone drifts have to go 200 yards and rise 1 in 6, show by sketches how you will get the *debris* down and how the faces are ventilated?

50 (4.) Explain the terms "creep" and "thrust." How are they brought on in underground workings, and what precautions would you take to prevent them?

50 (5.) What dangers are met with in approaching old abandoned workings, and what precautions should be taken to avoid these dangers?

50 (6.) Describe how you would render first aid to a man who has met with an accident at the coal face resulting in a compound fracture of the thigh and severe scalp wounds.

300

SUBJECT: ARITHMETIC.

Wednesday, 8th October, 1919, 2 p.m. to 3 p.m.

20 (1.) A horizontal seam of coal having a specific gravity of 1·2 and of an average thickness of 5 feet, extends over a lease of 1,000 acres, how many tons of coal could be got, allowing a loss in working of 15 per cent.?

20 (2.) A mine pump lifts 650 gallons per minute, after the pump has been standing four hours it runs ten hours to reduce the water in the sump to the same level as at the beginning of the four hours stoppage. What is the feeder of water per minute?

Possible marks.

20 (3.) Add the following areas and reduce the total to sq. yards:

Acres.	roods.	perches.	sq. yds.
13	3	25	13
9	2	10	$7\frac{1}{2}$
3	1	19	29
7	2	39	11

20 (4.) If the standard wage be 12s. 4d. + 25 per cent., how much coal must a miner produce to earn the standard wage if the hewing rate be three shillings per ton?

10 (5.) If six men earn £22 15s. in six days in what time will nine men earn the same amount?

10 (6.) Add together the following fractions:—

$\frac{5}{13}$ $\frac{2}{39}$ $\frac{25}{78}$ and $\frac{7}{156}$

and divide—

$\frac{38}{275}$ by $\frac{133}{385}$

100

SUBJECT: ROADWAYS.

Wednesday, 8th October, 1919, 3 p.m. to 4 p.m.

50 (1.) What are the principal things to be looked after on haulage roads in mines?

50 (2.) Describe briefly the arrangements you would make for installing an endless rope jig in a rise heading to deliver coal to the main haulage rope, average grade 1 in 12. Where would you place your tension wheel and why? Illustrate your answer by sketches.

50 (3.) In endless rope haulage what are the arrangements for keeping the rope tight?

50 (4.) Sketch a curve on a direct haulage road showing an S curve, and explain benefit derived from laying same.

50 (5.) A heading has been set out by the surveyor, you are instructed to keep it straight and maintain an even gradient of six inches per yard, how would you carry out these instructions?

50 (6.) In a main road the bars have become low owing to the loose *debris* lying on such bars. Describe in detail how you would replace them, the work to be done at night, and the road to be ready for work each morning.

300

SUBJECT: THE COAL MINES REGULATION ACT, 1902.

Wednesday, 8th October, 1919, 4 p.m. to 5 p.m.

20 (1.) What are the duties of an Under Manager under the Coal Mines Regulation Act and special rules?

16 (2.) What does the Act require:
As to inspection of mine before commencing work?

16 (3.) As to prohibition of single shafts, tunnels, or outlets?

16 (4.) As to the providing of signalling and manholes for travelling places worked by machinery?

16 (5.) As to stretchers and ambulance appliances?

16 (6.) As to persons not to be employed in coal getting without experience?

100

DIVISION III.

REPORT OF SUPERINTENDENT OF STATE BATTERIES.

Department of Mines,
State Batteries Branch,
Perth, 13th May, 1920.

The Under Secretary for Mines.

Sir,

I have the honour to submit, for the information of the Hon. the Minister for Mines, a report on the work of my Branch for the year 1919, being the twenty-second annual report.

MILLING.

Thirty batteries, comprising 205 head of stamps, were kept available by the Department for the treatment of auriferous ores—and two batteries, each having 10 stamps (Darlot and Tuckanarra) were operated by lessees under State Battery regulations.

Tonnage milled.—513 parcels of ore were crushed, the mean tonnage being 78.53 tons per parcel, and the total tonnage 40,290¾ tons, an increase of 961 tons compared with 39,329¾ tons crushed during 1918. The Wiluna battery (10 head) milled 10,906¾ tons of lode material and 177½ tons of quartz, equal to 27.5 per cent. of the total tonnage handled at all batteries. At Burtville, Quinns, Sandy Creek, and Yerilla batteries were idle during the year through lack of ore supplies (Schedules 1, 5, and 8).

Duty per Stamp.—At 30 batteries operated by the Department, only sufficient ore was offered for treatment to keep them running 15½ per cent. of full time (Sundays excluded). The 5-stamp batteries showed a mean duty of 4.27 tons, and the 10-stamp batteries 5.77 tons per 24 hours. The mean duty per stamp at all batteries was 4.89 tons per 24 hours. During 1918 the mean duty per stamp at all batteries was 4.54 tons per 24 hours.

Amalgamation.—23,173.42 ounces of gold bullion were recovered by amalgamation, and estimated to contain 19,674.51 ounces of fine gold from 28,525 tons milled. The recovery by amalgamation was equal to 77 per cent. of the gross value of the ore. During 1918 the recovery by amalgamation was 77.6 per cent., but in that year the gross value of the ore was 107s. 2d. per ton compared with 76s. per ton during 1919. (Schedule 5.)

Charges.—The only alteration in charges was made at Wiluna. On 10th April the charge of 16s. 3d. per ton was altered to the following sliding scale, for the treatment of lode ore as distinct from quartz.

Grade of Ore.	Rate per ton. s.	d.
Under 9 dwts. per ton	12	6
9 dwts. and under 9½ dwts. per ton ..	13	0
9½ " " 10 " " ..	13	6
10 " " 10½ " " ..	14	0
10½ " " 11 " " ..	14	6
11 " " 11½ " " ..	15	0
11½ " " 12 " " ..	15	6
12 " " 12½ " " ..	16	0
12½ " " 13 " " ..	16	6
13 " " 13½ " " ..	17	0
13½ dwts. per ton and over	17	6

Rebate amounting to £1,171 15s. was granted on 9,473 tons of low grade ore milled, and under Clause 2 of the crushing charges, 138.5 tons were milled free of charge.

Expenditure.—Including £2,519 1s. 5d. spent on repairs and renewals to batteries, the total expenditure for milling operations amounted to £24,884 6s. 3d., equal to 12s. 4.98d. per ton, compared with 13s. 2.93d. per ton during 1918, a decrease of 10.85d. per ton. The decrease, in view of decidedly higher prices ruling for commodities and labour, is explained by the fact that approximately half the tonnage was milled at two plants, Wiluna and Coolgardie, where it was large enough to enable low costs being recorded, viz., 6s. 0.7d. and 8s. 1.2d. per ton, respectively.

Revenue.—The total revenue from milling operations was £16,458 11s. 5d., equal to 8s. 2.02d. per ton, the revenue for 1918 being 8s. 11.42d., a decrease of 9.4d. per ton. The decrease in expenditure was therefore nearly offset by the lesser amount of revenue earned under our scale of charges.

Milling operations showed a loss of £8,425 14s. 10d. or £15 18s. 8d. less than during 1918, when the loss amounted to £8,441 13s. 6d. (Schedules 1, 5, and 8.)

TAILING TREATMENT.

On account of the high price of galvanised iron, of which commodity our leaching vats are made, renewals have not been effected for some years, with the result that several of the treatment plants are out of commission. It will be necessary, even if the price of iron remains high, to have renewals effected in order that treatment can be proceeded with during the summer of 1920-21. Only 15,764 tons of tailing were treated, against 24,364 tons treated during 1918, a decrease of 8,600 tons. The mean head value of tailing treated was 6.083 dwts. per ton, and the mean residue value was 1.26 dwts. per ton, a recovery of 79.2 per cent. Slag values were not realised, but will produce a net amount sufficient to make the total actual recovery from treatment over 80 per cent. At the close of the year 31,454 tons of payable tailing were accumulated at all batteries, except Mt. Ida and Marble Bar, where they are discarded owing to their refractory nature. At 31st December, 1918, there were 27,964 tons of tailing accumulated.

Expenditure.—Principally on account of the small tonnage handled, and also of the high price of cyanide, zinc shavings, and chemicals, the cost per ton increased from 8s. 3.74d. during 1918 to 9s. 2.47d. The total expenditure, including £259 5s. 11d. spent on repairs and renewals, amounted to £7,256 17s. 7d.

Revenue.—Revenue per ton was practically the same as during 1918 at 9s. 5.73d., the total being £7,348 0s. 9d. The profit derived from these operations was only £91 3s. 2d. During 1918 the profit was £1,419 13s. 9d. (Schedules 3 and 9.)

SLIME TREATMENT.

The vacuum filter plant at Wiluna handled 12,780 tons of slime, having a mean head value of 8.866 dwts. per ton, the residue having a mean value of 1.828 per ton, the assay recovery being 79.38 per cent., whilst the actual recovery showed a slight surplus, and was equal to 80.41 per cent. of the mean head value of the tonnage treated. During the previous year 11,676 tons were treated with a mean head value of 10.601 dwts per ton, whilst the residue value was 2.139 dwts per ton, the assay extraction being 79.82 per cent.

Expenditure.—The cost per ton was 9s. 1.08d., compared with 9s. 4.87d. during 1918, a decrease of 3.79d. per ton. The total expenditure was £5,808 18s. 6d.

Revenue.—The revenue was affected by the alteration in charges and amounted to £4,720, equal to 7s. 5.37d. per ton compared with 7s. 9.07 per ton during 1918.

Slime treatment showed a loss of £1,088 18s. 6d., compared with a loss of £981 19s. during 1918. (Schedules 3 and 9.)

TIN ORE TREATMENT.

The decline in the yardage of tin ore treated at Greenbushes was due to a suspension for some few months of market operations, and no doubt also to local conditions. During 1918, there were 5,985 yards of ore offered for treatment at the two plants, but for the period under review only 1,204 yards were forthcoming. Towards the close of the year advantage was taken of the market price for tin, to retreat some tailing at the Salt Water Gully plant. When 200 yards had been handled at a profit of £20 17s. 9d., the water supply from the creek failed and operations had to be suspended, as the tailing was not valuable enough to pay the cost of pumping water.

Expenditure.—£696 18s. 9d., equal to 10s. 1.51d. per yard. The high cost was due to the small yardage, and it cannot be reasonably or favourably compared with the cost, 4s. 10.2d. per yard, obtained during 1918 when 5,985 yards were handled.

Revenue amounted to £238 6s. 2d. or 3s. 11.88d. per yard, an increase of 11.6d. per ton on the figures for 1918, due to fixing a minimum revenue of 3s. 6d. per yard.

The loss on tin ore treatment operations was £368 12s. 7d., the loss for 1918 being £558 9s. (Schedules 1 and 8.)

ORE DRESSING.

During the month of June, a newly constructed ore dressing plant at Coolgardie commenced operations. Scheelite ore was handled, and after some delay caused through alterations necessary to the water supply and launders, the plant ran very well. A great deal of difficulty was experienced with sampling and assaying. As an instance I might mention that after treatment had been completed and the tailing dams were nearly dry, a sample was carefully bored from them. The assay showed 0.48 per cent. W.O.3. Some weeks afterwards another sample was bored from the same dams and the borings were all pulverised to pass a 90-mesh seive before mixing, the assay result being 0.16 per cent. WO3. Many checks have been made upon several samples, but results do not agree. Three samples very finely pulverised and thoroughly well mixed were sent to three assayers with the following results:—

I.	II.	III.
0·08 % WO3	0·41 % WO3	0·18 % WO3
1·7 % WO3	2·1 % WO3	1·6 % WO3
6·1 % WO3	5·0 % WO3	2·9 % WO3

It is obvious that correct values cannot be stated from these results, and that the ore contains some element or compound which interferes with the processes of assay.

365¾ tons of scheelite ore were treated for an expenditure of £365 11s. 6d., the revenue being £212 6s.

Concentrates to the value of £1,082 18s. 9d. were recovered from treatment. (Schedule 8.)

REPAIRS AND RENEWALS.

The cost of maintaining the plants amounted to £3,480 2s. 1d., compared with £4,161 1s. 2d. for the year 1918.

Expenditure under this heading was included in working costs, and was segregated as follows:—

	£	s.	d.
Batteries	2,519	1	5
Leaching plants	259	5	11
Slime plant	621	4	5
Tin Ore plant	66	14	8
Ore dressing plant	13	15	8
	£3,480	2	1

TOTAL OPERATIONS.

A considerable falling-off in the gross tonnage handled was due to the circumstances not permitting the treatment of more tailing and to a decrease of 4.781 yards of tin ore offered for treatment. The gross tonnage handled was 70,604½ tons, compared with 83,173¾ tons during 1918. The gross expenditure was £38,995 15s. 5d., equal to 11s. 0.55d. per ton. During 1918 it was 10s. 6.26d. per ton.

The gross revenue was £29,071 4s. 11d., equal to 8s. 2.81d. per ton, compared with 8s. 5.13d. per ton during 1918.

The total loss on all operations was £9,924 10s. 6d., or £1,274 3s. 4d. more than during 1918.

Comparative Synopsis of results at State Batteries for 12 *months ending* 31*st December*, 1919 *and* 1918.

Operation.	1919.			1918.		
	Tonnage.	Expenditure.	Revenue.	Tonnage.	Expenditure.	Revenue.
		per ton. s. d.	per ton. s. d.		per ton. s. d.	per ton. s. d.
Milling	40,290¾	12–4·08	8–2·02	39,329¾	13–2·93	8–11·42
Tailing Treatment	15,764	9–2·47	9–5·73	24,364	8–3·74	9–5·74
Slime Treatment...	12,780	9–1·08	7–5·37	11,892	9–4·87	7–9·07
Residue Treatment	...	...	...	264	11–10·68	11–10·68
Tin Treatment	1,204	10–1·51	3–11·88	5,985	4–10·20	3–0·28
Tin Residue	200	7–3·77	3–11·32	1,339	5–7·61	4–8·42
Ore Dressing	365¾	19–11·88	11–7·29	...	...	...

Receipts and Expenditure, 1919.

Operation.	Tonnage.	Expenditure.	Revenue.	Profit.	Loss.
		£ s. d.	£ s. d.	£ s. d.	£ s. d.
Milling	40,290¾	24,884 6 3	16,458 11 5	...	8,425 14 10
Tailing Treatment	15,764	7,256 17 7	7,348 0 9	91 3 2	...
Slime Treatment	12,780	5,808 18 6	4,720 0 0	...	1,088 18 6
Tin Treatment	1,204	606 18 9	238 6 2	...	368 12 7
Tin Residue	200	73 2 10	94 0 7	20 17 9	...
Ore Dressing	365¾	365 11 6	212 6 0	...	153 5 6
	70,604½	38,995 15 5	29,071 4 11	112 0 11	10,036 11 5
				Less profit ...	112 0 11
				Gross loss ...	£9,924 10 6

PURCHASE OF TAILINGS.

The Department purchased 25,080½ tons of tailing for the sum of £19,464 19s. 8d. net to owners, and 432 were purchased by the contractor at Peak Hill for £364 10s. at State battery rates. (Schedule 7.)

RETURN FROM GOLD ORE TREATED.

The quantity of ore treated by amalgamation was 28,525 tons from which 23,173.42 ounces of bullion valued at £83,575 13s. 8d. were recovered. The total value of the tailing therefrom was £24,911 8s., and the gross value of the ore was £108,487 1s. 8d., equal to 76s. per ton. (Schedule 5.) Milling charges absorbed £12,776 12s., leaving £70,790 1s. 8d. net for the owners from milling operations.

The net amount paid and due for tailing was £8,262 15s., and the net return received by owners from treatment of their ore was £79,061 16s. 8d., or 72.87 per cent. of its gross value.

10,906¾ tons of lode ore, having a gross value of £21,484 14s., were purchased at Wiluna for £10,685 net to owners, £7,602 9s. 7d. being charged for treatment. (Schedule 5.)

OUTPUT SINCE INCEPTION.

(1898 to 1919, inclusive.)

Tons of auriferous ore treated, 1,237,027.

Production—	£
By amalgamation	4,319,459
„ Tailing treatment	627,277
„ Slime treatment	196,005
„ Residue treatment	9,353
	£5,152,094

Tons of stanniferous ore treated, 79,277.

Production	92,654
	£5,244,748

NEW PLANTS.

An ore-dressing plant was installed at Coolgardie, and was put into commission during June. Its motive power is taken from the steam plant at the battery, and the mill is equipped with a rockbreaker, belt conveyors, bin, two sets of rolls, jig, two No. 5 Wilfley tables, one No. 3 Wilfley slime table, belt and bucket elevators, trommels, cones, pumps, and all accessories. To the close of the year only 365¾ tons of ore were offered for dressing.

A five-head battery complete, with a railway siding to the feed floor was erected at Cue, and commenced operations in October. To the end of the year 1,287½ tons were crushed. Towards the close of the year it was decided to dismantle the mills at Salt Water Gully and Bunbury End, Greenbushes, and to erect an efficient dressing plant for the treatment of stanniferous ore at a central position situated at Floyd's Gully. Preliminary work was commenced towards the end of December.

THE STAFF.

Mr. A. H. Cale resigned his position after twelve years' service as manager at Coolgardie. Mr. L. P. Bisset was transferred from the Leonora, Mt. Keith, and Mt. Sir Samuel circuit to Coolgardie, whilst Mr. D. Moyes took over the above-mentioned batteries in conjunction with Laverton, and Mr. J. Leipold had Linden added to the batteries in his charge. Mr. W. R. Burnside was placed in charge of the new mill at Cue, in addition to his managerial duties at Meekatharra and Quinns.

The managerial staff numbered 14 men at the close of the year, one less than at the close of 1918, whilst Head Office staff was unaltered. All members of the staff without exception rendered good and faithful service during a year beset with numerous difficulties.

GENERAL REMARKS.

Accompanying this report are twelve schedules, setting out details of operations.

For some years I have had occasion to draw attention to the increase in the cost of general supplies and labour, and I have to state that the tendency is still towards further increases. Prices of supplies and services show a decidedly upward tendency, especially for firewood, charcoal, cartage, freight, and items of the hardware and timber trades. An all round increase of one shilling per shift of employees, an increase recently given by employers throughout the goldfields, means under existing conditions an extra expenditure of £850 to £900 a year.

Milling and slime treatment show slightly increased tonnages this year, but tin ore and tailing treatment show largely decreased tonnages. Had conditions been normal, the tonnage of tailing treated would have been as much as during the two previous years, but we have been waiting for a favourable market to purchase galvanised iron required for the renewal of vats. One leaching plant after another has had to be closed on account of the vats becoming worn out. Tailing is accumulating in the meantime, and will be treated during the summer of 1920-21 at all batteries where there is over 1,000 tons if galvanised iron is procurable. The small tonnage of tailing handled had the effect of increasing the cost per ton, with the result that a profit of only £91 was made. Last year the profit on a much larger tonnage was £1,419, and the difference, £1,328, accounts for the increased loss on all operations of £1,274.

The mean gross value of ore milled showed a considerable decline. During 1918 the mean value was 90s. 6d., but this year it was only 65s. 11d., the lowest mean value on record. Quartz crushed had a mean gross value of 76s. per ton, and the net return to owners from treatment operations was equal to 72.87 per cent.

I have, etc.,

A. M. HOWE,
Superintendent of State Batteries.

Schedule 1.

Return showing the number of tons crushed, gold yield, average per ton in shillings, and total value for year ending 31st December, 1919.

Battery.	Tons Crushed.	Gold Yield, Bullion.	Average per ton in shillings.	Total Value.
		ozs.	s.	£
Bamboo Creek ...	888·50	1,735·95	140·67	6,249·42
Black Range	921·50	1,170·90	91·48	4,215·24
Boogardie	3,921·75	3,322·20	60·99	11,959·92
Coolgardie	7,281·25	1,990·20	19·73	7,164·72
Cue	1,287·50	763·42	42·69	2,748·31
Laverton	138·50	53·90	28·02	194·04
Leonora	94·00	390·50	299·10	1,405·80
Linden	747·00	726·80	70·05	2,616·48
Meekatharra	824·00	1,124·50	98·26	4,048·20
Marble Bar	480·75	497·20	74·46	1,789·92
Mt. Egerton	242·00	95·90	28·53	345·24
Mt. Ida	629·50	336·10	38·44	1,209·96
Mt. Keith	1,049·50	908·95	62·36	3,272·22
Mt. Sir Samuel ...	166·00	78·60	34·09	282·96
Mulline	549·00	240·75	31·57	866·70
Mulwarrie	154·25	51·30	23·94	184·68
Niagara	693·00	713·70	74·15	2,569·32
Norseman	1,783·50	2,501·65	100·99	9,005·94
Ora Banda	1,337·25	519·48	27·97	1,870·12
Payne's Find ...	2,849·25	3,901·10	98·58	14,043·96
Peak Hill	1,051·50	775·35	53·09	2,791·26
Siberia	543·25	161·40	21·39	581·04
Warriedar	541·50	305·10	40·57	1,098·36
Wiluna	177·25	175·50	71·29	631·80
Yarri	441·00	408·30	66·66	1,469·88
Youanmi	457·50	95·80	15·08	344·88
	29,250·00	23,044·55	55·39	82,960·37
Wiluna Lode ...	11,040·75	No amalgamation.		

Tin Plants.

Plant.	Yards of Tin ore treated,	Yield.
		Tons.
Greenbushes, Bunbury End	1,157	10·994
Greenbushes, Salt Water Gully	47	·758
	1,204	11·752

Schedule 2.

Return showing the number of tons crushed, gold yield, average per ton, and value since inception to 31st December, 1919.

Battery.	Tons Crushed.	Gold Yield.	Average per ton.	Value.
		ozs.	ozs.	£
Bamboo Creek ...	8,022·50	13,114·26	1·634	47,211·34
Black Range ...	67,896·40	71,481·50	1·052	257,528·73
Boogardie	62,617·15	40,956·84	·654	148,338·81
Burtville	30,458·00	66,078·71	2·169	239,189·17
Coolgardie	94,102·25	69,571·67	·739	250,511·49
Cue	1,287·50	763·42	·592	2,748·31
Darlot	33,210·00	37,637·74	1·133	138,928·25
Laverton	15,944·50	16,844·41	1·056	61,811·60
Leonora	53,106·95	58,881·84	1·108	215,454·95
Linden	18,581·50	20,703·28	1·114	74,531·90
Marble Bar	10,119·25	12,764·70	1·261	45,952·87
Meekatharra	73,709·50	88,244·54	1·197	320,359·73
Mt. Egerton	7,582·25	4,017·86	·529	13,731·12
Mt. Ida	40,655·40	53,203·21	1·308	194,833·73
Mt. Keith	8,990·25	7,981·00	·887	28,731·60
Mt. Sir Samuel ...	9,128·75	7,184·60	·787	25,864·55
Mulline	76,613·45	98,216·09	1·282	352,748·07
Mulwarrie	31,308·15	36,127·21	1·154	133,314·65
Niagara	63,976·00	57,071·49	·892	207,645·56
Norseman	57,917·70	63,789·32	1·101	232,824·02
Ora Banda	14,358·75	7,131·97	·496	25,675·06
Payne's Find ...	19,644·75	24,051·66	1·224	86,585·97
Peak Hill	18,188·30	19,554·92	1·075	71,568·95
Pinjin	17,088·65	12,912·68	·756	46,485·04
Quinn's	11,389·50	6,258·43	·549	22,530·35
Siberia	15,337·00	16,445·44	1·072	59,128·91
20-Mile Sandy ...	12,184·15	19,055·77	1·564	68,980·34
Tuckabianna	1,716·75	2,265·50	1·319	8,155·80
Tuckanarra	15,476·85	21,276·06	1·375	78,217·53
Warriedar	3,212·75	1,554·45	·484	5,596·02
Wiluna	54,841·00	29,532·12	·538	106,460·81
Yarri	45,691·00	30,155·26	·659	108,558·76
Yerilla	14,372·25	13,068·55	·909	44,245·70
Youanmi	26,900·50	9,226·53	·343	33,215·50
Batteries Closed ...	153,242·04	133,589·03	·872	488,030·06
	1,188,866·69	1,170,712·01	·985	4,246,145·25
Wiluna (Lode) ...	48,160·50	20,275·16	·421	73,313·43
Totals	1,237,027·19	1,190,987·17	·963	4,319,458·68

Tin Plants.

Plant.	Tons.	Yield, Black Tin.
		Tons.
Greenbushes, Bunbury End	56,448·50	717·471
Greenbushes, Salt Water Gully	7,024·00	62·274
Plants Closed	15,804·25	189·531
	79,276·75	969·276

Milling.

	Tons.		ozs.
Up to 1901 (3 years)	68,791	...	75,533
1902	39,517	...	57,255
1903	49,233	...	58,305
1904	71,616	...	78,309
1905	85,018	...	92,327
1906	95,831	...	94,187
1907	95,280	...	97,962
1908	95,624	...	89,875
1909	94,218	...	83,127
1910	89,278	...	80,074
1911	59,373	...	56,265
1912	56,636	...	53,868
1913	60,573	...	52,515
1914	56,570	...	45,641
1915	49,595	...	39,095
1916	47,330	...	31,734
1917	42,947	...	38,015
1918	39,329	...	33,523
1919	40,291	...	27,027

Cyaniding Sand.

Up to 1902	29,255
1903	33,369
1904	42,559
1905	54,420
1906	60,422
1907	63,778
1908	62,081
1909	61,265
1910	43,915
1911	27,444

Cyaniding Sand.—continued.

1912	18,599
1913	18,300
1914	6,219

Tailing.

	Tons.
1913	13,078
1914	32,723
1915	31,887
1916	34,725
1917	24,890
1918	24,364
1919	15,764

Slime Treatment.

	Tons.
Up to 1904	691
1905	7,028
1906	...
1907	8,220
1908	5,818
1909	16,848
1910	28,819
1911	20,821
1912	8,085
1913	6,089
1914	6,246
1915	3,454
1916	15,536
1917	13,086
1918	11,892
1919	12,780

Schedule 3.

Sand and Tailing Treatment, 1919.

Battery.	Tons.	Yield.	Value.
		Fine ozs.	£
Bamboo Creek	1,022	585·05	2,484·71
Black Range	640	202·99	862·30
Boogardie	4,200	985·40	4,184·87
Coolgardie	2,016	293·73	1,847·79
Laverton	1,200	321·92	1,367·48
Meekatharra	660	128·86	547·34
Mt. Keith	1,140	132·93	564·62
Mt. Sir Samuel	102	11·89	50·50
Niagara	720	100·23	425·77
Norseman	850	344·89	1,465·10
Ora Banda	1,560	290·85	1,235·77
Payne's Find	1,254	129·51	550·14
Yarri	630	120·13	510·48
Youanme	210	65·65	278·86
	16,204	3,714·03	15,775·73
Less Tonnage Revenue not collected till 1919 ...	440		
	15,764		

Slime Treatment, 1919.

Battery.	Tons.	Yield.	Value.
		Fine ozs.	£
Wiluna	12,780	4,623·26	19,617·89

Tin—Residue Treatment, 1919.

	Tons.	Yield, Tons.
Greenbushes, Salt Water Gully ...	200	1·45

Schedule 4.

Sand and Tailing Treatment since Inception to 31st December, 1919.

Battery.	Tons.	Yield.	Value.
		Fine ozs.	£
Bamboo Creek	6,174·00	2,104·23	8,951·23
Black Range	43,858·00	12,249·33	51,748·46
Boogardie	44,972·00	12,059·25	50,632·98
Burtville	16,788·75	5,464·13	22,793·76
Coolgardie	52,982·00	8,426·76	35,472·13
Darlot	23,654·00	2,699·17	11,042·16
Devon	261·50	120·44	511·64
Duketon	2,083·50	250·51	1,025·77
Laverton	14,996·00	2,566·98	10,708·48
Lennonville	24,309·00	6,592·48	26,658·28
Leonora	37,139·50	9,056·71	37,699·89
Linden...	15,487·00	5,221·48	22,197·84
Meekatharra	49,700·00	9,855·41	41,245·78
Menzies	31,487·50	7,975·80	33,434·78
Mt. Ida	3,570·00	357·97	1,423·64
Mt. Keith	7,053·00	816·70	3,468·72
Mt. Sir Samuel	5,988·00	1,367·56	5,809·39
Mulline	44,794·50	12,261·27	49,863·24
Mulwarrie	23,809·25	4,675·53	19,220·11
Nannine	3,650·00	410·12	1,742·50
Niagara	42,990·00	6,582·10	27,380·43
Norseman	40,339·50	8,794·60	36,600·37
Ora Banda	6,396·00	1,531·67	6,507·04
Payne's Find	12,927·00	1,538·14	6,533·92
Pig Well	11,379·00	2,373·25	9,962·50
Pinjin	11,718·00	1,243·07	5,256·01
Quinn's	7,486·00	686·56	2,916·43
Randell's	791·00	56·05	224·80
Sandy Creek	11,496·25	3,491·00	14,547·62
Siberia	5,550·00	1,201·56	5,105·20
Southern Cross	3,471·00	452·75	1,815·18
Wiluna	17,852·00	7,930·79	33,590·87
Yarri	44,180·00	4,197·75	17,567·84
Yerilla	13,620·00	1,622·66	6,892·92
Youanmi	11,425·00	3,019·17	12,821·50
Yundamindera	4,977·00	920·33	3,909·25
Totals	699,755·25	150,173·18	627,277·61

Residue Treatment from Inception to 31st December, 1919.

Battery.	Tons.	Yield.	Value.
		Fine ozs.	£
Linden	670·00	95·14	349·34
Menzies	24,270·00	1,579·26	6,679·01
Mulwarrie	4,618·00	546·85	2,325·02
Totals	29,558·00	2,221·25	9,353·37

Slime Treatment since Inception to 31st December, 1919.

Battery.	Tons.	Yield.	Value.
		Fine ozs.	£
Black Range	13,040·00	2,604·59	11,064·71
Boogardie	2,100·00	426·35	1,811·08
Burtville	1,643·00	519·00	2,204·71
Darlot	570·00	52·61	223·55
Laverton	273·00	45·24	192·19
Leonora	12,440·00	2,198·09	9,338·73
Linden	419·00	87·30	370·90
Meekatharra	1,980·00	462·78	1,966·08
Menzies	21,905·50	5,454·53	23,171·45
Mulline	21,576·75	6,833·05	24,557·11
Niagara	13,875·00	2,175·45	9,242·12
Norseman	16,177·50	3,577·15	15,195·06
Mulwarrie	4,733·50	751·79	3,194·22
Pig Well	340·00	64·65	274·57
Sandy Creek	293·50	75·00	318·68
Siberia...	347·00	104·47	443·73
Wiluna	56,934·00	21,357·60	90,700·48
Yarri	3,792·00	364·06	1,546·62
Yerilla	424·00	44·55	189·33
Totals	172,863·75	47,198·26	196,005·32

Tin Residue Treatment since Inception to 31st December, 1919.

	Tons.
Greenbushes, Bunbury End	315
Greenbushes, Salt Water Gully	1,224

Schedule 5.

Return showing Number of Parcels treated and Tons crushed at State Batteries for Year 1919.

Number of Parcels crushed.	Battery.	Tons.	Yield by Amalgamation. Bullion.	Yield by Amalgamation. Fine Gold.	Gross Contents of Tailings. Fine Gold.	Total Contents of Ore. Fine Gold.	Average per ton. Fine Gold.	Gross Value of Ore per ton.
			ozs.	ozs.	ozs.	ozs.	dwts. grs.	£ s. d.
11	Bamboo Creek	873·75	1,770·25	1,500·91	414·17	1,915·08	43 19	9 6 0
27	Black Range	921·50	1,170·90	992·75	489·27	1,482·02	32 2	6 16 4
80	Boogardie	3,921·75	3,322·20	2,816·74	1,171·45	3,988·19	20 5	4 5 11
68	Coolgardie	6,531·25	1,990·20	1,687·40	698·18	2,385·58	7 7	1 11 0
21	Cue	1,287·50	763·42	647·27	189·52	836·79	12 23	2 15 1
4	Laverton	188·50	53·90	45·69	20·23	65·92	9 12	2 0 4
7	Leonora	94·00	390·50	331·08	53·64	384·72	81 20	17 7 8
23	Linden	747·00	726·80	645·42	208·30	853·72	22 20	4 17 1
12	Marble Bar	480·75	497·20	421·55	75·28	496·83	20 16	4 7 9
25	Meekatharra	824·00	1,124·50	953·19	183·09	1,136·28	27 13	5 18 3
3	Mt. Ida	629·50	336·10	284·89	100·07	384·96	12 5	2 11 10
7	Mt. Keith	1,049·50	909·35	771·00	138·79	909·79	17 7	3 13 5
3	Mt. Sir Samuel	166·00	78·60	66·62	40·52	107·14	12 21	2 14 9
1	Mt. Egerton	242·00	95·90	81·29	62·32	143·61	11 20	2 10 4
15	Mulline	549·00	240·75	204·07	74·25	278·32	10 3	2 3 0
3	Mulwarrie	154·25	51·30	43·48	40·64	84·12	10 22	2 6 5
10	Niagara	693·00	713·70	604·97	184·14	789·11	22 18	4 16 7
65	Norseman	1,823·50	2,501·67	2,120·55	539·35	2,659·90	29 3	6 3 9
12	Ora Banda	1,337·25	519·53	440·38	165·61	605·99	9 1	1 18 5
41	Payne's Find	2,849·25	4,009·20	3,398·42	289·37	3,687·79	25 12	5 8 4
15	Peak Hill	1,051·50	761·35	645·36	202·25	847·61	16 2	3 8 4
4	Siberia...	548·25	161·40	136·81	62·84	199·65	7 8	1 11 2
11	Warriedar	541·00	305·10	258·62	249·43	508·05	18 18	3 18 8
6	Wiluna	177·50	175·50	148·76	88·60	237·36	26 17	5 13 5
10	Yarri	441·00	408·30	346·09	99·87	445·96	20 5	4 5 10
1	Youanme	457·50	95·80	81·20	78·20	154·40	6 17	1 8 6
485		28,525·00	23,173·42	19,674·51	5,864·38	25,538·89	17 21	3 16 0
28	Wiluna Lode	10,906·75	No Amalgamation		5,057·70	5,057·70	9 6	1 19 4
513		39,431·75						
	Add Tonnage not completed 31st December, 1919	1,011·00						
		40,442·75						
	Less Tonnage not completed 31st December, 1918	152·00						
		40,290·75						

Ore Dressing Plant—Coolgardie.

Tons Scheelite Ore Treated	365¼
Yield (Value at 52s. 6d. per unit)	£1,082·94
Yield per ton	£2 19 3

Tin Ore Treatment.

No. of Parcels.	Battery.	Yield of Tin Ore treated.	Yield, Black Tin.	Average per yard.
			Tons.	lbs.
25	Greenbushes, Bunbury End	1,157	8·61	19·4
3	Greenbushes, Salt Water Gully	47	·76	36·2

Schedule 6.

Expenditure from Consolidated Revenue Vote and Loan Expenditure Funds on Erection of State Batteries for Year ending 31st December, 1919, and Totals since Inception.

Battery.	From Revenue.	From Loan.	Total.
	£ s. d.	£ s. d.	£ s. d.
Coolgardie Ore Dressing Plant	...	4,984 14 6	4,984 14 6
Tuckabianna Battery—Lease of	...	22 17 0	22 17 0
State Battery, Cue, Erection	...	3,898 3 9	3,898 3 9
Instalment of Sampler, Norseman	...	4 7 4	4 7 4
Instalment of Sampler, Laverton	...	67 6 8	67 6 8
Suspense Account	...	19 0 0	19 0 0
Cue Railway Siding ...	...	366 10 8	366 10 8
Floyds Gully Tin Dressing Plant	...	20 1 0	20 1 0
	...	9,383 0 11	9,383 0 11
Erection of State Batteries, Expenditure to 31st December, 1907	91,981 1 8	...	...
Loan Expenditure to 31st December, 1918	...	276,849 10 0	368,830 11 8
Totals	91,981 1 8	286,232 10 11	378,213 12 7

Schedule 7.

Direct Purchase of Tailings, 1919.

Battery.	Tons.	Amount
		£ s. d.
Bamboo Creek	724½	828 5 3
Black Range	857½	1,043 10 11
Boogardie	2,641	1,914 9 5
Coolgardie	2,361½	592 15 4
Laverton	324½	151 15 5
Leonora	78	127 2 1
Linden	596	356 15 3
Meekatharra	669	379 10 7
Mt. Egerton	341½	147 0 5
Mt. Keith	394½	42 6 5
Mt. Sir Samuel	559	167 18 5
Mulline	362½	70 10 10
Mulwarrie	85½	83 9 0
Niagara	715	327 14 6
Norseman	1,274½	1,319 0 0
Ora Banda	292½	223 13 6
Payne's Find	385½	60 10 11
Wiluna	244½	215 8 1
Wiluna Lode	11,371	11,140 13 3
Yarri	436½	217 12 1
Youanme	366	54 18 0
Totals	25,080½	19,464 19 8

Schedule 7a.

Return showing Tailing payable and unpayable and Gross Contents, 1919.

Battery.	Tailing payable.		Tailing Unpayable.		Totals.	
	Tons.	Gross Contents.	Tons.	Gross Contents.	Tons.	Gross Contents.
		ozs. dwts. grs.		ozs. dwts. grs.		ozs. dwts. grs.
Bamboo Creek	649½	411 13 9½	48	2 10 2	697½	414 3 11½
Black Range	757½	486 15 17½	20½	2 9 21	778	489 5 14½
Boogardie	2,731	1,115 16 14½	433½	55 12 13½	3,164½	1,171 9 3½
Coolgardie	2,343½	486 16 1	3,062½	211 7 17½	5,406½	698 3 18½
Cue	338	88 9 20½	689½	101 0 17½	1,027½	189 10 14
Laverton	70½	15 14 19	45	4 10 0	115½	20 4 19
Leonora	72	52 17 20½	7½	0 15 0	79½	53 12 20½
Linden	533½	196 1 12½	82	12 4 13	615½	208 6 1¾
Marble Bar	243½	56 16 14½	132½	18 8 19½	381½	75 5 10
Meekatharra	412	150 18 8	242	32 3 13	654	183 1 21
Mt. Egerton	193	62 6 11	...	...	193	62 6 11
Mt. Ida	63½	34 19 18	440	65 1 16	503½	100 1 10
Mt. Keith	387	73 12 7	486½	65 3 13½	873½	138 15 20½
Mt. Sir Samuel	139½	40 10 12	...	...	139½	40 10 12
Mulline	229½	53 19 10½	209½	20 5 17	439	74 5 3½
Mulwarrie	85½	40 12 20½	...	...	85½	40 12 20½
Niagara	588½	184 2 19½	...	...	588½	184 2 19½
Norseman	1,258½	500 19 9½	284½	38 7 14½	1,543	539 7 0
Ora Banda	181½	77 1 17½	888½	88 11 0½	1,070	165 12 18
Paynes' Find	1,061½	121 11 14	1,062	117 15 22	2,123½	239 7 12
Peak Hill	432	186 5 9½	397½	15 19 16½	829½	202 5 1¾
Siberia	33½	23 4 0½	400½	39 12 20½	434½	62 16 21¼
Warriedar	444½	249 8 17½	...	...	444½	249 8 17½
Wiluna	148½	88 12 2½	...	...	148½	88 12 2½
Yarri	289	88 3 20½	85½	11 13 17	374½	99 17 13¼
Youanmi...	366	73 4 0	...	...	366	73 4 0
	14,058½	4,960 15 16½	9,018½	903 14 13¾	23,076½	5,864 10 6½
Wiluna Lode	10,906½	5,057 14 4½	No amalgamation.		10,906½	
Totals	24,965	10,018 9 21½	9,018½	903 14 13¾	33,983¼	5,864 10 6½

* Tailings having an assay value of 3 dwts. per ton is not purchased and is termed "unpayable."

Schedule 8.

Statement of Receipts and Expenditure for Year ending 31st December, 1919.

MILLING AND TIN.

Plant.	Tonnage.	Management.	Wages.	Stores.	Total Working Expenditure.	Cost per ton.	Repairs and Renewals.	Sundries.	Gross Expenditure.	Cost per ton.	Receipts.	Per ton.	Profit.	Loss.
		£ 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	888½	163 0 1	352 18 9	278 19 2	794 18 0	17 10·70	31 14 5	125 10 2	952 2 7	21 5·18	533 2 0	12 0·00	...	419 0 7
Black Range	921½	254 0 0	251 18 0	283 19 7	789 17 7	17 1·70	211 1 10	106 5 9	1,107 5 2	24 0·36	433 15 6	9 4·96	...	673 9 8
Boogardie	3,921¾	280 0 0	1,084 9 5	930 15 0	2 295 4 5	11 8·44	293 17 0	369 7 7	2,958 9 0	15 1·03	1,839 10 0	9 4·56	...	1,118 19 0
Burtville	...	8 17 1	4 5 8	1 8 8	14 11 5	...	1 6 8	2 3 10	18 1 11	...	3 2 0	...	...	14 19 11
Coolgardie	7,281¼	316 0 0	593 5 4	1,105 12 2	2,014 17 6	5 6·60	246 8 11	679 4 5	2,940 10 10	8 1·20	2,203 5 10	6 0·81	...	737 5 0
Darlot	...	8 17 1	...	6 15 2	15 12 3	...	...	...	15 12 3	...	22 16 6	...	7 4 3	...
Cue	1,287½	85 0 0	358 9 7	397 2 10	840 12 5	13 0·69	14 11 8	117 14 9	972 18 10	15 1·34	688 18 9	9 11·08	...	334 0 1
Laverton	138½	178 10 0	61 5 0	75 17 11	315 12 11	45 6·96	63 7 2	52 9 10	431 9 11	62 3·69	95 9 8	13 9·45	...	336 0 3
Lennonville	...	...	...	...	...	...	...	...	...	...	4 10 0	...	4 10 0	...
Leonora	94	37 0 0	37 6 11	61 6 8	135 13 7	28 10·41	9 18 1	46 1 7	191 13 3	40 9·36	58 6 8	12 4·80	...	133 6 7
Linden	747	47 8 7	148 10 3	173 15 6	369 14 4	9 10·77	21 15 8	101 6 10	492 16 10	13 2·32	360 18 1	9 7·94	...	131 18 9
Marble Bar	480¾	192 11 2	163 10 8	160 2 1	516 3 11	21 5·68	8 5 10	68 19 4	593 9 1	24 8·25	292 0 2	12 1·77	...	301 8 11
Meekatharra	824	255 10 6	221 18 9	143 19 4	621 8 7	15 0·98	57 8 2	129 18 4	808 15 1	19 8·76	342 6 2	8 3·69	...	466 8 11
Menzies	...	...	...	...	...	...	...	...	...	...	46 0 0	...	46 0 0	...
Mt. Egerton	242	59 0 0	52 9 2	59 14 3	171 3 5	14 1·75	10 11 7	56 2 8	237 17 8	19 7·92	127 1 0	10 6·00	...	110 16 8
Mt. Ida	629½	100 14 2	205 13 7	81 15 6	388 3 3	12 3·98	19 0 0	41 8 0	448 11 3	14 3·00	320 16 3	10 2·30	...	127 15 0
Mt. Keith	1,049¾	68 6 8	343 3 3	175 12 8	587 2 7	11 2·25	107 13 10	163 9 4	858 5 9	16 4·10	553 5 9	10 6·50	...	305 0 0
Mt. Sir Samuel	166	28 0 0	60 3 1	28 0 2	116 3 3	14 0·00	19 1 3	60 5 4	195 9 10	23 6·62	87 3 0	10 6·00	...	108 6 10
Mulline	549	24 11 7	196 16 8	90 2 10	311 11 1	11 4·17	52 9 11	65 5 10	429 6 10	15 7·68	246 19 10	8 11·95	...	132 7 0
Mulwarrie	154½	27 0 0	45 3 6	71 14 0	143 17 6	18 7·84	53 17 4	23 5 6	221 0 4	28 7·87	90 19 8	11 9·55	...	130 0 8
Niagara	693	129 10 0	188 18 1	172 18 4	491 6 5	14 2·13	20 15 2	82 1 10	594 3 5	17 1·75	347 5 0	10 0·25	...	246 18 5
Norseman	1,783½	228 12 7	501 12 4	323 5 2	1,053 10 1	11 9·62	82 6 10	157 15 1	1,293 12 0	14 6·07	873 4 10	9 9·50	...	420 7 2
Ora Banda	1,337½	188 6 0	266 10 6	200 11 10	655 8 4	9 9·62	96 8 6	144 10 8	896 7 6	13 4·87	438 19 4	6 6·76	...	457 8 2
Payne's Find	2,849½	195 0 0	695 5 7	478 2 5	1,368 8 0	9 7·24	160 17 10	275 19 8	1,805 5 6	12 8·04	1,497 4 7	10 6·09	...	308 0 11
Peak Hill	1,051½	250 14 3	234 0 4	232 11 10	717 6 5	13 7·70	40 11 4	81 11 9	839 9 6	15 11·59	521 2 3	9 10·92	...	318 7 3
Pinjin	...	...	...	...	...	...	...	...	...	...	2 10 0	...	2 10 0	...
Quinn's	...	...	...	1 14 5	1 14 5	...	...	0 7 8	2 2 1	...	...	...	...	2 2 1
20-Mile Sandy	...	38 0 0	70 0 0	Cr. 61 9 8	46 10 4	...	...	1 17 0	48 7 4	...	...	...	...	48 7 4
Siberia	543¼	56 0 0	173 10 0	141 19 0	371 9 0	13 8·08	82 4 8	37 17 8	491 11 4	18 1·15	231 2 6	8 6·09	...	260 8 10
Tuckabianna	...	...	...	10 2 9	10 2 9	...	...	6 4 0	16 6 9	...	20 0 0	...	4 13 3	...
Tuckanarra...	...	...	...	...	...	...	...	...	...	...	19 1 11	...	19 1 11	...
Warriedar	541½	50 0 0	132 18 3	105 10 2	288 8 5	10 7·82	2 5 0	44 13 10	335 7 3	12 4·63	253 15 6	9 4·46	...	81 11 9
Wiluna	177½	2 15 0	25 4 0	12 15 0	40 14 0	4 7·10	5 18 0	17 18 6	64 10 6	7 3·36	85 14 0	9 8·01	21 3 6	...
Yarri	441	55 0 0	105 19 7	120 16 7	281 16 2	12 9·36	184 7 10	64 4 11	530 8 11	24 0·67	301 4 1	13 7·92	...	229 4 10
Yerilla	...	...	...	4 8 7	4 8 7	...	38 19 6	...	43 8 1	...	...	...	...	43 8 1
Youanme	457½	31 0 0	137 11 4	63 13 5	232 4 9	10 1·82	23 9 7	80 2 9	335 17 1	14 8·18	209 16 3	9 2·06	...	126 0 10
Coolgardie Sales	...	...	...	18 13 11	18 13 11	...	...	...	18 13 11	...	2 19 1	...	...	15 14 0
Cue Sales	...	...	...	212 4 0	212 4 0	...	...	...	212 4 0	...	212 4 0	...	...	...
Darlot Sales	...	...	...	13 9 10	13 9 10	...	...	...	13 9 10	...	13 9 10	...	...	...
Marble Bar Sales	...	...	...	4 9 0	4 9 0	...	...	...	4 9 0	...	4 9 0	...	...	...
Meekatharra Sales	...	...	...	107 13 6	107 13 6	...	...	...	107 13 6	...	107 13 6	...	...	...
Mt. Keith Sales	...	...	...	6 13 6	6 13 6	...	...	...	6 13 6	...	6 13 6	...	...	...
Peak Hill Sales	...	...	...	7 8 6	7 8 6	...	...	...	7 8 6	...	7 8 6	...	...	...
Tuckabianna Sales	...	...	...	7 6 11	7 6 11	...	...	...	7 6 11	...	7 6 11	...	...	...
	29,250	3,359 4 9	6,712 17 7	6,311 12 6	16,383 14 10	11 2·52	1,960 13 7	3,204 4 5	21,548 12 10	14 8·92	13,463 11 5	9 2·54	105 2 11	8,190 4 4
Wiluna Lode	11,040¾	191 18 4	1,260 12 6	564 7 1	2,016 17 11	3 7·82	558 7 10	760 7 8	3,335 13 5	6 0·50	2,995 0 0	5 5·08	...	340 13 5
Coolgardie Ore Dressing ...	365¾	15 0 0	196 4 2	139 19 2	351 3 4	19 2·42	13 15 8	0 12 6	365 11 6	19 11·88	212 6 0	11 7·29	...	153 5 6
TIN PLANTS.														
Greenbushes—														
Bunbury End	1,157	150 8 8	50 12 6	125 3 0	326 4 2	5 7·65	57 17 1	36 17 10	420 19 1	7 3·31	226 8 2	3 10·95	...	194 10 11
Salt Water Gully	47	143 3 2	8 18 0	25 12 1	177 13 3	75 7·20	4 6 8	3 19 9	185 19 8	79 1·68	11 18 0	5 0·76	...	174 1 8
	41,860½	3,859 14 11	8,229 4 9	7,166 13 10	19,255 13 6	9 2·44	2,595 0 10	4,006 2 2	25,856 16 6	12 4·32	16,909 3 7	8 0·98	105 2 11	9,052 15 10

Schedule 9.

Statement of Receipts and Expenditure for Year ending 31st December, 1919.

TAILING, SLIME, AND RESIDUE.

Plant.	Tonnage.	Management.	Wages.	Assays.	Stores.	Total Working Expenditure.	Cost per ton.	Repairs and Renewals.	Sundries.	Gross Expenditure.	Cost per ton.	Receipts.	Per ton.	Profit.	Loss.
		£ 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 ...	1,022	77 15 5	157 14 1	27 17 5	234 9 2	497 16 1	9 8·89	22 9 4	97 15 5	618 0 10	12 1·12	551 15 5	10 9·55	...	66 5 5
Black Range ...	640	60 0 0	71 3 4	21 6 3	104 2 4	256 11 11	8 0·21	1 16 0	65 4 7	323 12 6	10 1·34	314 4 6	9 9·81	...	9 8 0
Boogardie	4,200	140 0 0	572 4 6	54 3 8	523 3 1	1,289 11 3	6 1·68	0 11 3	302 8 2	1,592 10 8	7 6·98	2,056 1 10	9 9·48	463 11 2	...
Coolgardie	2,016	59 0 0	237 12 1	51 3 2	222 17 7	570 12 10	5 7·93	5 17 11	262 5 9	838 16 6	8 3·85	886 11 0	8 9·52	47 14 6	...
Laverton	1,200	41 10 0	151 13 4	40 6 6	150 7 7	383 17 5	6 4·76	33 19 10	112 13 3	530 10 6	8 10·10	596 17 8	9 11·37	66 7 2	...
Leonora	...	...	...	...	0 17 5	0 17 5	...	...	8 10 0	9 7 5	...	...	...	...	9 7 5
Meekatharra... ...	660	45 0 0	107 17 6	4 7 10	81 19 10	239 5 2	7 3·00	...	52 10 8	291 15 10	8 10·10	302 14 3	9 2·06	10 18 5	...
Mt. Keith	1,140	70 0 0	135 15 6	26 19 2	132 15 4	365 10 0	6 4·94	37 18 11	104 14 6	508 3 5	8 10·96	378 2 7	6 7·59	...	130 0 10
Mt. Sir Samuel ...	102	60 0 0	25 9 9	15 0 10	38 8 10	138 19 5	26 3·21	66 1 8	5 8 3	205 9 4	40 3·43	53 17 6	10 6·74	...	151 11 10
Mulline	...	...	...	...	...	...	...	...	4 4 9	4 4 9	...	27 16 0	...	23 11 3	...
Mulwarrie	...	...	...	...	...	...	...	...	0 17 6	0 17 6	...	27 16 0	...	26 18 6	...
Niagara	720	30 0 0	109 18 0	19 6 5	80 6 8	239 11 1	6 7·84	...	51 7 1	290 18 2	8 0·96	330 6 0	9 2·08	39 7 10	...
Norseman	850	36 18 5	135 13 0	16 2 9	172 2 1	360 16 3	8 5·85	0 7 0	70 1 8	431 4 11	10 1·75	399 5 7	9 4·72	...	31 19 4
Ora Banda	1,120	66 14 0	181 15 0	11 13 9	173 17 6	434 0 3	7 9·00	41 5 0	86 18 2	562 3 5	10 0·45	478 1 8	8 6·43	...	84 1 9
Payne's Find ...	1,254	105 0 0	143 12 8	35 1 0	250 0 3	533 13 11	8 6·14	5 0 0	116 0 11	654 14 10	10 5·30	486 6 9	7 9·07	...	168 8 1
20-Mile Sandy ...	...	...	...	...	...	...	...	...	10 5 6	10 5 6	...	...	...	...	10 5 6
Yarri	630	25 0 0	87 15 0	14 18 2	76 19 0	204 12 2	6 5·92	39 5 9	59 1 10	302 19 9	9 7·41	323 7 7	10 3·19	20 7 10	...
Youanme	210	15 0 0	18 10 0	14 5 8	17 13 10	65 9 6	6 2·82	4 13 3	10 19 0	81 1 9	7 8·66	134 16 5	12 10·08	53 14 8	...
[redacted]	15,764	831 17 10	2,136 13 9	352 12 7	2,255 0 6	5,576 4 8	7 0·88	259 5 11	1,421 7 0	7,256 17 7	9 2·47	7,348 0 9	9 3·86	752 11 4	661 8 2
Wiluna Slimes ...	12,780	135 4 4	205 6 8	2,071 12 5	1,965 10 6	4,377 13 11	6 10·20	621 4 5	810 0 2	5,808 18 6	9 1·08	4,720 0 0	7 4·63	...	1,088 18 6
RESIDUES.															
Greenbushes—															
Salt Water Gully ...	200	13 5 9	34 19 6	...	17 16 8	66 1 11	6 7·29	4 10 11	2 10 0	73 2 10	7 3·76	94 0 7	9 4·82	20 17 9	...
	28,744	980 7 11	2,376 19 11	2,424 5 0	4,238 7 8	10,020 0 6	6 11·65	885 1 3	2,233 17 2	13,138 18 11	9 1·70	12,162 1 4	8 5·54	773 9 1	1,750 6 8

Schedule 10.

STATE BATTERIES.

Balance Sheet.

	£ s. d.	£ s. d.		£ s. d.	£ s. d.
To Capital Expenditure:			By Batteries, Cyanide, and Slimes Plants ..	378,213 12 7	
From General Loan Fund	286,232 10 11		Less Depreciation	295,152 13 3	
From Consolidated Revenue	91,981 1 8				83,060 19 4
		378,213 12 7	By Stores		15,373 2 3
To Treasury		109,038 5 8	By Sundry Debtors		7,041 2 1
To Interest and Sinking Fund ..		252,529 7 10	By Profit and Loss		639,279 12 6
To Sundry Creditors		4,973 10 1			
		£744,754 16 2			£744,754 16 2

Profit and Loss Account.

	£ s. d.	£ s. d.		£ s. d.	£ s. d.
To Expenditure—			By Revenue	1,118,486 16 10	
Head Office and all Batteries ..	1,210,084 8 3		By Loss on Working carried down ..	91,597 11 5	
					1,210,084 8 3
To Loss on Working brought down ..	91,597 11 5				
To Interest at 3½ per cent. and Sinking Fund at 1¼ per cent. on Capital Expenditure	252,529 7 10				
To Depreciation	295,152 13 3				
	£639,279 12 6		By Gross Loss		£639,279 12 6

Schedule 11.

Working Profit and Loss for Year ending 31st December, 1919.

	£ s. d.	£ s. d.		£ s. d.
To Working Expenditure—			By Revenue—	
Batteries and Tin Plants	25,856 16 6		Batteries and Tin Plants	16,909 3 7
Tailing and Slime Plants	13,138 18 11		Tailing and Slime Treatment ..	12,162 1 4
			By Loss on Year's operations	9,924 10 6
	£38,995 15 5			£38,995 15 5

SCHEDULE 12.

State Battery Statistics from Inception to 31st December, 1919.

Year.	Milling.				Sand and Tailing Treatment.				Slime Treatment.				Tin Treatment.				Gross Loss. ‡
	Tons.	Expenditure per ton.	Revenue per ton.	Loss.	Tons.	Expenditure per ton.	Revenue per ton.	Profit.	Tons.	Expenditure per ton.	Revenue per ton.	Loss.	Tons.	Expenditure per ton.	Revenue per ton.	Loss.	
		s. d.	s. d.	£		s. d.	s. d.	£		s. d.	s. d.	£		s. d.	s. d.	£	£
1899 ...	18,806	...	...	2,827	...	...	...	...	...	...	...	...	...	...	...	...	2,827
1900 ...	22,675	22 10·1	17 4·5	7,611	...	...	...	...	...	...	...	...	...	...	...	...	7,611
1901 ...	26,775	18 0·0	16 6·0	1,983	9,534	16 9	...	1,337	...	...	...	...	...	...	...	...	646
1902 ...	39,516	14 8·6	14 8·2	169	9,721	22 3	...	724	...	...	...	...	1,170	12 2	...	286	†269
1903 ...	49,233	13 6·8	12 10·6	1,250	33,369	7 7	...	1,442	...	...	...	...	2,009	8 2	...	153	†2,539
1904 ...	71,616	14 4·4	12 6·5	6,423	43,251	7 10	...	1,448	...	...	...	...	2,337	8 2	...	165	5,141
1905 ...	85,018	12 4·0	12 2·5	957	54,420	7 3	9 8·5	6,689	7,028	12 1	...	410	3,697	5 8	5 0·3	324	†3,342
1906 ...	95,831	12 2·0	11 3·8	4,076	65,159	7 4	9 2·1	5,549	4,737	11 8	12 1·1	†2,254	11,428	4 2	4 3·3	†156	†2,880
1907 ...	95,280	12 6·0	11 4·8	8,724	64,514	6 8·7	9 2·8	6,474	8,220	8 7·6	13 5·5	†1,983	10,496	4 4·4	4 8·8	†191	1,688
1908 ...	95,628	12 1·9	9 3·6	13,669	62,272	6 4·7	8 11·0	8,017	5,818	12 0·9	11 8·0	120	5,573	4 5·2	3 6·3	254	7,278
1909 ...	94,218	11 1·7	9 6·6	7,568	61,032	6 5·8	8 9·7	7,096	16,848	10 0·7	9 6·7	423	5,043	4 8·2	3 7·5	267	1,965
1910 ...	89,278	11 3·3	9 6·6	7,709	43,391	6 2·9	8 6·1	4,903	28,600	8 9·1	9 11·5	†1,723	3,769	5 5·5	3 4·1	401	2,365
1911 ...	59,373	12 6·9	9 10·3	8,058	27,362	6 5·9	8 9·7	3,173	28,183	10 10·5	9 5·3	1,666	6,061	4 0·3	3 4·9	188	7,490
1912 ...	56,636	12 9·2	9 8·7	8,616	18,600	8 3·5	8 8·6	397	8,085	11 8·6	10 5·2	519	5,330	4 5·1	3 7·6	210	9,786
1913 ...	60,573	12 5·6	9 5·4	9,155	31,378*	7 5·0	9 5·2	3,160	6,089	12 4·1	9 6·1	862	8,032	5 5·1	4 1·7	513	7,711
1914 ...	56,570	12 6·8	9 2·9	9,413	38,942	6 6·5	8 2·2	3,202	6,246	10 10·2	9 0·0	578	3,340	7 10·6	4 6·6	557	7,418
1915 ...	49,595	11 10·7	9 2·6	6,642	31,887	6 9·3	8 0·6	2,041	3,454	12 6·2	9 10·1	462	1,767	8 1·2	3 11·7	364	5,415
1916	47,304	12 6·7	9 1·9	8,018	35,665	7 1·7	8 7·3	2,510	15,536	8 8·2	8 7·3	56	943	11 11·6	4 0·3	374	5,982
1917 ...	42,947	12 1·5	9 0·0	6,714	24,674	8 3·3	8 10·3	727	15,408	9 8·5	8 3·1	1,104	1,118	11 2·9	3 8·2	422	7,554
1918 ...	39,330	13 2·9	8 11·4	8,442	24,364	8 3·7	9 5·7	1,420	11,892	9 4·8	7 9·0	982	5,985	4 10·2	3 0·2	558	8,650
1919 ...	40,290¾	12 4·1	8 2·0	8,426	15,764	9 2·4	9 3·8	91	12,780	9 1·1	7 4·6	1,089	1,204	10 0·9	3 11·2	369	9,925

* Tailing Treatment commenced 1913. † Profit. ‡ Details of Ore dressing and Residue Treatment not shown, but financial result included in the figure of this column.

DIVISION IV.

ANNUAL PROGRESS REPORT

OF THE

GEOLOGICAL SURVEY

FOR THE

YEAR 1919.

TABLE OF CONTENTS.

MAP OF WESTERN AUSTRALIA, showing the Chief Localities at which useful Minerals and Artesian Wells occur, together with the Boundaries of the Goldfields and other Mining Districts.

The Hon. J. Scaddan M.L.A.
Minister for Mines.

MAP OF WESTERN AUSTRALIA.

Showing The Chief Localities at which useful Minerals & Artesian Wells occur together with The Boundaries of Goldfields & other Mining Districts.

BASED ON THE WORK OF THE GEOLOGICAL SURVEY.

A. GIBB MAITLAND,
GOVERNMENT GEOLOGIST.

1919.

Scale of English statute miles.
50 40 30 20 10 0 50 100 150 200

REFERENCE

Towns	shown thus ◉ EUCLA
Railways	
Land District Boundaries	
Land Division	
Goldfields	
Telegraph Lines & Stations	
Lighthouses	
Stock Routes	
Heights in feet	(3800)
Steamer Routes	

ARTESIAN WELLS SHOWN THUS.

ARTESIAN	★
SUB-ARTESIAN	★
IN PROGRESS	★
ABANDONED (No Water)	☆

REFERENCE TO MINERAL SIGNS.

SILVER	Ag	ALUNITE and JAROSITE	AJ
COPPER	Cu	ASBESTOS	Ab
TIN	Sn	COAL	CC
LEAD	Pb	CORUNDUM	Cn
ZINC	Zn	DIAMONDS	CD
IRON	Fe	DIATOMITE	Di
TUNGSTEN	W	GRAPHITE	CG
MOLYBDENUM	Mo	GYPSUM	Gp
CHROMIUM	Cr	MAGNESITE	Mg
ALUMINIUM	Al	MICA	M
MANGANESE	Mn	OCHRE	Oc
ANTIMONY	Sb	OPAL	Op
BISMUTH	Bi	PHOSPHATE	Ph
TANTALUM	Ta	POTTERY CAY	PC
THORIUM	Th	SALT	Na
ARSENIC	As		
GOLD (Outside Goldfields)	Au		

By Authority: ED. WM. SIMPSON, Government Printer, Perth.

Annual Progress Report of the Geological Survey for the Year 1919.

The work of the Geological Survey during the year 1919 has been carried out with a reduced field staff along the usual lines, and has been confined to districts which seemed to give promise of being of the greatest value to the community at large, rather than to the individual. The field staff, however, is not in sufficient strength to meet the most pressing demands which the increased attention now being paid to outlying districts necessitates.

THE STAFF.

The work of the Geological Survey during the year 1919 has been carried out by 12 classified officers; Mr. T. Blatchford, Assistant Geologist, who had many years experience in private practice as a mining and metallurgical engineer, was transferred to the staff of the State Mining Engineer early in the year. Mr. C. Sidney Honman resigned his position as Field Geologist on his return from active service in Europe during the month of October, in order to improve his position. The positions thus rendered vacant remain unfilled, leaving only two officers available for the regular field work of the Department. Owing to a growing demand for men possessed of geological knowledge and experience, nearly all Geological Surveys are finding some difficulty in securing and retaining adequately trained officers. It is to be hoped that it may be possible to provide more rapid promotion and higher salaries for the field geologists as well as for the other scientific employees of the Department. To do this it is not necessary to entirely compete in salary with private corporations, etc., for it is generally recognised that the emoluments, in what may be called a more or less permanent position in the public service, can never equal those offered for similar services by private business firms or corporations.

FIELD WORK.

The attached Table shows the distribution of the field work during the year and the names of the officers, together with the different districts in which they were engaged.

Table showing the Distribution of Field Work for the Year 1919.

Goldfield or Land Division.	H. W. B. Talbot.		E. de C. Clarke.		F. R. Feldtmann.	
	No. of days in the field.	Percentage of working days.	No. of days in the field.	Percentage of working days.	No. of days in the field.	Percentage of working days.
South-West Division	17	4·65	27	7·39	25	6·80
Yilgarn Goldfield	7	1·90	...	...	...	...
Coolgardie Goldfield	70	19·17	10	2·74	...	...
North-East Coolgardie Goldfield ...	58	15·89	...	...	...	...
North Coolgardie Goldfield	6	1·64	7	1·91	...	...
Mount Margaret Goldfield	75	20·54	11	3·00	...	...
Yalgoo Goldfield	...	...	121	33·15	...	...
Murchison Goldfield	...	...	10	2·74	17	4·65
East Murchison Goldfield	...	...	7	1·91	...	...
	233	63·79	193	52·84	42	11·45

The new gold find near Wallangie, on the Kurrawang Woodline, in the Coolgardie Goldfield, was examined early in the year. The discoveries were made within an area which had never yet been examined by any member of the Geological Staff, lying, as it did, within a portion of the Coolgardie Goldfield which had not been surveyed geologically. In view of the efforts which were made by private enterprise towards the development of the mineral resources of this portion of the Coolgardie Goldfield, circumstances warranted such assistance and guidance as could be afforded by a reasonably accurate delineation of those broader geological features which had any bearing upon economic questions, and an endeavour was made to link up the auriferous belts with such of those as had been surveyed in the surrounding districts. The gold finds occurred in and along shear zones in the greenstone country, which is about six miles wide and 12 miles long, and is bounded on both sides by granitic rocks. These shear zones trend generally north-north-west and dip at high angles to the west. The gold was met with in a series of small and more or less parallel deposits which extend over an area having a length of from four to five miles and a width of a little over a mile. Not enough work was done at the time the area was examined upon the deposits to enable any very definite opinion to be expressed as to the future of the Wallangie area as a mining centre, for prospecting had hardly passed its initial stages. The geological structure of the area,

however, conforms to that which governs the occurrence of gold in the other fields in the State. The geological extent of the Wallangie zone is about 62 miles, and is made up of epidiorites, hornblendites, and jaspers, intersected by pegmatite dykes.

An occurrence of "seepage oil" on Location 2799 having been brought to the notice of the Department in the month of January, a visit was paid by Mr. E. de C. Clarke to the locality for the purpose of obtaining unsophisticated samples of the oil for examination in the laboratory. Some time was spent by Mr. Clarke at the site of the well in which the oil was stated to have occurred. Steps were taken to bale out the well, which is about 20 feet deep, the first 15 feet being in wash resting on decomposed granite, which forms the country rock of the neighbourhood. A sample of the water from the well was carefully taken. It was ultimately decided to completely bale out the well, remove the accumulation of foul-smelling sludge, and allow it to refill—an operation which took 36 hours to accomplish—when an unsophisticated sample of the water was collected. The samples thus taken were carefully examined and tested in the Geological Survey Laboratory, and it was found that the first sample contained a *medium sized drop* of a heavy oil, resembling a mineral or a resin oil, whilst the second had much decaying vegetable matter, together with several small insects and crustaceans, a small quantity of fat of animal origin, and a *little drop of oil,* which may be a resin oil or a heavy mineral oil. In connection with the reputed occurrence of petroleum on Avon Location 2799, it may be noted that a sealed bottle of water was handed to the Department in July, 1917, to be tested for mineral oil. The results of the Laboratory tests showed the occurrence of an odour of kerosene due to contamination of the bottle. In September of the same year a second bottle of water from the same locality was handed in, which, on investigation in the Laboratory, was found to contain distinct traces of petrol; this was, in all probability, due to contamination also. In August, 1918, a rock specimen from Pingelly was submitted by the Department of Industries for examination in connection with its possible bearing on the occurrence of oil in the locality. The specimen proved to be much too decomposed to enable the original rock to be identified, though it appears to have been a dolerite of the type which is so common in the areas of the State occupied by the granitic and allied rocks. It is possible that the small drops of oil found in the samples collected on Avon Location 2799 owe their origin to the decomposition and distillation of the disseminated organic and fatty matter in the 15 feet of wash, etc., lying on the granite, which was originally deposited by the usual processes of sedimentation in the shallow depression on the surface of the ancient complex of crystalline rocks which everywhere form the foundation upon which these modern accumulations rest in this portion of the State. As the geologist has to deal primarily with the stratigraphical location of oil, it may be pointed out that the geological constitution of the neighbourhood is not of such a nature as would lend encouragement to the belief that crude petroleum is likely to be found therein, as the requisite and qualifying conditions do not prevail in the locality from which the samples collected by Mr. Clarke came.

Administrative, routine, and other duties have, as has been the case in the past, left me with little time for systematic work in the field; nevertheless it was possible to pay a brief visit to Collie, to Hampton Plains, and to the Yalgoo Field.

The time of the resident scientific officers has been as usual devoted to work arising out of the field investigations and assisting in meeting the multifarious requirements of the public visiting the office in search of information and advice.

Laboratory researches were made during the year regarding Potash Supplies, Ochres, Glass Sands, Salt, Gypsum, and Iron Ores.

Of the petrological investigations which have been carried on, special mention may be made of the rocks of the Kimberley Goldfield, the Ashburton Drainage Area, and the Yalgoo Goldfield.

H. W. B. Talbot, Field Geologist.

From the beginning of the year until the 13th of February, Mr. Talbot was engaged in writing a report on part of the Ashburton Drainage Basin and the country southwards to Meekatharra. Fifteen days at the end of February and the beginning of March were spent in the Darling Range mapping the laterites. The time between the 7th of March and the 8th of April was spent at headquarters writing and revising reports and preparing various plans. A geological reconnaissance of the country north of the railway line, between Yalladine and Coolgardie, occupied him from the 8th of April to the 26th of June. Having completed the necessary maps and reports at headquarters, Mr. Talbot left Perth on the 14th of July, and the time between that date and the 12th of August he spent in an examination of the country to the north and south of the Trans-continental Railway, between the 51 and 175 mile posts. On the 16th of August he left Zanthus, on the Trans-Continental Railway, and travelled overland to Laverton, where he arrived on the 17th of September, and after getting supplies there commenced a reconnaissance survey of the country to the north-east with the object of delimiting the boundaries of the mineral-bearing country. On the completion of that work, he returned to Perth on the 3rd of December. Mr. Talbot was absent on leave from the 8th of December until the end of the year. The total number of days spent in the field by Mr. Talbot was 233.

E. de C. Clarke, Field Geologist.

Mr. Clarke devoted a portion of January to field investigations relating to a reported oil occurrence near Pingelly, on the Perth-Albany railway line. In March reports were made, after investigations in the field, on the new gold find at Wallangie, on the Kurrawang Wood Line, in the Coolgardie Goldfield; on the ore body at the Emu lease, near Menzies, in the North Coolgardie Goldfield; and on the new developments at the Commodore Gold Mine at Meekatharra, in the Murchison Goldfield. The remainder, with the exception of the time spent on annual leave of the first half of the year 1919—in all about two months—was occupied in the completion of the maps and reports on the previous season's field work in the Leonora-Duketon area. Mr. Clarke left Leonora early in July for Payne's Find (Goodingnow), in the south-east corner of the Yalgoo Goldfield, travelling by road, *via* Lawlers and Youanme. The geological survey of Payne's Find occupied about a month, after which three weeks were spent at the mining centre of Rothesay. On the completion of the survey of Rothe-

say, a visit to Melville (Noongal), about 11 miles north of the town of Yalgoo, was made, where about five weeks were spent in geological and mining investigations. A week in November was spent on the Irwin River dealing with proposals regarding State boring on the coalfield, and thereafter at Eradu in connection with the site of a proposed reservoir required to supply Geraldton with water. The first twenty days of December were spent with me in inspection work in the south-west portion of the Yalgoo Goldfield. In all, Mr. Clarke spent 193 days in the field, which were distributed throughout the districts, etc., set out in the table.

F. R. Feldtmann, Field Geologist.

After the return of Mr. Feldtmann from annual leave, on the 11th of January, the remainder of the month was spent in (a) the preparation of the account of his work for 1918; (b) drafting work in connection with the report on the Kokeby Clay Deposits, and in the preparation of the illustrative matter for publication with Bulletin No. 82, dealing with the Magnesite Deposits of Bulong. The period between the 4th and the 13th of February was spent in examining the Clackline and Baker's Hill Clay Deposits, whilst that between the 13th and the 28th was spent in the Bolgart district, including the clay deposits in the locality. In consequence of a partial reorganisation resulting from the reduction in the personnel of the staff, to which effect was given in 1917, the greater part of the year was spent by Mr. Feldtmann in miscellaneous drafting work and general supervision over the drafting room. On the 1st December Mr. Feldtmann left for Boogardie, on the Murchison Field, for the purpose of examining the Mt. Zion G.M.L. 1183M, which occupied his time until the 17th of the month, when he returned to headquarters. In all Mr. Feldtmann spent 42 days in the field.

PRINCIPAL RESULTS OF THE YEAR'S FIELD OPERATIONS.

1.—NOTE ON SOME AURIFEROUS LOCALITIES ON THE EAST COOLGARDIE GOLDFIELD TO THE SOUTH OF KALGOORLIE.

(A. Gibb Maitland.)

In view of the reported gold discoveries within the limits of the land held by the Hampton Plains Estate (Blocks 50 and 48), and it having been reported that the deposits "are on what may be termed an extension of the Boulder, Horseshoe, and Ivanhoe ore channel to the south," it was decided that an examination of the area should be made.

The chief topographical and geological features have been described in 1916, based upon field work carried out during the years 1913-1914, the results of which have already been published *in extenso* in Bulletin 66 (The Geology of the Country to the South of Kalgoorlie), where most of the rocks found have been included in the Pre-Cambrian System.

As a result of the investigations it appears that in its main tectonic features the country is made up of greenstones and their derivatives associated with a series of metamorphosed sedimentary rocks which are disposed in four more or less parallel belts, the general trend of which is north-west and south-east (*vide* Plate I., Bulletin 66).

The four belts have been, in order to facilitate description, designated:

(a) The Golden Ridge.
(b) The Feysville.
(c) The Somerville-Woolabar Belt, and
(d) The Mount Marion-Yilmia Trig. Belt.

These belts contain gold-bearing deposits of diverse types.

The recent gold finds are situated on Blocks 50 and 48 of the Hampton Plains Estate, and lie within the limits of what has already been described as the Somerville-Woolabar Belt, which there seem sound geological reasons for believing extends very much further to the north-westward of Binduli and Somerville, as far as Ora Banda.

The rocks of which the relatively small area covered by Locations 48 and 50 is made up consist almost entirely of greenstones and their metamorphic derivatives intersected by dykes and masses of acidic rocks—porphyries—some of which have been so crushed as to be virtually acidic schists. Some of these porphyries which contain seams of quartz and ironstone have been worked for their gold contents, as at Speakman's Boulder (formerly the Hampton Boulder Lease 15), where, however, it appears that the recoverable gold contents proved to be of too low a grade. Other deposits have been opened up and worked, and, having been fully described in Bulletin 66 by Mr. C. S. Honman, no further reference need be made thereto.

The situation of the find, now known as the Celebration Lode, made in June last by Messrs. Ireland and Hansen, is indicated with as close an approximation to accuracy as the relatively small scale of the attached * geological map will admit, together with its geological situation with regard to the ore-bearing porphyry of Speakman's (Hampton Boulder) to the south, and the other related rocks.

A vertical shaft has been sunk to a depth of 100 feet from the surface at a point about 8 chains from the northern boundary of the lease—No. 6—and cross-cuts, 11 and 13 feet respectively, put in east and west at the 50ft. level, through decomposed schistose material of uncertain origin. There being as yet no sketch plan of the workings, adequate description is somewhat difficult. There is a vein of quartz about 8 inches in thickness showing near the face of the western cross-cut which may possibly represent one of those veins showing on the surface near the shaft, or at any rate one parallel thereto. At the foot of the vertical shaft schistose material carrying ironstone veins is exposed. A grab sample from the dump of the decomposed oxidised rock, containing thin ironstone veins, was found to be highly auriferous, pointing to a close connection between these veins and the occurrence of gold. Cross-cuts have been put in east and west from the foot of the shaft, and some driving north and south along the lode has been carried out, from which the owners have, in the press reports, recorded good values. The southern drive showed at one spot a schistose formation carrying kernels and veins of quartz. Near the western face of the western cross-cut a solid vein of white quartz about 12 inches in thickness was encountered, which may possibly represent that exposed in the western cross-cut at the 50ft. level above. The oxidised clayey rock exposed in the shaft and

* Not reproduced.

underground workings proved to be too decomposed to enable its real nature to be made out, but from what could be seen it appeared to be along a crush zone carrying quartz and ironstone veins over a considerable width.

The nature of this is, however, to be found in the costean just to the south of the shaft, where a thin belt of altered micacised quartz-porphyry reaches the surface and seems to merge gradually into the decomposed schistose material on either side. There are several parallel costeans to the south of the shaft in which the formation is exposed over a distance of about 500 feet, and which it is stated is payable. A parallel lode is exposed in a costean in the east, and it is, I understand, endeavouring to intersect this from the bottom of the main shaft. Arrangements were being made to sink another shaft on the lode about 260 feet from the present main shaft. The country rock in the east is a fine-grained epidiorite of the Mount Hunt (Robinson) type.

The adjoining lease on the south (No. 12) is being exploited by a shallow shaft sunk with the object of picking up the extension of the main Celebration lode, and values have been reported to have been obtained in the workings.

The adjoining lease on the north of the Celebration (No. 11) has as yet had no work done upon it; owing, however, to the absence of outcrops and the cover of superficial deposits a judicious system of costeaning at right angles to the general strike will be necessary to enable anything to be located.

The formation in the Celebration lease, when view broadly, may, apart from the east and west quartz veins, be regarded as something in the nature of bedded veins, *i.e.*, having been formed by the deposition of quartz and other minerals from solution along lines of weakness, which, in general, coincide with the main structural features of the district, viz., N.N.W. and S.S.E., and as such they will probably be found to have the lenticular habit of such deposits.

Some miles to the south of the Celebration and on Location 48 is what is known as Slavin's, where some prospecting work has been done along a more or less vertical crush zone trending generally N. 20° W. in epidiorite. The zone itself is more or less platy and carries pyrites, and has a length of over 10 chains. A prospecting shaft 16 feet in depth has been put down on the deposit, which, it is stated, has yielded 25 dwts. of gold over a width of 4 feet. In the absence of a survey the precise situation of the occurrence cannot be shown on the plan attached.* The rocks in this portion of the area have been very little affected by secular decay, and are, in contradistinction to those to the north, practically fresh. Good colours of gold were washed from the soft debris which was found to contain a considerable quantity of iron ore.

Some distance south of this a small vein of quartz, containing in places considerable quantities of gold, was being actively worked by Messrs. Welfare and Westhead. The vein occurred in the granite which covers a small area in the southern portion of Location 48, and some of the gold from it was at the time of my visit being exhibited in Kalgoorlie. The site of the find is an old alluvial patch, upon which a large amount of work had been done in previous years, and from which there is some reason to believe considerable quantity of gold had been obtained.

* Not reproduced.

A brief visit was paid to Red Hill, on Lake Lefroy, to the south of Location 48. The neighbourhood of Red Hill, which has been the scene of mining and prospecting operations, the situation of which lies on the western shores of Lake Lefroy, has had its principal mining operations carried on in an acidic dyke which contains considerable quantities of very coarse iron pyrites. The larger portion of the area is made up of hills of greenstone, which, not having suffered very much secular decay, stand out in bold relief. These are intersected by dykes of granite, aplite, and porphyry, which are in all probability connected with that granite mass in the greenstone rocks on Block 48, and genetically connected with the gold occurrences in Messrs. Welfare and Westhead's reef previously referred to. A small rock-bound leader of quartz, containing considerable quantities of gold, had been opened up by Mr. Slater, and was pointed out to me. This was in close proximity to some old shallow workings in which gold had been obtained some 12 to 15 years previously. Mr. Slater's leader was connected with an acid porphyry dyke, of which there are several in the locality, and there seem some reasons for believing the quartz veins to represent the ultra-acid portions of the porphyries.

From the above notes it appears that there is a long belt of mineral-bearing country extending north-west from Lake Lefroy through Blocks 48 and 50 of the Hampton Plains Estate, along which it is probable there are other gold deposits than those which have at present been opened up and worked.

The discoveries on Block 50 are not on the southern extension of "the Boulder, Ivanhoe, and Horseshoe ore channel," but, as may be seen by the attached geological map * upon which the situations of the former have been laid down, on one more or less parallel thereto.

In so far as geological assistance towards the exploitation of the area is concerned, it is essential that in Blocks 50 and 48 large-scale geological surveys should be made, and the lodes, reefs, structural lines, and boundaries of the different types of greenstones more or less accurately laid down. This, however, is a work of time, and can only be carried out after considerable progress has been made with the lease surveys, which afford good base lines upon which to work. Detailed geological work of this kind is being, it is understood, or is about to be, carried out by the owners of the locations for their own guidance.

In view of the attention which is being given to the prospecting of the country to the southward in the vicinity of Lake Lefroy, the necessity for a definition of possible mineral-bearing areas within this portion of the State (lying to the south of that embraced on the Geological Map—Plate I.—of Bulletin 66) has already been pointed out, and it is contemplated undertaking it at the earliest available opportunity.

2.—NOTES ON THE COUNTRY TO THE NORTH AND SOUTH OF THE TRANSCONTINENTAL RAILWAY, BETWEEN RANDALL'S AND THE 174½ MILES PEG.

(H. W. B. Talbot.)

Although there are a few things of considerable interest to be seen in certain localities in the country examined to the north and south of the Transconti-

* Not reproduced.

nental Railway, it would be difficult to find within the boundaries of the State an area more inhospitable or more monotonous from a scenic point of view, especially in such a period of drought as that which existed prior to August, 1919. Flowers are fairly abundant in a good season, and the eye finds relief in viewing a variety of colours, but in a dry season the dull green of the gums and spinifex is the only relief from the reddish yellow of the sandy soil.

There are no elevations worthy of the name of hills east of Karonie, and so level is the country that a slight swell in the ground when viewed from a distance looks like a bold mountain range.

Soil-covered flats alternate with low ridges, in which greenstone, granite, or quartz-porphyry are exposed between Randall's Siding (51-mile) and the 72-mile Post on the Transcontinental Railway.

Outcrops of granite are seen at intervals between the 72-mile post and the 106-mile post, but along the railway line beyond the 106-mile no rock outcrops except cement are seen as far as the 174½-mile post, which was the farthest point reached by me. From the sandy character of the soil and the type of vegetation that it supports there is little doubt that granite is the underlying rock to within a mile of Kitchener Siding (167-mile). Here there is a change from the reddish-yellow sandy soil to a brownish loam; and the gums, mallee, and spinifex give place to oaks, bluebush, and saltbush. The change in soil and vegetation marks approximately the boundary between the granite area to the west and the Eucla Limestone Plateau, which extends eastwards beyond the South Australian Border and southwards to the sea coast. Portion of this limestone plateau between the railway and Goddard Creek was examined, but no limestone was seen *in situ*, although a few slabs were passed at wide intervals.

That portion of the country north of the railway line that was examined is as a rule covered by reddish or yellowish sand, and one can travel for days without seeing a rock outcrop of any kind. In most places the sandy country is undulating, but to the north, east, and south of Queen Victoria Spring there is a mass of high, jumbled sand hills. One of these, called Streich Mound, is the highest sand hill that I have seen in the State. It rises to a height of about 150 feet above the surrounding sand hills, and is, by aneroid, 330 feet above a depression 60 chains to the west. It is visible for a distance of 20 miles from any rise to the east or south-east and forms a good land mark by which Queen Victoria Spring may be picked up. The "spring" lies west-north-west of the mound, and is distant 7½ miles. It is situated in a small, grassy depression surrounded by pines and a few gum trees at the western end of some high sand ridges. The term spring is misleading as it is nothing more than a soak, and more than once visitors have found it dry.

I have little doubt that granite underlies this sandy country. Granite is seen to the north of the Ponton, and Gibson noted an outcrop of that rock about 20 miles east-north-east of Streich Mound.* Here and there fragments of angular glassy quartz are seen, and on some of the rises some detrital siliceous laterite, which in many localities forms a capping on granite.

On the north side of the Ponton, and from two to eight miles from it, about 30 miles above where the railway crosses the creek, there is a ridge of rocky granite hills which runs west-north-west for about 14 miles, and between the Ponton and the railway small outcrops and large bare masses of granite are occasionally seen.

On the right bank of the Ponton, opposite the granite ridge referred to above, there are low hills and lines of cliffs formed of horizontally bedded sedimentary rocks, principally sandstones and claystones; and to the south-west similar hills are seen at intervals to a point about nine miles north of the 95-mile post on the railway. Associated with these beds are rounded and polished quartz pebbles and boulders, from the size of a turkey's egg downwards. In this locality the boulders are strewn about the surface, or are embedded in the siliceous laterite which caps the granite and the sedimentary strata. They are also occasionally seen on some of the sandy rises between the Ponton and the railway line.

Only in one place was there any variety in the character of the rock forming the boulders or in their average size. This was at a granite rock 21 miles north of the 98-mile post on the railway. Here, although about 99 per cent. of the boulders were quartz, there were some of quartzite, a few pieces of partly rounded jasper, and a large rounded boulder of bluish porphyry. The boulders in this locality varied in size from lumps weighing 20lbs. downwards.

These horizontally bedded sedimentary rocks, with their associated rounded boulders and pebbles, have a marked resemblance to the Wilkinson Range Beds described in G.S.W.A. Bulletin No. 75, and in all probability they are outliers of that series. In that bulletin it was shown that the boulders were of glacial origin, and the opinion was expressed that they were dropped from icebergs in a shallow sea. No ice-scratched boulders were found in the area under discussion, but the irregular distribution of the boulders and pebbles seems to indicate that they were deposited in the same way as those farther to the north-east.

In the whole of the area examined there is only one defined water channel of any length. This is the Ponton or Goddard Creek. When followed from its outlet upwards it changes gradually in character from a stream with a deep channel between well-defined banks to a narrow salt lake, with small salt lakes and salt pans on both sides. These small lakes are connected with the main channel by short narrow openings.

A few days after a rainfall of about two and a half inches we travelled up the upper portion of the Ponton, which was then running strongly with salt water.

About 40 miles below where it is crossed by the railway the creek empties into a large claypan, and from this claypan a broad ill-defined channel runs southwards for about two miles when it opens out into a large saltbush flat broken by low banks of kopai. This flat extends away to the south as far as the eye can see, and there is little doubt that it represents the uplifted estuary into which Goddard Creek flowed. Viewed from rising ground its estuarine appearance is most striking. On the edges of the flat and the channel connecting it with the claypan and also along the creek banks near its end fragments of shells, mostly oysters, are scattered about.

* G.S.W.A. Bulletin No. 37. Perth: by Authority, 1909.

3.—NOTES ON A TRAVERSE FROM ZANTHUS, ON THE TRANSCONTINENTAL RAILWAY, TO LAVERTON.

(H. W. B. Talbot.)

As the journey from Zanthus to Laverton was made only with the object of undertaking the examination of an area to the north-east of Laverton, no stoppages or detours, except near Mt. Dennis, were made to investigate the country on either side of the route followed, but information was gained which will add to our knowledge of the geology of the country traversed.

No rock outcrops were seen between Zanthus and the Ponton. Along the creek there were occasional small outcrops of granite in the form of low breakaway cliffs, in most places capped with siliceous laterite or thin beds of horizontal sediments. Wherever these sedimentary rocks or laterite were seen there were rounded boulders and pebbles of quartz scattered about on the surface of the ground. The sedimentary beds became thicker away from the creek, and at a point about five miles north of where An 13 is shown on the map (Lands Dept. Litho. 26/300) there were two terraces which, by aneroid, had a total thickness of 50 feet.

After leaving this locality only very small patches of these sedimentary beds were seen until we reached some granite breakaways 10 miles north-east of Mt. Dennis. Here six feet of conglomerates, thickly studded with quartz boulders and pebbles rested upon an uneven granite surface. Above the conglomerate were beds of grit and sandstone similar to the Wilkinson Range Beds. In the thickest place seen the sedimentary beds had a thickness of about 20 feet. No sedimentary beds are seen on Mt. Dennis or any other breakaways to the south.

Sand and spinifex, with widely separated small outcrops of granite, occupied the country traversed from the cliffs five miles north of An 13 until we reached a point five miles east of the south-eastern corner of Gilgarna State Forest Reserve (Sheet 26/300). From there to Gilgarna Rock (Sheet 25/300), a distance of 27 miles, we travelled at right angles across the southern extension of portion of the belt of country mapped by Mr. C. S. Honman on Sheet 34/300. We crossed belts of greenstone, granite, vesicular rhyolite, porphyries, and porphyrites. The greenstone belts, where crossed, did not look promising from a mineral point of view, and were practically devoid of quartz reefs.

After we left Pinjin and got away from the greenstone belt at that centre sandy spinifex country, with occasional granite outcrops, was crossed until we got to some breakaways to the south of Mt. Dennis. From here some hills that looked like greenstone were seen to the east, and a traverse was made to them. These hills are composed of coarse greenstone, and about two miles to the east there is another line of elevated country of finer-grained greenstone. Between the two belts of hilly country there is a flat on which occasional vertical outcrops of weathered schist strike north-north-west. There are many quartz reefs and a few narrow bands of jasper which conform to the strike of the schists. There is a considerable amount of detrital quartz, some of which is of a "kindly" character. The belt appears to have been knapped over by prospectors, but no systematic work has been done. This country appears to be worth more attention than it has received.

On the east side of the fine-grained greenstone hills there is a ridge composed of what appears to be a sheared conglomerate. The band is about 300 feet wide, strikes north-north-west, and dips to the east at an angle of 60 degrees. Some of the larger blocks look more like conglomerate than the specimen [**1/2575**] I collected, and contained what appeared to be drawn out boulders over a foot long. About 30 feet from the east side of the conglomerate there is a band a few feet wide that is probably a sandstone [**1/1576**], which in places has become almost a jasper.

To the east of the conglomerate a red soil wandery flat extends for about three miles to a pointed jasper hill. This jasper marks the eastern limits of the greenstone belt, as sandy spinifex country, with numerous granite breakaways, occupies the country to the east as far as the eye can see. Where crossed the greenstone belt is about six miles wide. It runs out to a point about nine miles to the north. Its southern extension was not traced, but granite breakaways were seen extending across its course about eight miles to the south of where we crossed the belt.

The end of another greenstone belt was picked up about three miles north-east of Mt. Dennis. At first it was thought to be a small isolated belt, but as it was followed northwards the belt got wider, and at a point about eight miles north of Mt. Dennis the western boundary turned away to the westwards. We followed the eastern boundary northwards until we were east of Burtville. From a rise there it could be seen that the greenstone continued and joined the point which Mr. Clarke and I mapped as the eastern boundary of the Laverton Belt on our trip to the South Australian border in the year 1916.

It is only in the narrow part of the belt that any outcrops other than laterite and occasional small quartz reefs were seen. Where it is narrow there are schistose greenstones, striking N. 10° W. with bands of massive greenstone, which appear to be intrusive into the schistose rocks; and there are many low hills of weathered greenstone capped with laterite. Where the belt widens out it consists of parallel lines of hilly and level country. The level country consists of red soil wandery flats strewn with ironstone debris. The hilly country is very broken and consists of low laterite-capped hills and ridges with gullies and flats thickly strewn with debris from the higher ground. It is exceedingly difficult ground to traverse. The scrub is dense, and the stony ground is very hard on camels' feet.

From a point on the eastern boundary of the greenstone belt, 13 miles east from Burtville, a traverse was made to that centre. The country passed over was similar to that just described until we got to the mine workings near the township. Granite breakaways can be seen to the south of Burtville, so it appears that the greenstone just described is a portion of the Burtville-Laverton Belt, and that it runs out to a point two miles north-east from Mt. Dennis.

4.—THE COUNTRY TO THE NORTH-EAST OF LAVERTON.

(H. W. B. Talbot.)

It has been known for some time that several greenstone belts existed in various parts of the country to the north-east of Laverton, and as their boundaries had not been mapped it was considered advisable that the work should be undertaken.

Four of these belts, Cosmo Newbery, Mt. Shenton, Mt. Cumming, and Ulrich Range, were visited by Mr. C. G. Gibson in 1905, and his report on them is contained in G.S.W.A. Bulletin No. 24; but owing to the hurried nature of his visit and the shortage of water owing to severe drought, the boundaries of the belts were not defined. Few of the waters will last more than a few months after rain and none of them can be regarded as permanent, so unless the season is a good one the traveller in this country fares badly for water, and much time is wasted in digging out soaks which yield little or no water. Fortunately at the time of my visit there was an exceptionally good season and good rains fell at least once a month; consequently there was an abundance of water everywhere, except on the sandy country, and we were able to travel where we wished.

For about 100 miles to the east and north-east of the greenstone belt that runs northwards from Burtville past Laverton to Duketon the bulk of the country is occupied by granite on which are several relatively small belts of greenstone. To the east the granite disappears beneath the Wilkinson Range Beds, and to the north-east it is covered by the Nullagine Formation. As it is proposed to write a full description of the country to be published in Bulletin form, Mr. Gibson's description of the portion visited by him will serve. Of the greenstone belts there remain only the Mt. Gill Belt and the Point Salvation Belt which he did not visit.

The Mt. Gill belt is about 10 miles long from north to south and it has a maximum width of three miles. On it are many low hills and ridges, and one conspicuous table-topped hill which is visible for many miles from west round to south. This table-topped hill is called Mt. Gill. Its shape is due to a lateritic capping 30 feet in thickness, which is probably a laterised remnant of the Wilkinson Range Beds which overlies the granite breakaways to the north and east. Beneath the capping are much weathered greenstone schists.

The rocks of the Mt. Gill belt consist of massive and schistose greenstones and jasper bands. The greenstone schists are nearly everywhere much weathered. but in a few places near the massive greenstone (epidiorite) they are comparatively fresh and appear to be a sheared facies of the massive variety which could be seen gradually merging into the schists. Near the central portion of the belt there are narrow bands of jasper and along the western side there is a band about five miles long which forms a line of low hills.

A considerable amount of quartz debris is scattered about the surface of this belt, but comparatively few quartz reefs are seen. There appear to be two sets of quartz reefs; one set composed of milk white "buck" quartz cuts the schists at right angles, and another of small lenticular reefs of glassy vuggy quartz which either conform to the strike of the schists or cut them obliquely. There is a marked absence of acidic dykes that are so common in the greenstone belts of this region.

