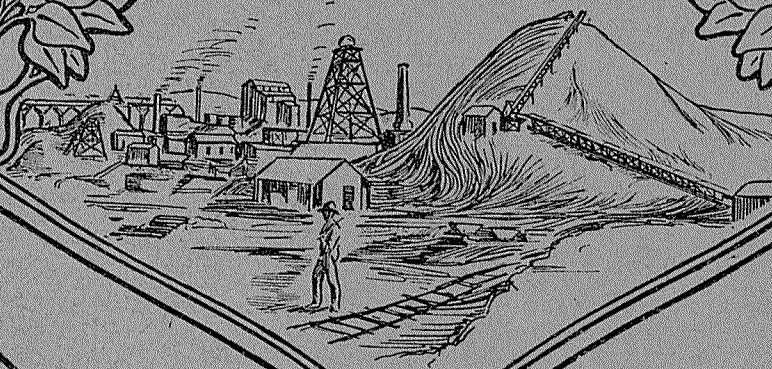




REPORT
OF THE
DEPARTMENT OF MINES
FOR THE YEAR
WESTERN · 1915. · AUSTRALIA



PRESENTED TO BOTH HOUSES OF PARLIAMENT

BY HIS EXCELLENCY'S COMMAND



H.D. Higgins

1916.

WESTERN AUSTRALIA.

REPORT

OF THE

DEPARTMENT OF MINES

FOR THE YEAR

1915.

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

PERTH:

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

1916.



MAP OF WESTERN AUSTRALIA

Showing the Goldfields and other Mining Districts also the distribution of useful Minerals

Scale of English statute miles

REFERENCE

Towns shown thus ● EUCLA

Railways shown thus ————

Rabbit Proof Fences shown thus ————

Goldfields shown thus [shaded area]

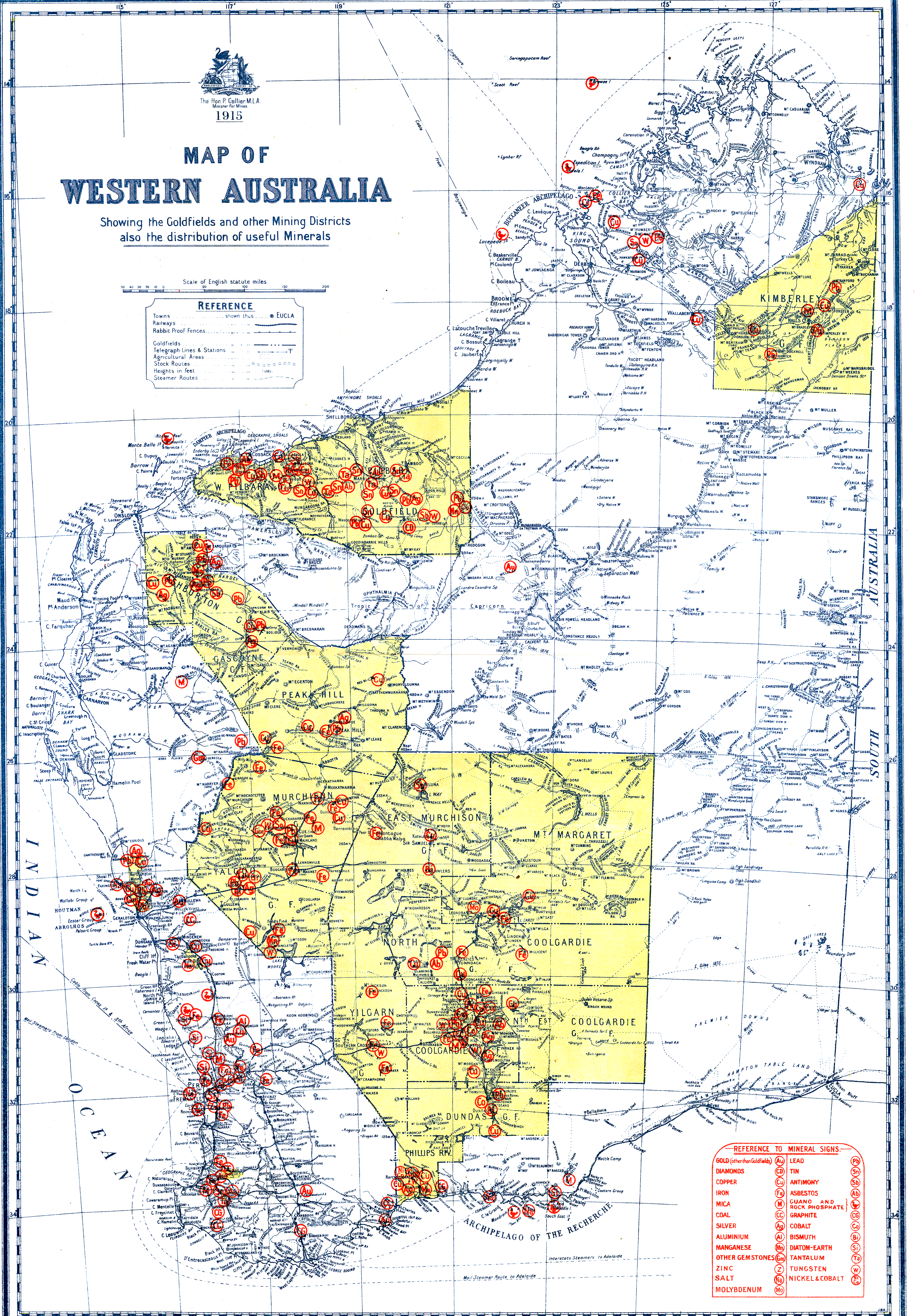
Telegraph Lines & Stations shown thus ————

Agricultural Areas shown thus [dotted area]

Stock Routes shown thus ————

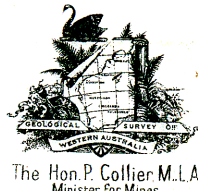
Heights in feet shown thus [number]

Steamer Routes shown thus [dashed line]



REFERENCE TO MINERAL SIGNS

GOLD (other than Goldfields)	AU	LEAD	Pb
DIAMONDS	CD	TIN	Sn
COPPER	CU	ANTIMONY	Sb
IRON	Fe	ASBESTOS	Ab
MICA	M	GUANO AND ROCK PHOSPHATE	G
COAL	C	GRAPHITE	Gc
SILVER	Ag	COBALT	Co
ALUMINIUM	Al	BISMUTH	Bi
MANGANESE	Mn	DIATOM-EARTH	DE
OTHER GEMSTONES (Gm)	Gm	TANTALUM	Ta
ZINC	Zn	TUNGSTEN	W
SALT	S	NICKEL & COBALT	Ni
MOLYBDENUM	Mo		

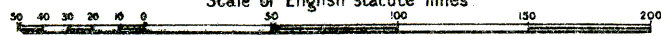


MAP OF WESTERN AUSTRALIA

Showing 4 Mile to 1 Inch Series of Geological Sketch Maps, & other Geological Maps issued since 1896.

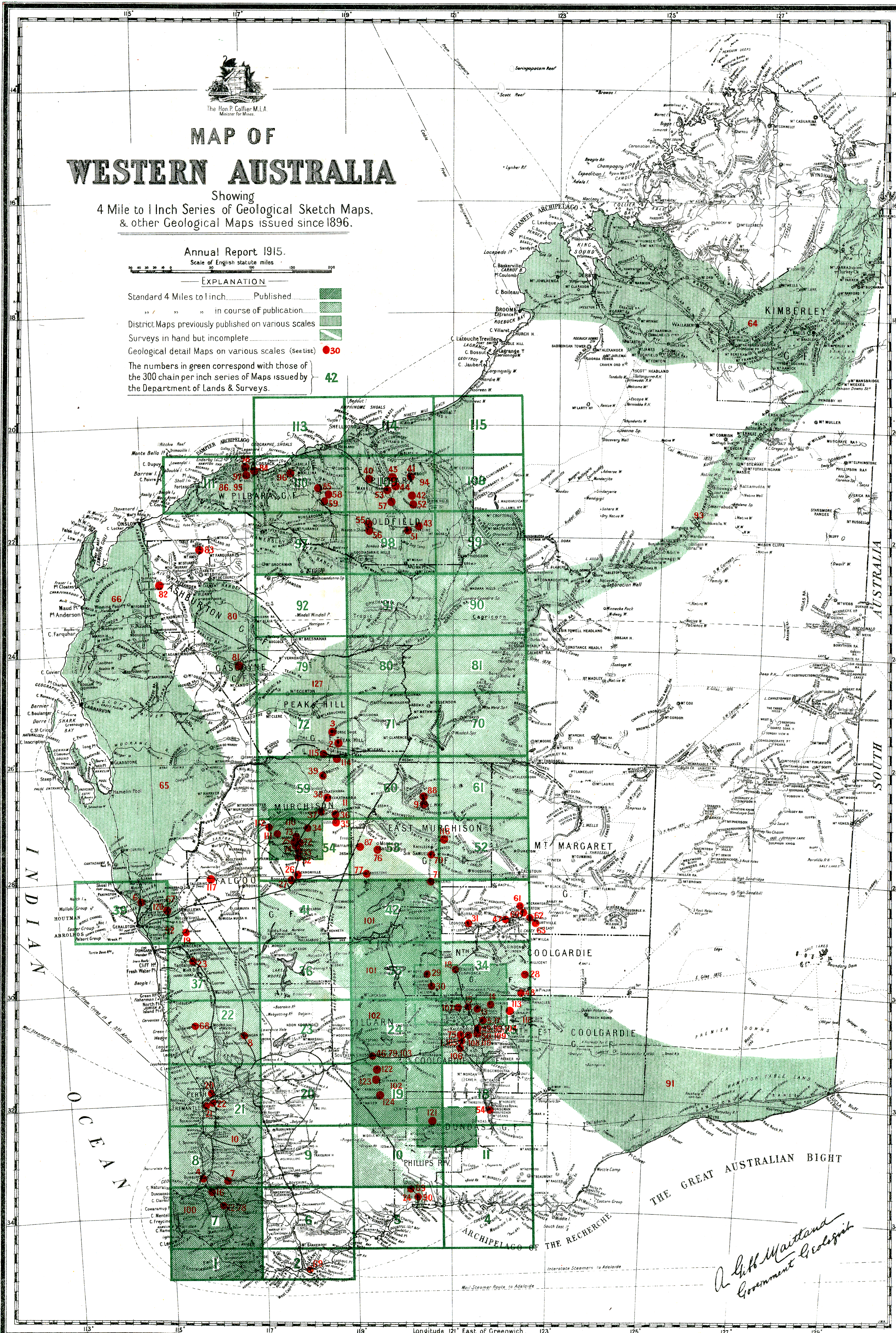
Annual Report 1915.

Scale of English statute miles



EXPLANATION

- Standard 4 Miles to 1 Inch. Published
- " " " " in course of publication
- District Maps previously published on various scales
- Surveys in hand but incomplete
- Geological detail Maps on various scales (See list)
- The numbers in green correspond with those of the 300 chain per inch series of Maps issued by the Department of Lands & Surveys.



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No.	Name	Annual Report.	No. of Bulletin.	
			Plato.	Plato.
1.	Coolgardie	1897	VII.	3
2.	Peak Hill	"	II.	"
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4.	Bunbury	"	IV.	"
5.	Northampton	"	VI.	47
6.	Collis Coal Field	1897	I.	9
7.	Wongan Hills	1898	I.	"
8.	Lake Way	"	IV.	"
9.	Greenbushes	"	VI.	"
10.	Mulgarrrie	1899	I.	"
11.	Lindsay's and Hayes' New Find	"	II.	"
12.	Bardoc	"	III.	"
13.	Donnybrook	"	IV.	"
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15.	Menzies	"	VI.	"
16.	Irwin Coal Field	"	VII.	22
17.	Wanneroo	1899	I.	38
18.	Canning River Valley	"	IV.	"
19.	Helena River Valley	"	V.	"
20.	Arrino	"	VI.	"
21.	Auriferous Reefs, Cue and Day Dawn	"	I. and II.	7
22.	Lennonville	"	I.	8
23.	Mt. Magnet and Boogardie	"	II.	8
24.	Edjudina and Yarrri	"	I.	11
25.	Mullins	"	I.	12
26.	Mulwarrie and Davyhurst	"	I.	12
27.	Leonora	"	II.	13
28.	The Island	"	I.	14
29.	The Mainland	"	III.	14
30.	Tuckanarra	"	IV.	14
31.	Quins	"	V.	14
32.	Gabanintha and Star of the East	"	VI.	14
33.	Nannine	"	VII.	14
34.	Meekatharra	"	VIII.	14
35.	Abbots	"	IX.	14
36.	Lalla Rookh	"	II.	15
37.	Bamboo	"	IV.	15
38.	Yandicoogina	"	V.	15
39.	Mosquito Creek	"	VI.	15
40.	Moolyella	"	VII.	15
41.	Talga Talga	"	III.	15
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45.	Kalgoorlie	"	II.	18
46.	Boulder Belt	"	I.	20
47.	Nullagine	"	I.	20
48.	Warrawoona	"	III.	20
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50.	Norseman	"	II.	21
51.	Tambourah	"	I.	23
52.	Western Shaw	"	II.	23
53.	Just in Time	"	IV.	23
54.	Wodgina	"	V.	23
55.	Stannum	"	VI.	23
56.	Laverton	"	I.	24
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61.	Princess Royal Harbour	"	IV.	26
62.	Sir Samuel	"	VI.	28
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64.	Cue	"	Pt. 1 XVI.	29
65.	Cuddingwarra	"	Pt. 1 XVII.	29
66.	Day Dawn	"	Pt. 2 IX.	29
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76.	Station Peak	"	XII.	33
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95.	Royal Standard G.M.	"	XII.	59
96.	Woodline Rush	"	XIII.	59
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102.	Yerilla	"	V.	64
103.	South-Western Districts	1898	III.	"
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No.	Name	Annual Report.	Plato.	No. of Bulletin.
10.	South-Western Districts	1898	III.	"
11.	Murchison and Sandford Rivers	"	V.	5
12.	Phillips River	"	I.	25
13.	Kimberley	"	I.	26
14.	Artesian Water North of Northampton	"	II.	26
15.	Artesian Water between the Muniya and Ashburton Rivers	"	II.	26
16.	Greenough River District	"	V.	26
17.	Ashburton and Gascoyne G.F.s.	"	II.	26
18.	West Pilbara G.F.	"	X.	33
19.	Country along Transcontinental Railway	"	I.	37
20.	Country between Arrino and Northampton	"	I.	38
21.	Wiluna to Hall's Creek	"	I.	39
22.	Pilbara G.F.	"	II.	40
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29.	Between Coolgardie and Boulder	"	I.	56
30.	Part of the Murchison G.F.	"	III.	57
31.	Bremer Range	"	XIX.	59
32.	Kalgoorlie and Mulline	"	XV.	64
33.	Peak Hill G.F.	"	II.	48

*A. G. H. Wattland
Government Geologist*

ANNUAL REPORT OF THE DEPARTMENT OF MINES, WESTERN AUSTRALIA, 1915.

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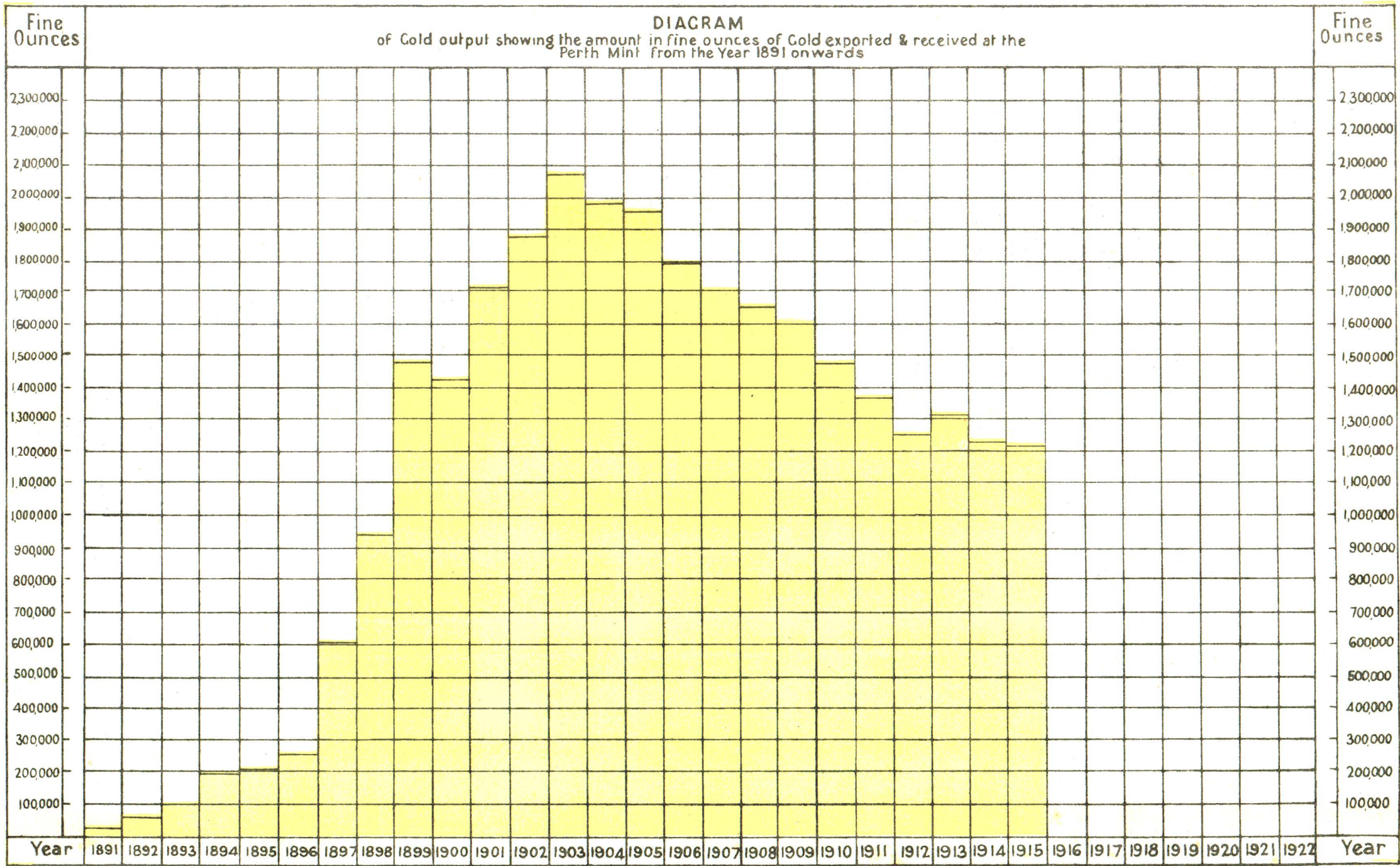
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STATE OF WESTERN AUSTRALIA.

**Report of the Department of Mines for the State of Western Australia
for the Year 1915.**

To the Hon. the Minister for Mines.

SIR,

I have the honour to submit the Annual Report of the Department for the year 1915, 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.,

H. S. KING,

Under Secretary for Mines.

Department of Mines, Perth, 31st March, 1916.

DIVISION I.

Summary by the Under Secretary for Mines.

- PART I.—GENERAL REMARKS.
- II.—MINERALS RAISED.
- III.—LEASES AND OTHER HOLDINGS UNDER THE VARIOUS ACTS RELATING TO MINING.
- IV.—MEN EMPLOYED.
- V.—ACCIDENTS.
- VI.—STATE AID TO MINING.
- VII.—REMARKS ON THE GOLDFIELDS AND MINERAL DISTRICTS, AND SUMMARIES OF WARDENS' AND OTHER OFFICERS' REPORTS.
- VIII.—EXISTING LEGISLATION.
- IX.—INSPECTION OF MACHINERY.
- X.—SCHOOL OF MINES.

PART I.—GENERAL REMARKS.

The value of the Mineral output of the State for the year 1915 was £5,478,149, being £56,125 less than that for the previous year.

Copper Ore exported showed a falling off of 3,176 tons, but Copper Ingots an increase of 763 tons. Silver and Tin showed increases, but Coal a falling off to the extent of 32,544 tons.

The value of the Gold yield was £5,140,228, being 93.88 per cent. of the total output.

The value of the Coal output was £137,859, of Copper £91,169, of Lead £39,032, and of Tin £41,391. The dividends paid by mining companies amounted to £792,317, and in the preceding year £799,392, a decrease of £7,075.

The total dividends paid to the end of 1915 were £25,494,386.

To the same date the total mineral production was £130,383,408, and the total Gold production £125,258,154.

GOLD.

The gold yield shows a decline, being 22,865 fine ounces less than for 1914, which was 81,066 fine ounces less than that for 1913.

The average value per ton of ore treated in the State as a whole has risen from 37.81 shillings in 1914 to 38.41 shillings in 1915, and in the East Coolgardie Goldfield, which for years has produced over 50 per cent. of the State's yield, from 34.20 shillings to 35.40 shillings.

Comparing the tonnages of ore treated in 1914 and 1915, there is a decrease of 89,141 tons in the latter year, during which 2,612,955 tons were treated.

The decreases were in Coolgardie, Dundas, East Coolgardie, East Murchison, Murchison, North Coolgardie, North-East Coolgardie, West Pilbara, and Yilgarn, the tonnages being 16,827, 9,431, 87,821, 42,307, 6,906, 24,401, 612, 311, and 6,122 tons respectively. Larger tonnages were treated in Broad Arrow, Gascoyne, Mount Margaret, Peak Hill, Phillips River, Pilbara, and Yalgoo; the in-

creases being 32,524, 78, 49,998, 197, 373, 841, and 11,487 tons respectively.

Working costs show a decrease, the average cost per ton of 2,000lbs. being as published by the Chamber of Mines:—In 1908, 19/3; in 1909, 19/11.5; in 1910, 20/1; in 1911, 20/4; in 1912, 19/3; in 1913, 19/6.6; in 1914, 20/6; and in 1915, 19/9.

There were increased outputs of gold in the Broad Arrow, Gascoyne, Mount Margaret, North-East Coolgardie, Peak Hill, Pilbara, West Pilbara, Yalgoo, and Yilgarn Fields.

In the Coolgardie, Dundas, East Coolgardie, East Murchison, Kimberley, Murchison, North Coolgardie, and Phillips River Fields there were decreases.

The area held under mining lease for all minerals is 52,504 acres, being an increase of 1,984 acres when compared with 1914. The area leased for gold-mining is greater by 1,121 acres, and for minerals by 863 acres. The area held under prospecting areas is 17,217 acres, including 7,794 acres for Coal and Oil. This is a decrease on the area held in 1914, of 15,245 acres, but for gold and base metals there was an increase of 381 acres, the falling-off being in the areas held for coal and oil.

The number of men engaged in all classes of mining is 12,253, a decrease of 321 on the figures for 1914, which is, of course, easily accounted for when one considers the number of men enlisting for service abroad, the miners having come forward in large numbers. The number of men engaged in mining for minerals other than gold decreased by 134, all showing a falling off. In gold mining there was a decrease of 787.

The average value of gold produced per man employed on gold mines has increased from £435.82 in 1914 to £457.06 in 1915. The average tonnage raised per man was 237.95 tons, and in the preceding year, 230.51 tons.

In the East Murchison Field there was a falling-off. This is attributable to the closing down of the Orova Mine and reduction of operations on the Black Range Mine, both in the Black Range District.

In the Lawlers District prospecting has been active. In the Wiluna District the Department has expended a large amount in renovating the State Battery and equipping it with a Slimes Plant, so that a largely increased output is looked for.

The Murchison Field records a decrease. This is the result of the closing down of the Kyarra Mine in the Meekatharra District, as the large mines have continued to develop well and mostly increased their outputs. In the Mt. Magnet District the position was well maintained, and the output showed an improvement. In the Oue District there was also an increase, which is attributable to the improved position of the Light of Asia Mine.

There was little change in the Day Dawn District, but the output was slightly increased.

The Mt. Margaret Field records an increase.

In the Mt. Margaret District the Lancefield Mine increased its operations and consequently its output, and several other mines reported improved prospects. In the Mt. Morgans District there was a continued improvement, and an increase.

The Mount Malcolm District had a slight decrease, but the position is still very satisfactory. The Sons of Gwalia Mine remains the chief producer.

The Coolgardie Field showed a reduction, the falling-off being in the Coolgardie District. An increase was reported from the Kunanalling District. At Gibraltar there was considerable activity in the early part of the year, but towards its close prospects were not too bright. The other centres remained quiet.

The North Coolgardie Field had a slight decrease.

In the Menzies District the Sand Queen Mine at Comet Vale and the Menzies Consolidated Mine at Woolgar are the principal producers. The mines at Comet Vale continue to open up well, and at Goon-garrie the "New Boddington" has come into prominence and gives much encouragement to its owners. The Ularring, Niagara, and Yerilla Districts do not show any improvement.

The North-East Coolgardie Goldfield had a slight increase, but nothing of any note transpired.

The Broad Arrow Goldfield had a good increase, the result of an improved output from the Ora Banda District, which it is hoped will continue. In the vicinity of Broad Arrow and Paddington there were some promising discoveries, and the Bardoc centre was the scene of increased activity, several new mining tenements having been applied for. The other centres remained unchanged.

In the East Coolgardie Goldfield the number of men engaged in mining was 4,598, and in 1914, 5,003, a decrease of 405. This Goldfield gave employment to about 40 per cent. of the number of men employed in gold mining, and the reported production during the year was 670,788 fine ounces of gold, about 56 per cent. of the total reported yield. The tonnage treated was 1,603,850 tons, being less than in 1914 by 87,821 tons. The average grade of the ore per ton improved from 34.20 shillings in 1914 to 35.40 shillings in 1915. Although the output shows a shrinkage most of the mines look well and the prospects are good.

The Yilgarn Field again had an increase. The mines at Westonia continue to develop satisfactorily, and the district is in a prosperous condition. The Bullfinch Mine has continued as a steady producer. Throughout the field there has been a considerable amount of prospecting, and many centres are most promising.

The Dundas Field had a slight decrease, and there was little change to record in any of the mines.

The Phillips River Field had a small decrease, and there is nothing of importance to report with regard to any of the mines.

In the Northern Goldfields—Kimberley, Pilbara, West Pilbara, Ashburton, and Gascoyne—there is little alteration. In Pilbara there was an improved output, and the State plants at Bamboo Creek, Marble Bar, and 20-Mile Sandy have continued to do good work. At Nullagine the erection of a large sluicing plant is in hand for the treatment of alluvial, and a further increased production should result.

The prospects for this field are better than for some time past.

TIN.

The quantity of tin exported was 429 tons, being greater than in 1914 by 66 tons, and in value by £5,742.

The Greenbushes Tinfield produced 247.33 tons, valued at £21,431, an increase on the preceding year of 2.79 tons, and in value of £286; the Pilbara Field 78.65 tons, valued at £7,633, a decrease on the preceding year of 8.75 tons, and in value of £535. None was produced on any of the other fields.

TANTALITE.

None of this metal was exported or reported.

COPPER.

The value of the copper exported was £91,169, being £52,995 more than in 1914. The quantity raised in the West Pilbara Field was 314.75 tons, valued at £3,546, a decrease in tonnage of 7,449.43 tons and in value of £37,061. This is attributable to the non-working of the Whim Well Copper Mine, the proposed operations for future working of the mine having been adversely affected by the European War. In the Phillips River Field the production was 3,681.03 tons, valued at £24,093, a decrease on the preceding year in tonnage of 1,160.12 tons, and in value of £13,431. This can only be attributed to the same cause as in West Pilbara, as the State Smelter continues to be of much assistance to prospectors. It is reasonable to anticipate a considerable improvement in output in future.

Other fields producing were Ashburton, 146 tons, valued at £3,744; East Murchison 10.93 tons, valued at £147; Murchison 33.70 tons, valued at £492; Peak Hill 237.58 tons, valued at £7,618, and Yalgoo 4.99 tons, valued at £95.

The average number of men engaged in copper mining was 144, and in 1914, 192.

COAL.

Six coal mines are working on the Collie field, and the output for the year was 286,666 tons, being 32,544 tons less than in 1914.

This is largely attributable to a reduction in operations on the Scottish Collieries mine, difficulties with an inflow of water having been experienced. There was also a falling-off in the bunkering trade.

The number of men employed, 498, is less by 27 than in 1914, and the output per man was, in 1914, 608 tons, and in 1915, 575 tons.

GRAPHITE.

Deposits of this mineral exist on the Donnelly River and at Kendenup, in the Plantagenet District, about 40 miles from Albany.

At the former very little work has been done recently, but at the latter operations have revealed quantities of good-grade ore which promises to prove the deposit a valuable one.

OTHER MINERALS.

The quantity of Silver obtained as a by-product and exported was 222,159 ounces, valued at £24,295, and in the preceding year 193,057 ounces, valued at £23,227, an increase of £29,102 ounces, and in value of £1,068. Lead and Silver-Lead Ore to the extent of 2,883 tons, valued at £39,082, was exported, and in the preceding year 3,554 tons, valued at £46,285. Pyritic Ore amounting to 6,557.62 tons, valued at £2,368, was reported, and in the preceding year 9,758.83 tons, valued at £3,485. 688 tons of Magnesite, valued at £1,196, was exported.

Small quantities of Bismuth, Mica, and Wolfram were exported.

No Asbestos was reported or exported.

MINING GENERALLY.

This year most of the Australian States, including the Northern Territory and Papua, again report decreased gold outputs.

The States of New South Wales and Queensland had slight increases. New Zealand had an increase of 188,144 ounces over the preceding year.

The Western Australian production was 51.29 per cent. of the total for Australasia, and in the previous year 54.18 per cent.

The results of this year's work, bearing in mind the terrible war raging, with its consequent demands for men to enlist, and which has resulted in the withdrawal of many from the ranks of the miners, must be considered as eminently satisfactory. It is well known that a shortage of competent labour for the large mines exists, and this of course has an adverse effect on production. Then in the case of mine owners enlisting, the Government suspends the labour covenants during the owner's absence, consequently a good number of small producers have been closed down. There was a continued improvement at Westonia and other centres throughout the Yilgarn Field,

and the mines at Meekatharra continue to develop well.

The new centre at Warriedar, in the Yalgoo Field, is promising, and the erection of a State plant there is under consideration. The old centre of Goongarrie had a very satisfactory development. There is also evidence of increased activity in the base metal industry.

The assistance to *bona-fide* prospectors by loans of equipment and transport facilities has been continued, and the whole of the Department's outfit is in constant use.

The area held under Prospecting Areas for Gold and Minerals, viz., 9,423 acres, is greater than in the previous year by 381 acres, and is an evidence of increasing activity in the direction of prospecting. The assistance rendered under the provisions of the Mining Development Act, details of which are given in the Report of the State Mining Engineer, published as Division II. of this Report, and which aims at assisting in the development of struggling mines, principally in the direction of equipping them with machinery, evidences that the Government is still doing its utmost to encourage and push ahead the industry. Assistance is also rendered by doing diamond drilling wherever there are reasonable prospects of success attending the efforts.

PART II. MINERALS RAISED.

TABLE 1.

Quantity and Value of all the Minerals produced during 1914 and 1915.

Description of Minerals.	1914		1915		Increase or Decrease for Year compared with 1914.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
1. Bismuth (exported), statute tons	9	685	871	8	598	598
2. Coal (raised), statute tons	319,210	148,684	286,686	187,859	32,544	10,825
3. Copper (Ore (exported), statute tons; Ingot, Matte, etc. (exported), statute tons)	3,913	33,654	737	13,768	3,176	19,886
4. Gold (exported and minted), fine ounces	183	4,620	946	71,401	763	72,881
5. Lead and silver lead (exported), statute tons	1,232,977	5,237,353	1,210,112	5,140,228	22,865	97,125
6. Magnesite (exported), statute tons	3,554	46,285	2,883	39,032	671	7,253
7. Mica (exported), statute tons	4	323	688	1,193	688	1,193
8. Pig Lead (exported), statute tons	4	323	28	28	13	302
9. Pyritic Ore (exported), statute tons	9,759	3,485	6,558	2,388	3,201	1,117
10. Silver (exported), fine ounces	193,057	23,227	222,159	24,295	32,322	1,068
11. Tin Ore and Ingot (exported), statute tons	363	35,649	429	41,391	66	5,742
12. Wolfram (exported), statute tons	1	40	1	25	15	15
13. Zinc, Spelter, etc. (exported), statute tons	22	379	7	143	15	236
Unenumerated (exported), statute tons	7	40	78	78	71	38
Total Values		£ 5,584,274		£ 5,478,140		£ 56,125

The figures against silver and lead for the year 1914 in the above table differ from those published in the Report for that year, due to a revision upon information furnished after such Report was in print.

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
15 Years Total	137,824,649	96,686,077	70.15

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 1915.

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

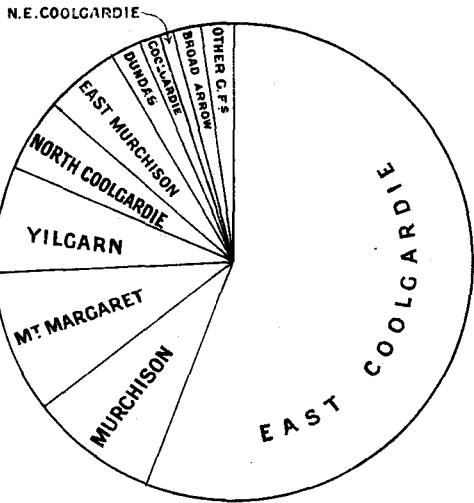


Fig. 2. Gold produced from various Goldfields as given by the Export and Mint Returns.

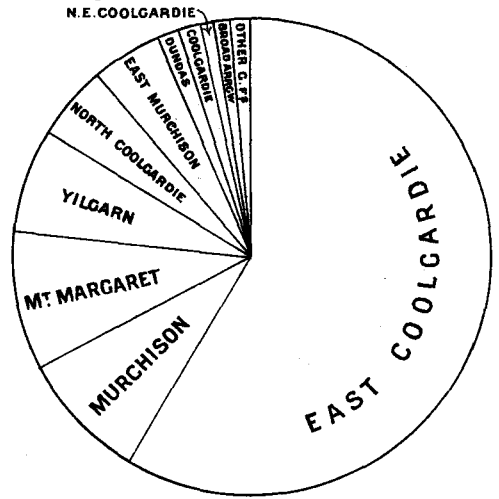


Fig. 3. Value of Gold and other Minerals.

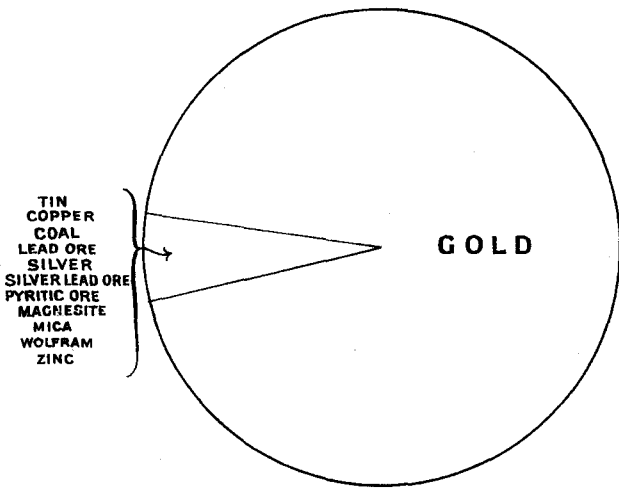


Fig. 4. Value of Minerals other than Gold.

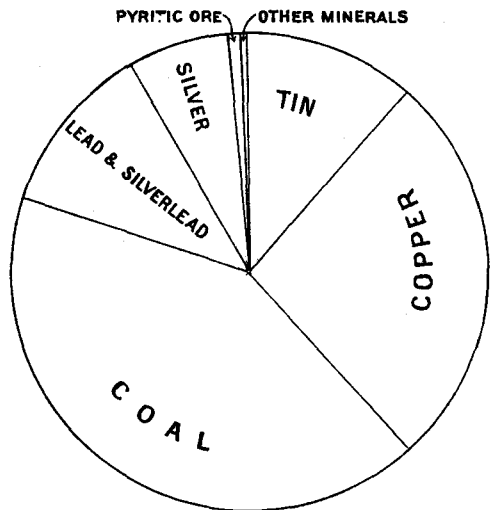


Fig. 5. Areas of Land leased for Goldmining on various Goldfields.