The Point Salvation belt is about 10 miles long from north to south and has a maximum width of about seven and a half miles. To the east and south it disappears beneath the Wilkinson Range Beds; it is bounded by granite on the west, and runs out to a point in a sandy spinifex flat to the north.

This belt was crossed by Mr. E. de C. Clarke and myself on our journey to the South Australian border in 1916, but the extent of the belt was not then determined, and it was thought that it might be the southern extension of the Mt. Shenton Belt. The greater part of the belt is thickly strewn with quartz rubble which in some places literally forms a pavement. Except on parts of the western side where fairly fresh greenstone schists are seen all rock outcrops are extremely weathered, but it is clear that they represent massive and sheared greenstones. Occasional bands of jasper are seen and the few hills which occur on the belt all have a "back-bone" of this rock.

All the greenstone belts in this district have received more or less attention from prospectors, but the Cosmo Newbery and Ulrich Range Belts are the only ones on which any systematic work has been done, and little or no work has been done on either of these since the time of Mr. Gibson's visit. The Cosmo Newbery Belt seems to be the only one that offers any inducement for further prospecting, and even here the gold deposits are likely to be small and irregular. Unless a deposit of sufficient size and richness to justify the erection of a battery was found, nothing but very rich stone would pay owing to the distance from the nearest battery and the sandy character of the roads to be traversed.

5.—A GEOLOGICAL RECONNAISSANCE IN THE SOUTHERN PORTION OF THE YALGOO GOLDFIELD.

(H. W. B. Talbot.)

I.—Introduction.

As little or nothing was known of the geology of the southern portion of the Yalgoo Goldfield lying to the east of Lake Moore and south of Warne River, it was considered advisable to dispatch a geological survey party to examine the country and to ascertain whether any of the greenstone belts which occur farther to the north and north-west extend to the southern part of the field. The writer with two men and five camels left Burracoppin on the Eastern Railway on 7th February, 1918, and followed No. 1 Rabbit-proof Fence up to the 96-mile post where work was commenced. An area of approximately 3,700 square miles of country lying to the west of the Rabbit-proof Fence between the 96 and the 162 mile posts was examined. Owing to the exceptionally heavy summer and autumn rains water could be found wherever there was a watercourse or a rock hole, and in places the ground was boggy and time was often wasted in digging out bogged camels, or making detours to avoid soft ground.

II.—Soil and Vegetation.

In the southern part of the area examined much of the country is covered with light sandy soil which

supports a thick growth of scrub with patches of gums and pines in places. In some localities (*e.g.*, to the east of Mt. Churchman) the scrub is so dense that it is impossible to walk through it without clearing a track. Occasionally a patch of more open country with a light loamy soil is seen. On these patches there are salmon and morrel gums, and, as a rule, some salt bush. As one works north the country becomes more open and the gums and scrubs are gradually replaced by mulga and grass. The soil on the more elevated ground in the northern part of the area is a sandy loam derived from the weathering of the rocks *in situ*, but in the vicinity of salt lakes and along the Warne River there are some rich alluvial flats which in good seasons support a luxuriant growth of grass, salt bush, and herbage of various kinds. Near the 162-mile post on the Rabbit-proof Fence there is a patch of less than two square miles in area of exceptionally rich soil derived from the weathering of a small belt of epidiorite. This patch is used by the Rabbit Department as a paddock, but it is so over-run with rabbits that the natural grasses have little chance to grow.

It may not be out of place to mention that rabbits are very numerous over practically the whole of the area examined except in the thick scrubs. They are seen in large numbers around the granite rocks and in the vicinity of salt lakes. In the sandy ground along the Warne for a few miles above Cowarra Pool they are exceedingly numerous, and it is no exaggeration to say that in a walk of half a mile one can see thousands of rabbits.

III.—Topography.

The area under discussion is remarkable for its uniformly level character. There are no elevations that rise more than 200 feet above the level of the surrounding country. In the southern part the country is undulating and rock outcrops are widely separated. Wherever seen they consist of bare granite rocks or breakaways.

In the northern part there are wide mulga-clad plains from which rise breakaways, bare granite rocks, or greenstone monadnocks.

In the central portion there are two depressions occupied by salt lakes which unite and connect with Lake Moore, which occupies an extensive area in the south-western part of the country examined.

The only watercourse of any size is the Warne "River," two branches of which rise in the greenstone hills in the vicinity of Milgoo (Trig Station K65) and Mulermurra (Trig Station K68), and unite about a mile above Cowarra Pool. The Warne has a well-defined channel down as far as Margararra Pool, below which the water in times of flood spreads over broad flats which it follows to Lake Moore.

On the area examined only two elevations have been dignified by being called "mounts" on the maps of the Lands Department; these are Mt. Churchman and Mt. Kenneth. The former is a large bare granite rock which rises to a height (by aneroid) of 150 feet above its base. It is of historical interest, as Mt. Churchman was Ernest Giles' objective on his overland journey from South Australia in 1876. At that time it was one of the most easterly hills in that latitude shown on the maps of the colony, and until he reached it Giles was in practically unknown country. The Trigonometrical Survey shows that Mt. Churchman is 1,403 feet above sea level.

Mt. Kenneth is situated on high ground between the two branches of the Warne. By the Trigonometrical Survey it is made 1,600 feet above sea level, but the top is only about 150 feet above its base. It is a flat-topped hill of irregular outline formed of weathered greenstone schist capped with ferruginous laterites. The hill is a typical breakaway and is surrounded by low cliffs. Its shape is due to the hard capping of laterite which protects the top from the agencies of erosion which have more effect on the unprotected sides. At the north end of Mt. Kenneth there are some small detached hills, and from a point about a mile and a half to the north a line of breakaways extends northwards for about three and a half miles. Mt. Kenneth was at one time connected with these breakaways, but it has been separated from them by lateral erosion; and in a relatively short time Mt. Kenneth will be broken into separate hills, as near the cairn the top is in one place only about 40 feet in width.

IV.—Geology.

A.—*Introductory.*

Granite underlies the whole of the country examined to the south of lat. 29deg. 7min. It is overlain by deposits of travertine in the vicinity of some of the salt lakes, and in places along Warne River; and some of the granite breakaways are capped with siliceous laterite. At Banner Spring the granite contains small lenses of granular hornblende-felspar, few of which are more than a chain or two in length.

North of lat. 29deg. 7min. there are greenstone belts in the granite, but the only ones of importance which come within the area covered by this report are situated near the heads of the two branches of the Warne.

No mine workings of any kind were seen in the country traversed, and no minerals of economic value appear to have been found.

B.—*Greenstones.*

Three large and three small belts of greenstone were seen in the area examined. The boundaries of one of the larger and the three smaller belts were mapped with some degree of accuracy, but the two largest belts extend northwards beyond the area which the writer was instructed to examine. The three large greenstone belts are separated by narrow areas of granite.

The Milgoo Belt extends in a southerly direction from the low peak of that name for about nine miles, and northwards for an unknown distance. In the portion mapped its maximum width is about nine miles.

The northern limit of the Mt. Kenneth belt was not defined, but that part of it which was examined runs south from Mulermurra for about five miles. At this point it splits. The western leg dies out about five miles farther south; the eastern part extends past Mt. Kenneth, south of which it widens out into an irregularly shaped area with a maximum width of about seven miles from east to west, and with a maximum depth of six miles from north to south.

What may be called the Cowarra Belt extends north-north-westerly from the pool of that name on Warne River for about twelve miles. It is somewhat lenticular in shape and its greatest width is about three miles.

The three smaller belts are lenticular in shape and are surrounded by granite. One of these lies almost due west of Mt. Kenneth at a distance of nine miles. It is about two miles long by thirty chains in width. The second is about 50 chains north of Mulierdruing Soak. Its maximum length and width are three miles and one mile respectively. The third belt is situated on the west side of the Rabbit Proof Fence near the 163 mile post. It is only a mile in width. On it are two rounded hills known as the Dromedaries.

There is little variety in the greenstones of these areas. With one exception they are all epidiorites. In some localities the epidiorites are much weathered and are capped with laterite. This was particularly noticeable in the Milgoo Belt where only an occasional outcrop of the underlying rock is seen in watercourses. The hills are all capped with laterite and the slopes and flats are thickly strewn with lateritic debris.

In the Mt. Kenneth Belt, too, many of the hills are capped with laterite, and much of the rock is extremely weathered. Except in the vicinity of Mulermurra the greenstones consist of epidiorites which in places show signs of crude foliation. The planes of foliation have a general north and south direction.

A low ridge, the rocks of which are in most places highly sheared and much weathered, runs south-south-eastwards for about 70 chains from Mulermurra. At the southern end of the ridge the rock is more massive and consequently less weathered. A specimen **[1/1655]** is described by Mr. Farquharson as follows:—

A dull-green medium-grained rock much decomposed and considerably sheared.

The rock is a sheared chlorite-quartz rock with patches of fine scaly talc, or, in places, probably sericitic mica, and obscure remains of felspar, with many scattered grains of leucoxene. The rock has the appearance of a serpentine and may be a sheared decomposed peridotite. The structure, however, in places resembles that of a decomposed of dolerite or diabase.

About half a mile south from the ridge referred to above, and in alignment with it, there is a deposit of impure and opalised magnesite on flat ground. No rocks outcrop beyond the end of the ridge, but the rock is probably derived from rock similar to **[1/1655]** by capillarity. No evidence was obtained regarding the relationship of the serpentine (?) and the epidiorites. The nearest rock outcrop to the ridge is an extremely weathered greenstone 70 chains to the west. The intervening country is thickly strewn with quartz and ironstone debris, and on the east there is a level plain with outcrops of granite some miles away.

In the Cowarra Belt and the three smaller belts the rocks are less weathered, and there is little or no laterite, but all outcrops consist of epidiorite, which in the field show little difference except in coarseness of texture and amount of foliation.

Three typical specimens of the epidiorites are described by Mr. Farquharson as follows:—

[1/1620] from 80 chains north of Mt. Kenneth.

A medium-grained dark grey-green rock.

S. Consists of large and small very ragged plates of augite parts and in places almost wholly altered either to pale green uralitic hornblende or to yellowish-brown hornblende and ragged plates and columns of partly or wholly zoisitised kaolinised or micacised felspar. Some of the plates of augite are surrounded by a vein of pale green fibrous hornblende, others by a vein of yellowish-brown hornblende, others are completely or in part replaced by pale-green almost colourless extremely fibrous hornblende. The ferro-magnesian flakes enclose or partly enclose the flakes and columns of felspar.

The rock is a partly amphibolised and partly zoisitised epidiorite.

[1/1678] from Dromedary Hills, 30 chains west of the 163-mile post on the Rabbit-proof Fence.

A rather fine-grained very dark grey rock with a faint greenish tinge, with numerous small white spots or threads of felspar.

S. Consists of many ragged flakes and plates and prismatic aggregates of green hornblende amongst which are ragged bent and broken columns of plagioclase in places partly granulitised and perforating the ferro-magnesian. A few needles of apatite and possibly a few grains of quartz.

Rock a fine-grained somewhat strained epidiorite.

[1/1681] from 100 chains north-north-west of Mulierdruing Soak.

A medium-grained dark green rock composed of small greenish white columns and grains of felspar in a greenish black mass.

S. Consists of numerous large and small ragged prismatic aggregates of green hornblende intermingled with rather ragged columnar twinned plagioclase which is short labradorite.

Rock an epidiorite probably derived from a gabbro.

Reference is made on page 10 to a small dyke-like mass of greenstone in the granite three miles to the north-east of Mt. Kenneth. From the way it is traversed by tongues and veins of granite it is clearly older than the granite; and microscopical examination shows that it differs but slightly from the epidiorites of the larger belts. A specimen **[1/1672]** is, according to Mr. Farquharson:—

A medium-grained greyish-green rock composed chiefly of dark-green hornblende and felspar.

S. Consists chiefly of ragged very fibrous plates of greenish (in part brownish) hornblende, with or without a core of colourless augite and kaolinised or in part micacised columns of plagioclase with a few grains of quartz. The felspars are in part altered to opaque grey granular zoisite. Many of the fibrous plates of hornblende have been considerably contorted by stress, and some are partly or wholly chloritised.

The rock is a medium-grained epidiorite which does not differ much from epidiorites forming greenstone areas in various parts of the State.

The greenstones are traversed by occasional basic dykes and many acid dykes. There are also numerous quartz reefs, some of which are merely an extremely acid phase of pegmatite. Few of the reefs seen were of a "kindly" nature; the only place that the writer saw that appeared worth prospecting was in the vicinity of Mt. Kenneth where there are some small reefs and leaders of ferruginous quartz, but even in this locality it is doubtful whether the reefs would be large enough, or the gold contents rich enough, to pay.

Metamorphic Schists.

Seven miles east-south-east from Mt. Kenneth there are several low rocky rises dotted about over an area of about a square mile. The rises are separated by level ground on which there are no outcrops.

In the field the rock forming the rises was thought to be a sheared granite, but chemical analysis and microscopical examination show that this view required modification and that the rock was a metamorphosed schist probably of sedimentary origin.

Mr. Farquharson's description of a specimen [1/1679] from seven miles E.S.E. of Mt. Kenneth, is as follows:—

A medium-textured granular greyish rock noticeably sheared.

S. Consists chiefly of quartz and chlorite, the latter in more or less parallel strings of ragged pale green scales, the former in ragged, elongated, and considerably deformed plates, grains, and platy aggregates between the chloritic strings. In places, however, are small aggregates of grains and very ragged small prisms of a colourless biaxial mineral with high refractive index, very good cleavage, moderate birefringence, and optical characters so closely resembling those of typical cyanite that it has been referred to this mineral.

The rock is therefore a chloritic quartz-cyanite rock much sheared and mechanically deformed.

The following table shows the result of an analysis made in the Geological Survey Laboratory:—

	Per cent.
SiO_2	72·57
Al_2O_3	10·15
Fe_2O_3	·49
FeO	2·70
MnO	·05
MgO	9·38
CaO	*Nil*
K_2O	·28
Na_2O	·34
H_2O —	·02
H_2O + ...	3·19
TiO_2	·57
P_2O_5	·20
	99·94

Little can be stated regarding the relation of the metamorphic schist to the granite which surrounds it. The contact was not seen, and as stated previously the rock was regarded as a sheared phase of the granite. The cyanite in the rock, however, is probably due to contact metamorphism so that the rock is probably older than the granite.

C.—*Granite.*

Outcrops of granite in the area under discussion are of four types: (a) large bare rounded masses, some of which rise from 150 to 180 feet above the general level of the surrounding country; (b) breakaways, the cliffs of which have a maximum height of about 50 feet; (c) low rocky hills; and (d) small exposures of rock on level ground, or in the channels of watercourses.

Although the granite varies considerably in texture there is little variation in the mineralogical composition of the rock. The granite is of the microcline-biotite variety, but the amount of biotite contained in it is greater in some localities than in others. The following are Mr. Farquharson's descriptions of two typical specimens of the granite:—

[1/1651.] From Mt. Churchman. A coarse-grained pinkish granite with large pink felspars, veinlets of epidote and with felspars slightly epidotised.

S. A coarse-grained chloritised biotite microcline granite. The felspar which is kaolinised and micacised consists of microcline and a soda-lime species, the latter in part epidotised and zoisitised. The biotite is in part chloritised and is then green in colour.

[1/1651.] A. From Banner Spring. A rather fine-grained grey granite with pale yellowish felspar and scales of black biotite.

S. Consists of a mass of intermingled plates and columns of felspar and flakes of quartz with ragged flakes of brown-yellow biotite. The felspar is in some part microcline, in part an acid plagioclase, in part probably orthoclase, and is more or less kaolinised or slightly micacised. The plagioclase is mostly in columnar crystals. A coarse intergrowth of quartz and felspar occurs in places.

Rock a biotite granite with a little microcline.

In some localities the granite is traversed by dykes and quartz reefs. The different varieties of dykes will be described under the next caption.

That the granite is intrusive into the greenstones is clearly seen in many places where the contact of the two rocks is visible. In every case where the contact was not obscured by a covering of soil or rock debris tongues and veins of granite are seen extending into the greenstones for several chains; and along the margin of the granite lenses of greenstone are enclosed in the granite. These greenstone lenses are invariably traversed by a network of granitic veins, some of which are less than a quarter of an inch in width. Three miles north-east of Mt. Kenneth there is an outcrop of epidiorite [1/1672] about 30 chains long by two to three chains in width, which at first sight appears to be a dyke in the enclosing granite. Closer inspection, however, shows that small tongues of granite cut nearly across it, and numerous grains of granite traverse it in all directions.

In many places on the greenstone areas there are lenses of granite similar in character to the main mass, but whereas lenses of greenstone enclosed by granite are cut by veins emanating from the granite, lenses of granite contained in the greenstone are not cut by the basic veins, but send veins into the surrounding greenstones. It would appear, therefore, that the granite magma had slowly eaten its way upwards through the older rocks and that tongues and veins of the acid magma preceded the main mass and found their way vertically and horizontally through cracks and fissures. In all probability many of the lenses and veins which are now exposed in the greenstone areas did not reach the surface but have been uncovered as denudation proceeded.

D.—*Dykes.*

Acid and basic dykes are numerous in many portions of the area examined, but the acid type is seen much more frequently than the basic.

The dykes may be classified as follows:—

1. Acid—
   - a. Pegmatites.
   - b. Aplites.
   - c. Felsitic quartz-porphyries.
2. Basic—
   - a. Hypersthene-hornblende and hypersthene-gabbros.
   - b. Micropegmatitic quartz-dolerites.
   - c. Partly chloritised and slightly amphibolised quartz-dolerites.

1. *Acid Dykes.*

a. Pegmatites.—These are more largely developed in the southern part of the area than elsewhere, although they are seen in some places in the vicinity of Mt. Kenneth. A rather remarkable fact about these pegmatite dykes or veins is that one granite rock may be traversed by a large number of them, whereas the next rock* visited may not contain one, and that quartz reefs are rarely present in the granite where there are no pegmatities.

The pegmatite dykes and veins in the southern part of the area do not appear to follow any par-

*The term "rock" here denotes the large base masses referred to previously.

ticular direction but traverse the granite at all angles from the meridian. Farther north, however, their strike is between north-west and west-north-west. In most places the width of the pegmatites is from two feet downwards, but here and there dykes with a width of as much as six feet are seen. The smaller dykes and veins are uniform in character throughout their length, but the larger ones are seen to vary considerably if followed along their outcrops. At the eastern end of the small greenstone area north of Mulierdruing Soak there are many large dykes which grade from coarse pegmatite into quartz when followed along their strike. In one of them a band of quartz formed the middle of the dyke, and another graded from coarse pegmatite in the middle to quartz at the sides.

A careful examination was made of many of the dykes for accessory minerals, but none other than quartz, felspar, and mica was seen.

b. Aplites.—A few parallel dykes of aplite were seen a few chains to the east of the 126 mile post on the Rabbit-proof Fence. The country rock in the vicinity is a much weathered granite, and the ground is mostly covered with rock debris so that little can be seen of the dykes which do not rise above the surface level.

c. Felsitic Quartz-Porphyries.—In the vicinity of Mt. Kenneth and in the greenstone belt which extends north-north-westwards from the Cowarra Pool on Warne River there are many dykes of felsitic quartz-porphyry, a few of which are shown on the plan. One of these is continuous for upwards of six miles, and runs in a north-easterly direction. This dyke has a maximum width of twenty chains, but it is not altogether clear whether where it is thickest it is one dyke or several narrow parallel dykes. West of Mt. Kenneth there are five bands of felsitic quartz porphyry about five chains apart, and the intervening space is covered with soil and with debris from the bands. A mile to the north-west the full width of twenty chains is thickly strewn with fragments of the felsitic quartz-porphyry, but none is seen *in situ*. It has been mapped as one dyke, but it is necessary to draw attention to the possibility of these being a series of narrow parallel dykes, as sufficient time was not available to traverse the dyke from end to end, and it has been mapped from observations made on four traverses which crossed it at right angles to its course. This dyke cuts across the granite and the greenstones, and similar dykes were seen in both formations in this locality.

The dykes all strike between north-west and north-north-west, but near their ends some of them depart from this course, in some cases almost at right angles to it, but where this occurs the dykes die out within a few chains.

In no instance were the pegmatite and the felsitic quartz-porphyry dykes seen cutting across each other, nor was one type seen in close proximity to the other. Both varieties of dykes are probably genetically connected with the granite which they traverse, but were derived from the magma after the upper portion had cooled. As the original granite cooled contraction would result in fissures being formed, and the dyke rocks found their way upwards through these.

A typical specimen of the felsitic quartz-porphyry [1/1668] from three and a half north-west of Mt. Kenneth is described by Mr. Farquharson as follows:—

A very fine-grained felsitic grayish white rock with a few indistinct phenocrysts of pale yellow felspar.

S. Consists of a few slightly kaolinised and micacised phenocrysts of felspar and a few small more or less ragged phenocrysts of quartz in a fine-grained ground-mass composed of minute squares, rods, and grains of kaolinised and micacised felspar and less common grains of quartz. The felspar of the phenocrysts, and probably of the ground-mass, are in part at least orthoclase.

The rock is a felsitic quartz-porphyry.

2. *Basic Dykes.*

a. Hypersthene - hornblende and hypersthene-gabbros.—Six miles to the north-north-west of Cowarra Pool on Warne River, there is dyke of a very dark gray, rather coarse-grained gabbroid rock running parallel with the western boundary of the greenstone belt which it traverses. The length of this dyke was not ascertained, but its width is about ten chains. A specimen [1/1673] is described by Mr. Farquharson as follows:—

S. Consists of ragged grains and prisms (and cross section) of pyroxene, and ragged plates of brown hornblende, intermingled with columnar crystals of striped plagioclase. The pyroxenes are of two kinds: (a) pleochroic pink grains which, as they show straight extinction in longitudinal sections and indications of a bisectrix in cross section showing the nearly rectangular cleavages, are hypersthene; (b) colourless or very pale green grains which in cross section extinguish along a line bisecting the rectangular cleavage angles and show in cross section an optic axis, and which are therefore monoclinic pyroxene. Both the pink and the colourless species are in places part or wholly surrounded by a vein of brown hornblende, and in places pink grains are enclosed completely in brown hornblende. Moreover, some of the monoclinic plates are partly altered to yellowish-green hornblende, or to green chlorite. It would appear, therefore, that the brown hornblende is chiefly, if not wholly, a derivative of the monoclinic pyroxene and only in very small part a derivative of the orthorhombic species. Further, the brown hornblende is most probably not original or only in small parts original.

The felspar species is labradorite.

The rock is a medium-grained hornblende-norite, or rather hypersthene-hornblende gabbro.

About two and a half miles south-south-east of Milgoo on ground thickly strewn with fragments of ironstone and quartz a small outcrop which probably represents a dyke was seen. A specimen [1/1663] of this rock was collected and has been examined by Mr. Farquharson who states that it is "similar to [1/1673], but with more of the pyroxene, and with diallage in excess of the hypersthene; also coarser in texture and felspars slightly zoisitised. Rock a hypersthene-gabbro."

No field evidence was obtained which would indicate the relative ages of these dykes and the other basic dykes, but Mr. Farquharson thinks that from their freshness, and from their resemblance to dyke rocks from Cue and Norseman which are known to be the latest intrusions at those centres, they are the youngest rocks in the area examined.

b. Micropegmatitic quartz-dolerites.—Six miles to the north of Cundiering Rockhole a dyke traverses the granite in an easterly direction. A specimen [1/1655] has been examined by Mr. Farquharson who reports as follows:—

A medium-grained gray-green rock with very pale greenish felspars.

S. A coarse-grained much chloritised micropegmatitic quartz dolerite, with large columnar felspars kaolinised, micacised, chloritised or epidotised, forming a very coarse flexus in which are interstitial quartz and areas of micropegmatite, small ragged flakes of chlorite and hornblende. The rock is identical with specimens of the quartz-dolerite amphibolites (?chloritised) of Kalgoorlie.

At Survey Station K. 94, three-quarters of a mile east of Cootewar Well, a basic dyke cuts a large quartz reef about fifty feet wide obliquely. The dyke runs parallel with, and close to, the reef to the east and west of where it cuts across it. [1/1653] from this dyke is described by Mr. Farquharson as follows:—

A pinkish gray rather fine-grained rock with very small greenish black patches.

S. Consists almost wholly of rather small and thin columnar crystals of striped plagioclase, in the interspaces between which are grains of quartz and small areas of a micropegmatitic intergrowth of quartz and felspar. A few crystals, ragged plates and prisms and small aggregates of green hornblende, and plates and flaky aggregates of green chlorite with a little granular sphene and ilmenite also occur. Some of the felspar columns are bordered by the intergrowth. All the felspar is turbid from kaolinisation, which renders the species forming the columns difficult to determine. The species, however, is apparently fairly acid.

The rock is a hornblende micropegmatite, which may be a facies of a granophyre or of a micropegmatite quartz-dolerite.

c. Partly chloritised and slightly amphibolised ophitic quartz-dolerites. Five miles to the south-east of Mt. Kenneth a dyke of fine-grained, dark, gray-green rock is seen traversing the greenstone. It also cuts across some granite veins and a felsitic quartz-porphyry dyke. It is therefore the latest intrusion in the locality. A specimen [1/1675] from this dyke is described by Mr. Farquharson as follows:—

A fine-grained partly chloritised and slightly amphibolised ophitic quartz-dolerite with remains of original grayish augite, and some interstitial quartz. A little ilmenite and pyrite are present. The felspars are mostly in long thin laths or columns and mostly kaolinised and but little zoisitised.

Detailed mapping would probably result in the discovery of other basic dykes, but in the traverses made by the writer the five dykes described were the only ones encountered.

The wide distribution of doleritic dykes is a remarkable feature in the geology of Western Australia. They are seen in all the greenstone and granite areas of the State, and in the North-West Division dykes and reefs of the same rock are seen intruding three sedimentary formations, the youngest of which is probably of Tertiary age. In some localities these dykes are very numerous, but in other districts one may travel for days without seeing one.

6.—THE MINERAL RESOURCES OF PART OF THE ASHBURTON DRAINAGE BASIN.

(H. W. B. Talbot.)

Gold.

Alluvial gold has been found in several places in the valley of the Ashburton, and in some localities gold was also obtained by dollying quartz from rich leaders. The principal workings were at Top Camp, Soldier's Secret, Dead Finish, Dead Finish No. 2, The Gorge, and Mt. Mortimer. It is stated by old residents of the district that at one time there were several hundred men on the diggings, but these have all left, and for some years past the only ones who visit the old camps are occasional "fossickers." The old diggers that remain in the district are employed on stations, or eke out a living by kangaroo shooting.

Most of the centres were visited in the year 1890 by the then Government Geologist, the late Mr. H. P. Woodward, who states that from Top Camp from 9,000 to 10,000 ounces were obtained; 1,000 ounces from Dead Finish, and 1,500 ounces from Soldier's Secret. He does not give the yield from Mt. Mortimer, but mentions that a nugget weighing 56 ounces was obtained there. Mr. Woodward states that about 15,000 ounces were obtained from the different mining centres in six months. The official gold-mining statistics give the total gold yield of the Ashburton Goldfield to the end of 1918 as—alluvial, 8,573.89 fine ounces; dollied and specimens, 315.64 fine ounces. In all probability the official returns fall far short of the actual amount of gold won, as in the early days of mining prospectors seldom reported the amount of alluvial gold they obtained, and as they disposed of it through various channels, the official returns probably represent only that portion that was sold to the banks.

Soldier's Secret, Dead Finish, and Mt. Mortimer were visited by the Government Geologist, Mr. A. Gibb Maitland, in 1907, and his description of these centres was published in Bulletin No. 33 q. v.

In addition to the localities referred to above, it is stated by old residents of the district that a large amount of gold was obtained from workings near the head of Turee Creek, but no reliable estimate could be formed of the amount of gold won, as reports were contradictory. It would appear, however, that some thousands of ounces were obtained. Owing to the drought and absence of feed for the horses these old workings were not visited, so it is not possible to state what formation yielded the gold.

In the opinion of the writer, the gold deposits of the Ashburton District are by no means exhausted, and the district still affords a promising field for properly equipped prospecting parties. To test the country thoroughly prospectors would require camels, as some of the most promising country has little or no surface water except for a short time after rain, and by the time the ground is dry enough for "dry-blowing" the surface waters have evaporated. It is only in good seasons that there is grass enough for horses, but there are always bushes and scrub upon which camels will thrive.

The Ashburton Beds have up to the present yielded all the gold that has been found in the Ashburton Valley. To the east of the 116th meridian the area in the Ashburton Drainage Basin occupied by these beds is approximately 5,400 square miles. In this area the rocks consist of highly inclined conglomerates, grits, arkoses, quartzites, sandstones, slates, and dolomitic limestones, and nearly everywhere there are numerous quartz reefs. To the west of the 116th meridian the rocks consist principally of micaceous sandstones, and there is less quartz than in the country farther east. It is to the east of longitude 116° that the most promising auriferous country lies, and it is here that systematic prospecting should be undertaken. In the writer's opinion the places that offer the greatest inducement to prospectors in the area occupied by the Ashburton Beds are (a) the country between the main Ashburton Mail Route and Hardey River to the east of longitude 116° 30′, and (b) the country drained by the upper portions of Kennedy and Cherrybooka Creeks.

In these localities the quartz is of a more "kindly" character than that seen elsewhere; but it by no means follows that these are the only places that will yield gold. They are, however, the localities that impressed the writer most.

The place that may possibly yield the richest gold deposits in the Ashburton District has not, so far as the writer could learn or see, yet been tested by prospectors. This is in the neighbourhood of Mount Bresnahan. The upper part of the range that runs south-east from this mount is composed of beds of boulder conglomerates of the Nullagine Formation, which rest unconformably upon the upturned edges of slates, etc., of the Ashburton Beds. Conglomerates almost identical in character occur at Nullagine, and here they rest unconformably upon strata of the Mosquito Creek Series, which is probably homologous with the Ashburton Beds. A considerable amount of alluvial gold was obtained from the ground below the base of the conglomerates at Nullagine, and these conglomerates have also yielded gold by crushing. At Just-in-Time, near Marble Bar, gold occurs in similar conglomerates at the base of the Nullagine Series. At Rooney's Patch, near the head of Brown's Creek, and at Sunday Hill, alluvial gold has also been obtained from these conglomerates. The four places just referred to, and Mount Bresnahan, are the only localities in the North-West Division that the writer has seen conglomerates at or near the base of the Nullagine Series, and in the four places mentioned gold is found in them.

In Bulletin 33 (pp. 105-106) the Government Geologist, Mr. A. Gibb Maitland, refers to the presence of remnants of conglomerate beds on the clay slate hills at Egina, in West Pilbara. Dry-blown workings extend to the base of the conglomerate, and Mr. Maitland states that this "suggests the possibility of the gold having been derived from the basal beds of the series (the conglomerate), as at Nullagine and Just-in-Time."

At Mount Bresnahan the conglomerates have a greater horizontal extent and vertical thickness than at any of the other localities. In the writer's opinion the country along the base of the range that extends south-east from Mount Bresnahan is well worth testing for alluvial gold. The finding of alluvial gold at the base of the range would indicate the presence of auriferous conglomerate above.

The country in the vicinity of Mount Bresnahan is difficult to prospect, as there is no feed for horses or camels in the best of seasons, and water would be found only for a short time after rain had fallen. For four or five miles out from the range the country is trenched by many steep U-shaped valleys, and the whole of the ground is thickly strewn with large rounded boulders derived from the disintegration of the conglomerate, and travelling over this broken boulder-strewn ground is slow and difficult. It took us over three hours to go from Cherrybooka Creek to the base of the mount, a distance of four and a half miles. The difficulties of travelling could, however, be overcome if prospects warranted the clearing of a track; and water could be obtained from the Ashburton and, in a good season, from Cherrybooka Creek.

As stated previously, it is reported that a considerable amount of gold, probably several thousand ounces, was obtained from the head of Turee Creek. The writer did not see the old workings, and is therefore unable to give any particulars as to the occurrence of gold in that locality. In the course of a hurried trip in this locality, however, he was impressed by the kindly character of the quartz reefs in the weathered schists near the head of the north-west branch of the Turee.

Copper.

Copper occurs in various places in the Ashburton Goldfield, and up to the end of 1917 a total of 351.07 tons of ore which yielded 97.13 tons of metallic copper valued at £6,408 was sent away from the district, but all the ore except 6.32 tons containing .79 ton of metallic copper valued at £94 was raised at Uaroo or Red Hill.

All the important copper mines in the district were examined by the Government Geologist, Mr. Maitland, in 1907, and are fully described by him in Bulletin 33. The copper mines described by Mr. Maitland have all been abandoned, and they were not visited by the writer. The only place that showed more than a mere stain of copper seen by the writer was at "Black's Copper Mine," situated six miles north-east of Peake Station. Here traces of copper are found nearly all over a hill that rises about 300 feet above the general level of the country. A few tons of ore were raised and sent away, but the mine was abandoned after a little desultory work had been done. There is no defined ore channel in the mine, and the copper ore (malachite) appears to have been deposited in certain places by permeating solutions. Under present conditions the mine is valueless, and could only be profitably worked if it were possible to treat low-grade ore on the spot.

The writer was informed that copper occurs in a few places in the Capricorn Range, but his informant stated that the lodes were small and all attempts by prospectors to find payable bodies of ore had failed.

It appears that under present conditions the copper deposits of the Ashburton are not rich enough to work at a profit. The cost of raising the ore, haulage to the port, shipping charges, and the high price of supplies and mining requisites make anything but high-grade ore unpayable. The known copper mines of the Ashburton received no attention during the period of the war when the price of copper was high; and now that the war is over copper will probably drop in value, so there is not much inducement to work the mines, or to invest capital in them.

Lead.

Silver-lead ore was discovered at Uaroo about the year 1901, and up to the end of 1918 the official statistics give the yield as 22,525.60 tons of ore, valued at £28,850.

The mines at Uaroo have been fully described by the Government Geologist in Bulletin 33. In passing, the writer looked over the Uaroo Silver-Lead Mine, but little development work had been done since Mr. Maitland's visit in 1907. A winze has been sunk to a depth of 83 feet from No. 3 Tunnel, and the underhand stopes have been deepened by extracting the ore. If this mine is to continue as an ore producer, it will be necessary to sink a new shaft to cut the lode at a depth. The present methods of working the mine are too costly, and it will be only a comparatively short time before it will be impossible to raise ore at a profit from the present workings. The ore body is strong under foot in the bottom of the mine, and there appears to be sufficient inducement to sink a shaft to facilitate working and lower costs.

Tin.

No discovery of tin has so far been reported in the areas of granite and older micaceous schist that extend southwards from the Ashburton to the Gascoyne to the west of Henry River, but the presence of many pegmatite dykes, some of which contain large quantities of tourmaline, indicates the possibility of the occurrence of tin in the district.

In the year 1913 a Mr. George Cathray forwarded the writer a parcel of stone from the Gascoyne with a request that it should be assayed for *gold*. On opening the parcel it was found that the contents consisted of fragments of pegmatite and angular pieces of cassiterite. Mr. Cathray was written to and informed of the importance of his discovery and was asked to let the Department have particulars of the locality from which he got the tin. No reply was, however, received from Mr. Cathray, but as he was engaged in kangaroo shooting he would probably be moving about and the letter that was sent to him may not have reached him.

In Bulletin No. 33, p. 27, the Government Geologist, Mr. A. Gibb Maitland, describing the country in the vicinity of Belyarra Pool on the Gascoyne, states: "the occurrence of tourmaline-bearing pegmatites in certain areas indicates the possibility of tin occurring in the vicinity."

So far as can be learnt, no prospecting for tin has yet been done between the Ashburton and the Gascoyne, but the country along the Mullewa-de Grey Stock Route, between a point about five miles north of the Telford and the head of the Alma, and also between the Lyons and the Gascoyne, appears to offer sufficient inducement to attract prospectors. Prospecting should be undertaken in the vicinity of the larger pegmatite dykes, especially those containing tourmaline. In most years there is plenty of water and sufficient feed for horses or camels.

7.—THE COUNTRY BETWEEN YALLADINE AND COOLGARDIE AS FAR NORTH AS THE MULLINE-MT. JACKSON ROAD.

(H. W. B. Talbot.)

The greater part of the area between Yalladine and Coolgardie is occupied by granite in which are long and comparatively narrow belts of greenstone. The granite is represented principally by sand plains covered with a dense growth of low scrub, but in some localities where the soil is loamy there are fine forests of gums, chiefly salmon and morrel gums, which are being cut to supply fuel for the mines at Kalgoorlie. Here and there on the sand plains and in the gum forests bare masses of granite occasionally rise abruptly from the plains by which they are surrounded. These "rocks," as they are termed locally, are of considerable importance, as it is on or close to these that the only water supplies of the district are obtained. On many of the granite rocks there are gnamma holes, and near the base of most of them soaks are found. Away from the rocks water found by sinking is too salt for use. Some of these rocks cover an area of a square mile or more, and rise to a height of about 100 feet above the level of the surrounding country.

In a few localities there are low "breakaway" cliffs of weathered granite, but these are not nearly so numerous or long as in the granite areas farther north and east.

The principal greenstone belts of the district are:—(1) the Wallangie Belt, (2) the southern portion of the Lake Barlee Belt, (3) the southern extension of the Mulline-Callion Belt, and (4) the Jaurdie Hills Belt.

1. *The Wallangie Belt.*—This belt extends from near Mt. Walter in a north-north-westerly direction for about 62 miles. For about 40 miles it is five miles wide, but at both ends the breadth narrows, and for the last 15 miles at the northern end it has an average width of a little more than a mile.

Much of the belt is occupied by red and brownish soil-covered flats which support a strong growth of gums and salt bush, and in many places several miles can be travelled without seeing rock outcrops of any kind.

As a general rule the rocks of this belt are much weathered and many extensive exposures are little more than coloured clays, but here and there unweathered outcrops show that the rocks are similar to those usually found on the greenstone belts of the Eastern Goldfields and that they consist principally of epidiorites, hornblendites, and jaspers.

To the north of the Iron Knob practically all the hills are composed of jasper bands, which strike north-north-west and are vertical or have a very high angle of dip.

At the northern and southern ends of the belt the greenstones are traversed by a great number of pegmatite dykes. These acidic dykes cut the greenstones at all angles, and range in size from bands 50 feet wide down to stringers a few inches across.

Gold mining leases have been worked at a few places at the southern part of the belt, the whole of which appears to have received more or less attention from prospectors. The latest find was near Wallangie Rocks, which was reported on by Mr. E. de C. Clarke (*vide* 9 below). At the time of my visit several parties were at work on the leases, but a few weeks later the place was deserted.

None of the leases at other places on the belt have been worked for some years. The Wallangie Belt is very difficult to prospect, as the rocks are much weathered and most of the reefs and lodes are hidden beneath a covering of soil or rock débris, or by a capping of cement or laterite. The only method, therefore, by which the gold deposits can be found is by "loaming."

Up to the present all the leases that have been worked proved disappointing, and although a few rich "dabs" were found near the surface, payable gold ceased to exist at a comparatively shallow depth. The only place on the belt that I was at all impressed by, apart from those localities that have been already worked, is situated about five miles north-north-west of Iron Knob. Thereabouts several reefs and leaders were seen which seemed to warrant careful sampling.

2. *The Southern portion of the Lake Barlee Belt.*—That portion of this belt which extends into the area under discussion runs in a south-south-easterly direction from the Mulline-Mt. Jackson road for a distance of about 18 miles. It runs north-north-westwards from the road to a point about six miles north of Mt. Forrest—a distance of about 90 miles—but that portion had been previously mapped.

Where the greenstone belt is crossed by the road it is about five and a half miles wide, but a little to

the south it breaks up into a number of points only one of which, the most westerly, extends for any distance into the granite. Geologically this portion of the belt bears a strong resemblance to the Wallangie Belt, and jasper bars form most of the hills. As at the ends of the Wallangie Belt, there are many pegmatite dykes.

Here and there signs of prospecting are seen, but evidently the results were not promising as no shafts were sunk.

3. *The Southern Extension of the Mulline-Callion Belt.*—The Mulline-Callion Belt dies out to the south at a point about 13 miles south-south-east of Callion. The rocks consist of massive and foliated epidiorites and hornblende schists. Unlike the two belts previously described jaspers are absent in the southern portion, although a few bands were seen west of Callion.

Within a few miles of Callion a good deal of work was done on several leases in the early days of the goldfields, but south from the leases no quartz reefs are seen, although here and there a small lens of that rock, seldom more than a few feet in length, is enclosed in the greenstone.

4. *The Jaurdie Hills Belt.*—This is a belt of irregular shape. It has a maximum width to the north of Jaurdie Hills of about 13 miles, and runs in a generally south-south-easterly direction from a point about four miles south of the southern end of the Mulline-Callion Belt to near Gnarlbine Soak, a distance of about 55 miles. The southern portion of the belt between the Eastern Railway and Gnarlbine Soak was mapped by Mr. T. Blatchford in 1912.

The rocks of the northern part of the belt consist of fine-grained greenstones which as a general rule are massive, but there are several areas in which the rocks are more or less schistose. In some localities there are many dykes of porphyry, aplite, and pegmatite, and in the vicinity of these the greenstone is more schistose than elsewhere.

When travelling over this belt one encounters many abandoned gold mines, and from some of the mining centres a considerable amount of gold was won in the past. From the Jaurdie Hills leases nearly 20,000 ounces of gold were obtained, and from Dunnsville the yield was over 8,500 ounces.

At the time the area was visited no men were seen at work anywhere on the belt, but there was evidence in the form of fresh workings that the district is visited from time to time by prospectors, and some of these had been at work at Dunnsville a short time prior to my arrival.

8.—REPORTED OCCURRENCE OF OIL NEAR PINGELLY, SOUTH-WEST DIVISION.

(E. de C. Clarke.)

In accordance with instructions (G.S.W.A. No. 116/02, L.B. 656/28), I left Perth for Pingelly in company with Mr. J. T. Moate, on January 14.

Mr. Martin's farm, the scene of the supposed occurrence, was reached on the morning of the following day. Mr. J. T. Martin, the owner, declared himself to be unaware that any such visit was proposed.

On viewing the Well, Messrs. Martin and Moate expressed disappointment at the small showing of oil, but thought that if the well were partly baled out more oil would escape. I, therefore, decided to make a longer stay, and to stay at the well continually until I had collected samples.

After the well had been partly baled out and time given for the oil to accumulate I collected a sample (C. 10), although Messrs. Martin and Moate again protested that the showing was a very poor one.

As Messrs. Martin and Moate were now of the opinion that, if the well were completely baled and allowed to refill partially, a much better showing would be made, I decided to wait two more days, as before, camping night and day at the well.

The well having been baled I found that there was a considerable accumulation of foul-smelling sludge at the bottom, which contained much decomposing organic matter, mainly probably of plant origin, but no doubt, some animal remains were also there, *e.g.*, frogs, which now live in the well, must die from time to time and leave their quota of fat, etc. As much as possible of this sludge was removed, but a complete clearance could not be made, as Mr. Moate and the man he had with him returned to Pingelly on Thursday evening, and the remaining man power was hardly equal to the task of cleaning out the well.

Having allowed the new supply of water to seep into the well for 36 hours, I collected Sample C. 11. Mr. Martin was more than ever disappointed with the showing on the well.

I may mention that the distinct "smell of kerosene" which I noted when collecting Sample C. 10 could not be detected in C. 11.

Mr. Martin gave me Sample C. 12, collected by himself some time ago. He informed me that he had added small quantities of salt and petrol to the sample some time previously when he had no idea that it would be of interest to any one else.

From Mr. Martin's account, the seeping of "oil" into this well is very intermittent, being best in Autumn and particularly fine on days after "earth tremors" have been felt.

My instructions do not include the making of a geological report, but I consider that the country between Pingelly and Mr. Martin's farm is granitic.

The well in question would be about 20 feet deep when completely cleaned out. From the surface to about 15 feet, the well is sunk through wash, below that it passes through granite, highly decomposed no doubt, but still *in situ*.

I was unable to visit the country farther east. Mr. Moate informed me that an area of "heavy sedimentation" occurs in this direction.

I am satisfied that after midday on Wednesday, January 15th, till the 2nd sample had been collected on January 18th, no one tampered with or "salted" this well.

APPENDIX.

Report on Three Samples of supposed Petroliferous Water from Pingelly District, collected by Mr. E. de C. Clarke.

(E. S. Simpson.)

Of the three samples of water from Martin's Well submitted, two were collected by Mr. Clarke in bottles free from contamination, one by the owner of the property, in a bottle which had been previously washed out with "Petrol." This last was, therefore, rejected as being certainly contaminated.

Mr. Clarke's samples were both examined in the same way. Immediately on opening the bottles, the nature of the vapour over the water was tested by smell and by test papers. Light petroleum spirit (free from all matter not volatile at room temperature) was added to the sample and repeatedly shaken with it over a length of about 18 hours, the water being kept at or about 15 deg. Centigrade. The spirit was then completely separated from the water, well washed with distilled water to remove any salts, and evaporated at room temperature, about 33°C. The residue was weighed and tested.

Sample No. 3858, marked C. 10. A colourless water, almost free from turbidity, but containing much dead and decaying organic matter, both vegetable and animal (crustacea and insects). On opening the bottle, the smell of sulphuretted hydrogen was the only one perceptible, and a strong reaction for this was given by lead test paper. On evaporating the petroleum spirit extract, a residue was obtained, weighing 0.041 grams and consisting of a thick oil of a light brown colour. Owing to the very small amount of this oil available (about one medium sized drop), it was difficult to ascertain its exact nature. It was found to be fluid at all temperatures above 150°C., it had an odour resembling some heavy mineral oils and some resin oils. Its solution in petroleum spirit was fluorescent, and at 200° the greater part distilled unchanged, properties characteristic of mineral hydrocarbons and resin oils. At a higher temperature it carbonised only slightly and yielded only a very slight acrid odour and slightly acid vapour. Animal and vegetable oils yield much acid and acrolein of very acrid odour.

Summing up, it appears that this water and its solid contaminations carry an appreciable amount of a heavy oil, very little of which appears to be of direct animal or vegetable origin, the greater part resembling a mineral oil or resin oil.

Sample No. 3859, marked C. 11. A water similar to C. 10, colourless and almost free from turbidity, but containing much decaying vegetable matter and many small dead insects and crustaceans. The odour of sulphuretted hydrogen was the only one perceptible on opening the bottle, and lead test paper confirmed its presence. On evaporating the petroleum spirit extract, a residue was obtained which weighed 0.015 grams, a little over one-third of the amount obtained from C. 10. At 15° C. it differed entirely, since for the most part it then became a solid fat. The chemical reactions differed distinctly. At 200° a small amount appeared to volatilise, the remainder set into a solid fat immediately it cooled to about 30°. On heating to about 300°, it completely dissociated and yielded free carbon with dense vapours, which were strongly acid and contained abundant acrolein.

From this, it appears that the chief constituent of the petroleum spirit extract from C. 11, is very different to that from C. 10. It is mainly a fat, probably of animal origin, mixed with a very little heavy oil, similar to that obtained from C. 10, which may be a resin oil or a heavy mineral oil.

It will be noted from Mr. Clarke's report that C. 10, which carried the higher proportion of oil of possible mineral origin, was collected from the well in the condition in which it was on Mr. Clarke's arrival. C. 11, on the other hand, was collected after the well had been completely baled out by Mr. Clarke and allowed to refill.

9.—THE WALLANGIE GOLD FIND ON THE KURRAWANG WOODLINE, COOLGARDIE GOLDFIELD.

(E. de C. Clarke.)

Introductory.

These notes are the results of an inspection of the find and its neighbourhood made, according to official instructions. The field work occupied me from March 6th to March 13th, 1919, and I wish to express my indebtedness to various prospectors, and particularly to the staff of the Goldfields Firewood Co., for much valuable assistance.

Wallangie—the name of a watering-place on the old Southern Cross-Goongarrie track, which is three or four miles west of the find—has been suggested as preferable to such names as "Woodline Find" or "So-and-So's Patch," of which there are already several in the annals of Western Australian gold-mining. Unless otherwise specified "Wallangie," as used in this report, must be understood to mean the gold find and not the original Wallangie.

The Wallangie Find is nearly 35 miles N.N.W. of Boorabbin, a station on the Perth-Kalgoorlie railway line, about midway between Southern Cross and Coolgardie, and is about two miles N.E. of the present Main Camp on the W.A. Goldfields Firewood Co.'s timber line ("Kurrawang Woodline"). Wood trains run daily on the company's line between Kurrawang (a station between Coolgardie and Kalgoorlie) and the Main Camp (a distance of over eighty miles) and this fact, combined with the liberal treatment afforded to prospectors by the company in the way of carriage for ore, supplies, and water, renders the find at present very accessible. If the company's present plans regarding the cutting out of the timber in this part of the country are executed Wallangie will probably continue to be easily reached from the woodline for three or four years to come, although during that period the main camp and position of existing lines will be moved several times.

It seems that gold was first discovered on the Wallangie leases by a prospector named Davis about the middle of 1918. However, the belt of greenstone country running slightly west of north from Mt. Walter was known to be gold-bearing many years ago. The tent and belongings of some unknown prospector, who in the early days perished perhaps when out hunting for his horses, were found about 18 months ago by woodcutters, and in June, 1918, not far from this pioneer's last camp, Gates' Dry-blowing Patch, about 1½ miles S.E. of the Wallangie leases, was discovered. Near the 77-mile on the Kurrawang Woodline a small find, sometimes called Moberg's, was made in April, 1918. This find, it is said, had not had a fair trial. Again, at Ryan's Find, about 7½ miles S.S.E. of Wallangie, a considerable amount of prospecting was done about four years ago, and 45 tons of ore is said to have yielded 2½ozs. per ton.

The country near Wallangie is gently undulating and is, in its natural state, covered with a fairly thick growth of salmon and other gums, with the usual sparse undergrowth of various shrubs. The chief land marks are the breakaways of ironstone (ferruginous laterite), which occur at intervals along the

line of the main gold finds. About 2½ miles north of the northernmost prospecting area on the Wallangie line is "Iron Knob"—a hill of banded contorted jasper rising about 100 feet above the surrounding country. Hills of apparently the same nature lie three or four miles north of Iron Knob, and similar hills are said to occur at intervals for many miles farther in the same direction.

Water for vital purposes may at present be obtained at the Woodline, being brought by train from Wallaroo Rock. The nearest well is at the original Wallangie. The depth to water at the Nullagine leases is not known. It is thought that a considerable amount of water draining off the breakaways near the south end of the leases could be inexpensively conserved by a dam.

Description of Workings.

Prospecting areas and leases on which work was being done at the time of my visit are as follows, beginning at the north end:—

Higgins' P.A., on which gold was first found by P. J. Higgins on January 11, 1919, now has a shaft vertical for 18 feet, thence going off on the underlie (45° to west) for about 12 feet. 2½ tons of quartzose rubble, said to be worth 6 or 8ozs. per ton, were taken out in the first 6 feet of this shaft; below this, at a vertical depth of about 15 feet, another body of quartz and ironstone, about 1 foot thick, known as the footwall reef, was encountered. This was followed on the underlay for a few feet, and at the bottom of the shaft the hanging-wall reef, here 3 feet 6 inches thick, is coming down at a steeper angle and meeting the footwall reef along a line of junction which pitches north. The quartz of both reefs is sugary and has a good deal of ironstone scattered through it in the form of hæmatite flakes and seams of earthy iron oxide. The walls of the two reefs are not clearly defined from the country, and below the rich surface pocket only low values are said to have been got in the shaft. For about 60 feet north of the shaft 6 or 7 potholes have been sunk on a sugary quartz vein—probably the hanging-wall reef—and are said to yield very good prospects. What is probably the southern continuation of this sugary quartz vein has been, it is claimed, followed through the greater part of the P.A. immediately south of Higgins, but is apparently barren at its outcrop. A shear plane, filled with brown iron oxide and carrying a little gold, cuts through the highly weathered sheared greenstones which form the country at Higgins', as elsewhere at Wallangie, and should intersect the quartz veins described above, at the shaft. This intersection may be accountable for the rich pocket in the upper part of the shaft.

Victory Reward, G.M.L. 4595.—The workings on this lease are about 1½ miles S.S.E. of those just described. Gold was first discovered here late in 1918 by J. Reid, sometime after the first find on the Breakaway Central P.A., half-a-mile still further to the S.S.E. Reid is reported to have obtained 50ozs. of gold from 6cwt. taken out of the pothole which has now become the main shaft. The lease is being worked under option by a syndicate. The workings —a main shaft, 17 feet deep, two or three potholes and four costeens, 4 feet to 6 feet or more in depth —are on the top, and near the edge of a breakaway. There is thus a considerable thickness, probably about 20 feet, of laterite (weathered and disjointed country) to be pierced before the settled (but of course still greatly weathered) country will be reached. An irregular patch of laterite, containing about 200 cubic feet, has been taken out of the shaft, and the portion bagged is expected to yield about 5ozs. per ton. The run of gold is being followed westward under the cement in the shaft. This rich pocket in the laterite appears to be a spread formation from a lode, which from present indications lies farther out to the west. The line of "lode" on the Breakaway Central P.A., to be described presently, will, if it runs perfectly straight, pass about 4 chains to the east of the Victory Reward workings. It is believed by some prospectors, however, that the Breakaway Central line of lode can be traced by various surface indications right to the workings in the Victory Reward lease. If so, this line of lode swings slightly to the west going north.

Victory South, G.M.L. 4598.—Gold is said to have been discovered on this lease shortly after the first find at the Breakaway Central P.A. The dab found here lies about 5 chains west of what is referred to in this report as the main line, and nearly ¼-mile S.S.E. of the Victory Reward workings. The gold was carried in a small "formation," apparently lying along a shear plane or fault, mainly composed of yellow and brown ironstone, which dips east steeply but gets flatter and more irregular going north. The workings consist of a shaft about 15 feet deep leading southwards, with a trench which shallows southwards, thus showing that the "shoot," if it can be dignified with that name, pitched north. I have no record of the amount of gold so far obtained from this lease.

Breakaway Central, P.A. 1536.—As already stated, the first find was made on this prospecting area. The finding of a few specks of gold led immediately to the pegging of a great number of alluvial claims, but very little, if any, alluvial gold has been won in this part, although prospects can be got with the dish from the soil overlying the supposed course of the lode. The workings are situated on the northern slope of a prominent breakaway. The first ore obtained was from a trench close up to the breakaway and yielded 17ozs. A short tunnel, cutting through a few feet on the hanging wall (west) side of this trench was afterwards put in, but with no results so far as I can learn. Near the surface, in "shaft 2," a small patch carrying 5ozs. was obtained. Shaft 2 was afterwards continued vertically to a depth of 20 feet and a drive put out, to no purpose, in footwall country. The best patch (yielding about 55ozs.) so far obtained here came from the top five feet of "shaft 1."

About 50 feet west of "shaft 1" erratic prospects are said to be obtainable in a highly decomposed yellow schist carrying much magnetite in places. About 50 feet west of "shaft 2" also prospects are said to be obtainable.

The strike of the schists and patches of ore is about S.S.E., the dip being westerly at an angle of about 70deg. It thus seems that the main workings in this P.A. are situated on the footwall of a possible lode formation, and that more exploration westwards towards the hanging wall is warranted. Supposing that a payable ore body with a westerly dip exist here, the portion now removed by weathering, which stood formerly at a higher level, and which has shed the gold now scattered through the surface soil, etc.,

would have deposited that gold on the footwall side of the present outcrop of the lode. For this reason, therefore, in order to find that lode, work slightly west of the surface prospects is warranted. The same considerations apply, of course, to search for the outcrops of any gold-bearing deposit of which the direction of dip is known.

Breakaway G.M. West, G.M.L. 4592.—Some costeening, etc., has been done here without result. A glance at the plan shows that this lease is west of the outcrop of the main line.

Breakaway G.M., G.M.L. 4591.—Prospecting for the continuation of the main line was just beginning at the time of my visit. Prospects are, it is reported, obtainable near the outcrop of a 6-inch rubbly quartz vein close to the N.E. peg of the lease. This is probably the continuation of the "main line," which it is said can be traced at intervals from the workings in the Breakaway Central P.A. to those in the Victory Reward G.M.L.

Davis & Woods' P.A.—This lies 1¾ miles S.S.E. of the Breakaway Central P.A. The intervening country, including that at the breakaways half a mile S. of the Breakaway Central, has been examined by prospectors without result. It is clear from the plan that Davis & Woods' P.A. is west of any southward continuation of the "main line."

Gold was discovered here by dryblowing about Christmas 1918 in a small gully which drains westward. At the point where the last prospects, coming up the north side of the gully, were obtained, a shaft is being sunk in a coarse gritty rock from which prospects are reported, and which is probably a highly weathered porphyry. Should this rock prove indeed to be the source of the gold on Davis & Woods' P.A., there is here a type of deposit quite distinct from the rest at Wallangie.

Patterson's P.A. lies south of Davis & Woods'. The workings, which consist of a pothole and a little trenching, lie in a bay in the breakaways. The best prospects have been obtained by dryblowing and loaming from a patch of about 200 square yards in the shallow layer of soil, gravel, etc., which overlies the decomposed schist. The gold obtained is said to include a fair proportion of the fine "mustard gold" generally found near the parent ore body. What is probably the west side of this body is formed by a quartz vein six inches thick with the usual north-north-westerly strike and westerly dip, and the prospectors are now trying to find whether there is any rich seam in a band of schists about 20 feet wide of which the quartz vein is the hanging wall.

Gates' Dryblowing Patch, from which about 150 ozs. of alluvial gold are said to have been won in the latter part of 1918 lies about 1½ miles south-east of Wallangie leases, on the west side of a ridge of ironstained schist in which about half a mile farther north prospects are said to be obtainable near a transverse vein of quartz. The gold at Gates' patch is reported to have come entirely from the top six inches of the red soil which is here about 15 feet thick. Whether this soil originates in one definite lode or comes from a number of very small dabs which would not be worth looking for individually is not of course known, nor is there any indication of the direction in which search should be made. Several 3oz. slugs and one weighing over 6oz. were found at this patch.

The foregoing description of the existing workings shows that—

(a) Gold has been discovered within the last nine months in a series of small deposits over a length of between four and five miles from Higgins' to Patterson's P.A., and a width of more than a mile from Patterson's P.A. to Gates' Dryblowing Patch. These dabs are probably a series of short parallel deposits scattered through the gold-bearing belt defined above. This belt is itself only a small part of a long strip of greenstone country which will be briefly described later in this report.

(b) Where "settled" country has been entered the dabs of gold are found to occupy highly sheared ironstained bands in weathered schists, but at Higgins' P.A. quartz veins which intersect one another and also intersect an ironstone "formation" are known to occur also, and at Davis & Woods' P.A. the gold-bearing rock is probably a porphyry.

(c) The amount of work yet done is too small and the structure of the country too much hidden by the covering of sand, soil, etc., to justify an expression of opinion as to the future of Wallangie as a mining centre. On the one hand the scattered occurrence of the "dabs" and their smallness are rather discouraging, but, on the other hand, the length of the line and the well sheared character of the country rock lead one to hope that payable ore bodies will yet be found.

(d) Prospecting has barely passed its initial stages at Wallangie. Ore bodies are most likely to be found in the first place in this difficult country by careful loaming in ground which has not more than a foot or so of overburden. The fact that the dabs so far found occur near the "ironstone" breakaway seems to show that the rocks bordering on the gold-bearing formation are more likely than any others, *in this part of Western Australia,* to weather into breakaways. Whatever be the explanation, it seems a practical rule that prospecting should be specially keen close to ironstone breakaways in this part of Western Australia.

General Geology.

In order that the character of the Wallangie Belt and its position relative to other gold-bearing belts may be understood, a short description of the general geology of the locality is added. In this description there will be found to be some repetition of statements made in the preceding section.

Wallangie lies in a belt of greenstone country about six miles wide which probably extends at least 12 miles south to Mt. Walter. If, as is likely, it connects to the north with a narrow belt (mapped by Talbot in Geological Survey Bulletin No. 45) which runs south-south-east from Lake Barlee, the belt has a length of about 150 miles. Another belt mapped by Honman runs east-south-east through Bungalbin (see Bulletin No. 71, Plates II. and III.) and would apparently join the Lake Barlee Belt about 15 miles north of Wallangie. Greenstone in the majority of cases carries the gold-bearing formations in this State, and it is probable that the neighbourhood of the junction of the two belts will, if not entirely covered up, be particularly worth careful prospecting. In fact, from the accounts of prospectors who have travelled along the belt, it is throughout its length worthy of thorough examination. Preliminary to this the country should be mapped so that the positions of tracks and waters,

besides the boundaries of the different formations, may be reliably marked for the use of prospectors.

The belt is, like all other greenstone belts in the goldfields, bounded on both sides by a broad expanse of granite which probably extends on the west for about 80 miles to the Koolyanobbing greenstone belt (see Bulletin No. 71), and on the east for about 100 miles to the Jaurdie Hills greenstone belt which has not yet been mapped. Further detail as to the granites is unnecessary here.

The greenstone belt at Wallangie is made up of very highly weathered, reddish brown or yellowish rocks, some—especially near the finds—being much sheared, others apparently not at all sheared. At the Breakaway Central P.A. the weathered greenstones in places contain very numerous small crystals of magnetite (magnetic iron) and I was given a piece of lodestone about one inch in diameter said to have been found in the same neighbourhood. The erratic behaviour of the compass at Wallangie points to the fairly widespread occurrence of magnetic iron here.

Below water level the rocks described above will be found to turn into greenish rocks of the kind known generally as greenstone—sheared in places, and in places unsheared.

The trend of the shear planes at Wallangie varies, but is generally north-north-east, the dip being nearly everywhere westerly at high angles (near 70°).

In a few places near the find, but not on the actual line of the gold deposits, are found outcrops of dark massive rocks which belong also to the greenstone series but which have not been as greatly weathered as those described above and which, therefore, appear at first sight to be younger and to be intrusions into the more weathered gold-bearing greenstones. A definite opinion on this point cannot be given at present, but in any case these rocks do not appear to have any close connection with the gold deposits and so are at present of little practical importance.

At Davis & Woods' P.A., as already remarked, a formation, locally spoken of as sandstone, is thought to be the source of the gold and is therefore of interest. A rock so highly weathered is almost impossible to identify with certainty, but it is most likely a quartz-porphyry dyke.

About 1½ miles east of the Wallangie leases is a line of low rises running in a north-north-westerly direction. These rises are comprised of ironstained schists and are commonly spoken of as jasper bars. These bars are probably only surface formations.

Iron Knob, a prominent hill 2½ miles north-north-west of Higgins' P.A., is composed of a well banded and, in places, contorted and brecciated jasper bar.

A feature of the finds is that they are close to a broken line of breakaways. So marked is this that, in default of more exact advice, prospectors will do well to give the ground close to such breakaways a good trial. The breakaways are made up of angular fragments of decomposed greenstone usually from one to three inches in length, cemented together by a white, or in places brown, matrix. This commonly-called conglomerate formation is not, like true conglomerates, made up of a compacted gravel in which the fragments are rounded and waterworn and which has been formed along a shore line by the mechanical action of water, but has been formed by the chemical action of water in weathering the greenstones. Further proof that the laterite is not a true conglomerate is afforded by the fact that the angular fragments are all disposed with their shear planes parallel to the course of the shear planes in the underlying greenstone—a coincidence that we would hardly expect to find in a consolidated gravel or true conglomerate.

10.—THE EMU G.M.L., MENZIES, NORTH COOLGARDIE GOLDFIELD.

(E. DE C. CLARKE.)

As instructed by the Government Geologist, I spent one and a half days in March, 1919, in examining the workings at the old "Emu" G.M.L. 5164Z, which is about five miles south-east of Menzies.* Brief reference to the Emu is made by H. P. Woodward in Geological Survey Bulletin No. 22, p. 72, etc.

The ore body on which the workings examined are situated has produced—according to the list of cancelled G.M. leases published by the Mines Department in 1918—a total of 1,367.27oz. from 530 tons since 1903. In March, 1919, a local syndicate had been prospecting for several months without success for a fresh make of payable ore.

The country in which the Emu vein lies is a rather coarse greenstone which is hard and very little weathered even close to the surface—a fact which increases the difficulties of mining. Less than a quarter of a mile west of the workings is a knoll of sheared granitic-looking rock which Woodward maps as one of his "Sericite mica quartzite and granite" group. Mr. Farquharson finds that specimens I collected from this knoll are fuchsite-andalusite schist. In the field it is noticeable that the margins of this rock mass are finer in grain than the central parts. This rock was, therefore, probably intruded into the surrounding greenstones and afterwards subjected to the same shearing process by which the latter were affected. This fuchsite-andalusite rock, therefore, while showing some petrological resemblance to the andalusite rock of Mt. Leonora, has a similarity in general aspect and in field relations to the foliated quartz-porphyries of the Leonora-Duketon district.†

The Emu reef is a very small seam of rich quartz striking approximately north and south and dipping west at an average angle of about 45deg. It was followed at the south end to a vertical depth of about 40ft. and at the north end about 10ft. lower. The rich ore is said to have been arranged in four distinct patches or shoots, though figures as to the limit of these shoots are not obtainable.

At the depths named above, the reef was found to "sit hard on a slide," beyond which it could not be found, though sought as follows by various men (see accompanying plan)‡:—Four crosscuts averaging about 30ft. in length were put out west from the 44ft. and 54ft. levels; a vertical winze was sunk to 35ft. and a 9ft. west crosscut put out from the bottom; two inclined winzes were sunk for 40ft. or more, following the underlie of the "slide"; the main shaft was continued through the "slide" on the former underlie of the reef to a vertical depth of more than 80ft. The "slide" may or may not be one continuous plane throughout the workings. In any

*See Map 2, G.S.W.A. Bulletin, No. 22.
†A Report on this District is now in preparation.
‡Not reproduced.

case it is one of the faults or groups of small faults so common near Menzies. The strike is approximately parallel to that of the reef, but the dip is the opposite direction, *i.e.*, east. In the Western Australian goldfields, a region of profound dynamic metamorphism, it is a good working assumption that all faults are reversed. Therefore in the Emu workings we should expect to find the reef continuing on the footwall side of the fault at a lower level than the point at which it was lost on the hanging wall side. Absolute certainty as to whether this is indeed a reversed fault and, if so, whether "below" will mean a few inches or hundreds of feet are of course points of great practical importance which could only be determined were the workings situated in country composed of bands of various distinct kinds of rock.

On the assumption then that this is a reversed fault it is clear that either the continuation of the reef on the footwall of the fault has been missed in the winzes or that it lies at a greater depth than they reached. Two of the winzes follow down on the fault plane, and in them the downward continuation of the reef might easily be missed in the broken country which so frequently borders faults. Crosscutting either east or west at the level at which the reef was cut off, or continuing the main shaft through the fault plane in the former underlie of the reef are clearly useless (see cross section on accompanying plan).*

If the reef has not been missed in the three winzes then either it has been displaced downwards so far that, having regard to its smallness, it is not worth looking for, or else the displacement has been in the opposite direction and the fault is a normal one.

At the north end of, and about five feet below, the 54ft. level a small patch of rich ore was obtained some years ago, and at this point there appears to be a west-dipping track which I believe to be the downward continuation of the Emu reef, and accordingly I advise further exploration here. In the event of the "track" cutting out, the sides of the vertical winze at the south end of 44ft. level should be carefully examined, as it is possible that the continuation of the reef was missed there. Many leaders of glassy quartz, carrying no gold and dipping west very flat, occur at the lower level of the Emu, and, at any rate in the northernmost crosscut have been followed under the mistaken idea that they are the continuation of the Emu reef. They should be easily distinguishable from the Emu reef by their flatter underlie, and by the different nature of the quartz, to say nothing of their utter barrenness. Failing all attempts on the lines above indicated there is the very forlorn hope that the fault is a normal one. In this case careful examination of the west crosscuts, where the continuation of the reef might very probably have been missed and their continuation westwards would be the best way of finding the lost ore body.

11.—GEOLOGY AND ORE-DEPOSITS OF NEW COMMODORE G.M., MEEKATHARRA, MURCHISON GOLDFIELD.

(E. DE C. CLARKE.)

1. *Introductory.*—At the suggestion of the management of the New Commodore G.M., I was instructed to examine their mine for the purpose of noting any new features disclosed by developments subsequent to the geological survey of Meekatharra made in 1914, and, if possible, of suggesting lines of work which showed reasonable prospect of success. Accordingly, I spent March 26-31 mainly in re-investigating the geology and ore-deposits of the New Commodore G.M. In this work I received all possible help from Mr. F. L. Bell, the manager.

When, in 1913-14, I previously examined the Commodore (now New Commodore) G.M. it was producing ore, although developments at the 400ft. level were disappointing. At the end of 1916, owing to lack of promise at the lower levels, underground work ceased on the property; but the Company acquired the neighbouring Macquarie lease and hoped to keep the plant working at the treatment of ore from that mine. However, it was found that, although the Macquarie lode maintained its size, it was too low grade, having regard to its refractory nature, to pay for treatment. It was therefore decided to explore the south end of the 300ft. level in the Commodore mine in the hope of picking up the northern continuation of two ore bodies found in about September, 1917, in the Ingliston G.M., the property adjoining the Commodore to the south. These ore bodies were styled the East Lode and North-East Spur respectively in the Ingliston G.M., and will be so designated in this report. In April, 1918, the Commodore having been unwatered, a crosscut was put out from the south end of the 300ft. level and the north end of the N.E. Spur was found. At the 400ft. level, moreover, the track of the East lode was followed southward and a rise put up which cut this track at its junction with the same N.E. Spur which dips west also but at a smaller angle than the East Lode. The lode matter at the junction is said to be almost valueless. Moreover, the N.E. Spur when winzed on from the 300ft. level at the south boundary of the Commodore lease gave evidence of lensing out northwards.

A south-east crosscut at the 400ft. level cut a pocket of good ore. Very little work was done to determine whether or not this pocket was part of a larger formation.

The above, together with further northward driving at 400ft. level and the extension of the long E. crosscut from No. 1 level, are the main additions to the mine workings since 1914.

2. *Geology and Ore Deposits of Paddy's Flat in relation to New Commodore G.M.*—In order that the position and possibilities of the Commodore G.M. may be appreciated, it is well to describe as briefly as possible the geological features of the neighbourhood.

According to Geological Survey Bulletin No. 68, the Commodore G.M. lies near the north end of the Paddy's Flat Belt of workings (see Fig. 1). The bulk of the rocks of this belt are "greenstones," a term which covers in this case a considerable variety of rocks dovetailed together in a complicated fashion but all formed from one or other of two groups of rocks, dolerites or peridotites, by mechanical and chemical alteration, and therefore separated into two main sub-divisions. Alteration varied in character and amount from place to place and so gave rise to a variety of end-products—the different "greenstones" of the belt. In Fig. 1 the two main sub-divisions are coloured respectively pale green and pale blue.

In the southern part of the belt, which has of late years been the most productive, one main lode channel in these greenstones has been followed. The channel everywhere lies close to a dyke of albite quartz-porphyry (the Paddy's Flat porphyry dyke).

* Not reproduced.

This albite-quartz-porphyry dyke was in all probability intruded into the greenstones just a little before the gold-bearing solutions, which were the last emanations from the same parent mass of molten acid rock as the porphyry. Experience proves that the search for the main line of lode in the south part of Paddy's Flat Belt should be confined to the greenstones close to the porphyry.

In the north part of Paddy's Flat belt conditions are more complex. Thus, in the Ingliston Extended workings the main lode channel, still clinging to the porphyry, is smaller, and neither it nor the porphyry has been encountered in any workings more than 1,300 feet north of the Ingliston Extended Faithful Shaft. Another lode formation—the "Mud Lode"—250 feet east of the main lode channel, was worked in the Ingliston Extended G.M., where it is interfered with by an intrusion of basaltic dolerite much later than any members of the gold-bearing series of rocks. A lode worked in the Macquarie G.M.L. may be the northern continuation of the Mud Lode.

Another porphyry dyke (the Halcyon) is found about 800 feet north of the last-known occurrence of the Paddy's Flat Dyke, and is found thence at intervals to the east of the Commodore workings and as far north-west as the Halcyon Extended workings. It is therefore mapped as a continuous dyke from the Ingliston to the Halcyon Extended. The Halcyon dyke is described as a chloritised albite-porphyry in Bulletin 68, and is regarded as distinct from the Paddy's Flat Dyke. It shows a remarkable amount of variation in character, some specimens being so basic that they seem more like greenstone than porphyry. Specimens from the Commodore G.M. workings were only identified as porphyry as a result of Mr. Farquharson's microscopic work. The examination of specimens collected this year leads Mr. Farquharson to regard this rock as, after all, the same as the Paddy's Flat porphyry, and recent disclosures in the Ingliston G.M. point to the likelihood of the two dykes being continuous in the field, somewhat as indicated on Fig. 1.

To add to the complications of the north end, the ore bodies and geological surroundings of the Ingliston and Commodore G.Ms. seem distinct from those of the mines in the main section of Paddy's Flat Belt. In the first place, the ore bodies of the former are not in alignment with those of the latter. Other differences may be thus tabulated:—

No.	Main (South) Section of Paddy's Flat Belt.	Ingliston and Commodore Gold Mines.
1	Strike of ore body generally N.N.E., with spurs of minor importance striking N.W.	Strike in Commodore N.N.E. In Ingliston a N.N.E. system is recognisable, but a system of spurs striking N. or West of N. is of great importance.
2	Dip of ore bodies East ...	Dip West (except near surface in Commodore E. Lode).
3	Ore bodies clearly associated with Paddy's Flat Porphyry Dyke.	No apparent connection with Halcyon Porphyry Dyke.
4	Fuchsite quartz Carbonate rock developed near Paddy's Flat Porphyry Dyke.	Stronger development of fuchsite rock, although the porphyry Dyke responsible for its formation is not nearly as prominent as in Paddy's Flat Dyke.

Despite these differences, however, the lode material in the Commodore is very similar in character to that from some parts of the main lode at the South end.

In the Commodore G.M. there are generally recognised to be two main lines of lode which are parallel and about 60 feet apart. In the Ingliston G.M., now that the intricacies of shallow workings are giving place to more systematic exploration at greater depth, there appears to be a main west-dipping lode channel continuous with the Commodore east lode, and giving out several spurs which have in general a north-west strike. In the lease to the north (the Old Commodore North) no continuation of the two Commodore ore bodies has been found, but two, or perhaps three, lines of lode of a different character have been worked. Of these, the eastern lies on the side of, or in, the Halcyon dyke, and must, if it extends south, lie east of the two Commodore ore bodies; the western is a fine-grained yellow or bleached rock with small irregular quartz stringers (said to carry all the gold); within the last year an ore body has been opened up in Commodore North Shaft V. Practically no work which would go to define the ore body or make its course clear has been done. At present it appears to have the same characteristics as the west ore body, but to be striking north-east.

3. *Geology and Ore-Deposits of New Commodore G.M. in the light of recent developments*:—

(a) *Country.*—The rocks of the Commodore G.M. are difficult to map or describe accurately, because in this mine is shown in marked degree that gradual transition of one type of greenstone into another, which is a feature of the Belt. Indeed, it is only by the aid of the miscroscope that the two *main* types of rock (altered dolerite and altered porphyry) occurring in the mine can be distinguished. The value of detailed petrology when applied to practical mining is exemplified here, for, if the assumption be correct that there exists in Commodore ground, alongside a porphyry dyke, an ore body as yet barely touched, it is obviously of great importance that the management should be perfectly clear as to the whereabouts of this porphyry in their workings and be able to make sure of its identity when they encounter it in new work.

Practically all the Commodore workings lie in highly altered rocks which were originally dolerites. The chief types represented are talc-chlorite-carbonate rock (in some places, particularly the north end of 400ft. level, very strongly sheared), fuchsitic rock, and chloritic slates. The distribution of these varieties is shown on the accompanying plan of the mine (Fig. 2),* in which the levels are separated; for detailed descriptions of the rocks Bulletin 68, pp. 134-5 and the further references there given may be consulted.

The chloritised albite-porphyry dyke was mapped in Bulletin 68 on rather scant evidence, but that its general course was correctly guessed is shown by the subsequent mining work in the Commodore and Ingliston G.Ms. The most southerly point at which it has been recognised is in the cross-cut at 200ft. level in the Ingliston Mine, the rock from which closely resembles the green pyritic form of the Halcyon, dyke [1/308] found on 170ft. level in the Halcyon Extended workings (Bulletin 68, p. 132). It is unnecessary here to go into detail regarding the occurrence of the chloritised albite-porphyry in the Commodore G.M. as the course of the dyke is shown on the accompanying plan of the mine. The long east

* Not reproduced.

cross-cut near the north end of No. 1 level, in which, in 1914, I probably overlooked the occurrence of the dyke, is now inaccessible, but I show it in this cross-cut on information received from Mr. F. L. Bell.

(b) *Ore bodies.*—The *West Lode* is a quartz vein dipping west steeply. Little ore has been obtained from it below a vertical depth of 200 feet. Followed south, the track of the lode is poorly defined in the chloritic slates; northwards at the west cross-cut on 300ft. level about 200 feet north-east of the main shaft the track probably follows a more northerly course than that taken by the drive. At 400ft. level no attempt has been made to find this lode, but at the plat is a formation 6 feet wide consisting of quartz veins lying in sheared carbonate rock which strikes north-north-east and dips east at 55°. Whether or not it is the downward continuation of the west lode which has rolled over between 300ft. and 400ft. levels, and although, so far as I can learn, it is valueless at the plat, it is strange that no driving on this formation has ever been done.

The *East Lode* is a "formation" consisting of quartz veins and stringers. Payable ore from the East Lode comes almost entirely from the south part of the mine, and values are reported to have cut out, at a depth of 250 feet, on a flat head carrying a foot or so of oxidised material; but the track of the ore channel is well marked throughout 400ft. level, although payable ore at that depth is found only in a few small patches. On page 140 of Bulletin 68 mention is made of the East Lode of the Ingliston G.M. Subsequent mining has shown that this is continuous with the main east ore channel of the Commodore.

A drive south 40 feet below the 400ft. level from the winze near the north end is said to have been in values. Clearly the only way to prospect the east lode satisfactorily is to sink the main shaft another 100 feet, cross-cut (probably only about 10 feet) to the lode channel and drive along it.

M Lode.—Since Bulletin 68 was written tributers obtained a small parcel of good ore in workings about 20 feet deep in M shaft. The rocks are too weathered at this depth to be identifiable, but since they show the characters usually assumed in the Paddy's Flat Belt by greenstones which have been altered by the intrusion of a porphyry dyke and which have subsequently been weathered, it is probable that a porphyry dyke is near by. The east cross-cut from No. 1 level (which is out 500 feet east of the main drive) passed, between 224 and 268 feet out, *i.e.*, in the part where it was almost below M shaft, through "blocky" country which Mr. Bell regards as porphyry. In this locality also 10s. values —the highest in the cross-cut except near the east lode—were encountered. In recent work at south end of 300ft. level an east-dipping make of a mineralised formation with much arseno-pyrite was disclosed, but not followed down. In the corresponding place at 400ft. level, *i.e.*, at the south-east end of the drive, a make of good ore apparently dipping east was discovered. At both the 300ft. and 400ft. levels the formation was in close contact with carbonated albite-porphyry.

I regard the four discoveries detailed above as being on one line of lode which has formed along the southern continuation of the Halcyon albite-porphyry dyke and as being the same line of lode as that opened up some years ago in Commodore North Shaft II. workings (Bulletin 68, p. 132).

Spurs.—In the Commodore, as in the Ingliston, a large proportion of the higher grade ore is yielded by spur reefs. In the Commodore, besides those spurs described in Bulletin 68, p. 138, the north end of a spur, spoken of in this report as the north-east spur, has been discovered. Exploratory work on it in the Commodore shows that values are lensing out northwards. What is apparently its junction with the main east ore channel has been found in a rise from the south end of 400ft. level, and certainly deserves further prospecting. As will be seen from the cross section at the south boundary of the Commodore G.M.' (Fig. 3), the north-east spur appears to be a link between M lode and East lode—the former being perhaps "blind" in this part of the field. At the same time it will be noticed on Fig. 3 that, if the east-dipping surface portion of the East lode be produced, it will come out at the 300ft. and 400ft. levels not far from the positions occupied by M lode. It is quite possible then, since there has been so little prospecting work east of the East lode at the south end of the Commodore, that split in the ore channel occurred unnoticed a few feet above No. 1 level, and that the body which has been mined thence downwards as the east lode is a large spur off a body which would then be identical with M lode.

In Bulletin 68, page 138, reference is made to cross-faults in the southern portion of the Commodore G.M. Examination of the later Commodore workings inclines one to the opinion that cross-faulting in this part of the field is not confined to one or two planes but rather that there is here a zone of cross-jointed fuchsite-carbonate rock in which, though the track of the lode channel is in most places marked and pursues its course with little deviation, there has been little or no gold deposition. The approximate north, west, and south boundaries of this patch of barren country are known, but, except for the fact that at the east end of the main crosscut, 400ft. level, a sheared rock occurs, we know nothing of its eastern limit and therefore do not know whether the supposed M lode will be affected by it.

4. *Questions asked by Manager and answers to them.*—In order to free practical conclusions from the various considerations by which they are reached, this report is best ended by quoting a list of questions framed by the Manager (Mr. F. L. Bell), and my replies thereto:—

(1) Do you regard the N.E. spur vein of the 300ft. level in Ingliston mine, and which has been worked through to the Commodore, as a branch of the East lode; or is it the junction of a separate ore body, which may extend upwards to the east of the present workings?

I regard the N.E. vein at the 300ft. level in the Ingliston G.M. as a spur off the main East lode. I consider that this spur, like all other spurs encountered in the Commodore and Ingliston workings, does not continue to carry payable ore for any great distance from the main body. Therefore the N.E. spur is not to be expected to be worth working for more than a few feet above and east of the south end of the 300ft. level in the Commodore G.M. Moreover, it will probably taper out rapidly north of the boundary winze on the 300ft. level. There is further reference to this spur in section 3.

(2) Is there any connection between the above-mentioned spur vein and the lode that cut out in the Commodore at about 250ft. in depth?

The ore body in the Commodore G.M. in which values cease along an oxidised seam at a depth of about 250ft. about 300ft. S.W. of the main shaft is the main east lode and therefore is not the same body as the spur vein referred to in section 1. There is a further want of resemblance between the two bodies in that, whereas on the main east lode values cut out along a head carry-

ing iron oxide, in the N.E. spur vein they die out for no visible reason. I consider the cause for the dying out of values in the N.E. spur to be increasing distance from the main route (*i.e.*, the main east ore channel) by which the gold-bearing solutions ascended.

(3) In view of the lode losing its gold content in the boundary winze at 360ft. and of there being no values in the rise from the south end of 400ft. level (though the lode is strong); do you consider that further work at depth is justified on this body?

The ore body in the boundary winze at the 300ft. level is the N.E. spur vein referred to in section 1, and, for the reasons given there, I do not consider it likely to yield a large quantity of ore. However, its junction with the main east ore-channel which is disclosed in the rise at the south end of No. 4 level is in a good-looking formation which, though barren at this point, is, judging by the behaviour of spurs in other parts of the Commodore G.M., likely to yield a good parcel of ore. In order that the payable stone in the boundary winze, and that in the back of the stope just above the 300ft. level, may be won, it would be best to connect the No. 4 level with the boundary winze, and if this could be done by driving along the junction disclosed in the rise at the south end of No. 4 level (I mean if that is practicable from a mining point of view), it is quite possible that good ore will be discovered further south on or near this junction. The continuation then, perhaps by a rising drive, southwards of the No. 4 level to the boundary is all the actual exploration that the N.E. spur deserves.

The Manager's third question also refers to the advisability or otherwise of further work at depth on the track of the main east lode which is well defined at the south end of 400ft. level:—At present further work is not called for in this direction. This is not because all hope of further makes of ore at greater depth on this west dipping track of the main east body must be abandoned, but because other developments, which will be spoken of later, show greater promise just now and because further and deeper work in the Ingliston G.M. on the East lode may be expected to throw light on the character of the same body in the Commodore G.M. and should therefore be awaited.

(4) Has the small patch of ore located in the S.E. cross-cut at 400ft. level any relation to the ore body worked at 300ft. level close to the Ingliston boundary?

Data regarding the small patch of ore located in the South-East cross-cut on the 400ft. level are very scanty at present. In my opinion, however, the track of the same make of ore occurs at the 300ft. level on the east side of the drive near the boundary winze. Here a make of mineralized rock and also a calcite vein dipping east are to be seen. I regard the N.E. (Ingliston) spur (section 1) as a link connecting the west dipping east lode with this east dipping east body, lying east of the east lode which I shall refer to as the M lode. Judging by its position on the general plan, this discovery in the 300ft. level is the top of a "blind" portion (*i.e.*, a part which does not, and never has come to the surface) of the lode, though it is on the other hand possible that the junction of M lode and east lode takes place above No. 1 level and was overlooked.

(5) Do you regard the faulted zone met to the south end of the mine as pitching north and increasing in size and in depth?

The track of the east lode passes with little or no disturbance through the "faulted zone," as may be seen both by examination underground and by the alignment of the east lode in the Commodore and in the Ingliston (north and south of the "faulted zone" respectively). We must, therefore, conclude that this is not strictly speaking a faulted zone at all but rather a belt of country in which, although the track of the lode persists, there has been little if any deposition of gold. I believe that the chief reason for this is that owing to the blocky nature of the country and the coarse heads running in various directions, the gold-bearing solutions were dispersed and not gathered into one definite channel. However, whether this zone is called a faulted zone or not, the fact remains that the ore deposits do not live through it. It appears to me that this zone of probably barren rock has widened at the 400ft. level and extends about 300ft. N.E. of the main shaft. Its southern edge is, however, 40 or 50 feet further north at the 400ft. level than at the 300ft. so the mine is gaining in kindly country at the south end with depth. Moreover, we have practically no information as to the width of the barren zone east of the Commodore workings and therefore do not know whether or not the M. lode has to contend with much of it.

(6) Is there any probability of a strong body of porphyry being discovered to the east of present workings and, if so, is there a probability of a lode forming in the contact of northern body of schists with the porphyry, and in the event of such a lode being possible, where would you advise prospecting for it?

From the results of my detailed mapping of the neighbourhood of the Commodore, together with the character of rocks in part of the 300ft. level, and of the highly weathered country exposed in shaft M, there is a strong probability that a dyke of chloritised albite porphyry lies just east of the present Commodore workings. The presence of so much fuchsite rock in the Commodore increases the probability that there is a porphyry dyke near by—experience along the Fenian line shows that fuchsite rock is developed only near porphyry. Whether or not the dyke will be "strong," *i.e.*, large and well defined, east of the Commodore cannot be foretold, but judging by the great development of fuchsite rock, I am inclined to answer this part of the question in the affirmative.

There is a strong probability, judging by its character further north, that either the Halcyon dyke will itself be gold-bearing, as in the Halcyon Extended workings, or that, as in the lease just north of the Commodore, lode-bearing material will be developed along one or both of its edges. Whether this dyke will be in contact with schists as the Manager's question implies or with fuchsite rock it is impossible to foretell, but in any case if the porphyry is the source of the gold this will not be of very great importance.

Considering the possible extent of the "barren zone" (section 5) north of the "small patch" on M. lode referred to in section 4, which is probably the beginning of a lode in or in contact with a porphyry, it is clear that exploratory work, as distinct from development work actually following values, at the south end of the 400ft. level is not advisable. Of course the continuation north and south of the S.E. end of the 400ft. level with rising or winzing on values is the first thing to do in developing M lode. Should values cut out at this south end search for the northern continuation of the lode, either at the surface near M. shaft (where a small patch of good ore was got by tributers—hence the name M. lode), or on No. 1 level in the long east cross-cut—where low values are recorded—or at the north end of 400ft. level in the soft chloritic schist and from the end of the main cross-cut of 400ft. level, should be undertaken. As implied in my general account of the geology of Meekatharra, I do not think the Commodore West lode has had a fair trial, but remarks on prospecting for it are hardly called for.

(7) With regard to the Macquarie leases, is there any reason to expect that the same refractory nature of the ore body will continue in depth or will ore become more amenable to treatment?

I have no direct knowledge of the latest developments on the Macquarie G.M., but from what I can gather as to the character of the ore deposit, I can see no reason to expect that it will become less refractory at greater depth.

5. *Conclusions.*—Perusal of the questions and answers above and of the more detailed preceding sections make it clear that there are several reasonable chances of the occurrence of payable ore deposits as yet untouched in the Commodore G.M. These occurrences can be proved or disproved by a comparatively small amount of work. To make matters clearer, I indicate roughly on Fig. 2 in red the direction in which exploratory work is warranted. It is likely that some of my conclusions will require alteration as the work proceeds, and these alterations may necessitate a different order of procedure or even point to other possibilities for the mine not even suggested in this report. Summarising, however, I consider the order in which the work is called for is—

I.—Exploration of M lode laterally by—

(1) Driving at south end of 400ft. level.

(2) Winzing between 300ft and 400ft. levels.
(3) Continuing main crosscut of 400ft. level.
(4) Crosscutting at north end of 400ft. level.
(5) Prospecting between surface and No. 1 level.

II.—Exploration of junction of N.E. spur and E. lode from rise at South end of 400ft. level.

III.—Exploration of E. lode at depth by sinking main shaft.

IV.—Exploration of formation of plat, 400ft. level.

V.—Exploration of W. lode laterally by driving from cross-cut, 300ft. level, 200 feet N.E. of main shaft.

12.—KEARNS' WORKINGS ON OLD COMMODORE NORTH LEASE, MEEKATHARRA, MURCHISON GOLDFIELD.

(E. DE C. CLARKE.)

In accordance with instructions from the Government Geologist, I examined on March 28th Kearns' workings, which are in Shaft V on the boundary between the old St. Francis (773N) and Commodore North (619N) leases.

Summarising from G.S.W.A. Bulletin No. 68, Plate XIII., Sheet 4. and pp. 131-132, we find that up to 1914 a considerable amount of work had been done off this shaft. A large "formation" (consisting of a fine grained yellow, or in places bleached, rock with small irregular quartz stringers, which are said to carry all the gold), had been located and was mapped by myself after examination of all the old workings, as running in a direction slightly east of north.

Mr. Kearns' work consists of an irregular gouging of the northern and eastern sides of the shaft at about 80ft. vertical depth—though a good deal of these sides had been stripped before his advent—and the putting in of a 30ft. drive in a north-east direction, a 15ft. drive south-west, and a crosscut south-east, for about 25ft. I call these drives and crosscuts respectively, in accordance with Mr. Kearns' ideas, he considering that the lode formation has a north-east strike. This formation has the same characteristics as that described above; the quartz leaders undoubtedly carry high values, and Mr. Kearns considers that the whole formation, of which he has over 250 tons at grass, will average 10dwts. of gold per ton. Others with a longer experience of the St. Francis and Commodore North consider this an optimistic forecast, to put it mildly.

As things are at present, the only indisputable fact pointing to the existence of the large body of ore which Mr. Kearns contends he has discovered is, that quartz leaders netting the soft yellow weathered country at about 80 feet vertical depth in shaft V carry visible gold and yield good prospects on dollying. The width, strike and dip of the zone—if it is a defined zone—of country in which the leaders occur and the average gold content even of that part of the zone which is exposed, are all matters of conjecture. Judging by the position of Mr. Kearns' work, he would certainly appear to be on a distinct branch of the "West Lode" of Bulletin 68, Plate XIII., Sheet 4, though it is remarkable, if a large lode exists near the shaft, that it was not discovered in the several drives or crosscuts which my plan shows to have been in existence in 1914. In any case, the amount of development work done on this assumed newly discovered body is clearly so small that the erection of any treatment plant is quite unwarranted at present. The obvious thing for Mr. Kearns to do is to have the ore crushed at the State or some private battery (I understand that arrangements might be made to crush at the New Commodore G.M., which is close to the workings), meanwhile, pushing ahead with exploration work so as to define, in some degree, at any rate, the course, size and tenor of the ore body. Mr. Kearns judges from the character of the ore that there will be about 5dwt. of gold per ton in the tailings, from which, if he has his ore crushed at the State Battery, he believes he will clear only about 2s. per ton, and he expects to clear 11s. 6d. per ton on the whole of the ore now at grass after paying carting and crushing expenses, out of which, 11s. 6d., costs of mining, etc., have to be met. All this, however, does not affect the fact that, as things are at present on this show, the erection of any treatment plant would be quite premature.

13.—SUMMARY OF NEW GEOLOGICAL FEATURES NOTED AT MEEKATHARRA, MURCHISON GOLDFIELD, MARCH, 1919.

(E. DE C. CLARKE.)

The following is a summary of the new features in mining and geology which were observed during a visit to Meekatharra, made primarily with the object of examining the New Commodore Mine.

Gwalia Mine.—This mine, at the south end of Paddy's Flat has put out some rich ore since the publication of Bulletin No. 68. This ore has been obtained from a small leader dipping west, which is referred to in Bulletin No. 68, p. 165. This is evidently not the main lode-formation, but is probably a spur vein off it, the main formation probably lying farther west and nearer the porphyry than is shown on sheet 8, Plate XIII, Bulletin No. 68. The country at the lowest level (1,250 feet) in the Gwalia is carbonate rock seamed with fuchsite.

Three or four shafts which were inaccessible to me have been sunk between the Gwalia and the Marmont Extended in an unsuccessful attempt to pick up the continuation of the Gwalia Extended make of ore.

On or near old Clarence G.M.L. (871N), south of the Gwalia, several shafts have been sunk to find the southern continuation of the Gwalia make of ore, but these have been unsuccessful. Prospecting work is proceeding a little west of the above in a more favourable locality—though hardly far enough west to cut the Paddy's Flat porphyry—which in prospecting this part of the country should, as a general rule, be first located. The country being sunk in is probably decomposed fuchsite rock.

Ingliston Consols Extended.—Workings near the northern boundary of this property have found the northern continuation of the Fenian-Consols lode clearly associated with the Paddy's Flat porphyry dyke.

North End of Paddy's Flat.—This part is dealt with in some detail in reports on the New Commodore G.M.L. and on new developments on the old Commodore North G.M.L. The two points of most general interest are:—

1. The proving of the southward continuation of the Halcyon chloritised albite-porphyry dyke to a point about 220 feet east of the Ingliston main shaft.

The gap in the field between the Halcyon and Paddy's Flat porphyry dykes is thus considerably lessened; moreover, Mr. Farquharson's microscopic examination of specimens from the south part of the Halcyon dyke leads him to conclude that the two dykes are composed of similar rock. Putting these two independent results together, it appears highly probable that the two dykes form one continuous body in the field.

2. Latest developments in the Commodore (now New Commodore) G.M. indicate the possibility that a lode-formation, as yet barely touched, is developed in close association with that part of the Halcyon porphyry dyke which lies in Commodore ground.

Pioneer G.M.—Prospecting here has lately resulted in the discovery of another reef between the "middle" and east reefs and parallel to them. This reef was discovered by driving along a spur vein, and its position has been marked on the original 100ft. plans filed in the Geological Survey Office. The parts explored do not carry gold in payable quantities.