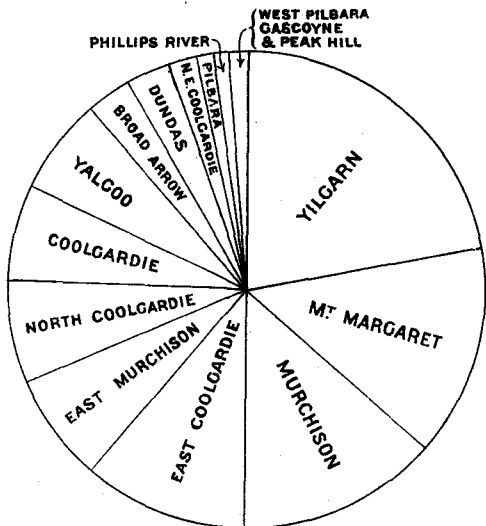
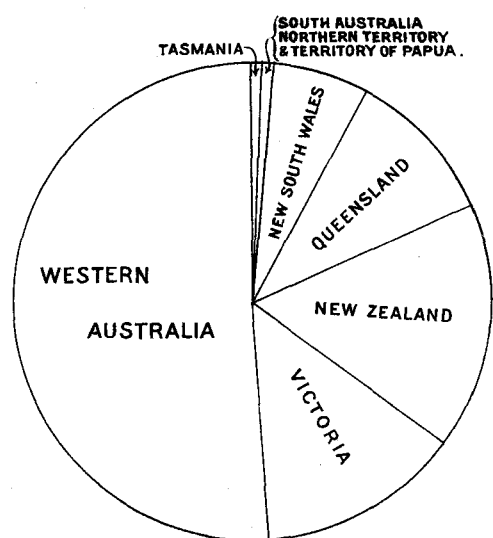
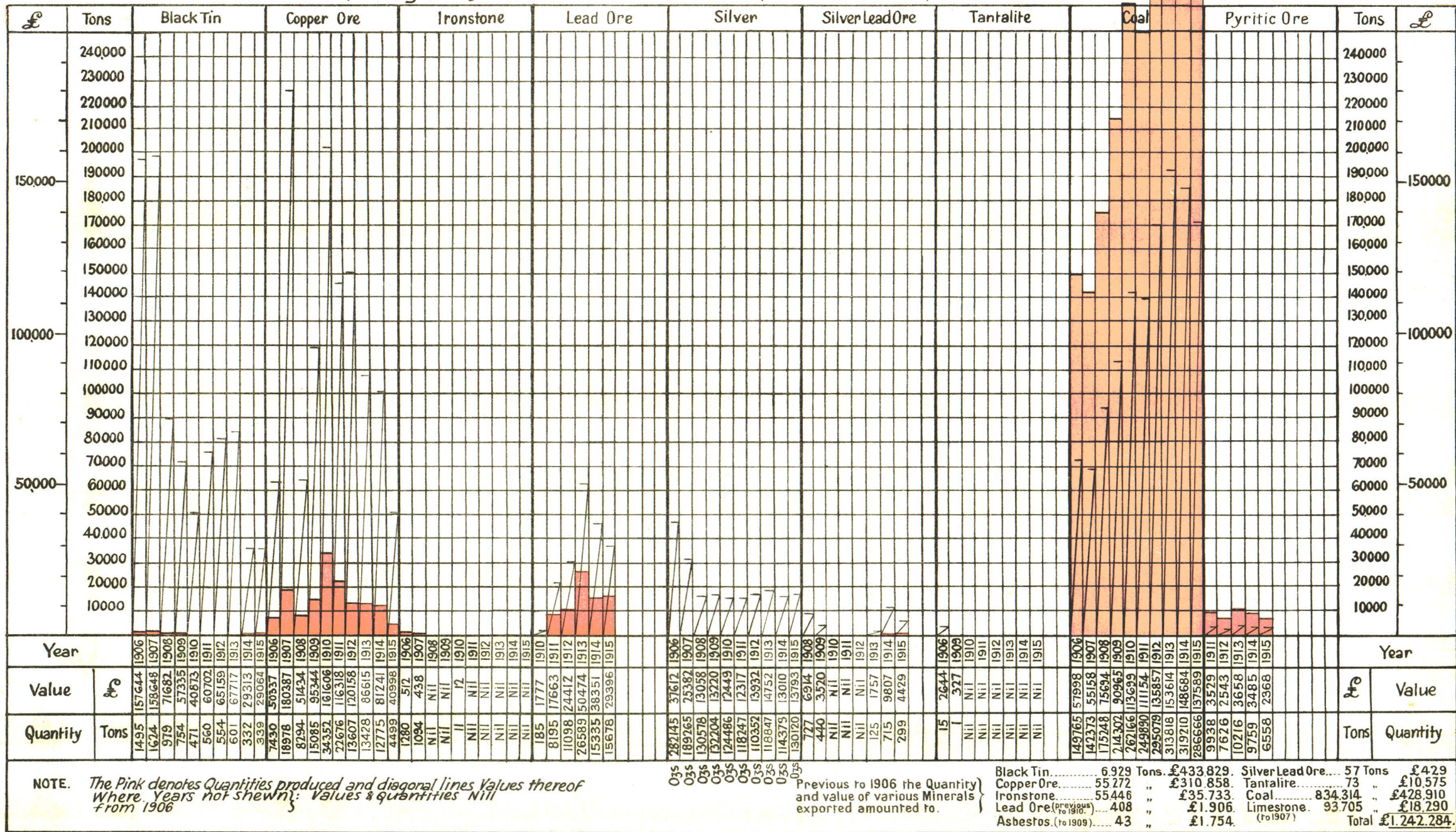


Fig. 6. Output of Gold in the States of Australia and the Dominion of New Zealand.



DIAGRAM

of the Mineral Output, showing Quantity & Value of Minerals other than Gold reported to the Mines Department from the Year -1906 onwards.



NOTE. The Pink denotes Quantities produced and diagonal lines Values thereof where Years not shown; Values & quantities Nil from 1906

Previous to 1906 the Quantity and value of various Minerals exported amounted to.

Black Tin.....	6,929	Tons.	£433,829.	Silver Lead Ore.....	57	Tons.	£429
Copper Ore.....	55,272	"	£310,858.	Tantalite.....	73	"	£10,575
Ironstone.....	55,446	"	£35,733.	Coal.....	834,314	"	£428,910
Lead Ore (Previous to 1906).....	408	"	£1,906.	Limestone.....	93,705	"	£18,290
Asbestos (to 1909).....	43	"	£1,754.				
				(to 1907)		Total	£1,242,284.

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.					
	1914.		1915.		Average Value of Gold per ton of Ore treated.	
	fine ozs.	fine ozs.	Percentage for each Goldfield.	Percentage for each Goldfield.	1914.	1915.
1. Kimberley	453	144	.04	.01	...	...
2. Pilbara	5,177	8,542	.43	.71	83.66	121.75
3. West Pilbara	1,023	1,507	.08	.13	92.72	192.64
4. Ashburton	...	...	...	...	...	...
5. Gascoyne	4	81	...	.01	...	85.65
6. Peak Hill	2,603	2,823	.21	.24	95.19	93.51
7. East Murchison	70,809	58,082	5.83	4.86	39.82	46.25
8. Murchison	115,722	108,050	9.53	9.04	48.78	46.94
9. Yalgoo	8,028	8,842	.50	.74	73.27	40.54
10. Mt. Margaret	96,793	108,563	7.97	8.91	39.63	34.80
11. North Coolgardie	72,188	59,513	5.95	4.98	61.04	66.31
12. Broad Arrow	9,286	22,290	.77	1.86	27.82	29.93
13. North-East Coolgardie	10,134	10,861	.83	.91	53.20	57.34
14. East Coolgardie	682,895	670,765	56.24	56.11	34.20	35.40
15. Coolgardie	20,981	18,345	1.73	1.53	46.34	49.18
16. Yilgarn	88,745	91,124	7.31	7.82	35.64	37.69
17. Dundas	26,591	23,884	2.19	2.00	41.30	45.22
18. Phillips River	4,665	3,817	.38	.82	158.91	113.10
State generally	144	273	.01	.02	...	...
Totals and averages	1,214,239	1,195,499	100.00	100.00	37.81	38.41

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.

The Pilbara, West Pilbara, Peak Hill, Yalgoo, Mount Margaret, Broad Arrow, North-East Coolgardie, and Yilgarn fields each show an increase.

TABLE 4.

Number of Gold-producing Mines in the several Goldfields and Districts during 1914 and 1915.

Goldfield.	District.	1914.		1915.		Increase or Decrease.
		District.	Goldfield.	District.	Goldfield.	
Kimberley
Pilbara	Marble Bar	20	30	23	30	...
	Nullagine	10		7		
West Pilbara	4	4	...	
Ashburton	
Gascoyne	10	1	+ 1	
Peak Hill	13	+ 3	
East Murchison	Lawlers	13	66	13	46	...
	Wiluna	14		6		
	Black Range	39		27		
	Cue	23		13		
Murchison	Meekatharra	54	120	48	112	...
	Day Dawn	10		10		
	Mt. Magnet	33		41		
Yalgoo	28	26	- 2	
	
Mt. Margaret	Mt. Morgans	4	47	8	47	...
	Mt. Malcolm	22		20		
	Mt. Margaret	21		24		
	Menzies	34		27		
North Coolgardie	Ularring	23	92	16	71	...
	Niagara	11		8		
	Yerilla	54		20		
		
Broad Arrow	...	30	...	26	- 4	
North-East Coolgardie	Kanowna	18	21	13	17	...
	Kurnaipi	3		4		
		
East Coolgardie	East Coolgardie	33	56	46	49	...
	Bulong	3		3		
	Coolgardie	33		38		
Coolgardie	Kunanalling	10	43	10	48	+ 5
		
Yilgarn	60	62	+ 2	
Dundas	19	20	+ 1	
Phillips River	23	20	- 3	
Totals	649	590	- 57	

TABLE 5.

Gold Yield from Registered Gold Mining Companies and Gold Mining Leases for the Years 1912, 1913, 1914, and 1915.

Goldfield.	REGISTERED COMPANIES PRODUCING OVER 12,000OZS.								REGISTERED COMPANIES PRODUCING UNDER 12,000OZS.								LEASES, EXCLUSIVE OF SUNDRY CLAIMS AND TREATMENTS.							
	1912.		1913.		1914.		1915.		1912.		1913.		1914.		1915.		1912.		1913.		1914.		1915.	
	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	...	...	...	...	...	...	...	...	...	1	451	1	727	1	90	30	4,358	30	4,106	29	3,233	29	5,598	
West Pilbara	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	1,020	8	1,300	4	917	4	1,168	
Gascoyne	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	80	
Peak Hill	...	...	...	...	...	...	...	1	1,047	...	...	...	...	...	...	4	339	8	972	10	1,635	13	1,747	
East Murchison	3	68,908	3	62,100	3	49,456	2	36,364	11	12,063	12	10,326	9	6,334	8	8,830	61	10,873	47	10,504	54	9,878	36	7,393
Murchison	1	27,199	2	40,174	2	33,366	2	29,456	8	17,681	7	16,316	8	18,525	6	10,942	106	47,979	99	56,494	110	58,886	104	61,333
Yalgoo	...	...	...	...	...	...	...	5	2,174	5	3,467	3	1,403	3	4,301	21	3,481	20	3,598	25	3,351	23	3,222	
Mt. Margaret	1	60,893	1	63,313	1	58,936	2	73,721	13	30,286	12	14,895	12	16,504	10	21,784	54	8,818	47	8,117	24	8,153	35	7,251
N. Coolgardie	...	...	1	14,826	2	35,941	2	35,348	17	24,031	13	20,181	10	5,851	5	2,180	84	26,838	82	23,550	80	21,813	64	12,609
Broad Arrow	...	...	1	27,067	...	...	1	14,531	2	5,266	2	19	2	2,840	1	405	26	3,297	32	4,998	28	5,034	24	5,715
N.E. Coolgardie	...	...	...	...	...	...	...	7	5,597	5	5,706	1	4,573	1	4,403	31	6,139	32	3,908	20	3,137	16	3,983	
E. Coolgardie	12	681,853	12	650,195	9	597,946	9	603,851	15	23,060	20	35,671	21	31,363	15	24,828	37	27,381	35	19,776	26	40,849	25	33,132
Coolgardie	...	...	...	...	...	...	...	10	24,761	5	19,008	8	8,190	7	4,570	46	12,766	40	9,084	35	8,970	41	9,683	
Yilgarn	...	...	2	47,020	2	54,439	2	59,100	14	6,166	10	17,302	10	20,898	11	16,886	87	12,006	59	11,342	48	8,181	49	7,995
Dundas	1	14,902	1	13,825	1	13,507	1	13,633	4	4,247	2	4,034	2	1,996	2	1,047	17	4,996	20	7,570	16	9,684	17	7,865
Phillips River	...	...	...	...	...	...	...	3	151	7	210	10	1,093	5	630	16	3,850	15	2,429	13	3,358	15	3,130	
Total...	18	856,755	23	918,520	20	843,591	21	866,004	110	156,530	101	147,486	97	120,297	75	101,396	623	174,141	574	167,748	532	187,079	496	171,904

TABLE 6.

Increase or Decrease in Output of certain producing Gold Mines in 1915, as compared with 1914.

Goldfield.	District.	Name of Mine.	Gold Production.		Increase or Decrease for Year, compared with 1914.
			1914.	1915.	
			Fine ozs.	Fine ozs.	Fine ozs.
East Murchison	Wiluna	1. Western Machinery Co., Ltd.	2,048·66	3,546·21	+ 1,497·55
Do.	Black Range	2. Black Range Mining Co., N.L.	15,131·89	14,759·00	- 372·89
Do.	do.	3. Yuanmi G.Ms., Ltd. (Sandstone)	15,315·35	2,135·10	- 13,180·25
Do.	do.	4. Yuanmi G.Ms., Ltd. (Yousame)	19,008·77	21,605·62	+ 2,596·85
Murchison	Cue	5. Light of Asia and Queen of the May leases	794·26	3,234·31	+ 2,440·05
Do.	Meekatharra	6. Commodore G.M. Co., N.L.	3,320·55	3,553·32	+ 237·77
Do.	do.	7. Fenian leases	26,401·03	26,599·64	+ 198·61
Do.	do.	8. Ingliston leases	969·38	3,480·64	+ 2,511·26
Do.	do.	9. Ingliston Consols Extended leases	10,781·08	12,749·75	+ 1,968·67
Do.	do.	10. Ingliston Extended G.Ms., Ltd.	5,114·88	4,877·52	- 237·36
Do.	do.	11. Kyarra G.M. Co., N.L.	9,582·61	2,291·79	- 7,290·82
Do.	do.	12. Lake View and Oroya Exploration, Ltd.	16,048·13	12,610·97	- 3,437·16
Do.	do.	13. Marmont	2,623·97	953·10	- 1,670·87
Do.	Day Dawn	14. Great Fingall Consolidated, Ltd.	17,317·89	16,845·96	- 471·93
Do.	Mount Magnet	15. Empress leases	3,060·80	1,419·98	- 1,640·82
Yalgoo		16. Bullrush Gold Estates, N.L.	570·27	3,958·07	+ 3,387·80
Mount Margaret	Mount Morgans	17. Westralia Mount Morgans Mines, N.L.	3,685·32	6,416·81	+ 2,731·49
Do.	Mount Malcolm	18. Sons of Gwalia, Ltd.	58,935·74	59,659·03	+ 723·29
Do.	do.	19. North Star: Malcolm Prospecting Co., N.L.	1,261·96	486·24	- 775·72
Do.	Mount Margaret	20. Ida H. G.M. Co., Ltd.	3,939·88	10,778·91	+ 6,839·03
Do.	do.	21. Kalgoolie and Boulder Firewood Co., Ltd.	2,954·97	14,062·33	+ 11,107·36
Do.	do.	22. Mary Mac G.M. Co., N.L.	3,103·29	2,682·57	- 420·72
Do.	do.	23. Nil Desperandum	2,433·06	580·19	- 1,852·87
North Coolgardie	Menzies	24. Gladstone leases	7,150·89	5,594·43	- 1,556·46
Do.	do.	25. Sand Queen G.Ms., Ltd.	20,672·27	20,530·28	- 111·99
Do.	do.	26. Menzies Consolidated G.Ms., Ltd.	15,268·42	14,788·37	- 480·05
Do.	Ularring	27. Riverina South leases	1,174·07	802·31	- 371·76
Do.	Niagara	28. Cosmopolitan No. 2: Western Machinery Co., Ltd.	404·01	1,709·26	+ 1,305·25
Broad Arrow		29. Associated Northern Blocks (W.A.), Ltd.	2,607·15	14,531·50	+ 11,924·35
Do.	do.	30. Lady Evelyn leases	236·17	1,608·74	+ 1,372·57
North-East Coolgardie	Kanowna	31. North White Feather G.Ms., Ltd.	4,572·53	4,403·94	- 168·59
East Coolgardie	East Coolgardie	32. Golden Ridge G.M. Co., Ltd.	10,132·81	6,861·30	- 3,271·51
Do.	do.	33. Associated G.Ms. of W.A., Ltd.	33,628·12	30,923·57	- 2,704·55
Do.	do.	34. Associated Northern Blocks (W.A.), Ltd.	6,245·77	7,581·26	+ 1,335·49
Do.	do.	35. Golden Horseshoe Estates Co., Ltd.	91,497·11	105,293·15	+ 13,796·04
Do.	do.	36. Great Boulder Perseverance G.M. Co., Ltd.	61,149·96	57,895·74	- 3,254·22
Do.	do.	37. Great Boulder Proprietary G.Ms., Ltd.	132,843·25	137,340·96	+ 4,497·71
Do.	do.	38. Idaho leases	4,591·02	3,838·04	- 752·98
Do.	do.	39. Ironsides North leases	14,268·98	16,972·08	+ 2,703·10
Do.	do.	40. Ivanhoe Gold Corporation, Ltd.	85,486·66	89,540·52	+ 4,053·86
Do.	do.	41. Kalgurli G.Ms., Ltd.	60,431·79	53,036·18	- 7,395·61
Do.	do.	42. Lake View and Star, Ltd.	63,159·72	57,532·86	- 5,626·86
Do.	do.	43. North Kalgurli (1912), Ltd.	2,225·79	1,763·28	- 462·51
Do.	do.	44. Oroya Links, Ltd.	38,498·91	36,859·09	- 1,639·82
Do.	do.	45. South Kalgurli Consolidated, Ltd.	31,250·35	35,429·78	+ 4,179·43
Do.	do.	46. Golden Zone leases	9,739·89	2,254·90	- 7,484·99
Do.	do.	47. Hannans Reward, Ltd.	1,263·37	1,140·88	- 122·49
Do.	Bulong	48. Transcontinental leases	2,116·23	1,751·86	- 364·37
Coolgardie	Coolgardie	49. Burbanks Birthday G.Ms., Ltd.	897·64	1,019·64	+ 122·00
Do.	do.	50. Burbanks Main Lode (1904), Ltd.	3,973·95	1,409·16	- 2,564·79
Do.	do.	51. Hidden Secret North leases	2,791·23	745·86	- 2,045·37
Do.	do.	52. Tindals Coolgardie G.M. Co., N.L.	2,008·00	840·46	- 1,167·54
Do.	Kunanalling	53. Carbine leases	1,562·67	4,254·42	+ 2,691·75
Yilgarn		54. Bullfinch Proprietary (W.A.), Ltd.	25,682·98	23,631·17	- 2,051·81
Do.	do.	55. Comet	1,118·81	376·73	- 742·08
Do.	do.	56. Corinthian North G.Ms., Ltd.	10,149·25	9,218·17	- 931·08
Do.	do.	57. Edna May Central G.M. Co., N.L.	1,446·23	5,424·47	+ 3,978·24
Do.	do.	58. Edna May G.M. Co., N.L.	28,755·69	35,468·83	+ 6,713·14
Do.	do.	59. Marvel Loch G.M. Co., N.L.	2,165·38	642·59	- 1,522·79
Do.	do.	60. Mountain Queen, Ltd.	6,044·49	329·34	- 5,715·15
Dundas		61. King	1,929·90	590·09	- 1,339·81
Do.	do.	62. Mararoa G.M. Co., N.L.	13,507·11	13,633·94	+ 126·83
Do.	do.	63. Princess Royal G.M. Co., N.L.	1,175·03	869·35	- 305·68
Do.	do.	64. Viking No. 1 leases	5,658·79	5,853·83	+ 195·04
Phillips River		65. Fair Play leases	1,113·21	1,200·34	+ 87·13

TABLE 7.

Averages of Gold Ore raised and treated, and Gold produced therefrom, per man employed on the several Goldfields of the State, during 1914 and 1915.

Goldfield.	1914.				1915.			
	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	56.02	32.74	55.17	32.25	107.65	40.36	154.28	57.85
3. West Pilbara	47.38	34.12	51.71	37.23	49.22	27.07	111.72	61.44
4. Ashburton	...	...	...	...	...	...	...	...
5. Gascoyne	...	...	...	...	...	...	...	...
6. Peak Hill	226.53	107.87	253.77	120.84	243.20	123.10	271.03	135.51
7. East Murchison	208.88	154.01	126.03	72.61	268.89	143.75	146.39	78.26
8. Murchison	266.36	145.65	152.95	83.64	275.71	143.72	152.32	79.40
9. Yalgoo	109.56	50.99	97.08	46.60	119.21	60.59	56.83	28.91
10. Mt. Margaret	306.18	202.89	170.80	94.49	422.53	239.36	173.22	98.05
11. North Coolgardie	169.70	92.01	121.92	66.11	168.65	98.05	131.64	76.53
12. Broad Arrow	267.54	129.83	67.95	42.51	421.96	246.58	148.64	86.86
13. North East Coolgardie	142.87	80.91	89.46	50.66	155.57	87.62	105.12	59.20
14. East Coolgardie	585.35	339.35	235.66	136.62	610.52	349.57	254.41	145.67
15. Coolgardie	131.29	75.48	71.62	41.17	159.47	74.10	92.33	42.90
16. Yilgarn	490.61	250.51	205.83	100.36	413.97	218.43	133.65	96.90
17. Dundas	432.68	248.39	210.33	120.75	387.56	195.66	179.69	104.65
18. Phillips River	178.17	113.38	333.24	212.08	143.36	77.49	190.83	103.15
Total Averages	410.15	230.51	182.55	102.60	431.39	237.95	195.07	107.60

The average value of gold produced per man employed above and below ground was £435.82 in 1914 and £457.06 in 1915. The average tonnage of ore raised shows an increase from 230.51 tons to 237.95 tons. The average tonnage raised per man is again highest in the East Coolgardie Field, viz. 349.57 tons, average value £618.77, the next being Broad Arrow Field, with 246.58 tons, average value £368.96.

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 1915.

State.	Output of Gold.	Value.	Percentage of total Output of Australasia.
	ozs.	£	
1. Western Australia	1,210,112	5,140,228	51.29
2. Victoria	329,068	1,397,793	13.95
3. Queensland	249,711	1,060,703	10.58
4. New South Wales	132,498	562,819	5.62
5. Tasmania	18,547	78,784	.79
6. South Australia	6,081	25,830	.26
7. Northern Territory	1,304	5,538	.05
8. Territory of Papua	12,965	55,074	.55
9. New Zealand	398,931	1,694,553	16.91
Total	2,359,217	10,021,322	100.00

TABLE 9.

Dividends paid by Western Australian Gold Mining Companies during 1915 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.	Authorized.	No. of shares issued.	Par Value Shares.	Paid up to	Dividends.		Grand Total paid to end of 1915.
						No.	Total Amount.	
		£		£ s. d.	£ s. d.		£	£
Peak Hill	Various Companies	...	...	...	...	...	...	160,666
East Murchison	Various Companies	...	...	...	...	...	...	437,968
Murchison	Kyarra G.M., N.L.	60,000	60,000	1 0 0	1 0 0	1	2,000	3,000
Do.	Other Companies	...	...	...	...	...	...	1,827,170
Mt. Margaret	Ida H. G.M. Co., Ltd.	80,000	282,361	0 5 0	0 5 0	1	3,530	89,295
Do.	Sons of Gwalia, Ltd.	350,000	325,000	1 0 0	1 0 0	4	40,625	982,238
Do.	Other Companies	...	...	...	...	...	...	296,918
North Coolgardie	Menzies Consolidated G.Ms., Ltd.	225,000	224,015	1 0 0	1 0 0	1	5,600	11,260
Do.	Sand Queen G.Ms., Ltd.	15,000	60,900	0 5 0	0 5 0	1	42,000	112,560
Do.	Other Companies	...	...	...	...	...	...	440,131
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	2	82,500	3,217,500
Do.	Great Boulder Proprietary G.Ms., Ltd.	175,000	1,750,000	0 2 0	0 2 0	4	262,500	4,744,300
Do.	Ivanhoe Gold Corporation, Ltd.	1,000,000	200,000	5 0 0	5 0 0	4	105,000	3,423,750
Do.	Kalgurli G.Ms., Ltd.	120,000	128,000	1 0 0	1 0 0	4	87,000	1,555,500
Do.	Lake View and Star, Ltd.	200,000	1,000,000	0 4 0	0 4 0	5	30,000	126,000
Do.	South Kalgurli Consolidated, Ltd.	150,000	250,007	0 10 0	0 10 0	2	15,625	161,875
Do.	Other Companies	...	...	...	...	...	...	6,918,578
Coolgardie	Various Companies	...	...	...	...	...	...	339,495
Yilgarn	Bullfinch Proprietary (W.A.), Ltd.	500,000	475,150	1 0 0	1 0 0	2	23,807	89,278
Do.	Edna May G.M. Co., N.L.	25,000	42,850	0 10 0	0 10 0	12	77,130	149,975
Do.	Other Companies	...	...	...	...	...	...	51,078
Dundas	Mararoa G.M. Co., N.L.	40,000	100,000	0 8 0	0 3 0	3	15,000	130,000
	Other Companies	...	...	...	...	...	...	147,000
	Total Dividends paid during 1915	...	...	...	...	...	792,317	...
	Total Dividends paid to end of 1915	...	...	...	...	...	...	25,494,386

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 1906 ..	63,170,910	13,744,719	21·76	..	..
1906	7,622,749	1,993,657	26·15	..	..
1907	7,210,749	1,738,123	24·10	5,722,273	30·37
1908	6,999,882	1,487,303	21·24	5,503,784	27·01
1909	6,776,274	1,359,088	20·05	5,398,725	25·17
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
Total ..	125,258,154	25,494,386	20·35	*43,104,846	*22·63

* Nine last years only.

TABLE 11.

Quantity and Value of Minerals, other than Gold and Coal, reported to the Mines Department during 1915.

Goldfield, District, or Mineral Field.	1915.		Increase or Decrease for Year compared with 1914.	
	Quantity.	Value.	Quantity.	Value.
	tons.	£	tons.	£
BLACK TIN.				
Pilbara Goldfield (Marble Bar District)	78·65	7,633	— 8·75	— 535
Greenbushes Mineral Field	247·33	21,431	+ 2·79	+ 286
Total	325·98	29,064	— 5·96	— 249
PYRITIC ORE.				
Mt. Margaret Goldfield (Mt. Morgans District)	6,557·62	2,368	— 3,201·21	— 1,117
COPPER ORE.				
West Pilbara Goldfield	314·75	3,546	— 7,449·43	— 37,061
Ashburton Goldfield	146·00	3,744	+ 146·00	+ 3,744
Peak Hill Goldfield	237·58	7,618	+ 124·88	+ 5,209
East Murchison Goldfield	10·93	147	+ 10·93	+ 147
Murchison Goldfield	33·70	492	+ 15·11	+ 217
Yalgoo Goldfield	4·99	95	+ 4·99	+ 95
Phillips River Goldfield	3,681·03	24,093	— 1,160·12	— 13,431
State generally	69·58	1,263	+ 31·08	+ 837
Total	4,498·56	40,998	— 8,276·56	— 40,243
LEAD ORE.				
Northampton Mineral Field	15,678·30	29,396	+ 343·68	— 8,955
SILVER-LEAD ORE.				
Ashburton Goldfield	298·96	4,429	— 416·14	— 5,378
MAGNESITE.				
East Coolgardie Goldfield (Bulong District)	601·50	601	+ 601·50	+ 601
WOLFRAM ORE.				
Yalgoo Goldfield	·25	27	+ ·25	+ 27

The output of Black Tin shows decreases in tonnage of 5.96 tons, and in value of £249, and in Pyritic Ore of 3,201.21 tons and in value of £1,117. In Copper Ore there were decreases in tonnage of 8,276.56 tons and in value of £40,243. Lead Ore shows an increase in tonnage of 343.68 tons, but a decrease in value of £8,955, while Silver Lead Ore shows decreases in tonnage and value of 416.14 tons and £5,378.

The production of Tin was confined to Pilbara and Greenbushes Fields, while Copper Ore came from West Pilbarra, Ashburton, Peak Hill, East Murchi-

son, Murchison, Yalgoo, and Phillips River Fields and 69.58 tons of a value of £1,263 came from several localities outside of any proclaimed field. The output of Lead Ore was confined to Northampton and of Silver Lead Ore to Ashburton. The production of Magnesite was confined to East Coolgardie 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 1914 and 1915, 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.	Under-ground.	Per Man employed under-ground.	Per Man employed above and under-ground.
Collie	1914	tons. 319,210	£ 148,684	127	398	tons. 802	tons. 608
	1915	286,666	137,859	123	375	764	575

The number of men employed at Collieries has decreased by 27, and the output by 32,544 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, 1914 and 1915.

Description of Leases.	1914.		1915.	
	No.	Acreage.	No.	Acreage.
Gold mining leases on Crown land	1,281	18,434	1,301	19,561
" " private property	1	6	...	...
Mineral leases on Crown land	270	32,012	228	32,875
" " private property	2	68	2	68
	1,554	50,520	1,531	52,504

The total number of leases held for mining decreased by 23, but there was an increase in area held of 1,984 acres, as compared with 1914. Leases for gold mining increased in number by 19 and in area by 1,121 acres.

The number of mineral leases decreased by 42, but the area held increased by 863 acres.

TABLE 14.

Number and Acreage of Gold Mining Leases in force each year for the Five Years ending the 31st December, 1915.

GOLDFIELDS.	DISTRICTS.		1911.		1912.		1913.		1914.		1915.		Percentage of Total Acreage.		Increase or Decrease for 1915 compared with 1914.		Goldfields.
	Name.	Proclaimed.	Leases.	Acreage.	Leases.	Acreage.	Leases.	Acreage.	Leases.	Acreage.	Leases.	Acreage.	1914.	1915.	Increase.	Decrease.	
Kimberley	20-5-86		509	10,136	196	3,659	174	3,288	153	2,932	248	4,381	15-80	22-40	1,449		Kimberley
Yilgarn	1-10-88		26	277	34	425	32	325	26	265	24	223					Yilgarn
Pilbara	1-10-88	Marble Bar	14	122	14	135	10	100	18	149	10	88	2-24	1-60		102	Pilbara
Ashburton	11-12-90	Nallagine	2	30			2	48									Ashburton
Murchison	24-5-91	Cue	56	605	48	629	45	577	29	321	24	242					Murchison
		Meekatharra	177	2,350	117	1,497	93	1,226	94	1,227	98	1,317	13-05	13-04	135		
		Day Dawn	49	445	48	453	40	376	44	477	46	507					
Dundas	31-8-93	Mount Magnet	42	485	44	461	40	384	42	381	45	485					Dundas
			70	862	56	674	54	631	50	596	48	543	3-23	2-78		53	
Coolgardie	6-2-94	Coolgardie	68	889	57	733	59	773	55	758	78	1,132	5-31	6-71	332		Coolgardie
		Knanalling	31	462	26	364	22	281	17	221	14	179					
East Coolgardie	1-10-94	East Coolgardie	179	2,596	171	2,417	168	2,353	155	2,140	149	2,023	12-91	11-01		227	East Coolgardie
		Bilong	10	145	7	109	12	217	14	221	7	126					
Yalgoo	23-1-95		39	500	60	803	54	713	50	753	77	1,295	4-98	6-62	542		Yalgoo
		Menzies	64	897	54	759	54	771	50	730	42	609					
North Coolgardie	28-8-95	Ularling	42	582	33	412	30	383	21	299	21	232	3-88	6-83		289	North Coolgardie
		Varilla	40	573	34	489	42	542	29	490	26	401					
		Niagara	47	560	24	334	15	224	14	197	8	95					
East Murchison	28-6-95	Lawlers	61	914	32	433	22	277	20	223	21	235					East Murchison
		Black Range	127	1,923	109	1,598	106	1,512	99	1,337	62	787	11-42	7-10	718		
		Wiluna	61	1,027	67	1,113	53	903	32	535	23	365					
North-East Coolgardie	15-4-96	Kanowna	44	555	57	908	46	602	31	381	25	313	2-32	1-81		73	N.E. Coolgardie
		Kurnalpi	4	27	62	1,065	6	84	5	47	4	42					
Broad Arrow	20-11-96		117	1,912	57	904	79	1,296	43	610	44	651	3-31	3-32	41		Broad Arrow
Peak Hill	1-4-97		50	559	20	279	23	299	14	159	15	158	0-86	0-80		6	Peak Hill
Mount Margaret	1-4-97	Mount Margaret	71	1,248	70	1,170	59	1,043	70	1,197	75	1,303					Mount Margaret
		Mount Malcolm	131	2,415	89	1,657	83	1,535	79	1,462	65	1,290	15-28	14-71	62		
		Mount Morgans	34	650	21	356	20	321	8	158	18	286					
West Pilbara	1-11-95	Crown Lands	7	78	9	108	7	82	4	42	3	36	0-23	0-19		4	West Pilbara
Do.		Private Property	1	6	1	6	1	6	1	6			0-03	0-03			Do.
Phillips River	14-9-90		26	409	17	257	13	210	12	186	12	185	1-01	0-94		7	Phillips River
Other Localities																	Other Localities
Gascoyne	15-4-97				2	36						4					Gascoyne
Totals			2,199	34,219	1,636	24,243	1,464	21,382	1,282	18,740	1,301	19,561	100-00	100-00			

Decrease for 1915: Leases 19, acres 1,121.

TABLE 15.

Number and Acreage of Mineral Leases in force 31st December each year, for the Five Years ending 31st December, 1915.

MINING DISTRICTS.		SUB-DISTRICTS.		1911.		1912.		1913.		1914.		1915.		Increase or Decrease for 1915, compared with 1914.		DISTRICTS.	
Name.	Proclaimed	Name.	Proclaimed.	Leases.	Acreage.	Leases.	Acreage.	Leases.	Acreage.	Leases.	Acreage.	Leases.	Acreage.	Increase.	Decrease.		
Ashburton	11-12-90	Cue	7-12-94	4	83	4	83	4	83	5	69	8	177	108	..	Ashburton	
Murchison	24-9-91	Meekatharra	7-12-94	..	..	21	615	9	258	6	163	4	96	..	67	Meekatharra
		Day Dawn	10-1-96	1	6	1	6	1	6	1	6	1	6	..	..	Day Dawn
		Mt. Magnet	7-12-94	Mt. Magnet
Greenbushes	7-4-92	Marble Bar	16-6-92	51	751	53	859	51	761	44	627	39	574	..	53	Greenbushes	
Pilbara	16-6-92	Nullagine	6-11-96	31	868	37	1,033	21	771	8	205	7	127	..	78	Marble Bar	
		Nullagine	6-11-96	1	18	1	3	Nullagine
Yalgoo	23-1-95	Yalgoo	..	1	48	1	24	11	320	11	256	4	84	..	172	Yalgoo	
Yilgarn	22-3-95	Yilgarn	..	..	..	2	23	1	12	2	15	1	3	..	12	Yilgarn
Coolgardie	22-3-95	Coolgardie	22-3-95	..	..	..	..	..	..	..	..	1	9	9	..	Coolgardie
		Kunanalling	1-9-97	Kunanalling
East Coolgardie	22-3-95	East Coolgardie	22-3-95	9	45	8	40	6	29	5	23	4	19	..	4	East Coolgardie	
		Bulong	15-4-96	Bulong
East Murchison	28-6-95	Lawlers	1-7-04	4	96	4	96	1	24	..	..	1	24	24	..	Lawlers
		Black Range	1-7-04	2	6	4	24	3	31	2	6	6	Black Range
North Coolgardie	16-8-95	Wiluna	1-3-10	..	..	..	..	..	..	..	..	1	10	10	..	Wiluna
		Menzies	15-4-96	Menzies
		Ularring	15-4-96	Ularring
		Yerilla	15-4-96	Yerilla
West Pilbara	1-11-95	Niagara	1-3-97	14	537	16	552	16	588	16	570	12	470	..	100	Niagara	
Dundas	27-12-95	..	..	..	..	1	48	1	48	1	48	1	48	..	..	West Pilbara
Collie	21-2-96	..	..	88	27,126	88	27,126	89	27,417	91	28,057	97	29,897	1,840	..	Dundas
North-East Coolgardie	15-4-96	Kanowna	15-4-96	..	..	..	..	..	..	..	..	..	..	..	..	Collie
Broad Arrow	20-11-96	Kurnalpi	15-4-96	1	20	Kanowna
		Crown Lands	..	1	10	1	10	13	212	10	157	8	107	..	50	Kurnalpi	
Northampton	1-1-97	Private Property	..	1	20	1	20	1	48	2	68	2	68	..	..	Broad Arrow
Peak Hill	1-4-97	..	..	..	..	..	..	4	108	24	550	9	255	..	295	Northampton
Mt. Margaret	1-4-97	Mt. Margaret	1-4-97	Peak Hill
		Mt. Malcolm	1-4-97	1	48	Mt. Margaret
		Mt. Morgans	2-4-02	6	134	6	134	6	134	6	134	6	134	48	Mt. Malcolm
Gascoyne	15-4-97	..	..	..	..	..	..	..	..	..	..	..	..	..	..	Mt. Morgans
Yandanooka	1-12-97	Crown Lands	..	2	40	2	40	Gascoyne
		Private Property
Phillips River	1-7-99	..	..	22	613	21	607	22	561	23	559	13	407	..	152	Phillips River
Other localities	..	Crown Lands	..	15	648	22	984	28	733	14	519	11	428	..	91	Other Localities	
		Private Property
Totals	..	..	..	253	31,049	301	32,359	289	32,161	272	32,080	230	32,943	..	..	..

Decrease for 1915: 42 leases, for an increased area of 863 acres.

In the Collie field the largest area is held, viz.: 29,897 acres, worked entirely for coal mining; then follow Greenbushes, with 574 acres for tin; West Pilbara 470 acres, Phillips River 407 acres, and Peak Hill 255 acres, all for copper.

Taking all the goldfields, the largest percentage of the area leased for gold mining is in the Yilgarn Goldfield, viz.:—22.40; then Mount Margaret, Murchison, East Coolgardie, East Murchison, and North Coolgardie, with percentages of 14.71, 13.04, 11.01, 7.10, and 6.83 respectively.

TABLE 16.

Number and Acreage of Mineral Leases in force on 31st December, 1915, showing Minerals for which they are worked.