Peridotite.—Specimens (C. 38) obtained from the dump of a shaft close to the north-west peg of the Macquarrie lease prove to be augite-olivine serpentine derived from a peridotite. The mapping of this part in Bulletin No. 68 as carbonate rock of peridotitic origin is thus corroborated.

Use of Geological Reports and Surveys.—Considerable use has been and is being made of Bulletin No. 68, more particularly of the detailed plans, which it is satisfactory to know are neither too large nor too elaborate for practical purposes. However, not enough attention is given to the written matter of this Bulletin by those for whom it is primarily intended—which is regrettable, since all the useful information which has been collected cannot be conveyed by maps and plans alone. It is suggested that, to make the mining community of any centre really conversant with those geological facts which bear on mining in the locality, it might be arranged to hold one or more meetings in the district concerned after a report is ready for the press. At these meetings the finished results of the survey would be explained, and thus the "lectures" given immediately after the completion of field work and before more exact results are available would be supplemented, but not supplanted.

14.—GEOLOGY OF PAYNE'S FIND (GOODINGNOW)—YALGOO GOLDFIELD.

(E. DE C. CLARKE.)

Payne's Find is about 100 miles south of Mt. Magnet, but in spite of its remoteness is a fairly prosperous centre, the deposits being well suited for exploitation by small parties. According to the official statistics Payne's Find, which was discovered in the year 1911, has been responsible up to the end of 1918 for 22,198.62oz. of gold, obtained by the milling of 20,510.81 tons of ore, in addition to 575.72oz. of alluvial, dollied and specimens.

Payne's Find lies near the south end of what is apparently a small lens of greenstone, which is probably surrounded by granite.

The greenstone country in which the ore-bodies occur is probably a hornblende or biotite-gneiss, rather resembling that of Westonia. This rock is cut by a series of gold-bearing quartz veins, generally with northerly strike and rather steep westerly dip, and by a number of narrow pegmatite dykes with a north-westerly strike and a flat westerly dip. Both quartz veins and pegmatite dykes are thin and can be traced for considerable distances—in some cases 20 or 30 chains. The pegmatites cut through and displace, and are therefore younger than, the gold-bearing quartz veins. In many of the quartz veins gold occurs in shoots only a few feet in length, but persisting with a southerly pitch to relatively considerable depths—in at least two places over 200 feet.

Further reference to the geology of this centre is unwarranted until petrological work on the collections has been done.

15.—GEOLOGY OF ROTHESAY—YALGOO GOLDFIELD.

(E. DE C. CLARKE.)

I spent about three weeks in examining the surface geology and underground workings of this centre, discovered in 1894, to which the attention of mining men is now reverting.

The country is mainly fine-grained greenstone, in places strongly sheared, in others apparently massive, the massive portions forming low ridges with a general north-westerly trend. Whether or not the massive and sheared greenstones are one rock mass which has been sheared more thoroughly in certain parts cannot be established by field evidence alone. Possibly when petrological results are available the matter will be settled. It is of more than mere "academic interest," for, in the event of a revival of mining at Rothesay, intelligent development will depend largely on a correct understanding of the true nature of the hard bars of apparently massive rock which form the cores of the ridges.

Small areas of rock which I believe to be serpentine and a few dykes of pegmatite complete the list of rocks found at Rothesay.

The gold occurs in quartz veins which strike north-west (parallel to the shearing of the schistose greenstone) and dip east at angles usually between 45deg. and 70deg. At least six lines of veins are distinguishable, of which that worked in Woodley's Reward G.M. is the longest, being traceable for nearly a mile. Up to the end of 1918 Rothesay had yielded 3,298.02 oz. of gold from 8,966.00 tons of ore.

16.—GEOLOGY OF MELVILLE (NOONGAL)—YALGOO GOLDFIELD.

(E. DE C. CLARKE.)

Five weeks' work at this deserted centre, which is about ten miles north of Yalgoo, sufficed to obtain data for a geological map on a scale of 5 chains to 1 inch, but probably six months' work would be required if detailed mapping of its intricate geological boundaries were desired.

The Melville country consists of greenstone traversed by a very large number of porphyry and pegmatite dykes, which in contrast to those of Payne's Find and Rothesay are by no means parallel but form a complicated network. Moreover, it is probable that the gold-bearing quartz veins are merely offshoots of the acid dykes, and not a distinctly older series as is the case at Payne's Find.

The pegmatite dykes and associated quartz veins of Melville are the home of a number of valuable or uncommon minerals, including scheelite, bismutite, bismutosphaerite, bismuthinite, molybdenite, corundum, and ilmenorutile.

Bismuth ore was mined about two years ago in a very small way, but with satisfactory results for the prospectors.

Melville being easily accessible from the railway station of Yalgoo deserves very much more attention from the base-metal prospector, for there is in its vicinity, particularly north-east of the townsite, a considerable area in which careful search is almost certain to disclose deposits of economic value.

Gold was first reported from Melville in 1894. From that time to December, 1918, this centre had produced 2,046.30oz. from 3,373.45 tons of ore, and in addition 92.38oz. of alluvial, dollied, and specimen gold.

From July, 1915, to November, 1918, 1,932½lbs. of bismuth ore, valued at £472 0s. 2d., was produced at Melville.

17.—SELECTION OF BORE SITE IN IRWIN RIVER.

(E. DE C. CLARKE.)

A week in November was spent at the Irwin River in selecting a site for a coal bore in accordance with my recommendations in last year's Annual Report, and in making further surveys which enable the logs of several old bores to be co-ordinated and thus increase our knowledge of the stratigraphy of this locality. I was directed to select a site at which the coal-bearing horizon would be cut at 500 feet, but, owing to the small amount of evidence as to direction of strike and amount of dip, it is impossible to be certain regarding the exact course of the coal-bearing horizon underground. It is advisable, therefore, that the plant erected on the chosen site should be capable of boring to 700 feet.

18.—RESERVOIR SITE NEAR ERADU.

(E. DE C. CLARKE.)

Fears having been entertained that the new reservoir site for the Geraldton water supply in Wicherina Brook near Eradu, on the Geraldton-Mullewa Railway, would prove leaky owing to the supposed presence of "faults" and of a bed of sandstone dipping down stream, the Government Geologist was requested to have the question investigated.

According to Bulletin 38 (G.S.W.A.) the proposed reservoir site lies in Jurassic strata, which W. D. Campbell states to be mainly sandstones with a minor portion of clayey rocks. The beds show rapid variation from the sandstone phase to the clay phase from place to place, although sandstone is the predominant rock of the formation. It seems unnecessary to enter here into a disquisition as to how such variations, common in shallow-water sedimentary rocks, come to pass.

Results of boring in Wicherina Brook show that clayey rocks are more common here than in most Jurassic areas in the neighbourhood (judging from Campbell's report), and also that rapid variation in the character of the beds occurs.

Boring shows that the rocks underlying the lower (down-stream) part of basin to a depth sufficient for practical purposes are in the main clays or shales of good holding capabilities. The few seams of sand or sandstone which occur are too small and discontinuous to be feared as avenues for leakage. It may be remarked here that the "indurated shale" or clay which is found almost invariably overlying the "blue shale" (probably carbonaceous) is merely a weathered phase of the blue shale.

Below the proposed embankment site the clayey rocks give place in a very short distance to sandstones, but, in my opinion, there is no likelihood of there being a fault in the geological sense occurring in this neighbourhood. In any case, as the embankment will be well up-stream from this sandy phase, it will not be affected by the change in country.

However, in the up-stream part of the dam site, above bore 18, clayey rocks cease to predominate, sandy rocks taking their place. Do these sandy rocks indicate a sandstone layer underlying the clayey rocks of the lower part of the dam site dipping down-stream under them, and so affording a means of escape for the water when dammed?

To elucidate this point it is only necessary to draw section-lines in various directions across the basin and on these sections to plot the bore data in their correct positions. Study of such sections shows that there is no evidence of a continuous bed of sandstone underlying the clays and shales, but that the sandstones and clays are merely the local variations to which reference has already been made.

Again, the only reliable strike and dip I could obtain shows that the beds strike north-north-east and dip west at about 3deg., so that Wicherina Brook runs along rather than across the strike of the strata.

It would be advisable to test further the ground between bores 26 and 18 and see whether or not the sand of 26 passes into the blue shale of 18. It should be noted that there is no such development of sand between 30 and 33 or between 38 and 22, which, of course, favours the view that the great development of sand in 40, 41, etc., is only a local pocket.

Regarding the possibility of obtaining a good well in Wicherina Brook near the junction of granite and sediments above the proposed dam to act as a supplement to the main supply, there does not appear to be any surface evidence regarding the exact position or nature of the contact between granite and sediment.

Judging from the topography of the neighbouring country there must be a considerable soakage in this part, but I can see no evidence whether or not there is any geological structure which will so localise and concentrate this soakage as to make it of service in this scheme. To settle this question it will of course be necessary to bore in the creek just below the assumed junction of granite and sediment. The probability that a large well near the head of the dam would, considering the sandy character of the rocks in this part, drain water from the dam is not, I understand, of practical importance. There is also, of course to be remembered, the likelihood that water which has drained off the granite will be too mineralised to be serviceable.

19.—THE CLAY DEPOSITS AT BOLGART, SOUTH-WEST DIVISION.

(F. R. Feldtmann.)

Introduction.—Early in December, 1917, a sample of white clay was sent to the Departmental Laboratory by Mr. G. H. Hutson, the owner of Lot 7 of the Bolgart Repurchased Area. The clay was stated to have been obtained from a well, sunk about 10 years previously, on this lot. The sample proved, on examination, to be a ball clay of excellent quality and suitable for use in the manufacture of china-ware.

Towards the end of 1918 instructions were orally given to examine the deposit, the examination being carried out during the latter half of February, 1919.

Location.—Bolgart townsite is situated in the South-West Division, on the Clackline-Calingiri Railway, about 60 miles north-east of Perth (about 90 miles by rail), and about 20 miles north-north-east of the town of Toodyay (25 miles by rail). The well from which the clay sample was taken is 2¾ miles east-south-east of Bolgart townsite, as the crow flies, and a trifle more than 4½ miles by road; it is 3¼ miles north-east of Wattening Siding, as the crow flies, and 4¼ miles by road. The road to Wattening Siding is less hilly and sandy than that to Bolgart.

Topography.—The district is well drained by brooks and watercourses. Bolgart Brook runs in a southerly direction immediately west of Bolgart Railway Station. It turns south-west and joins Yulgan Brook, which runs from the north-west, about 1¾ miles south-west of the Railway Station—the two, below their junction, forming Toodyay Brook, which flows in a general southerly direction. Toodyay Brook is joined by Wattening Brook, the general course of which is here almost due west, about 3½ miles south of Bolgart and about a quarter of a mile east-north-east of Wattening Siding.

The country round Bolgart, particularly to the south, is strongly undulating. This southern area consists of a number of irregular ridges, and small hills usually connected with, or forming part of, the ridges. In the case of a few small steep hills close to the flanks of the ridges, of which they at one time formed part, the connection is not always well marked. This area evidently formed part of a former tableland, which has been dissected by streams and watercourses and worn down till now represented only by the tops of the higher hills and ridges, which are usually fairly flat and capped by laterite, except where the backbone is formed by one of the later epidiorite dykes. The small almost isolated hills previously mentioned are steeply conical, with flattened apices, some of which are only a few feet across; a good example occurs a quarter of a mile north-east of the south corner of Lot 8. A dissected and much worn ridge, which runs in an east-north-easterly direction through Lots 9, 8, and 7, forms the divide between the watercourses running north to the Bolgart Brook and those running south towards Toodyay and Wattening Brooks.

South-West of Bolgart the Yulgan Brook runs close to the eastern margin of a flat valley, over half a mile wide at this point, which separates the previously-mentioned hilly area from the eastern face of a long wide granite ridge running through the middle of Location 56.

In and east of Lot 7 the strongly undulating country is replaced by a gently undulating sand-plain extending far to the east of the area examined. This change in the physical features has an important bearing on the clay deposits. The drainage of this area appeared to be in a general easterly or south-easterly direction towards the north-easterly portion of the Wattening Brook.

General Geology.—A belt of greenstones forms the main country rock of the strongly undulating area; this belt has in the area examined a maximum width of about three, and an average width of about two miles. Westward it is bounded by the granite west of Yulgan Brook. Its eastern boundary is obscured by the sand-plain. Its general strike appears to be about north-north-west, in common with that of the greenstone areas of the goldfields. The Blackboy Hill auriferous area—a description of which was given in the Annual Report for 1898—north-west of Bolgart, probably forms part of the same belt. The greenstones consist chiefly of epidiorites, from dolerites or gabbros, with local developments of amphibolites and hornblendites, and have, in places, been highly sheared and granulated. A few specimens show in section the remains of original augite. These rocks closely resemble the goldfields greenstones and without doubt belong to the same series, forming part of what is probably the westernmost belt of these rocks. The greenstones are cut by a number of acid dykes and both are, in places, cut by dykes of epidiorite. A few jasper "bars" similar to those so characteristic of the goldfields greenstones occur, some, striking about north-west, along the margin of the largest granite dyke, two, striking nearly east, along the edges of one of the larger epidiorite dykes, and others, also striking east, a few chains south of the townsite. A few short quartz reefs of lenticular shape occur; these appear to correspond rather to the series of barren reefs of granitic origin, found on the goldfields, than to the auriferous series.

The granite forming the ridge on Loc. 56 is a fine-grained pale-greyish highly acid rock, containing a relatively small number of biotite specks, arranged more or less in parallel strings, the rock thus showing a somewhat gneissic structure; it contains a few small pegmatite veins composed of felspar and quartz and containing in places grains of magnetite. The eastern margin of the granite, where examined, strikes roughly north-north-west. The larger acid dykes, which also strike about north-north-west, are composed of similar rock; usually, however, of slightly coarser grain and with a more pronounced gneissic structure. The smaller dykes are usually pegmatitic or aplitic and are more irregular in strike, but those striking north-north-west predominate. One small pegmatite dyke which crosses the Bolgart Road north of Gravel Reserve 9828 is composed of quartz containing a number of large felspar crystals up to five inches in length and usually twinned; this dyke is cut in half by the largest epidiorite dyke.

The epidiorite dykes are similar to and undoubtedly belong to the same series as those intruding the Darling Range granite. Coarse, medium, and

fine-grained varieties occur. The largest dykes are coarse in grain, have a plutonic structure, and appear to contain a greater proportion of felspars than most of the smaller dykes. These rocks are difficult to distinguish from the more massive varieties of the older epidiorites, but can be seen cutting through the acid dykes in places, and one of the smaller dykes which crosses the Bolgart Road 13 chains north of Hamersley Road contains small rounded inclusions of pegmatite, caught up from one of more of the small acid dykes. The epidiorite dykes are irregular in strike; the two largest strike, nearly east, but most of the smaller dykes strike about north-north-west.

Apart from the sand-plain area, much of the country is obscured by superficial deposits which include the laterite capping most of the hills, lateritic gravel which covers much of the higher ground, and the alluvial soil of the brook flats. The laterite varies in structure and composition. In the sand-plain area no traces of the underlying rock other than clay were seen.

The Clay Deposits.—Hutson's well is situated about 18 chains west of the east corner of Lot 7 and about four chains north of Hamersley Road, which separates Lots 7 and 11, near the middle of a small depression, about 12 chains in diameter, marked by clayey soil; the depression forms the eastern end of a small valley which starts near the south-west boundary of Lot 7. The dump of the well is entirely composed of fine white clay. The well was stated to be just over 48 feet deep, and, according to Mr. Hutson's description, was in white clay from the surface to the bottom where drift sand, from which there was a strong flow of fresh water, was encountered. It was stated that when the well was new, blind fish, five to six inches in length and with large heads, were baled out. The clay appeared in the hand specimen to be of excellent quality and highly plastic; examination in the Departmental Laboratory proves it to be one of the best ball clays obtained, so far, in this State, and well suited, when mixed with other clays, for the manufacture of chinaware.

On Lot 6, north-west of and adjoining Lot 7, is another well, situated six chains north-east of a point about the middle of the south-west boundary of the lot. The well is about 100 feet south of a watercourse, which runs westward from the north side of the divide separating the tributaries of Bolgart Brook from those of Wattening Brook, and is also within the sand-plain area. The dump was composed of fine white sand and kaolin, the kaolin on the top of the south side of the dump being practically free from sand. The clay is somewhat hard and is stained slightly brownish; the deposit might, however, improve at depth. No particulars of this well were obtainable.

About 58 chains farther west along the same watercourse is a third well, in Lot 5, south of Phillip's Road. This well, which was said to be about 28 feet deep, has been sunk through the alluvial soil west of the sand-plain area. The dump consisted largely of gritty white clay, apparently composed chiefly of minute sericite scales. No particulars as to the thickness of the deposit were available. This clay might possibly be used as a flux for other clays.

Conclusions.—The sand forming the extensive sand-plain, and the underlying clays, are residuary in character and are the products of decomposition of the crystalline rocks, particularly of the granite, the kaolin resulting from the breaking down of the felspars. The material has been transported to its present position by wind and water, but how far it has travelled it is impossible to say on the available evidence. Possibly the deposits are underlain by granite and the clay at any rate may not have travelled any great distance from its source. On the other hand, it is possible that some at least of the material, the sand in particular, may have been derived from the granite mass west of Bolgart before the Yulgan and Bolgart Brooks and their tributaries had so deeply and extensively dissected the intervening country, and have been transported to its present position by wind. During the transportation of the weathered material the kaolin was carried into depressions and valleys, gradually filling up the depressions.

The clay deposit exposed in Hutson's well should, judging by its thickness and the probable manner of its formation, be of considerable horizontal extent, as should also be the deposit in Lot 6. Further evidence is required to determine whether the clays cut in the three wells form parts of one continuous deposit, or whether the deposits in Lots 6 and 7 are separated by the low ridge which runs through the middle of Lot 7.

It is highly probable that other clay deposits occur in the depressions of the sand-plain.

The Possible Occurrence of Other Minerals of Economic Value.

Gold.—The geological features of the district are, viewed broadly, favourable to the occurrence of gold-bearing reefs, as they include a greenstone belt of fair width intersected by acid dykes and containing jaspers and quartz reefs. In the area examined, however, the few quartz reefs appeared to be of the barren granitic type and although a few, more glassy, stringers were seen which might contain gold, these were too small to be workable. In view, however, of the occurrence of gold-bearing veins in Loc. 1830 east of Blackboy Hill and from two to four miles north-west of Bolgart and apparently in the same greenstone belt, this district is worth prospecting. That greenstone country, probably forming part of the same belt, occurs still farther north-north-west is indicated by specimens of asbestos and chromite which have been sent to the Department.

Felspars.—A proportion of crushed felspar is used in the manufacture of chinaware. The only occurrence in this area of felspar crystals of any size is that of the small pegmatite dyke, already mentioned, on the Bolgart Road. This dyke is too small and contains too low a proportion of felspars to be workable, but other dykes may occur outside the area examined in which the felspars are present in sufficient proportion to be worked profitably. Most of the felspars in this dyke were stained red by iron oxide, but this was probably largely due to their being covered by dark red soil.

Bauxite.—Of the laterite deposits examined, the only one approaching a bauxite in appearance is that on the northern slope of a small steep hill on

Lot 8, about 15 chains east-south-east of the east corner of Lindsay Road. This is a coarsely-pisolitic pale yellowish-brown rock, with spheroids up to two-thirds of an inch in diameter. As, however, many of the spheroids when broken show a highly ferruginous core, and the more aluminous laterite does not cover any great area, the deposit does not appear to be worth testing. Laterites approaching bauxite in composition are rare in greenstone country.

20.—THE CLACKLINE AND BAKER'S HILL CLAY DEPOSITS, SOUTH-WEST DIVISION.

(F. R. Feldtmann.)

Introduction.—Clackline clays have been used for some years by the Clackline Fire Brick Co. for making fire-bricks and locomotive-boiler linings and seatings ("loco. lumps"). The deposit worked by this company was examined by Mr. W. D. Campbell in 1906, and a brief account of the geology of the deposit and immediately surrounding country was given in the Annual Report of the Geological Survey for that year. As a systematic examination of the clay deposits of the South-West Division was desirable, the district was revisited by the present writer, and the country between Clackline and Baker's Hill and also west of the last-named place, was examined early in February, 1919.

Location.—Baker's Hill townsite is situated on the Eastern Goldfields Railway, 47 miles (by rail) E.N.E. of Perth. Clackline townsite is four miles farther E.N.E. along the same railway. Clackline is the junction for the Toodyay-Calingiri Railway.

The Fire Brick Co.'s quarry is a short distance east of the west corner of Lot 19, and one mile west of Clackline Railway Station.

Topography.—Clackline is situated at the eastern edge of the hilly area of the Darling Plateau. Nanamullen Brook, which runs south and joins Clackline Brook east of the townsite, appears to mark the eastern boundary of the hilly area in this locality, as there is a distinct change in the topography and vegetation to the east. A zone of intense shearing which runs through Lots 171 and 18 may, even if originally formed during an older period of earth-movement, be occupied by a fault-line marking the eastern edge of this plateau, and Nanamullen Brook may possibly follow another.

Baker's Hill is situated near the highest point of the Darling Plateau cut by the Eastern Goldfields Railway, the railway station being 959 feet above sea-level. Between it and Clackline Railway Station there is a drop of 203 feet. Both townsites are on the south side of Clackline Gully, a valley striking about east-north-east. On both sides of this gully the ground rises fairly steeply, forming irregular ridges topped by a few fairly high hills, such as Baker's Hill, south of the gully, and one on the north side about 1½ miles north of the railway station, near the eastern boundary of Timber Reserve 14277. The ridges are dissected by small watercourses, these being particularly deep and numerous about half a mile north-west of the clay pit.

Geology.—The country rock consists of granite of both the biotite and hornblende varieties. The two varieties, which are present in about equal proportions, appeared, from the brief examination possible, to be merely different facies of the one rock-mass. At the eastern end of the area, the granite north of the gully—here of the biotite variety—is highly gneissic. The middle of the previously-mentioned zone of shearing is marked by a band of biotite gneiss or schist, altered at the surface to a rock closely resembling the laminated jaspers of the goldfields. This band runs north-north-west from Sugarloaf Hill, a prominent little hill with a steep slope to the south-east, on Lot 18; the clay pit on Lot 19 is on the south-east flank of this hill.

Laterite deposits occupy most of the higher ground, the granite outcropping between the laterite and the gully. The laterite varies considerably in composition from place to place, ranging from highly aluminous to highly ferruginous. Highly ferruginous varieties occur at the southern ends of Locs. 17564 and 18913, north-east of Road No. 4731, and from three-quarters of a mile to 1½ miles north-west of the clay pit; laterite from these localities was being quarried as a flux for the Fremantle Smelting Works.

The granite is cut in places, particularly near Clackline, by epidiorite dykes; the largest, which runs through Locs. 4028, 4051, and 4050, attaining a width in one place of about 400 feet. Most of the larger dykes strike east or east-north-east; others, including most of the smaller dykes, about north-north-west. They range from coarse to fine in texture. Doubtless other dykes are obscured by the laterite north of Clackline Gully and their presence may account for the highly ferruginous nature of the laterite in places.

Several large lenticular quartz reefs striking about north-north-west occur on Lot 172, east of the main shear zone. The presence of white mica in these reefs indicates their pegmatitic character. They appear to have been highly sheared.

The Clay Deposits.—The clay deposits of this area have all been formed by the decomposition *in situ* of the country rock, accompanied by the formation of laterite, the underlying rock being bleached and kaolinised. The composition of the clay differs from place to place, according to the composition of the original rock and the type and degree of alteration it has undergone.

The clay pit on Lot 19 is about 140 feet long by 115 feet wide. Its greatest depth—at the north side—is about 35 feet; at the south side it is 16 feet deep. A large proportion of the clay, including most of that in the north face, is highly micaceous, containing small scales of muscovite that can just be distinguished by the naked eye; a good deal of quartz is also present, and small pale-brownish patches suggest by their shape the presence of former "books" of biotite. An irregular band on the eastern side of the pit is purer and whiter and contains much less quartz. Dr. E. S. Simpson, who has also examined this pit, suggested to the writer that this band was the remains of an epidiorite dyke. In places, the presence of former pegmatite veins is indicated by veins of white kaolin containing a fair proportion of quartz grains of larger size than those of the main body of clay.

At the works the clay is roughly classified for practical purposes as "silica clay" and "alumina clay." The former includes the micaceous material, the latter the purer clay on the eastern side of the quarry.

A rough estimate by volume, by the Petrologist, of the relative proportions of the minerals present in

two small specimens, chosen from a number picked by the manager as representative of the "silica clay," is as follows:—

	No. 1. Per cent	No. 2. Per cent
Quartz	45	40
Kaolin	20	55
Mica	35	5

The second specimen was probably from a decomposed pegmatite vein. The mica present would act as a flux and lower the melting point of the clay. The "alumina clay" consists chiefly of kaolin with thin veinlets of quartz.

The writer was informed that in the manufacture of fire-bricks the proportions used were, roughly, two of "silica clay" to one of "alumina clay," and that for "loco. lumps" the clays were mixed in equal proportions.

The clay is well suited to the manufacture of fireproof material, but, with the possible exception of some of the purer material on the eastern side of the pit, is altogether unsuited for the manufacture of chinaware.

The deposit appears to occupy a wide area and probably extends to a considerable depth below the bottom of the pit.

Regarding the origin of this deposit: as previously stated, the clay-pit is on the south-eastern flank of Sugar-loaf Hill, the backbone of which is formed by a zone of intense shearing along which the granite has been altered to biotite gneiss or schist. The granite for some distance on both sides of the main zone of shearing was also sheared to a lesser degree, as may be seen in the quarry, certain bands being more intensely sheared than others. As a result of the shearing the felspars were largely altered to muscovite mica. The subsequent action of surface solutions changed the rock along the main zone of shearing to one closely resembling a laminated jasper, and also decomposed the adjacent granite, with kaolinisation of such portions of the felspars as had not been micacised and some laterisation of the rock at the surface; the muscovite remained unaltered during the decomposition of the rock. The final product of decomposition was therefore—excluding the laterite—a clay consisting of kaolin and muscovite, and containing a number of quartz grains.

The extensive laterite deposits in this area are without doubt underlain by clay, in places probably of considerable thickness; the only other places, however, seen by the writer, where white clay is exposed, are a small railway cutting about 35 chains S.W. of Baker's Hill Railway Station, and a deep cutting, about 30 chains in length, from a little less than a mile to 1¼ miles W.S.W. of the same station. The smaller cutting is chiefly in lateritic material underlain by kaolin, with irregular lenses and veinlets of ferruginous matter; deeper sinking should show kaolin free from iron. The deeper cutting shows an irregular but comparatively shallow laterite cap, underlain by kaolin. The kaolin is variable in quality, particularly as regards colour and the quantity of quartz grains it contains. It is in places stained pale-reddish by iron oxides, but in others is white and fairly free from quartz. The better material, which occurs near the middle of the cutting and west of the pipe-line crossing the top of the cutting, may be found suitable, when mixed with other clay, for the manufacture of chinaware. A sample which appeared to be fairly representative of the better material was taken from a point about 160 feet south-west of the pipe line. The cutting runs through a small saddle connecting Baker's Hill with a ridge north-west of the railway line; the deposit is most probably, therefore, of great length, and from the appearance of the clay in the bottom of the cutting should extend for a considerable distance below that level.

21.—THE MT. ZION G.M.L. 1183M, BOOGARDIE, MURCHISON G.F.

(F. R. Feldtmann.)

Introduction.

Early in November, 1919, a request was made by Messrs. Holzman and Delaney, the holders of G.M.L. 1183M, Mt. Zion, at Boogardie, for a geological survey of that mine, in which, it was stated, two new lodes had been discovered. The writer was accordingly instructed to examine the mine, the examination being made in the first half of December. The Mt. Zion lease and the country immediately surrounding were mapped in detail, on a scale of 100 feet to the inch, as accurately as the available means and time would permit, in order to show the relationships of the various jaspers and the faults forming the ore-bodies.

Location.

The Mt. Zion G.M.L. 1183M is situated from half to three-quarters of a mile north-easterly from Boogardie townsite. It covers an area of 17 acres and comprises former G.M.Ls. 571M, Sirdar, and 764M, Aquarius. At an earlier date part of the northern portion of the ground was covered by the southern portion of G.M.L. 200M, Narcissus.

Topography.

The country in the neighbourhood of the Mt. Zion lease, in common with most of the gold-mining area north, north-east, and south-east of Boogardie, is roughly and irregularly undulating, with ridges striking generally in a north-westerly direction, the backbones of the ridges being usually formed by the largest, or one of the largest, members of a series of jasper "bars." Near the Mt. Zion the highest point is occupied by an abrupt outcrop of a bar about 50 feet wide, about 3 chains north of the west corner of former G.M.L. 764M. This bar forms the backbone of a wide ridge with a steep escarpment to the south-west, the escarpment being largely formed by the south-western side of a jasper, about 2 chains wide, which runs through G.M.L. 1013M, Mars. This western ridge is connected with one, less abrupt, some distance north-east of the Mt. Zion by a wide saddle extending through the western portion of the former Sirdar Lease.

The drainage is towards a creek, from 5 to 75 feet in width, which runs in a south-south-westerly direction close to the southern boundary of G.M.L. 1183M and joins Jones Creek—the main drainage channel of the Boogardie area—not far from the west corner of the former Neptune G.M.L. 445N. The writer is unaware to what extent the creek south of the Mt. Zion has been tested for alluvial deposits.

Previous Reports.

The Boogardie Centre was first examined and mapped in detail by Mr. C. G. Gibson. A description of the workings of the Sirdar lease was given on pages 23-24 of his report.*

The district was examined and the mines described in detail by Mr. J. T. Jutson† in 1913. The Sirdar Mine is mentioned on pages 96-98, 105-108, and 122-126 of Mr. Jutson's report. Jutson described the main ore body as a "quartzite lode," and stated that the mine was, at the time of his examination, the most promising in the district.

General Geology.

The general geology of the Boogardie District has already been described at length by the previously mentioned writers. Briefly, the main country rocks are greenstones, comprising amphibolites, epidiorites, pyroxenites, hornblendites, and sheared and altered forms of these rocks. In and round the Mt. Zion lease these rocks are completely weathered and much of the ground is covered by a thin coating of lateritic material as well as by detrital deposits, and the only exposures seen that could be determined with any certainty were fragments of altered pyritic greenstone from the Mt. Zion main shaft workings, decomposed greenstone and quartz-porphyry on the dumps of Alexander's and adjoining shafts on former G.M.L. 176M, and fragments of highly hornblendic greenstone (probably hornblendite) on the former Neptune G.M.L. 445M.

Of the acid dykes described by the previous writers, the only one occurring within the area examined is that cut in Alexander's and adjoining workings on G.M.L. 1176M, fragments—determined by the Petrologist as felsitic quartz porphyry—of which were, as already stated, seen on the dumps; no trace of this dyke was seen *in situ* at the surface. Jutson stated that a white kaolin-like rock in the fault-gap in Alexander's workings is probably the decomposed product of a quartz porphyry, but that this could not positively be stated, as a white decomposed rock was seen at a lower level in the mine. From the quantity of the rock and its decomposed form on the dumps it is evident that the dyke is of considerable size; it is, however, possible that the white band in the fault-gap is a tongue from the main mass. As these dykes are probably offshoots from the granite magma from which the gold was also derived, it is probable that they exercised some influence on the distribution of the gold.

One of the most characteristic features of the Boogardie district is the great number of jaspers which form a number of series of bars disposed along a general line of weakness starting, according to Gibson's map, north of the railway about 1½ miles south-west of Mt. Magnet and running in a general north-westerly direction, passing rather less than half a mile east of Boogardie township. About three-quarters of a mile north of the township the line turns and runs in a westerly direction towards the granite which bounds the greenstone belt about two miles west and north-west of Boogardie. The series of jaspers running through the Mars G.M.L. 1013M and through former G.M.L. 764M and the westernmost portion of G.M.L. 1176M are in the eastern portion of the jasper belt and the bars in, and south-east and north-east of, the old Sirdar form an easterly branch of the belt near the bend.

Most of the individual bars are of considerable length; they range from about a foot to fully 130 feet in width. Most of those in and near the Mt. Zion are of the usual Murchison type, being moderately ferruginous and coloured purplish-brown, brown, or dark grey by hematite, limonite, and magnetite, but occasional bars occur, sometimes in the middle of a series—such as the fifth and sixth bars of the Mars-Aquarius series—which consist almost entirely of bands of white or pale grey quartz with occasional bands coloured bright red by finely divided hematite. The reason for this difference in appearance and composition is not clear, as the enclosing rock appeared to be the same in both cases. The average dip of the jaspers is about 85° north-east, but in some places the bars are vertical, and in others there is a slight south-westerly dip.

The most striking feature of this district is the extraordinary number of faults—the "Boogardie breaks"—the effects of which are most noticeable in the jaspers. The fault-gaps in the jaspers have been the source of most of the gold obtained in the district. The strike of the faults is, according to Gibson‡ usually nearly at right angles to that of the bars, but in the neighbourhood of the Mt. Zion usually makes an angle of about 60° with the latter, being on the average about north 28° east, whereas the strike of the jaspers averages about north 32° west. The faults range from a few feet to 20 and possibly 30 chains in length. In width the fault-gaps range from a thread to 14 feet or more. The horizontal displacement of the jaspers along the fault may be imperceptible—in which case the fault-line is marked by a slight crumpling and fracturing of the jasper laminæ—or may be as much as 20 feet, or even more. It is probable that in some places where the apparent displacement is still greater—for example, about 100 feet south of the west corner of G.M.L. 764M—the jaspers on each side of the fault were not originally continuous, but formed lenses in echelon, the gap between the lenses later forming a convenient path for the fault. Probably the lens now being worked by Holzman Bros., near the north boundary of the Mt. Zion, is a similar occurrence. The displacement of the bars is usually to the north-east, going north-west—*i.e.*, the displacement is to the right—but in places the displacement is in the opposite direction, due in some cases to the fact that the jaspers affected dip south-west instead of north-east, in others—especially where a number of faults are close together—to block faulting.

The fault-gaps are filled either with brecciated jasper, recemented by silica and iron oxides, or with sheared and altered country. Quartz stringers are usually present, the gold being as a rule associated with them. It is stated also that the gold is usually found on or close to one nose of the faulted jasper.

The material forming the Sirdar main lode differs from that of the majority of fault-lodes and varies at different levels. The lode near the surface consisted chiefly of soft sheared kaolinic material with occasional small irregular stringers and lenses of iron ore. At the 91ft. level the ore-body consisted almost entirely of exceedingly finely granular quartz, stained yellowish or brownish, with occasional lenses or stringers of vesicular iron ore consisting of hematite and limonite. Auriferous quartz veins cross the

* Gibson, Chas. G., Lennonville, Mount Magnet and Boogardie, Murchison Goldfield; W.A. Geol. Survey, Bull. 8, 1903.
† Jutson, J. T., W.A. Geol. Survey Bull. 59, Paper 39.
‡ *op cit.*, p. 16.

lode in places. This ore-body is remarkable for its great width, gold having been obtained, it is said, over a width of nearly 40 feet, in places, at the 126ft. level.

The Jaspers and Ore Bodies.

The northern half of that portion of the Mt. Zion which was formerly G.M.L. 764M is traversed by the southern portions of the six easterly jaspers of the Mars-Aquarius series, which comprises eight bars, of which the largest and westernmost runs through the middle of G.M.L. 1013M, Mars; this bar is 2 chains wide in places. The western corner of G.M.L. 764M is on the middle of the third and second-largest bar, here about 45 feet wide. An average space of about 40 feet separates each of the third, fourth, fifth, sixth, and seventh bars. The eighth bar runs immediately west of the north corner of G.M.L. 764M, crossing the north-eastern boundary of that lease immediately south of this corner. The bars are cut by numerous faults, which occur at intervals of, on the average, about 40 feet, north of the north-western boundary of the lease, but are closer together and less marked in their effect south of the boundary. About 200 feet south of the boundary the fifth and sixth bars turn at right angles and join to form an elliptical mass nearly 40 feet wide. The third and fourth bars appear to end about 210 and 140 feet respectively south of the boundary. The seventh and eighth apparently continue south beyond the limits of the area mapped by the present writer.

A few potholes have been sunk on the "breaks" in the above series as well as two shafts on the eighth bar. Crick's, the northernmost shaft, with a vertical depth of about 30 feet, is about 90 feet south-west of the west corner of the Sirdar, and the other, sunk by Holzman, 33 feet in depth, is about 40 feet farther south on another fault. A good patch was obtained in Crick's shaft chiefly, it is said, from a quartz leader on the hanging-wall side of the break. The break was partly obscured by the dump at the time of my visit, but according to Jutson* is 3½-4 feet wide, being filled chiefly with sheared decomposed "country."

What is probably the southern continuation of the eighth bar was cut in the Sirdar main shaft at a depth of about 35 feet. It is stated that it was also exposed about 14 feet north-east of the old 5-head battery when digging the foundation of the latter. The "noses" of this bar where cut by the Sirdar lode can also be seen in the open cut, where it is highly contorted. The seventh bar is also exposed near the south-western end of the cut. Farther south the eighth bar has been cut in three shafts 140, 160, and 210 feet, respectively, south of the Mt. Zion's south-eastern boundary; in the second shaft it is cut by an auriferous quartz vein which was being worked for the Mt. Zion syndicate by Coombe and party.

In the former Sirdar ground there are, in addition to the previously mentioned bars, three large and five small jaspers. Of these the westernmost and largest forms a prominent outcrop about 120 feet north of the south corner (of former G.M.L. 571M). This outcrop, which has a maximum width of about 40 feet, extends northward to about 180 feet north of the south-eastern boundary. South of this point the jasper is obscured by superficial deposits but appears to be pinching. To the north the bar can be traced to a point about 260 feet north of the main shaft. Thence it is obscured, but what is probably its northern continuation can be seen at a point about 100 feet south of the north-western boundary and also crossing the boundary about 90 feet east of the Sirdar west corner. At both these points it is little more than a foot wide. North of the boundary it was traced for another 170 feet.

The second large bar—on an average about two chains east of the first—averages about 18 feet in width. It outcrops strongly at its northern end—from about 190 feet to 320 feet S.S.E. of the north-western boundary of the lease—but is obscured to the south, only outcropping at points about 150 feet and 280 feet farther S.S.E., and finally about 30 feet north of the south-eastern boundary, where it appears to be about four feet wide.

About 40 feet north of the northernmost point on this last bar is the southern end of the prominent jasper outcrop in which is Holzman's open cut, and which has been thought to be the faulted continuation of the second bar. A fault line certainly runs through the gap between the outcrops, but from the effects of this fault on the bars farther north-east, compared with the gap separating the two outcrops, it is most probable that the northern outcrop is really a separate lens in echelon with the second jasper. This northern lens has a maximum width of 40 feet; its outcrop extends a few feet north of the north-western boundary; thence it is obscured, but its northerly extension is said to be visible in a creek a considerable distance farther north.

Between the western jasper and the previously mentioned lens are two small bars. Of these the more easterly crosses the north-western boundary about 180 feet from the west corner of the lease (former G.M.L. 571M. A very rich patch was obtained from a quartz leader on the foot-wall side of a break, about two feet wide, in this bar, about two chains north of the boundary. This patch was worked from Alexander's shaft on the former Polar Star G.M.L. 1076M (later G.M.L. 1176M).

The third large jasper outcrops about 110 feet north-west of the east corner of the lease; here it is about 9 feet wide. Northwards it is obscured for some distance but is exposed in a pothole about 335 feet N.N.W. of the east corner. Going north it widens, and opposite the west corner of former G.M.L. 823M is about 34 feet wide. It appears to fork about 100 feet north of this point, the eastern side of the east branch being cut in the old shaft about 240 feet south of the north corner of the Mt. Zion; the western edge of the west branch is about 50 feet farther west. A good patch was, it is said, obtained in this shaft, along what appears to be the north-easterly extension of the fault at present being worked from Delaney's shaft on the west side of the Westernmost jasper in this portion of the Mt. Zion.

Another small jasper runs between the northern portions of the second and third large jaspers. Two other comparatively small jaspers run close to the northern portion of the north-eastern boundary, and immediately east of the north corner is another bar which is probably the north-westerly extension of a long jasper which traverses the former Sirdar South

* *op cit.*, p. 131.

G.M.L. 1131M, crossing the south-eastern boundary of that lease close to the east corner.

The Ore-bodies.—The four chief ore-bodies of the Mt. Zion may be styled the Sirdar—or Main—Lode, the Spur Lode, Delaney's Lode, and Holzman's Lode. The first three are "fault-lodes"; the fourth has been formed by impregnation of a part of the large jasper lens, north-east of the second large jasper, with gold from a series of small faults which cut the jasper at intervals of a few feet—in this case the term "lode" is used only for the sake of convenience.

The Sirdar, Spur, and Delaney's Lodes appear to be branches of the one fault. The two former join in the large open cut about 260 feet north of the Sirdar south corner and immediately east of the eighth jasper from G.M.L. 764M. Delaney's Lode, so far as could be judged from the small length exposed, should join the Spur Lode between 100 and 120 feet farther north.

The Sirdar Lode has not been traced as far west as the Sirdar south-west boundary, but should cross it about 180 feet north of the south corner. East of the first large bar the lode is obscured, but it probably cuts through the second jasper near the outcrop about 190 feet north of the south-east boundary. A fault which is probably the north-easterly continuation of this lode cuts through the third large jasper west of the west corner of former G.M.L. 564M; a pothole has been sunk on this fault, on the west side of the bar.

The Sirdar Lode is irregular in width, strike, and dip. On the whole it has a slight north-westerly dip between the surface and the 91 feet level from the prospecting shaft. In addition to the large open cut—the main portion of which is about 90 feet long by 50 feet wide at the surface and is about 80 feet deep—the lode has been worked at depths of 91 and 118 feet from the prospecting shaft on the south-eastern side of the open cut, and also at the 126 feet level from the main shaft, which corresponds to and joins the 118 feet level from the prospecting shaft. The 118 feet level was unfortunately under water at the time of the writer's survey. The prospecting shaft was sunk to a total depth of 164 feet.

The ore-body at the 118 feet level was said to be 40 feet wide in places, and including the material from the prospecting shaft below that level, was said to average about 23dwts. The average value at the bottom of the shaft was said to be 29dwts., but owing to the hardness of the ore-body and the pump being too small to cope with the water the syndicate was unable to work the lode at this depth. According to Mr. Delaney, sulphides were met with at a depth of about 110 feet, but three specimens [**13169-13171**], collected by Mr. Jutson* from the 118-feet level and examined by Mr. Farquharson, show that the ore-body at that level consists in part of finely granular quartz, irregularly stained reddish-brown by hæmatite and limonite, a few squarish forms of which suggest their derivation from pyrite.

At the 91-feet level the ore-body consists mainly of granular quartz, with veinlets and irregular patches of iron ore and small vesicles lined therewith. A few narrow quartz veins of the usual auriferous type cross the formation at various angles. Near the walls the formation shows signs of considerable shearing. The ore-body ranges in width from about 8 to 37 feet (at its junction with the Spur Lode) at this level, being about 20 feet at the prospecting shaft and 9 feet in the cross-cut 31 feet south-west of the shaft. In a cross-cut (now mullocked up), 25 feet farther south-west, it is still narrower; here the ore-body is said to pitch south-west. The lode turns on meeting the main jasper at this level, the east wall running north for nearly 80 feet before turning east again; the west wall of the ore-body had not been cut at this end, the drive following the east wall. The ore from the stope at this level was said to average about 11dwts., but towards the end of the north-east drive the value was much lower.

In the open cut the ore-body, so far as could be judged—the main body of the ore having been stoped out—consisted mainly of soft, friable pale-yellowish kaolinic material, with small irregular vesicular lenses of iron ore, the middle portion of the formation being more sheared and more ferruginous. Very similar material formed the Spur Lode in the open cut.

In addition to these ore-bodies there was stated to be a considerable width of auriferous material in the workings from the 40 feet shaft, 55 feet north-west from Delaney's shaft. The writer was unable to examine this formation, but as no corresponding fault was observed in the main jasper, it is probable that this auriferous body has been formed by the impregnation of the weathered rock with gold leached out of the fault lodes.

Jutson† separates the ore-bodies of the Boogardie district into quartzite lodes and fault-lodes ("breaks"), classifying the Sirdar lode, which he evidently regards as similar in character to the ordinary jaspers, with the quartzite lodes. Although the ore-body at the 91 and 118-feet levels is chiefly composed of finely granular quartz, similar to that in many of the jaspers, it does not show the regular lamination characteristic of the latter, although planes of shearing are visible in places, particularly along the walls. Moreover the material in the open cut, where the ore-body most closely resembles an ordinary oxidised lode-formation, is entirely different from that forming the jaspers, and both this lode and the Spur lode fault the jaspers. The present writer, therefore, unhesitatingly classifies the Sirdar Lode with the fault-lodes, from the majority of which it differs only in its great width—due probably in part to impregnation of the enclosing country in the oxidised zone—and the degree of silicification it has undergone below a depth of about 80 feet from the surface. It was probably this silicification and the presence of portions of the faulted jaspers—in particular of the seventh and eighth bars—in the open cut, where the jasper laminæ are highly contorted and twisted round in places till roughly parallel to the strike of the "lodes," that induced Mr. Jutson to regard the formation as a "quartzite" lode.

The silicification of the ore-body below a depth of about 80 feet, with probable desilicification above that level, is probably largely due to the action of surface solutions, which, probably, also caused a certain amount of secondary enrichment accompanied by impregnation of the country rock adjoining the fault zone with gold derived from weathered portions of the lode since removed by detrital action.

* *op. cit.*, pp. 105-106.

† *op cit*, pp. 94 *et seq.*

As previously stated, Holzman's "Lode" is of a somewhat different character to the others. The ore-body consists of jasper which has been impregnated in the oxidised zone with gold evidently derived from a number of small faults, parallel in strike to the main faults in the lease and on the average about 12 feet apart. These faults are on the same line as, and are probably the north-easterly extension of the series of small faults in the Aquarius (*vide* map). Four of these faults cut the jasper obliquely in the open cut, which is 40 feet long by 29 feet wide and about 30 feet deep. Three others were observed north of the cut, and the jasper lens is apparently bounded at its south-eastern end by another; others may be obscured by the surface debris. The fault gaps are only about two inches wide and are filled with recemented brecciated material. The jasper is also cut longitudinally by another fault, about a foot wide, which runs through the middle of the open cut. The relations between this fault and the oblique faults could not, unfortunately, be determined, as the rock at the points of intersection had either been removed or was obscured by debris. Jutson, however, observed a longitudinal break in the Saturn Lease,* which carried gold, so that it is possible that this fault is of the same age as the others.

According to Mr. Holzman, who appeared to have interpreted the nature of the occurrence correctly, the jasper is richer in the immediate vicinity of the oblique faults than half-way between any two of them, indicating that the gold-bearing solutions have travelled along the faults.

The jasper is highly siliceous, but is coloured grey or purplish-grey by iron ore, probably largely limonite. A section [1/2662] shows much of the iron ore to have squarish outlines, indicating its origin from pyrite, with which the gold, from its fineness, was probably originally associated. A few small bands of dense purplish-black vesicular iron ore were observed.

The width of the ore-body will, broadly speaking, be governed by the width of the jasper; actual work alone can determine the longitudinal extent of the payable ore, but it is likely that the jasper will continue to be payable above water-level so long as the faults are sufficiently close together to enable the ore to be taken out in bulk. Below the oxidised zone the gold will most probably be restricted to the immediate vicinity of the faults, rendering the mining of the ore more difficult, and the difficulty of mining will be still further increased by the presence of water. Moreover, as it is probable that secondary enrichment has taken place in the oxidised zone, an increase in value of the ore below that zone is hardly to be expected. Under these circumstances, therefore, it is questionable whether the sulphide ore will pay. Above water-level, however, if present values are maintained, there should be several thousand tons of payable ore.

SUMMARY.

The country rock of the Mt. Zion G.M.L. 1183M, which comprises former G.M.Ls. 571M Sirdar and 764M Aquarius, is greenstone, much weathered and, in places, laterised at the surface, the lower-lying ground at the southern end of the lease being covered with detrital material.

The lease is traversed by a number of jaspers with an average strike of about N. 32deg. W. and an average dip of about 85deg. N.E. Of these jaspers, the six easterly members of a series of eight traverse the northern portion of former G.M.L. 764M, the two easternmost running into former G.M.L. 571M, where they are exposed in the open cut. In former G.M.L. 571M there are in addition three large and five small jaspers.

The jaspers are cut obliquely by a number of faults, with an average strike of N. 28° E., which in places, at their contact with the jaspers are sufficiently auriferous to form fault-lodes. The fault gaps are filled either with brecciated jasper or sheared and altered greenstone; quartz stringers are usually present, and these as a rule are highly auriferous.

The gold was originally introduced by siliceous solutions from the granite magma, which solutions formed the quartz stringers associated with the faults, the precipitation of the gold being most probably caused by iron-bearing minerals in the jaspers, or the pyritic bodies representing them below water-level.

The main ore-bodies of the Mt. Zion lease are the Sirdar Lode, the Spur Lode, and Delaney's Lode—all of which are, apparently, branches of one fault-lode—and, fourthly, Holzman's "Lode," which is distinct from the other three, the ore-body being formed by a jasper lens to the north-east of those with which the Sirdar Lode is associated; this jasper having been impregnated in the oxidised zone with gold derived from a number of small fault-planes which cut the jasper at intervals averaging 12 feet. Below the zone of oxidation the gold will probably be restricted to the immediate vicinity of the faults, and mining will be further impeded by the presence of water.

* *op cit.*, pp. 100-101 and fig. 11.

CHEMICAL AND MINERALOGICAL WORK.

(EDWARD S. SIMPSON.)

During the war interest in the search for, and utilisation of, the base and rare metals and of such non-metallic minerals as form the basis of manufacturing industries was greatly stimulated. With the continued shortage of shipping and high price of all imported articles this interest has grown rather than diminished during the year, and applications have poured into the laboratory for previously accumulated information, and for fresh details regarding the localities where economic minerals are to be found, and for particulars of their physical and chemical properties. The State is now therefore experiencing the full benefit of having a mineralogical laboratory in existence for so many years that it is able at short notice to supply such information regarding our mineral resources as is essential before they can be put to commercial uses.

The total number of samples received show a decline, viz., from 2,065 in 1918, to 1,557 in 1919, but as over 200 samples were held over from the previous year the staff has been kept fully occupied and closed the year still two months in arrears with its work.

With the additional temporary officers now employed, the staff would be sufficient to carry out all ordinary routine work were the necessary accommodation and apparatus available. In spite of repeated representations no improvement in this respect, however, has been made, and the many inconveniences pointed out in my previous reports remain still un-

remedied, with the result that each investigation is more arduous, takes longer, and costs more than it would if reasonable modern facilities were provided.

The nature of the routine work dealt with is indicated as far as possible in the accompanying table. The large number of potash assays and tungsten assays is remarkable. These are largely the result of the establishment by the Government of an Alunite Treatment Plant at Kalgoorlie and of a Scheelite Plant at Coolgardie.

Table showing the Routine Work carried out by the Geological Survey Laboratory during 1919.

	Public Pay.	Public Free.	Geological Survey.	Other Departments.	Total.
Samples	43	457	68	989	1557
Assays for—Gold	18	138	6	669	831
Silver	1	32	1	9	43
Copper	1	30	3	8	42
Tin	...	10	...	2	12
Lead	9	4	...	3	16
Zinc	...	1	2	...	3
Iron	1	48	14	26	89
Manganese	...	10	...	...	10
Arsenic	...	...	...	1	1
Bismuth	...	1	...	...	1
Lime	9	9	4	...	22
Mercury	...	5	...	...	5
Nickel	...	1	...	...	1
Potash	1	19	8	46	74
Soda	...	4	2	44	50
Titanium	...	1	...	1	2
Tungsten	...	6	1	101	108
Vanadium	...	...	2	...	2
Phosphorus	1	23	4	2	30
Sulphur	...	13	3	11	27
Silica	1	18	6	20	45
Tellurium	...	...	4	...	4
Salt	...	2	...	15	17
Tests for Petroleum	...	7	3	...	10
Analysis—Complete	5	7	14	23	49
Partial	...	6	12	108	126
Proximate	...	17	...	13	30
[redacted] Mechanical	...	11	5	44	60
Calorific Values	...	3	...	9	12
Clay Tests	...	5	1	11	17
Graphite Tests	...	8	...	3	11
Pigment Tests	...	29	...	6	35
Metallurgical Tests	...	...	...	3	3
Mineral Determinations *	5	244	13	40	302
Microphotos	...	...	10	...	10
Miscellaneous	...	1	1	23	25
	52	713	119	1,241	2,125

* Including reports on market value and economic applications.

Clays.—The results of the investigation into the clays of the southern half of the State are being slowly correlated and will ultimately be published in Bulletin form. This work would have been much further advanced but that it was found necessary, after sifting the results already obtained, to make further experiments in regard to many of the clays before a definite opinion could be expressed as to their economic application. Although the complete report is not yet available, the owners of three quarters of the clays submitted have been furnished with the detailed results of the examination of their samples and are thus enabled to proceed with their utilisation. Test pieces and experimental data are also available to all present or prospective manufacturers, most of whom are in close touch with the laboratory and its experimental work, of which they show due appreciation.

Potash Supplies.—In my last report reference was made to the potash famine and to certain successful results which had crowned the endeavours of the mineralogical staff to obtain a local source of supply of this indispensable fertiliser. Early in the year a Bulletin was issued entitled "Sources of Industrial Potash in Western Australia," which described all that was known on the subject up to that date, and indicated what were the most promising local sources of supply. This Bulletin has been in considerable demand throughout the State.

Of all local sources, Alunite appears to be the most promising. This mineral has been detected at Kanowna, Wallangie, Northampton and Ravensthorpe, the grade of the clean mineral being—

		Per cent.
Kanowna [redacted]	... Potash	5·0 to 9·3
Wallangie	... „	7·9 to 8·2
Northampton	... „	10·8
Ravensthorpe	... „	8·0

The possibility of obtaining commercial supplies at Northampton, Wallangie and Ravensthorpe is unknown, but at Kanowna an industry employing a considerable number of men is already established. About 500 tons of mineral have been raised and there are said to be some thousands of tons in sight within 60 or 80 feet of the surface in the form of veins and isolated boulders scattered thickly through a belt of completely kaolinised rock (slate?).

The available information, regarding Kanowna alunite was brought under the notice of the State Mining Engineer, on whose representations money was made available by the Government for the lease and operation of a treatment plant at Kalgoorlie. The method followed in this plant was that laid down by myself as the result of experiments in the laboratory and the work was constantly controlled by further experiment and analysis. Some treatment of the mineral is necessary before use, since the potash in the raw mineral is practically insoluble in water and therefore only extremely slowly available as plant food. Experiments made in the laboratory indicated two methods of treatment for this purpose. The first was to roast the crude ore at about 800deg. Centigrade, by which all the water and three-quarters of the sulphuric oxide were driven off and a mixture of insoluble alumina and water soluble potassium sulphate left behind. This was the process adopted in treating 300 tons of Kanowna alunite at Kalgoorlie, a process which would have proved successful in every respect had the grade of the ore reached the expected value of 6 per cent. potash. Owing, however, to contamination with clay and intergrowths of natroalunite the grade of the ore in bulk has been nearer 4 than 6 per cent. potash.

Experiments in the laboratory showed that a second method of ore treatment was available for rendering the potash water soluble. Alunite is very rapidly dissolved by caustic alkalis (caustic soda or caustic potash). Such substances, however, do not occur in our soils, and the addition of them to the soil would result in the destruction of all vegetation; they therefore cannot be used to increase or speed up the effect of alunite on plants. It has been found, however, that alunite is rather rapidly attacked by solutions containing calcium hydrate, the whole of the potash ultimately going into solution, and thus becoming available as a plant food. Since soils are improved by the addition of caustic or slaked lime in moderate proportions, the use of either of these substances in conjunction with alunite proves to be highly beneficial, the plants being enabled to absorb the whole of the potash of the alunite.

In practice two or more hundredweight of high grade caustic or dry slaked lime is mixed with each ton of dry or almost dry alunite, and the mixture applied to the surface of the soil or covered in to a shallow depth. Field experiments already made with this mixture in an orchard in the Darling Ranges and on suburban allotments in Perth have resulted in very healthy growths of wood and large crops of fruit of prime quality.

The lime treatment of alunite saves the heavy cost of roasting but adds to the weight, and therefore reduces the original grade of the mineral in potash by 10 per cent., whereas roasting reduces the weight and increases the grade by 30 to 40 per cent., thus making a big saving in freight and handling. The cost of liming is very small, but the cost of roasting appears to be prohibitive on low grade mineral. This cost is greater than it is in the case of roasting sulphides, since whilst the furnace reaction in the latter case is exothermic, in the case of alunite it is endothermic, requiring a large consumption of fuel to maintain.

An alternative source of potash, viz., jarosite, the iron compound homologous with alunite, continues to be found in various parts of the State, but nowhere in sufficiently large quantities to form a permanent source of supply. The localities for this mineral already known are Nullagine, Mulgine, Northampton, Kalgan River, Ravensthorpe, Little Wongan Hills, and Newcarnie.

In order that no obstacle shall be placed in the way of utilising as fertilisers these valuable local sources of potash it appears desirable that a regulation should be gazetted under Section 30 of the amended Fertilisers and Feeding Stuffs Act of 1904 defining the term "potash in readily soluble form" used in sections 4, 6, 8, and 11 of that Act. From the context it is plain that this term means something different from water-soluble potash, since the term water-soluble is used in connection with phosphoric acid but not in connection with potash. "Potash in readily soluble form" should be defined as "potash contained in compounds soluble in water, dilute acid, or dilute caustic alkali solution."

Ochres.

A great deal of work has been done during the year in testing natural pigments in view of the early establishment of one and possibly more oil paint and distemper ("calsomine") factories in the State. The various minerals likely to be in demand are red oxide, red ochre, yellow ochre, sienna, and umber for oil paints, and white kaolin, miloschite, and small quantities of the above pigments for distempers.

The kaolin required is pure white in colour, very fine grained, free from grit and easily ground. Such material is obtainable in the shape of washed kaolin from the Darling Ranges, and sedimentary clays from Mt. Kokeby, Bolgart, Piawaning, and other places. Some of the fine grained kaolinised rocks of the Eastern Goldfields would probably also be available.

Red oxide of suitable quality has been obtained at Jacob's Well, Kalgoorlie, and Geraldton. Red ochre at Kalgoorlie, Cossack, Geraldton, Watheroo, and Carbarup. Yellow ochre at Kalgoorlie, Cossack, Geraldton, Carbarup, and Denmark. Sienna at Cossack, Geraldton, Jarrahwood, and Denmark. Umber at Geraldton, Ravensthorpe and Hamersley River.

A deposit of miloschite (chromiferous kaolinite) at Grass Valley is likely to be worked for use in distempers, the natural colour being a very pleasing nile-blue of slightly varying tints.

Glass Sands.

The available resources of the Metropolitan Area in glass sands have been further investigated. Information regarding this matter was given in my last Annual Report.* No other sand has been found of the exceptionally high quality of that occurring on the north-eastern shore of Lake Gnangara, but sand of excellent quality, both as regards physical and chemical requirements, has been located at Bassendean and Cannington, besides large quantities in the vicinity of Lake Gnangara, only slightly inferior to that on the shore of the lake.

The average of thirteen samples from Bassendean was:

	Per cent.
Silica	99·72
Iron oxide	0·039

Two samples from Cannington:

	Per cent.
Silica	99·53
Iron oxide	0·046

*G.S.W.A. Annual Prog. Report, 1918, p. 26.

Such sands are suitable for the production of the best window glass and plate glass.

Salt.

The search for suitable supplies of salt for alkali manufacture continues. No underground beds of rock-salt are as yet known in the State, though the geological structure and history of certain areas of the State are not incompatible with their occurrence. Deposits which have been worked are of two general types, viz.:—

(1) Deposits formed in the summer on the surface of lagoons and lakes near the sea by the drying up of the winter rain water which has been saturated with sea spray. Of this type are the deposits at Lynton (Port Gregory), Rottnest, Esperance, and Middle Island, all of which have yielded commercial supplies. These deposits can only be worked in summer and early autumn, and can ultimately never yield more salt per annum that that which is carried into them each year by the winter rains and spray, probably in the most productive of them less than 10,000 tons per annum.

(2) Deposits formed during the dry weather at various seasons of the year on the surface of the numerous dry lakes of the drier portions of the southern interior. These are confined to the area within the 15-inch rainfall line, and owe their accumulation partly to the drying up of the surface drainage water carrying salt, but more largely to efflorescence from the very salt water with which the porous beds of the lakes are saturated to a depth of many feet. Of this type are the deposits at Cowcowing Lakes, Yarra Yarra Lakes, Lake Goongarrie, Lake Raeside, and many others, several of which have been worked on a commercial scale. None of these deposits appears capable of yielding more than a few thousand tons per annum, though this supply could be largely increased by pumping the underground water to the surface. The proportions of salt in some of these waters are:—

		Per cent.
Yarra Yarra Lake ...	NaCl	23·03
Yarra Yarra Lake ...	,,	6·89
Goongarrie Lake ...	,,	20·10
Hannan's Lake ...	,,	12·84
Southern Cross	,,	17·26
Lake Cowan	,,	18·88
Lake Cowan	,,	16·17

Lake Preston, a large permanent stretch of water on the coastal plain about 75 miles south of Perth, has been suggested as a source of salt by artificial evaporation of the water, which is salt all the year round. A sample of this water collected on the 18th September, 1918, contained 3.66 per cent. NaCl with 0.93 per cent. of other water soluble salts, chiefly magnesium chloride (0.46 per cent.) and magnesium sulphate (0.31 per cent).

The quality of the crude salt collected from these various sources, and placed on the market, is indicated by the following figures calculated on the steam-dried mineral:—

			Per cent.
Hutt Lagoon	Lynton	NaCl	99·55
Salt Lake	Rottnest ...	,,	97·90
Lake Polaris	Southern Cross ...	,,	97·67
Day Dawn G.M. ...	Southern Cross ...	,,	98·99
Pink Lake	Esperance ...	,,	99·13
Pink Lake	Esperance ...	,,	99·50
Lake	Middle Island ...	,,	99·68
Lake	Middle Island ...	,,	99·90
Lake	Bellenger Island	,,	98·77
Lake	Denham	,,	99·13
Lake Raeside	Leonora	,,	97·67
Lake Raeside	Leonora	,,	98·72
Lake Goongarrie ...	Comet Vale ...	,,	98·97
Lake Brown	Nungarin ...	,,	93·56
Lake Cowcowing ...	Koorda	,,	98·58

Gypsum.

The exceptionally high price now being asked for plaster of paris, none of which is made in this State, and the difficulty of obtaining supplies adequate to the demands of the building trade, have led to an energetic search for deposits of gypsum of a quality suitable for making plaster. Gypsum, particularly the powdery variety known as kopi, is very widely distributed throughout the State in late Tertiary and Post Tertiary deposits associated chiefly with the salt lakes of the drier parts of the interior south of the tropics. In every case known so far, these deposits are not available for plaster making, since they contain a sufficient amount of buff-coloured organic matter to render the set plaster light buff or grey in colour, instead of white. This organic matter does not lessen the strength of the plaster and should not, therefore, prohibit its use for wall plasters, since a badly tinted wall could, for a very small sum, be coated with a distemper. The prejudice, however, against the use of these tinted plasters held by architects and builders is so strong that no sale whatever can be found for them.

The best gypsum for this purpose so far discovered is found in the salt pans amongst the coastal sand dunes to the south of Dongara. Typical samples collected by Inspector Wilson of the Mines Department at Warmold and Knowler's Claim, at Dooka, showed:—

Gypsum, Dongara.

No. / Variety	1. Kopi.	2. Seed Crystals.	3. Seed Crystals with Calcite.	4. Seed Crystals with Calcite.	5. Seed Crystals.
Insoluble in acid	1·51	·48	·85	5·41	·86
Water soluble CaO	27·62	29·72	28·32	21·87	28·79
Acid soluble CaO	6·50	4·24	5·52	15·78	5·63
Equal to—					
Gypsum, $CaSO_4 2H_2O$	84·79	91·30	86·94	67·14	88·38
Calcite, $CaCO_3$	11·60	7·56	9·85	28·15	10·04

Of these, No. 2 proved to be the best, yielding a pure white, quick-setting plaster. Nos. 3 and 5 were almost as good, being almost pure white. No. 4 yielded a cream-coloured plaster, and No. 1 a deep-grey plaster.

A kopi collected by H. W. B. Talbot at the mouth of Goddard's Creek, 15 miles south-east of Kitchener Siding on the Trans-Australian Railway, may be taken as typical of the powdery gypsum which is found far and wide in low dunes on the lee side of salt pans and dry lakes:—

Gypsum, Goddard's Creek.

	Per cent.
CaO	31·20
MgO	·29
SO_3	42·05
CO_2	·82
NaCl	·46
Na_2O	·14
K_2O	·08
Fe_2O_3	·05
Al_2O_3	·26
SiO_2	3·37
H_2O + ...	20·59
H_2O —	·33
Organic	·78
	100·42

The colour of the set plaster made from this is greyish-white to very pale grey.

Beryl.

Hitherto this mineral has not been of any commercial value, except when it was sufficiently brightly coloured and transparent to be used as a gem under the names of emerald, aquamarine, and golden beryl. During the past year inquiries have come from America for supplies of common beryl in quantities of one ton upwards, and it is quite possible that this demand could be met from the known deposits in this State. The localities in which this mineral has been found are: Yinnietharra Station, Poona, Melville, Toodyay, Balingup, Greenbushes, Ravensthorpe, Londonderry, and Bellenger. Of these localities, Poona and Balingup appear to be the most likely to yield commercial quantities.

Clackline Iron Ores.

An opportunity occurred during the year of visiting the important brown iron ore deposit lying about three miles north-west of Clackline railway station. This deposit has for many years furnished the flux required by the lead smelters at Fremantle, and at least one million tons of ore still remain in sight. The exact form and origin of the deposit is obscure. The main body of ore does not appear to be a laterite (though it is capped in places with a thin layer of this material), but may be the outcrop of a large sulphide lode. The outcrop runs for a distance of about a mile on an east and west line along the northern slope of a shallow hanging valley on the summit of the Darling Plateau. The immediate country rock is invisible, but a few miles away, on the deeply eroded slopes of the plateau, completely kaolinised gneiss (occasionally garnetiferous) is exposed, with wide vertical bands of a highly quartzose rock, which appears to be an ultra-acid pegmatite, as well as dykes of dolerite and hypersthenite.

The ore has been obtained from a number of small quarries along the outcrop, none of which is more than 25 feet deep. In the largest quarry, on Location 17564, the vertical section disclosed was:—

0ft. to 3ft.—Loose yellow pebbly laterite.
3ft. to 5ft.—Mottled yellow and brown cellular laterite.
5ft. to 16ft.—Stony brown iron ore with innumerable veinlets of glassy black ore.
16ft. to 18ft.—Stony brown iron ore.

Partial analyses were made of average samples of the different sections of this face, and also a grab sample of cellular brown limonite, partly dull, partly glassy, from a quarry on Location 18913 at the eastern end of the iron-bearing area, which may be on a separate deposit. The results were:—

Iron Ore, Clackline.

	Loc. 17564.				Loc. 18913.
	0–3ft.	3–5ft.	5–16ft.	16–18ft.	2–8ft.
Fe_2O_3	54·28	56·36	76·82	76·68	77·58
Mn_2O_3	17·70	16·38	·34	3·22	1·00
Al_2O_3			3·06		3·38
TiO_2	·67	·54	*Nil*	*Nil*	trace
SiO_2	15·42	10·84	6·34	6·60	3·62
H_2O + ...	10·80	13·85	12·65	12·14	12·80
H_2O —	1·52	1·81	1·19	1·73	1·66
P_2O_5	...	...	·02	...	·02
SO_3	...	...	·16	...	·30
CaO	...	...	*Nil*	...	·10
MgO	...	...	*Nil*	...	trace
	100·39	99·78	100·58	100·37	100·46

It is evident that the surface material down to five feet on Location 17564 contains over 20 per cent. of admixed gibbsite (aluminium hydrate) and is a much poorer iron ore than that which lies below it and forms the main portion of the deposit

Yampi Iron Ores.

The State Mining Engineer has recently visited and sampled the iron ore deposit which occurs on two contiguous islands, Koolan and Cockatoo, on the north side of Yampi Sound. The deposit has been previously described by W. D. Campbell,* and some

* G.S. W.A., Bulletin 67, p. 124.

incomplete analyses published by the present writer.* More detailed analyses are now available of the samples taken by the State Mining Engineer, and these are given below:—

Iron Ore, Yampi Sound.

No.	1.	2.	3.	4.	5.	6.	7.	8.
Collected by	S.M.E.	S.M.E.	S.M.E.	S.M.E.	S.M.E.	S.M.E.	W.D.C.	W.DC.
Island	Cockatoo.	Cockatoo.	Koolan.	Koolan.	Koolan.	Koolan.	Koolan.	Koolan.
Fe_2O_3	73·86	98·55	87·02	97·53	58·18	95·59	94·97	92·71
Fe_3O_4	str. tr.	sl. tr.	str. tr.	str. tr.	sl. tr.	sl. tr.	tr.	tr.
SiO_2	25·55	·95	2·55	·52	40·50	4·20	4·16	7·06
TiO_2	·17	·17	2·64	·18	·37	·35	tr.	tr.
SO_3	·13	·02	·02	·02	·05	·12	·17	·10
P_2O_5	·02	·02	·11	·02	·02	·03	·14	·03
H_2O†	·16	·12	3·52	·02	·24	·17	·20	·16
Al_2O_3	·77	·66	4·63	2·37	1·23	·40	?	?
CaO	·05	·05	·10	·06	*Nil*	·04	...	...
MgO	*Nil*	trace	·10	·03	trace	trace	...	...
Mn_2O_3	*Nil*	trace	·06	·01	*Nil*	·01	...	...
	100·71	100·54	100·75	100·76	100·59	100·91	99·64	100·06
Fe	51·70	68·99	60·91	68·27	41·43	66·91	66·48	64·90
S	·05	·01	·01	·01	·02	·05	·07	·04
P	·010	·008	·050	·009	·010	·014	·062	·012

The ores are composed mainly of haematite and quartz with small quantities of magnetite, ilmenite, felspar, etc. They appear to be of sedimentary origin, being interbedded with quartzites and conglomerates, and showing in thin section rounded grains of quartz associated with granular haematite and secondary chalcedony.

Excluding No. 3, which was a surface gravel cemented with lateritic material, the ore averages 61.24 per cent. metallic iron, with 10.85 per cent. silica, and only 0.018 phosphorus and 0.036 sulphur.

The immense size of the deposit, its high grade, and its situation on the very shore of a deep land-locked harbour, make it rank as one of the most important iron ore deposits in the world.

Mineral Notes.

Amongst the many minerals submitted during the year for determination and report as to their economic value the following are noteworthy.

Chromiferous Spinel (*chromite and aluminate of iron and magnesium*), *Namban.*—A belt of serpentine country lying between the Midland Railway and the Goomalling-Mullewa Railway has already proved of economic importance by yielding commercial supplies of asbestos (anthophyllite). Recently surface boulders of chromiferous spinel have been discovered over portions of its outcrop lying east of Namban, and these may lead to the location of a workable deposit of this infusible and chemically inactive mineral suitable for use as a refractory lining for furnaces, etc. An analysis of the mineral shows that it is to be classed as Ceylonite, the composition being:—

Ceylonite, Namban.

	Per cent.
MgO	13·65
FeO	17·45
MnO	·26
Fe_2O_3	3·80
Al_2O_3	42·09
Cr_2O_3	22·76
SiO_2, H_2O	*Nil*
	100·01
Specific gravity	4·12

Emery (*impure alumina*), *Richenda River.*—Mention was made in my previous Annual Report† of the occurrence in the West Kimberley District of a considerable quantity of impure corundum (emery) suitable for the manufacture of various types of abrasives. An analysis since made of this shows that it contains:—

Emery, Richenda River.

	Per cent.
Al_2O_3	81·90
SiO_2	3·54
TiO_2	2·75
FeO	2·30
CaO	·91
MgO	*Nil*
H_2O	8·08
Carbon	·50
	99·98

Microscopic examination and calculation from the analysis indicate the mineral composition to be:—

	Per cent.
Diaspore, $Al_2O_3.H_2O$	53·9
Corundum, Al_2O_3	31·2
Kyanite, $Al_2O_3.SiO_2$	6·9
Ilmenite, $FeO.TiO_2$	4·9
Grossularite, $3CaO.Al_2O_3.3SiO_2$	2·4
Rutile, TiO_2	·2
Carbon, C	·5
	100·00

This contains more water and less iron than the usual run of emery. It is, however, hard, sharp, and of excellent quality for industrial purposes.

Emery, Roebourne.—Emery has also been found near Roebourne in loose surface boulders which have not yet been traced to their original matrix. This emery has the following composition:—

Emery, Roebourne.

	Per cent.
Al_2O_3	85·78
SiO_2	6·18
TiO_2	2·42
FeO	·46
MgO	·20
CaO	1·92
Cr_2O_3	·83
H_2O	2·08
	99·87

* G.S. W.A., Bulletin 67, p. 124.

† G.S., W.A., Annual Progress Report, 1918, p. 37.

The exact mineral composition of this material has not been elucidated, but it is a complex mixture containing between 60 and 70 per cent. of corundum. It makes an excellent abrasive.

Gibbsite (hydrate of aluminium), Toodyay.—This mineral forms the chief constituent of bauxite, which is the main source of metallic aluminium. An account of the bauxites of the Darling Ranges was given by E. de Clarke, and the writer in the Annual Progress Report for 1918.* The richest ore so far examined has come from Toodyay, one sample yielding 47.86 per cent. of acid-soluble alumina.

Apatite (fluophosphate of calcium), Westonia.—This mineral occurs abundantly in a coarse albite-biotite-quartz pegmatite vein at the 560ft. level of the Edna May Deeps Mine. The mineral is in long prismatic crystals up to 1.5 inches in length and 0.1 inch in diameter, with a density of 3.15. The colour is a dull green (Ridgway 35″ i, French green).

Microcline (silicate of potassium and aluminium), Londonderry.—Potash felspar of a size and quantity suitable for use in making porcelain and semi-porcelain ware, has been opened up at Londonderry, where it occurs in coarse pegmatite veins with quartz and mica. For this purpose it should be very free from iron compounds. A very pale grey microcline from the Marshal Foch M.L. was found to carry only 0.0056 per cent. of ferric oxide, and a white microcline from the General Haig M.L. 0.0112 per cent.

Magnesite (carbonate of magnesium), Corrigin and Kumminin.—In view of the increasing manufacture of sorel cement in Australia and the long distance (400 miles) which the Bulong mineral has to traverse to reach the coast, it is interesting to note the possibility of obtaining commercial supplies of magnesite in the Eastern Wheat Belt at Corrigin (174 miles from Perth) and Kumminin (182 miles). Partial analyses of bulk samples of large surface boulders of hard cryptocrystalline magnesite from these places showed:—

	Corrigin A.	Corrigin B.	Kumminin.
MgO	46·92	44·56	46·64
Equal to $MgCO_3$ ...	98·12	93·18	97·54
CaO	trace	1·92	trace
Fe_2O_3, Al_2O_3	1·00	1·74	1·56
Insoluble in acids ...	·60	1·02	1·16

These are all fairly high grade magnesites suitable for commercial use.

Psilomelane (hydrous manganite of manganese and potassium), Horseshoe.—A very pure psilomelane in hard dense masses has been obtained in commercial quantities near Horseshoe. Its composition was found to be:—

	Per cent.
MnO_2	75·35
MnO	6·00
Fe_2O_3	4·56
SiO_2	1·09
Al_2O_3	1·91
BaO	1·06
P_2O_5	·11
H_2O	3·27
K_2O	3·11
Na_2O	·53
Undetermined	3·01
	100·00
Total Mn	52·26
Total Fe	3·19
Phosphorus	0·048

* G.S. W.A., Annual Prog. Report, 1918, pp. 19-36.

This mineral is suitable for use in manufacturing steel, permanganates, or glass.

Iolite (hydrous silicate of aluminium and magnesium), Westonia.—This mineral, not previously recorded for the State, has been found in some abundance in a pagmatite vein at a depth of 566 feet in the Edna May Deeps G.M., Westonia. The mineral is in large rounded masses with a strongly marked basal parting, and less evident cleavage (010) at right angles thereto. Owing to the strong pleochroism of the species, the colour is illusive. At a little distance it appears cement grey, but closer inspection shows a violet tinge in some lights and a dull green in others. Alteration in the direction of a mica has gone on to a large extent, the mineral as a whole having now the following composition:—

	Per cent.
Si_2O	45·10
Al_2O_3	29·57
Fe_2O_3	·24
FeO	4·26
MnO	·38
MgO	9·56
CaO	1·06
Na_2O	1·27
K_2O	4·28
H_2O	4·42
TiO_2	*Nil*
	100·14

Publications.

The reports of investigations made at the public expense and issued to single individuals are not infrequently not put to any good use by those persons. For this reason permission is given to the Department under the Assay Regulations to publish the results of such investigations, and this permission has always been taken advantage of in the past under such conditions as to safeguard within reason the interests of those who submit material for examination. This has been done so judiciously that no exception has ever been taken to this action. It has been the practice to publish results of local economic interest in departmental Bulletins and Reports, whilst matters of purely scientific or theoretical interest which crop up in the course of the work of the laboratory are published in the journals of scientific societies. The publicity thus given has been productive of much good, the work done free by the laboratory, and the information collected by it, being made available ultimately to every one throughout the State who is interested, instead of being confined to one or two individuals who have failed to put it to any good use.

It is regrettable therefore that during the past year there has been an almost total suspension of publication by the Government, the only reports issued being the Annual Report for 1918 and Bulletin 77 dealing with "The Sources of Industrial Potash in Western Australia." In addition an article on "Alunite" was published by the Chamber of Mines in their Journal,† and an article on "The Assay of Alunite" in the Chemical Engineering and Mining Review of Melbourne.‡

A paper entitled "On Gearksutite at Gingin, Western Australia," was submitted to the Mineralogical Society (London), and a second "On Hisingerite from Westonia" to the Royal Society of Western Australia. These should appear in print early in

† Monthly Journal of the Chamber of Mines, xviii, 59 (1919).
‡ Chemical Engineering and Mining Review xi, 297 (1919).

this year in the "Mineralogical Magazine" and "Journal of the Royal Society of Western Australia" respectively. An article was written for the Colonial Secretary's Department on "Geological Features of the South-Western Caves District," and for the Federal Government of "Sulphur Ores in Western Australia."

The series of monographs on the mineralogy of various restricted districts of the State, which was begun in 1911 with the account of the minerals of Kalgoorlie, has been continued and an account written of "The Minerals of the Ashburton and Gascoyne Valleys." No authority for the printing of this has yet been obtained, nor for "The Minerals of Comet Vale and Goongarrie," written in 1918.

PETROLOGICAL WORK.

(R. A. FARQUHARSON.)

The work for the past year is conveniently summarised under the following heads:—

I.—Determinations and Reports for the Geological Survey Staff.

II.—Determinations and Reports for Mine Managers, for other Departments, for Prospectors, and the general public.

III.—Miscellaneous.

I.—*Determinations and Reports for the Geological Survey Staff*:—

A considerable part of the work for the year has again been the determination, description and correlation of rocks collected by the officers in the field, discussions with the officers concerned of the geological problems of each district, and careful consideration of the field occurrence of the rocks with the ascertained microscopic characters. The results of this work are that, so far as field data and specimens can be obtained, the mapping, which should be, and is, of the utmost importance to prospectors, and in live mining fields to mine managers, is as accurate as possible.

As in 1918, however, an increasingly large part of the work has been investigations for mine managers of problems arising in the course of their work, upon the solution of which the future development of their mines to a large extent depends.

The total number of sections cut and registered during the year was 336, but, in addition to these, I have myself cut 190, a number which comprises those cut for determinations for prospectors, for those engaged in mining, and for the public generally.

The suites of rocks examined include those from—

1. *Leonora, Laverton, Anaconda, etc.*—A statement of the different rock types met with in this district was given in the Annual Report for 1918. A general statement of the petrology, however, including a classification and a correlation of the rocks was prepared early in 1919, for Mr. Clarke, for use in the preparation of his Bulletin. For reasons of economy in printing, this has not been published as a separate chapter, but the information has been incorporated in Mr. Clarke's text.

2. *The Southern Portion of the Yalgoo Goldfield.*—As little or nothing was known of the geology of the southern portion of this Goldfield lying to the east of Lake Moore and south of Warne River, it was considered advisable to despatch a geological survey party to examine the country and to ascertain whether any of the greenstone belts which occur further to the north and north-west extend to the southern part of the field. The specimens examined are those collected by Mr. Talbot during the course of this survey. They include—

Biotite microcline granites.
Aplites and felsitic quartz porphyries.
Sheared chloritic-quartz rock with grains of a secondary mineral doubtfully referred to kyanite.
Amphibolised and zoisitised quartz-dolerites, epidiorites, etc.
Hypersthene-hornblende and hypersthene gabbros.
Micropegmatitic quartz-dolerites.

Owing to the necessity of economy in printing, the results have not been put into a separate chapter, but have been incorporated in Mr. Talbot's text.

3. *The Ashburton Drainage Basin.*—Portion of the country drained by the Ashburton, one of the largest rivers in the State, has in the past produced a considerable amount of gold and other minerals, and it was therefore considered advisable in the interests of mining generally to have an examination made of that part of the area not previously visited by an officer of the Geological Survey. The rocks examined were those collected by Mr. Talbot while engaged in a survey of this country. They include—

Sedimentary rocks: ferruginous sandstones, dolomitic and other limestones, chloritic grits and arkoses, quartzites, etc.
Acid and basic lavas: Rhyolitic quartz porphyries, weathered vesicular basaltic dolerites, volcanic agglomerates.
Chloritised and amphibolised micropegmatitic quartz dolerites, zoisitic epidiorites.
Chloritic and felspathic quartz porphyries.
Biotite granites.
Knotted micaceous schists.

In the course of the examination of these rocks an investigation was made of the presence or absence of any sedimentary metamorphic minerals in several of the limestones and dolomitic limestones of the area.

The results of the work have again, for the sake of economy, been incorporated in Mr. Talbot's text.

4. *Bolgart.*—These were collected by Mr. Feldtmann in the course of his investigation of the occurrence and origin of the clays of the neighbourhood. The rock types found included hornblendite, chloritised ophitic dolerite, epidotised quartz-epidiorite, granulitic epidiorite.

The clays were composed chiefly of quartz, white mica and kaolin, but the proportion of these varies considerably in different samples. In some, quartz and mica are fairly evenly balanced, in others quartz and kaolin make up nearly the whole of the rock, and in others kaolin is by far the most abundant constituent.

5. *Arrino District.*—In an early bulletin of the Geological Survey these rocks were classed as sedimentary tuffs grading into ferruginous sandstones. Recent examination, however, at the request of the Government Geologist, of sections of the typical rock shows that they are in reality highly ferruginous and felspathic grits, some of which have a distinctly banded structure. The assigning of a tufaceous origin to them was apparently due to the alleged presence of isotropic glass between the granular quartz and iron ore. This so-called glass, however, is really in part kaolinic material of very low birefringence and in part opal. No typical minerals,

fragments, or structures found in volcanic rocks or tuffs were observed in any section of any of the rocks.

6. *Kurrawang and Menzies.*—These were obtained by Mr. Clarke during the course of an examination of the new find at Wallangie, and of a mining difficulty at Menzies. The Wallangie rocks were examined with the object of determining the country-rock of the find; its relation to that of other goldfields, and the presence or absence of acid dykes. The rocks from near Menzies were chiefly interesting owing to the discovery by Mr. Clarke of an outcrop of what proved to be a fuchsite-andalusite schist.

7. *The Kimberley Division.*—The materials on which this report is based consist of collections of hand specimens of rocks obtained from the district described in the bulletin, and a few chemical analyses made in 1902. There are three separate collections, each made on exploring expeditions which at different times traversed different tracts of this little-known division of the State.

The first collection in point of time was that made by the Kimberley Exploring Expedition conducted by Mr. E. T. Hardman in 1883, the general results of which were published in the volume of Geological Survey Annual Reports for 1871-1891. The country traversed was that between latitudes 16° 35′ S. and 18° 30′ S., and between longitudes 122° 10′ E. and 126° 50′ E., comprising the district from Roebuck Bay to the Leopold Ranges, and between Port Osborne and a line running eastwards a little to the south of the Fitzroy River.

The second collection consists of those rocks obtained by Messrs. A. Gibb Maitland and C. G. Gibson in 1901 when attached to the Brockman Exploring Expedition. The parts explored by these officers included the neighbourhood of Wyndham; the gorge of the Isdell River; the land to the west, north-west, and north of the Synnot Tableland, including the Synnot Creek, Charnley River gorge, and the Calder River gorge; the eastern flanks of the Harding Range; the vicinity of Mount Kitchener, Mount Lyell, and Mount Trevor; the upper reaches of the Prince Regent River, and Mount Hann; and some of the hills overlooking Napier Broome Bay.

The third collection comprises the specimens presented to the Geological Survey Museum by Mr. W. V. Fitzgerald, who in 1905, while attached to Mr. Crossland's party, made an examination of the country along the May, Lennard, Barker, Adcock, Throssel, Upper Fitzroy, Hann, Barnett, Isdell, Sprigg, Lower Charnley, and Lower Calder Rivers.

Owing probably to the nature of two of the expeditions little or no information was at hand with regard to the field occurrence of the rocks and their mutual relations, and consequently each specimen was considered and described separately. Moreover, after examination of the specimens and comparison of the registered numbers with those field numbers given in the respective published accounts of the expedition, it was found that probably owing to the difficulties of transport and to frequent removals even in Perth, a considerable number, especially of Hardman's rocks, have been altogether lost.

All the rocks being regarded as members of one large collection, it has been found that sedimentary, igneous and metamorphic rocks are represented, the igneous types being more numerous than the others, though, of course, it does not follow that igneous rocks really occupy a greater area of country than do the sedimentary and metamorphic rocks. The sedimentary rocks comprise quartzites, chloritic grits, arkoses, limestones and slates. Of the quartzites, some are sugary-white and fine-grained, others red ferruginous, others again red with earthy hæmatite or brown limonite cement. The chloritic grits are all fine-grained with much fine scaly yellowish-green chlorite. A few are indistinctly laminated.

Limestones, in which the carbonate is largely calcite, are far more common in the district than the number of specimens would lead one to expect. All are fine-grained, some pink in colour, a few show relics of organic remains, and one is noteworthy for containing crystals of zinc blende.

Amongst the igneous rocks there are distinguishable the foliated or sheared, and the non-foliated. The former comprise hornblende schist, chlorite schist, and a few sheared epidiorites. The latter—the non-foliated—comprise vesicular or amygdaloidal basalts or dolerites, basaltic dolerites, amphibolised micro-pegmatitic quartz-dolerites, fine-grained fibrous and chloritised epidiorites, granites, tuffs and agglomerates, and a mica-leucitite. This leucitite, which is the most remarkable rock in the whole collection, comes, according to the register of Fitzgerald's specimens, from the Lennard River, near Mt. Eliza, West Kimberley. From the composition and structure of the rock and from partial analysis to determine the amount of potash and soda present, it has been determined as a mica-leucitite, *i.e.*, an alkaline basic lava, containing chloritic xenoliths. No similar rock has ever before been recognised in Western Australia, and when regard is paid to the locality at which the rock is said to have been found —beyond the southern escarpment of the Leopold Ranges and due east of Derby—and to the fact that throughout the Kimberley District no other alkaline volcanic rock has been found, and to the fact that nothing has been recorded as to the mode of occurrence of the rock, some doubt arises whether the rock really came from the locality given. Mica-leucitites of very similar if not identical character are well known in Java, and it is conceivable at any rate that the rock is a stray accidentally introduced into the collection from one of the Java boats. Should subsequent travellers prove the locality to be correct, the rock will furnish evidence of a close connection between some of the volcanic rocks of Java and some from the Kimberley District of Western Australia.

The metamorphic rocks are represented in the collection only by two specimens, one from Devil's Pass and the other from Granite Hills, Margaret River. The former is a garnetiferous chlorite-quartz schist, with small grains of a secondary mineral doubtfully referred to andalusite. The latter is a biotite-sillimanite gneiss. Both rocks are probably the result of severe dynamic metamorphism of pre-existing sedimentary series, and it is highly likely that other types will subsequently be found in the same localities.

II.—*Determinations and Reports for Mine Managers, for other Departments, for Prospectors, and the general public.*

The increase noted in the Annual Report for 1918 in the number and variety of requests for petrological information from mine managers and others engaged in mining has been well maintained, and

confirms my remarks in that Report that those responsible for the conduct of mining operations are becoming more and more alive to the value of an accurate knowledge of the character, origin, alteration, and relation to one another of the rocks of any mine or of several mines, and the influence of those factors on the development and future of the mine.

The investigations carried out under this head include:—

1. Determination of rocks from the Carbine Mine, Coolgardie:—

These specimens were sent for examination for the purpose of clearing up some difficulties met with in the working of the mine. One proved to be a porphyritic andesitic basalt dyke similar to those found at Sandstone, the Corinthian mine, etc. Another was a finely foliated siliceous facies from a zone of intense shearing, in all probability an altered form of the country rock impregnated with quartz.

2. Determination and correlation of rocks from Westonia sent down by Mr. H. G. Stokes, of the Golden Point Mine:—

The main objects in sending down these rocks were to follow if possible or to pick up the course of the auriferous facies of the Edna May gneiss, and to acquire some idea as to how far the structure of the more recently opened mines corresponded with or differed from that of the older. All the specimens were examined in the light of these two main aims. Amongst the rocks determined were:

(a) A so-called sillimanite-schist from the Golden Point mine. This proved to be a granulitic tremolite-felspar schist.

(b) Several specimens of granulitic hornblende-felspar rock and schist from the Golden Point and Central mines. These were sent particularly for comparisons with the Edna May auriferous gneiss.

(c) Schistose amphibolite or hornblende schist. Granulitic and imperfectly foliated hornblende-felspar rock of dioritic character, similar to the Edna May gneiss at the 245 feet level in Duff's Bore, but without quartz and without the brown-red biotite. Finely foliated extremely felspathic felspar hornblende rock.

(d) Bore cores from bores put down by Mr. Stokes in G.M.L. 2716. Last year boring operations were begun by Mr. Stokes on L. 2716 with the object of determining whether the auriferous Edna May gneiss lens extended eastward. At the same time Mr. Collins of the Consolidated Extended mine started cross-cutting to the boundary of his lease, so that with the cross-cut and the line of bores more or less at right angles to the strike of the Edna May lens, a fairly accurate knowledge would be obtained of the character of the rocks to the east of the lens. Samples of bore cores were sent down from time to time by Mr. Stokes for determination and comparison with other rocks of the field. In all at least six bores were put down but the rock met with was mainly decomposed or fresh granulitic hornblende-pyroxene schist, tremolitic anthophyllitic hornblendite, or similar to the facies in Duff's Bore at 465 feet. No rock similar to the Edna May gneiss was encountered. The rocks in the Consolidated Extended mine were granulitic hornblende-gneiss and anthophyllitic (tremolitic) hornblendite.

3. Investigations of rocks collected by me from Westonia:—

At the end of July as the result of requests made by Managers of the Golden Point and Consolidated Extended Mines, I was instructed to proceed to Westonia to examine the rocks of these two mines and the bore cores from L. 2716, and from this examination to form some conclusions as to the possibility of an extension of the auriferous Edna May gneiss to the east. In addition I took the opportunity of being on the field to examine the rocks of the different mines and of the neighbourhood generally in order if possible to supplement the information already published in my article on the Petrology of Westonia in Bulletin 71.

The conclusions arrived at from the consideration of some fifty specimens are as follow:—

1. There is a distinct band of gneiss which extends from the neighbourhood of the Recovery Mine to the Consolidated and Golden Point Mines through the Deeps and Central Mines. This gneiss is bordered on the footwall side by a granulitic hornblende schist (or gneiss without quartz), which also occurs in shafts between the Greenfinch and the Deeps. While there is some resemblance in places between this footwall greenstone and the Edna May gneiss itself, on the whole for mining purposes it must be regarded as the country rock of the latter, and consequently as distinct from it.

2. In the Recovery Mine there appear to be two facies which though resembling each other very closely in appearance and structure yet differ in that one contains quartz and the other does not. The facies with quartz, which is a gneiss practically identical with the true Edna May gneiss, occurs only in small amount in this (Recovery) mine, and owing to the level in which it occurs being under water, it was, unfortunately, not possible to examine the relation between the two facies. As a very similar rock to this quartzless gneiss occurs at the 321 feet level in the Central Mine, and at the 660 feet level in the Deeps Mine, it is probable that the two facies are genetically connected. In regard to this question much depends on the origin of the Edna May gneiss itself and on the origin of the quartz. In the Central Mine at 321 feet occurs a rock closely akin to a granodiorite, and in the Deeps at 760 feet a pyroxene-green hornblende-felspar gneiss with grains of sphene. From a comparison of these rocks with many samples of the Edna May biotitic gneiss, and from a consideration of the nature of the Edna May gneiss at depth, as revealed in Duff's Bore, the conclusion is inevitable that the original of the auriferous gneiss was a rock of monzonitic or granodioritic type, as already stated in Bulletin 71. Some of the quartz appears to be original in the rock, but from the enormous number of quartz veinlets in samples of the Edna May gneiss, it is highly probable that much of it is intrusive and has been produced by a kind of *lit par lit* injection. Samples from the horizontal bore that was put in in the Deeps Mine prove to be a granodioritic gneiss with biotite.

The biotite (brown-red) gneiss with quartz is, therefore, an alteration product of a granodioritic gneiss produced by the intrusion of pegmatitic quartz, and by severe earth movements which have brought about a pronounced gneissic structure. No secondary minerals of metamorphic origin, such as scapolite, salite, garnets, etc., were found in any sample of this gneiss in the mines examined.

3. The Edna May gneiss is an intrusive rock, and is not sedimentary rock metamorphosed. Specimens were obtained from the Deeps, which show not only a contact between the chloritic hornblendite of the footwall country with a pronounced selvage of gneiss at the junction and an alteration both of the chlorite and the hornblendite to brown or black biotite and of the chlorite of the gneiss to brown biotite, but also clear incorporation of fragments of the footwall hornblendite in the body of the gneiss. Also, while the body of the gneiss of this contact is similar in appearance to the Edna May gneiss and to a great extent to the quartzless gneiss of the Recovery, the selvage contains no quartz—a fact which again suggests a genetic connection between the two facies in the Recovery or the occurrences of two facies, one with quartz and one without quartz, in the auriferous lens.