Goldfield or Mineral Field.	District.	MINERALS.															
		Coal.		Tin.		Copper.		Iron.		Clay.		Limestone.		Wolfram.		Silver and Lead.	
		Leases.	Acres.	Leases.	Acres.	Leases.	Acres.	Leases.	Acres.	Leases.	Acres.	Leases.	Acres.	Leases.	Acres.	Leases.	Acres.
Pilbara	Marble Bar .. .. .	..	..	5	107	..	..	..	..	..	..	..	..	..	..	..	..
West Pilbara .. .. .	.. .. .	..	..	..	..	11	452	..	..	..	..	..	..	..	..	..	..
Ashburton .. .. .	.. .. .	..	..	..	..	4	132	..	..	..	..	..	..	..	..	..	1
East Murchison	Lawlers .. .. .	..	..	..	..	1	24	..	..	..	..	..	..	..	..	..	3
.. .. .	Wiluna .. .. .	..	..	..	..	..	..	..	..	..	..	..	1	10	..	..	..
Murchison	Cue .. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	6
.. .. .	Day Dawn .. .. .	..	..	..	..	..	..	..	..	1	6	..	..	..	..	..	..
Yalgoo .. .. .	.. .. .	..	..	..	..	2	36	..	..	..	..	..	..	..	..	..	..
Mt. Margaret	Mt. Morgans .. .. .	..	..	..	..	5	129	..	..	..	..	..	1	5	..	2	48
East Coolgardie	East Coolgardie .. .. .	..	..	..	..	..	..	..	..	..	..	..	1	6	..	..	..
Yilgarn .. .. .	.. .. .	..	..	..	..	..	..	..	..	1	3	..	..	..	..	..	..
Dundas .. .. .	.. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Phillips River .. .. .	.. .. .	..	..	..	..	13	407	..	..	..	..	..	..	..	..	..	..
Collie .. .. .	.. .. .	97	29,897	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Greenbushes .. .. .	.. .. .	..	..	39	574	..	..	..	..	..	..	..	..	..	..	..	..
Northampton .. .. .	.. .. .	..	..	..	..	1	12	..	..	..	..	..	..	..	..	..	..
Northampton	(Private Property) .. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Peak Hill .. .. .	.. .. .	..	..	..	..	9	255	..	..	..	..	..	..	..	..	..	..
Outside Proclaimed Fields .. .. .	.. .. .	..	..	..	..	3	84	7	302	..	..	..	..	..	..	..	..
Coolgardie .. .. .	.. .. .	..	..	1	9	..	..	..	..	..	..	..	..	..	..	..	..
Totals .. .. .	.. .. .	97	29,897	45	690	49	1,531	7	302	4	16	3	21	3	54	4	53

TABLE 16.

Number and Acreage of Mineral Leases, etc.—continued.

Goldfield or Mineral Field.	District.	MINERALS.														Total No. of Leases	Total Acreage.
		Tantalite.		Lead.		Mica.		Graphite.		Gravel.		Beryl.		Emerald.			
		Leases.	Acres.	Leases.	Acres.	Leases.	Acres.	Leases.	Acres.	Leases.	Acres.	Leases.	Acres.	Leases.	Acres.	Leases.	Acres.
Pilbara	Marble Bar	2	20	..	..	..	..	..	..	..	..	..	..	..	..	7	127
West Pilbara .. .. .	.. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	12	470
Ashburton .. .. .	.. .. .	..	..	1	10	..	..	..	..	..	..	..	..	..	..	8	177
East Murchison	Lawlers .. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	24
	Wiluna .. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	10
Murchison	Cue .. .. .	..	..	..	..	..	..	..	..	..	..	2	42	1	48	4	96
	Day Dawn .. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	6
Yalgoo .. .. .	.. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	84
Mt. Margaret	Mt. Morgans .. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6	134
East Coolgardie	East Coolgardie .. .. .	..	..	..	..	..	..	..	..	1	6	..	..	..	..	4	19
Yilgarn .. .. .	.. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	3
Dundas .. .. .	.. .. .	..	..	..	..	1	48	..	..	..	..	..	..	..	..	1	48
Phillips River .. .. .	.. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	13	407
Collie .. .. .	.. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	97	29,897
Greenbushes .. .. .	.. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	39	574
Northampton .. .. .	.. .. .	..	..	7	95	..	..	..	..	..	..	..	..	..	..	8	107
Northampton	(Private Property)	..	..	2	68	..	..	..	..	..	..	..	..	..	..	2	68
Peak Hill .. .. .	.. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9	255
Outside Proclaimed Fields .. .. .	.. .. .	..	..	..	..	..	..	1	42	..	..	..	..	..	..	11	428
Coolgardie .. .. .	.. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	9
Totals .. .. .	.. .. .	2	20	10	173	1	48	1	42	1	6	2	42	1	48	230	32,943

TABLE 17.

Number and Acreage of Miscellaneous Leases in force 31st December 1915.

District.	LEASES.										Total.	Acres.		
	Tailings.		Tramway.		Water.		Machinery.		Residence.					
No.	Acres.	No.	Acres.	No.	Acres.	No.	Acres.	No.	Acres.	No.	Acres.	No.	Acres.	
Goldfield.														
Yalgoo			12					1	24			11	24	
West Pilbara				2	25							2	25	
East Murchison			2	38							1	2	40	
Murchison			1	10								1	10	
												1	10	
												1	10	
												1	10	
												1	10	
Mt. Margaret			1	22								1	22	
North Coolgardie			1	12			2	6				3	18	
N.E. Coolgardie					1	2						1	2	
East Coolgardie			14	298			2	47	3	36	1	2	20	383
Coolgardie							1	13				1	13	
Phillips River					2	3						2	3	
Total			20	390	5	30	5	66	4	60	3	5	37	551

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TABLE 18.

Claims and Authorised Holdings under "The Mining Act, 1904," and Regulations existing on 31st December, 1914, and 1915.

GOLDFIELD OR MINERAL FIELD.	DISTRICT.	Prospecting Areas.				Water Rights.				Lode Claims.		Alluvial Claims.	
		Number.		Acreage.		Number.		Acreage.		1914.	1915.	1914.	1915.
Northampton .. .. .	.. .. .	1914.	1915.	1914.	1915.	1914.	1915.	1914.	1915.	1914.	1915.	1914.	1915.
Pilbara	Marble Bar	6	4	102	56	..	..	..	..	..	..	..	..
Do.	Nullagine	21	19	315	318	2	2	2	2	..	3	3	2
West Pilbara .. .. .	.. .. .	6	8	98	97	..	..	..	..	15	8	..	..
Ashburton .. .. .	.. .. .	5	6	69	88	2	1	7	5	..	1	..	..
Peak Hill .. .. .	.. .. .	3	..	52	..	..	..	..	..	1	..	..	..
East Murchison	Lawlers	18	..	226	..	4	..	18	..	..	..	..	..
Do.	Wiluna	19	19	246	245	14	14	18	18	..	..	..	..
Do.	Black Range	13	21	189	323	7	6	16	12	..	..	..	..
Murchison	Cue	33	25	475	216	4	2	8	6	..	..	1	1
Do.	Meekatharra	18	16	244	225	2	2	3	3	2	2	..	1
Do.	Day Dawn	47	34	686	505	1	1	1	1	..	..	..	..
Do.	Mt. Magnet	10	19	107	229	13	11	20	21	..	..	..	..
Yalgoo .. .. .	.. .. .	42	37	402	413	2	2	2	2	..	..	..	..
Mt. Margaret	Mt. Morgans	21	76	291	1,288	1	4	3	18	..	..	..	..
Do.	Mt. Malcolm	4	6	45	70	5	5	10	13	..	..	..	..
Do.	Mt. Margaret	15	25	202	373	30	27	199	195	..	..	..	..
North Coolgardie	Menzies	37	35	522	499	24	26	65	63	..	..	4	4
Do.	Ularring	21	23	289	239	9	8	27	26	..	..	..	..
Do.	Niagara	20	12	238	118	4	4	10	10	..	..	..	..
Do.	Yerilla	16	9	220	126	11	4	30	8	..	..	..	..
Broad Arrow .. .. .	.. .. .	25	18	368	286	7	7	12	12	1	..	..	..
N.E. Coolgardie	Kanowna	28	48	404	688	5	5	16	13	8	6	..	..
Do.	Kurnalpi	8	8	124	58	3	3	5	5	4	5	1	..
East Coolgardie	East Coolgardie	8	2	115	27	..	..	..	..	..	..	..	..
Do.	Bulong	21	50	262	689	10	9	34	29	1	2	..	..
Coolgardie	Coolgardie	8	4	115	61	..	..	..	..	..	..	..	..
Do.	Kunanalling	60	89	831	1,192	10	10	25	35	2	2	..	..
Yilgarn .. .. .	.. .. .	16	7	224	109	8	7	47	42	..	..	..	..
Dundas .. .. .	.. .. .	65	100	1,086	1,775	3	3	5	6	..	..	..	..
Phillips River .. .. .	.. .. .	15	15	205	211	9	9	26	26	1	1	..	..
Collie .. .. .	.. .. .	10	15	144	238	6	2	31	22	..	..	..	..
Greenbushes .. .. .	.. .. .	2	..	2,420	..	..	..	..	..	..	..	..	..
Gascoyne .. .. .	.. .. .	1	..	18	..	12	12	79	79	..	..	21	18
Outside Proclaimed Fields .. .. .	.. .. .	10	13	21,128	6,455	..	..	..	..	..	..	..	..
Totals .. .. .	.. .. .	652	763	*32,462	†17,217	208	186	719	672	35	30	30	26
Increase or Decrease for 1915 compared with 1914 .. .. .	.. .. .	+111	..	-15,245	..	-22	..	-47	..	-5	..	-4	..

GOLDFIELD OR MINERAL FIELD.	DISTRICT.	Dredging Claims.		Residence Areas.		Business Areas.		Machinery Areas.		Tailings Areas.		Garden Areas.		Washing Areas.	
		1914.	1915.	1914.	1915.	1914.	1915.	1914.	1915.	1914.	1915.	1914.	1915.	1914.	1915.
Northampton .. .. .	.. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Pilbara	Marble Bar .. .. .	..	..	1	1	9	12	1	1	..	1	5	5	..	..
Do.	Nullagine	3	3	3	3	3	2	2	1	..	..	5	3	..	..
West Pilbara .. .. .	.. .. .	..	..	16	13	17	18	2	2	..	..	3	3	..	..
Ashburton .. .. .	.. .. .	..	..	..	..	2	..	..	..	..	..	..	..	..	..
Peak Hill .. .. .	.. .. .	..	..	3	..	1	..	3	..	..	..	..	..	..	..
East Murchison	Lawlers .. .. .	..	..	1	1	1	1	4	4	5	6	2	2	..	..
Do.	Wiluna .. .. .	..	..	1	1	..	..	..	..	..	..	4	4	..	..
Do.	Black Range .. .. .	..	..	201	199	9	5	2	3	1	2	11	8	..	..
Murchison	Cue .. .. .	..	..	7	7	3	3	..	..	1	1	1	1	..	..
Do.	Meekatharra .. .. .	..	..	10	4	11	9	3	3	3	2	2	1	..	..
Do.	Day Dawn .. .. .	..	..	5	4	..	23	..	..	..	..	4	4	..	..
Do.	Mt. Magnet .. .. .	..	..	2	1	3	3	1	2	1	1	7	7	..	..
Yalgoo .. .. .	.. .. .	..	..	3	3	15	45	2	5	..	..	1	1	..	..
Mt. Margaret	Mt. Morgans .. .. .	..	..	..	..	..	..	2	2	..	..	6	6	..	..
Do.	Mt. Malcolm .. .. .	..	..	2	1	4	4	..	..	3	2	15	14	..	..
Do.	Mt. Margaret .. .. .	..	..	8	11	18	15	5	5	..	1	9	10	..	..
North Coolgardie	Menzies .. .. .	..	..	27	31	15	13	3	3	2	1	7	8	..	..
Do.	Ularring .. .. .	..	..	1	..	..	1	..	1	..	1	..	..	..	..
Do.	Niagara .. .. .	..	..	..	..	4	1	2	1	2	2	3	2	..	..
Do.	Yerilla .. .. .	..	..	..	..	2	3	2	2	1	1	1	1	..	..
Broad Arrow .. .. .	.. .. .	..	..	4	..	14	..	3	2	2	2	..	..	..	..
N.E. Coolgardie	Kanowna .. .. .	..	..	1	..	..	..	3	3	2	2	4	4	..	..
Do.	Kurnalpi .. .. .	..	..	..	..	1	1	1	1	..	..	..	..	..	..
East Coolgardie	East Coolgardie .. .. .	..	..	3	1	7	5	4	4	6	6	23	22	..	..
Do.	Bulong .. .. .	..	..	2	..	3	..	1	1	..	..	..	..	..	..
Coolgardie	Coolgardie .. .. .	..	..	2	2	3	4	3	3	2	2	2	2	..	..
Do.	Kunanalling .. .. .	..	..	1	1	4	4	2	2	..	..	..	..	..	..
Yilgarn .. .. .	.. .. .	..	..	93	247	57	82	3	2	3	3	3	4	..	..
Dundas .. .. .	.. .. .	..	..	..	..	1	1	3	3	2	2	3	3	..	..
Phillips River .. .. .	.. .. .	..	..	..	..	..	..	3	2	2	2	5	4	..	..
Collie .. .. .	.. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Greenbushes .. .. .	.. .. .	7	7	27	30	3	4	5	5	..	..	12	14	3	3
Gascoyne .. .. .	.. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Outside Proclaimed Fields .. .. .	.. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Totals .. .. .	.. .. .	7	10	424	561	210	259	65	63	39	40	138	133	3	3
Increase or Decrease for 1915 compared with 1914 .. .. .	.. .. .	+3	..	+137	..	+49	..	-2	..	+1	..	-5	..	..	..

* 1914 including nine for coal and oil—23,420 acres.

† 1915, including three for coal and oil—7,794 acres.

Last year the number of prospecting areas held was 652, the total acreage being 32,462 acres, which included 9 areas of 23,420 acres for coal and oil.

This year the number held is 763, of a total acreage of 17,217 acres, including three areas of 7,794 acres for coal and oil.

TABLE 19.

Miners' Rights issued during 1914 and 1915.

Place of Issue.	Miners' Rights.		Place of Issue.	Miners' Rights.	
	1914.	1915.		1914.	1915.
Albany	3	7	Mt. Egerton .. .. .	..	5
Boulder	14	20	Mount Magnet	208	183
Bridgetown .. .. .	..	14	Mount Morgans	49	29
Broad Arrow	95	65	Mulline	17	15
Broome	21	8	Nannine .. .. .	..	49
Bullfinch	43	32	Narrogin	2	1
Bunbury .. .. .	..	3	Norseman	87	74
Burtville .. .. .	..	16	Northampton	24	17
Busselton	12	6	Northam .. .. .	..	11
Carnarvon	28	23	Nullagine	49	56
Collie	10	10	Onslow	37	40
Coolgardie	249	428	Ora Banda .. .. .	..	27
Cue	156	253	Payne's Find .. .. .	..	25
Davyhurst	26	19	Peak Hill	47	53
Derby	9	17	Perth	222	262
Geraldton	12	15	Port Hedland	3	4
Greenbushes	120	129	Ravensthorpe	49	81
Hall's Creek	12	16	Roebourne	97	97
Kalgoorlie	369	441	Sandstone	252	139
Kanowna	74	66	Southern Cross	187	192
Kookynie	73	52	Toodyay .. .. .	..	1
Lake Darlot .. .. .	..	13	Wagin .. .. .	..	4
Laverton	145	175	Westonia	164	456
Lawlers	52	61	Wiluna	64	54
Leonora	101	100	Yalgoo	97	135
Linden .. .. .	..	25	Yarri .. .. .	..	14
Marble Bar	159	126	York	7	18
Marvel Loch	64	63	Youanme .. .. .	..	52
Meekatharra	221	146			
Mt. Jackson	10	..	Total	3,870	4,579
Menzies	130	136			

TABLE 20.

Number and Acreage of Miners' Homestead Leases in force on 31st December, 1914 and 1915.

Goldfield.	District.	1914.		1915.		Increase.		Decrease.	
		Leases.	Acreage.	Leases.	Acreage.	Leases.	Acreage.	Leases.	Acreage.
West Pilbara .. .. .	..	1	30	..	..	..	..	1	30
Greenbushes .. .. .	..	8	940	10	941	2	1	..	..
Pilbara	{ Marble Bar	5	71	5	71	..	..	..	..
	{ Nullagine .. .. .	..	..	..	..	..	..	..	..
Dundas .. .. .	..	27	1,417	27	1,417	..	..	..	..
Broad Arrow .. .. .	..	2	30	4	70	2	40	..	..
Yilgarn .. .. .	..	12	1,021	14	1,061	2	40	..	..
Mt. Margaret	{ Mt. Morgans	3	140	3	104	..	..	..	..
	{ Mt. Malcolm	6	1,244	5	1,239	..	..	1	5
	{ Mt. Margaret	18	844	19	868	1	24	..	..
	{ Cue	7	1,287	7	1,287	..	..	..	..
	{ Day Dawn	9	125	10	145	1	20	..	..
Murchison	{ Meekatharra	17	1,933	17	1,953	..	20	..	..
	{ Mt. Magnet	4	281	4	281	..	..	..	..
Yalgoo .. .. .	..	1	200	2	680	1	480	..	..
Coolgardie	{ Coolgardie	28	2,459	29	3,439	1	980	..	..
	{ Kunanalling	2	520	2	520	..	..	..	..
East Coolgardie .. .. .	..	100	3,537	100	3,600	..	63	..	..
Phillips River .. .. .	..	149	21,917	147	21,466	..	..	2	451
Peak Hill .. .. .	..	4	170	4	170	..	..	..	..
North-East Coolgardie	Kanowna	20	862	19	842	..	..	1	20
	Menzies	9	879	9	879	..	..	..	..
	Yerilla	1	10	1	10	..	..	..	..
North Coolgardie	Niagara	4	70	1	20	..	..	3	50
	Ularring	1	20	1	20	..	..	..	..
East Murchison	Lawlers	5	1,110	5	1,110	..	..	..	..
	Black Range	17	865	17	905	..	40	..	..
	Wiluna	4	69	4	69	..	..	..	..
	Total	464	42,051	466	43,203	10	1,708	8	556

As compared with the year 1914, there is an increase in the number of leases by two, and in acreage by 1,152 acres.

PART IV.—MEN EMPLOYED.

TABLE 21.

Average Number of Men engaged in Mining during 1914 and 1915.

Goldfield.	District.	Reef or Lode.		Alluvial.		Total.	
		1914.	1915.	1914.	1915.	1914.	1915.
1. Kimberley .. ..	.. ..	..	..	10	10	10	10
2. Pilbara	{ Marble Bar	99	80	26	16	125	96
3. West Pilbara	{ Nullagine	43	56	17	24	60	80
4. Ashburton .. ..	.. ..	25	20	15	13	40	33
5. Gascoyne .. ..	.. ..	..	2	5	4	5	6
6. Peak Hill .. ..	.. ..	..	1	3	3	3	4
7. East Murchison	{ Lawlers	21	20	3	3	24	23
.. ..	{ Wiluna	111	117	12	6	123	123
.. ..	{ Black Range	115	114	1	..	116	114
.. ..	{ Cue	722	491	7	3	729	494
8. Murchison	{ Meekatharra	107	119	6	7	113	126
.. ..	{ Day Dawn	790	727	22	23	812	750
.. ..	{ Mt. Magnet	299	267	13	15	312	282
9. Yalgoo .. ..	.. ..	150	203	7	14	157	217
.. ..	.. ..	125	301	8	18	133	319
10. Mt. Margaret	{ Mt. Morgans	57	88	28	14	85	102
.. ..	{ Mt. Malcolm	594	539	14	14	608	553
.. ..	{ Mt. Margaret	363	440	11	14	374	454
.. ..	{ Menzies	474	415	13	7	487	422
11. North Coolgardie	{ Ularring	143	94	7	6	150	100
.. ..	{ Niagara	158	92	16	15	174	107
.. ..	{ Yerilla	315	173	33	17	348	190
12. Broad Arrow .. ..	.. ..	211	243	68	38	279	281
13. North-East Coolgardie	{ Kanowna	176	151	15	22	191	173
.. ..	{ Kurnalpi	20	23	6	14	26	37
14. East Coolgardie	{ East Coolgardie	4,897	4,522	12	4	4,909	4,526
.. ..	{ Bulong	88	66	6	6	94	72
15. Coolgardie	{ Coolgardie	390	316	3	9	393	325
.. ..	{ Kunanalling	104	95	1	3	105	98
16. Yilgarn .. ..	.. ..	884	940	..	..	884	940
17. Dundas .. ..	.. ..	216	226	..	..	216	226
18. Phillips River .. ..	.. ..	22	37	..	..	22	37
State generally .. ..	.. ..	3	3	..	..	3	3
Total—Gold Mining		11,722	10,981	388	342	12,110	11,323
MINERALS OTHER THAN GOLD.							
Tin	{ Greenbushes	119	117	*5	*15	124	132
.. ..	{ Cue	1	..	..	..	1	..
.. ..	{ Marble Bar	12	7	*80	*49	92	56
.. ..	{ West Pilbara	75	13	..	..	75	13
.. ..	{ Ashburton .. ..	..	12	..	..	..	12
.. ..	{ Phillips River	82	75	..	..	82	75
Copper	{ Peak Hill	22	34	..	..	22	34
.. ..	{ Meekatharra	3	2	..	..	3	2
.. ..	{ Yalgoo .. ..	..	2	..	..	..	2
.. ..	{ State generally	10	6	..	..	10	6
Pyritic Ore	{ Mt. Morgans	30	25	..	..	30	25
Lead Ore	{ Northampton	83	62	..	..	83	62
.. ..	{ Ashburton	17	8	..	..	17	8
Coal	{ Collie River	525	198	..	..	525	498
Magnesite	{ Bulong .. ..	..	5	..	..	..	5
Total—Other Minerals		979	866	85	64	1,064	930
GRAND TOTAL		12,701	11,847	473	406	13,174	12,253

*Classified elsewhere as employed at mines.

TABLE 22.
Average Number of Men employed at Mines during 1915.

Mineral.	Above Ground.	Under Ground.	Total.	Percentage of total men employed.	Increase or decrease compared with 1914.
Coal	123	375	498	4·18	— 27
Copper	65	79	144	1·21	— 48
Gold	4,924	6,057	10,981	92·19	— 741
Lead	26	44	70	·59	— 30
Pyritic Ore	7	18	25	·21	— 5
Tin	*173	15	188	1·58	— 29
Magnesite	5	...	5	·04	+ 5
Total	5,323	6,588	11,911	100·00	— 875

*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 1915, 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 1914.	Percentage of total men employed.	
					1914.	1915.
1. Kimberley ... ..	...	...	...	...	...	...
2. Pilbara	85	51	136	— 6	1·21	1·24
3. West Pilbara	9	11	20	— 5	·21	·18
4. Ashburton	1	1	2	+ 2	...	·02
5. Gascoyne	1	...	1	+ 1	...	·01
6. Peak Hill	10	10	20	— 1	·18	·18
7. East Murchison	336	386	722	— 226	8·09	6·57
8. Murchison	630	686	1,316	— 30	11·48	11·98
9. Yalgoo	148	153	301	+ 176	1·07	2·74
10. Mt. Margaret	463	604	1,067	+ 53	8·65	9·72
11. North Coolgardie	324	450	774	— 316	9·30	7·05
12. Broad Arrow	101	142	243	+ 32	1·80	2·21
13. North-East Coolgardie	76	98	174	— 22	1·67	1·59
14. East Coolgardie	1,961	2,627	4,588	— 397	42·53	41·78
15. Coolgardie	220	191	411	— 83	4·21	3·74
16. Yilgarn	444	496	940	+ 56	7·54	8·56
17. Dundas	95	131	226	+ 10	1·84	2·06
18. Phillips River	17	20	37	+ 15	·19	·34
State generally	3	...	3	...	·03	·03
Total	4,924	6,057	10,981	— 741	100·00	100·00

TABLE 24.
Alluvial Gold Workers.

Goldfield.	1914.	1915.	Increase or decrease compared with 1914.
1. Kimberley	10	10	...
2. Pilbara	43	40	— 3
3. West Pilbara	15	13	— 2
4. Ashburton	5	4	— 1
5. Gascoyne	3	3	...
6. Peak Hill	3	3	...
7. East Murchison	20	9	— 11
8. Murchison	48	59	+ 11
9. Yalgoo	8	18	+ 10
10. Mt. Margaret	53	42	— 11
11. North Coolgardie	69	45	— 24
12. Broad Arrow	68	38	— 30
13. North-East Coolgardie	21	36	+ 15
14. East Coolgardie	18	10	— 8
15. Coolgardie	4	12	+ 8
16. Yilgarn ... ..	...	...	...
17. Dundas ... ..	...	...	...
18. Phillips River ... ..	...	...	...
Total	388	342	— 46

PART V.—ACCIDENTS.

TABLE No. 26.

Men employed in Mines killed and injured in Mining Accidents during 1914 and 1915.

A.—According to Locality of Accident.

Goldfield.	Killed.		Injured.		Total killed and injured.	
	1914.	1915.	1914.	1915.	1914.	1915.
1. Kimberley .. .. .	..	..	..	..	..	..
2. Pilbara .. .. .	..	..	1	..	1	..
3. W. Pilbara .. .. .	..	..	..	..	..	..
4. Ashburton .. .. .	..	1	..	..	..	1
5. Gascoyne .. .. .	..	..	..	..	..	..
6. Peak Hill .. .. .	..	..	..	..	..	..
7. E. Murchison	2	3	32	25	34	28
8. Murchison	4	2	56	61	60	63
9. Yalgoo .. .. .	..	..	..	3	..	3
10. Mt. Margaret	4	4	85	82	89	86
11. N. Coolgardie	1	2	7	3	8	5
12. N.E. Coolgardie .. .. .	..	1	4	..	4	1
13. Broad Arrow	1	1	..	4	1	5
14. E. Coolgardie	8	12	527	621	535	633
15. Coolgardie .. .. .	..	1	6	7	6	8
16. Yilgarn	5	3	13	29	18	32
17. Dundas	1	1	4	2	5	3
18. Phillips River .. .. .	..	..	4	3	4	3
MINING DISTRICTS—						
Northampton .. .. .	..	..	..	..	..	..
Yandanooka .. .. .	..	..	..	..	..	..
Greenbushes .. .. .	..	1	..	..	..	1
Collie .. .. .	..	2	90	81	90	83
Swan .. .. .	..	..	2	2	2	2
Total	26	34	831	923	857	957

From the above table it will be seen that the total number of fatal accidents for the year 1915 was 8 more than for 1914. The number of injured shows an increase of 92 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.

	1914.		1915.		Comparison with 1914.	
	Fatal.	Serious.	Fatal.	Serious.	Fatal.	Serious.
1. Explosives .. .. .	..	16	6	16	+ 6	..
2. Falls of Ground	8	93	16	108	+ 8	+ 15
3. In Shafts	8	26	5	24	— 3	— 2
4. Miscellaneous Underground	5	476	4	532	— 1	+ 56
5. Surface	5	220	3	243	— 2	+ 23
Totals	26	831	34	923	+ 8	+ 92

Of the fatal accidents, 30 occurred in gold mines, 2 in coal mines, 1 in a tin mine, and 1 in a silver-lead mine. The death-rate per 1,000 men employed on gold mines was 2.74 as against 2.15 in 1914.

TABLE NO. 27.

Deaths of Persons employed at Mines from Accidents during 1914 and 1915.

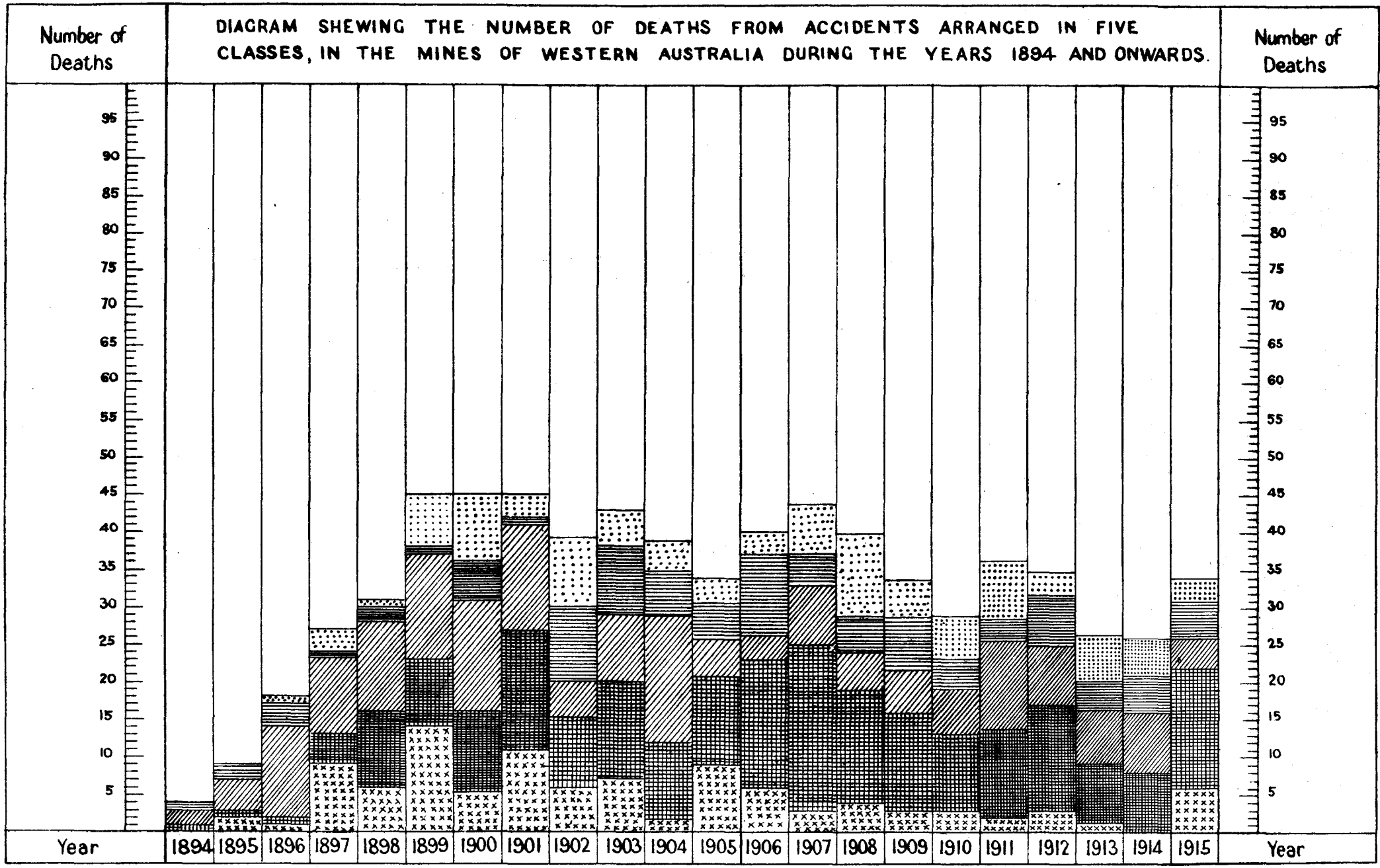
	1914.						1915.					
	Number of Persons killed.			Death Rate per 1,000 Men employed.			Number of Persons killed.			Death Rate per 1,000 Men employed.		
	Above Ground.	Under Ground.	Total.	Above Ground.	Under Ground.	Total.	Above Ground.	Under Ground.	Total.	Above Ground.	Under Ground.	Total.
Coal Mines ...	..	..	..	..	..	..	..	2	2	..	5.33	4.02
Men employed ...	(127)	(398)	(525)	..	..	..	(123)	(375)	(498)	..	..	..
Gold Mines ...	5	21	26	.91	3.19	2.15	3	28	31	.57	4.62	2.74
Men employed ...	(5,522)	(6,588)	(12,110)	..	..	..	(5,266)	(6,057)	(11,323)	..	..	..
Other Mines ...	..	..	..	..	..	..	..	1	1	..	6.41	2.31
Men employed ...	(333)	(206)	(539)	..	..	..	(276)	(156)	(432)	..	..	..
Total for all Mines ...	5	21	26	.84	2.92	1.97	3	31	34	.53	4.71	2.77
Total number of men employed ...	(5,982)	(7,192)	(13,174)	..	..	..	(5,665)	(6,588)	(12,253)	..	..	..

TABLE NO. 28.

Deaths from Accidents of persons employed in Gold Mines during 1915, and the Death Rate per 1,000 men employed, and per 1,000 tons of Gold Ore raised during 1914 and 1915 (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.	
	1915.			1915.			1914.	1915.	1914.
	Above Ground.	Under Ground.	Total.	Above Ground.	Under Ground.	Total.	Total.	1915.	1914.
1. Kimberley
2. Pilbara
3. West Pilbara
4. Ashburton
5. Gascoyne
6. Peak Hill
7. East Murchison	2	3	2.98	5.18	4.16	2.11	.029	.014
8. Yalgoo
9. Mt. Margaret	3	4	2.16	4.97	3.75	3.94	.016	.019
10. North Coolgardie	2	2	..	4.44	2.58	.92	.026	.010
11. North-East Coolgardie	1	1	..	10.20	5.74	..	.066	..
12. Broad Arrow	1	1	..	7.04	4.12	4.74	.017	.037
13. East Coolgardie	11	12	.51	4.11	2.62	1.60	.007	.005
14. Coolgardie	1	1	..	5.24	2.43	..	.033	..
15. Murchison	2	2	..	2.92	1.52	2.97	.011	.020
16. Yilgarn	3	3	..	6.05	3.19	5.66	.015	.024
17. Dundas	1	1	..	7.63	4.42	4.63	.023	.019
18. Phillips River
19. Swan
Total ..	3	27	30	.61	4.46	2.74	2.22	.011	.010

The number of Deaths per 1,000 men employed shows an increase from 2.22 in 1914, to 2.74 in 1915, and that per 1,000 tons of Gold Ore raised also shows an increase, being .011 as against .010 for the preceding year.



EXPLOSIONS
 FALLS OF GROUND
 IN SHAFTS
 MISCELLANEOUS UNDERGROUND
 ON SURFACE INCLUDING MACHINERY

PART VI.—STATE AID TO MINING.

STATE BATTERIES.

The number of State Batteries existing at the close of the year was 34. (of which two were leased). The old 10-head battery at Sandy Creek was dismantled and a 5-head battery, equipped with a gas power plant and new tailings treatment plant, was installed.

From inception to the end of 1915 gold and tin to the value of £4,572,477.90 have been recovered at the State plants.

1,067,154.94 tons of gold ore were treated and produced £3,834,494.45 worth of gold by amalgamation, £533,936.15 worth by cyanidation, £110,645.17 from slimes treatment, £6,679.01 from residues, and 70,026.75 tons of tin ore produced tin to the value of £86,723.12.

During the year the gold ore treated was 49,595 tons for 39,095.55 ozs. bullion.

The working expenditure for all plants during the year totalled £47,005 12s. 6d., and the revenue £41,664 17s. 7d., which, after including £75 4s. 9d. for additions and equipment (paid from revenue), shows a loss of £5,415 19s. 8d. on the year's operations.

The capital expenditure from the inception of the scheme was £357,939 3s. 7d.; £91,981 1s. 8d. being paid from Revenue and £265,958 1s. 11d. from Loan. The cost of administration for the year was £3,919 10s. 3d. as against £3,609 5s. 8d. for 1914.

The working expenditure from inception to the 31st December, 1915, exceeds the receipts by £59,383 9s. 6d.

GEOLOGICAL SURVEY.

The Geological Survey Division carried on its work with eighteen classified officers, more or less, on the lines of previous years, though in common with other branches of the Service, the effects of the war have been felt to such an extent as to somewhat dislocate its manifold operations.

As may be seen from the report of the Government Geologist, the work of the staff has been pretty well divided between (a) mining, (b) agriculture, (c) water supply, (d) general geological surveys, (e) engineering questions in which geological considerations are involved, (f) chemical and physical research work relating to mineral products, and (g) petrological and Palæontological investigations.

The work of the year embraced, *inter alia*—

An examination of the new Gold Find (Forrestania), South of Mount Holland.

Investigations into the alleged occurrence of oil near Wonnerup, in the South-West Division.

A survey of the Magnesite Deposits at Bulong.

A reconnaissance of the Yalgoo Goldfield, with special reference to its geology and ore deposits.

A survey of Kookynie and Tampa.

Investigations into the Foraminiferal Sand Deposits of Dongara, and the Limestone Deposits of Geraldton, Yonga, and Denmark.

The resident officers have, as usual, been engaged in those multifarious researches connected with the work of the field staff, the care of the survey collections, and assisting in dealing with the verbal and written requirements of enquirers at the departmental offices.

ASSISTANCE UNDER "THE MINING DEVELOPMENT ACT, 1902."

The following statement shows the sums advanced during the year, 1915, under the Mining Development Act:—

	£	s.	d.
Advanced in aid of mining work and equipment of mines with machinery	5,090	15	4
Advances in aid of erection and equipment of crushing plants, including subsidies paid on stone crushed for the public	2,228	2	6
Boring	223	19	5
Providing means of transport	754	13	4
	£8,297	10	7

In addition to the above, amounts totalling £4,001 4s. 3d. 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.

Included in the amount set against "Advances in aid of erection and equipment of crushing plants, including subsidies paid on stone crushed for the public" is the sum of £591 0s. 6d., being the subsidies paid to owners of plants crushing for the public, the conditions being that they crush for the public 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 6,095 tons.

The receipts under The Mining Development Act, exclusive of interest payments, amounted to £8,976 6s. 9d., and includes:—

Refunds of advances	£1,810	12	3
Sales of securities	317	8	1
Miscellaneous refunds	193	16	1

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

ASHBURTON GOLDFIELD.

There was not any output of gold during the year nor any reports indicative of a likelihood of revival in gold mining.

The output of Silver-lead ore was 298.96 tons, valued at £4,429, and in the preceding year 715.10 tons, valued at £9,807, a decrease in tonnage of 416.14 tons, and in value of £5,378.