4. The so-called sillimanite-gneiss or schist of the Deeps Mine is really an amphibole schist with nearly colourless prisms of amphibole produced probably by contact action of the pegmatite dykes on a chloritic hornblendite. The hypothesis of flat "saddle reefs" in the Westonia field, therefore, has, in my opinion, no justification whatever. In no single case were there any distinctive secondary metamorphic minerals, *i.e.*, minerals produced by metamorphism of a hypothetical sedimentary origin, found in the Edna May gneiss, and, of course, the evidence of the intrusion of the gneiss is conclusive.

5. From the character of the rocks exposed in the Consolidated Extended Mine in the bores put down by Mr. Stokes in Lease 2716, and from the character of the rocks encountered in the long cross-cut from the Consolidated Extended shaft, I am strongly of opinion that there is no direct continuation of the Edna May gneiss to the east. The rocks from the localities mentioned are those encountered in the footwall country (and possibly in the hanging wall) of the auriferous gneiss lens. There is, of course, a possibility that the auriferous gneiss occurs in lenses which are parallel and *en échelon*. If this is the case, other lenses may occur either to the north-east or to the south-east of the present one, but their discovery is absolutely dependent on chance (in default of any surface indications or of any indications from small prospecting shafts), and as thousands of feet of boring or cross-cutting might be put down in any direction without encountering any auriferous facies, the possibility can scarcely be investigated by Government assistance. There are no surface indications of an extension of the lens eastward, and though a few prospecting shafts have been put down, no evidence of the existence of any gneiss has been disclosed, and any further prospecting in this manner would be merely a gamble.

The occurrence in the Golden Point Mine of veinlets of auriferous quartz identical with that in the Edna May Mine tends to show either that the Edna May lens swings to the south-east or that it is petering out in the Golden Point ground. As a very considerable amount of work has already been done in the Golden Point Mine without the discovery of any body of stone comparable in extent and value with that in the producing mines, it would appear that the latter alternative is the truth.*

*Since the above was written prospecting bores put down to the south-east following the swing of the Edna May lens have proved the existence of auriferous material of the Edna May type. It therefore now appears that my alternative opinion that the gneiss swings to the south-east (instead of continuing eastward) is correct.

4. Examination of rocks from the Commodore Mine (now New Commodore), Meekatharra:—

These were collected by Mr. Clarke during the course of an inspection of the mine for the purpose of noting any new features disclosed by developments subsequent to the geological survey of 1914, and of suggesting lines of work. One of the difficulties in the mine is to distinguish altered (carbonated) porphyry from the other rocks, and the specimens were examined by me to determine which were porphyry and which altered fuchsite—carbonate rock, etc. In most cases it was only by dissolving away the carbonate by hot acid before the microscopic examination that the porphyry could be determined. In addition, the porphyry was compared with altered varieties of Paddy's Flat porphyry with which the auriferous quartz of Paddy's Flat is usually associated, and the opinon was expressed that the chloritic albite-porphyry of the Halcyon Mine, etc., is genetically connected with the albite porphyry of the Flat. The delimitation of the boundaries of the carbonated porphyry in the New Commodore Mine is of considerable importance in regard to the development of the mine.

5. *Determination of rocks from the Orchid Mine, Payne's Find, collected by Mr. Blatchford.*—These were numbered 1—8. Nos. 4, 5, and 6 are all somewhat similar. No. 4 is a normal microcline granite or aplite, which probably occurs as a dyke. No. 6 is a fine granular indistinctly foliated aplitic rock, and No. 5 is a distinctly foliated microcline aplite. No. 5 is similar to No. 4, but foliated, and if it occurs as a dyke, then either there are two sets of aplitic dykes, one pre-foliation and the other post-foliation, or No. 5 has been foliated by merely local movement.

Nos. 8 and 9 are both biotite-hornblende gneisses showing marked resemblance to the hornblendic gneiss of the Edna May group of leases.

No. 2 is a prismatic and somewhat granulitic hornblende schist with a little quartz and shows a noticeable similarity to portions of the No. 3 Bore core, Edna May.

Nos. 3 and 7 are biotite gneisses with green hornblende common or nearly absent, with brown or brown-red biotite, with felspar (more or less altered) in greater or less amount, and with more or less noticeable sphene. Both samples resemble the biotite gneiss from the Recovery Lease, Edna May group, and No. 3 in particular shows a marked similarity to the biotite gneiss of the Edna May leases. The quartz veinlets in No. 3 are remarkably suggestive of a *lit par lit* injection of quartz into a finely foliated gneiss. Should No. 3 be an injection gneiss, the fact would explain to some extent the similarities between Nos. 3 and 7 on the one hand, and Nos. 8 and 9 on the other, for the interjection combined with a dynamic movement that would produce the finer foliation observed in Nos. 3 and 7 would bring about a partial or complete alteration of the hornblende and chlorite of Nos. 8 and 9 into biotite, with the production of biotite gneiss.

A more complete investigation of the rocks of Payne's Find, collected by Mr. Clarke, is at present in hand, and this will enable more definite conclusions to be drawn with regard to them.

6. *Determinations of rocks from Hampton Plains.*—These were collected by Mr. H. G. Stokes when very little work had been done on the area. Several of the rocks were so decomposed that they were little more than clays. In all cases, however, attempts were made to prepare sections of them with the object of discovering any relict structures that might in-

dicate their origin. In a few, some indistinct structures were recognised and an interpretation of them was given in the notes, but no great degree of accuracy could be claimed for their determination until less oxidised and less clayey specimens were obtained.

Amongst the rocks were—

A very fine-grained extremely zoisitised epidiorite. A very coarse-grained completely amphibolised quartz-dolerite, which may also be described as a quartz-epidiorite. A considerably sheared and micacised quartz-porphyry, and an unsheared micacised quartz-porphyry. A fibrous chloritised form of a coarse, somewhat zoisitised, partly micropegmatitic and amphibolised quartz-dolerite, which closely resembles a chloritised form of the quartz-dolerite amphibolite of the North End, Kalgoorlie. A felspar-porphyry, probably an albite-porphyry. A finely laminated indurated (silicified) jasperoid slate. A much decomposed clayey rock, which, though too much altered to be certain of, exhibits characters in section suggesting that it was a quartz-porphyry.

7. Determination of various samples at different times for the Museum.

8. Determination of the large number of rocks and minerals in the collection of the State Junior Technical School.

9. Determination of several rocks for the Superintendent of State Batteries.

10. Determination and report on rock samples from Frankland River and the soil likely to result from them.

In addition to the above, 205 determinations of rocks and minerals have been made for prospectors, the Mines Department, and the general public, and information has on many occasions been given, both orally and in notes, about the market values of ores and possible buyers.

III.—*Miscellaneous.*

A fairly large amount of time and labour has been spent on the following:—

1. Reports on samples of graphite, manganese, asbestos, etc.

2. Preparation of numerous collections of minerals for prospectors, schools, mining registrars, etc. Included in these are six sets of 24 minerals each for the Repatriation Committee, and a collection for Mr. C. M. Harris.

3. Correction of proofs of reports.

4. Notes on New Zealand greenstone for use as a guide to prospectors in the Albany district.

5. Report on a stone from near Mullewa in regard to its polishing properties. The stone rather closely resembles bath-brick and the sender was informed that it was of value for the purposes to which bath-brick is put, but was useless for fine polishing.

6. Examination of and report on rocks from Darlington in regard to the probability of obtaining water.

7. Determination of rocks from Moora in connection with the occurrence of corundum.

8. Bringing up to date the register of rock sections in the collection.

9. Oral determination of material for prospectors and others, and oral advice on the occurrence, method of testing, and values of the different ores.

My article on Petrology and its Application in Industry, which forms part of the Mining Handbook now in the Press, was published during the year in the Chemical Engineering and Mining Review, Melbourne.

GEOLOGICAL SURVEY MUSEUM AND COLLECTIONS.

Little or no progress has been made in connection with the re-arrangement, etc., of the Geological Survey collections; this much needed work has been severely handicapped through lack of proper facilities to which attention has been drawn in previous reports. The proper housing of the Geological Survey staff, its Laboratory, and Collections, is, as has been pointed out in previous annual reports, one of the most pressing needs of the Department, which until rectified seriously impairs its utility, and one which merits serious and final consideration at the hands of the Government.

The accessions to the Geological Survey collection during the year 1919 amounted to 281, thus bringing the total number registered up to 16,630. The number of micro-sections cut and registered was 336, thus making a total of 3,973 slides in the possession of the Survey.

In pursuance of one of what may be called the educational functions of the Geological Survey, ten collections from the somewhat limited stock of duplicates were made up for distribution to prospectors and returned soldiers.

Special acknowledgment must be made of the donation to the Department of the following:—

Registered No.	Name.	Locality.	Donor.
1/2362	Model of Ruby Well Nugget ...	... ...	M. J. Murphy.
1/2363	Barytes	Ajana, Northampton District	Green & Morton.
1/2364	Gearksutite in Glauconitic Sand	Loc. 457, Gingin	E. S. Simpson.
1/2365	Fossil Wood (Fluor-apatite) ...	Gingin	E. S. Simpson.
1/2366	Slickensided Film of Molybdenite	Edna May Deeps, Westonia	H. G. Stokes.
1/2367	Titaniferous Biotite	560ft. Edna May Deeps, Westonia	H. G. Stokes.
1/2368	Green Apatite in Pegmatite ...	560ft. Edna May Deeps, Westonia	H. G. Stokes.
1/2371	Hydrobiotite and Actinolite ...	West side of Lake Goongarrie	J. T. Jutson.
1/2375	Muscovite Mica	Morrissey Creek, Gascoyne River	R. H. Underwood, M.L.A.
1/2376	Beryl	Morrissey Creek, Gascoyne River	R. H. Underwood, M.L.A.
1/2377	Tourmaline	Morrissey Creek, Gascoyne River	R. H. Underwood, M.L.A.
1/2378	Aerolite	27-mile Peg, Rabbit-proof Fence, North of Burracoppin, Avon District	H. G. Stokes.
1/2380	Galena	Bangemall, Gascoyne	R. H. Underwood, M.L.A.
1/2381	Hisingerite	Edna May Deeps, Westonia	A. Montgomery.
1/2467	Fossil Wood	Gnowangerup, Kojonup District, South-West Division	Capt. N. Davis.
1/2559	Fossil Wood	Toolbrunup, Stirling Range, South-West Division	F. R. Bradshaw.
1/2586	Garnets	Tames Station, Upper Gascoyne, North-West Division	P. Healey.
1/2588	Concentrates	"White Hope" Lease (Slavin's), Hampton Plains, North-East Coolgardie Goldfield	J. Hallahan.
1/2590	Ochres	Carbarup, South-West Division	A. Oliver.

Library.

The total additions to the Geological Survey Library during the year amounted to 539 publications by direct gift from cognate institutions throughout the world, and proceedings and transactions of scientific and technical societies. In addition 142 volumes were added by purchase, and 19 volumes bound.

Owing to the growth of the library, increased shelving capacity had to be provided during the year, and a re-arrangement of the volumes was found to be necessary.

The distribution of the official publications of the Geological Survey during 1919 amounted to 2,563, as against 3,701 of the previous year.

PUBLICATIONS.

The publications for the year have been as follow:

Annual Progress Report for the Year 1918.

Bulletin 77.—Sources of Industrial Potash in Western Australia: E. S. Simpson, I. H. Boas, and T. Blatchford.

Bulletin 82.—The Magnesite Deposits of Bulong: F. R. Feldtmann.

In addition there is now in the hands of the Government Printer:—

Memoir No. 1.—The Western Australian Mining Handbook, which is being issued in sections as they are received from the Printing Office.

The following are awaiting authority for publication:—

Bulletin 78.—The Mining Geology of Kookynie, Niagara, and Tampa, North Coolgardie Goldfield: Jno. T. Jutson.

Bulletin 79.—The Mining Geology of Comet Vale and Goongarrie, North Coolgardie Goldfield: Jno. T. Jutson.

Bulletin 80.—The Mining Centres of Quinn's and Jasper Hill, Murchison Goldfield: F. R. Feldtmann.

Bulletin 81.—The Warriedar Gold-Mining Centre, Yalgoo Goldfield: F. R. Feldtmann.

Bulletin 83.—The Geology and Mineral Resources of the North-West Division, between Latitudes 22 degrees and 28 degrees South and Longitudes 119-123 east: H. W. B. Talbot.

The publication of the above-mentioned Bulletins has been under consideration by the Government for some considerable time past. As is well known, the investigation into the geology of any tract of country, or mining district, if it is to be of any real value and service to the public, requires that the data shall have been obtained by actual survey; when the field observations have been marshalled and collated, they have to be put into such a shape as may make them ready for public use. The real value attached to such information depends almost entirely upon the ease with which it can be obtained when required, and the most effective method by which such is made available to the general public is through the medium of the Geological Survey bulletins and maps. It ought not to be forgotten that no geological survey has ever been instituted anywhere except for economic reasons, and simple justice to the public demands that in return for the expenditure thereon the results should be made available promptly. Several requests for information contained in the publications have already been made by members of the public. The contents of the bulletins are of such a practical informative nature regarding the physical features, geological structure, and the conditions, etc., governing the occurrence of mineral deposits, etc., couched in as simple language as possible consistent with this object, that none should be withheld any longer than is necessary.

The following have been completed:—

Bulletin 84.—The Field Geology and Broader Mining Features of the Leonora-Duketon District, including parts of the North Coolgardie, Mount Margaret and East Murchison Goldfields; and a report on the Anaconda Copper Mine and neighbourhood, Mount Margaret Goldfield E. de C. Clarke.

Bulletin 85.—A Geological Reconnaissance of Part of the Ashburton Drainage Basin, with Notes on the Country Southwards to Meekatharra: H. W B Talbot.

There are in active preparation or contemplated:

The Present Condition of our Knowledge of the Geology and Mineral Resources of the Kimberley Division: A Gibb Maitland.

The Artesian Water Resources of Western Australia: A. Gibb Maitland.

The Geology of Goodingnow (Payne's Find), Yalgoo Goldfield: E. de C. Clarke.

The Geology of Rothesay, Yalgoo Goldfield: E. de C. Clarke.

The Geology of Noongal (Melville), Yalgoo Goldfield: E. de C. Clarke.

Geological Sketch Map of Western Australia, Four Sheets, Scale 25 miles per inch, Natural Scale 1: 1,584,000.

A. Gibb Maitland

Government Geologist.

Geological Survey Office, Perth,

13th April, 1920.

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DIVISION V.

SCHOOL OF MINES OF W.A.

School of Mines,
Kalgoorlie, 2nd March, 1920.

The Under Secretary for Mines.

I beg to forward, for the information of the Hon. the Minister, my report for the year 1919.

During 1919, students took up a somewhat larger average number of classes than during the previous year. The number of individual students in attendance, 192, was almost exactly the same as during 1918, and both years showed a considerable increase over the last term of 1917.

The Preparatory Classes, leading up to the more advanced work of the School, continued to be well patronised. It is to these classes that the advance made during the last ten years is mainly due. They lay the foundation for a sound training in Mining School subjects, and are an indispensable adjunct of the senior work of the Associateship Courses. The existing demand for instruction in junior work in Science is worthy of encouragement in every possible way, but the large classes in preparatory subjects are a severe tax upon the available accommodation of the School, and occupy a considerable amount of the time of the lecturers. Any further increase in this direction will necessitate the provision of additional classrooms, and the appointment of assistants to carry on the work.

During 1919, Mr. Golding, the Instructor in Engine-driving, resigned, and was succeeded by Mr. Meredyth. Both instructors made good use of the mining plants for instructional purposes, with the result that the students benefited greatly by the visits that were made.

After rendering several years of excellent service as Instructor in Fitting and Turning, Mr. Murray notified the School that he could not resume classwork in 1919. He was succeeded by Mr. Troup, who, taking up the duties of Instructor early in the year, has maintained good attendances at his classes, and has handled a rather difficult proposition successfully.

At the beginning of 1919, owing to the difficulty of securing an instructor to succeed Mr. Bircher, who had resigned some months previously, Mr. McDougall, the Lecturer in Physics, was appointed to the combined position of Lecturer in Physics and Electrical Engineering, and has carried out various alterations beneficial to the classes. It is considered desirable that further effort should now be made to secure an independent Lecturer in the important subject of Electrical Engineering, preferably a graduate who has had recent experience in engineering works.

Mr. C. Cecil, who was promoted from the position of Cadet to that of Assistant in Physics, has performed his duties in a satisfactory manner.

Although, owing to the absence of the Lecturer on leave, the attendance at the Chemistry classes did not suffer, students had difficulty in fully covering the work laid down in the syllabus, and a number of those in the junior classes will require to repeat the course next year.

There were marked increases in the enrolment in the classes in Mechanical Drawing, Preparatory Geology, and Surveying. Although the prevailing epidemic of influenza interfered with the attendance at classes to some extent during the third term, the injurious effects on the School were not nearly as great as might have been expected.

At the end of 1919, one of the senior students, by completing his associateship, qualified for the Robert Falconer Research Scholarship of £100, but after the subject of research had been decided upon and Mr. Falconer had agreed to the selection, the research scholar secured a position at one of the mines, and forfeited his scholarship. Considering the opportunities of improvement afforded by a twelve months' course of post graduate research work, it is a matter for regret that the student to whom the scholarship was awarded could not have seen his way clear to proceed with the work.

The fine collection of rocks and minerals displayed in the Museum has been added to by a valuable collection of 366 specimens, generously donated by Mr. Rutter Clarke. The Lecturer in Geology also made a special collection of samples to illustrate the Geology in the North end of the Kalgoorlie field, and, in addition, has displayed an interesting set of molybdenum and tungsten minerals, obtained from all parts of Australia. The Museum, which is open to the public on Sundays as well as on week-days, is of considerable educative value to the community.

During 1919, 528 free assays and mineral determinations were made for prospectors of material from Crown lands not held under lease for mining purposes, as follows:—Assays for gold and silver, 404; assays for copper, tin, etc., 16; determinations of rocks, minerals, etc., 108; total, 528.

Mainly due to the impetus given to prospecting by the discoveries at Hampton Plains, the work of the public assay department was particularly heavy during the second half of the year. The free assays and mineral determinations entail a considerable amount of work on the Chemistry and Geology departments, but the information which the School is able to supply has been of great assistance to prospectors.

During 1919, some machines and equipment were secured for the proposed experimental plant, but unfortunately no commencement has yet been made with the building in which the plant is to be housed. The object of the metallurgical plant is not to carry out custom work for the public, but to make experi-

ments in various methods of ore treatment for the benefit of the mining community as a whole. The plant, when erected, will afford useful instruction to the metallurgical students who will assist in carrying out the experimental work. It is hoped that the provision of facilities for research into metallurgical problems, the investigations connected with which will be conducted under the supervision of qualified members of the staff, will lead to results beneficial to the mining industry.

The difficulty of procuring up-to-date equipment for the Science classes at the School of Mines still exists, and it is doubtful what supplies will be available in the near future. The instructors are greatly concerned at the shortage and the high prices of material required for ordinary maintenance, and special efforts on their parts are necessary to maintain their class-work at the level demanded by the recent advances in scientific knowledge.

The Honour List includes the names of over 200 students who enlisted in the Army or Navy, or took up munition work in England. Half of these have risen above the rank of private. The distinctions gained include one Croix de Guerre, two Distinguished Service Medals, five Military Crosses, and six Military Medals. The School mourns the loss of 35 who made the supreme sacrifice.

A number of students who have returned from active service have been re-instated in their former positions on the mines, or have been placed in others of equal responsibility, and several students have secured responsible positions abroad.

There is a general feeling among the staff of the School that, apart altogether from the question of providing increased facilities for additional students, extra accommodation should be provided for the benefit of those already in attendance. Owing to the growth of the preparatory classes, the class-room accommodation has become congested, and it is considered that extensive additions to the School buildings are now necessary, in order that the class-work may be demonstrated in a more convenient manner, and fuller use made of the instruments and apparatus which the School possesses. The recent discoveries at Hampton Plains may be expected to bring additional students to the School, and create an increased demand for men adequately trained to undertake one or other of the numerous activities connected with mining and ore treatment.

The senior classes can readily accommodate additional scholars in the more advanced subjects, but without extra class-rooms, the School cannot accept in the Preparatory classes a greater number than are now in attendance.

To provide increased remuneration for members of the staff, a revised classification has been put forward for consideration.

The statistics dealing with the enrolment of students, the examination results, etc., are forwarded herewith.

I have the honour to be,

Sir,

Your obedient servant,

F. B. ALLEN,
Director, School of Mines.

SCHOOL OF MINES OF WESTERN AUSTRALIA.

EXAMINERS.

The following Examiners conducted the Examinations in November, 1919:—

Subject.	Examiners.
Preparatory Mathematics ...	F. B. Allen, M.A., B.Sc.
Preparatory Chemistry	B. H. Moore, B.E., F.S.A.S.M.
Preparatory Physics and Electricity	C. Cecil.
Preparatory Geology	C. O. G. Larcombe, B.Sc., F.S.T.C., F.G.S.
Preparatory Mechanical Drawing	C. Cecil.
Mathematics I.	G. T. Irving, M.A.
Mechanics—Theoretical ...	W. E. Thomas, B.A.
Physics I.	R. Davis.
	D. McDougall, A.I.E.E.
Chemistry, I., II., and III.	B. H. Moore, B.E., F.S.A.S.M.
	R. R. Baxter, B.Sc.
Assaying, I. and II. ...	B. H. Moore, B.E., F.S.A.S.M.
	R. R. Baxter, B.Sc.
Metallurgy, I. and II. ...	F. C. Stockwell, B.Sc., A.S.A.S.M.
	B. H. Moore, B.E., F.S.A.S.M.
Petrology	C. O. G. Larcombe, B.Sc., F.S.T.C. F.S.G.
Mineralogy	
Geology	F. C. Stockwell, B.Sc., A.S.A.S.M.
Mining Geology	C. O. G. Larcombe, B.Sc., F.S.T.C., F.G.S.
Practical Mathematics	G. T. Irving, M.A.
Mechanical Drawing I. and II. ...	J. H. Tate.
Machine Design	H. J. Clucas, B.C.E.
Applied Mechanics ...	
Building Construction ...	J. H. Tate.
Mechanical Engineering I. and II.	
Surveying I. and II. ...	T. Butement, A.O.U.S.M.
Mining I. and II.	
Electrical Engineering I. and II. ...	D. McDougall, A.I.E.E.
Fitting and Turning I. and II. ...	W. J. Troup.
Engine Driving I. and II. ...	C. C. Meredith.
Gas Engine	A. E. Bosustow.
Indicator	

JUNIOR SCHOLARSHIP.

Subject.	Examiners.
English	B. H. Moore, B.E., F.S.A.S.M.
Physical Geography	C. O. G. Larcombe, B.Sc., F.S.T.C., F.G.S.
Mathematics	F. B. Allen, M.A., B.Sc.

W. A. SCHOOL OF MINES, KALGOORLIE.

ATTENDANCES, 1919.

Subject.	Effective Enrolment.		
	1st Term.	2nd Term.	3rd Term.
Elementary Mathematics (Thursday) ...	28	23	19
,, ,, (Friday) ...	18	14	9
Preparatory Mathematics (Monday) ...	25	21	18
,, ,, (Tuesday) ...	15	16	14
Preparatory Drawing (Thursday) ...	22	20	16
,, ,, (Friday) ...	42	43	38
Preparatory Physics	67	64	56
Preparatory Chemistry	51	46	35
Preparatory Geology	23	20	18
Mathematics I.	33	29	25
Theoretical Mechanics	4	3	3
Physics I.	27	23	21
Chemistry I.	23	21	19
Chemistry II.	1	2	2
Chemistry III.	1	1	1
Assaying I.	6	6	5
Metallurgy	2	2	2
Geology	3	3	3
Mineralogy	3	3	3
Petrology	1	2	2
Mining Geology	...	6	5
Mining I.	7	7	7
Mining II. (Mine Sampling)	4	...	...
Mining II. (Ore Dressing)	2	3	3
Mining II. (Mine Accounts)	...	1	...
Mining II. (Mine Administration) ...	...	...	1
Surveying I.	11	12	10
Surveying II.	5	5	5
Mechanical Drawing I.	22	19	20
Mechanical Drawing II.	10	9	10
Applied Mechanics	10	9	8
Mechanical Engineering I.	9	7	7
Engine Driving I.	12	11	10
Engine Driving II.	2	1	...
Electrical Engineering I.	6	6	6
Electrical Engineering II.	15	13	10
Fitting and Turning I.	21	19	14
Fitting and Turning II.	5	3	4
Mechanical Engineering II.	7	6	4
Gas Engine	22	19	16
Practical Mathematics	4	3	3
	569	521	452

ATTENDANCES, 1919—*continued.*

—	1918.			1919.		
	1st Term.	2nd Term.	3rd Term.	1st Term.	2nd Term.	3rd Term.
Total Enrolment	494	456	397	569	521	472
Individual Students	230	215	196	232	220	192

EXAMINATION RESULTS, 1919.

The following table shows the passes obtained by students of the Western Australian School of Mines, Kalgoorlie, at the Annual Examinations held in November, 1919 :—

Subject.	Class of Pass.		
	Credit.	Pass.	Total.
Elementary Mathematics	2	14	16
Preparatory Mathematics	5	13	18
Preparatory Mathematics, Arithmetic	...	7	7
Preparatory Mathematics, Algebra	...	4	4
Preparatory Mathematics, Geometry	...	2	2
Preparatory Mechanical Drawing	11	19	30
Preparatory Chemistry	1	11	12
Preparatory Physics	12	26	38
Preparatory Geology	2	9	11
Mathematics I.	2	5	7
Mathematics I., Algebra	...	2	2
Mathematics I., Geometry	...	7	7
Mathematics I., Trigonometry	...	1	1
Theoretical Mechanics	1	1	2
Physics	...	10	10
Chemistry I.	...	14	14
Chemistry II.	...	...	...
Chemistry III.	...	...	...
Assaying I.	2	3	5
Assaying II.	...	...	...
Metallurgy I.	...	2	2
Metallurgy II.	...	1	1
Geology	...	2	2
Mineralogy	1	1	2
Petrology	1	...	1
Mining Geology	1	3	4
Mining I.	1	6	7
Mining II. (Mine Sampling)	1	4	5
Mining II. (Mine Administration, etc.)	...	1	1
Surveying I.	3	3	6
Surveying II.	1	3	4
Mechanical Drawing I.	4	10	14
Mechanical Drawing II.	3	6	9
Applied Mechanics	...	...	...
Mechanical Engineering I.	...	6	6
Mechanical Engineering I. (Gas Engine)	8	3	11
Mechanical Engineering I. (Indicator)	5	3	8
Building Construction	...	...	...
Engine Driving I.	...	7	7
Engine Driving II.	...	...	...
Electrical Engineering I.	1	4	5
Electrical Engineering II.	1	3	4
Fitting and Turning I.	3	9	12
Fitting and Turning II.	2	...	2
Mechanical Engineering II.	...	4	4
Practical Mathematics	...	1	1
Machine Design	...	...	...
	74	230	304

ASSAYERS' CERTIFICATES.

The following have gained Certificates, as under :—

Adams, H.	P.T.S.	March, 1904.
Adams, P.	P.T.S.	February, 1905.
Beech, S. J.	K.S.M.	November, 1906.
Brown, T.	P.T.S.	November, 1906.
Brooking, J.	P.T.S.	November, 1906.
Hutchinson, D. M.	K.S.M.	November, 1906.
Banks, R.	K.S.M.	November, 1908.
Gabel, J.	K.S.M.	November, 1908.
Pike, R. W.	P.T.S.	November, 1908.
Baxter, R. R.	P.T.S.	November, 1909.
Bradley, W. S.	K.S.M.	November, 1909.
Burrows, M. F.	P.T.S.	November, 1909.
Compton, G. S.	P.T.S.	November, 1909.
Cook, H. J.	P.T.S.	November, 1909.
Klem, L. G.	P.T.S.	November, 1909.
Fraser, W.	K.S.M.	November, 1910.
Rowledge, H. P.	P.T.S.	November, 1910.
Benjamin, L. R.	P.T.S.	November, 1911.
Jackson, L. T. C.	P.T.S.	November, 1911.
Leevers, J. C.	K.S.M.	November, 1911.
Lapsley, R. G.	P.T.S.	November, 1912.
Kurth, E. E.	K.S.M.	November, 1913.
Grace, J. N. A.	P.T.S.	November, 1916.
Noall, J. C.	K.S.M.	November, 1917.
Cecil, Clyde	K.S.M.	November, 1918.
Terrell, J. H.	K.S.M.	November, 1918.
Nairn, T. W.	K.S.M.	November, 1918.

MINE SURVEYORS' CERTIFICATES.

The following have gained Certificates :—

Peat, J.	K.S.M.	November, 1909.
Adams, H.	K.S.M.	November, 1910.
Banks, R.	K.S.M.	November, 1911.
Gabel, J.	K.S.M.	November, 1911.
Pike, R. W.	K.S.M.	November, 1912.
Godden, F. W. R.	K.S.M.	November, 1915.
Mundle, E. B.	K.S.M.	November, 1915.
Leevers, J. C.	K.S.M.	November, 1916.

DIPLOMAS.

The following Students have gained Diplomas :—

Beech, S. J. (K.S.M.), Diploma in Metallurgy, November, 1906.
Adams, P. (P. and K.), Diploma in Metallurgy, November, 1907.
Adams, H. (P. and K.), Diploma in Metallurgy, November, 1908.
Banks, R. (C. and K.), Diploma in Metallurgy, November, 1910.
Burrows, M. F. (P. and K.), Diploma in Metallurgy, November, 1910.
Compton, G. S. (P.T.S.), Diploma in Metallurgy, November, 1910.
Cook, H. J. (P.T.S.), Diploma in Metallurgy, November, 1910.
Gabel, J. (K.S.M.), Diploma in Metallurgy, November, 1910.
Gabel, J. (K.S.M.), Diploma in Mining, November, 1911.
Pike, R. W. (P. and K.), Diploma in Metallurgy, November, 1911.
Galt, W. (K.S.M.), Diploma in Mechanical and Electrical Engineering, November, 1915.
Butement, J. C. (K.S.M.), Diploma in Mechanical and Electrical Engineering, November, 1915.
Edmondson, F. C. (K.S.M.), Diploma in Mechanical and Electrical Engineering, November, 1915.
Lang, J. H. (K.S.M.), Diploma in Mechanical and Electrical Engineering, November, 1905.
Grace, J. N. A. (P.T.S.), Diploma in Metallurgy, November, 1915.
Bradley, W. S. (K.S.M.), Diploma in Metallurgy, November, 1915.
Kurth, E. E. (K.S.M.), Diploma in Metallurgy, November, 1916.
LeMesurier, C. R. (K.S.M.), Diploma in Metallurgy, November, 1916.
Leevers, J. C. (K.S.M.), Diploma in Mining, November, 1916.
Davies, Watcyn (K.S.M.), Diploma in Mechanical and Electrical Engineering, November, 1917.
Weselman, Carl (K.S.M.), Diploma in Mechanical and Electrical Engineering, November, 1917.

SCHOLARSHIP EXAMINATIONS, 1919.

JUNIOR SCHOLARSHIP.

Candidates.	District.
Hopgood, L.	Boulder
Fawcett, A.	Boulder
Duke, R.	Boulder.

L. Hopgood gains the Junior Scholarship.

ENTRANCE SCHOLARSHIP.

Candidates.	District.
Carrigg, C. G.	Kalgoorlie.
Blurton, N.	Kalgoorlie.
Johns, E. N.	Boulder.
Dingle, C. W.	Boulder.

C. G. Carrigg gains the Entrance Scholarship.

CHAMBER OF MINES MECHANICAL DRAWING SCHOLARSHIP.

Candidate.	District.
Thrupp, T. W.	Boulder.

Thrupp, J. W., gains the Chamber of Mines Scholarship.

CRITCHLEY PARKER PRIZE.

The following has been recommended for the Prize offered by Critchley Parker, Esq., Melbourne :—

Mundle, E. B., The Industrial Australian and Mining Standard, 1920.

ANNUAL EXAMINATIONS.

* Denotes Technical Pass only.

PREPARATORY CHEMISTRY.

Credit—
Brown, Chas. W.

Pass—
Hanks, Alfred H. F. *
Carrigg, Clifford G.
Steel, Archie
Frawley, Thomas
McCall, Miss Myrtle
Blurton, Norman C.
Davidson, William G.
Johns, Edward N.
Wakeling, Ronald D.
McDermott, James
Rigbye, Leslie G.

PREPARATORY MECHANICAL DRAWING.

Credit—
Lucas, Frank S.
Frawley, Thomas
Blurton, Norman C.
Carrigg, Clifford G.
Johns, Edward N.
Lapham, Edgar M.
Wakeling, Ronald D.
Davidson, William G.
Sansum, William A.
Bates, Thomas
Worthington, Leslie W.

Pass—
Cribb, Arthur H.
Maguire, David E.
Mills, Stanley C.
Blinkhorn, John G.
Hanks, Alfred H. F. *
Goodacre, Robert C.
Downey, Thomas J.
Young, Ronald C.
Allen, George W. *
Ohlson, Roger B.
McCahon, John H.
Lloyd, Robert F.
Baker, Charles W.
Bridge, Jack
Douglas, Walter
Freeman, Reginald J.
Kirkwood, James
Parker, Henry J. A.
Thomas, Francis A.

PREPARATORY PHYSICS.

Credit—
Carrigg, Clifford G.
Frawley, Thomas
Blurton, Norman C.
Wakeling, Ronald D.
Dunstan, Gordon T.
Cribb, Harry H.
Harrop, Harold J.
Freeman, Reginald J.
Lucas, Frank S.
Leslie, Bernard H.
O'Brien, Dennis F.
Maguire, David E.

Pass—
Balstow, Leslie J.
Carter, Arnold J.
Thomas, Francis A.
Tyers, Samuel C.
Johns, Edward N.
Costello, John D.
Blackmore, Frederick J.
Rigbye, Leslie G. *
McCall, Miss Myrtle
Steel, Archie *
Downey, Thomas J.
Young, Ronald C.
McCahon, John H.
Boylen, Louis A.
Saunders, Alan D.
Lane, George H.
Bridge, Jack
Douglas, Walter
Bowen, Cecil E.
Hutchison, Edmund H.
Lapham, Edgar M.
Sansum, William A.
Shackles, Thomas A.
Mitchell, Frank
Phoenix, Cyril R.
Dingle, Cyril W.

PREPARATORY GEOLOGY.

Credit—
Powell, Thomas
Carrigg, Clifford G.

Pass—
Blurton, Norman C.
Davies, Idris
Phillips, William L.
Wakeling, Ronald D.
McCall, Miss Myrtle
Davidson, William G.
Johns, Edward N.
Bates, Thomas
Balstow, Leslie J.

PREPARATORY MATHEMATICS.

Credit—
Brown, Charles W.
Hanks, Alfred H. F.
Fairley, Thomas C.
Steel, Archie
Carrigg, Clifford G.

PREPARATORY MATHEMATICS—*continued.*

Pass—
Blurton, Norman C.
Maguire, David E.
Downey, Thomas J.
Saunders, Alan D.
Johns, Edward N.
Wishart, Gordon D. *
Asher, James H. *
Baird, William R.
Bryant, William C. *
Head, Bert
Wilson, Albert W.
Young, Ronald C.
Martin, Henry R.

ARITHMETIC.

Pass—
Douglas, Walter
Lapham, Edgar M.
Thomas, Frank A.
Shepherd, Edward L.
Wakeling, Ronald D.
Guyatt, David McG.
Mills, Stanley C.

ALGEBRA.

Pass—
Lapham, Edgar M.
Sansum, William A.
Douglas, Walter
Thomas, Frank A.

GEOMETRY.

Pass—
Shepherd, Edward L.
Wakeling, Ronald D.

ELEMENTARY MATHEMATICS.

Credit—
Cotterell, Alva B.
Wilson, Mark F.

Pass—
Ohlson, Roger B.
Blinkhorn, John G.
Slee, Cyril D.
Bridge, Jack
Freeman, Reginald J.
Hunt, Ernest G.
Metcalf, George S.
Rigbye, Leslie G.
Parker, Henry J. A.
Baker, Charles W.
McCahon, John H.
Phoenix, Cyril R.
West, William
Bowen, Cyril E.

MATHEMATICS.

FIRST COURSE.

Credit—
Lucas, Frank S.
Thrupp, Thomas W.

Pass—
Bates, Thomas
Crutchett, Alexander J.
Brown, Alexander O.
Taylor, Frank
Spalding, John

TRIGONOMETRY.

Dingle, Mervyn M.

GEOMETRY.

Rosenbrock, Ernest L.
Dingle, Mervyn M.
Ehlers, Charles
Jerrard, Harry C.
Jane, Jack A.
Duke, Clay E.
Goodacre, Robert C.]

ALGEBRA.

Rosenbrock, Ernest L.
Jane, Jack A.

THEORETICAL MECHANICS.

Credit—
McCaskill, Victor J.

Pass—
Duke, Clay E.

PHYSICS.

Pass—
Thrupp, Thomas W.
Crutchett, Edgar G.
Bates, Thomas
Baird, William R.
Gibbons, Leo. P. J.
Martin, Henry R.
Dingle, Mervyn M.
Rosenbrock, Ernest L.
Wilson, Albert W.
McLellan, Miss Christina

CHEMISTRY.

FIRST COURSE.

Pass—
McCaskill, Victor J.
Bourke, Terence N.
Lucas, Frank S.
McLellan, Miss Christina
Thompson, Eugene P.
Thrupp, Thomas W.
Sawell, Miss Barbara
Jolly, Harry G.
Dingle, Mervyn M.
Wilson, Albert W.
Baird, William R.
Rosenbrock, Ernest L.
Gibbons, Leo. P. J.
Burrows, Ernest W.

ASSAYING.

FIRST COURSE.

Credit—
Greer, Jack H.
Gibbons, Leo. P. J.

Pass—
Lethlean, Hedley V.
Jolly, Harry G
Pashent, Clement J.

METALLURGY.

FIRST COURSE.

Pass—
Kerr, Martin J.
Pashent, Clement J.

SECOND COURSE.

Pass—
Esdaile, Alexander N.
(Provisional, pending Thesis)

MINERALOGY.

Credit—
McLellan, Miss Christiana

Pass—
Lethlean, Hedley V.

GEOLOGY.

Pass—
McLellan, Miss Christina
Eddy, John T. *

PETROLOGY.

Credit—
Mundle, Edward B.

MINING AND ECONOMIC GEOLOGY.

Credit—
Mundle, Edward B.

Pass—
Nairn, Thomas W.
Crutchett, Edgar G.
Crutchett, Ivanhoe A.

MINING.

FIRST COURSE.

Credit—
Powell, Thomas

Pass—
Davies, Idris
Nairn, Thomas W.
Phillips, William L.
Eddy, John T.
Gibbons, Leo. P. J.
Crutchett, Ivanhoe A.

SECOND COURSE.

(*Mine Sampling.*)

Credit—
Nairn, Thomas W.

Pass—
Terrell, James H.
Crutchett, Edgar G.
Crutchett, Ivanhoe A.
McDermott, Chas. J.

(*Mine Administration.*)

Pass—
McDermott, Chas. J.

SURVEYING.

FIRST COURSE.

Credit—
Nairn, Thomas W.
Terrell, James H.
Crutchett, Ivanhoe A.

Pass—
Davies, Idris
Midgley, Frank M.
Carrigg, Clifford G.

SECOND COURSE.

(Provisional, pending Plans.)

Credit—
Powell, Thomas

Pass—
Waite, Thomas A.
Phillips, William L.
Crutchett, Edgar G.

MECHANICAL DRAWING.

FIRST COURSE.

Credit—
Wilson, Albert W.
Greer, Jack H.
Jane, Jack A.
Ehlers, Chas. Rosslyn

Pass—
Dingle, Mervyn M.
Rosenbrock, Ernest L.
Crutchett, Ivanhoe A.
Coad, William
Harris, Clifford R.
Blackmore, Frederick J.
Gibbons, Leo. J. P.
Crutchett, Alexander J.
Saunders, Allan D.
Balstow, Leslie J.

MECHANICAL DRAWING—*continued.*

SECOND COURSE.

Credit—
Leach, Mathew P.
Terrell, James H. *
Taylor, Frank

Pass—
Cope, William J.
Butement, Thomas George *
Taylor, Harry
Leevers, William J.
Snelling, John
Bennet, Thomas K.

MECHANICAL ENGINEERING.

FIRST COURSE.

Pass—
Spalding, John
Meredyth, Cyril C.
Fairley, Thomas C.
Head, Bert
Taylor, Frank
Bennet, Thomas K.

GAS ENGINE.

Credit—
Bosustow, Alfred S.
Beames, Hurtle M.
Dunstan, Gordon T.
Worthington, Leslie W.
Spalding, John
Bennett, Frederick W.
Slee, Cyril D.
Willcocks, William

Pass—
Parker, Victor J.
Williams, Arthur
Quick, Harold

INDICATOR.

Credit—
Spalding, John
Bosustow, Alfred S.
Beames, Hurtle M.
Willcocks, William
Dunstan, Gordon T.

Pass—
Worthington, Leslie W.
Slee, Cyril D.
Larson, John L.

ENGINE-DRIVING.

Pass—
Jones, Herbert T.
McGill, Albert B. *
Beames, Hurtle M.
Willcocks, William
Williams, Arthur
Powell, Thomas
Parker, Victor J. *

ELECTRICAL ENGINEERING.

FIRST COURSE.

Credit—
Spalding, John

Pass—
McCaskill, Victor J.
Mundle, Edward B.
Taylor, Frank
Cope, William J.

SECOND COURSE.

Credit—
Meredyth, Cyril C.

Pass—
McQueen, Neil
Gill, Leslie J.
Cairns, Matthew R.

† Provisional pending Thesis.

FITTING AND TURNING.

FIRST COURSE.

Credit—
Ehlers, Charles R.
Wilson, Albert W.
Dingle, Mervyn M.

Pass—
Lucas, Frank S.
Cowling, Edward W.
Barker, George J.
Jerrard, Harry C.
Goodacre, Robert C.
Powell, Thomas *
Jones, Herbert T. *
Larson, John L. *
Openshaw, Harold

FITTING AND TURNING.

SECOND COURSE.

Credit—
Taylor, Frank
Oates, William H.

MECHANICAL ENGINEERING.

SECOND COURSE.

Pass—
McCaskill, Victor J.
Rose, Louis A.
Gill, Leslie J.
Taylor, Harry

PRACTICAL MATHEMATICS.

Pass—
Meredyth, Cyril C.

DIVISION VI.

OPERATIONS OF "THE INSPECTION OF MACHINERY ACT, 1904."

Office of the Chief Inspector of Machinery,
"The Barracks,"
St. George's Terrace, Perth,
31st March, 1920.

Annual Report of the Chief Inspector of Machinery and Chairman of the Board of Examiners for Engine-drivers, for the Year ending 31st December, 1919, with Statistics.

The Under Secretary for Mines.

Sir,

I have the honour to submit, for the information of the Hon. the Minister for Mines, the following report on the operations of "The Inspection of Machinery Act, 1904," in the districts proclaimed thereunder, together with statistical tables for the year ending 31st December, 1919.

For easy reference I have divided the report as follows:—

(1) Inspection of boilers.

(2) Explosions and interesting defects.

(3) Inspection of machinery.

(4) Prosecutions under the Act.

(5) Accidents to persons caused by machinery.

(6) Engine-drivers' examinations and kindred matters.

(7) General.

DIVISION I.

Inspection of Boilers.

The number of boilers useful as steam generators on the register at the end of the year was 2,926, as against 2,993, at the end of 1918, showing a decrease of 67 boilers. There were 16 new boilers registered during the year. As against this there were 53 permanently condemned, and 34 transferred beyond the jurisdiction of the Act. All of these were exported to the Eastern States.

Operations in the various districts.

The following return shows the operations in the various proclaimed districts in connection with boilers, as compared with 1918:—

Return showing operations in the Proclaimed Districts (Boilers only) during the Year ended 31st December, 1919.

	Totals. 1919.	1918.
Total number of boilers registered and capable of being used as steam generators	2,926	*2,993
New boilers registered during the year	16	30
Boilers reinstated	4	..
Inspections for year—		
Thorough	1,349	1,363
Working	145	172
Boilers condemned during year—		
Temporarily	47	50
Permanently	53	24
Boilers converted into tanks, air receivers, etc., during year	..	..
Boilers transferred beyond the jurisdiction of this Act	34	36
Number of notices issued for repairs during the year	311	311
Number of certificates issued (including those issued under Section 30) during the year	1,329	1,351
Number of useful boilers out of use at end of the year	1,515	1.592
	£	s. d.
Total amount of fees for 1919	2,783	0 4
Total amount of fees for 1918	3,013	2 11
	1919.	1918.
Total number of Inspectors	7	7

The number of thorough and working inspections was 1,349, and 145 respectively, making a total of 1,494, showing a decrease of 14 thorough inspections, and decrease of 27 working inspections.

In the South-Western district 1,054 inspections were made or 70½ per cent. of the total number made in all districts. The inspections made in this district show an increase of 94 as against 1918.

In the Kalgoorlie group 348 inspections were made, being 23.2 per cent of the total inspections. The inspections in this district showed a decrease of 44.

In the North Coolgardie and Mount Margaret districts 49 inspections were made or 3.3 per cent of the total number. The inspections showed a decrease of 64, which is accounted for owing to the usual tour of inspection in these districts being held over until early this year.

In the East Murchison, and Murchison and Yalgoo districts 43 inspections were made, or 2.9 per cent. of total number, and the inspections showed a decrease of 27.

The total number of boilers out of use at the end of the year was 1,515, against 1,595 in 1918, thus an improvement on last year of 80 boilers.

In view of the shrinkage on the goldfields, towards the end of the year, I arranged that one of the inspectors from Kalgoorlie should do all the work down to Northam and surrounding districts. This arrangement will relieve the congestion in the South-Western district.

The revenue from boiler inspections was £2,783 0s. 4d., as against £3,013 2s. 11d. for the previous year, showing a decrease of £230 2s. 7d.

The number of boilers permanently condemned was 53, or 29 more than last year; and 34 boilers were removed from the jurisdiction of the Act, nearly all being exported to the Eastern States, where the demand for boilers continues.

The following table shows the number of boilers temporarily or permanently condemned as a percentage of inspections made, since the inception of an Act controlling boilers:—

Number of temporarily and permanently condemned Boilers per 100 inspections made, since 1899.

Year.	Temporarily. Per cent.	Permanently. Per cent.
1899	2.64	1.42
1900	2.21	.498
1901	4.34	.511
1902	5.00	.958
1903	2.43	.697
1904	3.08	.389
1905	2.84	.388
1906	3.98	.960
1907	4.36	.802
1908	3.18	.599
1909	2.89	.797
1910	4.49	1.382
1911	3.54	8.070
1912	3.93	2.471
1913	2.64	2.461
1914	2.97	2.178
1915	4.72	1.538
1916	3.97	1.456
1917	3.19	1.301
1918	3.25	1.563
1919	3.14	3.547

DIVISION II.

Explosions and Interesting Defects.

I am again able to report that there has been no explosion of any boiler under the jurisdiction of the Act.

The nearest approach to an explosion that has occurred for many years was in connection with a locomotive used at one of the timber mills. At the usual annual inspection in April the longitudinal seam at right side of firebox casing was found to have been leaking and had been caulked several times. The inspector ordered further caulking, and withdrawal of all tubes for the next inspection.

The caulking did not prove effective, and in October the same inspector again examined the seam. Although all tubes were out nothing suspicious was discovered. But the inspector was not satisfied, and requested that a few rivets be cut out of the seam. Even then nothing unusual was noticed until he got a magnifying glass, and found that wherever a rivet had been removed the inner plate was cracked at each side of the rivet hole. The plate was cut out and was discovered to be fractured along the line of rivet holes for a length of 5 feet 2 inches, or nearly the whole length of plate, and many of the rivets were cracked almost through. The corresponding seam on the other side was also found fractured, but for a lesser distance. There was no corrosion or reduction of the plate. The workmanship was good, the boiler was a standard type by a well-known Australian maker, and the material appears of excellent quality.

The resistance to tearing (Rt) at the seam was 69 per cent. of the whole plate, and resistance to shearing (Rs) was 73 per cent. Taking 69 per cent. as the strength of the seam there was a factor of safety of over six, which has been found ample for this class of boiler. I am therefore unwillingly compelled to admit that the cause of the fractures must remain more or less of a mystery. The only explanation which occurs to me is that in 1902 new sides were fitted to the firebox casing, and it is possible that the plates were distressed at this time, and the fractures developed gradually. I commended the inspector for his action, and feel convinced that had it not been for his pertinacity a disastrous explosion would have occurred.

A case of extremely rapid corrosion, similar to one mentioned in my annual report of 1918, occurred at a colliery at Collie. The corrosion was almost entirely confined to rivet heads in circular seams of shell, and in the Adamson's flanged seams of flue tube. About 100 rivets in the shell and 130 in the flue tube had to be renewed. In many cases the heads had entirely disappeared, and the shanks of the rivets were corroded below the surface of the plate. The caulking ring of several of the Adamson's seams was also badly corroded, being eaten away below the flanged edges in a few cases. The whole of the above corrosion took place in rather less than five months, and points to the absolute necessity of securing decent water supply. The corrosion referred to was caused by water drawn from the mine, and the quality of this changes with development. It may be good for a few months, and then get suddenly very bad. It is altogether false economy to depend on such a water supply for boilers.

In the early part of the year a digester was imported from Sydney, carrying a certificate under the New South Wales Factories and Shops Act, 1912, for 80lbs., which was the allowable pressure for 12 months from date of inspection. The certificate was dated August, 1918, and digester was stated to be "all in good order." It was found on arrival in this State by an inspector to be very badly corroded, the rivet heads and edges of seams in particular were much reduced. These parts had been carefully coated over with cement. The edges of the plates were built up with cement, and many of the "rivet heads" were mostly cement. Some of these rivets, after knocking off the cement, could be turned with the fingers. The entire lower half of the vessel had to be renewed, and certain other repairs executed.

The maker's name and age of digester were unknown, and in face of this and the condition of the boiler it is surprising that the pressure referred to was ever approved.

DIVISION III.

Inspection of Machinery.

The following return shows a classification of the power-driven machinery in the proclaimed districts. This year the number of groups driven by oil engines (including kerosene, petrol, and benzine engines) again easily takes the highest place. There are now 2,491 registered groups of such engines, as against 2,215 last year, showing an increase of 276.

Though not quite such a large increase as last year, the substantial increase of 276 shows how necessary this class of engine is becoming as an adjunct to agricultural industries.

Electrically driven groups take second place with 1,955, showing an increase of 102. Steam driven groups take third place with 1,285, as against 1,331 last year, showing a decrease of 46. Suction gas groups have increased by four, ordinary town gas groups have increased by nine, hydraulic groups remain as they were, and compressed air groups have increased by one.

Return showing Classification of various sources of Power-driven Machinery in use or likely to be used again in Proclaimed Districts during the Year ended 31st December, 1919.

Classification.	Totals. 1919.	1918.
No. of groups driven by—		
Steam engines	1,285	1,331
Oil engines	2,491	2,215
Ordinary gas engines	30	21
Suction gas engines	234	230
Compressed air engines	38	37
Electric motors	1,955	1,853
Hydraulic pressure	10	10
Totals	6,043	5,697

The following table shows the number and description of all the lifts in this State:—

Passenger Lifts—	
Electrically driven	64
Hydraulically driven	0
Goods Lifts—	
Electrically driven	88
Hydraulically driven	10
Belt driven	12
Total	174

There has been an increase of three in the number of lifts registered. This looks worse than it really is. There were actually (13) thirteen new lifts installed, but 10 belt-driven winches in the goldfields which had been entered in error as lifts were written off, leaving the apparent number of new lifts as three only.

The difficulty regarding wire ropes is not so acute as when last year's report was written. The Japanese ropes then referred to are giving good results, but are being carefully watched in the absence of accredited tests, etc. Nearly all of the lifts in the Metropolitan district are now working on alternating current, and though there is still a little difficulty owing to variable voltage, this is apparently being gradually overcome, and the lifts are mostly working smoothly.

The following return shows the work done in connection with machinery inspections:—

Return showing operations in the Proclaimed Districts (Machinery, only) during the Year ended 31st December, 1919.

	Totals. 1919.	1918.
Total registrations of useful machinery	6,043	5,697
Total inspections made	3,462	3,464
Certificates bearing fees	2,906	2,897
Certificates (steam) without fees	556	567
Notices issued "Machinery dangerous"	320	356
	£ s. d.	
Total amount of fees for 1919	1,200 14 0	
Total amount of fees for 1918	1,152 2 0	
	1919.	1918.
Number of Inspectors	7	7

There has again been a satisfactory increase of 346 in the total number of machinery registrations. In the South-Western district the increase was 364, or from 4,132 to 4,496.

In the Kalgoorlie groups the registrations decreased by four or from 830 to 826. In the remaining districts there was a decrease of 14. The total number of inspections made shows a decrease of two.

Dangerous machinery.

Three hundred and twenty notices were issued ordering various guards and fences to be erected; the number of notices issued being about 9.24 per cent. of the number of inspections made.

DIVISION IV.

Prosecutions under the Act.

No prosecution in regard to boilers or machinery was instituted during the year.

DIVISION V.

Accidents to persons caused by machinery.

During the year there have been 51 accidents, including two which ended fatally. This shows a decrease of 24 in the total number, and a decrease of two fatal as compared with 1918. There has been a slight increase in the number of accidents in the goldfields districts (four), and a decided decrease in the South-Western district (twenty-eight).

The following table shows the number of accidents and the percentage of these based on the total number recorded, caused by the various kinds of machinery mentioned:—

No. of Accidents.	Class of Machinery.	Percentage of total accidents.
13	Circular Saws and Band Saws	25·5 per cent.
1	Buzzers	1·96 per cent.
6	Ore Treating Machinery	11·76 per cent.
2 (1)	Fly-wheels, Pulleys, and Shafting	5·88 per cent., including 1 fatal.
8	Belting	15·7 per cent.
2	Chaff-cutters	3·92 per cent.
1	Passenger Lifts	1·96 per cent.
2	Goods Lifts	3·92 per cent.
12	Other Sources	23·52 per cent., or 1·96 per cent. each.
2 (1)	Scalds	5·88 per cent., including 1 fatal.
49 (2)		
Total 51		

The accidents from circular saws during the year again head the list, and account for 25½ per cent. of the whole number. Most of these accidents were caused by carelessness on the part of the injured men.

Buzzer accidents show a marked reduction, which I think is due to the more efficient guarding referred to in my last year's report.

One of the fatal accidents occurred in connection with refrigerating machinery, and was caused by the use of a bag, used as an overall. The shaft was rusty, and a few strands of the bag became entangled, causing the man to be whirled round the shaft. Death was almost instantaneous.

The other fatal accident was caused by the failure of a steam pipe flange. The flange cracked, owing to an undetectable flaw in it, and the pipe drew out of its thread, thus allowing a considerable escape of steam. The unfortunate man was badly scalded, and died eight days after the accident.

The passenger lift accident was due to a boy trying to jump out of the cage as the lift was moving. He might easily have been killed, had it not been for the presence of mind of the proprietor. As it was he escaped with a cut on the neck and a few bruises.

One of the goods lift accidents was due to a boy getting on to the platform of a very antiquated lift in spite of a notice forbidding any person to ride on the lift. He leaned forward and struck a beam which tipped him on to a packing case on the floor, He only fell four feet, and escaped with slight cuts on the head. The other goods lift accident was caused by a boy leaning on a badly attached guard rail guarding the shaft. The boy fell to the bottom (16 feet). He was uninjured except slight shock.

A curious accident occurred in September last at a timber mill. A piston rod was being removed from the 12in piston of a Simonsen log turner, and being rusty, difficulty was experienced in driving it out. It was therefore heated in a wood fire, and a 14lb. hammer used to drive it out. On the third blow the piston exploded violently. The man with the hammer was driven back against a lathe, the hammer was torn from his hand, and the sides of the piston were shattered to pieces, leaving the solid portion on the rod. One of the men working at it had a small piece of metal imbedded in the flesh of his chest, causing a nasty wound as well as burning him, and several small pellets struck him on the scalp. None of the injuries, however, were sufficiently serious to require medical attention. Considering the force of the explosion, it is little short of miraculous that the results were not more serious.

The piston was hollow and 1in. thick at sides. When originally put on the rod it was probably heated and shrunk on. The only feasible explanation of the explosion is that the heated air in the cavity after the shrinking process would, on cooling, become so attenuated as to cause a considerable vacuum. If the piston was cooled by immersion in water, it is conceivable that some water found its way through a minute flaw in to the cavity, and remained there, the small flaw becoming rusted up. On heating for removal of the rod the water would rapidly become steam at high pressure, and with the help of the blow might cause the explosion.

It would have been wise to have drilled a small hole into the cavity prior to attempting to heat the piston.

In November there was a fatal accident (not classed as an accident due to machinery) at one of the collieries. A small locomotive (24in. gauge) was used for hauling skips for about half a mile. The line was originally constructed for a horse line, and is ballasted with coal dust. On the day of the accident the driver got off his engine to couple up a skip, and the mine manager got on and said he would drive the engine. The driver got on to the skip. It appears that the speed was somewhat excessive and the engine left the rails, and after travelling some distance on the ballast it overturned, and the manager was pinned by the head under the cab. Death was instantaneous.

As the engine had quite recently been fitted with new wheels which are in good order, the cause of the accident appears to have been due to the speed and faulty road. The jury brought in a verdict of accidental death, with a rider that no person be allowed to drive the engine other than the driver.

DIVISION VI.

Engine-drivers' examinations and kindred matters.

During the year four examinations were held in Perth, two in Kalgoorlie and two in Bunbury. Examinations were advertised to be held at Southern Cross, Leonora, Mt. Magnet, Geraldton, and Albany, but fell through owing to the necessary number of candidates not being forthcoming.

The following table shows the certificates granted and their classification:—

Return showing total number of Engine-drivers' Certificates (all classes) granted in 1919 *and compared with* 1918.

Class of Certificate.	Number granted. 1919.	1918.
First Class Competency (including certificates issued under Regulation 27 and Section 63 of the Act)	3	3
Second Class Competency (including certificates issued under Regulation 27 and Section 63 of the Act)	23	18
Third Class Competency (including certificates issued under Regulation 27 and Section 63 of the Act)	43	47
Locomotive Competency	15	12
Traction Competency	6	2
Interim	4	5
Copies	7	5
Total	101	92

There is an increase in the number of certificates granted, the total number being nine more than last year.

The total number of certificates granted under this Act up to 31st December, 1919, is 2,785.

The revenue from engine-drivers' fees for the year was £137 5s., as against £120 7s. 6d. for 1918.

Inquiries, Prosecutions, etc.

No proceedings were undertaken against any engine-driver during the year.

The Board inquired into four cases of overwinds and similar occurrences on mining shafts. No action was taken in any of the cases, beyond making a record.

DIVISION VII.

General.

During the year 33 second-hand boilers were transferred to the Eastern States, and 28 more were cut up for plates for repair and constructional work. This had to be permitted in order to keep the industries going. I still dislike the dangerous practice of using old plates for either repair or constructional work, but under the circumstances it is unavoidable. I trust that before long stocks of boilers and plates will be available from the usual sources, and that this difficulty will cease.

In my report for the year ending December, 1918, I referred to the desirability of an Interstate Conference being held with a view to securing uniformity in connection with engine-drivers' certificates and examinations, and the whole of the operations of Inspection of Machinery Acts in the various States. Since 1901 in various annual reports and minutes, I have repeatedly urged that this matter receive attention.

It gives me much pleasure to report that a start in the desired direction has at last been made. Communications were received by the Hon. the Premier of this State from the Premier of New South Wales, suggesting a Conference of Chief Inspectors of Machinery, and similar officers, to be held in Sydney on 2nd December and following days for the purpose of discussing the question of uniform examination and certification of engine-drivers and boiler attendants, and inspection of boilers. Also to prepare a uniform Bill for consideration at the next Conference of Premiers. In accordance with instructions received I left this State on 22nd November, attended the conference, and returned on 23rd December. The conference met in the Assembly Room of the Education Building, Sydney, at 2.30 on 2nd December last, and continued its sittings daily from 9.30 a.m. to 5.30 p.m. until 10th December.

The representatives from the respective States were:—

(a) New South Wales—Mr. P. A. Fildes, Chief Inspector of Lifts.
(b) South Australia—Mr. J. P. Burnside, Registrar and Chief Inspector of Boilers.
(c) Queensland—Mr. J. Henderson, Chief Inspector of Machinery.
(d) Victoria—Mr. A. H. Merrin, Chief Inspector of Boilers, etc.
(e) Tasmania—Mr. E. S. Ross, Chief Inspector of Machinery.
(f) Western Australia—Mr. C. J. Mathews, Chief Inspector of Machinery.

The Queensland Draft Bill was taken as a basis for discussion, and after a good deal of hard work the unanimous result of our deliberations was as follows:—

(a.) A Draft Bill, with skeleton regulations attached, for the uniform examination and certification of engine-drivers and boiler attendants;

(b.) *Re marking of condemned boilers.*—While Conference considers it is practicable to condemn boilers for a pressure useful to the owner under particular conditions it is impracticable to mark boilers as absolutely condemned for all pressures.

The practice adopted in the several States is considered effective, and the condemnation is expressed in a specified form.

(c.) *Uniform boiler inspection.*—While Conference considers that the engine-drivers Bill would be a valuable legislative measure if adopted in the several States, it considers that the necessary preliminary condition in securing uniformity of boiler inspection is the existence in each State of the Machinery Act, uniform in its essential provisions, and the administration and operation of such Act in order to be competent, impartial, and thorough, should be entirely conducted by officers appointed by the Government.

Yours faithfully,

(Sgd.) E. J. EVANS,
Secretary.

The above results were communicated to the Hon. Premiers of the various States, and in a letter sent to the Hon. Premier of New South Wales it was also suggested for favourable consideration that:—

(a.) this Conference shall continue as at present constituted until finality is reached in securing uniform Inter-State legislation with regard to engine-drivers' certificates;

(b.) should the Premiers' Conference decide that this Bill should become law in each of the States, then the Conference should immediately meet again in order to draw up the uniform regulations in detail;

(c.) any future meeting should be held in Melbourne as being geographically more central to the majority of the members of the Conference;

(d.) with a view to the collection of data required in connection with the proposed regulations that the services of the Secretary, Mr. E. J. Evans, be available until finality is reached.

I now await instructions to deal further with this very necessary and long standing matter.

Under Section 68 a letter was received from the Secretary of the Collie Branch of the Federated Engine-drivers' and Firemens' Association, in which it was stated that the services of a fireman were necessary to assist the engine-driver on all shifts at the following mines:—

Collie Co-operative Collieries.
Westralia Coal Mine.
Collie Proprietary Coal Mine, and the
Premier Coal Mine.

After considerable correspondence had ensued, I decided to investigate the matter on the spot, and held a conference at the Court House, Collie, on 24th April, at which the managers of the mines, and the engine-drivers concerned were present. Evidence was tendered on both sides. I subsequently visited the mines, and decided each case on its merits. I was accompanied at each mine by the manager and engine-drivers concerned. The dispute was satisfactorily and reasonably settled, and work proceeded without any stoppage.

The principal industry of the South-Western District, viz., timber has improved very much during the year, and several mills which had been idle have been restarted. The scarcity of skilled timber workers, and the absence of shipping for export purposes has probably prevented a good many other mills from starting.

I regret to report that the fine mill at Hoffman, which has been operating for over 20 years, was destroyed by fire on the 9th March last with serious loss of plant, including the main engine and two

other boilers. This mill has since been re-erected on another site.

The scarcity of shipping, which acted as a restriction on the timber trade, undoubtedly had the opposite effect in the Collie industry. The absence of imported coal has kept these collieries exceptionally busy.

The high price of tin has made it possible for many low grade propositions being worked profitably, and practically all the plants engaged in this industry have been in constant use during the year.

I think generally the prospect for this next year is considerably brighter than it has been for many years past.

Work done for other Departments.

During the year a considerable amount of advisory work has been done for other departments. Wooroloo Sanatorium was again visited in connection with the alterations to hot water service, which is now satisfactory. Busselton butter factory was visited, and a report embodying several suggestions for its more economical working was submitted. These have since been given effect to.

A wages dispute was settled amicably at one of the public institutions under the control of the Medical Department, and various inspections and valuations were made for other departments.

Inspectorial Staff.

The staff remains as in 1918. One inspector was absent on sick leave for a period of nearly seven weeks. No additional assistance was obtained during that time.

I have already mentioned that one of the inspectors located at Kalgoorlie has been made available for a portion of the work in the Northam district. This will afford considerable relief to one of the South-Western inspectors, who has had more work in that part of the district allotted to him than he could contend with, owing to the extensive land settlement going on.

Clerical Staff.

No change of any importance has taken place in the clerical staff, whose time is fully occupied.

Revenue.

The total revenue from all sources during the year was £4,232 1s. 2d., made up as follows:—

	£	s.	d.
Fees for Boilers	2,783	0	4
Fees for Machinery	1,200	14	0
Fees, Engine-drivers' Certificates	137	5	0
Incidentals (being fees for special inspections, special expenses, etc.)	111	1	10
Total	£4,232	12	0

This shows a decrease of £158 17s. 9d. This decrease is made up as follows:—

	Increase. £	s.	d.	Decrease. £	s.	d.
Boiler Fees	..			230	2	7
Machinery Fees	48	12	0			
Engine-drivers' Fees	16	17	6			
Incidentals	5	15	4			
	71	4	10	230	2	7
				71	4	10
Total decrease				£158	17	9

On analysing the decrease from the district point of view:—

	Increase. £	s.	d.	Decrease. £	s.	d.
S.W. Group	54	1	4			
Kalgoorlie	..			31	2	4
North Coolgardie and Mt. Margaret	..			140	15	9
East Murchison and Murchison and Yalgoo	..			57	18	6
Engine-drivers' Fees	16	17	6			
	70	18	10	229	16	7
				70	18	10
Total decrease				£158	17	9

As from April, 1918, the practice of charging the prescribed fees to Government departments, other than Government trading concerns, was discontinued. The fees lost by this means since April amount to £28 5s., and will amount to a much larger sum during present year. Our decrease would have been correspondingly reduced under the old order of things.

During the year it has been necessary to write off as bad debts four items totalling £3 15s. The amount represents only .08 per cent of the total revenue.

Mileage.

The total distance travelled by inspectors during the year was 40,970 miles, of which 15,380 were by rail, 25,584 by road, and 6 by water. The distance travelled shows a decrease of 5,294 miles as against 1918, with a decrease of 43 in the number of inspections made. The average miles travelled per inspection were 8.26, showing a decrease of .99 miles per inspection as against last year.

Conclusion.

In conclusion, I wish to again tender my sincere thanks for kindly assistance rendered by the officers attached to the Crown Law, Police, and Postal Departments in various districts, in matters connected with the administration of the Act.

My staff have continued to carry out their duties efficiently, and to them also my thanks are due.

I have the honour to be,

Your obedient servant,

C. J. MATHEWS, M.Inst., C.E.,
Chief Inspector of Machinery and Chairman of the Board of Examiners.

DIVISION VII.

Annual Report of the Government Analyst for the Year 1919.

The Under Secretary for Mines.

I have the honour to submit, for the information of the Hon. Minister for Mines, my twenty-fourth Annual Report upon the work of this Department during the year 1919, and, as in previous years, will divide the report into three main headings corresponding to the three divisions of my work.

GOVERNMENT ANALYST.

Judged by numerical standards the amount of work performed in the General Laboratory during the year shows a falling off from that of the previous twelve months, but this is partly explained by the change which has taken place in the method of carrying out the work of the Department.

For some time past an advantageous modification of the relations of the Department to the public has been gradually brought about. Instead of confining activities merely to laboratory work, an endeavour has been made to get out into the country to come in personal contact with settlers, and instead of dealing with questions arising merely by correspondence, to make personal inquiries and give individual advice wherever possible.

In this way the actual chemical work required to be done has considerably lessened, as the information required is very often already available in the Department, and it is not necessary to have further samples submitted for analysis, which would only mean repeating work already done. This policy, I think, not only makes the work of the Department more strictly useful but also reacts with great benefit upon the staff, as it is bringing practical experience more closely in touch with technical theory.

This alteration in work, while relieving the staff from a certain amount of routine work which was before perhaps sometimes unnecessarily repeated, leaves their activities free to be engaged upon larger questions of general research and investigation, which are of increasing importance, but which do not, of course, swell the tabular figures showing actual analyses carried out.

Staff.—Several changes have taken place in my staff, both by loss and gain during the year. Mr. W. G. McKechnie, like Mr. Rawson in the previous year, obtained an advantageous offer from the Queensland Government, and left this State to take up work in the Government Analyst's Department in Brisbane, giving another instance of the difficulty met with in retaining experienced officers in this State.

Messrs. Malloch, Hood, and Hill, who have been absent on munition work in England, returned to their duties during the year, and the additional experience gained by them is proving of great value to the Department. It is very satisfactory to know that so many members of this staff were able to afford useful aid amongst the technical chemists who rallied to the assistance of the Empire during the war. All three of these officers have come back with excellent records, though I regret to say that two of them returned with health seriously impaired by the work which they had carried out in poison gas factories in Great Britain.

Mr. R. G. Lapsley (who had some years ago spent two years on my staff, but had subsequently left to go into private employment, and later still had enlisted with the Army Medical Corps and seen active service in France) also returned to Western Australia during the past year, and has rejoined my staff in order to take up the work connected with the milling of wheat which had to be abandoned owing to Mr. McKechnie's retirement.

General Analytical Work.—No special investigations under this heading have been carried out during the year, as any special technical inquiries undertaken belonged to the other branches of the Department.

The following table gives a summary of the chemical analyses performed:—

TABLE No. 1.—*General Analyses.*

Spirits	47
Milks	236
Barks, etc.	32
Medicinal Compounds	3
Powellising	93
Waters	261
Foodstuffs	36
Sewage	374
Criminal	53
Miscellaneous	89
Total	1,224

CHIEF INSPECTOR OF EXPLOSIVES.

The explosive trade of the State has declined very much from its former size, and the following tables of importations present a comparison between the explosives used in 1919 and in the previous years:—

TABLE No. 2.

Importations—1918–19.

	1918.		1919.	
	Quantity.	Value.	Quantity.	Value.
	lbs.	£	lbs.	£
Gelignite	1,576,000	69,039	950,000	39,783
Gelatine Dynamite	149,000	8,127	180,000	11,154
Blasting Gelignite	...	...	64,000	4,998
Dynamite	...	...	...	...
Permitted Explosives	25,000	...	...	...
Detonators	...	3,500	...	248
Fuse (Coils)	160,800*	4,779	54,000*	1,593
Powder, Blasting	105,000	4,030	40,025	1,453
Powder, Sporting	...	...	...	...
Explosives, N.E.I.	...	193	...	543
Fireworks, N.E.I.	...	244	...	349
Totals	2,015,800	89,912	1,288,025	60,121

* Overseas Imports only.

Comparisons of Importations last five years.

	1915.	1916.	1917.	1918.	1919.
	£	£	£	£	£
Nitro Compounds	129,211	183,269	93,377	77,166	55,935
Blasting Powder	7,239	3,123	13,339	4,030	1,453
Sporting Powder	...	...	36	189	...
Fuse	4,198*	4,701*	5,005*	4,779	1,593
Fireworks	73	92	1	240	349
Detonators	4,924	4,465	7,619	3,500	248
N.E.I.	940	2,170	4,784	193	543
Totals	146,585	197,820	124,161	90,097	60,121

* Overseas Imports only.

The end of the year sees the expiration of the temporary permits issued to meet war conditions allowing the use of lower grade explosives, and modifications in their composition. Considerable agitation has taken place during the year to permit of the retention of sodium nitrate as an ingredient in gelignite and gelatine dynamite, and after considerable discussion it has been decided to allow this to be done under certain conditions, the principal proviso being that the explosive must be marked in such a manner as to show whether it is made with sodium nitrate or potassium nitrate.

The views of this Department which have been expressed on many occasions in connection with this matter have been strongly confirmed during the year by the numerous complaints which have been received from time to time from various sources as to the quality of the explosives obtainable in this State. In one or two cases which were specially investigated it was found that the complaints were due to the development of inertness in the explosives. As this question was referred to in my last Annual Report, and has formed the subject of a special pamphlet issued by the Department to which reference has been previously made, I do not desire to deal with it again this year except in connection with one point which has arisen.

In order that consistent results may be obtained by the D'Autriche method of determining the Velocity of Detonation, it is necessary to standardise the method of applying the tests. The pamphlet issued by the Department was lacking in information on this point. It is perhaps therefore as well to here state the method employed in this laboratory, and which has formed the basis of all figures issued by this Department.

In all tests carried out, unless otherwise specially stated, fixed distances are observed between the firing detonators and the first velocity detonators as well as between the two velocity detonators. The uniformity of these distances is insured by the use of a metal gauge which forms punctures in the cartridge before inserting the velocity detonators. The two latter should always be placed 200 millimeters apart, and the first velocity detonator is inserted at 90 millimeters from the end of the cartridge in which the firing detonator is inserted.

As very varying results are obtained as to the velocity of detonation if these distances are varied, it is impossible to make exact comparisons unless some such standard method is adopted.

The inquiries made some years ago in this Department to try and ascertain the fundamental reason for the development of inertness in explosives had to be abandoned owing to the intervention of the war, but the return of members of my staff from work in the munition factories in England has enabled me to again take up this investigation, and a commencement has already been made on an extensive research designed to throw light upon the chemical or physical causes of the changes which take place. Such a research is likely to occupy an extended period, and it is, of course, impossible at the present time to forecast the result.

Magazine Reserves.—An alteration has been made during the year in the manner of making these reserves available for the erection of private magazines. A number of the leases (originally issued for periods up to twenty-one years) for magazine sites on these reserves expired during the year, and it has been decided in future not to issue extended leases for such sites, but only to let them from year to year, and also to make these leases fall concurrently with the licenses issued for the buildings erected. This makes the whole matter of administration simpler and more flexible.

No new reserves have been declared during the year, and the number still remains at fifty with a total area of 3,051 acres. On these reserves there are erected and licensed 75 magazines owned by private firms, and three Government magazines, with a total capacity of 1,118 tons. There are also 50 magazines erected on private property with a total storage capacity of 35 tons.

Inspections.—Owing to various difficulties connected with the internal organisation of the Department, and to the absence of the Assistant Inspector of Explosives on long service leave, the inspection work during the year had to be very much curtailed, and only 100 inspections of magazines and store premises were carried out. As a result of these inspections the following explosives were found to be unfit for consumption, and were destroyed:—

TABLE No. 3.

List of Explosives destroyed.

Date.	Locality.	Kind and Quantity.	Remarks.
17–3–19	Collie	600lbs., Blasting Powder ...	Damaged by water.
10–4–19	Bunbury	10lbs., Blasting Powder ...	Damaged by water.
17–4–19	Manjimup	3lbs., Gelignite	Chemical deterioration.
16–5–19	Mornington	175lbs., Blasting Powder ...	
23–5–19	Toodyay	1lb., Gelignite	Chemical deterioration.
24–5–19	York	2lbs., Gelignite	
19–6–19	Fremantle	150lbs., Gelignite Dynamite ...	Damaged by water.
19–6–19	Fremantle	4,000lbs., Gelignite	Low heat test, and chemical deterioration.
18–6–19	Naretha*	4,400lbs., Gelignite	Exudation and chemical deterioration.
19–5–19	Collie	25lbs., Gunpowder	Excessive moisture.
19–12–19	Perth	1lb., Gelignite	Chemical deterioration.
19–12–19	Perth	150 Detonators	Damaged by moisture.
22–12–19	Fremantle	2lbs., Gelignite	Chemical deterioration.
22–12–19	Perth	1lb., Gelignite	Chemical deterioration.

*Destroyed on behalf of Commonwealth Government.

The above table and the experience of the last three years prove how necessary are frequent inspections of stocks of explosives in order to prevent accidents from the storage and use of explosives which have become defective. I therefore propose during the coming year to institute a much more active campaign of inspection than has been possible since the outbreak of the war.

This, of course, will involve heavier expenses than has been the case for some years past, but owing to the alterations in the composition of some of our explosives, and to the tendency which exists in the absence of frequent inspection to keep old residual stocks which are unfit for consumption, I consider that public safety absolutely demands that extensive tours of inspection should be carried out next year.

The supply of ordinary blasting powder during the year has been very limited, and much difficulty has been experienced by the coal miners and quarrymen who have had to use as a substitute some of the permitted explosives in spite of the consequential effect on the cost of production. One shipment of blasting powder imported some time ago in which sodium nitrate was used instead of potassium nitrate has given a great deal of trouble to consumers, owing to its inefficiency.

No proceedings have been taken during the year for breaches of the Explosives Act, and 90 ordinary store licenses and 147 fireworks licenses have been issued.

The tests carried out in connection with the inspection of explosives were as follow:—

TABLE No. 4.

Heat tests on explosives	670
Fuse tests	48
Miscellaneous tests	3
Total	721

AGRICULTURAL CHEMIST.

The chemical work carried out under this heading comprised the following tests:—

TABLE No. 5.—*Agricultural Work.*

Soils	240
Fertilisers	115
Wheats and flours	154
Waters	51
Miscellaneous	19
Total	579

The remarks made in the introductory paragraphs of this report, having reference to personal work as against laboratory work, apply particularly in connection with this section. In co-operation with the Fruit Industries Branch of the Agricultural Department I have made numerous visits during the year to different parts of the agricultural areas, especially in the South-West, and, combined with analysis of soils taken from various districts, have endeavoured by personal conversation, addresses, etc., to impart to growers such information as may be of assistance to them in their industries.

In this connection the two most noteworthy inquiries which have been completed during the year have been in connection with the citrus orchards at Harvey, and the apple orchards at Mt. Barker. An examination of representative types of these soils combined with personal inquiries on the spot, discussions with individual growers, as well as addresses to assembled fruit-growers' associations, have, I think, proved of mutual advantage both to the settlers and to the Department, and arrangements are now being made for carrying out similar work in the Bridgetown district.

I think there is no doubt that considerable scope exists for using this Department in connection with the development of the various branches of agricultural industry. The value of the information available is not realised unless it is brought under the direct notice of settlers in various parts of the State. The improvement of pastures, conservation of soil moisture, drainage combined with intensive culture, the use of cover crops and green manuring, and the value of extensive application of lime are all matters having a very direct and important bearing upon the development of our South-Western lands, and it seems desirable that some definite policy of these matters should be framed and propagated so that settlers should not be left to the haphazard and variable methods which have hitherto too often prevailed.

The work of the botanical and pathological section has been ably carried out by Mr. Herbert, whose style and status has now been altered to that of Economic Botanist and Plant Pathologist. In connection with this branch also the actual number of examinations carried out shows a considerable falling-off from the previous year, but this is accounted for by the reasons stated elsewhere.

A certain amount of the botanical and pathological work having been done once does not require to be repeated, and it becomes more necessary that it should be conveyed to those who require it. This is best done by personal visits and addresses in the country, and during the last twelve months I have taken every opportunity to send Mr. Herbert to various parts of the State where matters of interest have arisen. This necessarily has led to the curtailment of actual laboratory work, which was further reduced by his absence on leave during the greater part of December. Although many of the simpler routine investigations will no longer be necessary as this section of the Department develops, it becomes increasingly evident that there are extensive fields of investigation awaiting inquiry. Two or three plant diseases have been discovered of which nothing is known, and which require an extensive biological research, such as the red root disease in onions, which has caused very considerable loss, and consequently increased the price of this vegetable during the year.

Again, it is very necessary that a botanical survey should be carried out to determine the number (if any) of cyano-genetic plants existing in this State, and which may be responsible for more or less mysterious losses of stock reported from various districts from time to time. Such a survey conducted of late years in Queensland has shown that there exists a hitherto unsuspected number of such plants.

These and other similar inquiries are sufficient to absorb the greater part of Mr. Herbert's activities when combined with personal instructional work, and I am, therefore, making arrangements for the appointment of a trained assistant to render Mr. Herbert's time available for such duties. I am hopeful that such an assistant may take up duty early in the new year.

The following notes, prepared by Mr. Herbert, give details of the Botanical and Pathological work performed:—

"During the year the greater part of the work has been purely botanical, pathological examinations being comparatively few, partly owing to the efficiency of the fruit inspectors, and partly to the dry season which is unfavourable to fungal activity. The botanical work falls into several groups—

1. *General identifications for the Department of Agriculture and for settlers.*—These consist mainly of fodder and poison plants, but frequently plants of alleged possible economic importance are sent in.
2. *Quarantine Seeds.*—All seeds imported into Western Australia are examined prior to being allowed entry. Samples containing noxious weeds are mechanically freed of impurity, and where this is impossible or impracticable they are destroyed.
3. *Germination Tests.*—Owing to the war considerable difficulty has been experienced by seedsmen in obtaining European seed, and a great deal of pre-war seed has been put on the market. A considerable number of samples has been examined, and in many cases it was found that the germination percentage was *nil.*
4. *Life Tests.*—The study of poison plants is very important in this State, and, unfortunately, the knowledge of them is as yet very incomplete. Life tests on rats and rabbits have been proceeded with systematically, with the result that several doubtful species have been placed on the list of toxic plants, and a large number have been proved innocent. Experiments with known poison plants have also been made in order to find out their relative toxicity. Some of the plants, however, are unpalatable to those animals when in the dry state, and the tests have been unsatisfactory with one plant, Camel Poison (*Erythrophloeum Laboucherii*). Even the pressure of partial starvation did not force them to eat it.

The list of known poison plants now includes *Gastrolobium calycinum* (York Road), *G. bidens* (Kite Leaf), *G. callistachys* (Rock Poison), *G. bilobum* (Heart Leaf), *G. spinosum* (Prickly Poison), *G. oxylobioides* (Champion Bay), *G. Brownii; G. polystachyum, G. crassifolium* (Narrow Leaf), *G. rotundifolium* (White Gum Poison), *Oxylobium parvifolium* (Box), *O. retusum* (Bloom Poison), *Isotropis striata* (Lamb Poison), *Dodonea viscosa, Duboisia hopwoodii* (Pituri), *Euphorbia Drummondii,* and *Cucumis myriocarpus.* The latter is an introduced poison, but is well established even as far inland as Wiluna. Stock are responsible for its wide dispersal.

The climate of Western Australia has resulted in the gradual development of protective devices on the part of the native plants, and for one of the principal protections is a coating of hairs. When such plants are eaten these hairs frequently cause impaction through becoming wefted into a ball in the stomach. As is to be expected, this trouble is most prevalent in the drier areas, and is not much in evidence in the South-West. In these cases the injury is mechanical and not toxic, and such plants cannot be classed as poison.

5. *Weeds.*—Heart Leaf, a native poison plant, has been added to the list of noxious weeds of the State at the urgent request of local road boards in affected districts. The Noxious Weeds Act was framed to prevent further spread of noxious weeds, and the danger of such spread is not sufficient to justify the declaration of all native poisons. There was previous to this only one native noxious weed, the Nut Grass (*Cyperus rotundus*). This is a troublesome garden weed, as it spreads both vegetatively and by seeds. Most of our noxious weeds come from the similar climatic zones of South Africa and the Mediterranean. Here, away from the natural enemies which kept them in check in their old homes, they flourish at the expense of the local vegetation, which, in addition to its natural insect and larger enemies,

is ceaselessly subjected to the attacks of man and his domestic animals. Most of these weeds are avoided by stock, and so have every chance of spreading. Six of them are poisonous. These are the Cape Tulip, Wild Melon, Noogoora Burr, Thorn Apple, Apple of Sodom, and Cotton Bush (*Gomphocarpus fruticosus*).

Pathological.—Pathology in Western Australia differs from that of the Eastern States in that a larger percentage of the diseases is physiological, and due to the irregularity of nutrition, which is the natural result of the long, dry summers and the very wet winters. Plants in summer must root deep to obtain their water supplies, and in winter the water table rises and draws a large number of these deeper roots. The result is that the surface roots are sent out at this period, and they in turn are subjected to next summer's dryness. Naturally introduced plants are most affected by such conditions, and we get exanthema in the orange, die-back, sour-sap, and drought in the Rosaceous fruits (the apple, pear, cherry, peach, etc.) The same principle underlies all these diseases, though the effect varies under different conditions and with different species. The native trees themselves have not been able to accustom themselves entirely to the climatic conditions, and stag-headedness (the dying of top branches) is common in jarrah and other trees. It may be seen well in King's Park, but here much of the stag-headedness is due to bush fires. Another disease not due to pathogenic organisms is chlorosis, which results in an anæmic condition of plants, a yellowing of the leaves, and hence inefficient nutrition. It is due to deficiency of iron, and application of sulphate or chloride of iron to the soil is very effective. Inoculation of the plant by injection of sulphate of iron into the stem has a similar result.

The remaining diseases are due to cryptogamic parasites, and the control of these lies in the use of suitable fungicides. It is here that the mycological examination is of extreme value, as the different forms of fungi (the main group causing disease) require different treatment. The mildews, for instance, are more sensitive to sulphur sprays, whereas Irish Blight seems to be unaffected by them. This is important as the most important part of pathological inquiry is in the prescribing of efficient treatment.

The following fungal and bacterial diseases have come under notice during the year:—

Apples—*Fusicladium dendriticum.*
Pears—*Fusicladium pyrinum.*
Onions—Downy Mildew and Red Root.
Apricot, Peach, and Almond—Shot Hole.
Orange—Brown Rot, Scab, Melanose, Sooty Mould and *Sphaerella citri.*
Lemons—Brown Rot.
Wheat—Take-all (*Ophiobolus graminis*), Ear Cockle (an eel worm disease, not fungal), Septoria, Smut, and Rust.
Beetroot—Eelworm.
Rhubarb—*Armillaria mellea.*
Tomato—*Septoria lycopersici*, Irish Blight, and Sleeping Sickness.
Cabbages.—Club Root.

Publications.—Three papers have been read before the Royal Society and are in type. These will be published within a few weeks. "*Nuytsia floribunda*, the Christmas Tree; its structure and Parasitism," was an account of the nature of this remarkable terrestrial mistletoe, a property previously unknown. "The Climbing Habits of the Narrow-mouthed Lamprey" was not a botanical paper, but the observations were made during a botanical examination of the Karri country near Big Brook. A new species of blackboy was described and given the name of *Xanthorrhoea reflexa*, Herbert; it promises to be of greater economic value than the common species, *X. Preissii.*

In addition to these, a paper on "Heliotropism and Nyctinasty in Flowers" has been forwarded to the Victorian Royal Society, and one on "Confusion between three Western Australian Species of Acacia" is ready for publication.

The pathological section of an Agricultural Department bulletin on Onion Culture and Diseases was printed during the year.

Lectures.—Nine country lectures were delivered in connection with the University extension scheme, and a series of lectures on Plant Diseases given to the Ugly Men's Instructional School for Returned Soldiers. Visits in connection with diseases and poison plant depredations were paid to Denmark, Big Brook, Jarrahdale, Calingiri, Wedin, Waterloo, Karragullen, Beaconsfield, Spearwood, and Capel. These latter also resulted in the collection of a large number of specimens for the Herbarium, to which about 300 specimens have been added during the year.

The numerical census of the work done is as follows:—

Botanical identifications	355
Pathological diagnoses	147
Quarantine seed examinations	31
Germination tests	54

FEEDING TESTS.

Plant.	Rats Fed.	Toxicity.
Agrostocrinum stypandroides	2	Negative.
Solanum sp.	2	Negative.
Erythrophloeum Laboucherii (Camel Poison)	4	One poisoned but three refused to eat the bait.
Gastrolobium spinosum (entire leaved variety)... ...	2	As poisonous as the normal form.
Gastrolobium trilobum (Bullock Poison)	2	Poisonous at flowering period.
Kennedya procumbens	1	Rat died, but it was found to be suffering from worms, so this test was worthless.
Euphorbia Drummondii	2	Poisonous.
Gastrolobium oxylobioides	1	Poisonous.
Gastrolobium parvifolium	1	Poisonous.
Bulbine sp.	1	Inconclusive.
Isotropis striata	1	Dried material innocuous.

The following table gives a summary of the total scientific work performed in this Laboratory and the Departments for which it was carried out:—

TABLE No. 7.

Agricultural Department	1,161
Explosives	673
State Hotels	41
Police	57
Public Works Department	81
Health	97
Railways	36
Forestry	39
Water Supply	584
Private	156
Miscellaneous	136
Mines	19
Quarantine Department	31
Total	3,111

E. A. MANN,
Government Analyst, Chief Inspector of
Explosives and Agricultural Chemist.

8th March, 1920.

WESTERN AUSTRALIA.

DEPARTMENT OF MINES.

MINING STATISTICS,

1919.

N17/20.

MINING STATISTICS TO 31st DECEMBER, 1919.

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TABLE OF CONTENTS—*continued.*

EXPLANATIONS OF SIGNS AND ABBREVIATIONS.

Gf. Goldfield.
Mf. Mineral field.
D. District.
G.M.L. Gold Mining Lease.
M.L. Mineral Lease.
Loc. Location.
L.C. Lode Claim.
Q.C. Quartz Claim.
R.C. Reward Claim.
M.R.C. Mineral Reward Claim.
M.A. Machinery Area.
Mach. L. Machinery Lease.
P.A. Prospecting Area.
T.A. Tailings Area.
T.L. Tailings Lease.
W.R. Water Right.
S.L. Special License.
N.E.I. Not elsewhere included.

SUMMARY OF MINERAL PRODUCTS.

GOLD AND OTHER MINERALS PRODUCED DURING 1919, AND THE ESTIMATED VALUE THEREOF, TOGETHER WITH A COMPARISON FOR PREVIOUS YEARS, AND THE TOTAL PRODUCTION TO DATE.

DESCRIPTION OF MINERAL.	1919.		1918.		1917.		1916.		Previously to 1916.		Total to date.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
		£		£		£		£		£		£
1. Antimony ... ... (Exported) statute tons	...	...	...	...	12	258	27	580	47	860	86	1,698
2. Arsenical Ore ... ... (Exported) do.	...	...	679	2,564	57	707	11	19	...	...	747	3,290
3. Asbestos ... ... (Reported) do.	53	1,443	...	...	...	...	...	...	43	1,754	96	3,197
4. Bismuth ... ... (Exported) do.	1 cwt.	15	...	...	½	24	½	133	10	672	11	844
5. Coal ... ... (Reported) do.	401,713	270,355	337,039	204,319	326,550	191,822	301,526	147,823	3,242,831	1,509,592	4,609,659	2,323,911
6. Copper { Ore ... ... (Exported) do.	455	9,740	1,643	24,877	966	20,878	650	14,971	66,117	764,631	69,831	835,097
6. Copper { Ingot and Matte (Exported) do.	4	365	478	41,269	535	64,860	457	49,862	9,880	619,424	11,354	775,780
7. Gadolinite ... ... (Reported) do.	...	...	...	...	...	...	...	...	1	112	1	112
8. Gold ... (Exported and Minted) fine ounces	734,066	3,118,113	876,511	3,723,183	970,317	4,121,645	1,061,398	4,508,532	29,488,257	125,258,154	33,130,549	140,729,627
9. Graphite ... ... (Exported) statute tons	...	...	5	75	18	158	21	284	7	40	51	557
10. Ironstone ... ... (Reported) do.	...	...	...	...	...	...	...	...	57,830	36,695	57,830	36,695
11. Lead (Ore and Concentrates) (Exported) do.	...	...	...	...	...	...	...	...	44,032	508,748	44,032	508,748
12. Lead and Silver Lead (Ore and Concentrates) (Exported) do.	248	3,704	282	3,045	22	593	428	12,033	3,823	47,103	4,803	66,478
13. Lead (Pig) ... ... (Exported) do.	1,780	48,462	5,489	163,880	4,661	139,940	3,523	74,930	697	13,608	16,150	440,820
14. Limestone ... ... (Reported) do.	...	...	...	...	...	...	...	...	93,706	18,290	93,706	18,290
15. Magnesite ... ... (Exported) do.	...	...	62	225	42	50	12	47	688	1,196	804	1,518
16. Mica ... ... (Exported) do.	1	514	...	...	...	...	*	10	*	653	*	1,177
17. Molybdenite ... ... (Exported) do.	7	100	5	97	14	158	...	...	...	...	26	355
18. Pyritic Ore ... ... (Reported) do.	4,136	4,919	2,252	1,629	3,575	1,752	4,409	2,263	44,098	15,583	58,470	26,146
19. Silver ... ... (Exported) fine ounces	223,332	55,342	109,830	22,711	222,075	38,339	173,012	22,258	3,030,455	358,162	3,758,704	496,812
20. Tantalite ... ... (Exported) statute tons	¼	75	...	...	17	2,513	47	9,375	*	6,129	*	18,092
21. Tin ... ... (Exported) do.	318	47,269	415	76,952	383	45,288	463	49,101	13,435	1,209,497	15,014	1,428,107
22. Tungsten Ore { Scheelite ... (Exported) do.	6	772	5	720	½	42	3	438	4	140	18	2,112
22. Tungsten Ore { Wolfram ... (Exported) do.	½	15	½	31	...	...	1	128	13½	1,267	15	1,441
23. Zinc ... ... (Exported) do	...	...	...	...	...	...	14	630	170	4,807	184	5,437
Unenumerated ... ... (Exported)	1	1	...	...	...	...	...	...	...	6,291	...	6,292
TOTAL VALUES	...	£3,561,204	...	£4,265,577	...	£4,629,027	...	£4,893,417	...	£130,383,408	...	£147,732,633

* Weight not stated.

AUSTRALASIAN MINERAL PRODUCTION.

COMPARATIVE TABLE SHOWING THE OUTPUT OF ALL MINERAL PRODUCTS FROM THE SEVERAL STATES OF AUSTRALIA AND THE DOMINION OF NEW ZEALAND DURING 1919.