Copper ore to the extent of 146 tons, valued at £3,744, was also produced.

BROAD ARROW GOLDFIELD.

The output of gold was 22,290 fine ounces, and in the preceding year 9,286 fine ounces; an increase of 13,004 fine ounces.

This increase is largely attributable to an improved output from the Ora Banda District, and it is hoped and expected that this will continue.

An important development on the line of lode between Broad Arrow and Paddington was reported, and a good deal of rich specimen stone unearthed.

The Bardoc centre was also the scene of increased activity, and several new mining tenements were applied for. The other centres remained unchanged, but as a whole the field improved and its prospects are brighter.

COLLIE COALFIELD.

The output of Coal for the year was 286,666 tons, and in the preceding year 319,210 tons, a decrease of 32,544 tons.

There has been steady development in most of the mines, and several of them are now in a position to keep up their present output for several years. The industry has suffered from the war, and a large number of the miners have enlisted and gone to the front.

The outlook, however, is good.

COOLGARDIE GOLDFIELD.

The output of gold for the year was 18,315 fine ounces, and in the preceding year 20,981 fine ounces, a decrease of 2,666 fine ounces. This decrease was attributable to a falling-off in the Coolgardie District, the Kunanalling District having recorded an increase.

The Bonnievale centre remained very quiet, and nothing transpired to inspire hopes for any immediate improvement.

At Burbanks the prospects are not encouraging.

At Eundynie the Hidden Secret Mine is still being worked and promises well.

At Gibraltar there was a good deal of activity in the early part of the year, but towards the close prospects were not too hopeful. At Higginsville, Londonderry, Mungari, Red Hill, and Widgiemooltha prospecting was continued.

In the Kunanalling District there was an improvement, and several properties were vigorously worked.

DUNDAS GOLDFIELD.

The output of gold for the year was 23,884 fine ounces, and for the preceding year 26,591 fine ounces, a decrease of 2,707 fine ounces.

There has not been any change of note in this field, and development work has proceeded steadily on most of the mines.

EAST COOLGARDIE GOLDFIELD.

The output of gold was 670,788 fine ounces, and in the preceding year 682,895 fine ounces, a decrease of 12,107 fine ounces.

601.50 tons of Magnesite, valued at £601, were raised in the Bulong District.

This small decrease in gold is, in view of the undoubted adverse effect on the industry of the European War, really very satisfactory.

The most important development of the year was on the Golden Horseshoe Mine, where high-grade ore was struck at 3,020 feet. A sulphide plant on the Hainault Mine, assisted by the Department, commenced operations and has been treating sulphide ores and concentrates for the public with much benefit to the industry.

On the other mines work has proceeded as usual.

In the Bulong District nothing of note transpired.

EAST MURCHISON GOLDFIELD.

The output of gold was 58,082 fine ounces, and in the preceding year 70,809 fine ounces, a decrease of 12,727 fine ounces.

Copper ore to the extent of 10.93 tons, valued at £147, was also produced, but none in the preceding year.

The decrease in gold is attributable to the closing down of the Oroya Mine and shortening of hands on the Black Range Mine in the Black Range District. A hopeful feature, however, is the fact that prospectors have acquired the ground abandoned by the Oroya Mine and are very sanguine.

At Youanme there has not been much change.

In the Lawlers District there has been a good deal of prospecting activity, and prospects are promising.

In the Wiluna District the most notable event was the completion of a slimes plant at the State Battery, which has also been completely renovated, and the commencement of operations. It is confidently expected that a material increase in output will be the result.

The prospects of the field are good.

GASCOYNE GOLDFIELD.

The output of gold was 81 fine ounces, and in the preceding year 4 fine ounces, an increase of 77 fine ounces.

The only mining being carried on is at Bangerall, where four (4) leases are in existence, on one of which a one-stamp Nissen Mill has been erected. The extreme remoteness of the locality retards its development, and an immediate improvement is not anticipated.

GREENBUSHES MINERAL FIELD.

The output of Black Tin was 247.33 tons, valued at £21,431, and in the preceding year 244.54 tons, valued at £21,145, an increase in tonnage of 2.79 tons, and in value of £286.

During the year the dredges have been in full work, and the average production has been maintained. Prospecting was somewhat retarded by a lengthy wet season, but, on the whole, the field has maintained its position.

KIMBERLEY GOLDFIELD.

The output of gold was 144 fine ounces, and in the preceding year 153 fine ounces, a decrease of 9 fine ounces.

There is nothing to report from this field, where the only mining is that done by fossickers working alluvial.

MOUNT MARGARET GOLDFIELD.

The output of gold was 106,563 fine ounces, and in the preceding year 96,793 fine ounces, an increase of 9,770 fine ounces. In addition, 6,557.62 tons of pyritic ore, valued at £2,368 were raised, and in the preceding year 9,758.83 tons, valued at £3,485, a decrease in tonnage of 3,201.21 tons, and in value of £1,117.

The Mount Margaret District, as in the preceding year, had an increase in output, the result of improvements in several of the mines and the continuance of active operations on the Lancefield Mine. At Burtville there has been a good deal of prospecting work and matters look hopeful. At Duketon there has also been activity, and at Eristoun and Hawk's Nest many prospectors have been busy.

In the Mount Morgans District work was continued on the Mt. Morgans Mine, and the Mt. Morven Leases were also worked throughout the year with encouraging results. The output of the district was in excess of the previous year.

In the Mount Malcolm district there was a slight decrease, but, considering the large number of prospectors who have enlisted, this is not very material. The various mines in this district continue to maintain their positions.

The outlook for this field is good.

MURCHISON GOLDFIELD.

The output of gold was 108,050 fine ounces, and in the preceding year 115,722 fine ounces, a decrease of 7,672 fine ounces.

Copper ore to the extent of 33.70 tons, valued at £492, was raised, and in the preceding year 18.59 tons, valued at £275, an increase in tonnage of 15.11 tons, and in value of £217.

In the Meekatharra District there was a falling-off, attributable to the closing down of the Kyarra Mine at Garden Gully, but in the immediate vicinity of Meekatharra the large mines have continued to develop well, and the output showed an increase.

At Yaloginda the Chunderloo Mine has ceased operations on account of want of capital, but other small shows have been worked. At Nannine and Quinns there was not any improvement, and the same may be said of Gabanintha, Burnakurra, Jillawarra, Chesterfield, Gum Creek, and Stake Well. At Ruby Well there was an improved output, but both here and at Holden's Find operations are retarded on account of the scarcity of water.

In the Mount Magnet District there was an increased output, and many prospecting areas contributed to the production. The position in this district was well maintained. In the Cue District there was an increase, the principal producer being the Light of Asia Mine, which is looking very well.

At Coodardie a plant is in course of erection on the Big Bell Mine. At Tuckabianna a good deal of prospecting has been done, and a five-head mill is in course of erection and should be crushing early in the New Year.

The Day Dawn District recorded a slight increase, but there was not any development of note recorded.

NORTHAMPTON AND YANDANOOKA MINERAL FIELDS.

There were not any minerals reported from Yandanooka.

In the Northampton Field the output of lead ore was 15,678.30 tons, valued at £29,396, and in the preceding year 15,334.62 tons, valued at £38,351, an increase in tonnage of 343.68 tons but a decrease in value of £8,955.

The production was naturally adversely affected by the war, but in the coming year it is expected that the Fremantle Smelter will be able to handle all the product, and a return to more prosperous times for the mines is anticipated.

NORTH COOLGARDIE GOLDFIELD.

The output of gold was 59,513 fine ounces, and in the preceding year 72,188 fine ounces, a decrease of 12,675 fine ounces.

In the Menzies District there was a slight decrease. The Sand Queen Mine at Comet Vale and the Menzies Consolidated Mine at Woolgar were the principal producers and extensive improvements and developments have been carried out on the latter.

In the vicinity of Menzies a good deal of work has been done on several leases.

At Comet Vale the mines have been vigorously worked, and continue to open up satisfactorily. At Goongarrie the "New Boddington" has been working and producing, and developments are encouraging. At Mt. Ida matters have been somewhat quiet.

In the Ularring District mining continued to remain very dull, and the output showed a falling-off.

In the Niagara District nothing of note transpired, and this also was the case in the Yerilla District.

NORTH-EAST COOLGARDIE GOLDFIELD.

The output of gold was 10,861 fine ounces, and in the preceding year 10,134 fine ounces, an increase of 727 fine ounces.

In the Kanowna District there was not much change in any of the various centres.

In the Kurnalpi District nothing of note transpired.

PEAK HILL GOLDFIELD.

The output of gold was 2,823 fine ounces, and in the preceding year 2,603 fine ounces, an increase of 220 fine ounces.

Copper ore to the extent of 237.58 tons, valued at £7,618, was raised, and in the preceding year 112.70 tons, valued at £2,409, an increase in tonnage of 124.88 tons, and in value of £5,209.

There was not much change at Peak Hill or at Mt. Egerton. At Ilgarere a little work was done on the copper shows, but the locality is under a great disadvantage on account of its remoteness.

PHILLIPS RIVER GOLDFIELD.

The output of gold was 3,817 fine ounces, and in the preceding year 4,665 fine ounces, a decrease of 848 fine ounces.

The production of copper ore was 3,681.03 tons, valued at £24,093, and in the preceding year 4,841.15 tons, valued at £37,524, a decrease in tonnage of 1,160.12 tons, and in value of £13,431.

The Government has continued to operate the local Smelter and thus keep mining operations going, and the results are considered very satisfactory, particularly in face of the war and its inevitable depressing effect on everything. It is confidently predicted that the field will continue to progress.

PILBARA GOLDFIELD.

The output of gold was 8,542 fine ounces, and in the preceding year 5,177 fine ounces, an increase of 3,365 fine ounces. Black tin to the amount of 78.65 tons, valued at £7,633, was raised, and in the preceding year 87.40 tons, valued at £8,168, a decrease in tonnage of 8.75 tons, and in value of £535.

The improvement in the gold output is very satisfactory, and is an evidence of the utility of the State plants, which have kept mining going.

Tin mining at the Moolyella and Cooglegong tin-fields is now confined to a few fossickers and natives, the latter obtaining a good deal of the tin won. At Bamboo Creek and Marble Bar crushings remain of good values, and the number of men working is on the increase.

At Nullagine the erection of a large sluicing plant to treat the big alluvial deposits has been commenced, and good results are anticipated.

At Eastern Creek the mines have been worked continuously, but scarcity of water for crushing has largely retarded operations. The field as a whole looks better than for some time past.

WEST PILBARA GOLDFIELD.

The output of gold was 1,507 fine ounces, and in the preceding year 1,023 fine ounces, an increase of 484 fine ounces.

Copper ore amounting to 314.75 tons, valued at £3,546, was raised, and in the preceding year 7,764.18 tons, valued at £40,607, a decrease in tonnage of 7,449.43 tons, and in value of £37,061.

This field has been exceedingly quiet, and the considerably reduced output of copper is the result of non-working at the Whim Well Copper Mine, the proposed operations of the company having been adversely affected by the war.

There is not any prospect of an immediate improvement.

WEST KIMBERLEY MAGISTERIAL DISTRICT.

The iron leases at Yampi Sound have not been worked during the year, having been under exemption. A certain amount of work was done on the copper show mentioned in last year's report, but not sufficient to absolutely determine its permanency or otherwise. Also a certain amount of desultory prospecting was carried out.

YALGOO GOLDFIELD.

The output of gold was 8,842 fine ounces, and in the preceding year 6,026 fine ounces, an increase of 2,816 fine ounces.

Copper ore to the extent of 4.99 tons, valued at £95, was also produced, but none in the preceding year, also .25 ton of Wolfram, valued at £27.

The Royal Standard Mine at Yuin was responsible to a large extent for the increase in output.

The Warriedar centre continues to look promising, and hopes are entertained that some of the shows at Mount Gibson will develop satisfactorily.

At Goodingnow and Gullewa there were slight decreases in output, but at Field's Find, Ninghan, Noongal, and Yalgoo increases were recorded.

The outlook for the field is promising.

YILGARN GOLDFIELD.

The output of gold was 91,124 fine ounces, and in the preceding year 88,745 fine ounces, an increase of 2,379 fine ounces.

The mines at Westonia have been actively developed, and are looking very promising. At Mt. Jackson the water question is still a serious one, but it is expected to be overcome before long, and an era of prosperity for the locality is then predicted.

At Golden Valley and Ennwin a good deal of prospecting has been carried on.

At Bullfinch the Proprietary Mine has been a steady producer. At the Corinthian North Mine the erection of roasters is expected to result in a satisfactory solution of the problem of the profitable treatment of the refractory ores of some of the large low-grade propositions on the field.

At Hope's Hill, Kennyville, and Marvel Loch matters have been somewhat quiet.

In the neighbourhood of Southern Cross there was not much doing, and the "Maori Lass" plant was closed down.

In the Nevoria centre the large low-grade propositions have been actively worked and the district promises to become a very thriving one.

At Parker's Range there was not much change. New finds were reported from a locality about 20 miles N.W. from Hatter's Hill, known as "Forrestania," and from a locality about 19 miles East of Diemel's Find, but it is too early to form definite conclusions regarding them.

During the year the Government lent considerable assistance towards equipping a large prospecting expedition comprised of various syndicates, and the Southern and South-East portions of the goldfield were systematically prospected, but nothing sensational discovered.

The outlook for this field is very promising.

PART VIII.—EXISTING LEGISLATION.

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

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

The latter Act was passed during the year and assented to on 20th November, 1915.

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

Under "The Mining Act, 1904"—

An additional Regulation No. 205A relative to

the cutting of timber on Coal Mining Leases.

Regulation No. 160 cancelled.

Under "The Mines Regulation Act, 1906"—

An amendment of General Rule 19 of Regulation 4.

An amendment to Regulation 13.

The cancellation of General Rule 19 of Regulation 4 and the amendment thereto and substitution of a new one in lieu thereof.

Under "The Coal Mines Regulation Act, 1902"—

An additional Regulation No. 66 relative to Survey and plans of Mines.

Under "The Mining Development Act, 1902"—

The cancellation of the existing Regulations for the purchase of auriferous copper ores at the State Smelting Works at Phillips River, and the substitution of fresh ones in lieu thereof.

PART IX.—INSPECTION OF MACHINERY.

The Chief Inspector of Machinery reports that the number of useful boilers at the end of the year totalled 3,021, as against 3,039 total for the preceding year. There is, therefore, a decrease of 18 boilers. There were 28 new registrations, and one which had previously been written off was resuscitated, making a total of 29 additions to the registers. On the other hand 23 were permanently condemned, 2 converted into air receivers, and 22 were transferred beyond the jurisdiction of this Act, which accounts for the decrease of 18 in the total.

Of the total 3,021 useful boilers, 1,496 were out of use at the end of the year, 1,574 thorough, and 246 working inspections were made, whilst 1,551 certificates were granted.

Permanent condemnations totalled 23, and temporary condemnations 86. As above explained, there were two conversions, but no exportations are recorded.

The total number of machinery plants in use was 4,165, against 3,674 for the previous year. Inspections made total 2,961, and certificates granted 2,936,

against 2,428, in the previous year. When these figures are considered, together with those given for boilers, the preference for machinery driven by other than steam power, when practicable, is very evident.

One hundred and eighty (180) applications for engine-drivers' certificates were received and dealt with by the Board during the year, and 119 certificates granted as follows:—

First Class Competency	..	..	9
Second Class Competency	..	..	22
Third Class Competency	..	..	57
Locomotive Competency	..	..	17
Traction Competency	..	..	3
Interim Competency	..	..	2
Copies of lost and destroyed certificates			9
			119
Total	..	..	119

In carrying out inspection and other work, the total mileage travelled during the year was 46,743, against 47,323 for the previous year, showing a decrease of 580 miles.

PART X.—SCHOOL OF MINES.

The progress hitherto recorded has been maintained during this, the twelfth year of the School's existence. The attendance at the beginning of the year was above the average and necessitated the temporary formation of additional classes, but as the year progressed the number in attendance, particularly in the preparatory classes, decreased considerably.

The staff are of opinion that this is caused through youths availing themselves of the system of free tuition and joining classes without having given full consideration to their future course of study. They appear to join the classes more or less as an experiment, and when they find that the work demands close application, become irregular in attendance and finally stay away altogether.

Many of the past and present students enlisted, and some of them have lost their lives on active service.

The question as to the relation which the School is to bear to the University has been considered, and an application that it be recognised as an affiliated institution of the University was approved by the Senate, subject to certain regulations and to the courses of instruction being arranged to meet the requirements of the University.

During the year a noteworthy donation was made to the School. This was a Research Scholarship of £100, given by Mr. Robert Falconer and available for associates of the School. The holder is required to engage in systematic research work for one year on some problem of economic importance to the mining

industry, and it is confidently expected that valuable results will follow.

The system of free assays for prospectors has been continued, and a total of 335 assays and determinations was made. By this means a large amount of valuable information has been supplied to prospectors.

CONCLUSION.

In dealing with the operations of the various sub-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 VIII. of this report.

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

H. S. KING,
Under Secretary for Mines.

Department of Mines,
Perth, 31st March, 1916.

DIVISION II.

REPORT OF STATE MINING ENGINEER FOR THE YEAR 1915.

The Under Secretary for Mines, Perth.

Office of State Mining Engineer,
Perth, 31st January, 1916.

Sir,

I have the honour to submit my Annual Report for the year 1915, for the information of the Hon. the Minister:—

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

Amendments to the above Acts came into operation during 1915, the "Coal Mines Regulation Act, 1915," making alterations in some of the conditions of granting Mine Managers' Certificates, and extending Section 72 of the principal Act, to include checkweighers and certain other persons, and "The Mines Regulation Act Amendment Act, 1915," making alterations in the classification and mode of appointment of Inspectors of Mines, and providing for the appointment of Workmen's and Special Inspectors.

The appointments of Messrs. Phoenix and Gourley as Inspectors of Mines were confirmed during the year, and a further appointment was made of Mr. Wm. Hutchinson as an Inspector of Mines, with the object of having an Inspector whose principal duty would be to devote himself to the betterment of the ventilation of the larger mines.

Inspectors' Reports.—Annual Reports have been received from all the Inspectors of Mines on the work of their offices, and progress of their districts for the past year, from which the following extracts are submitted:—

CENTRAL GOLDFIELD.

Mr. W. M. Deeble, Inspector of Mines, report dated 22nd February, 1916:—

"I beg to submit herewith my Annual Report on the progress of Mining in the above Goldfields:—

PEAK HILL GOLDFIELD.

"At the far north part of this field there has been very little change to report. At Egerton there are still about 20 men employed, but nothing new has been found. Ilgarere, situated about 120 miles North-East of Peak Hill, is still producing a small quantity of copper, but all lots sent from that place have to be hand-picked to bring the parcels sent up to a very

high grade, and this means a limited output. In this direction copper has been discovered in a large area of country.

Peak Hill.—From 20 to 25 men have been regularly employed at this place; most of them engaged in and around the workings of the old Peak Hill Mine.