DESCRIPTION OF MINERAL.	Western Australia.		NEW SOUTH WALES.		QUEENSLAND.		VICTORIA.		TASMANIA.		SOUTH AUSTRALIA.		NEW ZEALAND.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
		£		£		£		£		£		£		£
Gold ... ... fine ounces	734,066	3,118,113	65,839	279,666	121,030	514,103	135,427	575,260	7,686	32,650	3,224	13,696	217,315	923,095
Copper ... ... statute tons	4	365	1,460	139,296	,997	952,501	...	...	5,027	504,961	2,517	228,930	...	...
Copper Ore ... do.	455	9,740	...	...	...	...	...	...	...	...	...	...	...	...
Pyritic Ore ... do.	4,136	4,919	...	...	...	...	...	...	...	...	...	...	...	...
Lead and Silver Lead do.	2,028	52,166	89,486	1,355,040	135	4,739	...	...	2,357	64,403	...	...	...	...
Manganese ... ... do.	...	...	4,651	13,953	20	103	...	...	...	...	298	1,490	...	...
Platinum ... ... fine ounces	...	...	213	3,150	...	...	...	...	...	...	...	...	...	...
Silver ... ... do.	223,332	55,342	1,232,710	292,838	92,048	23,772	6,121	1,607	525,343	125,564	561	180	453,567	103,037
Tin (Ore and Ingot) statute tons	318	47,269	2,692	416,623	994	143,167	113	17,561	1,580	395,794	...	...	...	...
Tantalite ... ... do.	½	75	...	...	...	...	...	...	...	...	...	...	...	...
Scheelite ... ... do.	6	772	80	15,193	13	2,331	...	...	199	43,181	...	...	} 131	29,489
Wolfram ... ... do.	½	15	135	22,818	228	40,596	2	400	121	26,613	...	...		
Zinc (Spelter and Concentrates) do.	...	...	72,294	247,395	...	...	...	...	285	13,110	...	...	...	...
Antimony (Metal and Ore) do.	...	...	87	2,342	3	78	1,208	24,160	...	...	...	...	...	...
Bismuth (Metal and Ore) do.	(1 cwt.)	15	19	20,215	2	655	...	...	2	573	...	...	...	...
Alunite ... ... do.	...	...	2,485	14,910	...	...	...	...	...	...	60	246	...	...
Coal ... ... do.	401,713	270,355	8,631,554	5,422,846	931,631	614,307	535,574	406,617	66,253	47,004	...	...	1,847,848	2,693,163
Coke ... ... do.	...	...	424,773	550,127	...	...	...	...	...	...	...	...	...	...
Shale (Oil) ... do.	...	...	25,453	37,968	...	...	...	...	600	900	...	...	...	...
Iron ... ... do.	...	...	80,941	445,175	...	...	...	...	...	...	...	...	...	...
Iron "Oxide" ... do.	...	...	2,724	3,406	...	...	...	...	...	...	...	...	...	...
Ironstone ... do.	...	...	2,128	2,072	24,676	27,684	...	...	...	...	268,530	307,402	...	...
Lime ... ... do.	...	...	31,473	57,411	...	...	...	...	...	...	...	...	...	...
Limestone ... do.	...	...	83,032	22,779	86,436	27,842	...	...	...	...	45,398	15,994	...	...
Magnesite ... ... do.	...	...	9,264	8,032	...	...	77	231	...	...	273	508	...	...
Molybdenite ... do.	7	100	66	30,308	118	52,234	78	2,531	...	...	...	70	...	...
Phosphate Rock ... do.	...	...	...	...	...	...	2,491	2,491	...	...	5,950	8,982	...	...
Precious Stones ... do.	...	...	...	29,258	...	43,483	...	...	...	...	...	20,000	...	...
Mica ... ... do.	1	514	...	...	...	...	...	...	...	...	...	...	...	...
N.E.I.	...	1,444	...	449,545	...	24,432	...	4,190	...	46,337	...	174,497	...	264,595
Total Values	...	**£3,561,204**	...	**£9,882,366**	...	**£2,472,027**	...	**£1,035,048**	...	**£1,301,090**	...	**£771,995**	...	**£4,013,379**

PART I.—GOLD.

TABLE I.

MONTHLY PRODUCTION OF GOLD, IN FINE OUNCES, SHOWING THE QUANTITY REPORTED TO THE MINES DEPARTMENT DURING 1919.

GOLDFIELD.	DISTRICT.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.		JULY.	
		District.	Goldfield.	District.	Goldfield.	District.	Goldfield.	District.	Goldfield.	District.	Goldfield.	District.	Goldfield.	District.	Goldfield.
		ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.
Kimberley ...	... ...	...	...	...	38·72	...	14·83	...	15·68	...	...	...	42·50	...	39·00
Pilbara	Marble Bar ...	92·03	92·03	110·51	229·68	10·73	300·29	...	7·29	1,228·53	1,228·53	71·98	89·51	...	11·50
Do. ...	Nullagine ...	...		119·17		289·56		7·29		...		17·53		11·50	
West Pilbara ...	... ...	...	15·61	...	3·86	...	2·26	...	4·80	...	5·44	...	·55	...	...
Ashburton ...	... ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Gascoyne ...	... ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Peak Hill ...	... ...	...	8·19	...	...	...	...	...	...	...	739·67	...	209·43	...	28·27
East Murchison ...	Lawlers ...	208·60	1,728·30	233·06	1,912·38	364·14	2,412·40	322·40	1,754·49	152·02	2,565·43	268·60	2,769·95	652·52	2,585·06
Do. ...	Wiluna ...	226·20		483·47		397·05		304·69		980·43		726·97		602·57	
Do. ...	Black Range	1,293·50		1,195·85		1,651·21		1,127·40		1,432·98		1,774·38		1,329·97	
Murchison ...	Cue	121·95	3,794·73	222·75	3,718·06	444·83	3,283·61	600·64	4,878·59	570·06	4,483·91	1,011·67	4,307·98	1,536·16	5,194·43
Do. ...	Meekatharra...	3,119·40		3,168·90		2,687·53		3,380·30		3,274·45		3,008·55		3,172·20	
Do. ...	Day Dawn ...	...		109·51		75·22		461·83		243·87		80·54		185·62	
Do. ...	Mt. Magnet ...	553·38		216·90		76·03		435·82		395·53		207·22		300·45	
Yalgoo	... ...	...	98·77	...	82·25	...	180·64	...	358·73	...	1,137·55	...	976·76	...	14·21
Mt. Margaret ...	Mt. Morgans...	377·95	7,135·54	245·43	6,526·01	370·07	7,481·91	361·15	7,742·38	760·81	7,896·96	510·49	6,994·55	443·66	8,737·28
Do. ...	Mt. Malcolm...	4,145·83		3,873·58		4,091·70		3,997·84		4,109·81		3,280·67		4,712·15	
Do. ...	Mt. Margaret	2,611·76		2,407·00		3,020·14		3,383·39		3,026·34		3,203·39		3,581·47	
North Coolgardie	Menzies ...	1,229·78	1,691·64	1,927·54	2,089·02	1,825·41	2,024·97	1,594·42	1,725·03	2,437·44	2,623·57	1,657·36	1,897·53	1,453·39	1,517·54
Do. ...	Ularring ...	448·08		26·85		199·56		...		158·60		...		...	
Do. ...	Niagara ...	...		134·63		...		14·91		8·04		229·71		33·62	
Do. ...	Yerilla ...	13·78		...		...		115·70		19·49		10·46		30·53	
Broad Arrow ...	... ...	...	1,062·62	...	733·96	...	853·82	...	986·77	...	786·07	...	1,011·30	...	2,653·08
N.E. Coolgardie ...	Kanowna ...	78·05	78·05	25·02	25·02	1,073·65	1,073·65	4·26	4·26	1,236·04	1,236·04	87·31	87·31	600·65	718·76
Do. ...	Kurnalpi ...	...		...		...		...		...		...		118·11	
East Coolgardie ...	East Coolgardie	42,613·25	42,623·46	41,035·03	41,045·11	42,952·78	42,975·99	42,246·02	42,246·02	45,671·10	45,679·40	41,997·27	41,997·27	32,183·12	32,187·57
Do. ...	Bulong ...	10·21		10·08		23·21		...		8·30		...		4·45	
Coolgardie ...	Coolgardie ...	392·21	780·10	271·54	358·60	738·55	835·78	335·87	590·71	332·55	403·74	76·59	159·47	152·40	152·40
Do. ...	Kunanalling ...	387·89		87·06		97·23		254·84		71·19		82·88		...	
Yilgarn	... ...	...	4,760·52	...	2,960·24	...	5,219·60	...	6,093·46	...	4,312·68	...	6,865·04	...	4,467·74
Dundas	... ...	...	1,287·19	...	796·96	...	651·56	...	1,199·02	...	992·30	...	748·51	...	1,113·80
Phillips River ...	... ...	...	28·02	...	165·20	...	212·42	...	166·28	...	116·23	...	124·26	...	143·10
State generally ...		...	...	...	...	...	...	...	...	...	25·18	...	...	...	...
TOTAL	Fine Ounces ...	...	65,184·77	...	60,685·07	...	67,523·73	...	67,773·51	...	74,232·70	...	68,281·92	...	59,563·74
	Sterling Value	£276,887		£257,774		£286,823		£287,883		£315,320		£290,043		£253,011	

TABLE I.—*Monthly Production of Gold in Fine Ounces*—continued.

GOLDFIELD.	DISTRICT.	AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.		Total for 1919.	
		District.	Goldfield.	District.	Goldfield.	District.	Goldfield.	District.	Goldfield.	District.	Goldfield.	District.	Goldfield.
		ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.
Kimberley ...	... ...	...	...	...	...	...	...	...	...	...	...	...	150·73
Pilbara	Marble Bar ...	116·11	116·11	202·33	205·01	...	13·15	...	...	1,128·29	1,128·29	2,960·51	3,421·39
Do. ...	Nullagine ...	...		2·68		13·15		...		...		460·88	
West Pilbara ...	... ...	...	2·43	...	1·59	...	31·41	...	2·13	...	25·18	...	95·26
Ashburton ...	... ...	...	...	...	...	...	...	...	...	...	...	...	...
Gascoyne	... ...	...	...	...	...	...	...	...	...	...	...	...	...
Peak Hill ...	... ...	...	142·73	...	...	...	317·43	...	285·19	...	524·47	...	2,255·38
East Murchison ...	Lawlers	676·36	2,286·67	636·20	1,641·01	404·61	2,078·45	556·37	2,462·12	476·94	3,217·63	4,951·82	27,413·89
Do. ...	Wiluna	698·47		567·72		877·92		692·81		477·42		7,035·72	
Do. ...	Black Range ...	911·84		437·09		795·92		1,212·94		2,263·27		15,426·35	
Murchison ...	Cue	520·32	3,349·85	759·52	4,026·90	722·17	3,845·41	1,374·68	4,885·00	1,135·74	4,801·38	9,020·49	50,569·85
Do. ...	Meekatharra ...	2,322·69		3,132·95		2,595·33		2,553·17		3,021·33		35,436·80	
Do. ...	Day Dawn ...	245·67		130·02		94·44		379·67		377·19		2,383·58	
Do. ...	Mt. Magnet ...	261·17		4·41		433·47		577·48		267·12		3,728·98	
Yalgoo	... ...	...	...	...	70·34	...	608·09	...	82·49	...	1,178·55	...	4,788·38
Mt. Margaret ...	Mt. Morgans ...	355·22	7,429·63	350·64	7,271·63	735·99	7,044·85	245·70	7,021·25	545·23	6,869·94	5,362·34	88,151·93
Do. ...	Mt. Malcolm ...	4,520·17		4,552·39		4,490·70		3,928·77		3,803·13		49,506·74	
Do. ...	Mt. Margaret ...	2,554·24		2,368·60		1,818·16		2,846·78		2,521·58		33,342·85	
North Coolgardie...	Menzies	2,286·27	2,532·91	1,225·93	1,282·16	1,847·70	1,847·70	2,182·00	2,595·36	1,191·98	1,191·98	20,859·22	23,019·41
Do. ...	Ularring	...		...		...		98·57		...		931·66	
Do. ...	Niagara	...		23·81		...		301·79		...		746·51	
Do. ...	Yerilla	246·64		32·42		...		13·00		...		482·02	
Broad Arrow ...	... ...	...	51·40	...	509·24	...	1,084·01	...	865·57	...	1,130·73	...	11,728·57
N.E. Coolgardie ...	Kanowna ...	1,025·71	1,025·71	1·02	1·02	62·60	62·60	518·87	621·88	537·78	537·78	5,250·96	5,472·08
Do. ...	Kurnalpi ...	...		...		...		103·01		...		221·12	
East Coolgardie ...	East Coolgardie ...	15,534·82	15,534·82	43,568·96	43,572·32	41,911·04	41,911·04	5,094·67	5,094·67	2,187·22	2,187·22	396,995·28	397,054·89
Do. ...	Bulong	...		3·36		...		...		...		59·61	
Coolgardie ...	Coolgardie ...	410·86	512·90	515·18	515·18	405·75	555·78	234·88	234·88	355·83	714·76	4,222·21	5,814·30
Do. ...	Kunanalling ...	102·04		...		150·03		...		358·93		1,592·09	
Yilgarn	... ...	...	5,095·06	...	3,033·35	...	1,673·60	...	6,606·97	...	2,914·48	...	54,002·74
Dundas	... ...	...	1,666·61	...	1,159·80	...	931·58	...	1,085·13	...	897·15	...	12,529·61
Phillips River ...	... ...	...	163·73	...	178·09	...	274·43	...	71·02	...	57·34	...	1,700·12
State generally ...	...	...	...	...	11·20	...	...	...	10·03	...	...	...	46·41
TOTAL Fine ounces ...		...	**39,910·56**	...	**63,478·84**	...	**62,279·58**	...	**31,923·69**	...	**27,376·88**	...	**683,214·94**
TOTAL Sterling value		**£169,529**		**£269,641**		**£264,547**		**£135,603**		**£116,290**		**£2,923,351**	

The total gold yield of the State is as shown at page 5, being the amount of gold exported and also that lodged at the Royal Mint, which total includes alluvial and other gold not reported to the Department.

TABLE II.

TOTAL YEARLY PRODUCTION OF GOLD, IN FINE OUNCES, AS REPORTED TO THE MINES DEPARTMENT, TO 31ST DECEMBER, 1919.

GOLDFIELD.	DISTRICT.	1919.		1918.		1917.		1916.		1915.		1914.	
		District.	Goldfield.	District.	Goldfield.	District.	Goldfield.	District.	Goldfield.	District.	Goldfield.	District.	Goldfield.
		ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.
Kimberley	... ...	...	150·73	...	15·08	...	82·25	...	161·91	...	144·34	...	453·29
Pilbara	Marble Bar ...	2,960·51	3,421·39	2,991·73	3,748·40	2,463·66	5,406·75	3,515·58	5,881·60	6,462·36	8,541·97	3,304·94	5,177·46
Do.	Nullagine ...	460·88		756·67		2,943·09		2,366·02		2,079·61		1,872·52	
West Pilbara ...	... ...	...	95·26	...	120·37	...	304·77	...	608·84	...	1,507·02	...	1,922·70
Ashburton	... ...	...	...	...	...	...	6·50	...	...	...	...	...	...
Gascoyne	... ...	...	...	...	...	...	...	...	14·48	...	80·85	...	3·76
Peak Hill	... ...	...	2,255·38	...	1,089·31	...	1,743·72	...	2,389·29	...	2,823·13	...	2,602·62
East Murchison ...	Lawlers	4,951·82		4,115·55		4,784·50		6,579·41		6,055·13		4,324·57	
Do.	Wiluna*	7,035·72	27,413·89	7,909·60	29,210·72	9,523·65	32,856·56	14,472·13	46,811·44	6,746·78	58,082·36	6,936·34	70,808·46
Do.	Black Range ...	15,426·35		17,185·57		18,548·41		25,759·90		45,280·45		59,547·55	
Murchison	Cue	9,020·49		10,183·75		9,689·81		6,011·29		6,185·89		4,491·02	
Do.	Meekatharra ...	35,436·80	50,569·85	44,119·86	63,285·43	44,269·00	82,305·83	51,322·56	84,422·89	73,834·57	108,049·78	80,400·07	115,722·42
Do.	Day Dawn ...	2,383·58		4,176·83		23,746·93		18,134·71		19,168·14		18,926·64	
Do.	Mt. Magnet ...	3,728·98		4,804·99		4,600·09		8,954·33		8,861·18		11,904·69	
Yalgoo	... ...	...	4,788·38	...	4,397·89	...	5,812·74	...	8,194·69	...	8,841·88	...	6,025·92
Mt. Margaret ...	Mt. Morgans ...	5,302·34		5,294·03		6,314·21		8,439·99		7,463·52		4,880·95	
Do.	Mt. Malcolm ...	49,506·74	88,151·93	46,368·64	85,346·97	59,488·04	101,874·54	57,541·13	100,612·34	63,995·64	106,563·01	66,071·07	96,792·51
Do.	Mt. Margaret ...	33,342·85		33,684·30		36,072·29		34,631·22		35,103·85		25,840·49	
North Coolgardie ...	Menzies	20,859·22		30,345·06		30,725·13		36,756·35		49,096·24		53,789·52	
Do.	Ularring ...	931·66		4,791·82		1,090·35		2,989·66		2,474·10		5,026·09	
Do.	Niagara	746·51	23,019·41	1,203·81	36,829·91	1,185·17	34,795·55	1,790·01	45,146·57	3,155·13	59,513·22	6,724·42	72,188·05
Do.	Yerilla	482·02		489·22		1,794·90		3,610·55		4,787·75		6,648·02	
Broad Arrow ...	... ...	...	11,728·57	...	4,125·88	...	16,518·64	...	22,215·92	...	22,290·03	...	9,285·98
N.E. Coolgardie ...	Kanowna ...	5,250·96	5,472·08	3,439·60	3,700·25	5,912·39	5,933·17	6,392·00	6,678·02	10,077·23	10,860·98	9,560·02	10,134·10
Do.	Kurnalpi ...	221·12		260·65		20·78		286·02		783·75		574·08	
East Coolgardie ...	East Coolgardie...	396,995·28	397,054·89	524,729·46	524,823·36	557,874·83	557,983·37	578,183·41	579,344·34	668,913·16	670,788·24	680,494·61	682,895·41
Do.	Bulong	59·61		93·90		108·54		1,160·93		1,875·08		2,400·80	
Coolgardie	Coolgardie ...	4,222·21	5,814·30	5,334·36	7,962·75	6,980·68	10,285·68	8,768·13	13,618·32	11,990·23	18,314·77	17,009·37	20,981·45
Do.	Kunanalling ...	1,592·09		2,628·39		3,305·00		4,850·19		6,324·54		3,972·08	
Yilgarn	... ...	...	54,002·74	...	70,765·88	...	78,244·77	...	87,993·68	...	91,123·57	...	88,744·72
Dundas	... ...	...	12,529·61	...	15,949·44	...	18,419·01	...	21,594·78	...	23,884·18	...	26,590·76
Phillips River ...	... ...	...	1,700·12	...	4,478·49	...	4,734·52	...	5,418·97	...	3,816·76	...	4,665·42
†Donnybrook ...	... ...	...	...	...	...	...	...	...	...	...	...	...	...
State generally ...	...	...	46·41	...	195·43	...	111·41	...	618·78	...	272·59	...	144·16
TOTAL	Fine Ounces ...	...	688,214·94	...	856,045·56	...	957,419·78	...	1,031,726·86	...	1,195,498·68	...	1,214,239·19
	Sterling Value	£2,923,351		£3,636,250		£4,066,861		£4,382,497		£5,078,156		£5,157,760	

* Previous to 1st March, 1910, included in Lawlers District. † Abolished 4th March, 1908.

TABLE II.—*Total Yearly Production of Gold, in Fine Ounces, etc.*—continued.

GOLDFIELD.	DISTRICT.	1913.		1912.		1911.		1910.		Previous to 1910.		Total to December 31st, 1919.	
		District.	Goldfield.	District.	Goldfield.	District.	Goldfield.	District.	Goldfield.	District.	Goldfield.	District.	Goldfield.
		ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.
Kimberley	... ...	...	...	...	271·63	...	171·45	...	265·53	...	16,304·14	...	18,020·35
Pilbara	Marble Bar ...	3,845·81	5,598·21	3,441·44	5,999·11	2,346·74	4,608·08	2,613·40	5,369·94	91,781·93	150,937·08	125,728·10	204,689·99
Do.	Nullagine ...	1,752·40		2,557·67		2,261·34		2,576·54		59,155·15		78,961·89	
West Pilbara ...	... ...	...	1,421·15	...	1,118·20	...	983·17	...	1,483·62	...	19,016·99	...	27,682·09
Ashburton	... ...	...	11·70	...	38·73	...	256·33	...	247·63	...	8,322·35	...	8,883·24
Gascoyne	... ...	...	31·45	...	6·55	...	7·87	...	26·31	...	505·27	...	676·54
Peak Hill	... ...	...	2,765·59	...	1,861·64	...	1,747·01	...	4,327·02	...	230,377·87	...	253,982·58
East Murchison ...	Lawlers	4,843·05		7,307·72		27,193·85		45,203·50		792,016·36		907,375·48	
Do.	Wiluna	7,501·11	87,977·47	7,728·33	99,130·78	7,829·83	102,390·79	14,258·17	130,371·21	*	1,065,399·61	89,941·66	1,750,453·29
Do.	Black Range ...	75,633·31		84,094·73		67,367·11		70,909·54		273,383·25		753,136·15	
Murchison	Cue	6,525·65		8,993·26		11,455·56		9,576·29		284,707·72		366,840·73	
Do.	Meekatharra ...	72,701·81		50,558·20		54,241·79		50,046·60		331,004·27		887,935·53	
Do.	Day Dawn ...	27,126·72	122,027·56	28,283·42	105,372·78	37,947·41	119,653·40	46,474·13	124,351·38	1,078,154·35	1,981,076·76	1,304,522·86	2,956,838·08
Do.	Mt. Magnet ...	15,673·38		17,537·90		16,008·64		18,254·36		287,210·42		397,538·96	
Yalgoo	... ...	...	8,163·47	...	6,165·92	...	1,162·04	...	1,332·72	...	66,689·83	...	121,575·48
Mt. Margaret ...	Mt. Morgans ...	1,255·47		3,438·55		5,484·08		10,331·24		451,068·77		509,273·15	
Do.	Mt. Malcolm ...	72,738·73	91,272·70	34,288·81	102,969·60	92,811·29	152,474·39	97,689·68	160,281·18	922,687·83	1,822,455·06	1,603,187·60	2,908,794·23
Do.	Mt. Margaret ...	17,278·50		25,242·24		54,179·02		52,260·26		448,698·46		796,333·48	
North Coolgardie ...	Menzies	44,227·89		36,126·25		39,062·97		40,247·69		596,104·63		977,340·95	
Do.	Ularring	7,710·48		9,526·65		9,472·85		8,669·96		235,270·83		287,954·45	
Do.	Niagara	6,941·08	68,526·60	6,342·67	58,270·47	8,423·55	64,759·69	12,007·07	72,747·55	453,150·12	1,429,853·35	501,669·54	1,965,650·37
Do.	Yerilla	9,647·15		6,274·90		7,800·32		11,882·83		145,327·77		198,685·43	
Broad Arrow ...	... ...	...	34,739·33	...	13,375·43	...	7,152·73	...	15,481·88	...	322,669·15	...	479,583·54
N.E. Coolgardie ...	Kanowna ...	11,133·30	12,392·88	11,364·53	13,855·71	17,958·07	19,554·75	22,203·96	23,027·27	586,715·93	607,630·66	690,007·99	719,239·87
Do.	Kurnalpi ...	1,259·58		2,491·18		1,596·68		823·31		20,914·73		29,231·88	
East Coolgardie ...	East Coolgardie	719,323·42	719,928·72	755,368·56	756,795·14	775,050·60	776,493·74	777,893·88	778,479·54	10,901,169·96	11,052,616·53	17,335,997·17	17,497,203·28
Do.	Bulong	605·30		1,426·58		1,443·14		585·66		151,446·57		161,206·11	
Coolgardie	Coolgardie ...	28,407·27	31,891·49	37,246·77	42,181·59	28,982·04	33,753·71	31,928·00	37,911·04	791,385·07	959,058·79	972,254·13	1,181,773·89
Do.	Kunanalling ...	3,484·22		4,934·82		4,771·67		5,983·04		167,673·72		209,519·76	
Yilgarn	... ...	...	82,333·96	...	30,675·40	...	18,811·40	...	27,857·93	...	330,425·76	...	960,979·81
Dundas	... ...	...	27,039·47	...	25,314·35	...	28,989·86	...	29,627·34	...	377,413·91	...	607,352·71
Phillips River ...	... ...	...	2,788·47	...	4,201·36	...	5,656·54	...	8,194·90	...	39,986·44	...	85,641·99
†Donnybrook ...	... ...	...	...	...	...	...	...	...	...	...	841·76	...	841·76
State generally ...	... ...	...	178·60	...	240·40	...	359·99	...	847·41	...	4,691·93	...	7,707·11
TOTAL — Fine Ounces ...		...	1,299,088·82	...	1,267,844·79	...	1,338,986·94	...	1,422,231·40	...	20,486,273·24	...	31,757,570·20
TOTAL — Sterling Value ...		£5,518,179		£5,385,462		£5,687,655		£6,041,254		£87,020,158		£134,897,583	

* Previous to March, 1910, included in Lawlers District. † Abolished 4th March, 1908.

TABLE III

GENERAL RETURN.

RETURN SHOWING, FOR THE RESPECTIVE GOLDFIELDS AND DISTRICTS, THE AREA IN SQUARE MILES, LEASES IN FORCE, PARTICULARS OF PLANT, MEN EMPLOYED AND DIGGERS, ALLUVIAL, DOLLIED, AND SPECIMEN GOLD AND ORE TREATED, WITH GOLD AND SILVER YIELD, IN FINE OUNCES, AS REPORTED TO THE MINES DEPARTMENT FOR THE YEAR 1919.

Goldfield.	District.	Date of Proclamation of Goldfield.				Area in Square Miles.		Leases in force. 31-12-1919		Particulars of Plant.					Average Number of Men engaged in Gold Mining.		
										Milling.		Cyaniding.			Men employed.		
		Proclamation gazetted.	To take effect from.	Latest Amendment of Boundaries gazetted.	To take effect from.	Goldfield.	District.	No.	Area in Acres.	Stamps.	Other Mills.	Leaching Vats.	Agitating Vats.	Vacuum Filters and Presses.	Above Ground.	Under Ground.	Diggers.
Kimberley	...	20-5-86	20-5-86	31-10-02	1-11-02	33,833	...	...	...	...	...	...	...	...	...	...	12
Pilbara	Marble Bar	1-10-88	1-10-88	1-3-07	1-3-07	32,696	25,809	15	125	38	...	12	...	...	19	24	12
	Nullagine						6,887	5	42	25	1	14	...	...	13	6	21
West Pilbara	...	20-9-95	1-11-95	1-3-07	1-3-07	10,843	...	1	6	40	2	...	...	...	2	2	9
Ashburton	...	11-12-90	11-12-90	18-10-01	14-10-01	14,230	...	...	...	...	...	...	...	...	1	2	4
Gascoyne	...	25-6-97	15-4-97	...	...	5,313	...	...	...	1	...	...	...	...	2	...	4
Peak Hill	...	19-3-97	1-4-97	13-11-14	1-12-14	23,650	...	11	90	40	2	13	3	...	13	12	2
East Murchison	Lawlers ...	28-6-95	28-6-95	1-11-12	1-1-13	28,746	9,379	14	169	65	3	22	...	...	31	22	...
	Wiluna ...						10,496	23	400	90	7	12	12	2	41	36	...
	Black Range						8,871	18	296	80	7	25	3	2	87	86	...
Murchison	Cue ...	24-9-91	24-9-91	28-11-13	1-1-14	25,474	8,593	37	471	75	6	32	...	...	90	53	4
	Meekatharra						12,250	36	468	97	22	27	17	5	139	241	9
	Day Dawn ...						896	19	215	60	13	15	15	26	24	13	7
	Mt. Magnet ...						3,735	16	169	35	4	22	...	...	43	46	1
Yalgoo	...	8-2-95	23-1-95	30-7-15	9-8-15	23,230	...	26	375	70	6	7	5	...	48	57	1
Mt. Margaret	Mt. Morgans	12-3-97	1-4-97	7-9-17	17-9-17	57,230	14,007	17	283	60	3	22	2	1	51	57	7
	Mt. Malcolm						3,330	57	1,232	127	22	1	12	2	153	297	3
	Mt. Margaret						39,893	38	712	60	24	21	6	3	143	165	4
North Coolgardie	Menzies ...	28-6-95	28-6-95	7-9-17	17-9-17	13,746	6,805	30	450	95	23	67	4	1	138	161	9
	Ularring ...						3,093	15	183	40	4	11	4	...	23	24	5
	Niagara ...						688	5	72	50	5	17	...	8	13	12	3
	Yerilla ...						3,160	5	78	25	1	8	...	...	19	19	4
Broad Arrow	...	17-11-96	20-11-96	8-6-06	1-7-06	1,038	...	47	829	45	19	17	...	2	73	100	12
North-East Coolgardie	Kanowna ...	20-3-96	15-4-96	27-3-08	1-4-08	20,604	1,094	14	207	85	4	16	...	...	22	19	6
	Kurnalpi ...						19,510	3	23	5	1	...	...	...	6	6	2
East Coolgardie	East Coolgardie	21-9-94	1-10-94	27-3-08	1-4-08	1,800	810	168	2,689	540	316	162	165	102	1,318	1,731	19
	Bulong ...						990	3	53	...	...	...	...	...	10	8	7
Coolgardie	Coolgardie ...	6-4-94	6-4-94	1-3-07	1-3-07	11,702	9,384	43	723	143	9	29	...	...	125	112	36
	Kunanalling						2,318	13	155	35	3	11	...	...	38	42	17
Yilgarn	...	1-10-88	1-10-88	28-1-16	1-2-16	17,700	...	94	1,697	187	31	70	11	7	314	490	...
Dundas	...	31-8-93	31-8-93	1-3-07	1-3-07	11,430	...	37	416	65	14	43	10	2	61	79	...
Phillips River	...	21-9-00	14-9-00	28-1-16	1-2-16	5,078	...	8	118	45	3	4	...	...	12	17	1
State generally	...	...	...	...	...	...	...	1	12	...	2	...	...	...	8	2	...
	Total ...	...	...	...	...	338,343	...	819	12,758	2,323	557	700	269	163	3,080	3,941	221

TABLE IV.

PRODUCTION OF GOLD AND SILVER FROM ALL SOURCES, SHOWING IN FINE OUNCES THE OUTPUT AS REPORTED TO THE MINES DEPARTMENT DURING 1919, AND THE TOTAL PRODUCTION TO DATE.

Kimberley Goldfield.

Mining Centre.	Number of Lease.	Registered Name of Company or Lease.	Total for 1919.					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	...	...	...	...	...	...	...	423·00	477·76	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	94·55	62·68	...
Mt. Dockrell...	...	Voided leases	...	...	...	...	...	...	...	44·00	435·93	...
Ruby Creek ...	...	Voided leases	...	...	...	...	...	...	...	12,633·50	9,435·13	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	151·00	127·28	...
The Brockman	...	Voided leases	...	...	...	...	...	...	...	1,352·75	1,404·40	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	2,462·00	1,820·33	...
The Mary ...	...	Voided leases	...	...	...	...	...	...	...	399·00	210·03	...
The Panton ...	...	Voided leases	...	...	...	...	...	...	...	34·70	138·70	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	· 3·00	15·01	...
		From Goldfield generally:—										
		Reported by Banks and Gold Dealers	150·73	...	...	...	...	3,893·10	...	...	...	...
		Total	**150·73**		...	...	...	**3,893·10**	...	**17,597·50**	**14,127·25**	...

Pilbara Goldfield.

MARBLE BAR DISTRICT.

Bamboo Creek	807	Bonnie Doon	...	...	60·00	21·89	...	...	...	60·00	21·89	...
Do. ...	(801)	Bonnie Doon	...	...	100·00	47·31	...	...	...	222·50	119·44	...
Do. ...	795	Bulletin	...	...	8·50	41·67	...	...	...	44·00	106·88	...
Do. ...	707	Kitchener	...	...	122·00	244·35	...	...	...	2,087·25	4,540·16	...
Do. ...	740	(Mount Prophecy)	...	...	...	...	...	...	1·11	1,040·50	1,898·07	...
Do. ...	740, 794 ...	Mount Prophecy leases ...	...	...	554·25	1,024·11	...	...	...	554·25	1,024·11	...
Do. ...	794	(Perseverance)	...	...	...	...	...	...	...	290·50	584·21	...
Do. ...	789	Princess May and Charlie ...	...	...	28·75	53·15	...	...	...	122·25	265·72	...
Do. ...	...	Voided leases	...	...	...	...	...	...	454·61	14,602·00	22,699·45	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	307·83	866·85	1,092·36	...
Boodalyerrie	...	Voided leases	...	...	...	...	...	...	292·07	120·25	587·86	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	7·16	...	...	...
Breen's Find	...	Voided leases	...	...	...	...	...	...	...	14·00	66·82	...
Elsie ...	(792)	Trio	...	...	...	...	...	...	...	43·00	35·75	...
Do. ...	...	Voided leases	...	...	...	...	...	...	...	135·00	316·31	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	10·25	19·81	...

Lalla Rookh ...	786 [R.C. 112] ...	Haig	...	...	350·00	188·81	...	...	...	350·00	188·81	...
Do. ...	...	Voided leases	...	...	...	...	...	...	...	244·50	2,186·65	574·01
Do. ...	...	Sundry claims	...	...	61·00	51·32	...	...	...	6,969·00	6,858·04	...
Marble Bar ...	805	Homeward Bound East ...	...	...	84·00	75·07	...	...	...	84·00	75·07	...
Do. ...	694	Jo Jo	...	33·97	82·00	143·92	...	...	33·97	2,087·00	2,325·59	...
Do. ...	790	Rufus Henry	...	...	63·50	63·68	...	...	...	411·00	814·46	...
Do. ...	804	Verdun	...	...	19·00	19·83	...	...	...	19·00	19·83	...
Do. ...	722	Viking	...	...	24·25	26·64	...	...	...	1,427·25	1,519·42	...
Do. ...	...	Voided leases	...	...	...	...	...	...	147·90	15,932·45	21,078·48	...
Do. ...	...	Sundry claims	...	1·16	192·00	177·64	...	38·68	149·23	4,575·64	5,039·92	...
North Pole ...	...	Voided leases	...	...	...	...	...	...	...	474·00	340·75	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	50·50	69·56	...
North Shaw ...	...	Voided leases	...	...	...	...	...	7·53	...	351·45	674·72	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	567·06	...	...	...
Sharks ...	...	Sundry claims	...	...	...	...	...	145·08	19·37	24·50	93·14	...
Shaw River ...	...	Voided leases	...	...	...	...	...	...	...	101·00	49·63	...
Talga Talga ...	...	Voided leases	...	...	...	...	...	...	83·83	574·50	975·98	...
Do. ...	...	Sundry claims	...	...	...	...	...	50·26	68·99	204·65	520·25	...
Tambourah ...	...	Voided leases	...	...	...	...	...	...	...	1,438·50	1,739·44	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	79·29	639·25	797·44	...
Warrawoona ...	...	Voided leases	...	...	...	...	...	...	16·99	10,072·80	18,136·84	...
Do. ...	...	Sundry claims	...	...	...	...	...	44·30	362·50	1,127·04	2,163·74	...
Western Shaw	...	Voided leases	...	...	...	...	...	...	...	1,222·50	957·80	...
Do. ...	...	Sundry claims	...	...	...	...	...	12·52	67·47	...	...	...
Wyman's Well	744	Euro	...	...	98·00	91·13	...	...	...	438·00	443·68	...
Do. ...	...	Voided leases	...	...	...	...	...	...	33·55	115·04	493·98	...
Do. ...	...	Sundry claims	...	...	...	...	...	·93	16·72	355·86	592·18	...
Yandicoogina	...	Voided leases	...	...	...	...	...	...	140·76	2,733·20	5,824·23	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	238·35	103·75	120·34	...
	From District generally:—											
	Sundry Parcels treated at:											
	State Battery—Bamboo Creek	...	...	...	572·63	...	...	...	...	...	1,839·28	...
	State Battery—Marble Bar	...	...	...	...	...	...	...	...	...	34·06	...
	Various Works	...	...	...	...	...	...	...	...	237·95	1,204·91	...
	Reported by Banks and Gold Dealers	82·23	...	...	...	...	...	11,556·48	226·50	...	...	...
	Total	**82·23**	**35·13**	**1,847·25**	**2,843·15**	...	**11,855·78**	**3,315·26**	**72,556·93**	**110,557·06**	**574·01**

NULLAGINE DISTRICT.

Eastern Creek	180L	Crescent	...	...	70·00	258·94	...	...	...	969·75	1,884·01	...
Do. ...	176L	(Doherty Reward)	...	...	...	...	...	...	...	142·25	171·43	...
Do. ...	176L	Doherty Reward	...	...	100·00	114·70	...	...	...	1,365·00	2,196·35	...
Do. ...	176L (177L) ...	(Doherty Reward leases) ...	...	...	...	...	...	...	...	219·00	1,007·68	...
Do. ...	182L	Morning Star	...	...	...	...	...	...	4·19	367·00	834·03	...
Do. ...	178L	Shamrock	...	...	...	...	...	...	4·00	395·25	683·06	...
Do. ...	...	Voided leases	...	...	...	...	...	...	...	695·75	1,041·02	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	3·77	301·50	523·27	...

TABLE IV.—*Production of Gold and Silver from all sources, etc.*—continued.

PILBARA GOLDFIELD—continued.

NULLAGINE DISTRICT—*continued.*

Mining Centre.	Number of Lease.	Registered Name of Company or Lease.	Total for 1919.					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.
Elsie ...	...	Voided leases	...	...	...	...	...	...	...	408·25	1,323·85	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	24·00	27·48	
McPhee's Creek	...	Voided leases	...	...	...	...	...	...	...	113·00	137·92	...
Middle Creek	...	Voided leases	...	...	...	...	...	...	...	6,211·90	8,433·68	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	286·00	408·82	...
Mosquito Creek	...	Voided leases	...	...	...	...	...	1·07	21·42	7,259·80	12,464·00	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	166·47	2,188·94	3,116·77	...
Nullagine ...	...	Voided leases	...	...	...	...	...	...	13·96	7,453·25	11,335·12	...
Do. ...	...	Sundry claims	...	...	...	...	...	104·70	133·14	3,984·75	9,336·03	...
Twenty-Mile Sandy	(195L)	Billjim	...	...	...	...	...	...	...	2,458·50	2,064·92	...
Do. ...	...	Voided leases	...	...	...	...	...	...	3·20	2,635·20	5,722·07	...
Do. ...	...	Sundry claims	...	...	...	...	...	33·10	20·55	2,802·65	3,855·08	...
		From District generally:—										
		Sundry Parcels treated at:										
		Doherty's Works	...	...	...	...	...	...	...	...	1,17	...
		Fremantle Trading Co.'s Works	...	...	...	...	...	...	...	...	8·29	...
		State Battery, Twenty-Mile Sandy	...	...	...	...	...	...	...	62·00	1,744·32	...
		Various Works	...	...	...	...	...	...	...	50·50	2,641·67	...
		Reported by Banks and Gold Dealers	87·24	...	...	...	...	6,278·59	35·54	...	...	...
		Totals	**87·24**	...	**170·00**	**373·64**	...	**6,417·46**	**406·24**	**40,394·24**	**72,138·19**	...

West Pilbara Goldfield.

Croydon ...	...	Voided leases	...	...	...	...	...	...	...	8·00	5·44	...
Hong Kong ...	...	Voided leases	...	...	...	...	...	...	...	331·00	442·45	...
Do. ...	...	Sundry claims	...	...	...	...	...	21·40	·02	9·00	3·15	...
Lower Nicol ...	...	Voided leases	...	...	...	...	...	...	1·10	653·20	402·22	...
Do. ...	...	Sundry claims	...	...	...	...	...	10·44	2·71	10·00	11·51	...
Mallina ...	...	Voided leases	...	...	...	...	...	...	...	141·60	128·44	...
Nicol ...	...	Voided leases	...	...	...	...	...	...	...	30·00	11·47	...

Pilbara ...	(167)	Mountain Maid	...	...	...	...	...	...	...	...	4·00	5·74	...
Do. ...	...	Voided leases	...	...	...	...	...	...	...	48·12	148·00	293·42	...
Do. ...	...	Sundry claims	...	...	...	...	...	1·11	86·24	68·00	101·06	...	
Roebourne ...	M.L. 174 ...	Good Fortune	...	...	...	*1·83	*61·86	...	...	...	3·96	112·83	
Do. ...	M.L. 183 ...	Carlow Castle: Roebourne Copper Mines, Ltd.	...	...	...	*6·12	...	...	...	...	6·12	...	
Do. ...	...	Voided leases	...	...	...	...	...	...	...	113·36	573·91	237·91	
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	108·60	93·85	96·53	
Station Peak	165	Belladonna	...	...	180·00	49·08	...	...	17·93	943·00	262·93	...	
Do. ...	...	Voided leases	...	...	...	...	...	177·74	23·44	9,993·00	11,084·49	...	
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	37·50	48·19	...	
Towranna ...	...	Voided leases	...	...	...	...	...	...	2·62	3,965·80	5,187·51	...	
Do. ...	...	Sundry claims	...	...	22·00	12·35	...	...	...	22·00	12·35	...	
Upper Nicol...	...	Sundry claims	...	...	...	...	...	...	...	6·50	2·57	...	
Weerianna ...	...	Voided leases	...	...	...	...	...	...	...	2,436·15	3,079·81	...	
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	64·00	62·90	...	
Whim Creek ...	...	Voided leases	...	...	...	...	...	...	...	...	...	883·80	
		From Goldfield generally:—											
		Reported by Banks and Gold Dealers	25·88	...	...	...	...	5,365·75	92·82	...	7·16	...	
		Total	**25·88**	...	**202·00**	**69·38**	**61·86**	**5,576·44**	**275·00**	**19,092·71**	**21,830·65**	**1,331·07**	

* From Copper Ore.

Ashburton Goldfield.

Mt. Mortimer	...	Sundry claims	...	...	...	...	...	354·37	315·64	...	...	74·47	
Uaroo ...	M.L. 43, M.L. 49...	Uaroo Silver-Lead Mines, Ltd. ...	...	...	...	...	...	...	...	...	...	7,551·20	
Do. ...	...	Voided leases	...	...	...	...	...	...	...	...	...	162·02	
		From Goldfield generally:—											
		Reported by Banks and Gold Dealers	...	...	...	...	...	8,213·23	...	...	...	...	
		Total	...	...	...	...	...	**8,567·60**	**315·64**	...	...	**7,787·69**	

Gascoyne Goldfield.

Bangemall ...	...	Voided leases	...	...	...	...	...	...	6·22	350·70	313·82	...	
Do. ...	...	Sundry claims	...	...	...	...	...	...	12·29	6·00	24·01	...	
		From Goldfield generally:—											
		Reported by Banks and Gold Dealers	...	...	...	...	...	320·20	...	...	...	...	
		Total	...	...	...	...	...	**320·20**	**18·51**	**356·70**	**337·83**	...	

TABLE IV.—*Production of Gold and Silver from all sources, etc.*—continued

Peak Hill Goldfield.

Mining Centre.	Number of Lease.	Registered Name of Company or Lease.	Total for 1919.					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.
Egerton ...	352P	Hibernian	...	...	242·00	84·66	...	...	...	4,099·00	1,596·03	...
Do. ...	...	Voided leases	...	...	...	...	...	...	·91	315·25	360·00	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	23·51	1,093·75	506·79	...
Horseshoe ...	466P	Dinkum	...	11·70	...	...	...	...	11·70	...	...	...
Do. ...	...	Voided leases	...	...	...	...	...	...	1,950·96	728·38	1,973·46	2·00
Do. ...	...	Sundry calmis	...	7·16	...	...	...	...	639·53	16·05	45·14	...
Mt. Fraser ...	...	Voided leases	...	...	...	...	...	...	...	389·50	320·96	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	80·00	55·41	...
Peak Hill ...	459P	Atlantic	...	...	21·00	140·77	...	...	...	109·50	444·16	...
Do. ...	462P	Enterprise	...	...	...	...	...	...	...	112·00	388·48	...
Do. ...	448P	Evening Star	...	...	102·50	114·05	...	...	...	713·00	2,405·02	...
Do. ...	(463P)	Independent	...	...	...	...	...	...	...	12·00	37·61	...
Do. ...	5P, 306P	No. 1 North leases	...	10·59	318·00	275·98	...	...	10·59	2,037·50	1,802·47	...
Do. ...	445P	North Star	...	...	38·00	14·59	...	...	...	246·00	222·42	...
Do. ...	(1P), (2P), (4P), 5P, (6P), (8P), (9P), (13P), (15P), (16P), (26P), (27P), (28P), (29P), (35P), (36P), (43P), (53P), (54P), (63P), (146P), (152P), (190P), (213P), (222P), (239P), (248P), (252P), (262P), (274P), 306P, (313P)	(Peak Hill Goldfield, Ltd.)	...	...	...	...	...	...	191·46	462,057·01	223,273·59	2,285·59
Do. ...	468P	Simpson	...	...	190·00	19·28	...	...	...	190·00	19·28	...
Do. ...	398P	Temperance	...	...	206·00	10·96	...	...	6·65	797·00	509·20	...
Do. ...	465P	Wowser	...	...	...	...	...	...	...	37·50	97·54	...
Do. ...	...	Voided leases	...	...	...	...	...	...	521·54	5,201·62	4,583·88	...
Do. ...	...	Sundry claims	23·54	9·41	3,276·00	1,468·88	...	23·54	160·14	6,123·75	3,531·78	...
Ravelstone ...	...	Voided leases	...	...	...	...	...	...	101·64	4,219·85	3,117·68	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	553·60	283·17	...
Wilgeena ...	...	Voided leases	...	...	...	...	...	...	23·54	128·50	146·79	...
Wilthorpe ...	...	Voided leases	...	...	...	...	...	...	...	47·00	20·93	...
		From Goldfield generally :—										
		Sundry Parcels terated at : Purcell's Works	...	...	...	63·51	...	...	...	...	358·09	...

	State Battery, Egerton	...	...	...	...	...	...	...	...	294·87	...
	State Battery, Ravelstone	...	...	...	...	...	...	3·05	10·00	1,315·82	...
	Various Works	...	...	...	...	...	...	...	30·00	319·97	...
	Reported by Banks and Gold Dealers	·30	...	...	...	...	1,938·11	345·17	...	...	...
	Total	**23·84**	**38·86**	**4,393·50**	**2,192·68**	...	**1,961·65**	**3,990·39**	**489,352·76**	**248,030·54**	**2,287·59**

East Murchison Goldfield.

LAWLERS DISTRICT.

NOTE.—From the 1st March, 1910, the Lawlers District was subdivided into Wiluna and Lawlers. The gold produced after that date by the mines at Wiluna will be found in the Wiluna District, and the lease numbers of both districts are shown in each case.

Bronzewing ...	...	Voided leases	...	...	...	...	...	...	...	...	468·00	318·03	1·94
Cork Tree ...	...	Voided leases	...	...	...	...	...	...	...	29·90	3,767·00	3,292·87	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	25·50	13·00	9·32	...
Kathleen Valley	382	(Yellow Aster)	...	...	...	...	...	...	...	...	37,605·00	27,051·42	...
Do. ...	382	(Yellow Aster)	...	...	...	...	...	...	...	...	1,714·00	949·04	...
Do. ...	382, 1197 ...	Yellow Aster leases	...	...	584·00	417·74	...	...	...	...	1,609·00	889·86	...
Do. ...	382	(Yellow Aster: Yellow Aster G.M. Co., N.L.)	...	...	...	...	...	...	...	...	10,359·75	5,425·26	...
Do. ...	...	Voided leases	...	...	...	...	...	...	...	141·57	23,291·50	11,350·24	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	478·40	1,429·75	855·82	...
Lake Darlot ...	1207	New Discovery	...	...	220·00	84·11	...	...	...	...	220·00	84·11	...
Do. ...	273	St. George	...	145·34	9·00	19·36	...	...	...	3,251·30	899·00	7,974·00	...
Do. ...	...	Voided leases	...	...	...	...	...	...	...	1,197·12	64,266·30	40,682·33	...
Do. ...	...	Sundry claims	...	...	178·00	84·89	2·60	1·16	474·45		3,972·64	3,387·61	2·60
Lawlers ...	(M.L. 29) ...	Bungarra	...	...	...	...	...	...	...		...	...	493·34
Do. ...	(22), (37), 58, 62, (70), (155), (156), (157), (158), (376), (377), (381), (385), (399), (426), (427), (459), (474), (500), (508), (509), (510), (511), (512), (552,) (562), (563), (573), (811), (840)	(East Murchison United, Ltd.) ...	...	...	...	...	...	...	...		291,797·00	155,594·26	900·48
Do. ...	1171	(Great Eastern)	...	...	...	...	...	...	...		927·00	337·72	...
Do. ...	1171, (1186) ...	Great Eastern leases	...	...	360·00	274·45	...	...	...		1,601·74	1,352·43	...
Do. ..	(37), 58, 62, (70), (155), (156), (157), (158), (376), (377), (381), (385), (399), (426), (427), (459), (474), (500), (508), (509), (510), (511), (512), (552), (562), (563), (573), (811), (840)	(London and Western Australian Exploration Co., Ltd.)	...	...	...	...	...	...	...		179,563·00	40,438·14	2,560·31
Do. ...	1163	(May Bee)	...	...	...	...	...	...	...		4,157·00	1,270·06	...
Do. ...	1163	May Bee	...	...	...	...	...	...	...		1,014·00	238·21	...
Do. ...	1163, (1189) ...	(May Bee leases)	...	...	...	...	...	...	...		935·00	303·93	...

TABLE IV.—*Production of Gold and Silver from all sources, etc.*—continued.

East Murchison Goldfield—*continued.*

LAWLERS DISTRICT—*continued.*

Mining Centre.	Number of Lease.	Registered Name of Company or Lease.	Total for 1919.					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.
Lawlers	(22), (37), 58, 62, (70), (155), (156), (157), (158), (376), (377), (385), (459), (508), (509), (562), (563), (811), (840), 918, (1053), (1106), (1109), (1110), (1123), (1160)	(Northern Mines, Ltd.)	...	...	...	...	...	...	...	398,856·50	102,005·52	8,356·89
Do.	1172	Queen	...	...	643·00	722·21	130·59	...	...	3,073·50	3,479·09	245·70
Do.	910 (923)	(Sunrise leases)	...	...	...	...	...	...	...	8,644·00	4,076·63	...
Do.	1188	Try It	...	...	...	...	...	...	...	936·00	264·77	...
Do.	58 62, 918,	Waroonga G.M. Co. Ltd.	...	...	9,469·00	2,480·38	...	...	...	39,652·00	7,790·41	...
Do.	62 (562), (563),	(Waroonga South leases)	...	...	...	...	...	...	...	42,150·00	14,329·48	...
Do.	58	(Woronga: London and Western Australian Exploration Co., Ltd.)	...	...	...	...	...	...	...	2,438·50	2,755·45	...
Do.		Voided leases	...	...	...	...	...	...	687·39	284,386·98	147,157·83	1,794·21
Do.		Sundry claims	...	...	159·00	60·05	...	14·81	218·79	10,671·48	6,479·23	268·34
New England		Voided leases	...	...	...	...	...	...	57·54	899·00	720·25	...
Do.		Sundry claims	...	...	...	...	...	...	4·32	554·50	465·23	...
Sir Samuel	1190	Bellevue South	...	...	...	...	...	...	...	156·00	114·46	...
Do.		Voided leases	...	...	...	...	...	...	13·49	265,433·00	138,468·17	10,225·58
Do.		Sundry claims	...	...	165·00	60·94	...	...	21·37	3,718·00	2,726·91	...
Wiluna	(140), ([2J]), 162, [4J] (163), ([5J])	(Golden Age Consolidated, Ltd.)	...	...	...	...	...	...	...	42,521·00	19,750·45	...
Do.	542, [6J], 548, [7J], 550, [8J], (906), ([11J]), (930), ([13J]), (931), ([14J]), (932), ([15J]), (937), ([17J]), (938), ([18J]), (943), ([21J]), (944), ([22J]), (952), ([26J])	(Gwalia Consolidated Ltd.)	...	...	...	...	...	...	...	210,230·32	74,536·14	69·03
Do.	162, [4J], (163), ([5J])	(Lake Way leases)	...	...	...	...	...	...	...	630·00	369·60	...
Do.	162 [4J]	(Lake Way: Western Australian Goldfields, Ltd.)	...	...	...	...	...	...	...	2,786·00	1,238·44	...

Do. ...	870, [10J] ...	(Moonlight)	...	...	...	...	...	...	...	...	1,856·00	787·66	...
Do. ...	917, [12J] ...	(Squib)	...	...	...	...	...	...	...	...	276·50	67·00	...
Do. ...	...	Voided leases	...	...	...	...	...	...	537·27	58,149·75	41,452·53	124·00	
Do. ...	...	Sundry claims	...	...	...	...	...	5·30	...	2,841·15	1,516·76	...	
		From District generally :—											
		Sundry Parcels treated at :											
		Great Eastern Battery	...	...	...	278·51	...	...	...	...	2,468·07	...	
		Queen Works	...	...	...	323·84	...	...	...	...	727·30	14·40	
		State Battery—Lake Darlot	...	...	...	...	...	...	...	315·00	1,097·09	...	
		State Battery—Sir Samuel	...	...	...	...	...	...	...	23·50	1,290·13	...	
		State Battery—Wiluna	...	...	...	...	...	...	...	390·00	2,047·17	20·00	
		Various Works	...	...	...	...	...	...	...	1,619·50	14,563·26	744·33	
		Reports by Banks and Gold Dealers	...	...	...	...	...	5,593·22	67·15	...	5·74	...	
		Total	...	145·34	11,787·00	4,806·48	133·19	5,614·49	7,205·56	2,012,817·86	894,555·43	25,821·15	

WILUNA DISTRICT.

Note.—Previous to the 1st March, 1910, **Wiluna** formed part of the Lawlers District. The gold produced by mines at Wiluna previous to that date will be found in the Lawlers District, and the lease numbers of both districts are shown in each case.

Collavilla ...	...	Voided leases	...	...	...	...	...	...	...	1,518·00	496·28	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	30·00	21·47	...
Gum Creek ...	226J [1386N] ...	Alma May	...	...	864·00	306·44	...	...	...	864·00	306·44	...
Mt. Keith ...	201J	Aurora	...	...	789·50	533·11	...	...	...	2,123·00	1,551·60	...
Do. ...	207J	Miss Deal	...	...	423·00	311·88	...	...	...	1,783·00	1,631·68	...
Do. ...	...	Voided leases	...	...	...	...	...	...	8·29	3,966·25	3,392·39	...
Do. ...	...	Sundry claims	...	...	10·50	25·21	...	...	78·26	1,406·75	883·20	...
New England ...	...	Voided leases	...	...	...	...	...	...	...	952·00	309·11	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	115·00	100·62	...
Wiluna ...	91J [940] ...	(Adelaide)	...	...	...	...	...	...	...	401·00	33·29	...
Do. ...	218J	Great Ziz Zag	...	...	91·75	93·85	...	...	...	472·00	296·32	...
Do. ...	6J [542], 7J, [548], 8J, [550], (11J), (13J), (14J), (15J), (17J), (18J), (21J), (22J), (24J), (25J), (26J), (39J), (161J), (163J)	(Gwalia Consolidated, Ltd.)	...	...	...	...	...	...	...	29,774·50	10,780·42	20·29	
Do. ...	119J	(Happy Jack)	...	...	...	...	...	...	...	743·00	236·41	...	
Do. ...	202J	Happy Jack South : Wiluna G.Ms., Ltd.	...	...	...	...	...	...	...	1,364·75	767·50	...	
Do. ...	216J	Just in Time	...	...	...	...	...	...	...	1,214·25	853·75	...	
Do. ...	4J, [162], (5J), ([163])	Lake Way leases : Wiluna G.Ms., Ltd.	...	...	...	...	...	...	...	2,044·00	975·78	...	
Do. ...	10J, [870] ...	(Moonlight)	...	...	...	...	...	...	...	5,181·00	1,078·40	...	
Do. ...	10J, [870EM], 37, 91, 109, (123)	Moonlight leases	...	...	1,850·00	856·62	...	...	...	24,891·00	9,618·65	...	
Do. ...	6J, [542], 7J, [548], 8J, [550], (11J), (13J), (14J), (15J), (17J), (21J), (161J), (163J),	Western Machinery Co., Ltd. ...	...	...	10,881·25	4,832·78	...	...	...	50,966·50	24,233·99	...	

TABLE IV.—*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 1919.					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.
Wiluna ...	12J, [917], (23J), (28J), (30J), (33J), (36J), (43J), (76J), (113J), 119J, 124J, (137J), ([1002])	Wiluna Gold Mines, Ltd.	...	...	...	...	...	...	...	23,935·25	10,412·94	...
Do. ...	...	Voided leases	...	...	...	...	...	...	27·92	17,040·50	6,925·28	...
Do. ...	...	Sundry claims	...	...	111·00	75·83	...	87·59	79·88	6,126·50	2,708·15	·33
		From District generally :—										
		Sundry Parcels treated at :										
		State Battery—Mt. Keith	...	...	...	...	...	...	...	...	556·95	12·68
		State Battery—Wiluna	...	...	...	...	...	...	...	202·00	11,482·98	198·70
		Reported by Banks and Gold Dealers	...	...	...	...	...	3·20	2·92	...	...	...
		Total	...	...	**15,021·00**	**7,035·72**	...	**90·79**	**197·27**	**177,114·25**	**89,653·60**	**232·00**
		BLACK RANGE DISTRICT.										
Barrambie ...	...	Voided leases	...	...	...	...	...	...	...	455·50	1,862·24	...
Do. ...	...	Sundry claims	...	...	7·00	38·97	...	...	16·01	127·00	127·18	...
Bellchambers	...	Sundry claims	...	...	...	...	...	...	...	45·00	36·62	...
Birrigrin ...	(867B)	Pelerin	...	...	60·00	95·25	...	...	...	60·00	95·25	...
Do. ...	...	Voided leases	...	...	...	...	...	...	820·68	11,958·16	14,945·20	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	34·52	744·50	678·89	...
Curran's Find	641B	Red, White, and Blue	...	...	145·00	283·42	...	...	24·58	6,173·00	2,416·49	...
Do. ...	...	Voided leases	...	...	...	...	...	...	107·70	164·50	71·82	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	27·20	380·50	200·83	...
Erroll's ...	(862B)	Lost Chance	...	2·16	...	...	...	...	113·50	5·00	38·10	...
Do. ...	...	Voided leases	...	...	...	...	...	14·17	18·54	67·00	388·58	...
Do ...	...	Sundry claims	...	...	8·50	4·57	...	6·53	335·16	228·00	327·90	...
Hancock's ...	837B	Comedy King	...	...	130·00	327·54	...	...	365·90	754·00	1,553·36	...
Do. ...	...	Voided leases	...	...	...	...	...	...	6,123·94	25,937·25	25,789·68	52·08
Do. ...	...	Sundry claims	...	...	236·50	103·91	...	...	119·02	1,669·00	981·55	...
Maninga Marley	203B	(Havilah)	...	...	120·00	128·78	...	...	...	638·00	716·05	...

Do. ...	203B	(Havilah)	...	...	...	...	...	...	...	...	1,507·50	2,315·74	...
Do. ...	203B, (243B), (249B), (254B), (287B), (288B), (289B), (305B), (350B), (504B)	(Havilah G.M. Co., N.L.)	...	...	...	...	...	...	...	...	36,508·00	20,052·80	22·55
Do. ...	203B, (243B), (287B), (289B), (350B)	(Havilah G.M. Co., N.L.)	...	...	...	...	...	...	...	...	6,026·00	5,029·69	...
Do. ...	203B, (243B), (249B), (254B), (287B), (288B), (289B), (305B)	(Havilah leases)	...	...	...	...	...	...	...	...	2,240·00	2,432·48	...
Do. ...	203B, 345B ...	Havilah leases	...	...	...	55·78	...	...	...	...	...	55·78	...
Do. ...	203B, (243B), (289B)	(Havilah leases: Tailings Treatment, Ltd.) ...	...	...	...	...	...	...	...	...	371·00	2,086·50	...
Do. ...	...	Voided leases	...	...	...	...	...	...	195·20	11,977·23	14,442·35	...	
Do. ...	...	Sundry claims	...	...	...	...	...	...	158·16	853·50	669·68	...	
Montagu ...	...	Voided leases	...	...	...	...	...	...	94·39	9,133·40	7,223·46	...	
Do. ...	...	Sundry claims	...	...	...	...	...	...	45·67	794·50	471·76	...	
Nungarra ...	(868B)	Shipmate	...	...	8·50	14·98	...	...	...	8·50	14·98	...	
Do. ...	...	Voided leases	...	...	...	...	...	25·94	986·09	12,162·75	8,793·43	3·64	
Do. ...	...	Sundry claims	...	...	65·00	36·23	...	46·67	1,455·98	3,452·90	2,152·25	...	
Sandstone ...	4B	(Adelaide)	...	...	...	...	...	...	7·21	7,443·00	12,675·94	...	
Do. ...	4B, 5B, (11B), (17B), (26B), (70B), (140B), (150B)	(Adelaide leases)	...	...	...	...	...	...	...	21,010·00	30,255·28	...	
Do. ...	5B	(Black Range)	...	...	...	...	...	...	152·68	637·00	1,477·66	5·60	
Do. ...	4B, 5B, 255B, 332B, 562B, 850B	Black Range Consolidated Mines, N.L.	...	...	39·00	33·28	...	...	...	133·00	154·85	...	
Do. ...	4B, 5B, (9B), (11B), (17B), (26B), (70B), (140B), (150B), (256B), (494B), (509B), (620B), (627B)	(Black Range Mining Co., N.L.) ...	...	...	...	...	...	4·75	199·90	227,485·00	159,278·43	1,315·00	
Do. ...	4B, 5B, (11B), (70B), (140B)	(Black Range Pinnacles Co., N.L.) ...	...	...	...	...	...	...	...	1,228·50	1,684·82	...	
Do.	255B	(Black Range West G.M. Co., N.L.)	...	...	...	...	...	...	...	1,077·65	1,035·43	...	
Do. ...	255B, 332B, 562B, (601B)	(Black Range West G.M. Co., N.L.) ...	...	...	...	...	...	...	51·62	613·00	377·95	...	
Do. ...	4B, 5B, 255B, 332B, 562B, (601B), 850B	(Black Range West G.M. Co., N.L.) ...	...	...	...	...	...	...	...	87·50	100·67	...	
Do. ...	854B	Entente	...	...	185·00	163·70	...	...	10·83	1,248·00	921·53	...	
Do. ...	856B	Nancy's Reward	...	...	139·00	238·74	...	...	...	647·00	657·46	...	
Do. ...	(789B)	Pyx	...	...	...	...	...	...	...	952·50	745·01	13·50	
Do. ...	(848B)	Wanderie	...	...	...	...	...	...	...	21·00	9·45	...	
Do. ...	...	Voided leases	...	...	...	...	...	...	2,685·27	423,969·62	231,457·74	10,420·12	
Do. ...	...	Sundry claims	...	...	112·50	86·91	...	24·01	972·03	2,702·00	1,801·17	...	
Youanmi ...	514B	United	...	...	457·50	78·93	...	...	11·86	15,411·00	4,241·87	...	
Do. ...	863B, 864B, 865B, 866B	Yuanmi G.Ms., Ltd.	...	...	17,675·00	13,468·00	1,264·92	...	...	24,355·00	18,433·57	1,375·31	

TABLE IV.—*Production of Gold and Silver from all sources, etc.*—continued.

EAST MURCHISON GOLDFIELD—*continued.*

BLACK RANGE DISTRICT—*continued.*

Mining Centre.	Number of Lease.	Registered Name of Company or Lease.	Total for 1919.					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.
Youanmi ...	...	Voided leases	...	...	...	...	...	·36	115·06	283,509·75	132,261·45	2,949·72
Do. ...	...	Sundry claims	...	...	...	...	...	...	2·31	1,773·75	456·26	...
		From District generally:										
		Sundry Parcels treated at:										
		State Battery—Black Range	...	...	...	200·50	...	...	...	202·00	13,902·69	59·53
		State Battery—Youanmi	...	...	...	64·70	...	...	...	...	2,849·81	...
		Various Works	...	...	...	...	...	...	...	37·00	5,664·78	...
		Reported by Banks and Gold Dealers	...	...	...	...	...	1,336·82	11·43	...	...	...
		Total	...	**2·16**	**19,388·50**	**15,424·19**	**1,264·92**	**1,459·25**	**15,262·44**	**1,148,984·96**	**736,414·46**	**16,217·05**

Murchison Goldfield.

CUE DISTRICT.

Barrambie ...	...	Voided leases	...	...	...	...	...	...	22·49	16,903·92	14,338·52	125·60
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	70·50	35·81	...
Cuddingwarra	1860	Big Bell	...	...	7,310·00	1,358·48	...	...	...	31,144·36	5,628·58	...
Do. ...	...	Voided leases	...	...	...	...	...	10·59	124·53	35,855·75	43,796·59	15·42
Do. ...	...	Sundry claims	...	...	...	95·08	...	...	41·80	498·54	1,064·83	...
Cue	203, 1148 ...	(Cue Consolidated G.Ms., Ltd.) ...	...	...	...	...	...	...	...	23,427·50	18,382·10	...
Do. ...	203	Cue No. 1	...	...	·75	175·30	20·40	...	...	7,753·75	12,947·76	20·40
Do. ...	1148	(Light of Asia)	...	...	...	...	...	...	...	10,175·00	7,302·20	...
Do. ...	1148, (1299), (1300), (1634), (1666), (1667)	(Light of Asia leases)	...	...	...	...	...	...	...	14,024·00	9,078·43	...
Do. ...	1148, 1151, 1252, (1300), 1362, 1498, (1634), (1667)	(Light of Asia and Queen of the May leases)	...	...	3,443·00	3,085·13	...	...	...	23,043·00	18,341·27	...
Do. ...	1949	Pathe	...	...	9·50	15·07	...	...	...	9·50	15·07	...
Do. ...	1151, 1252, 1362, (1391), 1498, (1689)	(Queen of the May leases) ...	...	...	...	...	...	...	...	6,926·00	6,974·06	...
Do. ...	1978	Vera	...	...	69·00	10·59	...	...	...	69·00	10·59	...
Do. ...	...	Voided leases	...	...	...	...	...	34·72	529·45	182,371·12	129,204·39	43·35
Do. ...	...	Sundry claims	...	...	528·50	153·14	...	20·95	393·28	15,135·09	9,539·94	...

Eelya ...	...	Voided leases	...	...	...	...	...	...	...	8·78	971·00	1,778·94	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	101·86	539·65	595·13	...
Erroll's ...	...	Voided leases	...	...	...	...	...	...	...	20·25	14,098·50	8,902·24	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	...	227·00	92·86	...
Mindoolah ...	...	Voided leases	...	...	...	...	...	3·07	...	...	7,935·50	4,773·33	42·97
Do. ...	...	Sundry claims	...	...	...	...	...	...	9·81	1,004·00	1,123·77	...	
Reedy's Find	1932	Culculli	...	...	38·50	295·40	...	...	...	...	138·00	1,009·48	...
Do. ...	1977	Emu	...	...	159·50	101·35	...	...	...	...	159·50	101·35	...
Do. ...	1934	Tuckanarra	...	...	24·00	63·98	...	...	...	...	37·00	149·13	...
Do. ...	1923	Turn of the Tide	...	...	40·00	456·77	...	...	4·00	208·50	2,282·64	...	
Do. ...	1941	Wild Rabbit	...	...	10·00	22·23	...	...	...	82·00	127·87	...	
Do. ...	...	Voided leases	...	...	...	...	...	...	210·65	540·00	673·20	...	
Do. ...	...	Sundry claims	...	...	...	32·96	...	164·88	75·28	353·80	226·12	...	
Tuckabianna	(1928)	Blue Streak	...	...	...	...	...	...	...	509·00	234·56	...	
Do. ...	(1976)	Hopeful	...	15·93	...	...	...	...	15·93	...	...	...	
Do. ...	1926	Nigel	...	...	160·00	559·93	...	...	...	589·00	2,078·66	...	
Do. ...	(1931)	Tosiana	...	...	26·00	19·57	...	...	...	630·00	1,219·73	...	
Do. ...	1914	Triplicate	...	...	90·00	38·14	...	...	...	529·00	205·85	...	
Do. ...	1924	Triplicate North	...	...	75·00	64·03	...	...	...	191·00	229·16	...	
Do. ...	(1974)	Triplicate West	...	...	...	...	...	...	...	29·00	14·79	...	
Do. ...	1929	Tuckabianna North	...	...	69·00	30·10	...	...	...	341·50	140·42	...	
Do. ...	...	Voided leases	...	...	...	...	...	...	146·77	49·00	60·37	...	
Do. ...	...	Sundry claims	...	...	...	...	...	23·44	92·04	204·50	76·13	...	
Tuckanarra ...	1337	Nemesis	...	...	...	...	...	...	619·00	2,214·00	6,077·07	...	
Do. ...	...	Voided leases	...	...	...	...	...	14·65	2,095·42	15,584·10	14,405·28	172·77	
Do. ...	...	Sundry claims	...	180·95	49·00	390·51	...	51·94	355·36	2,849·70	6,352·01	...	
	From District generally :—												
	Sundry Parcels treated at :												
	Cue No. 1 Works		...	...	...	21·93	...	...	...	1,870·50	6,684·54	...	
	State Battery—Tuckanarra		...	...	...	268·79	...	...	...	518·50	3,270·91	...	
	Triplicate Works		...	...	...	1,565·13	...	...	...	...	2,772·48	...	
	Various Works		...	...	...	...	...	...	...	5,055·02	18,568·66	...	
	Reported by Banks and Gold Dealers		...	...	...	...	...	755·43	7·54	...	...	...	
	Total		...	**196·88**	**12,101·75**	**8,823·61**	**20·40**	**1,079·67**	**4,874·24**	**424,865·30**	**360,886·82**	**420·51**	

MEEKATHARRA DISTRICT.

Abbotts ...	1446N	Venture	...	...	26·00	8·89	...	...	...	26·00	8·89	...	
Do. ...	...	Voided leases	...	...	...	...	...	...	26·45	35,184·60	37,115·51	...	
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	55·60	90·87	...	
Burnakura ...	...	Voided leases	...	...	...	...	...	...	3,239·43	38,480·95	30,579·03	26·90	
Do. ...	...	Sundry claims	...	...	...	...	...	12·51	81·11	137·00	111·87	...	
Chesterfield ...	...	Voided leases	...	...	...	...	...	29·02	409·15	6,756·26	7,445·01	·80	
Do. ...	...	Sundry claims	...	...	...	...	...	...	38·83	428·60	472·64	...	
Gabanintha ...	(1408N)	Grafton	...	...	...	9·96	64·31	...	...	510·00	176·03	239·52	
Do. ...	...	Voided leases	...	...	...	...	...	...	16·93	21,408·00	13,271·55	576·05	
Do. ...	...	Sundry claims	11·72	2·82	...	...	...	13·05	74·38	1,063·50	715·19	...	
Garden Gully	...	Voided leases	...	...	...	...	...	26·36	74·91	29,854·06	21,435·37	1,102·59	
Do. ...	...	Sundry claims	...	...	...	...	...	...	3·32	238·10	320·01	...	

TABLE IV.—*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 1919.					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.
Gum Creek ...	1386N, [226J] ...	Alma May	...	...	...	...	...	...	...	1,082·00	248·83	...
Do. ...	...	Voided leases	...	...	...	...	...	25·27	88·12	2,557·08	3,110·73	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	338·00	278·36	...
Holden's Find	1436N	Unlimited	...	...	...	...	...	...	...	21·00	20·61	...
Do. ...	1291N	Waterloo	...	...	3,232·00	1,098·77	...	...	...	9,132·00	2,979·36	...
Do. ...	...	Voided leases	...	...	...	...	...	...	14·77	1,237·25	957·74	...
Do. ...	...	Sundry claims	...	...	55·00	31·17	...	...	44·63	141·00	121·33	...
Jillawarra ...	...	Voided leases	...	...	...	...	...	...	1,134·68	1,499·55	2,801·53	...
Do. ...	...	Sundry claims	...	...	...	...	...	169·02	142·95	23·50	53·81	...
Meeka Pools ...	...	Voided leases	...	...	...	...	...	...	...	111·58	82·27	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	2·84	211·72	184·83	...
Meekatharra...	597N	(Commodore)	...	...	...	...	...	...	...	498·00	1,268·71	...
Do. ...	597N, 915N, 1041N, 1365N	(Commodore G.M. Co., N.L.)	...	...	108·00	51·81	...	...	...	40,527·00	16,121·38	3·32
Do. ...	(1382N)	Danube	...	...	40·00	5·05	...	...	...	88·00	19·47	...
Do. ...	477N	(Fenian)	...	...	...	...	...	...	...	8,831·75	18,289·22	...
Do. ...	477N, 814N ...	Fenian leases	...	...	22,800·00	15,256·08	...	...	...	258,129·00	219,997·80	...
Do. ...	(1441N)	Globe	...	...	120·00	96·61	...	...	...	120·00	96·61	...
Do. ...	1331N	Gwalia	...	...	147·00	596·64	...	...	115·72	2,585·00	8,121·62	...
Do. ...	(1345N)	Haveluck	...	...	...	...	...	...	20·04	1,931·50	644·99	...
Do. ...	555N	(Ingliston)	...	...	...	...	...	...	...	1,202·49	2,332·27	...
Do. ...	475N	(Ingliston Consols Extended) ...	...	...	...	...	...	...	...	1,536·25	4,248·25	·30
Do. ...	475N, 515N, 729N, 822N	Ingliston Consols Extended leases	...	...	29,206·00	14,500·17	...	...	...	222,626·22	126,669·25	...
Do. ...	555N, 1239N ...	Ingliston leases	...	...	2,544·00	2,605·65	...	...	...	14,349·85	13,371·64	...
Do. ...	(902N)	Ingliston North	...	...	...	...	...	...	...	10·00	25·05	...
Do. ...	(1202N)	Ingliston Proprietary South ...	...	...	...	...	...	...	...	54·00	89·12	...
Do. ...	(637N)	(Ingliston South Extended) ...	...	...	...	...	...	...	...	10·00	10·60	...
Do. ...	(507N)	(Ingliston United)	...	...	...	...	...	...	...	293·25	147·95	...
Do. ...	(507N), (637N), (931N), 933N, (964N), (1071N), (1142N)	(Lake View and Oroya Exploration, Ltd.)	...	...	...	...	...	...	...	117,650·26	45,208·20	2,448·42
Do. ...	1440N	Lone Hand	...	...	129·00	52·91	...	...	...	179·00	76·17	...
Do. ...	915N	(Macquarrie)	...	...	...	...	...	...	40·05	4,315·08	1,148·10	...
Do. ...	533N	Marmont	...	...	65·00	87·36	...	...	...	54,326·10	38,117·44	...
Do. ...	580N	(Marmont Extended)	...	...	...	...	...	...	...	43·00	38·03	...
Do. ...	580N, 888N ...	(Marmont Extended leases) ...	...	...	...	...	...	...	...	152·00	129·61	...
Do. ...	597N, 915N, 1041N, 1365N	New Commodore G.M. Co., N.L. ...	...	...	127·10	76·78	...	...	...	127·10	76·78	...
Do. ...	(372N)	Pioneer	...	...	31·00	9·21	...	...	38·17	6,995·18	6,335·14	...

Do. ...	(507N), (637N), (931N), 933N, (964N), (1071N), (1142N), (1366N)	Queenhills Gold Mines, Ltd.	...	...	...	...	...	...	...	...	212·00	159·06	...
Do. ...	(931N)	(Queen of the Hill)	...	...	...	...	...	...	...	...	549·00	158·59	...
Do. ...	...	Voided leases	...	...	...	...	...	3·88	290·34	151,367·13	87,729·43	3·00	
Do. ...	...	Sundry claims	...	4·45	241·00	149·17	...	181·83	178·86	4,459·55	2,231·91	...	
Munara Gully	...	Voided leases	...	...	...	...	...	...	...	13,167·75	6,489·65	...	
Do. ...	...	Sundry claims	...	...	...	...	...	...	11·62	80·00	40·02	...	
Nannine ...	166N	Nannine	...	123·13	54·00	40·21	...	...	178·08	174·00	98·39	...	
Do. ...	(16N), (25N), 166N	(Nannine leases)	...	...	...	...	...	...	8·71	23,649·60	24,385·66	127·60	
Do. ...	(1444N)	Royalist	...	10·59	...	...	...	...	10·59	...	...	...	
Do. ...	...	Voided leases	...	...	...	...	...	34·02	361·95	68,097·02	43,048·73	39·85	
Do. ...	...	Sundry claims	...	...	18·00	6·80	...	7·63	243·73	2,327·20	1,803·14	...	
Quinn's ...	1430N	Nowthanna	...	...	...	...	...	...	...	65·00	6·75	...	
Do. ...	...	Voided leases	...	...	...	...	...	7·30	1,186·50	18,812·16	8,868·04	90·70	
Do. ...	...	Sundry claims	...	68·86	...	...	...	2·25	813·32	1,671·50	1,281·62	...	
Ruby Well ...	...	Voided leases	...	...	...	...	...	...	...	7,443·00	3,988·36	...	
Do. ...	...	Sundry claims	...	...	...	...	...	...	8·48	261·00	341·66	...	
Stake Well ...	(1398N)	Once Again	...	...	20·00	30·11	...	...	...	20·00	30·11	...	
Do. ...	...	Voided leases	...	...	...	...	...	...	200·12	21,342·00	9,536·07	...	
Do. ...	...	Sundry claims	...	...	...	...	...	...	31·79	186·00	192·00	...	
Star of the East	...	Voided leases	...	...	...	...	...	...	...	27,244·00	20,305·40	...	
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	127·62	94·97	...	
Yalogindа ...	(1423N)	Rocklee	...	...	...	...	...	...	353·93	32·50	96·33	...	
Do. ...	1434N	Rocklee South Extended ...	...	226·38	...	126·88	...	...	226·38	...	126·88	...	
Do. ...	...	Voided leases	...	...	...	...	...	...	597·91	25,711·52	13,026·52	8·68	
Do. ...	...	Sundry claims	...	89·54	...	...	...	10·89	504·89	1,978·17	1,588·80	...	
		From District generally :—											
		Sundry Parcels treated at :											
		Connecticut Battery	...	...	...	...	...	...	...	...	173·61	...	
		Ruby Well Battery	...	...	...	...	...	...	...	...	699·32	...	
		State Battery—Meekatharra	...	...	...	...	...	...	...	14·00	10,242·65	19·00	
		State Battery—Quinn's	...	...	...	...	...	...	...	...	618·79	...	
		Various Works	...	...	...	...	...	...	...	172·75	4,301·81	342·17	
		Reported by Banks and Gold Dealers	59·08	...	...	...	...	9,755·99	13·79	...	...	...	
		Total	**70·80**	**525·77**	**58,963·10**	**34,840·23**	**64·31**	**10,279·02**	**10,827·47**	**1,256,241·85**	**866,829·04**	**5,028·90**	

DAY DAWN DISTRICT.

Day Dawn ...	1D, 2D, 86D, (87D), (99D), (119D), 129D, (158D), (159D), 170D, 185D, (191D), (209D), 210D, (211D), (212D), (213D), (224D), (225D), (249D), (424D), 453D, (455D), (467D)	Great Fingall Consolidated, Ltd. ...	...	...	1,006·25	1,605·32	...	...	...	1,862,953·26	1,182,802·80	169,210·20

TABLE IV.—*Production of Gold and Silver from all sources, etc.*—continued.

MURCHISON GOLDFIELD—*continued.*

DAY DAWN DISTRICT—*continued.*

Mining Centre.	Number of Lease.	Registered Name of Company or Lease.	Total for 1919.					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.
Day Dawn ...	(119D)	(West Fingall No. 6)	...	...	...	...	...	...	...	43·00	15·32	...
Do. ...	...	Voided leases	...	...	...	...	...	126·30	511·03	45,040·38	30,749·52	·24
Do. ...	...	Sundry claims	...	121·72	151·00	288·58	...	...	258·39	2,034·08	1,646·05	...
Jasper Hill ...	513D, 517D, 518D, 520D, 535D	Black Range Pinnacles Co., N.L. ...	...	...	...	...	...	...	...	9,158·00	3,893·26	...
Do. ...	513D	(Comet)	...	...	...	...	...	...	...	67·20	36·23	...
Do. ...	516D	Neptune	...	...	...	...	...	...	...	25·00	4·63	...
Do. ...	548D	Night Watch	...	40·81	...	...	...	...	400·22	...	...	...
Do. ...	... ...	Voided leases	...	...	...	...	...	4·90	781·28	6,058·55	5,040·17	...
Do. ...	...	Sundry claims	...	28·83	26·00	25·42	...	...	390·26	213·00	384·88	...
Lake Austin... (Island)	536D	Eureka	...	52·79	...	...	...	...	52·79	...	...	...
Do. ...	(537D)	Good Luck	...	...	...	...	...	...	551·53	58·50	146·45	...
Do. ...	(543D)	Haig	...	...	...	...	...	...	344·48	...	...	...
Do. ...	...	Voided leases	...	...	...	...	...	590·52	672·01	29,715·87	45,240·25	...
Do. ...	...	Sundry claims	...	44·82	28·25	15·01	...	17·74	291·55	509·89	307·80	...
Mainland ...	...	Voided leases	...	...	...	...	...	·41	2,706·26	7,272·13	23,129·51	...
Do. ...	...	Sundry claims	...	160·28	...	...	...	3·24	233·68	77·45	89·03	...
		From District generally :—										
		Sundry Parcels treated at :										
		Various Works	...	...	...	...	...	...	16·61	940·75	1,537·30	...
		Reported by Banks and Gold Dealers	...	...	...	...	...	1,542·21	3·48	...	·77	...
		Total	...	**449·25**	**1,211·50**	**1,934·33**	...	**2,285·32**	**7,213·57**	**1,964,167·06**	**1,295,023·97**	**169,210·44**

MOUNT MAGNET DISTRICT.

Lennonville ...	964M	(Empress)	...	...	...	...	...	...	...	1,649·00	7,361·81	...
Do. ...	964M, (1078M), (1079M), (1115M), (1116M), (1117M)	Empress leases	...	...	...	16·90	...	...	...	4,813·00	3,171·33	...
Do. ...	1158M	Galtee Moore	...	...	19·00	23·35	...	...	...	116·50	129·89	...
Do. ...	...	Voided leases	...	...	...	...	...	...	3,196·79	133,314·98	112,492·50	458·82
Do. ...	...	Sundry claims	...	...	...	243·77	...	7·11	93·23	1,884·42	1,534·11	...
Mt. Magnet ...	1167M	Bell Bird	...	10·50	105·25	109·97	...	...	238·41	393·75	521·36	...
Do. ...	1182M	Carbine	...	...	30·50	17·40	...	...	...	30·50	17·40	...
Do. ...	1181M	Fortune of War	...	5·77	221·50	126·20	...	...	5·77	221·50	126·20	...

Do. ...	1155M	Gift	...	...	...	16·36	...	...	250·89	120·25	2,047·74	...
Do. ...	(1176M)	Good Luck	...	...	...	...	...	...	...	25·75	45·16	...
Do. ...	1156M	Leap Year	...	...	120·00	164·69	...	...	...	474·75	555·21	...
Do. ...	1013M	Mars	...	...	...	...	...	...	...	8,078·15	2,032·72	...
Do. ...	1183M	Mount Zion	...	...	278·75	114·10	...	...	...	278·75	114·10	...
Do. ...	1151M	Morning Star	...	...	167·70	512·76	...	...	9·76	933·70	1,066·55	...
Do. ...	(445M)	Neptune	...	...	...	...	...	...	927·80	2,547·31	3,008·78	...
Do. ...	1075M	New Havelock	...	15·77	...	...	...	...	15·77	1,271·00	627·16	...
Do. ...	1095M	Pearl	...	...	...	...	...	...	2·36	221·82	214·19	...
Do. ...	1175M	St. Patrick	...	...	595·50	492·24	...	...	...	687·50	624·70	...
Do. ...	(1124M)	Tattersall's	...	...	...	...	...	...	47·55	480·75	432·80	...
Do. ...	1165M	Trevallen	...	...	283·00	82·53	...	...	2·07	1,521·00	401·59	...
Do. ...	1069M	Turning Point	...	...	...	...	...	...	8·35	100·50	118·93	...
Do. ...	...	Voided leases	...	...	...	...	...	27·83	6,886·28	345,980·33	195,315·69	714·36
Do. ...	...	Sundry claims	1·37	9·73	1,277·00	445·72	...	1·82	1,118·01	17,850·66	10,394·62	...
Mt. Magnet East ...	...	Voided leases	...	...	...	...	...	63·29	764·53	5,522·28	2,811·75	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	37·22	214·50	144·10	...
Moyagee ...	1099M	Moyagee	...	...	288·00	429·66	...	...	...	814·50	1,695·24	...
Do. ...	...	Voided leases	...	...	...	...	...	...	5·08	2,053·15	2,416·74	...
Do. ...	...	Sundry claims	...	...	14·00	7·07	...	...	111·10	557·73	682·58	...
Paynesville ...	...	Voided leases	...	...	...	...	...	...	152·90	19·75	26·62	...
Do. ...	...	Sundry claims	...	...	...	24·54	...	...	1·46	27·75	599·97	...
Youanmi ...	...	Sundry claims	...	...	...	...	...	...	...	33·00	44·58	...
		From District generally :—										
		Sundry Parcels terated at :										
		Early Bird Works	...	...	...	...	...	...	...	...	109·15	...
		Fremantle Trading Co.'s Works	...	...	...	...	...	...	...	...	143·80	...
		Morning Star Battery	...	...	...	...	...	...	...	...	863·23	...
		State Battery, Boogardie	...	...	...	858·58	...	...	...	65·01	14,298·73	...
		State Battery, Lennonville	...	...	...	...	...	...	...	18·06	6,576·77	...
		Various Works	...	...	...	...	...	...	...	25·00	9,142·80	1·00
		Reported by Banks and Gold Dealers	...	...	...	...	...	1,652·63	·35	...	...	...
		Total	**1·37**	**41·77**	**3,400·20**	**3,685·84**	...	**1,752·68**	**13,875·68**	**532,346·60**	**381,910·60**	**1,174·18**

Yalgoo Goldfield.

Adavale ...	...	Sundry claims	...	...	...	...	...	...	...	10·00	12·56	...
Bilberatha ...	...	Voided leases	...	...	...	...	...	...	...	554·00	200·07	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	2·90	...	...	...
Carlaminda ...	...	Voided leases	...	...	...	...	...	...	...	947·32	524·72	3·30
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	114·00	71·96	...
Field's Find...	850	Commodore	...	...	...	...	...	...	...	154·50	254·51	...
Do. ...	(680)	Fields Find Extended	...	...	...	...	...	...	...	2,073·50	1,803·09	...
Do. ...	(845)	Lliven	...	...	...	...	...	...	...	...	2·90	...
Do. ...	...	Voided leases	...	...	...	...	...	...	204·26	33,893·30	24,702·34	...
Do. ...	...	Sundry claims	...	...	13·00	5·12	...	5·77	157·03	371·75	384·49	...
Goodingnow ...	681	Aster Consolidated	...	...	89·50	35·95	...	...	2·77	1,455·50	1,091·94	...
Do. ...	878	Carnation	...	...	998·00	1,742·00	...	...	...	1,359·00	2,544·01	...
Do. ...	606	(Lake View)	...	...	...	...	...	...	...	163·00	185·46	...

TABLE IV.—*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 1919.					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.
Goodingnow ...	606	Lake View: Payne's Find Development Co., N.L.	...	...	695·50	715·48	...	...	15·58	6,376·00	5,928·82	...
Do. ...	892	Mariposa	...	...	91·00	68·69	...	...	...	91·00	68·69	...
Do. ...	613	Orchid	...	...	603·25	722·97	...	...	...	2,278·75	4,005·02	...
Do. ...	849	Princess Mary	...	...	67·50	29·06	...	...	...	265·00	329·19	...
Do. ...	607	Sweet William	...	...	203·00	227·39	...	...	75·56	1,836·50	2,368·12	...
Do. ...	607	(Sweet William)	...	...	...	...	...	...	2·16	4·85	81·59	...
Do. ...	607, (608), (662)	(Sweet William Consolidated Mines, N.L.)	...	...	...	...	...	...	7·68	907·46	1,564·84	...
Do. ...	...	Voided leases	...	...	...	...	...	146·70	168·98	6,243·00	6,394·05	...
Do. ...	...	Sundry claims	...	72·47	76·00	27·60	...	148·00	80·76	2,354·50	1,206·03	...
Gullewa ...	(877)	Mugga King	...	...	342·00	255·57	...	...	...	1,112·00	564·16	...
Do. ...	...	Voided leases	...	...	...	...	...	...	...	21,944·50	14,564·66	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	629·50	531·62	...
Kirkalucka ...	...	Sundry claims	...	...	...	...	...	...	...	8·80	4·01	...
Messenger's Patch	...	Voided leases	...	...	...	...	...	...	315·99	587·20	305·89	...
Do. ...	...	Sundry claims	...	...	...	7·14	...	463·12	315·11	438·55	280·85	...
Mt. Farmer ...	...	Voided leases	...	...	...	...	...	...	...	64·00	40·19	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	5·00	6·22	...
Mt. Gibson ...	(865)	Gold Bar	...	...	45·00	18·89	...	...	...	45·00	18·89	...
Do. ...	722	Golden Harp	...	...	171·50	318·03	...	...	...	171·50	318·03	...
Do. ...	(836)	Wee McGregor	...	...	97·00	34·43	...	...	...	97·00	34·43	...
Do. ...	...	Voided leases	...	...	...	...	...	...	...	5·00	17·67	...
Do. ...	...	Sundry claims	...	...	76·00	40·84	...	...	...	76·00	40·84	...
Ninghan ...	722, 723	Golden Harp leases	...	...	...	...	...	...	6·44	16·00	388·07	...
Do. ...	...	Voided leases	...	...	...	...	...	...	...	10·00	1·41	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	5·00	17·89	...
Noongal ...	...	Voided leases	...	...	...	...	...	...	15·86	3,086·95	1,847·66	...
Do. ...	...	Sundry claims	...	...	...	...	...	11·55	64·97	286·50	198·64	...
Nyouda ...	880	Gnow's Nest	...	...	57·00	60·86	...	...	...	57·00	60·86	...
Do. ...	...	Voided leases	...	...	...	...	...	...	217·63	416·00	183·91	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	4·28	18·00	21·67	...
Pinyalling ...	...	Voided leases	...	...	...	...	...	...	1·36	2,281·60	902·03	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	2·39	160·50	132·57	...
Rothesay ...	...	Voided leases	...	...	...	...	...	...	...	8,971·00	3,331·15	...
Wadgingarra	...	Voided leases	...	...	...	...	...	...	...	541·61	600·91	...

Do. ...	...	Sundry claims	...	...	...	...	...	...	...	...	71·50	38·21	...
Warriedar ...	841	Highland Chief	...	...	102·50	63·32	...	...	...	...	579·75	366·70	...
Do. ...	890	Iron Clads	...	...	215·00	75·78	...	...	...	...	260·50	95·51	...
Do. ...	708	Mug's Luck	...	...	133·75	84·06	...	...	...	...	6,301·75	1,983·87	...
Do. ...	731	Porcupine	...	...	...	...	...	...	...	...	66·25	12·73	...
Do. ...	...	Voided leases	...	...	...	...	...	...	...	...	3,206·25	1,362·35	7·30
Do. ...	...	Sundry claims	...	...	77·25	34·85	...	...	1·80		496·25	235·22	...
Yalgoo ...	...	Voided leases	...	...	...	...	...	...	3·23		6,314·50	9,965·18	...
Do. ...	...	Sundry claims	...	...	18·00	9·89	...	...	17·77		848·50	511·61	...
Yuin	712 (735) ...	(Bullrush Gold Estates, N.L.) ...	...	...	...	...	...	...	...		23,690·00	7,302·83	130·13
Do. ...	...	Voided leases	...	...	...	...	...	...	127·12		31,381·50	14,957·04	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	4·70		276·50	57·88	...
		From Goldfield generally :—											
		Sundry Parcels treated at :											
		Field's Find Extended Treatment Works ...	...	...	...	...	...	...	...		...	152·40	...
		Goodingnow (Payne's Find) State Battery ...	...	...	25·50	137·99	...	...	...		38·50	1,484·12	...
		Yuanmi G.M., Ltd., Works (Warriedar Options)	...	...	...	...	...	...	...		...	310·93	26·67
		Various Works	...	...	...	...	...	9·42	...		664·00	1,332·45	...
		Reported by Banks and Gold Dealers	...	...	...	...	...	666·73	...		...	...	...
		Total	...	**72·47**	**4,197·25**	**4,715·91**	...	**1,451·29**	**1,816·53**		**176,682·89**	**118,307·66**	**167·40**

Mount Margaret Goldfield.

MOUNT MORGANS DISTRICT.

NOTE.—Prior to 31st August, 1917, the mining centres of Eucalyptus, Linden, Mt. Celia, Mt. Howe, and Yundamindera were included in Yerilla District, and the output is recorded in that district. From 1st September, 1917, the output from these centres is shown in Mt. Morgans District, to which they were transferred.

Australia United	...	Voided leases	...	...	...	...	...	...	1,911·63		15,913·69	23,305·76	1·76
Do. ...	...	Sundry claims	...	143·95	...	...	...	...	537·73		799·25	2,072·62	...
Eucalyptus ...	...	Sundry claims	...	...	...	...	...	...	...		11·00	5·40	...
Federation Well	...	Voided leases	...	...	...	...	...	...	...		1,248·50	1,782·71	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	...		108·07	64·68	...
Korong ...	...	Voided leases	...	...	...	...	...	17·95	72·23		2,722·00	3,473·45	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	34·97		279·28	232·89	...
Linden ...	344F, [998R] ...	Bindah	...	...	1,102·00	293·59	...	...	...		1,102·00	293·59	...
Do. ...	348F, [1035R] ...	Danube	...	...	42·00	48·32	...	...	...		78·25	81·99	...
Do. ...	340F, [871R] ...	Democrat	...	...	205·00	353·31	...	...	...		482·50	667·35	...
Do. ...	342F, [942R] ...	Great Junction	...	...	272·00	107·99	...	...	...		609·50	361·83	...
Do. ...	(352F), ([1049R])	Lady Edith	...	...	20·50	12·76	...	...	...		116·50	133·09	...
Do. ...	(345F), ([1005R])	Olympic	...	...	...	...	...	...	...		67·00	63·60	...
Do. ...	341F, [903R] 343F, [985R]	Torquay leases	...	...	2,040·35	444·86	...	...	...		3,818·77	1,490·11	·68
Do. ...	...	Sundry claims	...	...	197·50	88·63	...	...	...		520·25	292·23	...
Mt. Margaret	314F	Mt. Morven	...	...	153·00	94·25	...	...	...		2,437·00	1,584·34	...
Do. ...	...	Voided leases	...	...	...	...	...	·37	...		3,969·00	2,699·62	12·55
Do. ...	...	Sundry claims	...	...	...	...	...	16·61	44·03		365·50	281·86	...

TABLE IV.—*Production of Gold and Silver from all sources, etc.*—continued.

MT. MARGARET GOLDFIELD—*continued.*

MT. MORGANS DISTRICT—continued.

Mining Centre.	Number of Lease.	Registered Name of Company or Lease.	Total for 1919.					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. Morgans...	6F	(Lily of the Valley South: Westralia Mt. Morgans G.M. Co., Ltd.)	...	...	...	...	...	...	...	1,587·50	808·18	...
Do. ...	6F	(Lily of the Valley South: Westralia Mt. Morgans Syndicate, Ltd.)	...	...	...	...	...	...	...	3,002·00	1,022·90	...
Do. ...	325F	Millionaire	...	...	9·00	7·87	...	...	...	206·50	728·27	...
Do. ...	5F, (10F), (19F), (22F), (32F), (73F)	(Westralia Mt. Morgans G.M. Co, Ltd.)	...	...	...	...	...	...	...	575,148·00	294,758·28	5,552·63
Do. ...	7F, (20F), (21F) ...	(Westralia Mt. Morgans G.M. Co., Ltd.)	...	...	...	...	...	...	...	18,261·00	8,127·69	...
Do. ...	5F, 6F, 7F, (10F), (19F), (20F), (22F), (32F), 301F	Westralia Mt. Morgans Mines, N.L. ...	...	...	8,082·00	3,050·97	...	...	...	114,897·00	28,108·72	...
Do. ...	...	Voided leases	...	...	...	...	...	...	76·56	34,127·75	20,210·28	77·86
Do. ...	...	Sundry claims	...	...	5·60	9·68	...	6·61	22·66	1,362·10	1,619·49	...
Murrin Murrin	...	Voided leases	...	...	...	...	...	10·43	222·93	127,364·72	100,606·89	29·60
Do. ...	...	Sundry claims	...	68·41	212·00	257·40	...	...	222·89	1,058·75	1,109·71	...
Redcastle ...	...	Voided leases	...	...	...	...	...	4·49	436·54	2,509·95	2,169·63	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	103·58	139·00	163·01	...
Yundamindera	357F	Big Stone	...	...	147·25	133·05	...	...	...	296·25	225·19	...
Do. ...	...	Voided leases	...	...	...	...	...	...	...	230·00	337·18	...
Do. ...	...	Sundry claims	...	...	163·00	122·02	...	...	...	492·25	284·24	...
		From District generally :—										
		Sundry Parcels treated at:										
		Battles Ville Battery	...	...	...	60·88	...	...	...	126·00	95·88	15·94
		Hainault Sulphide Plant—Kalgoorlie	...	...	...	...	...	...	...	127·21	83·91	...
		Mt. Morven Cyanide Works	...	...	...	...	...	...	...	...	129·48	...
		State Battery—Linden	...	...	10·00	2·97	...	...	...	10·00	1,179·08	...
		Westralia Mt. Morgans Works	...	...	...	...	...	...	...	...	153·10	...
		Various Works	...	...	...	...	...	...	...	788·50	3,010·07	84·03
		Reported by Banks and Gold Dealers	1·43	...	...	...	...	1,680·17	32·47	...	...	...
		Total	**1·43**	**212·36**	**12,661·20**	**5,088·55**	**...**	**1,736·63**	**3,718·22**	**916,382·54**	**503,818·30**	**5,775·05**

MOUNT MALCOLM DISTRICT.

Cardinia ...	...	Voided leases	...	...	...	...	...	...	1,568·29	1,628·24	3,550·42	...
Diorite King...	(1459C)	King of the Hills	...	...	...	...	...	...	44·49	1,829·00	1,748·44	24·05
Do. ...	...	Voided leases	...	...	...	...	...	...	774·66	32,641·53	29,711·89	...
Do. ...	...	Sundry claims	1·40	1·45	...	...	...	1·40	131·02	2,455·30	2,932·85	...

Dodger's Well	...	Voided leases	...	...	...	...	...	...	57·90	1,299·30	1,927·94	...
Do.	...	Sundry claims	...	...	...	...	...	...	3·37	786·25	644·95	...
Leonora	... 1473c	(Auckland)	...	...	...	...	...	...	...	226·50	82·22	...
Do.	... 1473c	Auckland: Chaffer's G.M. Co. (1916), Ltd.	...	...	100·00	23·96	...	...	...	300·00	56·92	...
Do.	... 1504c	Dawn of Hope	...	...	31·50	74·51	...	...	...	79·50	219·26	...
Do.	... 198c	(Eastern)	...	...	...	...	...	...	...	302·00	321·72	...
Do.	... 1482c	Leonora Gold Blocks	...	...	...	...	...	...	10·15	5,069·00	1,919·80	...
Do.	... 1485c	Ping Pong	...	...	...	...	...	...	79·35	459·50	474·29	...
Do.	... 1486c	Rajah	...	...	22·50	56·72	...	...	96·45	150·25	614·71	...
Do.	... 193c, 198c, 207c, 352c, 353c, 380c, 446c, 447c, 450c, 476c, 489c, 490c, 504c, 523c, 741c, 742c, 807c, 809c, 811c, 812c, 813c, 814c, 980c, 981c, 1082c, 1225c, 1226c, 1227c, 1228c, 1229c, 1230c, 1231c, 1232c, 1259c, 1291c, 1292c, 1341c, 1342c, 1343c, 1344c, 1345c, 1346c, 1347c	Sons of Gwalia, Ltd.	...	...	131,829·00	48,615·73	4,420·70	...	...	2,554,978·50	1,203,224·81	71,065·72
Do.	... 198c, 1082c ...	(Sons of Gwalia South G.M. Co., N.L.)	...	...	...	...	...	...	...	631·00	903·61	...
Do.	... 198c, 1082c, (1257c), (1258c), 1259c, (1284c), (1285c), (1300c), (1301c)	(Sons of Gwalia South G.Ms., Ltd.) ...	...	...	...	...	...	...	...	98,239·00	51,593·99	8·66
Do.	... 198c, 1082c, 1259c	(Sons of Gwalia South G.Ms., Ltd.) ...	...	...	...	...	...	...	...	9,909·00	3,169·89	...
Do.	... 263c	(Trump)	...	...	...	...	...	...	...	562·50	2,393·40	...
Do.	... 263c	Trump: Gwalia Central G.Ms., Ltd. ...	...	...	163·00	106·95	...	...	...	1,161·00	2,853·80	...
Do.	... 263c, (774c), (793c)	(Trump leases)	...	...	...	...	...	...	...	21,794·45	16,002·07	...
Do.	... ...	Voided leases	...	...	...	...	...	...	1,661·47	131,797·00	62,178·12	10·71
Do.	... ...	Sundry claims	6·59	...	38·00	197·36	...	6·59	196·07	8,469·55	7,910·93	...
Malcolm	... ...	Voided leases	...	...	...	...	...	...	47·07	62,301·78	47,425·54	...
Do.	... ...	Sundry claims	...	...	...	...	...	...	8·88	2,981·90	2,085·85	...
Mertondale	... ...	Voided leases	...	...	...	...	...	...	...	88,663·00	60,840·00	1,497·58
Do.	... ...	Sundry claims	...	...	40·00	50·38	...	...	55·24	1,092·46	1,538·97	...
Mt. Clifford	... 1329c	Victory No. 1	...	...	20·00	46·14	...	...	208·09	685·46	7,048·67	...
Do.	... (1502c)	Victory No. 2	...	...	2·00	8·12	...	...	...	8·50	64·35	...
Do.	... ...	Voided leases	...	...	...	...	...	...	1,364·45	3,265·50	6,996·22	...
Do.	... ...	Sundry claims	...	...	...	...	...	12·89	253·36	749·50	1,267·66	...
Pig Well	... (1295c)	(Starlight)	...	...	...	...	...	...	...	181·50	695·73	...
Do.	... (1295c), (1324c), (1461c), (1475c)	Starlight G.M. Syndicate, N.L. ...	...	...	65·00	33·17	...	...	...	336·25	203·33	...
Do.	... (1295c), (1324c) ...	(Starlight leases)	...	...	...	...	...	...	...	75·50	235·87	...
Do.	... ...	Voided leases	...	...	...	...	...	...	...	12,982·07	13,538·20	63·68
Do.	... ...	Sundry claims	...	...	40·00	1·79	...	...	34·61	2,598·40	1,102·78	...
Randwick	... (1401c)	Triangle	...	...	4·50	44·04	...	...	...	120 40	1,501·35	...
Do.	... ...	Voided leases	...	...	...	...	...	...	239·49	7,944·75	7,170·22	...
Do.	... ...	Sundry claims	...	...	...	...	...	66·57	111·18	1,282·14	944·20	...

TABLE IV.—*Production of Gold and Silver from all sources, etc.*—continued.

MT. MARGARET GOLDFIELD—*continued.*

MOUNT MALCOLM DISTRICT.

Mining Centre.	Number of Lease.	Registered Name of Company or Lease.	Total for 1919.					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.
Webster's Find	...	Voided leases	...	...	...	...	...	30·30	...	21,760·00	13,970·17	...
Do. ...	...	Sundry claims	...	...	...	...	...	36·37	15·73	1,397·80	939·58	...
Wilson's Creek	...	Voided leases	...	...	...	...	...	...	...	333·50	168·27	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	4·24	5·00	19·04	...
Wilson's Patch	1496c	Great Western	...	...	1,047·00	156·92	...	...	...	1,047·00	156·92	...
Do. ...	...	Voided leases	...	...	...	...	...	...	99·38	26,348·10	12,475·57	1·05
Do. ...	...	Sundry claims	...	...	14·00	66·54	...	...	1·50	798·00	1,081·56	...
		From District generally :—										
		Sundry Parcels treated at :										
		Fremantle Trading Co.'s Works	...	...	...	...	...	...	...	...	1·42	...
		State Battery, Leonora	...	...	...	...	...	...	...	95·50	10,370·34	98·14
		Various Works	...	...	...	...	...	...	...	371·50	7,149·72	20·12
		Reported by Banks and Gold Dealers	14·97	...	...	...	...	2,408·48	131·00	...	...	...
		Total	**22·96**	**1·45**	**133,542·50**	**49,482·33**	**4,420·70**	**2,562·60**	**7,197·44**	**3,112,193·88**	**1,593,427·56**	**72,789·71**

MOUNT MARGARET DISTRICT.

Burtville ...	2095T	Bell	...	...	12·00	12·15	...	...	...	12·00	12·15	...
Do. ...	2034T	General Bridges	...	...	...	...	...	...	...	58·00	43·39	...
Do. ...	1044T	Nil Desperandum	...	...	103·00	257·57	...	...	...	8,073·00	12,189·33	...
Do. ...	...	Voided leases	...	...	...	...	...	2·29	411·46	57,700·18	89,088·82	275·27
Do. ...	...	Sundry claims	...	...	...	17·66	...	...	54·75	3,171·40	2,862·31	...
Duketon ...	2102T	Dolorite	...	86·51	...	...	...	...	115·02	...	...	...
Do. ...	(2018T)	Hemitite	...	2·74	...	6·86	...	...	264·69	49·50	100·79	...
Do. ...	2029T	Limonite	...	...	...	...	...	...	294·51	·42	26·44	...
Do. ...	2110T	Silver Wedding	...	31·42	...	...	...	...	31·42	...	...	...
Do. ...	...	Voided leases	...	...	...	...	...	3·54	2,135·64	31,393·00	21,995·81	...
Do. ...	...	Sundry claims	...	...	...	29·84	...	...	19·00	238·50	366·37	...
Eagle's Nest ...	...	Voided leases	...	...	...	...	...	...	145·34	331·00	1,215·78	...
Do. ...	...	Sundry claims	...	...	...	...	...	4·00	193·75	70·00	45·65	...
Erlistoun ...	...	Voided leases	...	...	...	...	...	...	11·66	27,012·07	18,461·35	...
Do. ...	...	Sundry claims	...	...	...	...	...	1,179·43	116·81	2,120·98	1,837·10	...
Euro	1984T	(Lone Star)	...	...	...	...	...	...	...	2,840·00	714·96	...
Do. ...	1984T, 1991T, 2009T, 2014T	Lone Star leases	...	...	...	...	...	...	...	4,752·00	910·81	...
Do. ...	...	Voided leases	...	...	...	...	...	...	65·14	83,964·25	35,957·12	...

Do. ...	...	Sundry claims	...	...	...	...	...	...	46·52	259·50	116·69	...
Laverton ...	2058T	Augusta	...	3·95	25·50	8·58	...	...	3·95	231·51	160·94	...
Do. ...	2083T	Beria Main Reef	...	...	347·00	57·70	...	...	...	627·00	90·80	...
Do. ...	(2085T)	British Flag	...	...	...	...	...	...	...	31·50	12·44	...
Do. ...	(2076T), (2077T) ...	British Lion North leases ...	...	...	...	...	...	...	...	241·50	118·75	...
Do. ...	838T	(General Wabash)	...	...	...	...	...	...	...	100·00	288·72	...
Do. ...	(2099T)	Golden Circle	...	...	...	...	...	...	...	13·50	105·12	...
Do. ...	829T	(Ida H.)	...	...	...	...	...	...	...	111·00	285·13	...
Do. ...	829T, 838T, 846T, (1219T), (1310T), (1671T), (1894T)	Ida H. G.M. Co., Ltd.	...	...	4,300·58	3,206·88	...	...	...	229,897·46	170,117·88	4,674·69
Do. ...	715T, 806T, 1206T, (1207T), (1483T), 1523T, 1524T, 1525T, 1542T, (1544T), (1548T)	(Kalgoorlie and Boulder Firewood, Ltd.)	...	...	...	...	...	...	...	71,802·00	25,003·11	3,364·01
Do. ...	1897T	(Lady Harriet)	...	...	...	...	...	...	...	991·00	98·94	...
Do. ...	715T, 806T, 1206T, (1207T), (1483T), 1523T, 1524T, 1525T, 1542T, (1544T), (1548T)	(Lancefield G.M. Co., Ltd.)	...	...	...	...	...	...	...	102,179·78	39,402·81	...
Do. ...	715T, 806T, 1206T, (1207T), (1483T), 1523T, 1524T, 1525T, 1542T, (1544T), 1548T)	(Lancefield G.M. Co., Ltd.	...	...	...	...	...	...	...	153,829·00	58,842·47	5,824·39
Do. ...	715T, 806T, 1206T, (1207T), (1483T), 1523T, 1524T, 1525T, 1542T, (1544T), (1548T)	(Lancefield G.M. Co., Ltd.)	...	...	...	...	...	...	...	260,749·00	103,535·54	21,612·29
Do. ...	715T, 806T, 1206T, 1523T, 1524T, 1525T, 1542T, 2050T, 2051T	Lancefield G.Ms., Ltd.	...	...	78,068·00	28,649·74	5,124·80	...	...	272,740·00	98,605·06	16,701·47
Do. ...	(2067T)	Laverton Proprietary	...	...	...	...	...	...	...	166·00	20·02	...
Do. ...	1897T, 1900T, (1948T), 1949T, (1950T), 1962T, (1974T,) (1996T), (1997T)	Mary Mac G.M. Co., N.L.	...	...	3,155·00	496·43	...	...	...	32,683·00	7,465·50	...
Do. ...	1949T	(Pinnacles)	...	...	...	...	...	...	...	96·00	36·51	...
Do. ...	2108T	White Horse	...	...	26·25	7·23	...	...	...	26·25	7·23	...
Do. ...	...	Voided leases	...	...	...	...	...	17·66	2,020·16	180,972·95	79,678·22	...
Do. ...	...	Sundry claims	...	14·35	54·75	5·97	...	195·37	1,275·84	4,035·20	3,648·47	...
Mt. Barnicoat	...	Voided leases	...	...	...	...	...	...	...	652·00	359·12	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	23·00	23·37	...
Quartz Hill ...	...	Voided leases	...	...	...	...	...	...	...	10·00	3·86	...
Red Hill ...	...	Sundry claims	...	...	...	...	...	...	...	27·00	13·76	...
		From District generally :—										
		Sundry Parcels treated at :										
		Brown Hill Consols Works—Kalgoorlie	...	...	...	...	...	...	...	...	13·70	...
		Mulga Queen Works	...	...	6·00	2·27	...	...	...	6·00	181·20	...
		State Battery—Burtville	...	...	...	110·31	...	...	...	62·00	6,548·22	...
		State Battery, Laverton	...	...	...	319·83	...	...	...	77·50	2,046·52	...
		Various Works	...	...	...	...	...	...	...	89·00	3,055·22	...
		Reported by Banks and Gold Dealers	14·86	...	...	...	...	2,012·03	...	...	...	...
		Total	**14·86**	**138·97**	**86,098·08**	**33,189·02**	**5,124·80**	**3,414·32**	**7,205·66**	**1,534,515·95**	**785,713·50**	**52,452·12**

TABLE IV.—*Production of Gold and Silver from all sources, etc.*—continued.

North Coolgardie Goldfield.

MENZIES DISTRICT.

Mining Centre.	Number of Lease.	Registered Name of Company or Lease	Total for 1919.					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 ...	5217z	(Gladsome)	...	...	...	...	...	...	...	10,879·50	8,678·16	95·29
Do. ...	5217z, 5333z, 5380z	Gladsome Leases	...	...	4,950·00	3,360·44	156·24	...	...	64,870·00	47,739·62	1,410·36
Do. ...	5300z	Happy Jack : Forwood, Down & Co., Ltd.	...	...	136·00	53·00	...	...	...	136·00	53·00	...
Do. ...	5300z	(Happy Jack)	...	...	...	...	...	...	...	1,363·50	776·10	...
Do. ...	5300z, (5325z) ...	(Happy Jack leases)	...	...	...	...	...	...	...	7,691·50	3,922·48	...
Do. ...	(5325z)	(Iron King)	...	...	...	...	...	...	...	41·50	20·62	...
Do. ...	5410z	Lake View	...	6·66	24·00	3·54	...	...	6·66	258·71	90·91	...
Do. ...	5300z, (5325z), (5451z)	(Princess Royal G.M. Co., N.L.) ...	...	...	60·00	41·16	...	...	...	1,110·00	427·34	...
Do. ...	5312z	(Sand King)	...	...	...	...	...	...	...	35·50	30·33	...
Do. ...	5211z	(Sand Queen)	...	...	...	...	...	...	...	3,436·75	3,639·12	2·00
Do. ...	(5208z), 5211z, 5224z, 5320z	(Sand Queen G.Ms., Ltd.)	...	...	...	...	...	...	...	6,083·50	2,949·83	...
Do. ...	5211z, 5224z, 5312z, 5320z	Sand Queen G.Ms., Ltd.	...	...	2,284·60	2,406·24	...	...	...	116,425·22	100,662·46	3,658·76
Do. ...	...	Voided leases	...	...	...	...	...	...	409·70	10,067·60	5,528·34	2·00
Do. ...	...	Sundry claims	...	...	18·00	12·03	...	...	31·91	632·75	435·72	...
Goongarrie ...	5466z	Little Grace	...	372·13	18·50	463·85	...	...	372·13	18·50	463·85	...
Do. ...	(5414z)	(New Boddington)	...	...	...	...	...	...	191·83	412·70	1,785·68	...
Do. ...	(5414z), (5428z), (5435z), (5430z)	New Boddington Gold Mining Syndicate, Ltd.	...	...	...	...	...	...	...	11,818·00	5,238·79	...
Do. ...	...	Voided leases	...	...	...	...	...	·94	463·55	14,949·09	9,940·52	...
Do. ...	...	Sundry claims	...	171·06	121·55	275·50	...	33·72	481·49	974·80	1,080·94	...
Menzies ...	5440z	Crusoe North	...	...	228·50	173·63	...	...	...	1,195·00	1,066·00	...
Do. ...	5423z	Lady Shenton	...	...	651·25	558·45	...	...	...	4,709·50	3,510·97	...
Do. ...	(5462z)	Mabel	...	...	...	...	...	...	...	118·50	213·29	...
Do. ...	4931z, 4934z, 4935z, 4936z, 5074z, 5075z, 5260z, 5261z, 5315z	Menzies Consolidated G.Ms., Ltd. ...	...	...	23,111·00	11,228·11	...	...	...	435,369·00	231,452·71	78·67
Do. ...	(2832z), (2844z), 3100z, (3138z), (4966z), (5392z)	Menzies Mining and Exploration Corporation, Ltd.	...	...	...	...	...	...	...	26,410·00	29,963·12	...
Do. ...	(5392z)	(Revival)	...	...	...	...	...	...	...	22·50	5·90	...
Do. ...	2823z	Robinson Crusoe	...	...	298·50	186·39	...	...	13·24	4,966·25	2,724·85	...
Do. ...	2823z	(Robinson Crusoe: Crusoe Gold Claims, Ltd.)	...	...	...	...	...	...	...	33,135·00	32,978·74	1,038·47
Do. ...	...	Voided leases	...	...	...	...	...	45·42	1,035·80	307,163·21	356,748·36	10,224·59
Do. ...	...	Sundry claims	...	...	683·50	363·19	8·00	6·69	359·68	17,038·75	12,651·56	768·49

Mt. Ida ...	(5250z)	Forest Belle	...	...	...	...	...	...	...	4,809·00	4,149·01	...
Do. ...	5471z	Lucknow	...	...	67·00	120·12	...	...	...	67·00	120·12	...
Do. ...	5290z	(Unexpected South)	...	...	...	...	...	...	...	1,136·00	714·65	8·25
Do. ...	5290z, (5329z), (5381z)	(Unexpected South Leases) ...	...	...	...	...	...	...	...	4,524·00	8,179·29	35·64
Do. ...	5290z, 5454z ...	Unexpected South Leases ...	...	...	...	...	...	...	...	23·00	7·24	...
Do. ...	(5292z)	Wild Rose	...	...	...	...	...	...	...	1,150·79	937·33	...
Do. ...	...	Voided leases	...	...	...	...	...	...	77·07	44,306·58	52,958·33	62·74
Do. ...	...	Sundry claims	16·48	...	562·50	127·24	...	31·22	9·57	4,780·00	2,722·52	...
		From District generally :—										
		Sundry Parcels treated at :										
		Balkis Battery	...	...	...	570·92	...	...	...	50·75	4,458·74	...
		Crusoe Wedderburn Cyanide Works	...	...	...	...	...	...	...	...	1,497·89	...
		Fremantle Trading Co., Ltd.. Works	...	...	...	...	...	...	...	...	212·98	...
		Gidney's Cyanide Works	...	...	...	169·05	...	...	...	...	169·05	...
		Lady Harriet Battery	...	...	7·50	154·63	...	...	...	244·00	2,854·66	...
		Menzies Mining & Exploration Corporation, Ltd., Works	...	...	...	...	...	...	...	639·50	732·04	...
		Mt. Ida Meteor Works	...	...	...	...	...	...	...	...	1,916·49	...
		State Battery, Mt. Ida	...	...	...	...	...	...	...	1,842·25	4,484·34	...
		Various Works	...	...	...	...	...	...	...	1,807·05	21,725·38	10,394·43
		Reported by Banks and Gold Dealers	25·40	...	...	...	...	955·48	195·48	...	...	...
		Total	**41·88**	**549·85**	**33,222·40**	**20,267·49**	**164·24**	**1,073·47**	**3,648·11**	**1,147,432·75**	**972,619·37**	**18,424·69**

ULARRING DISTRICT.

Davyhurst ...	(972u)	Little Dele	...	...	2,422·00	171·44	...	...	...	8,885·00	732·89	...
Do. ...	...	Voided leases	...	...	...	...	...	2·93	138·99	146,759·73	122,330·54	5,403·14
Do. ...	...	Sundry claims	...	...	35·00	35·62	...	...	30·12	5,891·85	3,096·68	...
Diemel's Find	...	Sundry claims	...	...	...	...	...	...	7·37	102·50	119·13	...
Mulline ...	(987u)	Just in Time	...	...	...	...	...	...	...	5·50	11·70	...
Do. ...	139u, (235u), (555u), (670u), (671u), (679u), (732u), (862u)	(Lady Gladys G.M. Co., N.L.) ...	...	...	...	...	...	...	...	16,871·50	17,777·42	...
Do. ...	139u, (235u), (555u), (670u)	(Lady Gladys G.M. Co., N.L.) ...	...	...	...	...	...	...	...	1,220·50	512·52	...
Do. ...	139u, (235u), (555u)	(Lady Gladys Leases)	...	...	...	...	...	...	170·89	7,741·00	15,025·05	...
Do. ...	139u, (235u), (555u), (670u)	Lady Gladys Leases	...	...	16·75	3·91	...	...	...	997·50	482·14	...
Do. ...	324u, 600u, 730u, 969u, 970u, 974u, 975u	Riverina South G.M. Co., N.L. ...	...	...	1,389·25	502·67	...	...	...	5,017·25	5,055·02	227·04
Do. ...	324u, 600u, 730u	Riverina South leases	...	...	...	...	...	...	43·87	18,480·50	13,442·65	...
Do. ...	763u	Young Australian	...	...	60·25	78·28	...	...	...	531·25	723·72	...
Do. ...	763u	(Young Australian)	...	...	...	...	...	...	...	1,295·00	3,609·26	...
Do. ...	763u, (938u), (939u)	(Young Australian Leases) ...	...	...	...	...	...	...	...	2,672·25	5,763·88	...
Do. ...	...	Voided leases	...	...	...	...	...	...	59·33	39,756·22	33,959·65	2·71
Do. ...	...	Sundry claims	...	...	242·25	81·18	...	...	35·53	5,794·76	4,588·63	·69
Mulwarrie ...	...	Voided leases	...	...	...	...	...	...	56·84	18,397·64	25,527·59	26·37
Do. ...	...	Sundry claims	...	...	77·99	52·92	...	...	21·45	2,082·36	1,855·55	...
Ularring ...	...	Voided leases	...	...	...	...	...	...	563·34	9,429·60	13,647·97	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	143·00	113·15	...

TABLE IV.—*Production of Gold and Silver from all sources, etc.*—continued.

NORTH COOLGARDIE GOLDFIELD—*continued.*

ULARRING DISTRICT—*continued.*

Mining Centre.	Number of Lease.	Registered Name of Company or Lease.	Total for 1919.					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.
		From District generally :—										
		Sundry Parcels treated at :										
		Expansion Battery	...	...	...	...	...	...	...	96·50	188·65	...
		Hannan's Central Battery, Kalgoorlie	...	...	...	...	...	...	...	18·40	4·66	...
		State Battery, Mulline	...	...	9·50	5·64	...	...	...	513·50	12,992·19	...
		State Battery, Mulwarrie	...	...	...	...	...	...	...	595·20	4,762·31	...
		Various Works	...	...	...	...	...	...	15·82	90·25	465·72	...
		Reported by Banks and Gold Dealers	...	...	...	...	...	18·53	·77	...	...	...
		Total	...	...	**4,252·99**	**931·66**	...	**21·46**	**1,144·32**	**293,388·76**	**286,788·67**	**5,659·95**
		NIAGARA DISTRICT.										
Desdemona ...	...	Voided leases	...	...	...	...	...	...	5·73	9,585·25	7,471·39	12·04
Do. ...	...	Sundry claims	...	...	...	...	...	...	8·99	1,331·70	634·19	...
Kookynie ...	756G	Cosmopolitan No. 1	...	...	96·50	60·85	...	...	...	96·50	60·85	...
Do. ...	758G	(Cosmopolitan No. 1 : Cosmopolitan Proprietary, Ltd.)	...	...	...	...	...	...	...	578·00	793·00	...
Do. ...	756G	(Cosmopolitan No. 1 : Western Machinery Co., Ltd.)	...	...	16·50	7·73	...	...	...	449·84	377·71	...
Do. ...	757G	(Cosmopolitan No. 2 : Cosmopolitan Proprietary, Ltd.)	...	...	...	...	...	...	...	710·00	909·66	...
Do. ...	757G	Cosmopolitan No. 2 : Western Machinery Co., Ltd.)	...	...	365·50	373·11	...	...	...	3,081·00	3,596·68	...
Do. ...	769G	(Two Ds.)	...	...	...	...	...	...	...	100·00	14·01	...
Do. ...	769G, 770G, 771G	Two Ds. Leases	...	...	610·00	76·77	...	...	...	810·00	480·82	...
Do. ...	...	Voided leases	...	...	...	...	...	...	257·33	728,797·47	382,319·79	5,375·97
Do. ...	...	Sundry claims	...	...	10·00	11·38	...	30·59	90·14	4,680·35	4,294·34	...
Niagara ...	...	Voided leases	...	...	...	...	...	...	104·54	84,472·50	51,887·97	...
Do. ...	...	Sundry claims	...	...	20·00	48·55	...	13·27	70·23	9,818·79	6,039·66	...
Tampa ...	...	Voided leases	...	...	...	...	...	...	15·66	49,271·87	22,173·80	174·24
Do. ...	...	Sundry claims	...	...	16·00	13·09	...	5·07	69·44	3,202·00	1,888·09	...
		From District generally :—										
		Sundry Parcels treated at :										
		Grafter Battery	...	...	16·00	41·25	...	...	...	98·00	448·91	...
		Hainault Sulphide Plant	...	...	...	9·03	...	...	...	...	9·03	...
		Lubra Queen G.M. Co., N.L., Works	...	...	...	...	...	...	...	...	153·47	...
		State Battery, Niagara	...	...	...	104·75	...	...	...	622·50	8,875·11	...
		Various Works	...	...	...	...	...	...	...	451·00	6,356·43	41·17
		Reported by Banks and Gold Dealers	...	...	...	...	...	1,426·26	787·38	...	...	...
		Total	...	...	**1,150·50**	**746·51**	...	**1,475·19**	**1,409·44**	**898,156·77**	**498,784·91**	**5,603·42**

NOTE.—Prior to 31st August, 1917, the mining centres of Eucalyptus, Linden, Mt. Celia, Mt. Howe, and Yundamindera were included in Yerilla District, and the output is recorded in that District. From 1st September, 1917, the output from these centres is shown in Mt. Morgans District, to which they were transferred.

Edjudina ...	1054R	Missing Link	...	...	44·50	26·65	...	...	...	44·50	26·65	...
Do. ...	1018R	Neta Extended	...	...	11·00	6·87	...	...	...	634·58	647·78	...
Do. ...	(1010R), 1011R ...	Neta Leases	...	...	123·75	82·28	...	...	...	530·75	422·29	...
Do. ...	1015R	Senate	...	...	58·00	36·84	...	...	4·38	1,278·50	1,531·10	...
Do. ...	...	Voided leases	...	...	...	...	...	...	14·06	29,649·12	39,077·22	37·79
Do. ...	...	Sundry claims	...	...	151·00	166·18	...	...	21·26	3,098·50	2,586·17	...
Eucalyptus ...	...	Voided leases	...	...	...	...	...	...	2,864·77	1,351·35	3,020·68	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	367·50	362·50	381·82	...
Linden ...	998R, [344F] ...	Bindah	...	...	...	...	...	...	...	1,462·50	531·95	...
Do. ...	871R, [340F] ...	Democrat	...	...	...	...	...	...	9·01	2,245·25	5,026·30	...
Do. ...	1024R, [346F] ...	Great Carbine	...	...	...	...	...	...	...	67·75	20·30	...
Do. ...	942R, [342F] ...	Great Junction	...	...	...	...	...	...	6·11	1,086·75	1,030·90	...
Do. ...	(1005R), [(345F])	Olympic	...	...	...	...	...	...	...	442·50	655·11	...
Do. ...	903R, [341F], 985R, [343F]	Torquay Leases	...	...	...	...	...	...	...	325·68	107·45	...
Do. ...	903R, [341F], (904R), 985R, [343F], (992R)	(Westralia United Goldfields, Ltd.)	...	...	...	...	...	...	...	1,995·00	1,452·42	...
Do. ...	...	Voided leases	...	...	...	...	...	7·53	538·04	11,942·60	14,854·48	...
Do. ...	...	Sundry claims	...	...	...	...	...	77·81	35·11	6,493·25	4,798·42	...
Mount Celia ...	...	Voided leases	...	...	...	...	...	...	...	14·00	5·39	...
Mt. Howe ...	...	Sundry claims	...	...	...	...	...	...	...	5·00	11·13	...
Mt. Remarkable ...	...	Voided leases	...	...	...	...	...	...	17·74	528·72	415·09	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	4·00	1·32	...
Pinjin ...	...	Voided leases	...	...	...	...	...	...	46·99	14,637·80	10,306·68	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	99·36	3,422·35	2,297·51	...
Yarri ...	...	Voided leases	...	...	...	...	...	6·30	87·08	36,822·75	19,124·10	2·00
Do. ...	...	Sundry claims	...	...	111·00	47·50	...	...	5·31	5,418·60	2,865·44	...
Yerilla ...	...	Voided leases	...	...	...	...	...	...	3,089·51	15,619·21	12,313·06	13·93
Do. ...	...	Sundry claims	...	...	...	...	...	19·30	15·88	2,401·00	1,338·07	...
Yilgangie ...	...	Voided leases	...	...	...	...	...	...	...	218·75	295·45	...
Do. ...	...	Sundry claims	...	...	...	...	...	121·67	29·83	25·50	46·17	...
Yundamindera ...	...	Voided leases	...	...	...	...	...	...	80·47	69,067·85	46,004·87	5·82
Do. ...	...	Sundry claims	...	...	...	...	...	...	85·22	3,151·25	2,740·75	...
		From District generally :—										
		Sundry Parcels treated at :										
		Battles Ville Battery	...	...	...	...	...	...	...	...	621·83	...
		Fremantle Trading Co., Ltd., Works	...	...	...	...	...	...	...	...	4·92	...
		Neta Battery	...	...	...	...	...	...	...	...	325·69	...
		State Battery, Linden	...	...	...	...	...	...	...	72·00	4,030·90	...
		State Battery, Pingin	...	...	...	...	...	...	...	125·50	1,278·16	...
		State Battery, Yarri	...	...	...	115·70	...	...	...	231·50	4,412·89	3·50
		State Battery, Yerilla	...	...	...	...	...	2·17	...	72·00	1,257·22	...
		Various Works	...	...	...	...	...	...	...	660·85	3,999·04	...
		Reported by Banks and Gold Dealers	...	...	...	...	...	1,011·56	154·74	...	...	...
		Total	...	...	**499·25**	**482·02**	...	**1,246·34**	**7,572·37**	**215,509·71**	**189,866·72**	**63·04**

TABLE IV.—*Production of Gold and Silver from all sources, etc.*—continued

Broad Arrow Goldfield.

Mining Centre.	Number of Lease.	Registered Name of Company or Lease.	Total for 1919.					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.
Bardoc ...	1807w	Birthday	...	...	...	...	...	...	...	8·34	8·32	...
Do. ...	(1827w)	Revenue	...	...	25·80	22·26	...	...	...	33·32	30·33	...
Do. ...	(1803w)	Zoroastrian	...	...	...	...	...	...	928·55	12·00	310·02	...
Do. ...	(1833w)	Zoroastrian	...	23·25	6·45	80·41	...	...	23·25	6·45	80·41	...
Do. ...	...	Voided leases	...	...	...	...	...	...	935·13	73,074·89	51,267·14	203·60
Do. ...	...	Sundry claims	...	...	16·80	46·54	...	43·02	559·27	3,040·23	2,679·39	...
Black Flag ...	...	Voided leases	...	...	...	...	...	27·81	373·99	40,332·13	24,451·48	...
Do. ...	...	Sundry claims	...	5·86	121·75	134·55	...	686·51	171·64	2,113·48	1,999·04	...
Broad Arrow	1825w	Credo: Credo Gold Mining Syndicate, No Liability	...	...	18·92	3·67	...	...	...	18·92	3·67	...
Do. ...	(1820w)	Dixie Regina	...	...	...	...	...	...	...	11·20	36·94	...
Do. ...	1771w	North Duke	...	114·34	...	...	...	...	279·11	84·30	373·58	...
Do. ...	1799w	Oversight	...	...	...	...	...	...	1,214·31	138·00	446·45	...
Do. ...	1735w	Tara	...	1,122·22	136·00	383·53	...	...	3,164·85	349·90	1,378·68	...
Do. ...	...	Voided leases	...	...	...	...	...	54·85	2,313·89	117,724·49	97,562·88	15·85
Do. ...	...	Sundry claims	...	...	563·30	427·15	...	969·86	1,219·84	8,471·55	6,121·69	...
Carnage ...	...	Voided leases	...	...	...	...	...	...	...	138·00	251·97	...
Paddington ...	(1816w), (1819w)	Mt. Eddy leases	...	...	...	...	...	...	...	298·56	134·50	...
Do. ...	...	Voided leases	...	...	...	...	...	5,557·72	257·75	174,811·02	82,063·80	18·96
Do. ...	...	Sundry claims	...	...	30·00	30·95	...	1,714·16	2·13	10,202·98	6,580·14	...
Siberia ...	1399w, 1424w, 1429w, 1442w, 1655w	Associated Northern Blocks (W.A.), Ltd.	...	...	18,338·50	8,618·55	...	...	...	226,894·59	80,438·87	1,664·70
Do. ...	1774w	Christmas Lone Hand	...	...	...	...	...	...	...	39·00	187·70	...
Do. ...	(1811w)	Dark Horse	...	...	10·00	11·58	...	...	...	83·62	761·67	...
Do. ...	1371w	Gimblet South	...	...	634·00	152·54	...	...	...	71,592·50	12,016·48	...
Do. ...	1399w	(Gimblet South Extended) ...	...	...	...	...	...	...	...	525·00	835·44	...
Do. ...	1399w, 1424w, 1429w, 1442w	(Gimblet South Extended leases)	...	...	...	...	...	...	...	215·00	39·98	...
Do. ...	1338w	(Gimblet West)	...	...	...	...	...	...	...	680·50	482·83	...
Do. ...	1289w, (1308w) ...	(Lady Evelyn Leases)	...	...	...	...	...	...	25·26	5,376·25	5,267·70	...
Do. ...	1736w	Pole	...	...	...	...	...	...	...	60·00	15·62	...
Do. ...	1823w	Reality	...	...	33·00	90·10	...	...	...	111·00	712·85	...
Do. ...	1375w	(Siberia Consols)	...	...	...	...	...	...	41·58	1,013·50	3,136·03	...
Do. ...	1375w	Siberia Consols	...	...	...	...	...	...	...	581·25	1,236·74	...
Do. ...	1375w, (1610w), (1720w)	(Siberia Consols G.M. Co., N.L.) ...	...	...	...	...	...	...	39·23	352·50	598·52	...
Do. ...	1336w	(Slippery Gimblet)	...	...	...	...	...	...	...	26,110·50	8,217·79	...
Do. ...	1336w, 1338w, (1419w)	Slippery Gimblet Leases: Associated Northern Blocks (W.A.), Ltd.	...	...	...	...	...	...	...	4,697·00	1,774·52	...

Do. ...	...	Voided leases	...	...	...	...	...	...	...	789·17	23,523·30	12,250·36	...
Do. ...	...	Sundry claims	...	...	203·75	89·75	...	126·49	537·09		7,628·89	6,926·15	...
Smithfield ...	...	Voided leases	...	...	...	...	...	...	...		1,027·00	200·90	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	23·79		49·50	149·47	...
		From Goldfield generally :—											
		Sundry Parcels treated at :											
		Brown Hill Consols Works—Kalgoorlie	...	...	...	...	...	...	...		38·99	15·32	...
		Fremantle Trading Co., Ltd., Works	...	...	...	...	...	...	...		...	80·10	...
		Hannan's Central Works—Kalgoorlie	...	...	...	...	...	...	...		8·70	15·47	...
		Hainault Sulphide Plant	...	...	...	9·57	...	...	...		...	9·57	...
		Pole Works	...	...	...	...	...	...	...		...	356·07	...
		Regan's Carnage Battery	...	...	...	...	...	...	...		27·00	598·81	...
		State Battery—Ora Banda	...	...	...	291·67	...	...	...		47·00	1,525·06	...
		State Battery—Siberia	...	...	...	...	...	...	...		40·00	746·57	...
		Zoroastrian Works	...	...	...	...	...	...	...		116·50	1,082·23	...
		Various Works	...	...	...	...	...	2,271·17	...		16,622·68	31,760·91	278·85
		Cement from Alluvial Claims at Paddington	...	...	...	...	...	...	...		50·94	8·72	...
		Cement from Alluvial Claims at Siberia	...	...	...	...	...	...	...		1,052·30	209·31	...
		Reported by Banks and Gold Dealers	70·08	...	...	...	...	7,793·93	...		...	...	...
		Total	**70·08**	**1,265·67**	**20,138·27**	**10,392·82**	...	**19,245·52**	**12,899·83**		**819,434·77**	**447,438·19**	**2,181·96**

North-East Coolgardie Goldfield.

KANOWNA DISTRICT.

Black Swan ...	...	Voided leases	...	...	...	...	...	...	...		160·00	141·76	...
Gambier ...	...	Voided leases	...	...	...	...	...	...	38·73		12,729·00	6,638·30	·07
Do. ...	...	Sundry claims	...	...	...	...	...	24·70	245·94		858·75	750·42	...
Gindalbie ..	..	Voided leases	...	...	...	...	...	...	19·94		43,605·08	39,435·32	38·31
Do. ...	...	Sundry claims	...	...	...	...	...	...	674·82		1,017·75	1,207·80	...
Gordon ...	1385x	Pride of the Morning	...	...	1,000·00	153·74	...	...	...		2,170·00	233·69	...
Do. ...	...	Voided leases	...	...	...	...	...	...	268·25		40,607·30	11,425·99	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	54·65		630·50	577·80	...
Kanowna ...	(1362x)	Beck's Reward	...	...	...	...	...	...	...		714·00	348·79	...
Do. ...	(1380x)	Gentle Polly	...	...	...	...	...	...	...		53·00	21·80	...
Do. ..	1389x	Golden Valley	...	...	689·00	159·51	...	...	...		762·00	209·45	...
Do ...	1019x	Kanowna	5·84	...	867·00	4,111·32	...	5·84	691·94		9,232·50	14,072·39	...
Do. ..	1299x	(Kanowna Consol)	...	...	...	...	...	...	...		713·50	129·30	...
Do. ...	1299x	(Kanowna Consol)	...	...	...	...	...	...	...		339·00	207·36	...
Do. ...	1299x, (1300x) ...	(Kanowna Consol Leases) ...	...	...	...	...	...	...	6·76		312·00	261·31	...
Do. ...	1299x, 1379x ...	Kanowna Consol leases ...	...	...	101·00	134·37	...	...	...		1,247·00	933·58	...
Do. ...	18x, (19x) ...	(Lily Australis G.Ms., Ltd.)	...	...	...	...	...	...	...		197·00	119·18	...
Do. ...	(1360x), (1361x)...	New Moon leases	...	...	...	...	...	...	...		494·00	453·31	...
Do. ...	(1384x)	New Moon South	...	...	...	88·03	...	...	...		160·00	192·42	...
Do. ...	(3x), (14x), 15x, 18x, (19x), (60x), (81x), (938x), (974x), (1035x), (1103x), (1263x)	(North White Feather G.Ms., Ltd.) ...	...	...	...	...	...	...	...		147,974·75	74,343·01	159·19
Do. ...	(14x), 15x, 18x, (19x), (974x), (1035x), (1103x), (1263x), (1276x), (1278x)	(North White Feather G.Ms., Ltd.) ...	...	...	...	...	...	...	...		37,768·50	10,594·79	...

TABLE IV.—*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 1919.					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.
Kanowna ...	12x, 13x, (14x), 15x, 18x, (19x), (72x), (855x), (974x), (1035x), (1103x), (1263x), (1278x)	North White Feather G.Ms., Ltd. ...	...	...	99·00	59·87	...	...	...	54,316·27	24,349·63	...
Do. ...	(1367x)	Victoria Extended	...	...	...	...	...	...	...	190·00	44·55	...
Do. ...	12x, 13x, (14x), 15x, (855x), (1001x), (1012x), (1103x), (1107x), (1108x), (1109x)	(White Feather Main Reefs, Ltd.) ...	...	...	...	...	...	...	...	123,327·56	82,334·52	1,675·68
Do. ...	(9x), (10x), 12x, 13x, (72x), (83x), (201x), (855x), (1001x), (1012x), (1108x), (1249x)	(White Feather Main Reefs (1906), Ltd.)	...	...	...	...	...	...	20·45	24,393·00	9,138·31	...
Do. ...	...	Voided leases	...	...	...	...	...	3·59	3,674·54	244,567·46	136,391·84	647·37
Do. ...	...	Sundry claims	...	...	243·00	266·09	...	88·95	1,364·75	13,876·91	6,972·64	1·50
Mulgarrie ...	...	Voided leases	...	...	...	...	...	...	1,216·63	5,843·26	3,567·48	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	13·29	846·00	500·16	...
Six Mile ...	...	Voided leases	...	...	...	...	...	...	1,595·63	559·00	767·72	...
Do. ...	...	Sundry claims	...	...	24·00	18·58	...	...	31·44	141·50	103·37	...
	From District generally :—											
	Sundry Parcels treated at :											
	Kalgoorlie Foundry, Ltd., Works		...	...	...	...	...	...	...	...	553·56	...
	Lady Pratt Works		...	...	...	...	...	...	...	16·00	277·83	...
	Old Cement Works—Martin's		...	...	...	169·60	...	...	...	102·78	11,923·44	...
	Riedel and Norton's Works		...	...	...	70·44	...	...	...	642·00	2,306·21	...
	Various Works		...	...	...	...	...	25·01	...	903·10	23,131·41	...
	Totals for Leases and Quartz Claims		5·84	...	3,023·00	5,231·55	...	148·09	9,917·76	771,470·47	464,660·44	2,522·12
	Cement from Alluvial Claims :											
	Reported by Owners		...	...	...	...	...	305·41	867·52	26,376·40	12,715·90	...
	Treated locally (not reported by owners) at :											
	Lady Pratt Works		...	...	...	...	...	...	...	15·00	3·18	...
	Old Cement Works—Martin's		...	...	...	...	...	...	...	10,791·00	3,527·94	...
	Riedel and Norton's Works		...	...	...	...	...	...	...	14,717·00	2,190·47	...

Various Works			...	...	...	...	...	...	...	...	77,350·21	54,918·51	...
Treated outside District (not reported by owners) ...			...	...	...	...	...	...	...	...	27,854·55	36,723·92	...
Reported by Banks and Gold Dealers			13·57	...	...	...	...	103,943·30	·86	...	...	84·69	...
Total			**19·41**	**...**	**3,023·00**	**5,231·55**	**...**	**140,396·80**	**10,786·14**	**928,574·63**	**574,825·05**	**2,522·12**	

KURNALPI DISTRICT.

Jubilee ...	...	Voided leases	...	...	...	...	...	...	145·13	1,821·25	1,408·51	...	
Do. ...	...	Sundry claims	...	...	...	...	...	18·87	...	46·00	28·91	...	
Kurnalpi ...	427K	Agoriad Aur	...	118·11	...	...	...	...	118·11	...	...	...	
Do. ...	423K	Kurnalpi Pride	...	...	...	...	...	...	578·45	11·80	231·73	...	
Do. ...	...	Voided leases	...	...	...	...	...	371·18	1,785·95	2,805·31	2,245·39	6·27	
Do. ...	...	Sundry claims	...	...	...	...	...	226·49	77·08	130·00	157·19	...	
Mulgabbie ...	(424K)	John Bull	...	...	...	...	...	...	44·48	2·00	212·98	...	
Do. ...	428K	Try Again	...	103·01	...	...	...	...	103·01	...	...	...	
Do. ...	...	Voided leases	...	...	...	...	...	...	562·31	82·65	7,077·71	4·95	
Do. ...	...	Sundry claims	...	...	...	...	...	6·50	1,432·79	137·50	820·13	...	
From District generally :													
Sundry Parcels treated at :													
Various Works			...	...	...	...	...	...	...	56·50	193·15	...	
Reported by Banks and Gold Dealers			...	...	...	...	...	11,366·21	19·62	...	...	...	
Total			**...**	**221·12**	**...**	**...**	**...**	**11,939·25**	**4,866·93**	**5,093·01**	**12,375·70**	**11·22**	

East Coolgardie Goldfield.

EAST COOLGARDIE DISTRICT.

Binduli ...	...	Voided leases	...	...	...	...	...	...	...	175·80	97·60	...	
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	138·47	74·34	...	
Boorara ...	(4569E)	Elsie May	...	...	...	...	...	...	...	420·92	317·64	...	
Do. ...	(4610E)	Eva	...	...	15·10	11·54	...	...	113·28	48·60	122·57	...	
Do. ...	3908E, 3910E, (3912E), (4033E), (4045E), (4327E)	(Golden Ridge G.M. Co., Ltd.) ...	...	...	...	...	...	...	...	239,600·10	132,893·92	408·36	
Do. ...	4629E	Jewel	...	...	90·50	95·72	...	...	...	118·50	196·84	...	
Do. ...	3908E, 3910E, 4625E	Waterfall Gold Mine Leases ...	...	...	3,280·00	1,700·04	...	...	...	5,973·00	3,692·66	...	
Do. ...	3908E, 3910E, (3912E), (4033E)	(Waterfall Leases)	...	...	...	...	...	...	...	2,849·00	2,389·48	...	
Do. ...	4634E	Waterfall South	...	...	50·00	24·38	...	...	...	50·00	24·38	...	
Do. ...	...	Voided leases	...	...	...	...	...	...	268·28	56,602·63	31,233·31	...	
Do. ...	...	Sundry claims	...	...	90·60	112·21	...	·49	53·46	397·60	419·09	...	
Boulder ...	392E	(Acrobat : Paringa Consolidated Mines, Ltd.)	....	...	...	...	...	...	...	10·25	37·15	...	
Do. ...	392E	Acrobat : Paringa Mines (1909), Ltd.	...	...	630·94	243·84	...	...	...	14,280·61	6,673·67	...	
Do. ...	38E, 71E, 72E, (101E)	Associated G.Ms. of W.A., Ltd. ...	...	...	55,020·70	23,036·76	415·23	...	8·49	1,835,623·20	1,016,289·45	31,048·91	
Do. ...	49E, (4211E) ...	Associated Northern Blocks (W.A.), Ltd.	...	...	22,975·89	24,766·65	...	...	524·18	392,316·60	479,755·36	4,844·50	

TABLE IV.—*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 1919.					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 ...	(682E), 902E, 923E, 986E, (1064E), 1124E, 1196E, 4075E	(Boulder Deep Levels, Ltd.)	...	...	...	...	...	...	...	3,043·00	1,778·10	26·71
Do. ...	902E, 923E, 986E, 1124E, 1196E, 4075E	(Boulder Deep Levels (1907), Ltd.) ...	...	...	...	...	...	...	...	787·50	210·30	...
Do. ...	281E	(Brookman Bros.: Boulder G.M. Co., Ltd.)	...	...	...	...	...	...	...	8,655·00	8,417·00	...
Do. ...	4633E	Brown Hill Extended, Ltd.	...	...	180·23	22·38	...	...	...	180·23	22·38	...
Do. ...	(558E), (1175E), (3961E)	Brown Hill Extended, Ltd.	...	...	...	...	...	...	...	34,746·58	45,535·84	...
Do. ...	24E, (888E), 949E	Central and West Boulder G.Ms., Ltd.	...	...	359·00	178·99	...	...	...	66,076·86	33,422·17	...
Do. ...	352E	(Chaffer's G.M. Co., Ltd.)	...	...	...	...	...	...	...	4,256·00	1,299·03	161·50
Do. ...	352E, 873E, 4334E	(Chaffer's G.M. Co., Ltd.)	...	...	...	...	...	...	...	111,111·00	44,796·77	...
Do. ...	352E, 873E, 4334E	(Chaffer's Gold Mining Co. (1913), Ltd.)	...	...	...	...	...	...	...	13,350·00	3,334·91	129·57
Do. ...	1621E	(Croesus Proprietary G.M. Co.) ...	...	...	...	...	...	...	...	79·00	45·87	...
Do. ...	4617E	Croesus South	...	...	671·00	421·80	...	...	...	1,183·00	585·60	...
Do. ...	4627E	Garvagh	...	...	123·00	68·31	...	...	...	192·00	225·14	...
Do. ...	351E, 1001E, 1002E, 1085E, 1113E, 1219E, 1326E, 1397E	Golden Horseshoe Estates, Co., Ltd.	...	...	105,588·00	47,651·10	27,054·63	...	...	4,128,650·00	2,604,421·47	486,825·19
Do. ...	750E	(Golden Link Consolidated G.Ms., Ltd.)	...	...	...	...	...	...	...	10,729·00	6,096·80	...
Do. ...	2325E, 2326E ...	(Golden Link Consolidated G.Ms., Ltd.)	...	...	...	...	...	...	...	1,525·00	733·48	...
Do. ...	750E, 1621E ...	(Golden Links, Ltd.)	...	...	...	...	...	...	...	87,115·02	43,504·60	19·06
Do. ...	873E	(Great Boulder Main Reefs, Ltd.) ...	...	...	...	...	...	...	...	143,292·39	119,541·14	761·98
Do. ...	50E	Great Boulder No. 1, Ltd.	...	...	188·53	142·37	...	...	...	18,532·27	14,495·08	...
Do. ...	66E	Great Boulder Perseverance G.M. Co., Ltd.	...	...	44,408·56	37,260·78	10,464·05	...	...	3,134,845·79	1,645,804·91	167,332·90
Do. ...	16E, 51E, 61E, 102E, 280E, 1109E, 4366E	Great Boulder Proprietary G.Ms., Ltd.	...	...	106,952·00	73,845·95	16,048·70	...	...	3,170,742·00	2,844,062·31	302,375·10
Do. ...	902E, 1124E ...	(Great Boulder South G.M. Co., Ltd.)	...	...	...	...	...	...	...	437·00	122·11	...
Do. ...	3643E	(Hainault G.M., Ltd.)	...	...	...	...	...	...	...	517,345·70	184,570·02	113·30
Do. ...	6E	(Hannan's Block 45, Ltd.)	...	...	...	...	...	...	...	2,343·55	3,226·69	...
Do. ...	131E, 245E, 269E, 743E, (794E), 969E	(Hannan's Central G.Ms., Ltd.) ...	...	...	...	...	...	...	...	6,098·00	3,360·33	...
Do. ...	739E	(Hannan's Crœsus G.M. Co., Ltd.) ...	...	...	...	...	...	...	...	4,256·75	4,416·90	...
Do. ...	1004E	(Hannan's North Crœsus G.M. Co., Ltd.)	...	...	...	...	...	...	...	50·00	13·21	...
Do. ...	15E, 60E, 902E, 923E, 986E, 1116E, 1124E, 1196E, 4075E	(Hannan's Star Consolidated, Ltd.) ...	...	...	...	...	...	...	...	360·00	175·59	...

Do.	...	15E, 60E, 1116E	(Hannans Star G.M. Co., Ltd.) ...	...	...	...	...	...	...	...	...	85,652·75	-40,438·85	2,142·59
Do.	...	15E, 60E, 1116E ...	(Hannans Star, Ltd.)	...	...	...	...	...	...	...	...	13,470·50	4,716·66	191·22
Do.	...	4317E, 4318E, 4442E	Idaho Leases	...	562·22	12,315·00	6,870·34	...	...	4,301·12	110,456·77	53,192·77	...
Do.	...	946E, (4370), 4531	Ironsides North Leases ...	...	...	4,760·00	12,142·54	...	...	...	66,982·64	123,087·20	...
Do.	...	946E	(Ironsides North G.M. Co., N.L.) ...	...	...	...	...	...	...	...	1,348·00	807·48	...
Do.	...	31E, 1357E, 1413E, 1507E, 4399E, 4445E, 4476E	Ivanhoe Gold Corporation, Ltd. ...	...	...	130,559·00	63,486·43	19,800·11	...	...	3,688,682·00	2,297,546·57	369,680·55
Do.	...	1507E, (2899E), (3712E), (3713E)	(Ivanhoe Junction G.M. Co., N.L.) ...	...	...	...	...	...	...	...	1,764·00	121·43	...
Do.	...	6E, 131E, 245E, 269E, (301E), 739E, 743E, (794E), 969E	(Kalgoorlie Amalgamated, Ltd.) ...	...	...	...	...	...	...	...	32,589·00	8,859·95	...
Do	...	6E, 131E, 245E, 269E, (301E), 739, 743E, (794E), 969E	(Kalgoorlie Amalgamated (new), Ltd.	...	...	...	...	...	...	...	27,145·00	6,265·27	...
Do.	...	6E, 131E, 245E, 269E, (301E), 739E, 743E, (794E), 969E	(Kalgoorlie Amalgamated (1909), Ltd.)	...	...	...	...	...	...	...	7,940·50	1,568·40	...
Do.	...	33E	(Kalgoorlie Bank of England G.M. Co., Ltd.)	...	...	...	...	...	...	...	11,775·50	7,080·49	...
Do.	...	73E, (74E) ...	(Kalgoorlie Mint and Iron King Gold Estates, Ltd.)	...	...	...	...	...	...	...	3,020·00	1,762·00	...
Do.	...	73E, (74E) ...	(Kalgoorlie Mint & Iron King G.Ms., Ltd.)	...	...	...	...	...	...	...	3,647·00	7,454·80	...
Do.	...	1004E	(Kalgurli Golden Eagle) ...	...	...	...	...	...	...	...	4,891·50	1,289·65	...
Do.	...	1004E	(Kalgurli Golden Eagle: Golden Links, Ltd.)	...	...	...	...	...	...	...	193·00	31·63	...
Do.	...	22E, 34E ...	Kalgurli G.Ms., Ltd.	...	...	29,338·76	15,575·93	...	...	...	1,627,041·49	1,042,710·43	188·24
Do.	...	15E, 25E, 32E, 60E, 352E, 873E, 902E, 923E, 986E, 1116E, 1124E, 1196E, 2325E. 2326E, 4075E, 4334E, (4432E), (4433E), (4434E), 4493E	Lake View & Star, Ltd.	...	...	83,256·33	30,257·61	1,923·59	...	...	1,483,285·36	486,777·53	47,869·58
Do.	...	25E, 32E, 2325E, 2326E	(Lake View Consols, Ltd.)	...	...	...	...	...	...	...	1,179,303·55	1,016,875·27	38,491·89
Do.	...	(75E)	(Lake View South G.M. (W.A.), Ltd.)	...	...	...	...	...	...	...	10,712·98	11,393·57	...
Do.	...	(75E)	Lake View South, Ltd.	...	...	...	...	...	...	...	17,412·34	4,539·46	...
Do.	...	33E, 35E, 975E ...	New North Boulder G.Ms., Ltd. ...	...	...	518·54	458·72	...	...	...	23,288·11	14,600·69	...
Do.	...	33E, 35E, 975E ...	(North Boulder G.M. Co., Ltd.) ...	...	...	...	...	...	...	...	33,549·15	47,532·52	...
Do.	...	33E, 35E, 975E ...	(North Boulder G.Ms., Ltd.) ...	...	...	...	...	...	...	...	4,542·50	4,256·55	·63
Do.	...	281E, 287E, 444E	(North Kalgurli Co., Ltd.)	...	...	...	...	...	43·99	...	104,116·49	60,229·47	7,202·47
Do.	...	281E, 287E, 444E	North Kalgurli (1912), Ltd.	...	...	898·41	1,848·94	...	...	...	25,314·09	11,425·24	...
Do.	...	73E, 410E, 448E, 532E, 578E, 698E, 944E, 1395E, (3031E), (4180E)	(Oroya Brownhill Co., Ltd.)	...	...	...	...	...	...	...	1,075,862·55	1,163,881·77	61,682·30
Do.	...	6E, 73E, 131E, 169E, 245E, (301E), 410E, 448E, 532E, 578E, 698E, 739E, 743E, 750E, (794E), 944E, 969E, 1004E, 1395E, 1621E, (3031E), (4180E)	Oroya Links, Ltd.	...	...	16,671·66	20,618·41	445·12	...	...	843,908·50	319,002·08	27,744·24

TABLE IV.—*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 1919.					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 ...	392E	(Paringa Mines (1909), Ltd.) ...	...	...	...	...	...	...	...	26,890·74	12,599·54	...
Do. ...	1208E, 3612E, 3643E	South Kalgurli Consolidated, Ltd. ...	...	...	64,259·00	24,651·20	1,721·76	...	...	609,839·00	197,126·39	14,584·52
Do. ...	1208E, 3612E ...	(South Kalgurli G.M.s, Ltd.) ...	...	...	...	...	...	...	...	826,909·00	347,222·75	17,609·67
Do. ...	4537E	Union Jack	...	...	...	...	...	...	...	110·00	41·00	...
Do. ...	...	Voided leases	...	...	...	...	...	109·90	5,780·86	144,124·49	71,900·79	...
Do. ...	...	Sundry claims	...	...	153·78	48·08	...	24·58	...	1,531·09	1,118·72	...
Feysville ...	Block 48 ...	Hampton Plains Estate, Ltd. ...	...	...	4·40	56·61	...	4,565·62	21·59	20,615·28	2,502·56	...
Do. ...	Block 50 ...	(Hampton Plains Estate (1906), Ltd.)	...	...	...	...	...	...	...	85·00	108·82	...
Do. ...	Block 41 ...	Hampton Properties, Ltd.	...	...	...	...	...	...	...	41·00	22·66	...
Do. ...	Block 45 ...	Hampton Properties, Ltd.	...	...	...	...	...	...	52·75	51·75	76·63	...
Do. ...	Block 50 ...	(Hampton Properties, Ltd.) ...	...	...	...	...	...	...	7·26	6,348·00	3,956·22	...
Do. ...	Block 50 ...	Hampton Properties, Ltd. ...	...	...	...	...	...	...	106·23	671·73	579·99	...
Do. ...	...	Voided leases	...	...	...	...	...	...	22·86	305·70	111·90	...
Do. ...	...	Sundry claims	...	...	16·60	9·60	...	...	4·86	196·34	111·94	...
Kalgoorlie ...	(4509E.), (4530E), (4539E), (4551E)	Adelaide Enterprise Prospecting Syndicate, N.L.	...	...	...	...	...	...	...	22,710·68	4,604·95	...
Do. ...	4560E	Belgravia Hill	...	...	126·00	22·50	...	...	...	529·00	122·33	...
Do. ...	796E, 1228E ...	(Bonnie Lass Leases)	...	...	...	...	...	...	160·69	6,011·00	5,945·22	...
Do. ...	796E, 1228E, (3771)	Bonnie Lass Leases	...	...	271·00	136·74	...	...	...	16,329·65	8,403·33	...
Do. ...	4623E	Cassidy Hill	...	...	19·00	34·28	...	...	...	104·00	148·13	...
Do. ...	4557E	Corn Cob	...	...	...	...	...	...	...	73·42	32·94	...
Do. ...	4585E	(Creswick)	...	...	...	...	...	...	...	88·00	78·65	...
Do. ...	4585E, 4597E, 4598E	Creswick Leases	...	...	2,733·00	1,094·49	...	...	...	3,622·00	1,941·66	...
Do. ...	4509E	(Enterprise)	...	...	...	...	...	...	...	219·00	76·49	...
Do. ...	4609E	Fair Play	...	...	7·11	27·13	...	...	...	78·21	162·97	...
Do. ...	(4539E)	(Gordon)	...	...	...	...	...	...	...	64·89	14·24	...
Do. ...	4546E, 4547E, 4548E	Hannan's Reward, Ltd.	...	5·72	3,385·00	850·43	...	...	5·72	27,649·00	7,489·49	...
Do. ...	796E, 1228E ...	(Hannans Reward North G.M. Co., N.L.)	...	...	...	...	...	...	16·87	334·00	247·34	...
Do. ...	4001E, 4035E, 4036E	Hidden Secret Leases	...	...	53·00	1·70	...	...	105·65	10,748·95	15,292·25	43,383·29
Do. ...	4586E	Hidden Secret West	...	...	...	...	...	...	...	18·00	2·90	...
Do. ...	4653E	Hurroo	...	...	16·00	5·66	...	...	...	16·00	5·66	...
Do. ...	4628E	Kalgoorlie Star	...	...	84·08	34·75	...	...	...	99·03	43·58	...
Do. ...	4477E	Lord Nelson	...	...	84·00	48·33	...	...	123·27	2,849·64	1,406·68	...
Do. ...	4587E	Mayman's Consols	...	...	73·00	10·54	...	...	...	73·00	10·54	...
Do. ...	4632E	North End	...	...	24·00	3·30	...	...	...	24·00	3·30	...
Do. ...	1228E	(Red, White, and Blue) ...	...	...	...	...	...	...	...	130·00	25·56	...
Do. ...	4542E	Successful	...	...	...	...	...	...	...	20·00	10·12	...
Do. ...	4499E	Williamstown	...	...	495·03	327·96	...	...	...	2,864·72	1,267·20	...

Do. ...	...	Voided leases	...	...	...	...	...	...	242·48	9,072·33	844,316·55	324,484·48	633·83
Do. ...	...	Sundry claims	...	...	1,571·66	535·78	...	207·69	284·60	20,420·37	5,531·67	...
Wombola ...	4574E	Creedon's Welcome	...	...	56·00	219·08	...	...	...	285·71	1,407·99	...
Do. ...	4600E	Daisy	...	...	73·60	674·29	...	...	...	208·15	1,310·35	...
Do. ...	4555E	Dinnie	...	...	49·20	76·56	...	...	...	282·50	1,018·05	...
Do. ...	(4582E)	Jerry	...	...	...	...	...	...	...	30·90	269·60	...
Do. ...	4607E	Little Jean	...	...	15·85	70·39	...	...	...	45·00	255·00	...
Do. ...	...	Voided leases	...	...	...	...	...	...	613·86	4,904·23	3,231·43	...
Do. ...	...	Sundry claims	...	...	40·10	199·61	...	...	...	640·56	541·73	...
	From District generally :—											
	Sundry claims		...	...	...	...	...	10,907·93	431·95	5,208·00	1,560·12	...
	Sundry Parcels treated at :											
	Adeline Works		...	...	...	...	...	42·64	35·12	127·90	20,900·12	...
	Associated Northern Works		...	...	...	...	...	...	...	...	287·41	...
	Bonnie Lass Leases		...	...	...	...	...	...	...	55·00	1,297·73	...
	Brown Hill Consols Works		...	...	...	...	...	...	...	753·26	45,148·48	...
	Dunstan & Cummings' Works		...	...	...	578·10	...	...	...	...	7,503·40	1,194·00
	Fremantle Trading Co., Ltd., Works		...	...	...	1,521·84	343·37	...	...	...	8,703·61	7,451·28
	Hainault Sulphide Plant		...	...	...	78·38	88·39	...	...	35·66	1,525·19	711·79
	Hannan's Central Lakeside Works (A.W.A. Slimes Plant)		...	...	...	...	...	...	...	58·06	4,788·43	...
	Hannan's Central Works		...	...	...	4,107·49	...	...	...	142·80	58,982·81	67·17
	Mystery Battery		...	...	...	...	...	...	14·43	200·00	1,437·30	...
	North Kalgurli Battery		...	...	...	...	...	...	...	...	810·22	...
	Various Works		...	...	...	...	...	341·72	15·15	38,756·72	75,908·77	1,968·67
	Reported by Banks and Gold Dealers		160·78	...	...	...	...	10,745·11	9,013·32	...	4·57	...
	Total		**160·78**	**567·94**	**692,552·16**	**396,266·56**	**78,304·95**	**27,232·15**	**31,158·18**	**27,155,329·87**	**17,277,606·84**	**1,636,845·01**

BULONG DISTRICT.

Balagundi ...	...	Voided leases	...	...	...	...	...	...	2,408·98	1,110·68	1,473·73	12·92
Do. ...	...	Sundry claims	...	...	4·00	18·81	...	...	118·47	215·40	197·91	...
Bulong ...	...	Voided leases	...	...	...	...	...	107·54	8,433·70	99,606·01	82,419·97	...
Do. ...	...	Sundry claims	...	...	...	...	...	1,648·60	987·93	6,835·96	14,495·77	...
Hogan's Find	...	Voided leases	...	...	...	...	...	...	908·82	309·50	276·51	...
Majestic ...	...	Voided leases	...	...	...	...	...	...	...	1,001·25	318·78	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	43·20	17·00	7·42	...
Mt. Monger	...	Voided leases	...	...	...	...	...	...	1,862·57	1,121·35	969·69	...
Do. ...	...	Sundry claims	...	...	...	...	...	215·60	...	369·80	302·47	...
Randall's ...	...	Voided leases	...	...	...	...	...	...	60·04	31,820·04	10,645·98	...
Do. ...	...	Sundry claims	...	...	...	...	...	20·45	...	1,893·55	486·04	...
Sudden Jerk...	...	Voided leases	...	...	...	...	...	...	63·91	14·25	53·67	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	·15	10·23	...
Taurus ...	...	Voided leases	...	...	...	...	...	2·06	3·70	1,678·15	760·83	...
Do. ...	...	Sundry claims	...	...	...	...	...	112·69	...	276·00	411·01	...
Woolline ...	...	Voided leases	...	...	...	...	...	...	...	792·75	610·57	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	39·33	61·57	...

TABLE IV.—*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 1919.					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.
	From District generally :—											
	Sundry claims		...	...	...	...	...	5·64	41·85	790·75	284·26	...
	Sundry Parcels treated at :											
	Various Works		...	...	...	...	...	...	...	6,102·15	5,848·25	...
	Reported by Banks and Gold Dealers		40·80	...	...	...	...	24,473·31	52·39	...	...	...
	Total		**40·80**	...	**4·00**	**18·81**	...	**26,585·89**	**14,985·56**	**153,994·07**	**119,634·66**	**12·92**

Coolgardie Goldfield.

COOLGARDIE DISTRICT.

Bonnievale ...	4554	Lorna	...	...	35·00	75·68	...	...	8·36	335·75	330·37	...
Do. ...	(4558)	New Victoria	...	...	...	...	...	...	9·00	268·49	676·39	...
Do. ...	...	Voided leases	...	...	...	...	...	...	7·64	350,940·60	187,077·36	...
Do. ...	...	Sundry claims	...	...	140·40	67·37	...	...	23·54	1,945·68	1,165·56	...
Bulla Bulling	...	Voided leases	...	...	...	...	...	...	...	612·38	346·15	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	12·82	314·60	182·17	...
Burbanks ...	(4484)	Belgian Queen	...	...	10·75	19·12	...	...	134·57	282·60	456·61	...
Do. ...	(134), (135), (136), 1527, (1705), 2761, (3571), (3661), (3806), (3996), (4025), (4032)	(Burbanks Birthday Gift G.M., Ltd.)	...	...	...	...	...	...	...	132,706·00	126,351·59	...
Do. ...	(134), (135), (136), 1527, (1705), 2761, (3571), (3661), (3806), (3996), (4025), (4032)	(Burbanks Birthday G.M.s, Ltd.) ...	...	...	...	...	...	...	...	36,677·20	25,186·99	334·85
Do. ...	(134), (135), (136), 1527, 2761, (3571), (3661)	Burbanks Birthday G.Ms., Ltd. ...	...	...	25·00	600·27	...	...	...	34,992·18	22,337·68	89·38
Do. ...	(4409)	Burbanks Mainstay	...	...	...	...	...	...	...	1,984·00	550·27	...
Do. ...	4593	Burbanks Surprise	...	...	26·00	12·10	...	...	...	26·00	12·10	...
Do. ...	4597	General Foch	...	...	20·00	29·20	...	...	...	20·00	29·20	...
Do. ...	4471	Ivanhoe Burbanks	...	...	290·50	171·79	...	...	...	2,258·75	1,508·67	...
Do. ...	4442	Ivanhoe North	...	...	...	...	...	...	...	81·75	39·27	...
Do. ...	2160	Lady Robinson	...	...	195·00	72·92	...	...	...	5,733·00	2,186·16	...

Do.	2160	(Lady Robinson)									5,315·40	3,327·12		
Do.	2160, (3950), (4125)	(Lady Robinson G.M. Co., N.L.)									16,823·50	7,797·88		
Do.	4601	Victor				18·50	30·81				18·50	30·81		
Do.	(4469)	Lord Bobs									665·75	156·96		
Do.		Voided leases							13·36	197·04	169,417·48	110,394·74		96·83
Do.		Sundry claims	13·97	277·00	336·18			43·37	141·95		3,909·00	3,147·77		
Cave Rocks	(4570)	Blue Spec		69·00	17·22						69·00	17·22		
Do.	(4568)	Gold Coin									63·00	10·82		
Coolgardie	(4577)	Bird in Hand									576·50	79·36		
Do.	4559	Cookshot	61·11	38·00	20·17				120·14		207·88	656·50		
Do.	4555	(Dreadnought)									867·85	870·10		
Do.	4555, 4561, (4563)	Dreadnought Leases		84·95	35·69						284·18	151·88		
Do.	4567	Griffith's Gold Mine		2,818·00	363·15				1·70		3,360·00	502·26		
Do.	Block 35	Hampton Plains Estate, Ltd.									100·50	28·76		
Do.	Block 49	Hampton Plains Estate, Ltd.							10·94		150·00	157·31		
Do.	Block 53	Hampton Plains Estate, Ltd.							358·42		67·00	112·49		
Do.	Block 59	Hampton Plains Estate, Ltd.		82·00	78·55				4·12		7,840·25	7,151·48		
Do.	4556	Lady Carmen		205·50	80·65				74·83		821·50	380·23		
Do.	(4579)	Lucky Hit		54·00	28·68				96·21		97·00	91·66		
Do.	4600	Melva Maie		30·00	65·41						30·00	65·41		
Do.	4435	Prosperity		1,438·00	140·29			2·52	317·21		6,766·25	2 250·61		
Do.	4479	Rio Tinto		93·00	14·09						428·30	130·12		
Do.		Voided leases						1,296·50	3,816·55		532,017·73	313,945·39		·96
Do.		Sundry claims	1·16	620·50	224·10			80·29	1,829·72		30,883·29	13,057·55		
Eundynie	4253	(Hidden Secret North)									68·00	60·72		
Do.	4253, (4266), (4351), (4405), (4406), (4462)	Hidden Secret North Leases		130·00	79·02						28,271·00	14,261·73		
		Voided leases									1,473·50	644·31		1·75
		Sundry claims									117·00	31·11		
Gibraltar	4586	Carlton		191·00	376·01						209·00	381·41		
Do.	4602	Great Gnarlbine		17·00	8·95						17·00	8·95		
Do.	4580	Lloyd George		152·75	118·66						317·75	276·87		
Do.		Voided leases									953·75	600·96		
Do.		Sundry claims	7·06	230·50	75·45				48·55		613·25	358·42		
Gnarlbine		Voided leases							10·94		1,899·75	1,049·90		
Do.		Sundry claims							1·31		184·75	97·36		
Higginsville	4184, (4185), (4191), (4206) (4207)	(Red Hill Westralia G.Ms., Ltd.)									16,983·00	6,848·02		127·78
Do.	4184	(Sons of Erin : Forwood, Down, & Co., Ltd.)									117·00	1,000·35		
Do.	4184, (4185)	(Sons of Erin G.M. Co., N.L.)							285·20		4,742·00	2,938·77		
Do.	4184, (4185), (4191), (4206), (4207)	(Sons of Erin Leases)									1,394·00	911·95		
Do.	4184, 4428, (4432)	Sons of Erin Leases : Forwood, Down & Co., Ltd.									3,606·00	2,121·82		7·01
Do.		Voided leases							2·06		5,274·00	1,020·45		
Do.		Sundry claims							16·52		720·90	492·89		
Londonderry	4594	Cheapside		148·00	66·72						148·00	66·72		
Do.	4545	Royal Standard		41·36	147·16						404·86	582·28		
Do.		Voided leases							46·25		26,237·66	17,510·31		
Do.		Sundry claims		132·25	37·37				6·00		1,599·85	1,355·63		

TABLE IV.—*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 1919.					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.
Mungari ...	...	Voided leases	...	...	...	...	...	...	17·71	735·00	331·78	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	107·82	340·01	200·77	...
Red Hill ...	...	Voided leases	...	...	...	...	...	...	1,541·48	40,793·20	31,064·05	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	34·62	160·42	287·90	...
Ryan's Find ...	(4596)	Victory South	...	...	·37	61·30	...	...	...	·37	61·30	...
Do. ...	...	Voided leases	...	...	...	...	...	...	...	46·79	81·25	...
Do. ...	...	Sundry claims	...	...	35·60	46·44	...	...	·44	75·69	220·14	...
Widgiemooltha	4028	Flinders	...	19·39	36·00	116·95	...	...	57·25	518·60	2,644·89	...
Do. ...	...	Voided leases	...	...	...	...	...	...	763·97	8,678·28	3,656·20	·17
Do. ...	...	Sundry claims	...	...	30·00	6·51	...	9·21	35·61	3,143·68	1,294·26	...
		From District generally:—										
		Sundry Parcels treated at:										
		Burbanks Main Lode Works	...	...	...	...	...	2·77	...	557·50	1,261·60	114·17
		Fremantle Trading Co.'s Works	...	...	...	...	...	...	...	...	20·08	...
		Highgate Works	...	...	...	...	...	...	...	100·00	321·11	...
		Imperial Battery	...	...	...	...	...	...	...	...	2·60	...
		Lady Robinson Cyanide Works	...	...	...	...	...	...	...	70·00	348·28	...
		State Battery, Coolgardie	...	...	...	357·54	...	...	...	687·50	9,745·99	...
		Various Works	...	...	...	...	...	4·98	...	3,083·61	15,618·12	108·89
		Reported by Banks and Gold Dealers	138·00	...	...	...	...	7,385·38	543·04	...	...	...
		Total	**138·00**	**102·69**	**7,715·98**	**3,981·52**	...	**8,338·38**	**10,688·53**	**1,503,601·51**	**952,732·22**	**881·79**
		KUNANALLING DISTRICT.										
Balgarrie ...	...	Voided leases	...	...	...	...	...	10·94	75·48	5,124·25	4,305·74	1·38
Do. ...	...	Sundry claims	...	...	...	...	...	...	18·57	1,050·25	383·04	...
Carbine ...	33s	(Carbine)	...	...	...	...	...	...	10·85	2,401·00	1,164·53	...
Do. ...	33s, 710s, 711s	Carbine Leases	...	...	710·00	379·98	...	...	677·13	35,882·36	22,810·39	...
Do. ...	(866s)	Never Can Tell	...	...	...	...	...	...	...	823·00	514·06	...
Do. ...	...	Voided leases	...	...	...	...	...	...	...	2,524·00	2,719·54	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	73·00	55·69	...
Carnage ...	...	Voided leases	...	...	...	...	...	176·04	659·31	2,402·00	2,170·67	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	61·00	27·50	...
Cashman's (Siberia)	716s, [1289w] ...	Lady Evelyn	...	...	...	...	...	...	...	241·75	479·81	...

Do. ...	...	Voided leases	...	...	...	...	...	67·51	793·44	7,187·90	6,395·33	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	6·16	116·00	67·61	...
Chadwin ...	...	Voided leases	...	...	...	...	...	...	...	1,111·75	2,062·12	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	8·87	507·00	449·22	...
Dunnsville ...	...	Voided leases	...	...	...	...	...	...	181·12	17,407·10	7,982·23	...
Do. ...	...	Sundry claims	...	...	...	...	·43	89·26	293·09	265·11	...
Jourdie Hills	...	Voided leases	...	...	...	...	...	18·00	28,009·74	19,401·09	28·45
Do. ...	...	Sundry claims	...	...	...	1·44	...	...	...	760·50	422·33	...
Kandana ...	...	Voided leases.	...	...	...	...	...	...	...	465·00	68·12	...
Kintore ...	...	Voided leases	...	...	...	...	...	6·66	143·66	44,174·14	31,882·70	...
Do. ...	...	Sundry claims	...	...	...	...	...	100·30	·78	1,217·70	1,150·90	...
Siberia ...	...	Voided leases	...	...	...	...	...	1·07	1,557·81	8,216·85	10,530·14	...
Do. ...	...	Sundry claims	...	...	...	...	...	30·91	...	223·00	349·86	...
25 Mile ...	696s	(Blue Bell)	...	...	...	...	...	...	8·05	697·00	429·47	...
Do. ...	727s	(Blue Bell Extended) ...	...	...	...	...	...	...	...	113·00	71·32	...
Do. ...	696s, 727s ...	Blue Bell Leases	...	...	35·00	7·46	...	...	...	1,693·00	1,644·11	...
Do. ...	845s	Sadie	...	...	196·50	210·80	...	...	...	1,754·00	1,567·22	...
Do. ...	871s	Shamrock	...	...	143·00	107·62	...	...	2·96	409·00	283·13	...
Do. ...	645s	Star of Fremantle	...	...	...	...	...	...	...	5,275·00	3,503·31	...
Do. ...	603s	Sydney Mint	...	...	36·00	40·83	...	...	229·72	1,429·75	3,202·42	...
Do. ...	847s	Turn of the Tide	...	...	507·50	528·34	...	...	2·72	2,240·30	3,108·71	...
Do. ...	...	Voided leases	...	...	...	...	...	...	453·30	87,359·49	66,468·64	18·84
Do. ...	...	Sundry claims	...	...	262·50	136·92	...	13·22	98·21	6,385·45	3,331·91	...
		From District generally :—										
		Sundry Parcels treated at :										
		Blue Bell Battery	...	...	...	142·00	...	3·77	...	72·00	1,625·97	...
		Stanley Works	...	...	...	...	...	14·86	...	402·60	384·93	...
		Various Works	...	...	...	...	...	9·22	...	1,276·66	2,006·02	...
		Reported by Banks and Gold Dealers	36·70	...	...	...	...	263·44	1·10	...	...	...
		Total	**36·70**	...	**1,890·50**	**1,555·39**	...	**698·37**	**5,036·50**	**269,379·63**	**203,784·89**	**48·67**

Yilgarn Goldfield.

Blackbourne...	...	Voided leases	...	...	...	...	...	...	...	1,282·50	341·37	...
Bullfinch ...	914, 915, 916, 926, 928, 942, 960	(Bullfinch leases)	...	...	...	...	...	...	...	1,027·52	10,958·88	...
Do. ...	914, 915, 916, 926, 928, 930, 942, 960	Bullfinch Proprietary (W.A.), Ltd. ...	...	...	56,289·00	14,375·94	3,582·40	...	...	410,477·42	149,354·33	22,933·57
Do. ...	...	Voided leases	...	...	...	...	...	...	...	360·65	364·67	...
Do. ...	...	Sundry claims	...	...	8·50	5·77	...	...	...	45·40	67·05	...
Corinthian ...	896, (934), (946)	Corinthian North G.Ms., Ltd. ...	...	...	...	...	...	...	...	131,222·00	27,795·29	...
Do. ...	...	Voided leases	...	...	...	...	...	...	...	3,286·00	1,529·54	...
Do. ...	...	Sundry claims	...	...	31·00	4·06	...	...	...	104·50	77·35	...
Ennuin ...	...	Voided leases	...	...	...	...	...	...	...	134·56	361·34	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	117·00	72·12	...
Forrestonia ...	2909	Great Southern	...	...	...	...	...	...	...	77·00	58·26	...

TABLE IV.—*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 1919.					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.
Golden Valley	2272	Glide Away	...	...	54·00	38·64	...	...	...	1,669·00	1,809·36	...
Do.	2948	Greenharp New	...	...	326·00	395·43	...	...	...	626·50	806·04	...
Do.	2994	Radio	...	...	453·50	959·15	...	...	...	753·50	2,322·58	...
Do.	3138	Rona Daphne	...	...	45·00	93·13	...	...	...	45·00	93·13	...
Do.	2739	Rosalie	...	...	130·00	57·20	...	...	...	250·75	179·47	...
Do.	(2653)	Violet	...	...	...	...	...	...	...	217·14	120·62	...
Do.		Voided leases	...	...	...	...	...	...	18·05	4,501·85	4,630·61	2·00
Do.		Sundry claims	...	...	13·00	25·66	...	...	2·75	1,872·22	1,576·88	...
Greenmount	2787	Gold Mount	...	...	...	...	...	...	...	45·00	11·14	...
Do.	3179	Jean Nichol	...	...	41·00	76·43	...	...	...	41·00	76·43	...
Do.	550	(Sunbeam)	...	...	...	...	...	14·00	...	4,472·00	1,427·25	...
Do.	550	Sunbeam	...	...	...	...	...	...	...	200·00	100·14	...
Do.	550, (565)	(Sunbeam leases)	...	...	...	...	...	...	...	3,191·00	816·42	...
Do.	536	(Transvaal)	...	...	...	...	...	...	...	30,233·00	7,340·62	579·78
Do.	536	Transvaal	...	...	3,088·00	830·09	...	...	...	3,088·00	830·09	...
Do.	536, (1358)	(Transvaal leases)	...	...	7,080·00	1,377·91	...	...	...	11,924·00	2,891·60	...
Do.		Voided leases	...	...	...	...	...	31·99	21·62	70,329·00	17,477·32	364·72
Do.		Sundry claims	...	...	155·00	25·24	...	...	4·12	802·50	293·98	...
Hope's Hill	2544	Colleen Bawn	...	...	...	...	...	...	...	330·20	1,442·44	...
Do.		Voided leases	...	...	...	...	...	...	56·97	129,884·85	33,899·78	1·00
Do.		Sundry claims	...	...	...	...	...	...	25·38	1,622·50	506·06	...
Kennyville	570	(Great Leviathan)	...	...	...	...	...	...	...	3,821·85	2,948·67	...
Do.	570	Great Leviathan	...	...	555·00	146·63	·50	...	...	5,552·00	3,580·71	·50
Do.	570	(Great Leviathian: Northern Blocks Syndicate, Ltd.)	...	...	...	...	...	...	...	10,705·00	2,974·64	...
Do.	911	Trafalgar	...	...	11·00	6·62	...	...	...	1,984·00	1,499·02	...
Do.		Voided leases	...	...	...	...	...	...	18·76	3,487·50	2,405·25	·09
Do.		Sundry claims	...	...	20·00	11·59	...	...	...	463·00	208·45	...
Koolyanobbing		Voided leases	...	...	...	...	...	...	...	308·00	116·74	...
Do.		Sundry claims	...	...	...	...	...	...	...	55·00	11·24	...
Marvel Loch	3069	Banker	...	...	765·00	640·99	...	...	...	1,043·00	926·75	...
Do.	923	Bohemian	...	...	156·00	134·36	...	...	17·44	3,747·00	3,633·21	...
Do.	1689	(Bronco)	...	...	...	...	...	...	...	217·00	22·17	...
Do.	1689	Bronco: Bronco Horseshoe Proprietary Mining Co., N.L.	...	...	...	...	...	...	...	2,411·00	759·62	...
Do.	3140	Bulimba	...	...	51·00	23·02	...	...	...	51·00	23·02	...
Do.	719	(Great Victoria)	...	...	...	...	...	...	...	1,356·00	281·53	...

Do. ...	719, 944, 945, 1227, 1228, 1606	Great Victoria leases	...	...	18,195·00	3,477·67	...	...	...	114,709·26	15,095·99	...
Do. ...	3161	Lucky Seven	...	...	13·00	5·72	...	...	...	13·00	5·72	...
Do. ...	852	May Queen	...	...	50·00	147·55	...	...	4·07	785·50	4,084·49	...
Do. ...	3110	Pathfinder	...	...	...	...	...	...	...	45·00	10·84	...
Do. ...	(3115)	Pathfinder East	...	...	...	...	...	...	...	60·00	9·43	...
Do. ...	3017	Pro Patria	...	...	90·00	51·33	...	...	...	541·00	720·94	...
Do. ...	1011	Rising Star	...	...	...	...	...	...	...	140·00	11·48	...
Do. ...	(3102)	Saint Patrick	...	...	...	...	...	...	...	170·00	38·22	...
Do. ...	2998	St. George	...	...	358·00	111·23	...	...	...	2,248·00	853·33	...
Do. ...	(3071)	Ulverston	...	...	52·00	39·48	...	...	...	774·00	760·87	...
Do. ...	3011	Victory	...	...	73·00	22·56	...	...	...	643·00	445·51	...
Do. ...	...	Voided leases	...	...	...	...	...	...	80·78	231,672·00	80,819·63	771·03
Do. ...	...	Sundry claims	...	...	2,029·00	509·65	...	7·72	68·81	8,825·49	4,586·59	...
Mt. Jackson...	(1979)	Allen's Find	...	...	...	...	...	...	...	1,641·05	837·02	...
Do. ...	2053	Great Unknown	...	...	...	...	...	...	37·22	1,394·93	3,608·73	...
Do. ...	...	Voided leases	...	...	...	...	...	...	77·66	34,150·05	23,230·72	2,305·28
Do. ...	...	Sundry claims	...	...	...	...	...	4·42	25·43	1,481·75	1,062·53	...
Mt. Rankin ...	...	Voided leases	...	...	...	...	...	3·84	5·20	496·00	122·17	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	170·00	54·38	...
Parker's Range	(3145)	Dibdale	...	...	25·00	15·75	...	...	...	25·00	15·75	...
Do. ...	2801	Scots Greys	...	...	355·00	134·22	...	...	...	735·00	251·82	...
Do. ...	724	(Spring Hill)	...	...	...	...	...	...	...	3,232·00	607·21	...
Do. ...	724, (760) ...	(Spring Hill Leases)	...	...	...	...	...	...	...	8,910·00	2,215·59	...
Do. ...	724, 2633 ...	Spring Hill G.M. Co., N.L.	...	...	...	...	...	...	...	1,215·00	144·94	...
Do. ...	2806	Star of the Range	...	...	...	...	...	...	...	121·75	213·11	...
Do. ...	2951	White Horseshoe	...	...	279·00	160·84	...	...	...	1,474·50	1,271·38	...
Do. ...	...	Voided leases	...	...	...	...	...	...	105·14	13,539·50	9,784·18	...
Do. ...	...	Sundry claims	...	...	27·00	14·55	...	...	...	1,713·75	1,101·44	...
Southern Cross	3185	Artilleryman	...	...	145·00	152·30	...	...	...	145·00	152·30	...
Do. ...	3166	Central	...	...	25·00	7·52	...	...	...	25·00	7·52	...
Do. ...	(3082)	Frances	...	...	31·00	12·97	...	...	...	752·00	250·99	...
Do. ...	3177	Glen Innes	...	...	118·00	66·38	...	...	...	118·00	66·38	...
Do. ...	...	Voided leases	...	...	...	...	...	2·13	211·22	432,075·20	211,107·54	·364·41
Do. ...	...	Sundry claims	1·77	...	237·00	40·15	...	5·50	595·45	3,826·10	1,156·27	...
Westons ...	(2769)	(Battler)	...	...	...	...	...	...	...	115·00	170·64	...
Do. ...	2180	(Edna May)	...	...	...	...	...	...	...	581·00	919·27	...
Do. ...	(2769, (3004), (3040)	Edna May Battler G.M. Co., N.L. ...	...	...	...	...	...	...	...	3,616·00	3,306·78	...
Do. ...	2291, 2585, 2615	Edna May Central G.Ms., N.L. ...	...	...	19,220·00	12,921·07	...	...	...	124,462·00	52,530·99	19·38
Do. ...	2570, 2617, 2644	Edna May Consolidated G.M. Co., N.L.	...	...	...	...	...	...	...	21,779·00	8,860·73	...
Do. ...	2168, 2238, 2777	Edna May Deep Levels G.M. Co., N.L.	...	...	10,908·00	5,804·32	...	...	...	22,868·00	18,135·71	...
Do. ...	2180, 2605 ...	Edna May G.M. Co., N.L.	...	...	17,929·00	10,196·68	...	...	...	191,577·00	171,085·16	...
Do. ...	(2775)	Emma May	...	...	...	...	...	...	...	40·00	20·31	...
Do. ...	(3004)	(Great Battler)	...	...	...	...	...	...	...	50·50	68·86	...
Do. ...	(2086), 2087, (2635), (2841)	Greenfinch Proprietary G.M., N.L. ...	...	...	18·00	15·74	...	...	...	8,465·27	3,153·55	...
Do. ...	(2807)	Hill End	...	...	28·00	16·27	...	...	...	222·00	153·14	...
Do. ...	(3015)	Kitty	...	...	...	...	...	...	...	11·00	5·07	...
Do. ...	3097	Le Trois	...	...	...	...	...	...	...	36·00	23·99	...
Do. ...	2291	(Myrtle Central)	...	...	...	...	...	...	...	751·00	243·96	...
Do. ...	2168, 2238 ...	(Myrtle Consols Leases)	...	...	...	...	...	...	...	4,009·00	3,696·32	·20

TABLE IV.—*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 1919.					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.
Westons	2570	(Myrtle East)	...	...	...	...	...	...	...	202·00	116·12	...
Do.	2816	Pertha M.	...	...	80·00	120·08	...	...	...	949·00	737·23	...
Do.	...	Voided leases	...	...	...	...	...	...	4·06	827·25	712·18	...
Do.	...	Sundry claims	...	...	14·00	4·74	...	...	11·04	800·75	832·64	...
		From Goldfield generally :—										
		Sundry Parcels treated at :										
		Australia Battery	...	...	...	...	...	...	...	38·00	124·94	...
		Donovan's Find Battery	...	...	...	...	...	...	...	...	3,342·47	...
		Fremantle Trading Co., Ltd., Works	...	...	...	...	...	...	...	21·28	592·34	33·90
		Great Victoria Cyanide Works	...	...	...	...	...	...	...	...	5,832·18	...
		Greenfinch Proprietary G.M. Works	...	...	...	...	...	...	...	...	2,387·29	...
		Hainault Sulphide Plant, Kalgoorlie	...	...	...	...	...	...	...	...	18·58	...
		Hope's Hill Cyanide Works	...	...	...	...	...	...	...	...	1,210·29	...
		Howlett's Battery	...	...	...	139·74	...	...	...	...	139·74	...
		Marvel Loch Mining Co., N.L.	...	...	...	...	...	...	...	...	4,711·07	...
		Never Never Works	...	...	...	257·94	...	...	...	...	1,064·44	...
		Spring Hill Works	...	...	...	115·98	...	...	...	...	569·70	...
		Sunbeam Works	...	...	...	210·68	...	...	...	8·00	6,330·85	...
		Violet Works	...	...	...	...	...	...	...	...	968·68	...
		Various Works	...	...	...	...	...	...	...	59·00	13,700·05	2·64
		Reported by Banks and Gold Dealers	...	...	...	...	...	22·05	3·53	...	...	...
		Total	**1·77**	...	**139,571·00**	**54,000·97**	**3,582·90**	**91·65**	**1,394·70**	**2,098,790·79**	**959,493·46**	**27,378·50**

Dundas Goldfield.

Buldania	...	Voided leases	...	...	...	...	...	...	3·02	846·05	708·99	...
Do.	...	Sundry claims	...	...	...	...	...	...	38·53	341·27	519·77	...
Dundas	...	Voided leases	...	...	...	...	...	...	...	4,543·23	2,208·48	...
Do.	...	Sundry claims	...	...	...	...	...	...	385·37	182·50	143·88	...
Killaloe	...	Voided leases	...	...	...	...	...	...	...	20·65	6·88	...
Norseman	1244	Adeline	...	...	163·50	211·40	...	...	...	163·50	211·40	...
Do.	(1199)	Crown	...	...	65·75	63·12	...	...	27·72	1,014·75	1,411·21	...
Do.	1226	Cumberland	...	9·53	25·50	29·27	...	...	9·53	162·00	323·44	...
Do.	1183	Edith Eleanor	...	...	...	...	...	...	272·76	303·50	552·19	...
Do.	(966)	(Esperanza No. 2)	...	...	...	...	...	...	·96	689·00	948·88	...
Do.	1209	Hoffman's Gold Mines	...	...	296·00	172·20	...	...	...	815·25	638·47	...
Do.	1239	Iron King	...	...	166·50	42·19	...	...	...	369·50	79·36	...
Do.	(1237)	Ken and Gwen Syndicate	...	...	...	...	...	...	...	45·25	20·43	...
Do.	(1231)	Lake View	...	154·35	33·00	54·07	...	...	874·51	105·25	668·17	...
Do.	852	(Mararoa)	...	...	...	...	...	...	...	9,167·00	4,484·90	...

Do.	...	852, 912, (966), 977, (979), 980, 985, (987), (1031), (1166), (1190), (1192), 1203, 1238	Mararoa G.M. Co., N.L.	...	...	...	...	12,648·00	5,466·09	...	...	...	308,343·50	147,118·60	24,310·24
Do.	...	1260	Mountain View ...	...	...	...	137·75	...	...	...	...	137·75	...	...	...
Do.	...	1249	Myrtle	...	...	...	...	89·25	86·69	...	...	...	89·25	86·69	...
Do.	...	1259	Myrtle Extended	...	...	...	...	22·50	41·31	...	...	...	22·50	41·31	...
Do.	...	903	(O.K.)	...	...	...	...	...	...	...	...	21·23	1,147·25	1,293·01	...
Do.	...	903, 1138 ...	O.K. leases ...	...	...	...	...	230·00	755·38	...	...	...	2,219·25	3,040·69	...
Do.	...	(1236)	Point View ...	...	...	...	...	13·00	16·71	...	...	126·89	13·00	16·71	...
Do.	...	1242	Red, White, and Blue ...	...	...	...	...	1,762·50	392·66	...	...	...	1,762·50	392·66	...
Do.	...	1092	(Sun)	...	...	...	...	...	...	...	...	142·26	655·50	737·49	...
Do.	...	1092	Sun	...	...	...	...	107·00	105·39	...	...	...	1,061·00	1,259·56	...
Do.	...	1092, (1125) ...	(Sun leases) ...	...	...	...	...	...	...	...	...	...	337·00	692·34	...
Do.	...	1210	Surprise	...	...	...	722·91	18·00	122·22	...	...	1,622·53	128·00	417·51	6·48
Do.	...	1220	Victors	...	...	...	...	...	...	...	...	215·51	10·25	21·14	...
Do.	...	1016	(Viking Extended)	...	...	...	...	...	...	...	...	133·35	72·50	419·67	4·90
Do.	...	990	(Viking No. 1) ...	...	...	...	...	...	...	...	...	...	1,274·00	3,095·95	...
Do.	...	990, 1060 ...	(Viking No. 1 leases)	...	...	...	...	...	...	...	...	...	775·50	1,176·13	16·89
Do.	...	990, 1016, 1060, 1117, 1194	Viking No. 1 leases	...	...	...	...	2,906·00	2,850·52	...	...	...	45,999·25	41,844·93	242·83
Do.	...	1180	Viking South ...	...	...	...	...	27·50	66·57	...	...	...	524·50	720·99	...
Do.	...	986	Vini Vidi Vici ...	...	...	...	...	...	...	...	...	2,482·06	351·50	916·53	...
Do.	...	...	Voided leases ...	...	...	...	...	...	...	...	4·23	4,243·72	471,658·54	340,394·36	10,279·11
Do.	...	...	Sundry claims ...	...	...	...	93·56	945·75	638·37	...	996·60	2,191·54	18,647·21	10,384·30	·59
Peninsula	...	...	Voided leases ...	...	...	...	...	...	...	...	...	17·61	7,764·00	4,705·10	...
		From Goldfield generally :—													
		Sundry Parcels treated at :													
			Lady Mary Works	...	...	...	...	...	...	...	...	...	90·25	1,071·85	...
			Mararoa Crushing and Cyaniding Works	...	...	...	...	...	...	...	...	...	232·50	2,543·56	38·75
			Rawlings, Bullen & Rumble Works	...	...	...	...	...	294·18	...	...	...	27·00	3,481·43	...
			State Battery—Norseman	...	...	...	...	7·75	3·17	...	...	...	383·75	10,578·77	885·41
			Various Works	...	...	...	...	...	...	...	...	54·52	103·00	2,947·45	607·70
		Reported by Banks and Gold Dealers ...		...	...	...	...	...	...	...	1,026·29	...	...	1·04	...
		Total		...	1,118·10	19,527·50	11,411·51	...	2,027·12	12,999·37	882,461·20	592,326·22	36,392·90		

Phillips River Goldfield.

Kundip	...	147, 179 ...	Fair Play leases	...	...	...	...	...	...	...	...	...	4,319·56	7,603·21	12·63
Do.	...	(136), (137), (138), (139)	(Flag Gold and Copper Mining Co., Ltd.)	...	...	...	...	...	...	...	...	...	7,031·50	4,729·53	1,078·38
Do.	...	(136), (137), (138)	Flag leases	...	...	198·33 ...	152·38 *50·57	...	...	...	...	...	3,214·36	3,033·74	...
Do.	...	184	Gem	...	...	447·20	531·74	...	...	...	...	...	2,821·96	2,417·62	...
Do.	...	151	(Gem Consolidated) ...	...	...	...	...	...	...	...	...	...	777·50	616·30	...
Do.	...	151, 156 ...	Gem Consolidated leases ...	...	...	259·67 ...	355·40 *57·28	...	...	...	...	...	6,308·92	5,683·90	8·00
Do.	...	M.L. 52, M.L. 94	Harbour View Gold and Copper Co., Ltd.	...	...	99·00	37·41	...	...	...	...	...	1,363·10	1,734·65	360·11
Do.	...	M.L. 52, M.L. 94	(Harbour View leases)	...	...	...	...	...	...	...	...	379·86	3,619·25	1,560·86	61·41
Do.	...	M.L. 52, M.L. 94	(Harbour View leases)	...	...	...	...	...	...	...	...	...	3,403·50	2,227·62	1·88
Do.	...	98	Hillsborough	...	...	215·66 ...	232·53 *28·08	...	...	...	...	...	2,654·50	4,969·61	118·03

*From copper ore.

TABLE IV.—*Production of Gold and Silver from all sources, etc.*—continued.

PHILLIPS RIVER—*continued.*

Mining Centre.	Number of Lease.	Registered Name of Company or Lease.	Total for 1919.					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.
Kundip ...	(185)	Mt. Iron	...	...	...	...	...	...	...	160·66	44·86	...
Do. ...	M.L. 370 ...	North Harbour View	...	...	26·00	5·50	...	...	...	35·27	21·75	...
Do. ...	M.L. 52, M.L. 94	(Ravensthorpe G.M. Syndicate, N.L.)	...	...	...	...	...	...	...	1,124·00	433·94	164·98
Do. ...	74	Two Boys	...	...	97·60	142·68	...	...	3·90	11,254·71	8,349·12	...
Do. ...	...	Voided leases	...	...	...	...	...	113·28	172·41	16,014·80	9,274·49	1,991·82
Do. ...	...	Sundry claims	...	...	...	...	...	79·05	71·58	762·19	450·52	15·45
Mt. Desmond	M.L. 203 ...	(British Flag)	...	...	...	...	...	...	...	...	7·76	...
Do. ...	M.L. 203 ...	British Flag: Phillips River Gold and Copper Co., Ltd.	...	...	...	...	...	...	...	...	4·08	...
Do. ...	M.L. 208 ...	(Desmond)	...	...	...	...	...	...	...	...	·77	...
Do. ...	M.L. 208 ...	Desmond	...	...	...	*9·15	...	...	...	...	152·68	...
Do. ...	M.L. 208 ...	(Desmond: Phillips River Gold and Copper Co., Ltd.)	...	...	...	...	...	...	...	...	219·59	14·55
Do. ...	M.L. 95	Elverdton	...	...	...	*1·10	...	...	...	...	519·16	...
Do. ...	M.L. 95	(Elverdton: Phillips River Gold and Copper Co., Ltd.)	...	...	...	...	...	...	...	...	2,569·38	6,537·35
Do. ...	M.L. 95	(Elverdton: Phillips River Option Syndicate, N.L.)	...	...	...	...	...	...	...	...	9·63	...
Do. ...	M.L. 168 ...	(Elverton South: Phillips River Gold and Copper Co., Ltd.)	...	...	...	...	...	...	...	...	·94	...
Do. ...	(M.L. 367) ...	Ironclad	...	...	...	*7·15	...	...	...	...	7·15	...
Do. ...	M.L. 109 ...	(Mt. Desmond)	...	...	...	...	...	...	1·40	...	36·97	...
Do. ...	M.L. 109 ...	Mt. Desmond: Phillips River Gold and Copper Co., Ltd.	...	...	...	...	...	...	...	...	228·19	180·06
Do. ...	M.L. 199 ...	(P.L.P.)	...	...	...	...	...	...	...	...	13·69	7·41
Do. ...	M.L. 199 ...	P.L.P.: Phillips River Gold and Copper Co., Ltd.	...	...	...	...	...	...	...	...	3·14	...
Do. ...	...	Voided leases	...	...	...	...	...	...	...	9·00	129·10	152·22
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	...	31·21	51·01
Mt. Purchas...	...	Voided leases	...	...	...	...	...	...	4·38	346·05	293·13	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	4·75	4·68	...
Ravensthorpe	M.L. 379 ...	Ballarat	...	...	...	*·39	...	...	...	...	·39	...
Do. ...	M.L. 16	(Marion Martin)	...	...	...	...	...	...	...	...	20·09	...
Do. ...	M.L. 16	Marion Martin	...	...	...	*5·08	...	...	...	...	232·72	...
Do. ...	M.L. 16	(Marion Martin: Phillips River Gold and Copper Co., Ltd.)	...	...	...	...	...	...	...	...	275·33	205·97
Do. ...	(M.L. 363) ...	Mt. Benson	...	...	...	...	...	...	...	...	115·76	...
Do. ...	M.L. 15	(Mt. Cattlin)	...	...	...	...	...	...	·49	200·00	85·50	...
Do. ...	M.L. 15	Mt. Cattlin	...	...	...	*·33	...	...	...	...	788·54	...
Do. ...	M.L. 15	(Mt. Cattlin: Mt. Cattlin Copper Mining Co., Ltd.)	...	...	...	...	...	...	...	...	1,496·92	52·92

Do. ...	M.L. 15	(Mt. Cattlin: Phillips River Gold and Copper Co., Ltd.)	...	...	...	...	...	...	...	...	387·33	...
Do. ...	M.L. 15	(Mt. Cattlin: Phillips River Gold and Copper Co., Ltd.)	...	...	...	...	...	...	...	...	3,077·08	3,814·45
Do. ...	M.L. 342 ...	Surprise	...	...	...	...	...	...	...	...	31·53	...
Do. ...	...	Voided leases	...	...	...	...	...	...	141·31	21,716·76	18,615·87	310·73
Do. ...	...	Sundry claims	...	6·60	22·84	74·78 *1·97	...	157·82	6·60	1,997·18	1,233·98	20·65
West River ...	...	Voided leases	...	...	...	...	...	...	...	...	10·34	31·06
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	...	2·95	3·44
		From Goldfield generally :—										
		Sundry Parcels treated at:										
		Gem Battery	...	...	...	...	...	...	...	...	138·89	...
		Phillips River Smelter	...	...	...	...	...	...	...	...	385·96	493·66
		Two Boys' Works	...	...	...	...	...	...	...	...	100·95	...
		Various Works	...	...	...	...	...	...	...	...	4·76	...
		Reported by Banks and Gold Dealers	...	...	...	...	...	122·05	...	...	...	...
		Total	...	**6·60**	**1,366·30**	**1,693·52**	...	**472·20**	**781·93**	**89,139·52**	**84,387·86**	**15,688·17**

* From Copper Ore.

† Donnybrook Goldfield.

Donnybrook...	...	Voided leases	...	...	...	...	...	23·24	...	1,613·30	816·23	...
Do. ...	...	Sundry claims	...	...	...	...	...	...	...	40·00	2·29	...
		Total	...	...	...	...	...	**23·24**	...	**1,653·30**	**818·52**	...

State generally.

Coobana Creek	28H	Cubana Reward	...	46·41	...	...	...	...	46·41	...	...	...
		Sundry parcels treated at:										
		Fremantle Trading Co., Ltd., Fremantle ...	...	...	...	...	...	...	...	...	2,906·29	9,347·45
		Hainault Sulphide Mill, Kalgoorlie	...	...	...	...	...	...	...	...	21·28	...
		State Smelter, Ravensthorpe	...	...	...	...	...	...	...	...	41·20	...
		Various Works	...	...	...	...	...	...	...	27·00	4,411·14	481·77
		Sundry Specimens	...	...	...	...	...	...	2·87	...	...	...
		Reported by Banks and Gold Dealers	...	...	...	...	...	124·89	153·03	...	...	...
		Total	...	**46·41**	...	...	...	**124·89**	**202·81**	**27·00**	**7,379·91**	**9,829·22**

† Abolished 4th March, 1908.

Total Output of Gold Bullion entered for EXPORT, and received at the Perth Branch of the Quantity obtained each Year from the respective

Year.	Kimberley.			Pilbara.			*a* West Pilbara.			Ashburton.		
	Export.	Mint.	Total.	Export.	Mint.	Total.	Export.	Mint.	Total.	Export.	Mint.	Total.
	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.
1886	270·17	...	270·17	...	...	...	...	...	...	...	...	...
1887	4,359·37	...	4,359·37	...	...	...	...	...	...	...	...	...
1888	3,124·82	...	3,124·82	...	...	...	...	...	...	...	...	...
1889	2,204·28	...	2,204·28	9,992·63	...	9,992·63	...	...	...	...	...	...
1890	4,002·42	...	4,002·42	14,363·01	...	14,363·01	...	...	...	...	...	...
1891	2,415·07	...	2,415·07	10,623·32	...	10,623·32	...	...	...	750·31	...	750·31
1892	974·08	...	974·08	11,533·84	...	11,533·84	...	...	...	·63	...	·63
1893	1,450·77	...	1,450·77	10,465·43	...	10,465·43	...	...	...	418·43	...	418·43
1894	526 59	...	526·59	14,541·20	...	14,541·20	...	...	...	255·20	...	255·20
1895	784·27	...	784·27	17,464·65	...	17,464·65	...	...	...	483·76	...	483·76
1896	797·85	...	797·85	10,565·27	...	10,565·27	...	...	...	598·64	...	598·64
1897	495·67	...	495·67	10,695·67	...	10,695·67	...	...	...	928·75	...	928·75
1898	257·54	...	257·54	10,433·27	...	10,433·27	1,814·48	...	1,814·48	402·46	...	402·46
1899	728·52	275·94	1,004 46	17,888·69	473·96	18,362·65	1,749·39	...	1,749·39	214·26	252·10	466·36
1900	29·16	576·14	605·30	8,629·83	6,703·99	15,333·82	522·76	122·85	645·61	44·82	424·27	469·09
1901	...	601·26	601·26	36·68	10,223·75	10,260·43	78·38	357·46	435·84	7·70	50·24	57·94
1902	1·48	378·02	379·50	...	9,199·50	9,199·50	...	2,822·20	2,822·20	...	...	...
1903	...	433·71	433·71	2·26	12,049·52	12,051·78	...	5,493·23	5,493·23	...	114·67	114·67
1904	...	31·51	31·51	...	6,931·27	6,931·27	...	4,320·82	4,320·82	...	125·96	125·96
1905	...	545·95	545·95	48·33	13,353·49	13,401·82	...	1,164·92	1,164·92	...	42·05	42·05
1906	...	647·77	647·77	...	4,956·14	4,956·14	...	755·35	755·35	...	138·84	138·84
1907	...	362·06	362·06	...	4,130·48	4,130·48	...	332·30	332·30	...	41·85	41·85
1908	...	338·00	338·00	...	8,172·26	8,172·26	...	1,076·68	1,076·68	...	45·87	45·87
1909	...	168·95	168·95	...	5,529·19	5,529·19	...	1,396·22	1,396·22	...	228·16	228·16
1910	...	487·25	487·25	...	5,894·32	5,894·32	63·66	1,387·66	1,451·32	...	173·06	173·06
1911	...	148·53	148·53	...	4,874·00	4,874·00	58·00	819·35	877·35	...	270·68	270·68
1912	...	294·55	294·55	...	6,274·04	6,274·04	...	747·34	747·34	...	38·73	38·73
1913	...	266·41	266·41	...	4,207·37	4,207·37	...	1,237·85	1,237·85	...	39·26	39·26
1914	...	196·46	196·46	...	5,544·64	5,544·64	...	1,262·73	1,262·73	...	46·14	46·14
1915	...	220·94	220·94	...	7,411·06	7,411·06	·64	1,239·94	1,240·58	...	16·63	16·63
1916	...	249·58	249·58	...	6,700·93	6,700·93	...	560·79	560·79	...	31·16	31·16
1917	...	108·90	108·90	...	4,673·40	4,673·40	63·80	559·95	623·75	...	21·21	21·21
1918	...	116·34	116·34	2·35	2,951·81	2,954·16	...	26 ·48	267·48	...	6·29	6·29
1919	...	239·74	239·74	...	3,849·66	3,849·66	...	23·90	23·90	...	3·30	3·30
Total	22,422·06	6,688·01	29,110·07	147,286·43	134,104·78	281,391·21	4,351·11	25,949·02	30,300·13	4,104·96	2,110·47	6,215·43

Year.	*d* Yalgoo.			*c* Mt. Margaret.			*e* North Coolgardie.			*f* Broad Arrow.		
	Export.	Mint.	Total.	Export.	Mint.	Total.	Export.	Mint.	Total.	Export.	Mint.	Total.
	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.
1886	...	...	...	...	...	...	...	...	...	...	...	...
1887	...	...	...	...	...	...	...	...	...	...	...	...
1888	...	...	...	...	...	...	...	...	...	...	...	...
1889	...	...	...	...	...	...	...	...	...	...	...	...
1890	...	...	...	...	...	...	...	...	...	...	...	...
1891	...	...	...	...	...	...	...	...	...	...	...	...
1892	...	...	...	...	...	...	...	...	...	...	...	...
1893	...	...	...	...	...	...	...	...	...	...	...	...
1894	...	...	...	...	...	...	...	...	...	...	...	...
1895	...	...	...	...	...	...	...	...	...	...	...	...
1896	...	...	...	...	...	...	15,351·71	...	15,351·71	...	...	...
1897	1,819·81	...	1,819·81	7,770·22	...	7,770·22	66,697·57	...	66,697·57	3,720·87	...	3,720·87
1898	3,360·44	...	3,360·44	38,706·19	...	38,706·19	63,181·09	...	63,181·09	22,035·17	...	22,035·17
1899	5,089·83	4,643·00	9,732·83	58,064·19	15,128·98	73,193·17	54,489·26	40,059·43	94,548·69	32,224·04	7,607·18	39,831·22
1900	462·55	7,918·53	8,381·08	65,998·38	60,607·45	126,605·83	15,660·11	79,340·01	95,000·12	29,955·07	12,860·80	42,815·87
1901	6·80	8,330·42	8,337·22	65,352·46	114,840·17	180,192·63	6,620·82	122,806·58	129,427·40	9,313·50	17,066·09	26,379·59
1902	483·32	4,396·91	4,880·23	61,846·01	124,306·49	186,152·50	4,034·18	156,856·03	160,920·24	2,128·49	13,665·52	15,794·01
1903	47·08	1,430·59	1,477·67	65,416·09	125,437·19	190,853·28	1,348·74	167,153·90	168,502·64	5,201·12	18,245·41	23,446·53
1904	...	2,796·23	2,796·23	63,180·89	119,889·93	183,070·82	1,614·64	139,518·37	141,133·01	318·83	20,660·78	20,979·61
1905	76·75	4,549·25	4,626·00	34,949·75	153,203·05	188,152·80	1,193·71	145,615·47	146,809·18	603·66	15,300·58	15,904·24
1906	...	4,883·17	4,883·17	21,839·88	137,022·23	158,892·11	1,140·45	107,890·76	109,031·21	1,245·75	16,841·70	18,087·45
1907	...	3,199·60	3,199·60	23,989·43	154,059·92	178,049·35	13,240·87	72,701·05	85,941·92	4,292·34	13,610·81	17,903·15
1908	...	456·43	456·43	19,324·02	147,879·90	167,203·92	6,701·28	76,700·77	83,402·05	3,613·64	7,946·35	11,559·99
1909	...	626·80	626·80	24,123·15	135,914·94	160,038·09	6,389·19	66,631·79	73,020·98	6,711·37	4,863·50	11,574·87
1910	...	725·79	725·79	28,507·31	131,976·01	160,483·32	1,889·24	60,886·71	62,775·95	...	321·40	321·40
1911	...	294·80	294·80	21,302·54	131,280·97	152,583·51	209·17	60,270·42	60,479·59	176·57	280·54	457·11
1912	...	1,169·18	1,169·18	4,835·73	101,353·79	106,189·52	53·68	49,946·08	49,999·76	...	4·33	4·33
1913	...	2,837·97	2,837·97	157·14	89,408·71	89,565·85	...	60,855·69	60,855·69	...	8,947·58	8,947·58
1914	...	1,403·35	1,403·35	184·66	103,550·71	103,735·37	...	73,943·49	73,943·49	...	3,074·74	3,074·74
1915	...	4,218·34	4,218·34	68·20	107,934·53	108,002·73	638·99	56,372·00	57,010·99	...	14,447·56	14,447·56
1916	...	4,336·27	4,336·27	642·48	111,277·58	111,920·06	...	39,714·46	39,714·46	...	6,815·74	6,815·74
1917	...	1,108·11	1,103·11	...	111,357·98	111,357·98	...	28,306·34	28,306·34	...	9,185·65	9,185·65
1918	...	878·62	878·02	...	95,186·67	95,186·67	...	30,273·00	30,273·00	...	2,493·63	2,493·63
1919	...	648·81	648·81	...	95,129·83	95,129·83	...	21,535·19	21,535·19	...	2,782·50	2,782·50
Total	11,346·58	60,851·57	72,198·15	633,288·72	2,366,747·03	2,973,035·75	260,484·70	1,657,377·57	1,917,862·27	121,540·42	197,022·89	318,562·31

Year.	*h* Dundas.			*i* Phillips River.			¶ Donnybrook.			State generally.		
	Export.	Mint.	Total.	Export.	Mint.	Total.	Export.	Mint.	Total.	Export.	Mint.	Total.
	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.
1886	...	...	...	...	...	...	...	...	...	...	...	...
1887	...	...	...	...	...	...	...	...	...	...	...	...
1888	...	...	...	...	...	...	...	...	...	...	...	...
1889	...	...	...	...	...	...	...	...	...	...	...	...
1890	...	...	...	...	...	...	...	...	...	...	...	...
1891	...	...	...	...	...	...	...	...	...	...	...	...
1892	...	...	...	...	...	...	...	...	...	...	...	...
1893	132·37	...	132·37	...	...	...	...	...	...	...	...	...
1894	204·31	...	204·31	...	...	...	...	...	...	...	...	...
1895	216·40	...	216·40	...	...	...	...	...	...	...	...	...
1896	3,891·77	...	3,891·77	...	...	...	...	...	...	...	...	...
1897	17,275·36	...	17,275·36	...	...	...	...	...	...	...	...	...
1898	28,655·52	...	28,655·52	...	...	...	...	...	...	...	...	...
1899	39,980·65	423·71	40,404·36	...	...	...	277·27	175·49	452·76	...	809·07	809·07
1900	8,144·72	28,254·19	36,398·91	...	...	...	...	237·56	237·56	5,644·83	1,450·08	7,094·91
1901	5,411·46	29,752·16	35,163·62	...	...	...	...	4·20	4·20	215·91	1,511·63	1,727·54
1902	4,401·31	26,714·16	31,115·47	2,946·53	4,422·56	7,369·09	4·94	57·64	62·58	7·77	2,115·52	2,123·29
1903	1,311·53	33,905·88	35,217·41	2,136·09	5,441·68	7,577·77	...	82·64	82·64	53·44	2,839·44	2,892·88
1904	1,834·03	31,347·06	33,181·09	936·76	2,047·59	2,984·35	...	...	...	·86	1,344·25	1,345·11
1905	1,324·48	27,411·31	28,735·79	2,060·46	1,458·44	3,518·90	...	...	...	70·41	1,515·58	1,585·99
1906	1,111·18	20,198·62	21,309·80	945·65	1,439·03	2,384·68	...	...	...	284·38	763·15	1,047·53
1907	...	22,830·71	22,830·71	4,043·86	1,514·90	5,558·76	...	...	...	799·48	285·47	1,084·95
1908	...	41,203·39	41,203·39	969·00	3,631·02	4,600·02	...	...	...	15·91	1,953·56	1,969·47
1909	...	35,894·72	35,894·72	4,025·81	3,605·75	7,631·56	...	...	...	46·78	455·34	502·12
1910	...	43,260·55	43,260·55	3,271·89	5,031·60	8,303·49	...	...	...	48·67	222·89	271 56
1911	...	48,361·14	48,361·14	1,374·96	4,241·05	5,616·01	...	...	...	209·03	129·01	338·04
1912	...	38,373·40	38,373·40	...	3,292·05	3,292·05	...	...	...	687·32	142·72	830·04
1913	...	27,090·46	27,090·46	...	3,515·02	3,515·02	...	...	...	385·58	230·17	615·75
1914	...	27,803·51	27,803·51	...	395 67	395·67	...	...	...	280·34	287·86	568·20
1915	...	24,148·61	24,148·61	2,011·73	263·06	2,274·79	...	...	...	188·32	318·59	506·91
1916	...	21,956·42	21,956·42	4,119·93	181·13	4,301·06	...	...	...	8,188·93	357·85	8,546·78
1917	...	19,346·27	19,346·27	2,995·76	196·24	3,192·00	...	...	...	356·72	216·30	573·02
1918	...	16,215·83	16,215·83	4,463·52	400·11	4,863·63	...	...	...	1·89	562·96	564·85
1919	...	13,631·96	13,631·96	...	349·49	349·49	...	...	...	...	88·12	88·12
Total	113,895·09	578,124·06	692,019·15	36,301·95	41,426·39	77,728·34	282·21	557·53	839·74	17,486·57	17,599·56	35,086·13

a Prior to 1st May, 1898, included with Pilbara. *d* Prior to 1st April, 1897, included with Murchison. *c* From 1st August, 1897.
e Prior to 1st May, 1896, included with Coolgardie. *f* From 1st September, 1897. *h* Prior to 1893 included with Yilgarn.
i Prior to 1902, included in State generally. ¶ Abolished 4th March, 1908.

ROYAL MINT, FROM 1ST JANUARY, 1886, TO 31ST DECEMBER 1919, SHOWING, IN FINE OUNCES, THE GOLDFIELDS, AND THE TOTAL ANNUAL VALUE.

Year.	*b* GASCOYNE.			*c* PEAK HILL.			*c* EAST MURCHISON.			MURCHISON.		
	Export.	Mint.	Total.	Export.	Mint.	Total.	Export.	Mint.	Total.	Export.	Mint.	Total.
	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.
1886	...	...	...	...	...	...	...	...	...	...	...	...
1887	...	...	...	...	...	...	...	...	...	...	...	...
1888	...	...	...	...	...	...	...	...	...	...	...	...
1889	...	...	...	...	...	...	...	...	...	...	...	...
1890	...	...	...	...	...	...	...	...	...	...	...	...
1891	...	...	...	...	...	...	...	...	...	1,846·83	...	1,846·83
1892	...	...	...	...	...	...	...	...	...	21,789·19	...	21,789·19
1893	...	...	...	...	...	...	...	...	...	18,974·77	...	18,974·77
1894	...	...	...	...	...	...	...	...	...	47,365·54	...	47,365·54
1895	...	...	...	...	...	...	...	...	...	58,575·66	...	58,575·66
1896	...	...	...	...	...	...	...	...	...	63,769·17	...	63,769·17
1897	...	...	...	4,571·38	...	4,571·38	8,457·34	...	8,457·34	74,154·67	...	74,154·67
1898	...	...	...	12,288·93	...	12,288·93	35,393·19	...	35,393·19	83,794·22	...	83,794·22
1899	297·96	76·63	374·59	14,064·24	14,558·64	28,622·88	33,826·08	3,361·95	37,188·03	61,586·09	22,074·71	83,660·80
1900	...	77·02	77·02	9,528·14	16,119·79	25,647·93	23,545·54	28,671·55	52,217·09	53,815·70	43,423·77	97,239·47
1901	6·59	16·82	23·41	231·85	19,352·44	19,584·29	29,780·63	40,557·07	70,337·70	92,149·56	38,996·10	131,145·66
1902	...	107·29	107·29	85·93	28,044·55	28,130·48	25,450·63	53,583·10	79,033·73	141,731·91	40,926·08	182,657·99
1903	...	30·76	30·76	203·60	29,395·32	29,598·92	21,878·06	65,334·05	87,212·11	154,012·88	54,348·53	208,361·41
1904	...	10·95	10·95	...	17,475·33	17,475·33	21,296·85	64,550·36	85,847·21	165,232·67	52,683·16	217,915·83
1905	...	21·34	21·34	125·01	13,371·75	13,496·76	1,361·68	89,249·93	90,611·61	131,656·36	92,742·05	224,398·41
1906	...	78·73	78·73	...	2,038·62	2,038·62	140·68	95,168·89	95,309·57	79,172·69	109,936·80	189,109·49
1907	...	8·44	8·44	...	5,918·75	5,918·75	2,891·66	117,735·69	120,627·35	54,811·74	115,497·50	170,309·24
1908	...	31·82	31·82	...	9,864·36	9,864·36	10,701·24	137,028·14	147,729·38	45,483·05	111,540·54	157,023·59
1909	...	7·37	7·37	...	7,322·29	7,322·29	11,599·83	136,637·67	148,237·50	24,682·47	107,167·27	131,849·74
1910	...	26·31	26·31	...	3,057·25	3,057·25	1,557·78	137,190·44	138,748·22	19,568·85	111,414·23	130,983·08
1911	...	7·87	7·87	...	134·23	134·23	11·77	96,442·87	96,454·64	13,919·70	109,444·91	123,364·61
1912	...	6·55	6·55	...	196·11	196·11	...	90,397·82	90,397·82	6,377·17	105,245·32	111,622·49
1913	...	...	...	...	258·10	258·10	195·78	80,122·11	80,317·89	5,749·47	115,694·96	121,444·43
1914	...	4·11	4·11	...	85·66	85·66	354·75	65,609·61	65,964·36	6,443·82	111,822·67	118,266·49
1915	...	65·55	65·55	·56	446·00	446·56	268·57	52,926·34	53,194·91	8,669·79	96,610·36	105,280·15
1916	...	60·53	60·53	...	155·01	155·01	902·67	30,284·85	31,187·52	6,694·02	77,369·19	84,063·21
1917	...	...	...	...	...	...	...	7,942·96	7,942·96	1,082·93	94,142·67	95,225·60
1918	...	...	...	...	...	...	...	768·08	768·08	214·23	75,478·06	75,692·29
1919	...	...	...	...	57·83	57·83	...	766·30	766·30	...	64,425·15	64,425·15
Total	304·55	638·09	942·64	41,099·64	167,852·03	208,951·67	229,614·73	1,394,329·78	1,623,944·51	1,443,325·15	1,750,984·03	3,194,309·18

Year.	*e* NORTH-EAST COOLGARDIE.			*e* EAST COOLGARDIE.			*g* COOLGARDIE.			YILGARN.		
	Export.	Mint.	Total.	Export.	Mint.	Total.	Export.	Mint.	Total.	Export.	Mint.	Total.
	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.	fine ozs.
1886	...	...	...	...	...	...	...	...	...	...	...	...
1887	...	...	...	...	...	...	...	...	...	...	...	...
1888	...	...	...	...	...	...	...	...	...	...	...	...
1889	...	...	...	...	...	...	...	...	...	...	...	...
1890	...	...	...	...	...	...	...	...	...	1,662·61	...	1,662·61
1891	...	...	...	...	...	...	...	...	...	2,036·99	...	2,036·99
1892	...	...	...	...	...	...	...	...	...	11,480·61	...	11,480·61
1893	...	...	...	...	...	...	...	...	...	18,973·91	...	18,973·91
1894	...	...	...	...	...	...	...	...	...	67,760·73	...	67,760·73
1895	...	...	...	...	...	...	94,227·58	...	94,227·58	28,178·31	...	28,178·31
1896	3,679·63	...	3,679·63	76,297·42	...	76,297·42	111,919·21	...	111,919·21	17,666·25	...	17,666·25
1897	29,437·40	...	29,437·40	268,411·95	...	268,411·95	61,848·03	...	61,848·03	14,819·20	...	14,819·20
1898	112 039·58	...	112,039·58	402,847·31	...	402,847·31	93,312·00	...	93,312·00	16,097·78	...	16,097·78
1899	57,674·82	14,940·55	72,615·37	796,696·63	29,567·58	826,264·21	113,816·75	...	113,816·75	10,463 35	...	10,463·35
1900	10,400·57	36,233·90	46,634·47	600,328·29	125,105·24	725,433·53	101,589·22	24,700·89	126,290·11	6,919·11	8,114·60	15,033·71
1901	6,798·56	39,024·18	45,822·74	698,042·56	238,840·93	936,883·49	60,988·33	46,167·62	107,155·95	688·47	25,628·83	26,317·30
1902	549·07	46,316·67	46,865·74	460,462·26	546,964·68	1,007,426·94	9,584·35	70,720·21	80,304·56	49·15	26,677·85	26,727·00
1903	4,308·99	36,145·75	40,454·74	570,447·27	580,790·97	1,151,238·24	2,872·61	80,887·85	83,760·46	3·31	22,232·80	22,236·11
1904	55·09	33,262·10	33,317·19	555,016·48	584,579·88	1,139,596·36	7,318·63	69,681·38	77,000·01	...	22,761·00	22,761·00
1905	2,187·11	40,220·19	42,407·30	479,254·37	613,103·20	1,092,357·57	1,100·07	61,073·11	62,173·18	28·87	29,965·37	29,994·24
1906	1,590·31	30,943·82	32,534·13	454,645·84	612,546·81	1,067,192·65	177·80	62,066·34	62,244·14	...	25,291·11	25,291·11
1907	3,132·83	25,399·75	28,532·58	323,550·05	643,139·11	966,689·16	103·78	60,474·81	60,578·59	...	25,570·77	25,570·77
1908	925·44	23,902·44	24,827·88	207,748·62	657,936 89	925,685·51	1,050·88	61,670·65	62,721·53	...	23,311·41	23,311·41
1909	1,774·45	24,566·87	26,341·32	306,462·21	620,612·07	927,074·28	871·76	40,982·65	41,854·41	...	20,866·10	20,866·10
1910	...	19,082·01	19,082·01	179,062·94	653,211·05	832,273·99	350·91	36,311·70	36,662·61	204·41	20,958·23	21,162·64
1911	...	18,528·97	18,528·97	123,160·54	686,386·80	809,547·34	...	38,264·02	38,264·02	...	24,049·13	24,049·13
1912	194·22	14,475·38	14,669·60	71,429·00	717,356·45	788,785·45	...	33,840·93	33,840·93	...	14,688·17	14,688·17
1913	...	11,210·69	11,210·69	70,078·57	722,593·22	792,671·79	...	42,327·65	42,327·65	...	27,439·38	27,439·38
1914	...	5,210·22	5,210·22	40,393·05	677,609·26	718,002·31	...	35,593·00	35,593·00	9,688·59	63,679·58	73,368·17
1915	...	8,773·97	8,773·97	5,493·67	709,061·79	714,555·46	...	21,957·78	21,957·78	3,798·03	81,713·56	85,511·59
1916	...	1,996·06	1,996·06	6,194·14	635,425·68	641,619·82	...	17,590·21	17,590·21	...	90,705·75	90,705·75
1917	...	769·16	769·16	4,523·28	602,459·51	606,982·79	...	12,381·82	12,381·82	...	84,800·82	84,800·82
1918	...	145·91	145·91	10,216·56	560,438·18	570,654·74	...	6,500·66	6,500·66	...	74,399·36	74,399·36
1919	...	116·83	116·83	6,445·89	459,912·83	466,358·72	...	6,727·82	6,727·82	745·57	67,956·84	68,702·41
Total	234,748·07	431,265·42	666,013·49	6,777,208·90	11,677,642·13	18,454,851·03	661,131·91	3,918·19	3,918·19	...	60,140·27	60,140·27

Year.	GRAND TOTAL.			
	Export.	Mint.	Total.	Value.
	fine ozs.	fine ozs.	fine ozs.	£ s. d.
1886	270·17	...	270·17	1,147 12 2½
1887	4,359·37	...	4,359·37	18,517 8 6½
1888	3,124·82	...	3,124·82	13,273 7 10½
1889	13,859·52	...	13,859·52	58,871 9 11½
1890	20,402·42	...	20,402·42	86,663 19 5
1891	27,116·14	...	27,116·14	115,182 0 10½
1892	53,271·65	...	53,271·65	226,283 11 8
1893	99,202·50	...	99,202·50	421,385 8 8½
1894	185,298·73	...	185,298·73	787,098 19 6
1895	207,110·20	...	207,110·20	879,748 4 2½
1896	251,618·69	...	251,618·69	1,068,808 5 2
1897	603,846·44	...	603,846·44	2,564,976 12 9½
1898	939,489·49	...	939,489·49	3,990,697 13 10
1899	1,283,360·25	187,244·41	1,470,604·66	6,246,731 10 7½
1900	894,387·27	519,923·59	1,414,310·86	6,007,610 13 4½
1901	923,686·96	779,729·56	1,703,416·52	7,235,653 9 1
1902	707,039·75	1,163,997·60	1,871,037·35	7,947,661 9 7½
1903	833,685·78	1,231,115·62	2,064,801·40	8,770,718 17 0½
1904	810,616·04	1,172,614·03	1,983,230·07	8,424,235 17 3½
1905	655,089·88	1,300,226·00	1,955,315·88	8,305,653 18 5½
1906	562,250·59	1,232,296·01	1,794,546·60	7,622,749 8 7
1907	431,803·14	1,265,750·45	1,697,553·59	7,210,749 6 2½
1908	356,353·96	1,291,557·17	1,647,911·13	6,999,881 10 10½
1909	386,370·58	1,208,898·83	1,595,269·41	6,776,273 14 7½
1910	233,970·34	1,236,661·68	1,470,632·02	6,246,847 15 0
1911	160,422·28	1,210,445·24	1,370,867·52	5,823,075 1 9½
1912	83,577·12	1,199,080·87	1,282,657·99	5,448,384 16 5½
1913	86,255·13	1,227,788·15	1,314,043·28	5,581,701 1 2½
1914	51,454·65	1,181,522·17	1,232,976·82	5,237,352 12 6½
1915	17,340·47	1,192,771·23	1,210,111·70	5,140,227 15 5½
1916	26,742·17	1,034,655·87	1,061,398·04	4,508,532 5 11
1917	9,022·49	961,294·67	970,317·16	4,121,645 6 2½
1918	15,644·12	860,867·03	876,511·15	3,723,182 14 9
1919	6,445·89	727,619·90	734,065·79	3,118,113 5 6½
TOTAL	10,944,489·00	22,186,060·08	33,130,549.08	140,729,627 5 4½

b Prior to March, 1899, included with Ashburton. *c* From 1st August, 1897. *e* Prior to 1st May, 1896, included with Coolgardie. *g* Declared 5th April, 1894, to which date included with Yilgarn.

TABLE VI.

COMPARATIVE RETURN OF GOLD BULLION ENTERED FOR EXPORT AND RECEIVED AT THE PERTH BRANCH OF THE ROYAL MINT, DURING THE YEARS 1917, 1918, AND 1919, SHOWING IN FINE OUNCES THE QUANTITY RECORDED EACH MONTH, AND ITS VALUE.

MONTHS AND QUARTERS.	1917.				1918.				1919.			
	EXPORT.	MINT.	TOTAL.	VALUE.	EXPORT.	MINT.	TOTAL.	VALUE.	EXPORT.	MINT.	TOTAL.	VALUE.
	fine ozs.	fine ozs.	fine ozs.	£ s. d.	fine ozs.	fine ozs.	fine ozs.	£ s. d.	fine ozs.	fine ozs.	fine ozs.	£ s. d.
JANUARY	1,756·00	83,961·77	85,717·77	346,105 18 10½	687·00	73,703·44	74,390·44	315,990 10 8½	...	69,953·61	69,953·61	297,144 0 11½
FEBRUARY	1,893·97	81,810·13	83,704·10	355,552 8 4	816·00	76,987·39	77,803·39	330,487 15 10½	733·10	66,310·48	67,043·58	284,783 0 6½
MARCH	428·07	76,170·86	76,598·93	325,371 11 5½	2,568·00	69,730·59	72,298·59	307,104 17 9½	...	66,158·54	66,158·54	281,023 12 3½
1st January to 31st March ...	**4,078·04**	**241,942·76**	**246,020·80**	**1,045,029 18 7½**	**4,071·00**	**220,421·42**	**224,492·42**	**953,583 4 4½**	**733·10**	**202,422·63**	**203,155·73**	**862,950 13 9½**
APRIL	...	82,143·56	82,143·56	348,923 13 3½	406·61	66,079·30	66,485·91	282,414 3 10½	32·96	63,464·81	63,497·77	269,721 7 7½
MAY	1,269·38	78,165·27	79,434·65	337,416 18 11	3,823·04	73,701·65	77,524·69	329,303 19 0½	524·99	68,654·55	69,179·54	293,856 0 1½
JUNE	268·67	82,600·54	82,869·21	352,006 0 7	577·67	74,904·52	75,482·19	320,627 19 3	1,050·48	73,546·47	74,596·95	316,867 14 0½
1st January to 30th June ...	**5,616·09**	**484,852·13**	**490,468·22**	**2,083,376 11 5½**	**8,878·32**	**435,106·89**	**443,985·21**	**1,885,929 6 6½**	**2,341·53**	**408,088·46**	**410,429·99**	**1,743,395 15 7½**
JULY	384·62	81,165·80	81,550·42	346,404 3 3½	1,511·28	72,081·85	73,593·13	312,603 14 11	680·07	68,028·11	68,708·18	291,853 15 11½
AUGUST	889·66	80,181·01	81,070·67	344,366 6 4	106·74	76,156·04	76,262·78	323,943 13 11½	835·49	58,117·09	58,952·58	250,414 12 10½
SEPTEMBER	...	81,760·81	81,760·81	347,297 16 11	964·04	74,057·80	75,021·84	318,672 10 4½	...	36,241·61	36,241·61	153,944 11 5½
1st January to 30th September ...	**6,890·37**	**727,959·75**	**734,850·12**	**3,121,444 18 0**	**11,460·38**	**657,402·58**	**668,862·96**	**2,841,149 5 10**	**3,857·09**	**570,475·27**	**574,332·36**	**2,439,608 15 10½**
OCTOBER	...	73,900·90	73,900·90	313,911 1 4½	...	71,438·95	71,438·95	303,453 7 5	585·71	64,987·11	65,572·82	278,535 12 8½
NOVEMBER	...	80,641·12	80,641·12	342,541 14 1	1,444·66	70,711·35	72,156·01	306,499 4 11½	1,171·33	64,823·40	65,994·73	280,327 15 10½
DECEMBER	2,132·12	78,792·90	80,925·02	343,747 12 8½	2,739·08	61,314·15	64,053·23	272,080 16 6½	831·76	27,334·12	28,165·88	119,641 1 0½
Total	**9,022·49**	**961,294·67**	**970,317·16**	**4,121,645 6 2½**	**15,644·12**	**860,867·03**	**876,511·15**	**3,723,182 14 9**	**6,445·89**	**727,619·90**	**734,065·79**	**3,118,113 5 6½**

TABLE VII.

MONTHLY RETURN OF GOLD, CONTAINED IN BULLION, FURNACE PRODUCTS, AND ORE, ENTERED FOR EXPORT DURING 1919.

MONTH.	UNITED KINGDOM.			VICTORIA.			NEW SOUTH WALES.			SOUTH AUSTRALIA.			TOTALS.		
	Bullion.	Furnace Products.	Ore.	Bullion.	Furnace Products.	Ore.	Bullion.	Furnace Products.	Ore.	Bullion.	Furnace Products.	Ore.	Bullion.	Furnace Products.	Ore.
1919.	Fine ozs.	Estimated fine ozs.	Estimated fine ozs.	Fine ozs.	Estimated fine ozs.	Estimated fine ozs.	Fine ozs.	Estimated fine ozs.	Estimated fine ozs.	Fine ozs.	Estimated fine ozs.	Estimated fine ozs.	Fine ozs.	Estimated fine ozs.	Estimated fine ozs.
January	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
February	...	...	...	...	...	...	...	733·10	...	...	...	...	...	**733·10**	...
March	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
April	...	...	...	...	...	...	...	32·96	...	...	...	...	...	**32·96**	...
May	...	...	...	...	...	...	...	524·99	...	...	...	...	...	**524·99**	...
June	...	...	...	...	...	...	...	1,050·48	...	...	...	...	...	**1,050·48**	...
July	...	...	...	...	...	...	...	680·07	...	...	...	...	...	**680·07**	...
August	...	...	...	...	...	...	...	835·49	...	...	...	...	...	**835·49**	...
September	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
October	...	...	...	...	...	...	...	585·71	...	...	...	...	...	**585·71**	...
November	...	...	...	...	...	...	...	1,171·33	...	...	...	...	...	**1171·33**	...
December	...	...	...	...	...	...	...	831·76	...	...	...	...	...	**831·76**	...
TOTALS	...	...	...	...	...	...	...	**6,445·89**	...	...	...	...	...	**6,445·89**	...

TABLE VIII.

RETURN OF GOLD BULLION RECEIVED AT THE PERTH BRANCH OF THE ROYAL MINT FROM MAY, 1899, TO THE 31ST DECEMBER, 1919, SHOWING IN GROSS OUNCES THE QUANTITY OBTAINED FROM THE RESPECTIVE GOLDFIELDS AND OTHER COUNTRIES, AND THE ACTUAL VALUE THEREOF.

Year.	Kimberley.	Pilbara.	West Pilbara.	Ashburton.	Gascoyne.	Peak Hill.	East Murchison.	Murchison.	Yalgoo.	Mt. Margaret.	North Coolgardie.	Broad Arrow.	North-East Coolgardie.
	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.
1899	308·45	529·80	...	281·80	85·65	16,274·00	3,758·07	24,675·64	5,190·05	16,911·54	44,779·38	8,503·50	16,700·90
1900	644·02	7,493·88	137·33	474·26	86·10	18,019·08	32,049·74	48,540·12	8,851·52	67,748·45	88,688·14	14,376·10	40,503·12
1901	663·37	11,279·93	394·38	55·42	18·56	21,351·67	44,746·88	43,024·65	9,191·01	126,703·91	135,493·31	18,829·13	43,055·63
1902	439·93	10,706·03	3,284·37	...	124·86	32,637·17	62,357·98	47,628·18	5,116·94	144,663·12	182,543·06	15,903·42	53,901·58
1903	511·75	14,217·53	6,481·58	135·30	36·29	34,684·27	77,089·29	64,127·18	1,687·99	148,006·49	197,229·08	21,528·20	42,649·25
1904	37·69	8,293·58	5,170·06	150·73	13·10	20,909·99	77,237·31	63,037·71	3,345·82	143,453·51	166,939·82	24,721·53	39,799·55
1905	656·34	16,053·42	1,400·46	50·54	25·65	16,075·36	107,295·17	111,493·34	5,469·06	184,178·87	175,057·14	18,394·17	48,352·22
1906	785·23	6,007·79	915·63	168·30	95·43	2,471·21	115,363·22	133,264·79	5,919·37	166,097·63	130,784·60	20,415·43	37,509·91
1907	431·72	4,924·97	396·22	49·89	10·06	7,057·22	140,382·15	137,713·43	3,815·06	183,693·29	86,685·09	16,228·85	30,285·39
1908	400·19	9,676·11	1,292·97	54·32	37·68	11,679·58	162,243·76	132,066·00	2,625·14	175,092·47	90,815·08	9,408·64	28,300·91
1909	203·59	6,662·82	1,682·49	274·93	8·89	8,823·58	164,652·43	129,139·74	755·31	163,781·55	80,293·29	5,860·66	29,603·84
1910	586·44	7,094·46	1,670·20	208·31	31·67	3,679·72	165,123·37	134,098·94	873·58	158,847·24	73,283·66	386·84	22,967·23
1911	183·78	6,033·33	1,014·60	334·38	9·78	165·36	119,267·86	135,342·96	363·85	162,319·77	74,536·34	346·78	22,917·38
1912	361·11	7,674·55	912·60	47·77	8·09	237·96	110,585·25	128,679·43	1,410·49	124,123·10	61,018·13	5·32	17,705·86
1913	319·55	5,048·77	1,491·66	47·37	...	564·67	96,270·04	139,021·56	3,410·52	107,391·67	73,160·41	10,814·52	13,452·90
1914	238·83	6,750·56	1,538·31	56·09	5·00	104·45	79,785·02	135,990·48	1,705·85	125,937·60	89,904·49	3,727·56	6,318·12
1915	270·76	9,084·52	1,540·93	20·50	81·05	550·77	65,111·82	118,861·14	5,208·56	132,819·64	69,318·34	17,810·14	10,808·78
1916	306·92	8,265·75	692·68	38·34	74·07	190·21	37,169·30	95,071·24	5,320·33	136,731·10	48,799·86	8,415·40	2,441·68
1917	133·03	5,770·70	683·84	25·85	...	...	9,660·88	115,360·36	1,366·18	136,343·74	34,650·24	11,300·38	936·97
1918	144·31	3,643·49	339·36	7·87	...	...	949·78	93,501·94	1,090·10	118,132·80	37,572·67	3,087·67	179·83
1919	293·46	4,813·34	29·62	4·10	...	71·92	958·91	79,921·84	806·04	117,763·53	26,692·84	3,455·12	144·34
Total ...	7,920·47	160,025·33	31,069·29	2,486·07	751·93	195,548·19	1,672,053·23	2,110,560·67	73,522·77	2,840,741·02	1,968,244·97	233,519·36	508,335·39

Year.	East Coolgardie.	Coolgardie.	Yilgarn.	Dundas.	*Phillips River.	†Donny-brook.	State generally.	Total. Western Australia. Quantity.	Western Australia. Actual Value.	Total. Other Countries. Quantity.	Other Countries. Actual Value.	Grand Total. Quantity.	Grand Total. Actual Value.
	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	£ s. d.	ozs.	£ s. d.	ozs.	£ s. d.
1899 ...	33,051·33	27,611·24	9,070·70	473·63	...	196·17	904·39	209,306·24	762,546 11 6	103·46	336 18 3	209,409·70	762,883 9 9
1900 ...	139,845·60	51,607·26	28,648·51	31,583·20	...	205·55	1,620·93	581,182·91	2,096,212 14 2	17·49	44 15 7	581,200·40	2,096,257 9 9
1901 ...	263,514·75	78,026·07	29,433·84	32,825·75	...	4·64	1,667·79	860,280·69	3,033,311 0 4	92·25	297 5 8	860,372·94	3,033,608 6 0
1902 ...	636,536·52	94,134·17	25,873·68	31,088·91	5,146·80	67·08	2,461·98	1,354,615·78	4,791,303 18 1	16·27	38 10 2	1,354,632·05	4,791,342 8 3
1903 ...	685,289·82	82,218·79	26,856·28	40,006·39	6,420·79	97·52	3,350·32	1,452,624·11	5,139,852 11 9	294·78	703 14 10	1,452,918·89	5,140,556 6 7
1904 ...	699,475·35	73,076·66	35,854·87	37,508·11	2,450·03	...	1,608·47	1,403,083·89	4,955,870 9 0	263·05	614 11 9	1,403,346·94	4,956,485 0 9
1905 ...	737,065·14	74,615·36	30,404·65	32,953·56	1,753·32	...	1,821·99	1,563,115·76	5,475,841 2 10	525·80	1,491 0 7	1,563,641·56	5,477,332 3 5
1906 ...	742,525·99	73,307·24	30,996·76	24,484·65	1,744·38	...	925·10	1,493,782·66	5,330,245 12 1	413·86	974 16 0	1,494,196·52	5,331,220 8 1
1907 ...	766,846·83	73,532·99	27,795·35	27,222·21	1,806·30	...	340·39	1,509,217·41	5,416,812 0 7	640·51	1,663 4 3	1,509,857·92	5,418,475 4 10
1908 ...	779,009·10	48,524·18	22,835·58	48,785·54	4,299·19	...	2,080·42	1,529,226·86	5,386,858 15 8	1,313·84	3,885 2 3	1,530,540·70	5,390,743 17 11
1909 ...	747,856·04	43,756·68	25,255·30	43,254·22	4,345·04	...	548·71	1,456,759·11	5,143,035 17 1	882·56	1,109 6 7	1,457,641·67	5,144,145 3 8
1910 ...	786,209·41	46,054·82	28,945·68	52,068·70	6,056·08	...	268·26	1,488,454·61	5,163,100 17 11	2,251·71	1,670 11 7	1,490,706·32	5,164,771 9 6
1911 ...	848,725·06	41,861·54	18,190·20	59,831·49	5,242·16	...	159·90	1,496,846·52	5,143,795 10 5	452·22	915 19 4	1,497,298·74	5,144,711 9 9
1912 ...	876,900·05	51,732·78	33,429·29	52,220·76	4,026·32	...	174·26	1,471,253·12	5,106,466 9 1	641·47	1,527 8 0	1,471,894·59	5,107,993 17 1
1913 ...	867,887·30	42,738·63	76,581·73	47,535·02	4,221·40	...	277·70	1,490,235·42	5,204,738 18 3	697·50	1,247 12 7	1,490,932·92	5,205,986 10 10
1914 ...	824,280·77	26,696·51	99,410·57	47,487·27	480·65	...	350·48	1,450,768·61	5,016,905 19 0	915·24	1,726 5 1	1,451,683·85	5,018,632 4 1
1915 ...	872,406·66	21,593·44	111,539·75	42,283·16	324·48	...	392·28	1,480,026·72	5,060,196 7 6	1,260·07	2,610 8 11	1,481,286·79	5,062,806 16 5
1916 ...	780,354·90	15,238·33	104,136·12	36,653·26	221·89	...	437·33	1,280,558·71	4,405,278 18 10	1,059·26	2,060 6 9	1,281,617·97	4,407,339 0 7
1917 ...	737,833·22	7,968·62	91,168·91	34,685·39	238·50	...	264·27	1,188,391·08	4,074,112 6 7	1,016·70	1,905 17 7	1,189,407·78	4,076,018 4 2
1918 ...	695,564·50	8,338·10	84,297·45	29,649·05	494·27	...	705·32	1,077,698·51	3,655,942 4 5	1,468·02	2,476 6 11	1,079,166·53	3,658,418 11 4
1919 ...	569,081·41	4,866·10	74,493·69	20,346·85	434·47	...	109·08	904,286·66	3,089,248 3 1	1,358·71	2,611 16 1	905,645·37	3,091,854 19 2
Total ...	14,090,259·75	987,499·51	1,015,218·91	772,947·12	49,706·07	630·96	20,469·37	26,741,715·38	93,451,671 3 2	15,684·77	29,911 18 9	26,757,400·15	93,481,583 1 11

* Prior to 1902 included in State generally.

† Abolished 4th March, 1908.

PART II.—MINERALS OTHER THAN GOLD.

TABLE IX.

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 1919, AND PREVIOUS YEARS.

BLACK TIN.

Period.	Pilbara Goldfield—Marble Bar District.				Greenbushes Mineral Field.				Total.			
	Quantity.			Value.	Quantity.			Value.	Quantity.			Value.
	Lode.	Stream.	Total.		Lode.	Stream.	Total.		Lode.	Stream.	Total.	
	tons.	tons.	tons.	£	tons.	tons.	tons.	£	tons.	tons.	tons.	£
Previous to 1899 ...	...	75·45	75·45	4,419	...	1,590·33	1,590·33	66,108	...	1,665·78	1,665·78	70,527
1899	...	57·50	57·50	3,612	...	277·32	277·32	21,658	...	334·82	334·82	25,270
1900	...	387·87	387·87	27,174	...	435·62	435·62	29,528	...	823·49	823·49	56,702
1901	...	412·98	412·98	21,148	...	321·34	321·34	18,852	...	734·32	734·32	40,000
1902	...	216·35	216·35	15,103	...	403·21	403·21	24,680	...	619·56	619·56	39,783*
1903	...	292·11	292·11	21,528	...	524·94	524·94	34,362	...	817·05	817·05	55,890
1904	...	320·86	320·86	24,355	...	533·64	533·64	34,462	...	854·50	854·50	58,817
1905	...	435·74	435·74	33,880	...	643·52	643·52	52,960	...	1,079·26	1,079·26	86,840
1906	36·59	675·06	711·65	78,449	26·18	757·10	783·28	79,195	62·77	1,432·16	1,494·93	157,644
1907	104·13	749·56	853·69	85,603	40·40	729·60	770·00	73,045	144·53	1,479·16	1,623·69	158,648
1908	31·00	372·03	403·03	30,636	13·90	562·43	576·33	41,046	44·90	934·46	979·36	71,682
1909	81·75	212·21	293·96	22,431	44·40	414·35	458·75	34,786	126·15	*628·08	*754·23	†57,335
1910	33·75	119·75	153·50	12,899	25·06	292·65	317·71	27,974	58·81	412·40	471·21	40,873
1911	27·35	121·30	148·65	16,064	27·82	383·30	411·12	44,638	55·17	504·60	559·77	60,702
1912	10·25	113·13	123·38	14,993	14·90	415·55	430·45	50,166	25·15	528·68	553·83	65,159
1913	14·15	124·95	139·10	16,506	29·06	429·42	458·48	50,954	43·21	‡557·72	‡600·93	§67,717
1914	12·35	75·05	87·40	8,168	5·32	239·22	244·54	21,145	17·67	314·27	331·94	29,313
1915	5·05	73·60	78·65	7,633	7·55	239·78	247·33	21,431	12·60	313·38	325·98	29,064
1916	6·50	146·67	153·17	15,939	9·94	271·80	281·74	27,319	16·44	418·47	434·91	43,258
1917	4·05	65·00	69·05	9,264	11·18	226·74	237·92	29,928	15·23	291·74	306·97	39,192
1918	5·70	93·80	99·50	20,984	50·52	245·28	295·80	57,653	56·22	339·08	395·30	78,637
1919	...	36·70	36·70	5,871	23·66	220·95	244·61	34,959	23·66	257·65	281·31	40,830
Total	372·62	5,177·67	5,550·29	496,659	329·89	10,158·09	10,487·98	876,849	702·51	15,340·63	16,043·14	1,373,883

* Includes tons 1·52, the produce of Cue District. † Includes £118, value of tons 1·52, the produce of Cue District, ‡ Includes tons 3·20, the produce of Cue District and tons ·15 of Coolgardie District. § Includes £242, value of tons 3·20 the produce of Cue District, and £15, value of ·15 tons of Coolgardie District.

TANTALITE.

Period.	Pilbara Goldfield—Marble Bar District.				Greenbushes Mineral Field.				Total.			
	Quantity.			Value.	Quantity.			Value.	Quantity.			Value.
	Lode.	Stream.	Total.		Lode.	Stream.	Total.		Lode.	Stream.	Total.	
	tons.	tons.	tons.	£	tons.	tons.	tons.	£	tons.	tons.	tons.	£
Previous to 1899 ...	...	...	...	...	...	...	...	...	...	...	...	...
1899	...	...	...	...	...	...	...	...	...	...	...	...
1900	...	...	...	...	...	...	...	...	...	...	...	...
1901	...	...	...	...	...	...	...	...	...	...	...	...
1902	...	...	...	...	...	...	...	...	...	...	...	...
1903	...	...	...	...	...	...	...	...	...	...	...	...
1904	...	...	...	...	...	...	...	...	...	...	...	...
1905	...	70·95	70·95	8,925	...	2·34	2·34	1,590	...	73·29	73·29	10,515
1906	1·80	12·85	14·65	2,644	...	...	...	...	1·80	12·85	14·65	2,644
1907	...	...	...	...	...	...	...	...	...	...	...	...
1908	...	...	...	...	...	...	...	...	...	...	...	...
1909	·45	...	·45	113	...	·85	·85	214	·45	·85	1·30	327
1910	...	...	...	...	...	...	...	...	...	...	...	...
1911	...	...	...	...	...	...	...	...	...	...	...	...
1912	...	...	...	...	...	...	...	...	...	...	...	...
1913	...	...	...	...	...	...	...	...	...	...	...	...
1914	...	...	...	...	...	...	...	...	...	...	...	...
1915	...	...	...	...	...	...	...	...	...	...	...	...
1916	...	...	...	...	...	...	...	...	...	...	...	...
1917	...	12·50	12·50	1,782	...	...	...	...	...	12·50	12·50	1,782
1918	...	...	...	...	...	...	...	...	...	...	...	...
1919	...	...	...	...	...	...	...	...	...	...	...	...
Total	2·25	96·30	98·55	13,464	...	3·19	3·19	1,804	2·25	99·49	101·74	15,268

Period.	Pyritic Ore.		Copper Ore.											
	Mt. Morgans D.		Pilbara Goldfield.				West Pilbara Gf.		Ashburton Gf.		Peak Hill Gf.		E. Murchison Gf.	
			Marble Bar D.		Nullagine D.								Lawlers D.	
	Quantity.	‖Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	tons.	£	tons.	£	tons.	£	tons.	£	tons.	£	tons.	£	tons.	£
Previous to 1899	...	...	...	...	...	...	7,018·00	55,270	...	...	...	...	...	...
1899	...	...	...	...	...	...	2,555·00	29,478	...	...	...	...	...	...
1900	...	...	...	...	...	...	1,605·00	12,139	...	...	...	...	...	...
1901	...	...	...	...	...	...	1,162·00	15,891	...	...	...	...	...	...
1902	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1903	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1904	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1905	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1906	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1907	...	...	7·77	190	...	...	3,365·50	63,548	...	...	...	...	...	...
1908	...	...	...	...	...	...	1,486·00	17,691	188·00	2,311	...	...	6·77	69
1909	...	...	...	...	...	...	7,135·50	62,447	10·75	259	...	...	...	...
1910	...	...	...	...	...	...	8,479·80	64,861	...	...	...	...	...	...
1911	9,938·92	3,529	25·10	196	5·00	120	9,082·02	69,140	...	...	...	...	...	...
1912	7,625·80	2,543	...	...	...	...	12,284·02	104,289	...	...	...	...	...	...
1913	0,216·18	3,658	...	...	...	...	12,621·73	76,878	...	...	...	...	...	...
1914	9,758·83	3,485	...	...	...	...	7,764·18	40,607	...	...	112·70	2,409	...	...
1915	6,557·62	2,368	...	...	...	...	314·75	3,546	146·00	3,744	237·58	7,618	10·93	147
1916	4,409·22	2,263	...	...	...	...	48·87	16,116	2·61	27	250·93	8,268	63·42	1,311
1917	3,575·46	1,752	...	...	...	...	783·61	13,406	3·71	67	287·84	9,683	75·00	1,523
1918	2,251·81	1,629	...	...	...	...	1,844·19	28,961	...	...	76·28	2,480	82·44	1,814
1919	4,135·93	4,919	...	...	...	...	1,030·78	15,807	...	...	14·39	353	...	...
Total ...	58,469·77	26,146	32·87	386	5·00	120	79,480.95	690,075	351·07	6,408	979·72	30,811	238·56	4,364

‖ Represents the value of the sulphur only the copper contents not having been treated yet.

TABLE IX.—*Minerals other than Gold, etc.*—continued.

COPPER ORE—*continued.*

Period.	Murchison Gf.				Yalgoo Gf.		Northampton Mf.		Yandanooka Mf.		Mt. Margaret Goldfield.			
	Meekatharra D.		Day Dawn D.								Mt. Morgans District.		Mt. Margaret District.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	tons.	£	tons.	£	tons.	£	tons.	£	tons.	£	tons.	£	tons.	£
Previous to 1899	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1899	...	...	...	...	...	...	98·00	1,715	38·00	407	273·00	4,338	...	...
1900	...	...	5·15	91	...	...	...	...	...	...	4,539·00	30,718	...	...
1901	...	...	10·50	76	...	...	38·50	277	...	...	7,660·00	40,738	...	...
1902	...	...	...	...	...	...	...	...	...	...	1,954·00	6,852	...	...
1903	...	...	...	...	...	...	...	...	...	...	13,965·00	45,557	...	...
1904	...	...	...	...	...	...	...	...	...	...	500·00	900	...	...
1905	...	...	...	...	...	...	...	...	...	...	60·00	674	...	...
1906	133·50	2,816	...	...	13·91	91	...	...	...	...	4,361·05	21,934	...	...
1907	...	...	31·71	274	10·00	130	...	...	...	...	5,141·52	58,888	2·85	26
1908	...	...	...	...	9·50	97	...	...	133·55	1,482	4,404·10	20,221	...	...
1909	608·00	2,823	...	...	...	...	...	...	...	...	...	...	...	...
1910	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1911	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1912	...	...	4·80	54	...	...	...	...	...	...	...	...	...	...
1913	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1914	15·19	248	3·40	27	...	...	...	...	...	...	...	...	...	...
1915	33·70	492	...	...	4·99	95	...	...	...	...	...	...	...	...
1916	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1917	82·92	2,164	...	...	...	...	...	...	...	...	...	...	...	...
1918	78·34	1,794	...	...	...	...	...	...	...	...	...	...	...	...
1919	16·81	377	...	...	...	...	...	...	...	...	...	...	...	...
Total	968·46	10,714	55·56	522	38·40	413	136·50	1,992	171·55	1,889	47,357·67	230,820	2·85	26

COPPER ORE—*continued.*

Period.	North Coolgardie Goldfield.		East Coolgardie Goldfield.		Phillips River Goldfield.		State generally.		Total.	
	Menzies District.		E. Coolgardie D.							
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	tons.	£	tons.	£	tons.	£	tons.	£	tons.	£
Previous to 1899	...	...	...	...	...	...	...	...	7,018·00	55,270
1899	...	...	...	...	...	...	...	...	2,964·00	35,938
1900	...	...	...	...	34·00	725	...	...	6,183·15	43,673
1901	...	...	...	...	1,089·14	12,918	...	...	9,960·14	69,900
1902	...	...	...	...	308·25	1,238	...	...	2,262·25	8,090
1903	...	...	...	...	1,561·33	10,984	...	...	20,526·33	56,541
1904	...	...	...	...	3,468·89	24,280	...	...	3,968·89	25,180
1905	...	...	...	...	2,329·04	15,592	...	...	2,389·04	16,266
1906	4·70	33	...	...	2,885·00	25,270	13·50	193	7,411·66	50,337
1907	1·42	18	...	...	10,414·57	57,273	3·08	40	18,978·42	180,387
1908	...	...	50·67	330	2,015·71	9,233	...	...	8,294·30	51,434
1909	...	...	...	...	7,330·70	29,815	...	...	15,084·95	95,344
1910	...	...	...	...	25,871·65	96,745	...	...	34,351·45	161,606
1911	...	...	...	...	13,563·68	46,862	...	...	22,675·80	116,318
1912	...	...	...	...	1,318·38	15,815	...	...	13,607·20	120,158
1913	...	...	...	...	806·95	9,737	...	...	13,428·68	86,615
1914	...	...	...	...	4,841·15	37,524	38·50	426	12,775·12	81,241
1915	...	...	...	...	3,681·03	24,093	69·58	1,263	4,498·56	40,998
1916	...	...	...	...	5,428·08	48,618	3·47	36	6,697·38	74,376
1917	...	...	...	...	5,255·57	66,868	...	...	6,488·65	93,711
1918	...	...	...	...	2,901·66	42,978	...	...	4,982·91	77,527
1919	...	...	...	...	215·02	4,993	...	...	1,277·00	21,530
Total	6·12	51	50·67	330	95,319·30	581,561	128·13	1,958	225,823·88	1,562,440

Period.	IRONSTONE.								LEAD ORE.					
	W. Pilbara Gf.		E. Coolgardie Gf. E. Coolgardie D.		State generally.		Total.		Northampton Mf.		West Pilbara Gf.		Total.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	tons.	£	tons.	£	tons.	£	tons.	£	tons.	£	tons.	£	tons.	£
Previous to 1899	100·00	300	...	...	...	...	100·00	300	...	...	...	...	...	...
1899	...	...	...	...	12,852·00	8,939	12,852·00	8,939	82·75	912	...	...	82·75	912
1900	...	...	...	...	12,251·00	9,258	12,251·00	9,258	268·00	533	...	...	268·00	533
1901	...	...	450·00	247	20,119·00	12,999	20,569·00	13,246	...	...	...	...	...	...
1902	...	...	...	...	4,800·00	2,040	4,800·00	2,040	...	...	...	...	...	...
1903	...	...	...	...	220·00	88	220·00	88	...	...	...	...	...	...
1904	...	...	...	...	1,441·50	577	1,441·50	577	...	...	...	...	...	...
1905	...	...	...	...	3,212·60	1,285	3,212·60	1,285	...	...	...	...	...	...
1906	...	...	...	...	1,279·87	512	1,279·87	512	...	...	...	...	...	...
1907	...	...	...	...	1,093·53	438	1,093·53	438	10·00	128	...	...	10·00	128
1908	...	...	...	...	...	...	...	...	57·00	461	...	...	57·00	461
1909	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1910	...	...	...	...	† 10·50	† 12	10·50	12	185·10	1,777	...	...	185·10	1,777
1911	...	...	...	...	...	...	...	...	8,194·76	17,663	...	...	8,194·76	17,663
1912	...	...	...	...	...	...	...	...	11,098·50	24,412	...	...	11,098·50	24,412
1913	...	...	...	...	...	...	...	...	26,589·53	50,474	...	...	26,589·53	50,474
1914	...	...	...	...	...	...	...	...	15,334·62	38,351	...	...	15,334·62	38,351
1915	...	...	...	...	...	...	...	...	15,678·30	29,396	...	...	15,678·30	29,396
1916	...	...	...	...	...	...	...	...	34,578·34	110,872	44·00	770	34,622·34	111,642
1917	...	...	...	...	...	...	...	...	46,801·97	143,925	62·57	759	46,864·54	144,684
1918	...	...	...	...	...	...	...	...	47,079·68	176,330	...	...	47,079·68	176,330
1919	...	...	...	...	...	...	...	...	7,385·70	29,841	...	...	7,385·70	29,841
Total	100·00	300	450·00	247	57,280·00	36,148	57,830·00	36,695	213,344·25	625,075	106·57	1,529	213,450·82	626,604

† Iron ore from Koolan Island, Yampi Sound.

TABLE IX.—*Minerals other than Gold, etc.*—continued.

Period.	Silver Lead Ore.		Coal.		Tungsten Ores.							
					Scheelite.						Wolfram.	
	Ashburton Gf.		Collie River Mf.		North Coolgardie Gf. Menzies District.		Coolgardie Gf. Coolgardie District.		Total.		State generally.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	tons.	£	tons.	£	tons.	£	tons.	£	tons.	£	tons.	£
Previous to 1899	...	...	3,508·00	1,761	...	...	...	...	...	...	...	...
1899	...	...	54,336·00	25,951	...	...	...	...	...	...	...	...
1900	...	...	118,410·10	54,835	...	...	...	...	...	...	...	...
1901	21·05	152	117,835·80	68,561	...	...	...	...	...	...	...	...
1902	35·85	277	140,883·90	86,188	...	...	...	...	...	...	...	...
1903	...	...	133,426·62	69,128	...	...	...	...	...	...	...	...
1904	...	...	138,550·04	67,174	...	...	...	...	...	...	...	...
1905	...	...	127,364·06	55,312	...	...	...	...	...	...	...	...
1906	...	...	149,755·27	57,998	...	...	...	...	...	...	...	...
1907	...	...	142,372·54	55,158	...	...	...	...	...	...	...	...
1908	727·25	6,914	175,247·92	75,694	...	...	...	...	...	...	*5·00	90
1909	440·00	3,520	214,301·98	90,965	...	...	...	...	...	...	† 42·00	115
1910	...	...	262,166·06	113,699	...	...	...	...	...	...	‡ 194·00	877
1911	...	...	249,899·15	111,154	...	...	...	...	...	...	...	...
1912	...	...	295,078·91	135,857	...	...	...	...	...	...	‡ 4·64	69
1913	125·50	1,757	313,817·96	153,614	...	...	...	...	...	...	...	...
1914	715·10	9,807	319,210·32	148,684	...	...	...	...	...	...	** ·25	27
1915	298·96	4,429	286,666·35	137,859	...	...	...	...	...	...	20·00	117
1916	67·83	554	301,525·97	147,823	...	...	...	...	...	...	...	...
1917	...	...	326,550·07	191,822	...	...	...	...	...	...	...	...
1918	237·48	3,461	337,039·24	204,319	...	...	...	...	...	...	...	...
1919	214·76	3,116	401,713·18	270,355	273·06	829	45·71	101	318·77	930	...	...
Total	2,883·78	33,987	4,609,659·44	2,323,911	273·06	829	45·71	101	318·77	930	265·89	1,295

Period.	Gadolinite.		Asbestos.					
	Pilbara Gf.		Pilbara Gf.				Total.	
	Marble Bar D.		Marble Bar D.		Nullagine D.			
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	tons.	£	tons.	£	tons.	£	tons.	£
Previous to 1899	...	...	...	...	...	...	...	...
1899	...	...	...	...	...	...	...	...
1900	...	...	...	...	...	...	...	...
1901	...	...	...	...	...	...	...	...
1902	...	...	...	...	...	...	...	...
1903	...	...	...	...	...	...	...	...
1904	...	...	...	...	...	...	...	...
1905	...	...	...	...	...	...	...	...
1906	...	...	...	...	...	...	...	...
1907	...	...	...	...	...	...	...	...
1908	...	...	40·00	1,600	...	...	40·00	1,600
1909	...	...	2·83	154	...	...	2·83	154
1910	...	...	...	...	...	...	...	...
1911	...	...	...	...	...	...	...	...
1912	...	...	...	...	...	...	...	...
1913	1·00	112	...	...	...	...	...	...
1914	...	...	...	...	...	...	...	...
1915	...	...	...	...	...	...	...	...
1916	...	...	...	...	...	...	...	...
1917	...	...	...	...	...	...	...	...
1918	...	...	...	...	...	...	...	...
1919	...	...	...	...	53·00	1,443	53·00	1,443
Total	1·00	112	42·83	1,754	53·00	1,443	95·83	3,197

Period.	Limestone.								Diamonds.		Magnesite.		Antimony.	
	Murchison Gf. Cue District.		Yilgarn Goldfield.		State generally.		Total.		Pilbara Gf. Nullagine District.		East Coolgardie Goldfield. Bulong District.		West Pilbara Goldfield.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	tons.	£	tons.	£	tons.	£	tons.	£	carats.	£	tons.	£	tons.	£
Previous to 1899	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1899	...	...	...	...	17,593·00	2,838	17,593·00	2,838	§	24	...	...	...	...
1900	...	...	269·85	273	15,657·00	3,321	15,926·85	3,594	...	...	...	...	...	...
1901	...	...	1,642·00	919	16,568·00	3,429	18,210·00	4,348	...	...	...	...	...	...
1902	...	...	535·00	340	4,545·35	1,000	5,080·35	1,340	...	...	...	...	...	...
1903	...	...	102·00	75	1,177·50	103	1,279·50	178	...	...	...	...	...	...
1904	...	...	...	...	13,397·20	1,699	13,397·20	1,699	...	...	...	...	...	...
1905	...	...	...	...	9,144·60	1,220	9,144·60	1,220	...	...	...	...	...	...
1906	...	...	...	...	9,472·28	1,691	9,472·28	1,691	...	...	...	...	...	...
1907	298·00	772	...	...	3,303·95	610	3,601·95	1,382	...	...	...	...	...	...
1908	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1909	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1910	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1911	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1912	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1913	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1914	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1915	...	...	...	...	...	...	...	...	...	...	601·50	601	...	...
1916	...	...	...	...	...	...	...	...	...	...	97·50	97	20·78	491
1917	...	...	...	...	...	...	...	...	...	...	20·50	21	...	...
1918	...	...	...	...	...	...	...	...	...	...	105·25	334	...	...
1919	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Total	298·00	772	2,548·85	1,607	90,858·88	15,911	93,705·73	18,290	...	24	824·75	1,053	20·78	491

* Produced within the West Kimberley Magisterial District. † Tons 22·00, value £30, the produce of West Kimberley, and tons 20·00, value £85, the produce of Cue. ‡ The produce of Cue District. § Weight unknown. ** The produce of Yalgoo Goldfield.

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, the latest available returns of which are to be found in Table XXV., pages 74–78.

TABLE X.

QUANTITY AND VALUE OF BLACK TIN REPORTED TO THE MINES DEPARTMENT DURING 1919, AND TOTALS TO DATE.

LOCALITY.	NUMBER OF LEASE, CLAIM, OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1919. Quantity. Lode.	1919. Quantity. Stream.	1919. Quantity. Total.	1919. Value.	TOTALS TO DATE. Quantity. Lode.	TOTALS TO DATE. Quantity. Stream.	TOTALS TO DATE. Quantity. Total.	TOTALS TO DATE. Value.
			tons.	tons.	tons.	£	tons.	tons.	tons.	£
PILBARA GOLDFIELD.										
MARBLE BAR DISTRICT.										
Cooglegong		Sundry claims	...	15·00	15·00	2,433	...	1,675·27	1,675·27	147,395
Mill's Find		Sundry claims	...	...	...	...	...	·85	·85	69
Moolyella		Voided leases	...	...	...	...	...	330·53	330·53	21,340
Do.		Sundry claims	...	19·70	19·70	3,091	...	2,765·21	2,765·21	259,769
Old Shaw		Voided leases	...	...	...	...	...	6·75	6·75	424
Do.		Sundry claims	...	...	...	...	...	214·04	214·04	14,525
Tabba Tabba		Sundry claims	...	2·00	2·00	347	...	110·27	110·27	12,064
Wodgina	86, 87, 95	H.M. and Anchorite leases	...	...	...	...	...	5·00	5·00	500
Do.	84	(Mount Cassiterite)	...	...	...	...	138·52	13·85	147·37	14,184
Do.	84, (93), (148)	Mount Cassiterite leases	...	...	...	...	195·50	1·60	197·10	16,913
Do.		Voided leases	...	...	...	...	37·82	6·10	43·92	4,414
Do.		Sundry claims	...	...	...	...	5·78	48·20	53·98	5,062
		Totals	...	**36·70**	**36·70**	**5,871**	**372·62**	**5,177·67**	**5,550·29**	**496,659**
MURCHISON GOLDFIELD.										
CUE DISTRICT.										
Poona		Sundry claims	...	...	...	...	...	1·52	1·52	118
Cuddingwarra		Sundry claims	...	...	...	...	...	3·20	3·20	242
		Totals	...	...	...	...	...	**4·72**	**4·72**	**360**
COOLGARDIE GOLDFIELD.										
COOLGARDIE DISTRICT.										
Bulla Bulling		Sundry claims	...	...	...	...	...	·15	·15	15
		Totals	...	...	...	...	...	**·15**	**·15**	**15**
GREENBUSHES MINERAL FIELD.										
Greenbushes	472	(Aqua)	...	...	...	...	...	1·50	1·50	128
Do.	296	(Central)	...	...	...	...	...	100·16	100·16	9,728
Do.	511	Champion	...	17·00	17·00	1,840	1·60	189·45	191·05	20,597
Do.	615	Cornwall	2·75	...	2·75	440	2·75	...	2·75	440
Do.	(583)	Cornwall	·73	...	·73	81	7·93	...	7·93	1,513
Do.	369	Enterprise	...	...	...	...	·20	7·29	7·49	667
Do.	472, 497, 510	Excelsior leases	...	29·11	29·11	4,179	...	78·05	78·05	11,601
Do.	510	(Excelsior Extended)	...	...	...	...	...	·05	·05	5
Do.	497	(Excelsior Tin Mining Co., Ltd.)	...	...	...	...	...	4·05	4·05	281
Do.	(611)	Gang Forward	...	...	...	...	·46	·28	·74	125
Do.	(589)	Grafter	...	...	...	...	1·67	...	1·67	319
Do.	(35), (169), (218), (272), (287), (295), 296, (331), (375), (395), (421), (425), (428), (432), (448), (453)	Greenbushes Development Co., Ltd.	...	·58	·58	89	·35	970·41	970·76	86,812
Do.	608	Hamel	...	...	...	...	...	1·43	1·43	280
Do.	(599)	Homeward Bound	...	...	...	...	...	1·07	1·07	200
Do.	(592)	Jellicoe	...	...	...	...	...	·31	·31	57
Do.	(515)	Kapanga	4·94	...	4·94	702	27·66	·76	28·42	3,617
Do.	73, 233, 271, 504	King Tin leases	...	24·67	24·67	3,516	6·52	84·44	90·96	11,070
Do.	271	(King Tin North)	...	...	...	...	...	1·84	1·84	117
Do.	598	Last Chance	...	·15	·15	21	...	·15	·15	21
Do.	605	Lost and Found	...	...	...	...	·50	...	·50	87
	606	Lost and Found North	·10	...	·10	14	4·80	...	4·80	975
Do.	73	(Nelson)	...	...	...	...	...	22·40	22·40	1,675
Do.	73, 233	(Nelson leases)	...	...	...	...	...	61·01	61·01	4,164
Do.	(596)	Nil Desperandum	...	...	...	...	·25	...	·25	48
Do.	504	(Old Bunbury)	...	...	...	...	...	37·62	37·62	3,619
Do.	529, 555, (571)	Phœnix Sluicing Co., Ltd.	...	...	...	...	...	58·95	58·95	5,553
Do.	(498)	Rat	...	...	...	...	...	·74	·74	84
Do.	616	Returned Soldier	3·81	...	3·81	631	3·81	...	3·81	631
Do.	588	Satin Bird	1·13	...	1·13	110	4·56	1·05	5·61	951
Do.	505, (519), 614	Scotia leases	...	3·95	3·95	469	...	49·57	49·57	4,822
Do.	580	Southern Cross	...	...	...	...	3·85	...	3·85	719
Do.	(450), (458), (485), (486), (487), (488), (489)	Stanhope United leases	...	35·00	35·00	6,140	...	569·80	569·80	71,290
Do.	(600)	Sunday Gift	...	...	...	...	1·72	...	1·72	327
Do.	529	(Three C's)	...	...	...	...	...	53·33	53·33	4,314
Do.	565	Turn of the Tide	...	4·09	4·09	617	...	11·96	11·96	1,681
Do.	(603)	Two Battlers	·10	...	·10	12	·10	...	·10	12
Do.	(381), (435), (436), 472, (478)	Westralian Gully Tin Co., Ltd.	...	...	...	...	6·38	34·38	40·76	3,235
Do.	Loc. 289, 290	Freehold Ground (Clarth and others)	...	...	...	...	...	318·04	318·04	28,959
Do.		Voided leases	...	...	...	...	186·95	1,056·55	1,243·50	106,200
Do.		Sundry claims	10·10	106·40	116·50	16,098	67·83	6,441·45	6,509·28	489,925
		Totals	**23·66**	**220·95**	**244·61**	**34,959**	**329·89**	**10,158·09**	**10,487·98**	**876,849**

TABLE XI.

QUANTITY AND VALUE OF TANTALITE REPORTED TO THE MINES DEPARTMENT DURING 1919, AND TOTALS TO DATE.

LOCALITY.	NUMBER OF LEASE, CLAIM, OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1919. Quantity. Lode.	1919. Quantity. Stream.	1919. Quantity. Total.	1919. Value.	TOTAL TO DATE. Quantity. Lode.	TOTAL TO DATE. Quantity. Stream.	TOTAL TO DATE. Quantity. Total.	TOTAL TO DATE. Value.
			tons.	tons.	tons.	£	tons.	tons.	tons.	£
PILBARA GOLDFIELD.										
MARBLE BAR DISTRICT.										
Wodgina ...	86, 87, 95 ...	H.M. and Anchorite leases ...	...	...	...	...	2·25	44·80	47·05	7,340
Do. ...	...	Sundry claims	...	...	...	...	...	51·50	51·50	6,124
		Totals	...	...	...	...	**2·25**	**96·30**	**98·55**	**13,464**
GREENBUSHES MINERAL FIELD.										
Greenbushes ...	369	Enterprise	...	...	...	...	...	3·19	3·19	1,804
		Totals	...	...	...	...	...	**3·19**	**3·19**	**1,804**

TABLE XII.

QUANTITY AND VALUE OF PYRITIC ORE REPORTED TO THE MINES DEPARTMENT DURING 1919, AND TOTALS TO DATE.

LOCALITY.	NUMBER OF LEASE, CLAIM, OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1919. Quantity.	1919. †Value.	TOTAL TO DATE. Quantity.	TOTAL TO DATE. †Value.
			tons.	£	tons.	£
MT. MARGARET GOLDFIELD.						
MT. MORGANS DISTRICT.						
Eulaminna ...	4F, 5F, (11F), (12F)	West Australian Copper Co., Ltd.	3,825·67	4,616	47,644·91	21,081
Murrin Murrin	18F	Nangeroo: Nangaroo Mines, Ltd.	310·26	303	10,824·86	5,065
		Totals	**4,135·93**	**4,919**	**58,469·77**	**26,146**

† Represents the value of the sulphur only, the copper contents not yet having been treated.

TABLE XIII.

QUANTITY AND VALUE OF COPPER ORE REPORTED TO THE MINES DEPARTMENT DURING 1919, AND TOTALS TO DATE.

LOCALITY.	NUMBER OF LEASE, CLAIM, OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1919. Quantity. Ore.	1919. Quantity. Metallic Copper.	1919. Value.	TOTAL TO DATE. Quantity. Ore.	TOTAL TO DATE. Quantity. Metallic Copper.	TOTAL TO DATE. Value.
			tons.	tons.	£	tons.	tons.	£
PILBARA GOLDFIELD.								
MARBLE BAR DISTRICT.								
Marble Bar ...	... ...	Voided Leases	...	...	...	11·00	1·64	90
Do. ...	... ...	Sundry claims	...	...	...	4·75	·48	25
North Pole ...	... ...	Voided leases	...	...	...	9·35	1·39	81
North Shaw ...	... ...	Voided leases	...	...	...	7·77	1·90	190
		Totals	...	...	...	**32·87**	**5·41**	**386**
NULLAGINE DISTRICT.								
McPhee's Creek	... ...	Voided leases	...	...	...	5·00	2·22	120
		Totals	...	...	...	**5·00**	**2·22**	**120**
WEST PILBARA GOLDFIELD.								
Croydon ...	...	Voided leases	...	...	...	604·00	108·65	7,333
Egina	...	Voided leases	...	...	...	542·00	104·15	6,643
Roebourne ...	M.L. 183 ...	(Carlow Castle: Roebourne Copper Mines, Ltd.)	...	...	...	69·00	7·80	780
Do. ...	M.L. 174 ...	Good Fortune	30·30	4·50	496	56·77	8·58	904
Do. ...	M.Ls. 174, (175)	(Good Fortune leases)	...	...	...	63·40	9·58	1,011
Do. ...	M.L. 184 ...	Good Luck	...	...	...	5·21	1·01	111
Do. ...	M.L. 178 ...	Lily Blanche	...	...	...	16·98	2·97	272
Do. ...	M.L. 167 ...	(Quod Est)	...	...	...	22·43	3·49	256
Do. ...	M.Ls. 167, 183	Roebourne Copper Mines, Ltd.	16·70	2·70	270	87·95	13·55	1,360
Do. ...	M.L. 144 ...	Yannery Hill Copper Mine	42·28	12·16	896	335·25	89·69	7,281
Do. ...	...	Voided leases	...	...	...	2,386·80	454·18	37,667
Do. ...	...	Sundry claims	...	...	...	77·41	13·61	800
Whim Creek ...	M.L. 34 ...	(Balla Balla Copper Mines, Ltd.) ...	...	...	...	2,009·00	166·33	12,036
Do. ...	M.L. 34 ...	Mons Cupri: Whim Well Copper Mines, Ltd.	...	...	...	282·50	33·75	2,979
Do. ...	Loc. 71 ...	Pilbarra Copper Fields, Ltd.	330·00	59·00	5,900	330·00	59·00	5,900
Do. ...	Loc. 71 ...	(Whim Well Copper Mines, Ltd.)	611·50	107·30	8,245	72,562·75	9,343·89	604,492
Do. ...	...	Voided leases	...	...	...	30·00	5·50	250
		Totals	**1,030·78**	**185·66**	**15,807**	**79,480·95**	**10,425·73**	**690,075**

TABLE XIII.—*Quantity and Value of COPPER ORE, etc.*—continued.

LOCALITY.	NUMBER OF LEASE, CLAIM, OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1919.			TOTALS TO DATE.		
			Quantity.		Value.	Quantity.		Value.
			Ore.	Metallic Copper.		Ore.	Metallic Copper.	
			tons.	tons.	£	tons.	tons.	£
ASHBURTON GOLDFIELD.								
Ashburton ...	...	Sundry claims	...	...	...	6·32	·79	94
Red Hill ...	...	Voided leases	...	...	...	175·50	33·85	2,126
Uaroo	...	Voided leases	...	...	...	169·25	62·49	4,188
		Totals	...	...	...	**351·07**	**97·13**	**6,408**
PEAK HILL GOLDFIELD.								
Peak Hill ...	M.L. 35P ...	Burra Copper Mines, Ltd.	...	...	...	25·84	8·85	943
Do. ...	M.L. (41P.) ...	Butcher Bird	...	...	...	36·80	8·33	949
Do. ...	M.Ls. 37P, 38P	Sonia and Diana leases	...	...	...	110·04	37·26	3,907
Do. ...	M.L. 9P ...	Sons of Gwalia	14·39	4·54	353	448·10	165·50	15,179
Do. ...	M.Ls. (29P), (30P), 31P	(Two Sisters leases)	...	...	...	64·04	30·93	1,466
Do. ...	M.L. 31P ...	Two Sisters North	...	...	...	115·76	31·40	3,594
Do. ...	...	Voided leases	...	...	...	117·11	34·69	2,936
Do. ...	...	Sundry claims	...	...	...	62·03	21·96	1,837
		Totals	**14·39**	**4·54**	**353**	**979·72**	**338·92**	**30,811**
EAST MURCHISON GOLDFIELD.								
LAWLERS DISTRICT.								
Kathleen Valley ...	...	Voided leases	...	...	...	6·77	1·32	69
Lawlers ...	ML.. (29) ...	Bungarra	...	...	...	157·44	23·85	2,837
Do. ...	...	Sundry claims	...	...	...	74·35	13·25	1,458
		Totals	...	...	...	**238·56**	**38·42**	**4,364**
MURCHISON GOLDFIELD.								
MEEKATHARRA DISTRICT.								
Gabanintha ...	G.M.L. (1408N)	Grafton	16·81	3·49	377	83·34	16·72	1,935
Do. ...	...	Voided leases	...	...	...	837·22	103·12	7,446
Do. ...	...	Sundry claims	...	...	...	34·42	9·23	1,072
Holden's Find...	...	Sundry claims	...	...	...	6·72	1·11	111
Yaloginda ...	...	Sundry claims	...	...	...	6·76	1·41	150
		Totals	**16·81**	**3·49**	**377**	**968·46**	**131·59**	**10,714**
DAY DAWN DISTRICT								
Day Dawn ...	... ...	Voided leases	...	...	...	26·95	5·17	305
Do. ...	... ...	Sundry claims	...	...	...	28·61	2·93	217
		Totals	...	...	...	**55·56**	**8·10**	**522**
YALGOO GOLDFIELD.								
Mount Gibson ...	... ...	Sundry claims	...	...	...	4·99	1·10	95
Twin Peaks ...	... ...	Sundry claims	...	...	...	19·50	3·49	227
Wadgingarra ...	... ...	Voided leases	...	...	...	13·91	·98	91
		Totals	...	...	...	**38·40**	**5·57**	**413**
NORTHAMPTON MINERAL FIELD.								
Geraldine ...	... ...	Voided leases	...	...	...	136·50	36·05	1,992
		Totals	...	...	...	**136·50**	**36·05**	**1,992**
YANDANOOKA MINERAL FIELD.								
Arrino	... ...	Sundry claims	...	...	...	126·05	18·48	1,386
Yandanooka ...	Freehold Gd. ...	Muggawa Copper Mines	...	...	...	7·50	1·20	96
Do. ...	... ...	Voided leases	...	...	...	38·00	7·95	407
		Totals	...	...	...	**171·55**	**27·63**	**1,889**
MOUNT MARGARET GOLDFIELD.								
MOUNT MORGANS DISTRICT.								
Eulaminna ...	[10C, 11C], 4F, 5F (12C, 37C)	(Mt. Malcolm Copper Mine leases) ...	...	...	...	13,516·00	1,001·98	70,754
Do. ...	[10C, 11C], 4F, 5F	(Mt. Malcolm Copper Mine leases) ...	...	...	...	3,839·00	418·00	17,065
Do. ...	[10C, 11C], 4F, 5F (12C, 37C)	(Murrin Copper Mines, Ltd.)	...	...	...	19,165·00	798·50	45,817
Do. ...	4F, 5F(11F) (12F)	West Australian Copper Co., Ltd.	...	...	...	9,794·05	1,976·08	80,199
Mt. Margaret ...	... ...	Voided leases	...	...	...	11·53	2·40	163
Murrin Murrin...	18F	Nangeroo : Nangaroo Mines, Ltd.	...	...	...	6·80	3·00	160
Do. ...	... ...	Voided leases	...	...	...	1,525·29	248·04	16,662
		Totals	...	...	...	**47,857·67**	**4,448·00**	**230,820**

TABLE XIII.—*Quantity and Value of COPPER ORE, etc.*—continued.

LOCALITY.	NUMBER OF LEASE, CLAIM, OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1919. Quantity. Ore.	1919. Quantity. Metallic Copper.	1919. Value.	TOTALS TO DATE. Quantity. Ore.	TOTALS TO DATE. Quantity. Metallic Copper.	TOTALS TO DATE. Value.
			tons.	tons.	£	tons.	tons.	£
MOUNT MARGARET GOLDFIELD—*continued*.								
MOUNT MARGARET DISTRICT.								
Burtville ...	...	Voided leases ...	...	...	...	2·85	·29	26
		Totals ...	...	...	...	**2·85**	**·29**	**26**
NORTH COOLGARDIE GOLDFIELD.								
MENZIES DISTRICT.								
Goongarrie ...	...	Voided leases ...	...	...	...	4·70	·42	33
Do. ...	...	Sundry claims ...	...	...	...	1·42	·40	18
		Totals ...	...	...	...	**6·12**	**·82**	**51**
EAST COOLGARDIE GOLDFIELD.								
EAST COOLGARDIE DISTRICT.								
Boorara ...	...	Voided leases ...	...	...	...	50·67	6·22	330
		Totals ...	...	...	...	**50·67**	**6·22**	**330**
PHILLIPS RIVER GOLDFIELD.								
Kundip ...	G.M.Ls. 147, 179	Fair Play leases ...	...	...	...	130·09	119·64	10,985
Do. ...	G.M.Ls. (136), (137), (138), (139)	(Flag Gold and Copper Mining Co., Ltd.) ...	...	...	...	2,107·84	144·75	8,494
Do. ...	G.M.Ls. (136), (137), (138)	Flag leases ...	...	...	...	356·29	39·38	3,743
Do. ...	G.M.L. 184 ...	Gem ...	...	3·66	357	90·98	20·46	2,251
Do. ...	G.M.Ls. 151, 156	Gem Consolidated leases ...	...	7·36	612	48·00	76·75	8,327
Do. ...	M.Ls. 52, 94 ...	Harbour View Gold and Copper Co., Ltd. ...	...	...	...	1,168·01	88·27	8,048
Do. ...	M.Ls. 52, 94 ...	(Harbour View leases) ...	...	...	...	604·36	76·80	4,524
Do. ...	M.Ls. 52, 94 ...	(Harbour View leases) ...	...	...	...	508·27	64·66	3,642
Do. ...	G.M.L. 98 ...	Hillsborough ...	...	6·28	530	692·84	50·19	4,036
Do. ...	M.L. 370 ...	North Harbour View ...	...	...	...	13·80	·80	99
Do. ...	M.Ls. 52, 94 ...	(Ravensthorpe G.M. Syndicate, N.L.) ...	...	...	...	132·56	24·36	1,382
Do. ...	G.M.L. 74 ...	Two Boys ...	...	2·38	214	...	28·30	3,249
Do. ...	...	Voided leases ...	...	...	...	964·05	106·62	6,893
Do. ...	...	Sundry claims ...	...	·96	82	87·56	14·25	1,177
Mt. Desmond ...	M.L. 203 ...	British Flag: Phillips River Gold and Copper Co., Ltd.	...	...	...	19·90	3·64	250
Do. ...	M.L. 208 ...	Desmond ...	101·81	14·57	1,508	1,365·87	160·54	16,582
Do. ...	M.L. 208 ...	(Desmond: Phillips River Gold and Copper Co., Ltd.)	...	...	...	1,234·05	215·74	14,956
Do. ...	M.L. 95 ...	Elverdton ...	7·34	1·23	95	7,413·84	675·14	67,169
Do. ...	M.L. 95 ...	(Elverdton) ...	...	...	...	130·00	5·70	570
Do. ...	M.L. 95 ...	(Elverdton: Phillips River Gold and Copper Co., Ltd.)	...	...	...	30,574·23	2,186·64	124,252
Do. ...	M.L. 95 ...	(Elverdton: Phillips River Option Syndicate, N.L.)	...	...	...	2,946·02	401·43	22,657
Do. ...	M.L. 168 ...	Elverton South: Phillips River Gold and Copper Co., Ltd.	...	...	...	15·73	1·46	92
Do. ...	M.L. 168 ...	(Elverton South) ...	...	...	...	18·48	2·39	119
Do. ...	M.L. 109 ...	Mt. Desmond: Phillips River Gold and Copper Co., Ltd.	...	...	...	1,762·22	216·76	18,128
Do. ...	M.L. 109 ...	(Mt. Desmond) ...	...	...	...	198·87	30·77	1,640
Do. ...	M.L. 199 ...	P.L.P.: Phillips River Gold and Copper Co., Ltd.	...	...	...	17·56	1·88	121
Do. ...	M.L. 199 ...	(P.L.P.) ...	...	...	...	208·66	33·69	2,277
Do. ...	...	Voided leases ...	...	...	...	1,015·17	166·71	9,770
Do. ...	...	Sundry claims ...	26·65	5·38	540	125·09	23·86	1,771
Ravensthorpe ...	M.L. 16 ...	Marion Martin ...	37·87	4·24	407	2,222·71	251·72	25,983
Do. ...	M.L. 16 ...	(Marion Martin) ...	...	...	...	865·69	130·61	6,650
Do. ...	M.L. 16 ...	(Marion Martin: Phillips River Gold and Copper Co., Ltd.)	...	...	...	2,855·36	375·44	23,506
Do. ...	M.L. (363) ...	Mount Benson ...	...	...	...	376·33	20·44	2,264
Do. ...	M.L. 15 ...	Mount Cattlin ...	2·03	·27	26	2,174·69	142·36	15,268
Do. ...	M.L. 15 ...	(Mount Cattlin) ...	...	...	...	281·56	31·35	1,716
Do. ...	M.L. 15 ...	(Mount Cattlin: Mount Cattlin Copper Mining Co., Ltd.)	...	...	...	6,608·76	333·59	28,841
Do. ...	M.L. 15 ...	(Mount Cattlin: Phillips River Gold and Copper Co., Ltd.)	...	...	...	1,263·76	80·26	7,646
Do. ...	M.L. 15 ...	(Mount Cattlin: Phillips River Gold and Copper Co., Ltd.)	...	...	...	14,432·25	714·90	40,313
Do. ...	M.L. 342 ...	Surprise ...	...	...	...	867·05	154·40	11,583
Do. ...	...	Voided leases ...	...	...	...	6,607·32	806·48	49,083
Do. ...	...	Sundry claims ...	39·32	6·43	622	986·65	103·50	9,391
West River ...	...	Voided leases ...	...	...	...	44·04	7·41	414
Do. ...	...	Sundry claims ...	...	...	...	145·41	24·81	1,939
		From Goldfield generally ...	...	...	...	1,637·88	128·64	9,760
		Totals ...	**215·02**	**52·76**	**4,993**	**95,319·80**	**8,287·49**	**581,561**
STATE GENERALLY.								
	M.L. 221H ...	Yampi Sound Copper Mine ...	...	...	...	92·86	22·80	1,473
	...	Voided leases ...	...	...	...	18·30	4·30	256
	...	Sundry claims ...	...	...	...	16·97	2·63	229
		Totals ...	...	...	...	**128·13**	**29·73**	**1,958**

TABLE XIV.

QUANTITY AND VALUE OF IRONSTONE REPORTED TO THE MINES DEPARTMENT DURING 1919, AND TOTALS TO DATE.

LOCALITY.	NUMBER OF LEASE, CLAIM, OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1919.		TOTALS TO DATE.	
			Quantity.	Value.	Quantity.	Value.
			tons.	£	tons.	£
		WEST PILBARA GOLDFIELD.				
Whim Creek ...	... ...	Voided leases	...	...	100·00	300
		Totals	...	...	**100·00**	**300**
		EAST COOLGARDIE GOLDFIELD.				
		EAST COOLGARDIE DISTRICT.				
Boulder ...	... ...	Voided leases	...	...	450·00	247
		Totals	...	...	**450·00**	**247**
		STATE GENERALLY.				
		Avon	...	...	22,223·00	16,241
		Clackline	...	...	18,253·50	8,789
		Coate's Paddock	...	...	4,712·00	3,277
		Greenbushes	...	...	7,481·00	4,629
		Koolan Island—Yampi Sound	...	...	10·50	12
		Werribee	...	...	4,600·00	3,200
		Totals	...	...	**57,280·00**	**36,148**

TABLE XV.

QUANTITY AND VALUE OF LEAD ORE REPORTED TO THE MINES DEPARTMENT DURING 1919, AND TOTALS TO DATE.

LOCALITY.	NUMBER OF LEASE, CLAIM, OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1919.			TOTALS TO DATE.		
			Lead Ore.	Metal therefrom.	Value.	Lead Ore.	Metal therefrom.	Value.
			tons.	tons.	£	tons.	tons.	£
		NORTHAMPTON MINERAL FIELD.						
Geraldine ...	Loc. 1 ...	Geraldine Mine	17·68	11·75	303	774·59	257·13	5,139
Do. ...	M.L. 150 ...	Surprise	413·20	267·30	7,375	2,834·18	1,574·75	38,145
Do. ...	M.L. 158 ...	Surprise South	14·00	5·41	170	14·00	5·41	170
Do. ...	M.L. 153 ...	Three Sisters	...	...	...	6·25	3·94	112
Do. ...	M.L. 159 ...	Welcome Lead Mine	...	...	...	5·74	3·59	68
Do. ...	...	Voided leases	...	...	...	57·00	41·61	461
Do. ...	...	Sundry claims	...	...	...	327·04	175·65	3,408
Narra Tarra ...	Loc. 833 ...	Narra Tarra: Fremantle Trading Co., Ltd.	4,360·40	407·67	11,756	76,020·45	8,379·37	244,891
Do. ...	Loc. 118, 119	Lauder and Raven (Tributers)	15·46	9·12	230	81·69	46·42	867
Do. ...	...	Sundry claims	...	...	...	225·00	27·00	185
Northampton ...	Loc. 14.2 ...	Baddera: Fremantle Trading Co., Ltd.	2,002·80	239·54	6,821	124,863·36	13,265·50	205,516
Do. ...	Loc. 436 ...	Fortune Exploration Co., N.L. ...	9·44	5·57	144	24·57	14·77	312
Do. ...	M.Ls. 127, 128, 129	Kirton's leases	84·45	29·92	834	2,136·76	379·89	7,572
Do. ...	M.L. (142) ...	Nooka Lead Mining Co., N.L. ...	...	...	...	876·12	176·40	3,349
Do. ...	Loc. 1146 ...	Wheal Ellen: Fremantle Trading Co., Ltd.	465·20	77·64	2,154	4,476·68	616·06	17,788
Do. ...	Loc. 436 ...	(Wheal of Fortune Extended Syndicate)	...	...	...	125·82	43·13	793
Do. ...	...	Voided leases	...	...	...	253·88	166·84	3,408
Do. ...	...	Sundry claims	3·07	1·72	54	222·12	132·14	2,679
Victoria ...	...	Voided leases	...	...	...	19·00	12·54	212
		Totals	7,385·70	1,055·64	29,841	213,344·25	25,322·14	625,075
		WEST PILBARA GOLDFIELD.						
Roebourne ...	... ...	Sundry claims	...	...	...	2·57	1·36	39
Whim Creek ...	... ...	Voided leases	...	...	...	104·00	46·00	1,490
		Totals	...	...	...	106·57	47·36	1,529

TABLE XVI.

QUANTITY AND VALUE OF SILVER-LEAD ORE REPORTED TO THE MINES DEPARTMENT DURING 1919, AND TOTALS TO DATE.

LOCALITY.	NUMBER OF LEASE, CLAIM, OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1919.		TOTALS TO DATE.	
			Quantity.	Value.	Quantity.	Value.
			tons.	£	tons.	£
		ASHBURTON GOLDFIELD.				
Ashburton ...	... ...	Voided leases	...	...	56·90	429
Do. ...	... ...	Sundry claims	...	...	2·83	40
Uaroo	M.Ls. 43, 49, 84	Uaroo Silver Lead Mines, Ltd.	214·76	3,116	2,824·05	33,518
		Totals	214·76	3,116	2,883·78	33,987

TABLE XVII.

QUANTITY AND VALUE OF COAL REPORTED TO THE MINES DEPARTMENT DURING 1919, AND TOTALS TO DATE.

LOCALITY.	NUMBER OF LEASE, CLAIM, OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1919.		TOTALS TO DATE.	
			Quantity.	Value.	Quantity.	Value.
			tons.	£	tons.	£
		COLLIE RIVER MINERAL FIELD.				
Collie	197, etc. ...	Cardiff Coal Mining Co. Ltd.	95,143·45	57,816	893,848·78	417,434
Do. ...	151, etc. ...	(Collie Boulder Coal Co., Ltd.)	...	...	71,512·70	26,139
Do. ...	244, etc. ...	Collie Co-operative Collieries, Ltd.	88,540·00	62,615	966,685·30	509,259
Do. ...	88 (part of) ...	(Collie Proprietary Coalfields of W.A., Ltd.)	...	...	477,781·55	242,918
Do. ...	85–100 ...	(Collie Proprietary Coalfields of W.A., Ltd.)	...	...	580,392·15	289,246
Do. ...	260–6, 271 ...	Premier Coal Mining Co., Ltd.	30,281·70	20,397	154,523·93	82,013
Do. ...	151, etc. ...	(Scottish Co-operative Collieries Co., Ltd.)	...	...	430,796·95	171,303
Do. ...	151, etc. ...	Scottish Collieries, Ltd.	676·20	401	2,314·51	1,210
Do. ...	85–100, 267 ...	The Proprietary Coal Mines of W.A., Ltd.	119,864·69	82,299	602,226·11	346,907
Do. ...	88 (part of) ...	The Proprietary Coal Mines of W.A., Ltd.	...	...	109·00	54
Do. ...	250, etc. ...	Westralian Coal Mining Co., Ltd.	67,207·14	46,827	403,898·61	224,498
Do. ...	...	Voided leases	...	...	25,569·85	12,930
		Totals	**401,713·18**	**270,355**	**4,609,659·44**	**2,323,911**

TABLE XVIII.

QUANTITY AND VALUE OF LIMESTONE REPORTED TO THE MINES DEPARTMENT DURING 1919, AND TOTALS TO DATE.

LOCALITY.	NUMBER OF LEASE, CLAIM, OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1919.		TOTALS TO DATE.	
			Quantity.	Value.	Quantity.	Value
			tons.	£	tons.	£
		MURCHISON GOLDFIELD.				
		CUE DISTRICT.				
Cuddingwarra ...	... ...	Voided leases	...	...	298·00	772
		Totals	...	...	**298·00**	**772**
		YILGARN GOLDFIELD.				
Southern Cross	... ...	Voided leases	...	...	2,548·85	1,607
		Totals	...	...	**2,548·85**	**1,607**
		STATE GENERALLY.				
Fremantle ...	... ...	... ...	...	...	90,858·88	15,911
		Totals	...	...	**90,858·88**	**15,911**

TABLE XIX.

QUANTITY AND VALUE OF ASBESTOS REPORTED TO THE MINES DEPARTMENT DURING 1919, AND TOTALS TO DATE.

LOCALITY.	NUMBER OF LEASE, CLAIM, OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1919.		TOTALS TO DATE.	
			Quantity.	Value.	Quantity.	Value.
			tons.	£	tons.	£
		PILBARA GOLDFIELD.				
		MARBLE BAR DISTRICT.				
Soansville ...	... ...	Voided leases	...	...	42·83	1,754
		Totals	...	...	**42·83**	**1,754**
		NULLAGINE DISTRICT.				
Hale's Well ...	M.Ls. 18L, 19L, 20L	Barnetts Asbestos, Nos. 1, 2 and 3	43·00	1,068	43·00	1,068
Do. ...	M.L., 16L ...	Marjorie	4·00	100	4·00	100
Do. ...	M.Ls., 21L, 22L	Nullagine, Nos. 1 and 2	6·00	275	6·00	275
		Totals	**53·00**	**1,443**	**53·00**	**1,443**

TABLE XX.

QUANTITY AND VALUE OF GADOLINITE REPORTED TO THE MINES DEPARTMENT DURING 1919, AND TOTALS TO DATE.

LOCALITY.	NUMBER OF LEASE, CLAIM, OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1919.		TOTALS TO DATE.	
			Quantity.	Value.	Quantity.	Value.
			tons.	£	tons.	£
PILBARA GOLDFIELD.						
MARBLE BAR DISTRICT.						
Cooglegong ...	(M.L. 254) ...	Iverna	...	...	1·00	112
		Totals	...	...	**1·00**	**112**

TABLE XXI.

QUANTITY AND VALUE OF TUNGSTEN ORES REPORTED TO THE MINES DEPARTMENT DURING 1919, AND TOTALS TO DATE.

SCHEELITE.

LOCALITY.	NUMBER OF LEASE, CLAIM, OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1919.			TOTALS TO DATE.		
			Ore.	Contents Tungstic Trioxide.	Value.	Ore.	Contents Tungstic Trioxide.	Value.
			tons.	units.	£	tons.	units.	£
NORTH COOLGARDIE GOLDFIELD.								
MENZIES DISTRICT.								
Comet Vale ...	G.M.L. 5410z...	Lake View	246·59	268·67	705	246·59	268·67	705
Do. ...	...	Sundry Claims	26·47	47·38	124	26·47	47·38	124
		Totals	**273·06**	**316·05**	**829**	**273·06**	**316·05**	**829**
COOLGARDIE GOLDFIELD.								
COOLGARDIE DISTRICT.								
Higginsville ...	...	Sundry claims	45·71	38·54	101	45·71	38·54	101
		Totals	**45·71**	**38·54**	**101**	**45·71**	**38·54**	**101**

WOLFRAM.

LOCALITY.	NUMBER OF LEASE, CLAIM, OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1919.			TOTALS TO DATE.		
			Ore.	Metallic contents.	Value.	Ore.	Metallic contents.	Value.
			tons.	tons.	£	tons.	tons.	£
MURCHISON GOLDFIELD.								
CUE DISTRICT.								
Callie Spring ...	... ...	Voided leases	...	...	...	194·00	6·11	877
Do. ...	... ...	Sundry claims	...	...	...	44·64	2·30	271
		Totals	...	...	...	**238·64**	**8·41**	**1,148**
YALGOO GOLDFIELD.								
Yalgoo	M.L. (36) ...	Yandanoo King North	...	...	...	·25	·12	27
		Totals	...	...	...	**·25**	**·12**	**27**
[redacted] **STATE GENERALLY.**								
Derby	(146H) ...	Taylor's Wolfram Reward ...	...	...	...	27·00	2·00	120
		Totals	...	...	...	**27·00**	**2·00**	**120**

TABLE XXII.

QUANTITY AND VALUE OF MAGNESITE REPORTED TO THE MINES DEPARTMENT DURING 1919, AND TOTALS TO DATE.

LOCALITY.	NUMBER OF LEASE, CLAIM, OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1919.		TOTALS TO DATE.	
			Quantity.	Value.	Quantity.	Value.
			tons.	£	tons.	£
EAST COOLGARDIE GOLDFIELD.						
		BULONG DISTRICT.				
Bulong	... ...	Sundry claims	...	...	824·75	1,053
		Totals	...	...	**824·75**	**1,053**

TABLE XXIII.

QUANTITY AND VALUE OF DIAMONDS REPORTED TO THE MINES DEPARTMENT DURING 1919, AND TOTALS TO DATE.

LOCALITY.	NUMBER OF LEASE, CLAIM, OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1919.		TOTALS TO DATE.	
			Quantity.	Value.	Quantity.	Value.
			carats.	£	carats.	£
PILBARA GOLDFIELD.						
		NULLAGINE DISTRICT.				
Nullagine ...	M.R.C. 61 ...	(Morgans, A. E.)	...	...	...	24
		Totals	...	...	...	**24**

TABLE XXIV.

QUANTITY AND VALUE OF ANTIMONY REPORTED TO THE MINES DEPARTMENT DURING 1919, AND TOTALS TO DATE

LOCALITY.	NUMBER OF LEASE, CLAIM, OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1919.			TOTALS TO DATE.		
			Ore.	Metallic contents.	Value.	Ore.	Metallic contents.	Value.
			tons.	tons.	£	tons.	tons.	£
WEST PILBARA GOLDFIELD.								
Balla Balla ...	M.L. (185) ...	Star	...	...	...	20·78	11·58	491
		Totals	...	...	...	**20·78**	**11·58**	**491**

TABLE

RETURN OF ORE AND MINERALS OTHER THAN GOLD

YEAR.	COPPER.												
	COPPER ORE.										COPPER INGOT, MATTE, ETC.		Total Value of Copper Exported.
	West Pilbara Gf.		Northampton Mf.		Phillips River Gf.		State generally.		Total.		State generally.		
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	
	tons.	£	tons.	£	tons.	£	tons.	£	tons.	£	tons.	£	£
1850 ...	...	...	...	...	...	...	...	...	...	...	...	...	...
1 ...	...	...	...	...	...	...	...	...	...	...	...	...	...
2 ...	...	...	...	...	...	...	...	...	...	...	...	...	...
3 ...	...	...	[2]†	7	...	...	...	...	...	7	...	...	7
4 ...	...	...	...	...	...	...	...	...	...	...	...	...	...
5 ...	...	...	2	26	...	...	...	...	2	26	...	...	26
6 ...	...	...	57	1,018	...	...	...	...	57	1,018	...	...	1,018
7 ...	...	...	80	1,920	...	...	...	...	80	1,920	...	...	1,920
8 ...	...	...	433	9,531	...	...	...	...	433	9,531	...	...	9,531
9 ...	...	...	941	14,122	...	...	...	...	941	14,122	...	...	14,122
1860 ...	...	...	517	8,021	...	...	...	...	517	8,021	...	...	8,021
1 ...	...	...	409	6,339	...	...	...	...	409	6,339	...	...	6,339
2 ...	...	...	783	12,536	...	...	...	..	783	12,536	...	...	12,536
3 ...	...	...	763	12,208	...	...	...	...	763	12,208	...	...	12,208
4 ...	...	...	1,076	17,216	...	...	...	...	1,076	17,216	...	...	17,216
5 ...	...	...	886	13,290	...	...	...	...	886	13,290	...	...	13,290
6 ...	...	...	557	8,362	...	...	...	...	557	8,362	...	...	8,362
7 ...	...	...	337	5,055	...	...	...	...	337	5,055	...	...	5,055
8 ...	...	...	83	1,245	...	...	...	...	83	1,245	...	...	1,245
9 ...	...	...	155	2,325	...	...	...	...	155	2,325	...	...	2,325
1870 ...	...	...	6	90	...	...	...	...	6	90	...	...	90
1 ...	...	...	...	...	...	...	...	...	...	...	...	...	...
2 ...	...	...	...	...	...	...	...	...	...	...	...	...	...
3 ...	...	...	56	848	...	...	...	...	56	848	...	...	848
4 ...	...	...	67	998	...	...	...	...	67	998	...	...	998
5 ...	...	...	205	3,071	...	...	...	...	205	3,071	...	...	3,071
6 ...	...	...	279	4,185	...	...	...	...	279	4,185	...	...	4,185
7 ...	...	...	54	803	...	...	...	...	54	803	...	...	803
8 ...	...	...	9	135	...	...	...	...	9	135	...	...	135
9 ...	...	...	...	...	...	...	...	...	...	...	...	...	...
1880 ...	...	...	8	120	...	...	...	...	8	120	...	...	120
1 ...	...	...	...	...	...	...	...	...	...	...	...	...	...
2 ...	...	...	2	23	...	...	...	...	2	23	...	...	23
3 ...	...	...	5	75	...	...	...	...	5	75	...	...	75
4 ...	...	...	118	1,770	...	...	...	...	118	1,770	...	...	1,770
5 ...	...	...	120	1,793	...	...	...	...	120	1,793	...	...	1,793
6 ...	...	...	249	3,735	...	...	...	...	249	3,735	...	...	3,735
7 ...	...	...	23	345	...	...	...	...	23	345	...	...	345
8 ...	...	...	88	1,488	...	...	...	...	88	1,488	...	...	1,488
9 ...	...	...	112	1,904	...	...	...	...	112	1,904	...	...	1,904
1890 ...	...	...	8	136	...	...	...	...	8	136	...	...	136
1 ...	263	4,462	...	...	...	...	...	...	263	4,462	...	...	4,462
2 ...	[1]†412	6,319	155	2,377	...	...	...	...	567	8,696	...	...	8,696
3 ...	50	606	...	...	...	...	...	...	50	606	...	...	606
4 ...	...	...	...	...	...	...	...	...	...	...	...	...	...
5 ...	802	12,832	24	120	...	...	...	...	826	12,952	...	...	12,952
6 ...	6	100	...	...	...	...	...	...	6	100	...	...	100
7 ...	65	731	21	302	...	...	...	...	86	1,033	...	...	1,033
8 ...	281	3,334	75	932	...	...	...	...	356	4,266	...	...	4,266
9 ...	1,404	31,979	587	9,473	...	...	...	...	1,991	41,452	...	...	41,452
1900 ...	544	10,696	...	...	105	2,411	197	3,355	846	16,462	249	17,475	33,937
1 ...	1,058	26,464	1	10	1,205	22,107	397	6,322	2,661	54,903	880	55,866	110,769
2 ...	68	1,698	20	330	162	2,469	33	489	283	4,986	175	7,918	12,904
3 ...	4	180	25	460	302	3,538	15	349	346	4,527	1,075	33,288	37,815
4 ...	50	500	...	...	11	154	310	3,378	371	4,032	102	3,827	7,859
5 ...	...	...	...	...	80	2,808	713	8,576	793	11,384	794	53,867	65,251
6 ...	112	323	...	...	...	...	224	2,930	336	6,162	343	30,367	36,529
7 ...	...	...	...	...	...	...	3,727	61,493	3,727	61,493	1,602	141,883	203,376
8 ...	...	...	...	...	...	...	2,503	29,272	2,503	29,272	479	27,819	57,091
9 ...	...	...	...	...	...	...	6,959	59,541	6,959	59,541	833	45,100	104,641
1910 ...	...	...	...	...	...	...	6,309	27,271	6,309	27,271	1,281	68,657	95,928
1911 ...	...	...	...	...	...	...	9,825	33,709	9,825	33,709	828	44,409	78,118
1912 ...	...	...	...	...	...	...	9,536	58,688	9,536	58,688	28	1,136	59,824
1913 ...	...	...	...	...	...	...	4,339	136,472	4,339	136,472	82	5,891	142,363
1914 ...	...	...	...	...	...	...	3,913	33,654	3,913	33,654	183	4,520	38,174
1915 ...	...	...	...	...	...	...	737	13,768	737	13,768	946	77,401	91,169
1916 ...	...	...	...	...	...	...	650	14,971	650	14,971	457	49,862	64,833
1917 ...	...	...	...	...	...	...	966	20,878	966	20,878	535	64,860	85,738
1918 ...	...	...	...	...	...	...	1,643	24,877	1,643	24,877	478	41,269	66,146
1919 ...	...	...	...	...	...	...	455	9,740	455	9,740	4	365	10,105
Total	...	...	...	...	...	...	...	...	69,831	835,097	11,354	775,780	1,610,877

[1]†*See* Woodward's Mining Handbook, Perth: By Authority, 1895; page 123. [2]† Weight not stated.

XXV.

ENTERED FOR EXPORT FROM 1850 TO 1919, INCLUSIVE.

Tin.											
Black Tin (Dressed Tin).								Tin Ingot (White tin).		Total Value of Tin Exported.	Year.
Pilbara Gf.		Greenbushes Mf.		[3]†State generally.		Total.		Greenbushes Mf.			
Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.		
tons.	£	tons.	£	tons.	£	tons.	£	tons.	£	£	
...	...	...	...	...	...	...	...	...	...	...	1850
...	...	...	...	...	...	...	...	...	...	...	1
...	...	...	...	...	...	...	...	...	...	...	2
...	...	...	...	...	...	...	...	...	...	...	3
...	...	...	...	...	...	...	...	...	...	...	4
...	...	...	...	...	...	...	...	...	...	...	5
...	...	...	...	...	...	...	...	...	...	...	6
...	...	...	...	...	...	...	...	...	...	...	7
...	...	...	...	...	...	...	...	...	...	...	8
...	...	...	...	...	...	...	...	...	...	...	9
...	...	...	...	...	...	...	...	...	...	...	1860
...	...	...	...	...	...	...	...	...	...	...	1
...	...	...	...	...	...	...	...	...	...	...	2
...	...	...	...	...	...	...	...	...	...	...	3
...	...	...	...	...	...	...	...	...	...	...	4
...	...	...	...	...	...	...	...	...	...	...	5
...	...	...	...	...	...	...	...	...	...	...	6
...	...	...	...	...	...	...	...	...	...	...	7
...	...	...	...	...	...	...	...	...	...	...	8
...	...	...	...	...	...	...	...	...	...	...	9
...	...	...	...	...	...	...	...	...	...	...	1870
...	...	...	...	...	...	...	...	...	...	...	1
...	...	...	...	...	...	...	...	...	...	...	2
...	...	...	...	...	...	...	...	...	...	...	3
...	...	...	...	...	...	...	...	...	...	...	4
...	...	...	...	...	...	...	...	...	...	...	5
...	...	...	...	...	...	...	...	...	...	...	6
...	...	...	...	...	...	...	...	...	...	...	7
...	...	...	...	...	...	...	...	...	...	...	8
...	...	...	...	...	...	...	...	...	...	...	9
...	...	...	...	...	...	...	...	...	...	...	1880
...	...	...	...	...	...	...	...	...	...	...	1
...	...	...	...	...	...	...	...	...	...	...	2
...	...	...	...	...	...	...	...	...	...	...	3
...	...	...	...	...	...	...	...	...	...	...	4
...	...	...	...	...	...	...	...	...	...	...	5
...	...	...	...	...	...	...	...	...	...	...	6
...	...	...	...	...	...	...	...	...	...	...	7
...	...	...	...	...	...	...	...	...	...	...	8
...	...	5	300	...	...	5	300	...	...	300	9
...	...	68	5,400	...	...	68	5,400	...	...	5,400	1890
...	...	204	10,200	...	...	204	10,200	...	...	10,200	1
...	...	265	13,843	...	...	265	13,843	...	...	13,843	2
57	3,470	171	7,664	...	...	228	11,134	...	...	11,134	3
19	949	371	14,325	...	...	390	15,274	...	...	15,274	4
...	...	277	9,703	...	...	277	9,703	...	...	9,703	5
...	...	137	4,338	...	...	137	4,338	...	...	4,338	6
...	...	96	3,275	...	...	96	3,275	...	...	3,275	7
...	...	68	2,760	...	...	68	2,760	...	...	2,760	8
30	2,025	278	21,138	...	...	308	23,163	...	...	23,163	9
368	30,146	102	8,032	...	...	470	38,178	142	18,872	57,050	1900
439	34,600	68	4,895	...	...	507	39,495	97	12,607	52,102	1
248	19,698	31	2,870	...	...	279	22,568	141	16,830	39,398	2
267	20,988	25	1,868	...	...	292	22,856	235	29,277	52,133	3
64	4,932	24	1,389	379	20,797	467	27,118	129	16,155	43,273	4
188	16,853	119	8,177	666	51,748	973	76,778	[2]†	1	76,779	5
329	28,375	444	46,254	624	64,005	1,397	138,634	45	8,746	147,380	6
...	...	...	...	1,424	151,414	1,424	151,414	78	14,725	166,139	7
...	...	...	...	1,093	83,294	1,093	83,594	[2]†	1	83,595	8
...	...	...	...	698	62,989	698	62,989	...	...	62,989	9
...	...	...	...	500	45,129	500	45,129	...	...	45,129	1910
...	...	...	...	495	55,220	495	55,220	...	...	55,220	1911
...	...	...	...	651	79,738	651	79,738	...	...	79,738	1912
...	...	...	...	484	72,142	484	72,142	...	...	72,142	1913
...	...	...	...	363	35,649	363	35,649	...	...	35,649	1914
...	...	...	...	420	41,391	429	41,391	...	...	41,391	1915
...	...	...	...	463	49,101	463	49,101	...	...	49,101	1916
...	...	...	...	383	45,288	383	45,288	...	...	45,288	1917
...	...	...	...	415	76,952	415	76,952	...	...	76,952	1918
...	...	...	...	318	47,269	318	47,269	...	...	47,269	1919
...	...	...	...	...	...	14,147	1,310,893	867	117,214	1,428,107	Total.

[2]† Weight not stated. [3]† Probably the produce of Pilbara Goldfield and Greenbushes Mineral Field.

TABLE XXV.—*Return of Ore and Minerals other than Gold*

YEAR.	SILVER.		‡ LEAD.		‡ LEAD AND SILVER-LEAD.		PIG LEAD.		ZINC INGOTS AND CONCENTRATES.	
	State generally.		Northampton Mf.		State generally.		State generally.		State generally.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	ozs.	£	tons.	£	tons.	£	tons.	£	tons.	£
1850	...	...	5	55	...	...	...	...	...	...
1	...	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...	...
3	...	...	[2]†	4	...	...	55	1,200	...	...
4	...	...	...	...	...	...	122	2,440	...	...
5	...	...	25	250	...	...	134	2,675	...	...
6	...	...	...	...	...	...	60	1,200	...	...
7	...	...	...	...	...	...	120	2,410	...	...
8	...	...	...	...	...	...	61	1,220	...	...
9	...	...	13	135	...	...	25	495	...	...
1860	...	...	98	985	...	...	...	...	...	...
1	...	...	79	790	...	...	...	...	...	...
2	...	...	9	90	...	...	...	...	...	...
3	...	...	230	2,300	...	...	...	...	...	...
4	...	...	80	800	...	...	...	...	...	...
5	...	...	703	8,436	...	...	...	...	...	...
6	...	...	273	3,282	...	...	...	...	...	...
7	...	...	902	10,824	...	...	[4]†3	50	...	...
8	...	...	1,100	13,206	...	...	...	...	...	...
9	...	...	699	8,394	...	...	...	...	...	...
1870	...	...	1,209	14,514	...	...	...	...	...	...
1	...	...	420	5,040	...	...	...	...	...	...
2	...	...	364	4,368	...	...	...	...	...	...
3	...	...	965	11,586	...	...	...	...	...	...
4	...	...	2,144	25,725	...	...	...	...	...	...
5	...	...	2,289	27,468	...	...	4	89	...	...
6	...	...	2,192	26,298	...	...	[4]†7	155	...	...
7	...	...	3,956	47,466	...	...	[4]†1	15	...	...
8	...	...	3,618	43,410	...	...	...	...	...	...
9	...	...	2,775	33,300	...	...	...	...	...	...
1880	...	...	1,921	15,368	...	...	[4]†5	89	...	...
1	...	...	1,401	11,204	...	...	[4]†1	20	...	...
2	...	...	1,794	14,348	...	...	...	...	...	...
3	...	...	1,038	7,266	...	...	...	...	...	...
4	...	...	696	4,872	...	...	...	...	...	...
5	...	...	465	3,255	...	...	...	...	...	...
6	...	...	611	4,277	...	...	...	...	...	...
7	...	...	471	4,710	...	...	[4]†6	120	...	...
8	...	...	532	5,320	...	...	[4]†2	40	...	...
9	...	...	250	2,500	...	...	...	...	...	...
1890	...	...	214	2,135	...	...	...	...	...	...
1	...	...	25	250	...	...	...	...	...	...
2	...	...	30	150	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...
7	...	...	[2]†	4	...	...	[4]†1	11	...	...
8	...	...	5	33	...	...	...	...	...	...
9	...	...	16	96	...	...	77	1,077	...	...
1900	28,749	3,594	27	242	...	...	...	...	...	...
1	60,869	7,609	...	...	...	...	...	...	...	...
2	83,293	9,190	...	...	...	...	...	...	...	...
3	168,113	19,153	...	...	...	...	...	...	...	...
4	399,190	45,912	...	...	...	...	...	...	...	...
5	359,744	44,278	...	...	...	...	...	...	...	...
6	282,145	37,612	...	...	...	...	...	...	...	...
7	189,265	25,382	...	...	211	1,866	...	...	73	3,390
8	168,455	18,877	...	...	518	5,006	...	...	11	98
9	176,813	18,778	...	...	211	1,199	...	...	19	244
1910	176,139	18,777	248	1,433	...	...	...	...	12	147
1911	169,043	18,333	{ 679	6,682	} ...	...	...	...	12	189
			{ 870	8,320						
1912	165,371	19,725	1,868	22,270	...	...	...	...	14	217
1913	188,020	23,420	3,169	59,002	...	...	...	...	...	...
1914	193,057	23,227	3,554	46,285	...	...	...	...	22	379
1915	222,159	24,295	...	...	2,883	39,032	13	302	7	143
1916	173,012	22,258	...	...	428	12,033	3,523	74,930	14	630
1917	222,075	38,339	...	...	[22	593	4,661	139,940	...	...
1918	109,830	22,711	...	...	282	3,045	5,489	163,880	...	...
1919	223,332	55,342	...	...	248	3,704	1,780	48,462	...	...
Total	3,758,704	496,812	44,032	508,748	4,803	66,478	16,150	440,820	184	5,437

[2] †Weight not stated. [4] † Estimated. ‡ Ore and Concentrates.

entered for EXPORT from 1850 to 1919, inclusive—continued.

Tungsten Ore.				Arsenical Ore.		Tantalite.		Non-Metallic Minerals.				Year.
Wolfram.		Scheelite.						Graphite.		Magnesite.		
State generally.		State generally.		State generally.		State generally.		State generally.		State generally.		
Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	
tons.	£	tons.	£	tons.	£	tons.	£	tons.	£	tons.	£	
...	...	...	...	...	...	...	...	...	...	...	...	1850
...	...	...	...	...	...	...	...	...	...	...	...	1
...	...	...	...	...	...	...	...	...	...	...	...	2
...	...	...	...	...	...	...	...	...	...	...	...	3
...	...	...	...	...	...	...	...	...	...	...	...	4
...	...	...	...	...	...	...	...	...	...	...	...	5
...	...	...	...	...	...	...	...	...	...	...	...	6
...	...	...	...	...	...	...	...	...	...	...	...	7
...	...	...	...	...	...	...	...	...	...	...	...	8
...	...	...	...	...	...	...	...	...	...	...	...	9
...	...	...	...	...	...	...	...	...	...	...	...	1860
...	...	...	...	...	...	...	...	...	...	...	...	1
...	...	...	...	...	...	...	...	...	...	...	...	2
...	...	...	...	...	...	...	...	...	...	...	...	3
...	...	...	...	...	...	...	...	...	...	...	...	4
...	...	...	...	...	...	...	...	...	...	...	...	5
...	...	...	...	...	...	...	...	...	...	...	...	6
...	...	...	...	...	...	...	...	...	...	...	...	7
...	...	...	...	...	...	...	...	...	...	...	...	8
...	...	...	...	...	...	...	...	...	...	...	...	9
...	...	...	...	...	...	...	...	...	...	...	...	1870
...	...	...	...	...	...	...	...	...	...	...	...	1
...	...	...	...	...	...	...	...	...	...	...	...	2
...	...	...	...	...	...	...	...	...	...	...	...	3
...	...	...	...	...	...	...	...	...	...	...	...	4
...	...	...	...	...	...	...	...	...	...	...	...	5
...	...	...	...	...	...	...	...	...	...	...	...	6
...	...	...	...	...	...	...	...	...	...	...	...	7
...	...	...	...	...	...	...	...	...	...	...	...	8
...	...	...	...	...	...	...	...	...	...	...	...	9
...	...	...	...	...	...	...	...	...	...	...	...	1880
...	...	...	...	...	...	...	...	...	...	...	...	1
...	...	...	...	...	...	...	...	...	...	...	...	2
...	...	...	...	...	...	...	...	...	...	...	...	3
...	...	...	...	...	...	...	...	...	...	...	...	4
...	...	...	...	...	...	...	...	...	...	...	...	5
...	...	...	...	...	...	...	...	...	...	...	...	6
...	...	...	...	...	...	...	...	...	...	...	...	7
...	...	...	...	...	...	...	...	...	...	...	...	8
...	...	...	...	...	...	...	...	...	...	...	...	9
...	...	...	...	...	...	...	...	...	...	...	...	1890
...	...	...	...	...	...	...	...	...	...	...	...	1
...	...	...	...	...	...	...	...	...	...	...	...	2
...	...	...	...	...	...	...	...	...	...	...	...	3
...	...	...	...	...	...	...	...	...	...	...	...	4
...	...	...	...	...	...	...	...	...	...	...	...	5
...	...	...	...	...	...	...	...	...	...	...	...	6
...	...	...	...	...	...	...	...	...	...	...	...	7
...	...	...	...	...	...	...	...	...	...	...	...	8
...	...	...	...	...	...	...	...	...	...	...	...	9
...	...	...	...	...	...	...	...	...	...	...	...	1900
...	...	...	...	...	...	...	...	...	...	...	...	1
...	...	...	...	...	...	...	...	...	...	...	...	2
...	...	...	...	...	...	...	...	...	...	...	...	3
...	...	...	...	...	...	...	...	...	...	...	...	4
...	...	...	...	...	...	18	5,729	...	...	...	...	5
...	...	...	...	...	...	...	...	...	...	...	...	6
...	...	4	140	...	...	...	...	...	...	...	...	7
...	...	...	...	...	...	[2]†	400	...	...	...	...	8
1	100	...	...	...	...	...	...	...	...	...	...	9
2	190	...	...	...	...	...	...	...	...	...	...	1910
9	826	...	...	...	...	...	...	...	...	...	...	1911
...	...	...	...	...	...	...	...	...	...	...	...	1912
1	86	...	...	...	...	...	...	...	...	...	...	1913
½	40	...	...	...	...	...	...	7	40	...	...	1914
¼	25	...	...	...	...	...	...	...	...	688	1,196	1915
1	128	3	438	11	19	47	9,375	21	284	12	47	1916
...	...	½	42	57	707	17	2,513	18	158	42	50	1917
¼	31	5	720	679	2,564	...	...	5	75	62	225	1918
½	15	6	772	...	...	¼	75	...	...	...	...	1919
15	**1,441**	**18**	**2,112**	**747**	**3,290**	**...**	**18,092**	**51**	**557**	**804**	**1,518**	**Total**

[2]† Weight not stated.

TABLE XXV.—*Return of Ore and Minerals other than Gold entered for EXPORT from 1850 to 1919, inclusive*—continued.

Year.	Non-Metallic Minerals—*continued.*						Minerals not Elsewhere Included.		Total Value of Minerals other than Gold exported to Date.	Year.
	Asbestos.		Coal.		Mica.					
	State generally.		Collie River Mf.		State generally.					
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.		
	tons.	£	tons.	£	tons.	£	tons.	£	£	
1850	...	...	...	...	...	...	...	...	55	1850
1	...	...	...	...	...	...	...	...	...	1
2	...	...	...	...	...	...	...	...	...	2
3	...	...	...	...	...	...	...	...	1,211	3
4	...	...	...	...	...	...	...	...	2,440	4
5	...	...	...	...	...	...	...	...	2,951	5
6	...	...	...	...	...	...	...	...	2,218	6
7	...	...	...	...	...	...	...	...	4,330	7
8	...	...	...	...	...	...	...	...	10,751	8
9	...	...	...	...	...	...	...	...	14,752	9
1860	...	...	...	...	...	...	...	...	9,006	1860
1	...	...	...	...	...	...	...	...	7,129	1
2	...	...	...	...	...	...	...	...	12,626	2
3	...	...	...	...	...	...	...	...	14,508	3
4	...	...	...	...	...	...	...	...	18,016	4
5	...	...	...	...	...	...	...	...	21,726	5
6	...	...	...	...	...	...	...	...	11,644	6
7	...	...	...	...	...	...	...	...	15,929	7
8	...	...	...	...	...	...	...	...	14,451	8
9	...	...	...	...	...	...	...	...	10,719	9
1870	...	...	...	...	...	...	...	...	14,604	1870
1	...	...	...	...	...	...	...	...	5,040	1
2	...	...	...	...	...	...	...	...	4,368	2
3	...	...	...	...	...	...	...	...	12,434	3
4	...	...	...	...	...	...	...	...	26,723	4
5	...	...	...	...	...	...	...	...	30,628	5
6	...	...	...	...	...	...	...	...	30,638	6
7	...	...	...	...	...	...	...	...	48,284	7
8	...	...	...	...	...	...	...	...	43,545	8
9	...	...	...	...	...	...	...	...	33,300	9
1880	...	...	...	...	...	...	...	...	15,577	1880
1	...	...	...	...	...	...	...	...	11,224	1
2	...	...	...	...	...	...	...	...	14,371	2
3	...	...	...	...	...	...	...	...	7,341	3
4	...	...	...	...	...	...	...	...	6,642	4
5	...	...	...	...	...	...	...	...	5,048	5
6	...	...	...	...	...	...	...	...	8,012	6
7	...	...	...	...	...	...	...	...	5,175	7
8	...	...	...	...	...	...	...	...	6,848	8
9	...	...	...	...	...	...	...	...	4,704	9
1890	...	...	...	...	...	...	...	...	7,671	1890
1	...	...	...	...	...	...	...	...	14,912	1
2	...	...	...	...	[2]†	25	...	...	22,714	2
3	...	...	...	...	[2]†	4	...	...	11,744	3
4	...	...	...	...	...	...	...	...	15,274	4
5	...	...	...	...	[2]†	3	...	...	22,658	5
6	...	...	...	...	...	...	...	...	4,438	6
7	...	...	...	...	[2]†	209	...	...	4,532	7
8	...	...	1	1	...	...	...	...	7,060	8
9	...	...	[2]† 1	798	772	[2]†	50	...	...	66,611	9
1900	...	...	...	...	355	350	[2]†	3	5	85	95,261	1900
1	...	...	...	...	971	969	...	...	...	4	171,453	1
2	...	...	...	...	12	12	...	...	[6]† 3	47	61,551	2
3	...	...	[5]† 10	110	127	...	...	[7]† 22	230	109,468	3
4	...	...	...	...	11	7	...	...	7	81	97,132	4
5	...	...	...	...	108	87	...	...	62	127	192,251	5
6	...	...	...	...	86	65	...	...	10	1,035	222,621	6
7	...	...	...	...	26 *1,447	28 1,138	...	...	[8]† 96	1,447	402,906	7
8	...	...	[2]† 1,242	13 *9,612	11 7,747	[2]†	10	42	2,750	176,827	8
9	...	...	...	...	353 *85,647	183 93,781	...	...	[9]† 263	735	232,650	9
1910	...	...	...	...	3 *48,876	2 38,400	...	...	½	100	200,106	1910
1911	...	...	...	...	*40,063	29,344	...	...	[10]† 14	407	197,439	1911
1912	...	...	...	...	6 *42,602	6 30,721	...	...	[11]†	8	212,509	1912
1913	...	...	...	...	*54,228	39,125	...	...	5	17	336,155	1913
1914	...	...	...	...	*54,416	38,244	4	323	[12]† 9	635	182,996	1914
1915	...	...	...	...	1,667 *26,167	1,513 19,288	[2]†	26	[13]†	115	218,495	1915
1916	...	...	...	...	2,447 *37,590	1,857 28,387	[2]†	10	[14]†	713	265,043	1916
1917	...	...	...	...	*31,951	29,359	...	...	[15]†	440	343,167	1917
1918	...	...	1	25	*23,238	24,424	...	...	[16]† 5	97	360,895	1918
1919	...	...	36	752	*69,708	76,924	1	514	[17]†	116	244,050	1919
Total	...	...	...	2,030	532,512	462,872	...	1,177	...	9,189	5,059,557	Total

* Bunker Coal. [2]† Weight not stated. [5]† 4 cwts. [6]† Includes Cobalt ore, 2 tons, valued at £41 : Plumbago ore, 1 ton, valued at £6.

[7]† Antimony ore. [12]† Bismuth. [16]† Molybdenite.

[8]† Includes—
Antimony ore, 25 tons = £630
N.E.I., 71 tons ... = 817
Total £1,447

[10]† Includes—
Iron ore, 9 tons ... = £7
Ores, N.E.I., 5 tons = 400
Total £407

[13]† Includes—
Bismuth, 1 ton ... = £37
Fireclay, 12 tons = 75
Manganese, 3 cwt. = 3
Total £115

[15]† Includes—
Antimony, 12 tons = £258
Bismuth, 9cwt. ... = 24
Molybdenite, 14 tons = 158
Total £440

[9]† Includes—
Other Concentrates, 29 tons = £108
N.E.I., 234 tons = £627
Total £735

[11]† Includes—
Manganese, 2 tons = £4
N.E.I. ... ... = 4
Total £8

[14]† Includes—
Antimony, 27 tons = £580
Bismuth, 4 cwt. ... = 133
Total £713

[17]† Includes—
Bismuth, 1 cwt. ... = £15
Corundum, 1 ton ... = 1
Molybdenite, 7 tons = 100
£116

PART III.—ALL MINES.

TABLE XXVI.

MILLING AND CYANIDING PLANTS ERECTED IN THE RESPECTIVE GOLDFIELDS, DISTRICTS, AND MINERAL FIELDS ON THE 31ST DECEMBER, 1919, AND THE TOTAL VALUE OF MINING MACHINERY.

Mining Centre and Lease or Area.	Name of Mine, Company, or Works.	Milling. Batteries. Number of Heads of Stampers.	Milling. Other Mills. Prospecting Mills.	Ball Mills.	Griffin Mills.	Huntington Mills.	Puddlers.	Other Crushers.	Flint Mills.	Grinding Pans.	Cyaniding. Leaching Vats.	Agitating Vats.	Vacuum Filters and Presses.	Value of all Mining Machinery.
	PILBARA GOLDFIELD.													
	MARBLE BAR DISTRICT.													
Bamboo Creek. 795	Bulletin	10	...	...	...	...	...	...	...	...	4	...	...	...
⋀ *Elsie.* 792	State Battery, Bamboo Creek	5	...	...	...	...	...	...	...	...	5	...	...	...
Lalla Rookh. R.C. 112	Trio	3	...	...	...	...	...	...	...	...	...	...	...	...
Marble Bar. 694	Lalla Rookh	10	...	...	...	...	...	...	...	...	3	...	...	...
⋀	Jo Jo G.M.	5	...	...	...	...	...	...	...	...	...	...	...	...
	State Battery, Marble Bar	5	...	...	...	...	...	...	...	...	...	...	...	...
	Total	**38**	...	...	...	...	...	...	...	...	**12**	...	...	**£11,918**
	NULLAGINE DISTRICT.													
Eastern Creek. M.A. 11L. *Middle Creek.* 212L	Doherty's Works	10	...	...	...	...	...	...	...	...	4	...	...	...
20-Mile Sandy. ⋀	Barton	10	...	...	...	...	...	...	...	1	6	...	...	...
	State Battery, 20-Mile Sandy	5	...	...	...	...	...	...	...	...	4	...	...	...
	Total	**25**	...	...	...	...	...	...	...	**1**	**14**	...	...	**£29,806**
	WEST PILBARA GOLDFIELD.													
Station Peak. 165 *Tooranna.* (155) *Weerianna.* (M.A. 12).	Belladonna	20	...	...	...	...	...	...	...	1	...	...	...	...
	Tauri Tom Tit	10	...	...	...	...	...	...	...	1	...	...	...	...
	Porteminna Battery	10	...	...	...	...	...	...	...	...	...	...	...	...
	Total	**40**	...	...	...	...	...	...	...	**2**	...	...	...	**£2,350**
	GASCOYNE GOLDFIELD.													
Bangemall. (32)	Gem	1	...	...	...	...	...	...	...	...	...	...	...	...
	Total	**1**	...	...	...	...	...	...	...	...	...	...	...	**£1,100**
	PEAK HILL GOLDFIELD.													
Peak Hill. (1P, etc.)	(Peak Hill Goldfields, Ltd.)	30	...	...	...	...	...	2	...	...	8	3	...	...
⋀	State Battery, Mt. Egerton	5	...	...	...	...	...	...	...	...	...	...	...	...
⋀	State Battery, Ravelstone	5	...	...	...	...	...	...	...	...	...	...	...	...
⋀	Purcell's Works	...	...	...	...	...	...	...	...	...	5	...	...	...
	Total	**40**	...	...	...	...	...	**2**	...	...	**13**	**3**	...	**£6,643**
	EAST MURCHISON GOLDFIELD.													
	LAWLERS DISTRICT.													
Kathleen Valley. 382	Yellow Aster	10	...	...	...	...	...	...	...	...	4	...	...	...
Lake Darlot. T. Lic. 138H (633, etc.)	Murie & Dowson's Cyanide Works	...	...	...	...	...	...	...	...	...	5	...	...	...
⋀	Zangbar	10	...	...	...	...	...	...	...	...	...	...	...	...
Lawlers.	State Battery, Lake Darlot	10	...	...	...	...	...	...	...	...	...	...	...	...
1171	Great Eastern	5	...	...	...	...	...	...	...	1	6	...	...	...
1172	Queen	5	...	...	...	...	...	...	...	...	5	...	...	...
910	Sunrise	5	...	...	...	...	...	1	...	...	2	...	...	...
1188	Try It	5	...	...	...	...	...	...	...	...	...	...	...	...
58, etc. *Sir Samuel.*	Waroonga G.M. Co., Ltd.	10	...	...	...	...	...	1	...	...	...	...	...	...
⋀	State Battery, Sir Samuel	5	...	...	...	...	...	...	...	...	...	...	...	...
	Total	**65**	...	...	...	...	...	**2**	...	**1**	**22**	...	...	**£13,304**
	WILUNA DISTRICT.													
Collavilla. (71J)	May Queen Reward	5	...	...	...	...	...	...	...	...	...	...	...	...
Gum Creek. 226J	Alma May	5	...	...	...	...	...	...	...	...	...	...	...	...
Mt. Keith. ⋀	State Battery, Mt. Keith	5	...	...	...	...	...	...	...	...	3	...	...	...
Wiluna. 10J	Moonlight	10	...	...	...	...	...	...	...	2	...	6	1	...
6J, etc.	Western Machinery Co., Ltd.	30	...	...	...	...	...	...	...	...	...	...	...	...
12J, etc.	Wiluna G.Ms., Ltd.	25	...	...	...	...	...	1	...	3	9	3	...	...
⋀	State Battery, Wiluna	10	...	...	...	...	...	...	1	...	...	3	1	...
	Total	**90**	...	...	...	...	...	**1**	**1**	**5**	**12**	**12**	**2**	**£50,872**

TABLE XXVI.—*Milling and Cyaniding Plants erected in the respective Goldfields, Districts, etc.*—continued.

Mining Centre and Lease or Area.	Name of Mine, Company, or Works.	Milling.									Cyaniding.			Value of all Mining Machinery
		Batteries.	Other Mills.											
		Number of Heads of Stampers.	Prospecting Mills.	Ball Mills.	Griffin Mills.	Huntington Mills.	Puddlers.	Other Crushers.	Flint Mills.	Grinding Pans.	Leaching Vats.	Agitating Vats.	Vacuum Filters and Presses.	
	EAST MURCHISON GOLDFIELD—*contd.*													
	BLACK RANGE DISTRICT.													
Birrigrin.														
M.A. 10B	Pelerin	5	...	...	...	...	...	...	...	...	...	...	...	...
M.A. 8B	Reply Works	5	...	...	...	...	...	...	...	...	4	...	...	...
Curran's Find.														
641B	Red White and Blue	5	...	...	...	...	...	...	...	...	6	...	...	...
Maninga Marley.														
203B	Havilah	10	...	...	...	...	...	...	...	1	2	...	...	...
Sandstone.														
M.A. 13B.	Yuanmi G.Ms., Ltd.	20	...	...	...	...	...	...	1	1	...	...	2	...
⋀	State Battery, Black Range	10	...	...	...	...	...	...	...	...	5	...	...	...
Youanmi.														
863, etc.	Yuanmi G.Ms., Ltd.	20	...	1	...	...	...	...	1	2	6	3	...	...
⋀	State Battery, Youanmi	5	...	...	...	...	...	...	...	...	2	...	...	...
	Total	**80**	...	**1**	...	...	...	...	**2**	**4**	**25**	**3**	**2**	**£99,708**
	MURCHISON GOLDFIELD.													
	CUE DISTRICT.													
Cuddingwarra.														
1860	Big Bell	10	...	...	...	...	...	...	...	1	12	...	...	...
(595)	Victory United	10	...	...	...	...	...	...	...	...	4	...	...	...
Cue.														
(1833)	Agamemnon	5	...	...	...	...	...	...	...	...	...	...	...	...
203, etc.	Cue, No. 1	20	...	...	...	...	...	...	...	1	4	...	...	...
(1020)	Gem of Cue Extended	15	...	...	...	...	...	...	...	...	...	...	...	...
1148, etc.	Light of Asia	...	...	...	...	...	...	2	...	...	6	...	...	...
Tuckabianna.														
1914	Triplicate	5	...	...	...	...	...	...	...	...	3	...	...	...
Tuckanarra.														
⋀	State Battery, Tuckanarra	10	...	...	...	...	...	...	...	2	3	...	...	...
	Total	**75**	...	...	...	...	...	**2**	...	**4**	**32**	...	...	**£33,239**
	MEEKATHARRA DISTRICT.													
Gabanintha.														
(1324N)	Hamburg Belle	5	...	...	...	...	...	...	...	...	3	...	...	...
Garden Gully.														
M.A. 16N	Kyarra G.M. Co., N.L.	10	...	...	...	...	...	...	...	...	...	...	1	...
Meekatharra.														
597N, etc.	New Commodore G.M. Co., N.L.	10	...	...	...	...	1	2	...	...	4	4	1	...
477N, etc.	Fenian leases	15	...	...	...	...	...	2	...	8	...	8	1	...
555N	Ingliston	10	...	...	...	...	...	...	...	...	...	...	...	...
475N	Ingliston Consols Extended	15	...	...	...	...	...	...	...	1	6	...	...	...
(398N), etc.	Ingliston Extended G.Ms., Ltd.	...	...	...	...	...	...	...	...	2	2	2	1	...
507N, etc.	Queenhills G.Ms., Ltd.	2	...	...	...	...	...	...	2	2	...	3	1	...
⋀	State Battery, Meekatharra	5	...	...	...	...	...	...	...	...	5	...	...	...
Nannine.														
166N, etc.	Nannine leases	10	...	...	...	...	...	...	...	2	...	...	...	...
Quinns.														
⋀	State Battery, Quinns	5	...	...	...	...	...	...	...	...	...	...	...	...
Ruby Well.														
(1261N)	Harder to Find	5	...	...	...	...	...	...	...	...	4	...	...	...
1291N	Waterloo	5	...	...	...	...	...	...	...	...	3	...	...	...
	Total	**97**	...	...	...	...	**1**	**4**	**2**	**15**	**27**	**17**	**5**	**£118,916**
	DAY DAWN DISTRICT.													
Day Dawn.														
1D, etc.	Great Fingal Consolidated, Ltd.	40	...	...	...	...	...	3	...	6	15	9	2	...
(138D)	Murchison Associated	10	...	...	...	...	...	...	...	...	...	...	...	...
Webb's Patch.														
513D	Black Range Pinnacles Co., N.L.	10	...	...	...	...	...	...	...	4	...	6	24	...
	Total	**60**	...	...	...	...	...	**3**	...	**10**	**15**	**15**	**26**	**£21,200**
	MT. MAGNET DISTRICT.													
Boogardie.														
(696M)	Sirdar	...	...	...	...	...	...	...	...	...	3	...	...	...
⋀	State Battery, Boogardie	5	...	...	...	...	...	...	...	...	5	...	...	...
Lennonville.														
964M, etc.	Empress leases	5	...	...	...	...	...	...	...	1	...	...	...	...
⋀	State Battery, Lennonville	10	...	...	...	...	...	...	...	...	...	...	...	...
Mt. Magnet.														
M.A. 6M	Great Boulder No. 1, Ltd.	10	...	...	...	...	...	...	...	...	...	...	...	...
1013M	Mars	...	...	1	...	...	...	...	...	...	7	...	...	...
1075M	New Havelock	5	...	...	...	...	...	...	...	...	4	...	...	...
1095M	Pearl	...	1	...	...	...	...	...	...	...	...	...	...	...
Paynesville.														
T.A., 9M	Paynesville Cyanide Works	...	...	...	...	...	1	...	...	...	3	...	...	...
	Total	**35**	**1**	**1**	...	...	**1**	...	...	**1**	**22**	...	...	**£16,248**

TABLE XXVI.—*Milling and Cyaniding Plants erected in the respective Goldfields, Districts, etc.*—continued.

Mining Centre and Lease or Area.	Name of Mine, Company, or Works.	Milling. Batteries. Number of Heads of Stampers.	Milling. Other Mills. Prospecting Mills.	Ball Mills.	Griffin Mills.	Huntington Mills.	Pudlers.	Other Crushers.	Flint Mills.	Grinding Pans.	Cyaniding. Leaching Vats.	Agitating Vats.	Vacuum Filters and Presses.	Value of all Mining Machinery
	YALGOO GOLDFIELD.													
Fields Find. 680 *Gullewa.* 877 *Noongal.* M.A. 18 *Mt. Gibson.* 722 *Payne's Find.* ⋀ *Warriedar.* 708 ⋀ *Yalgoo.* M.A. 17 * *Yuin.* 712, etc.	Fields Find Extended	10	...	...	...	...	...	1	...	...	...	...	...	...
	Mugga King	5	...	...	...	...	...	...	...	...	...	...	...	...
	Melville Battery	5	...	...	...	...	...	...	...	...	...	...	...	...
	Mt. Gibson Crushing Co.	5	...	...	...	...	...	...	...	...	...	...	...	...
	State Battery, Payne's Find	5	...	...	...	...	...	...	...	...	3	...	...	...
	Mug's Luck	10	...	...	...	...	...	...	...	...	4	5	...	...
	State Battery, Warriedar	5	...	...	...	...	...	...	...	...	...	...	...	...
	Ivanhoe Works	5	...	...	...	...	...	...	...	...	...	...	...	...
	Bullrush Gold Estates, N.L.	20	...	...	...	...	...	...	...	5	...	...	...	...
	Total	**70**	...	...	...	...	...	1	...	5	7	5	...	£25,810
	MT. MARGARET GOLDFIELD.													
	MT. MORGANS DISTRICT.													
Linden. 341F [904R] ⋀ *Mt. Margaret.* 314F *Mt. Morgans* 5F, etc. 325F *Murrin Murrin.* (194F) *Yundamindera.* M.A. 9F	Torquay	5	...	...	...	...	...	...	...	...	...	...	...	...
	State Battery, Linden	10	...	...	...	...	...	...	...	...	6	...	...	...
	Mt. Morven	5	...	...	...	...	...	...	...	...	3	...	...	...
	Westralia Mt. Morgans Mines, N.L.	10	...	...	...	...	...	...	...	3	...	2	1	...
	Millionaire Works	5	...	...	...	...	...	...	...	...	...	...	...	...
	Hills Proprietary	20	...	...	...	...	...	...	...	...	9	...	...	...
	Battlesville Battery	5	...	...	...	...	...	...	...	...	4	...	...	...
	Total	**60**	...	...	...	...	...	...	...	3	22	2	1	£13,998
	MT. MALCOLM DISTRICT.													
Leonora. (1473C) 263C 1482C 190C, etc. 198C, etc. ⋀ *Mt. Clifford.* 1329C *Mt. Malcolm.* (1175C) (1470C) *Pigs Well.* (1295C. etc.) *Wilson's Patch.* 1496	Chaffers G.M. Co., (1916), Ltd.	5	...	...	...	...	...	1	...	...	...	...	...	...
	Gwalia Central G.Ms., Ltd.	5	...	...	...	...	...	...	...	...	...	...	...	...
	Leonora Gold Blocks, N.L.	10	...	...	...	...	...	1	...	4	1	4	...	...
	Sons of Gwalia, Ltd.	50	...	...	...	...	...	...	4	10	...	8	2	...
	Sons of Gwalia South, G.Ms., Ltd.	10	...	...	...	...	...	1	...	...	...	...	...	...
	State Battery, Leonora	10	...	...	...	...	...	...	...	...	...	...	...	...
	Victory No. 1	5	...	...	...	...	...	...	...	...	...	...	...	...
	North Star: Malcolm Prospecting Co., N.L.	10	...	...	...	...	...	...	...	...	...	...	...	...
	Never Tire	2	...	...	...	...	...	...	...	...	...	...	...	...
	Starlight G.M. Syndicate, N.L.	10	...	...	...	...	...	...	...	1	...	...	...	...
	Great Western	10	...	...	...	...	...	...	...	...	...	...	...	...
	Total	**127**	...	...	...	...	...	3	4	15	1	12	2	£246,552
	MT. MARGARET DISTRICT.													
Burtville. 1044T *Erlistoun.* M.A. 18T (1990T) M.A. 20T *Euro.* 1984T *Laverton.* 2083T 829T, etc. 715T, etc. (189T) ⋀	Nil Desperandum	...	...	1	...	...	...	...	...	1	...	...	...	...
	Little Doris	5	...	...	...	...	...	...	...	...	...	...	...	...
	Mulga Queen Consols	10	...	...	...	...	...	...	...	...	4	...	...	...
	Westralia Tasmania	5	...	...	...	...	...	...	...	...	4	...	...	...
	Lone Star	10	...	...	...	...	...	...	...	...	6	...	...	...
	Beria Main Reef	...	...	...	...	1	...	...	...	...	...	...	...	...
	Ida H. G.M. Co., Ltd.	10	...	...	...	...	...	1	...	1	...	...	...	...
	Lancefield G.Ms., Ltd.	...	...	5	...	...	...	1	...	8	...	6	3	...
	Mary Mac G.M. Co., N.L.	10	...	...	...	...	...	1	...	4	4	...	...	...
	State Battery, Laverton	10	...	...	...	...	...	...	...	...	3	...	...	...
	Total	**60**	...	6	...	1	...	3	...	14	21	6	3	£47,678
	NORTH COOLGARDIE GOLDFIELD.													
	MENZIES DISTRICT.													
Comet Vale. 5217Z 5300Z 5211Z, etc. *Goongarrie.* 5414Z *Menzies.* (5354Z) (5420Z) M.A. 60Z (4895Z) 4931Z, etc. 3100Z, etc. T.A. 47Z *Mt. Ida.* M.A. 34Z ⋀	Gladsome	10	...	...	...	...	...	...	...	2	...	...	...	...
	Happy Jack	...	...	...	...	1	...	...	...	...	...	...	...	...
	Sand Queen G.Ms., Ltd.	10	...	...	...	...	...	2	...	5	12	...	...	...
	New Boddington	10	...	...	...	...	...	...	...	...	...	...	...	...
	Balkis	5	...	...	...	...	...	...	...	1	5	...	...	...
	Goodenough	5	...	...	...	...	...	...	...	...	...	...	...	...
	Lady Harriet Battery	5	...	...	...	...	...	...	...	1	4	...	...	...
	Mararoa	10	...	...	...	...	...	...	...	1	7	...	...	...
	Menzies Consolidated G.Ms., Ltd.	20	...	...	...	...	...	...	...	9	15	4	1	...
	Menzies Mining and Exploration Corp., Ltd.	10	...	...	...	...	...	...	...	...	8	...	...	...
	Gidneys Works	...	...	...	...	...	...	...	...	...	14	...	...	...
	Mt. Ida Meteor	...	...	...	...	...	...	...	...	...	...	...	...	...
	State Battery, Mt. Ida	5	...	...	...	...	...	...	...	1	2	...	...	...
	Total	**5**	...	...	...	...	...	...	...	...	...	...	...	...
		95	...	...	...	1	...	2	...	20	67	4	1	£44,777

TABLE XXVI.—*Milling and Cyaniding Plants erected in the respective Goldfields, Districts, etc.*—continued.

Mining Centre and Lease or Area.	Name of Mine, Company, or Works.	Milling.									Cyaniding.			Value of all Mining Machinery.
		Batteries.	Other Mills.											
		Number of Heads of Stampers.	Prospecting Mills.	Ball Mills.	Griffin Mills.	Huntington Mills.	Puddlers.	Other Crushers.	Flint Mills.	Grinding Pans.	Leaching Vats.	Agitating Vats.	Vacuum Filters and Presses.	
	NORTH COOLGARDIE GOLDFIELD—*contd.*													
	ULARRING DISTRICT.													
Davyhurst. (438U) *Mulline.* 324U, etc. ⋀ *Mulwarrie.* ⋀	Waihi	10	...	...	...	...	...	...	...	...	...	...	...	...
	Riverina South	10	...	...	...	...	...	1	1	2	...	4	...	...
	State Battery, Mulline	10	...	...	...	...	...	...	...	...	5	...	...	...
	State Battery, Mulwarrie	10	...	...	...	...	...	...	...	...	6	...	...	...
	Total	**40**	...	...	...	...	...	**1**	**1**	**2**	**11**	**4**	...	**£30,512**
	NIAGARA DISTRICT.													
Kookynie. 769G *Niagara.* M.A. 35G (734G) (419G) T.L., 108H ⋀ *Tampa.* (753G) M.A., 59G	Two D's	...	...	1	...	...	...	1	...	...	...	...	6	...
	Eagle Hawk Heather	10	...	...	...	...	...	...	...	...	...	...	...	...
	Lubra Queen	5	...	...	...	...	...	...	...	...	...	...	...	...
	Orion Mines, Ltd.	10	...	...	...	...	...	...	...	1	6	...	...	...
	Bright's Cyanide Works	...	...	...	...	...	...	...	...	...	3	...	...	...
	State Battery, Niagara	10	...	...	...	...	...	...	...	...	6	...	...	...
	Golden Butterfly G.M. Co., N.L.	10	...	...	...	...	...	...	...	1	...	...	2	...
	Grafter	5	...	...	...	...	...	...	...	1	2	...	...	...
	Total	**50**	...	**1**	...	...	...	**1**	...	**3**	**17**	...	**8**	**£6,299**
	YERILLA DISTRICT.													
Edjudina. 1011E *Yarri.* ⋀ *Yerilla.* ⋀	Neta	10	...	...	...	...	...	...	...	1	...	...	...	...
	State Battery, Yarri	10	...	...	...	...	...	...	...	...	5	...	...	...
	State Battery, Yerilla	5	...	...	...	...	...	...	...	...	3	...	...	...
	Total	**25**	...	...	...	...	...	...	...	**1**	**8**	...	...	**£3,656**
	BROAD ARROW GOLDFIELD.													
Bardoc. 1833W *Carnage.* M.A., 22W *Paddington.* (1733W) *Siberia.* 1399W 1371W 1289W 1736W ⋀ ⋀	Zoroastrian	5	...	...	...	...	...	1	...	...	...	...	...	...
	Regan's Carnage Battery	10	...	...	...	...	...	...	...	...	2	...	...	...
	Mount Eddy	...	...	...	...	1	...	...	...	...	...	...	...	...
	Associated Northern Blocks (W.A.), Ltd. ...	...	...	1	...	2	3	1	...	10	7	...	2	...
	Gimlet South	10	...	...	...	...	...	...	...	...	...	...	...	...
	Lady Evelyn	5	...	...	...	...	...	...	...	...	...	...	...	...
	Pole Battery	5	...	...	...	...	...	...	...	...	3	...	...	...
	State Battery, Ora Banda	5	...	...	...	...	...	...	...	...	5	...	...	...
	State Battery, Siberia	5	...	...	...	...	...	...	...	...	...	...	...	...
	Total	**45**	...	**1**	...	**3**	**3**	**2**	...	**10**	**17**	...	**2**	**£4,841**
	NORTH-EAST COOLGARDIE GOLDFIELD.													
	KANOWNA DISTRICT.													
Gordon. 1385X 891X *Kanowna.* M.A., 19X M.A., 56X Q.C., 57X M.A., 58X	Pride of the Morning	...	...	...	...	1	...	...	...	...	...	...	...	...
	Sirdar	10	...	...	...	...	...	...	...	...	8	...	...	...
	Martin's Works	15	...	...	...	...	...	1	...	...	8	...	...	...
	North White Feather G.Ms., Ltd.	40	...	...	...	...	...	...	...	1	...	...	...	...
	Riedel & Norton s Works	10	...	...	...	...	...	...	...	1	...	...	...	...
	Lady Pratt	10	...	...	...	...	...	...	...	...	...	...	...	...
	Total	**85**	...	...	...	**1**	...	**1**	...	**2**	**16**	...	...	**£12,898**
	KURNALPI DISTRICT.													
Kurnalpi. M.A., 2K *Mulgabbie.* M.A., 1K	Success	5	...	...	...	...	...	...	...	...	...	...	...	...
	Simmons Battery	...	1	...	...	...	...	...	...	...	...	...	...	...
	Total	**5**	**1**	...	...	...	...	...	...	...	...	...	...	**£150**

TABLE XXVI.—*Milling and Cyaniding Plants erected in the respective Goldfields, Districts, etc.*—continued.

Mining Centre and Lease or Area.	Name of Mine, Company, or Works.	Milling.									Cyaniding.			Value of all Mining Machinery.
		Batteries.	Other Mills.											
		Number of Heads of Stampers.	Prospecting Mills.	Ball Mills.	Griffin Mills.	Huntington Mills.	Puddlers.	Other Crushers.	Flint Mills.	Grinding Pans.	Leaching Vats.	Agitating Vats.	Vacuum Filters and Presses.	
	EAST COOLGARDIE GOLDFIELD.													
	EAST COOLGARDIE DISTRICT.													
Boorara.														
3908E, etc.	Golden Ridge, G.M. Co., Ltd.	20	...	...	...	...	...	...	...	1	4	...	...	...
Boulder.														
38E, etc.	Associated G.Ms. of W.A., Ltd.	...	...	9	...	...	...	1	...	20	...	6	7	...
49E, etc.	Associated Northern Blocks (W.A.), Ltd. ...	...	...	...	...	1	...	...	...	...	4	...	...	...
351E, etc.	Golden Horseshoe Estates, Ltd.	140	...	1	...	...	3	6	15	24	20	22	20	...
50E	Great Boulder No. 1, Ltd.	10	...	...	...	...	...	...	...	...	...	...	...	...
66E	Great Boulder Perseverance G.M. Co., Ltd. ...	...	...	8	...	...	...	4	2	17	...	24	13	...
M.A., 59E	Great Boulder Proprietary G.Ms., Ltd. ...	...	1	5	13	...	...	9	...	20	...	23	14	...
3643E	Hainault Sulphide Plant	...	...	2	...	...	...	...	...	2	6	2	...	...
M.A., 7E	Hannan's Central Battery	20	...	...	...	...	...	3	1	...	8	4	2	...
4317E	Idaho	10	...	...	...	...	...	1	...	1	6	...	...	...
946E	Ironsides North	10	...	...	...	...	...	...	...	2	6	...	...	...
31E, etc.	Ivanhoe Gold Corporation, Ltd.	100	...	...	...	...	...	3	2	25	32	13	3	...
22E, etc.	Kalgurli G.Ms., Ltd.	...	...	9	...	...	...	6	...	18	...	16	9	...
15E, etc.	Lake View & Star, Ltd.	75	...	1	...	...	...	7	8	21	...	27	17	...
281E, etc.	North Kalgurli (1912), Ltd.	20	...	...	...	...	...	...	...	...	6	3	1	...
6E, etc.	Oroya Links, Ltd.	55	...	2	2	...	1	4	5	3	13	14	5	...
1208E, etc.	South Kalgurli Consolidated, Ltd.	40	...	4	...	...	...	2	...	15	34	11	10	...
Kalgoorlie.														
796E	Bonnie Lass (Raven Battery)	10	...	...	...	...	...	...	...	...	...	...	...	...
M.A., 5E	Brown Hill Consols, Ltd.	20	...	...	...	...	...	...	...	...	...	...	...	...
4623E	Cassidy Hill	...	...	...	...	1	...	...	...	...	3	...	...	...
4545E	Creswick Battery	...	...	...	...	1	...	...	...	...	...	...	...	...
M.A., 64E	Dunstan & Cummings Works	...	...	...	...	...	1	...	...	...	12	...	1	...
4546E, etc.	Hannans Reward, Ltd.	10	...	...	...	1	...	...	...	1	3	...	...	...
L.C., 353E	Lone Hand Works	...	...	...	...	1	...	...	...	...	5	...	...	...
	Total	**540**	**1**	**41**	**15**	**5**	**5**	**46**	**33**	**170**	**162**	**165**	**102**	**£1,323,236**
	COOLGARDIE GOLDFIELD.													
	COOLGARDIE DISTRICT.													
Burbanks.														
(134), etc.	Burbanks Birthday G.Ms., Ltd.	60	...	...	...	...	...	1	...	...	...	...	...	...
M.A., 77	Burbanks Main Lode (1904),, Ltd.	10	...	...	...	...	...	...	...	...	...	...	...	...
2160	Lady Robinson G.M. Co., N.L.	10	...	...	...	...	...	...	...	...	8	...	...	...
4469	Lord Bobs	...	...	...	...	1	...	...	...	...	...	...	...	...
Coolgardie.														
(3918)	Coolgardie Redemption	10	...	...	...	...	...	...	...	...	...	...	...	...
M.A., 11	New Bailey's Mines, Ltd.	10	...	...	...	...	...	...	...	...	6	...	...	...
⩚	State Battery, Coolgardie	10	...	...	...	...	...	...	...	...	6	...	...	...
Eundynie.														
4253	Hidden Secret North	10	...	...	...	...	...	...	...	...	6	...	...	...
Gibraltar.														
(4418)	Reform	5	...	...	...	...	...	...	...	...	3	...	...	...
Higginsville.														
4184	Sons of Erin	10	...	...	...	...	...	...	...	...	...	...	...	...
Red Hill.														
(4331)	Edquist	...	...	...	...	...	...	...	...	6	...	...	...	...
Widgiemooltha.														
M.A., 63	Highgate Battery	3	...	...	...	...	...	...	...	1	...	...	...	...
⩚7497	Imperial Battery	5	...	...	...	...	...	...	...	...	...	...	...	...
	Total	**143**	**...**	**...**	**...**	**1**	**...**	**1**	**...**	**7**	**29**	**...**	**...**	**£32,568**
	KUNANALLING DISTRICT.													
Carbine.														
338	Carbine	10	...	...	...	...	...	1	...	2	...	...	...	...
25-Mile														
6968	Blue Bell	5	...	...	...	...	...	...	...	...	7	...	...	...
8?18	Shamrock	5	...	...	...	...	...	...	...	...	4	...	...	...
(6458)	Star of Fremantle	10	...	...	...	...	...	...	...	...	...	...	...	...
(8468)	Swallow	5	...	...	...	...	...	...	...	...	...	...	...	...
	Total	**35**	**...**	**...**	**...**	**...**	**...**	**1**	**...**	**2**	**11**	**...**	**...**	**£6,970**
	YILGARN GOLDFIELD.													
Bullfinch.														
914, etc.	Bullfinch Proprietary (W.A.), Ltd.	20	...	...	...	...	...	...	2	2	...	4	3	...
Corinthian.														
896, etc.	Corinthian North G.Ms., Ltd.	10	...	...	...	...	...	2	...	...	6	4	2	...
Golden Valley.														
22?2	Glide Away	5	...	...	...	...	...	...	...	1	4	...	...	...
Greenmount.														
550	Sunbeam	5	...	...	...	...	...	...	...	1	5	...	...	...
536	Transvaal	20	...	...	...	...	...	1	...	...	...	...	...	...
Hope's Hill.														
M.A., 21	Lakeside Battery	10	...	...	...	...	...	...	...	1	6	...	...	...
Kennyville.														
570	Great Leviathan	5	...	...	...	...	...	...	...	...	...	...	...	...
Marvel Loch.														
M.A., 23	Donovan's Find Battery	5	...	...	...	...	...	...	...	...	4	...	...	...
719, etc.	Great Victoria	10	...	...	...	...	...	...	...	3	10	...	...	...
M.A., 19	Marvel Loch Cyanide Works	...	...	...	...	...	...	...	...	...	10	...	...	...
M.A., 16	Mountain Queen, Ltd.	2	...	...	...	...	...	...	...	3	...	...	1	...
M.A., 18	Never Never Works	10	...	...	...	...	...	...	...	...	2	...	...	...
Mt. Jackson.														
(1933)	Butcher Bird, No. 1	5	...	...	...	...	...	...	...	...	...	...	...	...
Parker's Range.														
(508)	Australia	5	...	...	...	...	...	...	...	...	5	...	...	...
2801	Scots Greys	5	...	...	...	...	...	...	...	...	...	...	...	...
724	Spring Hill G.M. Co., N.L.	10	...	...	...	...	...	...	...	1	3	...	...	...
Southern Cross.														
2787	Mt. Rankin G.Ms., N.L.	10	...	...	...	...	...	...	...	2	...	...	...	...
Westons.														
2769	Edna May Battler G.M. Co., N.L.	5	...	...	...	...	...	...	...	4	...	...	1	...
2291	Edna May Central G.Ms., N.L.	10	...	...	...	...	...	1	...	2	8	...	...	...
2570	Edna May Consolidated G.M. Co., N.L. ...	10	...	...	...	...	...	...	...	2	...	...	...	...
2168	Edna May Deep Levels G.M. Co., N.L. ...	10	...	...	...	...	...	...	...	...	...	...	...	...
2180	Edna May G.M. Co., N.L.	10	...	...	...	...	...	...	...	2	7	3	...	...
2087	Greenfinch Proprietary G.M., N.L.	5	...	...	...	...	...	...	...	1	...	...	...	...
	Total	**187**	**...**	**...**	**...**	**...**	**...**	**4**	**2**	**25**	**70**	**11**	**7**	**£176,201**

TABLE XXVI.—*Milling and Cyaniding Plants erected in the respective Goldfields, Districts, etc.*—continued.

Mining Centre and Lease or Area.	Name of Mine, Company, or Works.	MILLING.									CYANIDING.			Value of all Mining Machinery.
		Batteries.	Other Mills.											
		Number of Heads of Stampers.	Prospecting Mills.	Ball Mills.	Griffin Mills.	Huntington Mills.	Puddlers.	Other Crushers.	Flint Mills.	Grinding Pans.	Leaching Vats.	Agitating Vats.	Vacuum Filters and Presses.	
	DUNDAS GOLDFIELD.													
Norseman. (938, etc.) M.L., 31 (1021) M.A., 18 990	Hampton Uruguay, Ltd.	10	...	...	...	...	...	...	...	4	12	4	1	...
	Mararoa G.M. Co., N.L.	20	...	...	...	...	...	...	...	5	13	4	1	...
	Princess Royal North	10	...	...	...	...	...	...	...	2	2	2	...	...
	Rawlings. Bullen & Rumble	10	...	...	...	...	...	...	...	3	4	...	...	...
	Viking No. 1 Syndicate	10	...	...	...	...	...	...	...	...	6	...	...	...
	State Battery, Norseman	5	...	...	...	...	...	...	...	...	6	...	...	...
	Total	**65**	...	...	...	...	...	...	...	**14**	**43**	**10**	**2**	**£24,805**
	PHILLIPS RIVER GOLDFIELD.													
Kundip. 136, etc. M.L., 6 151, etc. M.A., 52 74	Flag leases	5	...	...	...	...	...	...	...	...	...	...	...	...
	Gem	5	...	...	...	...	...	...	...	...	4	...	...	...
	Gem Consolidated	5	...	...	...	...	...	...	...	...	...	...	...	...
	Harbour View Gold and Copper Co., Ltd. ...	10	...	...	...	...	...	...	...	...	...	...	...	...
	Two Boys	10	...	...	...	...	...	...	...	...	...	...	...	...
Mt. Purchas. M.L., 18	Mt. Purchas Prospecting Plant	...	1	...	...	...	...	...	...	...	...	...	...	...
Ravensthorpe. (153) M.A., 4	Maori Queen	...	1	...	...	...	...	1	...	...	...	...	...	...
	Ravensthorpe Battery Co., Ltd.	10	...	...	...	...	...	...	...	...	...	...	...	...
	Total	**45**	**2**	...	...	...	...	**1**	...	...	**4**	...	...	**£10,600**
	State generally	...	...	1	...	...	...	1	...	...	...	...	...	...
	Total	...	...	1	...	...	...	1	...	...	...	...	...	£30,000

TABLE XXVI.—*Milling and Cyaniding Plants erected in the respective Goldfields, Districts, etc.*—continued.

GOLDFIELD.	DISTRICT.	MILLING.									CYANIDING.			Total Value of all Mining Machinery.
		Batteries.	Other Mills.											
		Number of Heads of Stampers.	Prospecting Mills.	Ball Mills.	Griffin Mills.	Huntington Mills.	Puddlers.	Other Crushers.	Flint Mills.	Grinding Pans.	Leaching Vats.	Agitating Vats.	Vacuum Filters and Presses.	
	GOLD MINING.													£
KIMBERLEY	... ...	...	...	...	...	...	...	...	...	...	...	...	...	...
PILBARA	Marble Bar	38	...	...	...	...	...	...	...	...	12	...	...	11,918
	Nullagine	25	...	...	...	...	...	...	...	1	14	...	...	29,806
WEST PILBARA	... ...	40	...	...	...	...	...	...	...	2	...	...	...	2,350
ASHBURTON	... ...	...	...	...	...	...	...	...	...	...	...	...	...	...
GASCOYNE	... ...	1	...	...	...	...	...	...	...	...	...	...	...	1,100
PEAK HILL	... ...	40	...	...	...	...	...	2	...	...	13	3	...	6,643
EAST MURCHISON ...	Lawlers	65	...	...	...	...	...	2	...	1	22	...	...	13,304
	Wiluna	90	...	...	...	...	...	1	1	5	12	12	2	50,872
	Black Range	80	...	1	...	...	...	...	2	4	25	3	2	99,708
	Cue	75	...	...	...	...	...	2	...	4	32	...	...	33,239
MURCHISON	Meekatharra	97	...	...	...	...	1	4	2	15	27	17	5	118,916
	Day Dawn	60	...	...	...	...	...	3	...	10	15	15	26	21,200
	Mt. Magnet	35	1	1	...	...	1	...	...	1	22	...	...	16,248
YALGOO	... ...	70	...	...	...	...	...	1	...	5	7	5	...	25,810
MT. MARGARET ...	Mt. Morgans	60	...	...	...	...	...	...	...	3	22	2	1	13,998
	Mt. Malcolm	127	...	...	...	...	...	3	4	15	1	12	2	246,552
	Mt. Margaret	60	...	6	...	1	...	3	...	14	21	6	3	47,678
	Menzies	95	...	...	...	1	...	2	...	20	67	4	1	44,777
NORTH COOLGARDIE ...	Ularring	40	...	...	...	...	...	1	1	2	11	4	...	30,512
	Niagara	50	...	1	...	...	...	1	...	3	17	...	8	6,299
	Yerilla	25	...	...	...	...	...	...	...	1	8	...	...	3,650
BROAD ARROW	... ...	45	...	1	...	3	3	2	...	10	17	...	2	4,841
N.E. COOLGARDIE ...	Kanowna	85	...	...	...	1	...	1	...	2	16	...	...	12,898
	Kurnalpi	5	1	...	...	...	...	...	...	...	...	...	...	150
EAST COOLGARDIE	East Coolgardie	540	1	41	15	5	5	46	33	170	162	165	102	1,323,236
	Bulong	...	...	...	...	...	...	...	...	...	...	...	...	...
COOLGARDIE	Coolgardie	143	...	...	...	1	...	1	...	7	29	...	...	32,568
	Kunanalling	35	...	...	...	...	...	1	...	2	11	...	...	6,970
YILGARN	... ...	187	...	...	...	...	...	4	2	25	70	11	7	16,201
DUNDAS	... ...	65	...	...	...	...	...	...	...	14	43	10	2	24,305
PHILLIPS RIVER	... ...	45	2	...	...	...	...	1	...	...	4	...	...	10,600
STATE GENERALLY	... ...	...	...	1	...	...	...	1	...	...	...	...	...	30,000
	Total, Gold Mining Machinery ...	**2,323**	**5**	**52**	**15**	**12**	**10**	**82**	**45**	**336**	**700**	**269**	**163**	**£2,446,355**
	LEAD MINING.													
NORTHAMPTON, M.F.	... ...	...	...	...	...	...	...	6	...	...	...	...	...	28,500
	Total, Lead Mining Machinery ...	...	...	...	...	...	...	**6**	...	...	...	...	...	**£28,500**
	TIN MINING.													
PILBARA	Marble Bar	...	...	...	...	1	...	2	...	...	...	...	...	25,300
GREENBUSHES TINFIELD ...	... ...	5	...	...	1	...	1	7	...	...	...	...	...	28,617
	Total, Tin Mining Machinery ...	**5**	...	...	**1**	**1**	**1**	**9**	...	...	...	...	...	**£53,917**
	COPPER MINING.													
PHILLIPS RIVER	... ...	...	...	...	...	...	...	13	...	...	...	...	...	76,251
WEST PILBARA	... ...	...	...	...	...	...	...	5	...	...	...	...	...	139,574
MT. MARGARET	Mt. Morgans	...	...	...	...	...	...	...	...	...	...	...	...	2,500
	Total, Copper Mining Machinery ...	...	...	...	...	...	...	**18**	...	...	...	...	...	**£218,325**
	COAL MINING.													
COLLIE RIVER COALFIELD ...	... ...	...	...	...	...	...	...	...	...	...	...	...	...	81,081
	Total, Coal Mining Machinery ...	...	...	...	...	...	...	...	...	...	...	...	...	**£81,081**
Total Machinery other than Gold Mining		**5**	...	...	**1**	**1**	**1**	**33**	...	...	...	...	...	**£381,823**
Total, all Mining Machinery		**2,328**	**5**	**52**	**16**	**13**	**11**	**115**	**45**	**336**	**700**	**269**	**163**	**2,828,178**

APPENDIX.

ROYAL MINT, PERTH BRANCH.

Subject to the Regulations, any person may deposit gold at the Mint in his own name. Those who cannot attend personally for the purpose may send the gold by an agent, under Police escort, or by Post.

A circular can be obtained from the Deputy Master of the Mint giving all necessary information for intending depositors, conditions of the Escort Service, Coining Regulations, etc., etc.

An Escort Service is provided by the Police Department for parcels of all sizes. The consignor pays for the carriage by coach or train, but the escort charges may be collected by the Mint.

Forms for use in connection with gold sent to the Mint by post or under Police escort can be obtained at the Mint.

Charges for Assaying, Refining, and Coinage.

Gross Weight of Deposit in ounces.	Mint Charge.	Gross Weight of Deposit in ounces.	Mint Charge.	Gross Weight of Deposit in ounces.	Mint Charge.
Up to and including—	£ s. d.	Up to and including—	£ s. d.	Up to and including—	£ s. d.
24	0 5 0	400	4 3 4	1,300	10 4 2
30	0 6 3	410	4 5 5	1,400	10 16 8
40	0 8 4	420	4 7 6	1,500	11 9 2
50	0 10 5	430	4 9 7	1,600	12 1 8
60	0 12 6	440	4 11 8	1,700	12 14 2
70	0 14 7	450	4 13 9	1,800	13 6 8
80	0 16 8	460	4 15 10	1,900	13 19 2
90	0 18 9	470	4 17 11	2,000	14 11 8
100	1 0 10	480	5 0 0	2,100	15 4 2
110	1 2 11	490	5 2 1	2,200	15 16 8
120	1 5 0	500	5 4 2	2,300	16 9 2
130	1 7 1	520	5 6 8	2,400	17 1 8
140	1 9 2	540	5 9 2	2,500	17 14 2
150	1 11 3	560	5 11 8	2,600	18 6 8
160	1 13 4	580	5 14 2	2,700	18 19 2
170	1 15 5	600	5 16 8	2,800	19 11 8
180	1 17 6	620	5 19 2	2,900	20 4 2
190	1 19 7	640	6 1 8	3,000	20 16 8
200	2 1 8	660	6 4 2	3,100	21 9 2
210	2 3 9	680	6 6 8	3,200	22 1 8
220	2 5 10	700	6 9 2	3,300	22 14 2
230	2 7 11	720	6 11 8	3,400	23 6 8
240	2 10 0	740	6 14 2	3,500	23 19 2
250	2 12 1	760	6 16 8	3,600	24 11 8
260	2 14 2	780	6 19 2	3,700	25 4 2
270	2 16 3	800	7 1 8	3,800	25 16 8
280	2 18 4	820	7 4 2	3,900	26 9 2
290	3 0 5	840	7 6 8	4,000	27 1 8
300	3 2 6	860	7 9 2	4,100	27 14 2
310	3 4 7	880	7 11 8	4,200	28 6 8
320	3 6 8	900	7 14 2	4,300	28 19 2
330	3 8 9	920	7 16 8	4,400	29 11 8
340	3 10 10	940	7 19 2	4,500	30 4 2
350	3 12 11	960	8 1 8	4,600	30 16 8
360	3 15 0	980	8 4 2	4,700	31 9 2
370	3 17 1	1,000	8 6 8	4,800	32 1 8
380	3 19 2	1,100	8 19 2	4,900	32 14 2
390	4 1 3	1,200	9 11 8	5,000	33 6 8

For every additional 100ozs. the charge is increased by 12s. 6d.

NOTE.—Additional charges (*see* Regulation No. 6) are collected when base metals in a deposit exceed 2 per cent. of its weight.

The following table illustrates the operation of these charges in case of gold of the value of £3 17s. 10½d. an ounce:—

Weight of Deposit.	Rate of Charge per ounce.	Amount of Charge.	Net Value of Deposit.
ozs.	d.	£ s. d.	£ s. d.
50	2.5	0 10 5	194 3 4
100	2.5	1 0 10	388 6 8
600	2.3	5 16 8	2,330 8 4
1,000	2.0	8 6 8	3,885 8 4
5,000	1.6	33 6 8	19,435 8 4
10,000	1.55	64 11 8	38,872 18 4

NOTE.—A proportion of silver in deposits of gold is paid for by the Mint as follows:—

In deposits under 1,000ozs. gross: all silver in excess of 8 per cent. of the weight of the deposit after melting.
" from 1,000 " to 5,000 " " 6 " " " " "
" " 5,000 " " 10,000 " " 5 " " " " "
" " 10,000 " upwards " " 4 " " " " "

The rate at which payment for silver is made is liable to fluctuation.

GOLD ESCORT SERVICE.

RATES.

Actual Cost, plus 20 per cent.

RATES FOR CARRIAGE OF GOLD ON GOVERNMENT RAILWAYS.

	Distance not over—							
	25 miles.	50 miles.	100 miles.	150 miles.	200 miles.	250 miles.	300 miles.	350 miles.
Gold dust and bullion per 100ozs.	s. d. 1 0	s. d. 2 0	s. d. 3 0	s. d. 3 9	s. d. 4 6	s. d. 5 0	s. d. 5 6	s. d. 6 0

6d. per 100ozs. for every additional 50 miles, or part thereof.

NOTE.—A special reduction of 25 per cent. is made for all gold dust or bullion consigned to the Perth Mint.

To find the value per ounce of gold sent from a mine to the Mint.—Divide the standard gold by the weight before melting, and multiply the result by £3 17s. 10½d. For instance, supposing the Mint return to show:—

	Ozs.
Weight before melting	47.41
Standard gold	38.19

The calculation would be as follows:—

4741)3819.0(.805
3792.8
26200
23705
2495

.805 × £3 17s. 10½d. =
.805 × £3.894
.805
19470
311520
£3.134(670)
20
s. 2.680
12
d. 8.160 = £3 2s. 8d., value per ounce of gold as produced from the mine.

By Authority: FRED. WM. SIMPSON, Government Printer, Perth.