Ruby Well.—There has been a number of prospectors around this place, and from what has been done the chutes of ore seem to be erratic in values. The only mine at the place is the Harder to Find G.M. The mine is equipped with a five-head mill of 1,250lbs. stampers driven by a 40 h.p. gas engine. An average of 23 men has been employed, and 2,100 tons have been treated for a yield of 1,341ozs. 2dwts. over the plates.

"The manager stated it is intended to erect a cyanide plant during the coming year. The deepest shaft on the mine is 130 feet, and the deepest level 120 feet, at which depth the reef has been driven on for 120 feet in length. For the amount of work done the results seem to be very encouraging.

Holden's Find.—There are several small parties on rich leaders in this district, but there has been no crushing facilities at the place. A five-head mill has been purchased and is now on the ground, and is expected to be erected and ready for crushing early in the coming year.

Meekatharra.—At the North end of the main mines several promising finds were made during the year, but values seem to be erratic at that end. The most Northern mine is the Commodore G.M., which has employed on an average 41 men during the year.

The deepest shaft on the mine is only 400 feet deep. During the year 6,300 tons have been crushed from the mine for a bullion yield valued at £14,600, and 1,200 tons of slimes for £459. The manager estimates the accumulated slime is worth 15s. per ton.

"Ingliston G.M. adjoins the Commodore mine on the south. The mine is equipped with a ten-head mill complete, and power supplied by a suction gas engine. There has been an average of 30 men engaged on the mine throughout the year, and 3,500 tons have been treated. The only development worth noting was the finding of what is known as the Eastern reef, out of which 3,000 tons have been crushed for bullion valued at £13,000. Another reef has been

lately cut at the 300ft. level, which is large and shows colours of gold on the hanging wall side, but up to the present there has not been sufficient done to give even a rough estimate as to value.

"Ingliston Extended G.M.—The average number of men employed in and on this mine was 46, and the tonnage treated was 11,305 tons for 4,876.41 fine ounces valued at £20,792. The mine is equipped with a ten-head mill complete with two Wilfley concentrators and one Blake crusher.

"Ingliston Consols Extended G.M.—This mine has employed an average of 87 men during the year, and 25,890 tons were treated during the same period for a yield valued at £55,700. The main shaft has a total depth of 755 feet, and the lowest level is at 747 feet. The surface plant consists of a 15-head mill of 1,250lbs. stampers each, three concentrating tables, one Hadfield rock-breaker, and six vats of 35 tons capacity each. It seems a pity that such a mine should be worked by a small shaft of only two compartments.

"Fenian G.M.—This mine is still the main producer in the district. The main shaft is down 891 feet, and the lowest level, No. 9, is 850 feet. The surface plant consists of 15-head stamper mill, two concentrators, two rock-breakers, cyanide plant of 3,300 tons capacity per month, and one Merton's furnace of eight tons capacity per day for concentrates. The winding machinery is driven by steam, and the milling power is supplied by suction gas engines. The average number of men employed is 147, and the tonnage crushed during the year was 37,437 short tons for 26,229.62 fine ounces valued at £111,421. The total production up to 31st December, 1915, was 191,496 tons for 160,099.22 ounces valued at £679,797 14s., and the dividends paid £302,665 17s. 6d.

"This is another mine labouring under the disadvantage of using a very small shaft.

"Marmont G.M.—Although this mine is south of and adjoining the Fenian G.M., it is unfortunate that they have not been able to pick up anything like the high values found in the Northern mine. One noticeable feature is that there is considerably more water in this mine, and it is not drained by the deeper workings of the Fenian.

"Globe G.M.—This is a small show being worked about four miles south of the main belt of mines. The shaft is down 220 feet, and a level was driven at 210 feet. The total tonnage treated from this for the year was 69½ tons for 89.65 ozs. by amalgamation. A new development was found on the surface some distance north-east of the old workings, and a crushing, taken from surface down to 44 feet, of 39 tons returned 72ozs. 12dwts. over the plates, with 12dwts. 14grs. in the sands. Another crushing is being taken out which the owners expect to yield equal to the last.

"Queen of the Hills G.M.—This mine is at a stage where it is rather difficult to deal with the ore being mined. The surface portion was of oxidised ironstone material, but in sinking heavy mineralised stone is met, and the treatment suitable for the higher part of the mine is hardly suitable for the minerals obtained from the deeper levels. A limited number of faces is being worked at present. The main shaft is down to No. 6 level, and should the management decide to drive into the lode at that

depth it will give more working faces, and, as far as I can learn, there seems to be a reasonable chance of the mine giving better results than of late.

"*Gabanintha*.—Very little has been done in the district during the year. At the latter end of the year the old Mountain View was taken up and machinery erected on it, but it is too early for results yet.

"*Quinns*.—During the year the Nowthanna, Commonwealth, and Singapore shows have been working on reefs, and a number of others prospecting on contact veins, but in no case has anything been discovered worth recording.

"*Yaloginda*.—The only mine working continuously through the year is the Mystery G.M. The reef is of fair grade, but the quantity milled has been small.

"*Nannine*.—A number of alluvial workers has been engaged around this place, but only one mine has been employing labour. The Nannine G.M. has been employing on the average five men, and has treated 390 tons for a return of 233.75ozs. Although one of the oldest mines in the goldfield the lowest level is only 200 feet, which is very surprising in view of the fact that very rich gold was obtained from the surface down to that depth.

"*Tuckanarra*.—Some rich patches are from time to time found in this district. During the year 26 tons from the Nemesis produced 120.5ozs. Oliver and mate brought in a crushing of six tons from about 20 miles west of the foot of Mt. Weld which gave a return of 81.95ozs. Harrison and McLennan dollied from the same district 43ozs., and 40ozs. of gold were dollied from the Princess Ena. A considerable number of alluvial diggers has been engaged also. There is a large area of country along the Weld Range which has simply been run over up to the present, and which, in my opinion, affords a very promising field to the prospector.

"*Cue*.—In and around the town of Cue about the same number of men has been employed this year as in the one before.

The Light of Asia has been the main producer, and has crushed 6,064 tons for a yield of 3,229.22 ozs. At the Big Bell, situated 20 miles west of Cue, machinery is being erected, and is expected to be at work early in 1916.

"*Tuckabianna*.—Situated about 17 miles east of Cue, 189.95ozs. of gold were dollied from the L. and P. Alliance, and two men are now engaged prospecting trying to pick up the chute of ore.

A mile further north Dr. Juett and party have taken up a lease, and are now engaged erecting a five-head mill. A prospecting shaft was first put down 34 feet on lode, and the ore taken out gave high assay values. A vertical shaft was afterwards sunk to 100 feet, at which depth a good supply of fresh water was struck.

"*Jasper Hill*.—This is situated about 14 miles south-east of Cue, and is better known as "Pinnacles."

The only mine being worked by a company is the Black Range Pinnacles G.M., on which 14 men have been engaged in development work during the currency of an option agreement. The option was exercised, and a contract let for the erection of an up-to-date treatment plant. The surface plant will con-

sist of a 70ft. underlay head gear, 200-ton ore bin and rock breaker station, ten 1,150lb. stamps with four auxiliary grinding pans, Callow separator and mechanical thickeners. The whole product to be treated in a slimes plant of the Cassell type and estimated capable of treating 2,000 tons per month. It is estimated that 22,500 tons of payable ore have been developed to date. The other shows in this place are Shields and Moore P.A. A shaft has been sunk altogether in lode which runs approximately north to west and underlies east 55 degrees; water was cut at 35 feet depth. Forty tons of ore broken, and at surface, are estimated to be worth 12 dwts. per ton.

"Jackson and party P.A.—A shaft has been put down 50 feet to water level on reef. Crosscuts from bottom six feet east and seven feet west, together with width of shaft, show the reef to be at least 20 feet in width. At this point about 75 tons of ore at surface are estimated to be worth 8dwts. per ton.

"Venus Lease (Hodgson and O'Donnell).—The shaft is down 65 feet, and a drive north for 50 feet was estimated to be in ore averaging 8dwts. per ton, and a further eight feet nice gold can be seen in the stone.

"Kelly and mate's P.A. is only a dollying proposition; 23 ozs. of gold have been dollyed from a leader, and six tons crushed returned 17ozs. 4dwts. over the plates.

"Webb's Patch is about four miles east of Jasper Hill. Hunter and party have dollyed from the old Hill End Lease 321.5ozs. of gold. The gold seems to be very patchy at this place.

"Day Dawn.—Great Fingall Consolidated, Ltd.—During the first part of the year this mine obtained the following results:—

		tons.	
Current ore	43,706	.. =	£16,520.6
Accumulations	66	..	12.76
		lbs.	
Slags shipped	19,975	..	259.68
Total yield .. ..		..	<u>16,793.04</u>

"The average number of men employed during the year was 203, but at present the total number on the mine is less than 100. At the end of October mining and milling operations were suspended to allow of development work being carried on to open up the No. 19 level. For this purpose the Government has guaranteed a loan of £15,000 from the Commonwealth Bank. It is expected that the development work will be completed by the end of March, and that there will be a sufficient number of faces open for the management to employ the old number again, and keep the mill going at its full capacity.

"Lake Austin.—During the last quarter of the year two prospectors found some rich gold at this place. They first dollyed 420.26ozs., and then in December crushed 21 tons for 95.65ozs. of gold; altogether a total of 515.91ozs. There is a line of country from Lake Austin through Mainland and on to Webb's Patch in which rich patches have been discovered.

"Moyagee.—I have seen four shows working in this part during the year, but only two have obtained

payable results—the "Moonlight," which has not been working all the year, crushed 68.5 tons for a return of 167.11ozs., and the "Moyagee" 345.5 tons for 711.35ozs.

"Mt. Magnet.—At the Lennonville side the only mine worth noting is the Empress G.M. The mine is fitted with a five-head mill complete, and during the year has crushed 832 tons for a yield of 1,419.96 ozs.

"The power is supplied by a 90 h.p. suction gas engine, which drives air compressor, and the compressed air goes into a receiver. The winding winch is driven by compressed air, and works smoothly and seems to be very suitable for a small mine like this.

"Early Bird G.M. is situated about two miles east of Mt. Magnet, and is equipped with a five-head mill. Returns from this show that 90 tons have been crushed for 196.21ozs. fine gold. The same Party holds the New Year, from which 491 tons have been treated for a yield of 913.7ozs.

"Mars G.M.—The largest tonnage output in the district has been from this mine, which has milled 2,800 tons for a return of 500.5ozs. The treatment is by a dry crusher and then into cyanide vats. The ore is mined by an open-cut, and raised through a shaft at one end. The whole working costs should be low.

"Sirdar G.M.—This mine has been worked down to a depth of 120 feet on a large lode by a small party, who raised and crushed 638.5 tons for a yield of 337.58ozs.

"New Havelock G.M. is equipped with a five-head mill driven by a suction gas engine, and 543 tons were crushed during the year for 211.51ozs.

"Morning Star G.M.—The average number engaged on this mine has been 10 men, and during the year 292 tons have been milled for a return of 214.58ozs.

"There is a large number of small shows being worked in and around Mt. Magnet, mostly on contact veins, which make very rich patches. Unfortunately these have not given as good a return as last year.

YALGOO GOLDFIELD.

"This field has shown signs of improvement, and a large area of new country is being opened up.

"Yalgoo.—At this place there is a mill on the Ivanhoe G.M. which has crushed for the public 490 tons during the year, mainly ore raised by prospectors working between Yalgoo and Noongal.

"Reliance G.M. is situated three miles north-east of Yalgoo, and was known many years ago under the same name. A shaft was put down 40 feet and ore stoped out irregularly to the surface. The average width of reef where seen seems to be about four feet. For some reason the lease was abandoned, and the present owners, prospecting around it years later, obtained good prospects, and took out a parcel of 21 tons from the bottom of the 40ft. level, from which they got a return of 30ozs. 18dwts. over the plates. The reef at this point was nine feet wide.

"About seven miles north of Yalgoo two prospectors were at work on leaders. When I visited that part last time I could see colours of gold in the stone being broken.

"Yuin.—The Royal Standard G.M. is situated 50 miles north-west of Yalgoo, and employs about 40 men. During the year 13,172 tons were milled for a yield of 3,957.15ozs.

"Mugga King G.M. is situated about eight miles south-west of Gullewa, on the Mugga Mugga Hills. The reef being worked will average three feet in width, and most of the ore crushed up to date was mined from 70 feet depth. The party working this show have erected a three-head mill, the stampers about 3cwt. each, and this is driven by a 20 h.p. oil engine. During the year 215 tons have been crushed for a return of 199.32ozs. fine.

"Around Gullewa.—Molybdenite has been found in several places, but in no case has any work of a practical nature been done on it.

"Warriedar.—This place gives a promise of better results during the coming year, and quite a small town is springing up near the mines. The total supply of water for milling purposes was only about 6,000 gallons per day until late in the year, and the result of this was to keep the place back.

"Water has been found two miles South-East, and a shaft having been sunk to a depth of 122 feet and a few feet of crosscutting done, a plentiful supply of good water was cut and a pumping plant installed. Pipes are being obtained to connect this up to the treatment plant on the Warriedar Options. These consist of a number of leases on which the following work has been done:—

"Ironclad G.M.—Shaft put down 152 feet and a level put in at 114 feet depth.

"Aurum Lease.—Main shaft 182 feet and the lowest level at 100 feet depth.

"Mug's Luck Lease.—Main shaft 94 feet and level at 94 feet.

"Porcupine Lease.—Shaft down 72 feet.

"On this mine there is a ten-head mill with two 5-ft. grinding pans and a cyanide plant of 50 tons capacity.

"456 tons have been milled and 156 tons cyanided for bullion valued at £453, and the slimes (300 tons) are valued at 47s. per ton.

"The manager reports that the drives at 114 feet depth on the Ironclad Lease carried high values over the short distance driven. Owing to the ore being sulphide, work was suspended and drives started at a depth of 88 feet. The reef gave high values over a length of 128 feet.

"Aurum Lease.—Drives north and south at 100 feet depth were in high-grade ore over a distance of 60 feet with good values continuing in both faces.

"Mug's Luck Lease.—At a point 500 feet north of the Aurum main shaft a shaft was sunk to a depth of 94 feet in payable values.

"As the original holders of these leases had been assisted by the Mines Department on the understanding that they were to treat ore for the public, the present holders carried this out and crushed a total of 670 tons on State Battery terms. On my

last visit to Warriedar I visited twelve other shows extending from eight miles south of Warriedar Options to four miles north, and in each direction I saw gold in some of the stone broken, but as most of these shows had been discovered in the latter part of the year there has not been sufficient work done to prove anything, and all I can say is that the prospects are very encouraging.

"Field's Find.—On the Field's Find Extended 123 tons have been crushed for 254 ozs. Mining has been very quiet at this place during the year, but a new find was reported at the latter end of the year, and several leases applied for.

"Goodingnow.—Astor Consolidated.—Six men are working this show. The main shaft was down 92 feet on underlay of reef on my last trip, and a 1½-ton skip was being used to raise the material. Power was supplied by a small vertical boiler and steam winch. 4,000 gallons of water were making in shaft: it was being pumped by a Fairbanks Morse 2 h.p. benzine engine. A total of 402 tons were crushed for the year for a return of 291.94 ozs.

"Blend G.M.—The shaft was down 72 feet, and stoping carried on from bottom of a reef two feet wide. 125.5 tons were milled for 85.96 ozs. Two men were engaged on this.

"Carnation G.M. employs six men, who were engaged stoping when I visited the place last.

"301.5 tons were crushed for a yield of 311.31 ozs.

"Daphne G.M.—Two men employed, chiefly prospecting. 27.5 tons crushed returned 20.78 ozs.

"Marigold G.M. employs two men, and crushed 60 tons for a yield of 59.59 ozs.

"Mariposa G.M. treated 65.5 tons for 83 ozs.

"Orchid G.M.—The main shaft is down on reef to 120 feet depth, and second shaft down on reef to 70 feet. These shafts are connected at 50 feet depth. The reef varies considerably in width. In sinking the deeper shaft nothing but crushing material was taken out.

"During the year 271 tons were crushed for a yield of 422.71 ozs.

"Payne's Find Development Co.—The main shaft was down 165 feet on pitch of ore chute, and altogether 538.5 tons were crushed for 855.34 ozs. during the year.

"Altogether the Goodingnow returns average 1 oz. per ton of ore milled.

"Mt. Gibson is situated about 50 miles S.W. of Goodingnow. Although named Mt. Gibson, the shows being worked are really about 10 miles south of that mount.

"There are a number of areas being worked at the prospecting stage at this place. The most notable is the one first met on, the north end, and named the Golden Harp North. Three tons crushed at the Goodingnow State Mill gave a return of 356 ozs. Where this crushing was taken from a shaft was put down on reef to 40 feet depth, and at 36 feet depth salt water was struck estimated to be making 260 to 300 gallons per hour. Beside the rich ore crushed, about 35 tons of ore were put in the dump, which is also high grade, but not sufficient to cart across 50 miles of country to a mill. Several other shows have promising prospects, but more work is required on them.

"Sunday Permits.—Fifteen permits were granted during the year to work underground; eight of these were for filling sand in the worked-out ground, and seven for sinking shafts where there was a heavy inflow of water. I think it will be recognised that where dry sand filling is used underground it is sure to raise dust, and it is best to get as much as possible into the mine when the miners are away.

"Prosecutions.—There were four prosecutions during the year. The first was for not having the workings of the mine sufficiently secured.

A case was taken against a man for driving a Holman Hoist without a certificate, and two for contravention of the Sunday Labour in Mines section. Convictions were obtained in each case.

"Accidents.—There were two fatal accidents in the Murchison G.F. during the year. Both occurred in the Fenian G.M., and were caused by falls of ground. The first happened in a stope which had been filled close to the back. The underground boss was crawling into the stope on hands and knees, and a man was following him, when a rock about two and a-half tons fell on the latter, killing him instantly.

The second occurred in a stope in the same mine on the following day. A man was standing in the stope with a shovel in his hand watching a miner working down some loose ground; he walked towards the miner and put the point of the shovel against the back of the stope, at the same time saying 'Try this'; at that instant the rock at the point of the shovel fell. The height of the stope at that place was six feet.

"Dust and Ventilation.—There has been very little dust trouble in this district during the year, but there are three mines at Meekatharra where the ventilation of the lower levels is not all that could be desired. In the case of two mines there is quite sufficient air going into the workings, but it short circuits and comes to the surface again through upper workings. The work of remedying this is in hand, and it is hoped that the greater part of the air going into the mine will be forced to the lower workings before passing to the return outlet.

"Prospecting.—It is to be regretted that there are not more prospectors out testing the large areas of country known to contain gold, but which, up to the present, have only been run over. When I speak of prospectors, I mean men who have a knowledge of the work and go about it in a methodical way. The day of napping stone and putting down prospecting shafts on lodes where a reasonable sample cannot be obtained should be past.

It is noticeable that a large percentage of those who are out prospecting even now have very little method, and consider what a prospector finds is due more to luck than judgment, but it will be found that the methodical man is usually the "lucky prospector." In the occurrence of gold it is recognised that in all reefs and lodes the payable ore is either in shoots or deposits, the greater number of which come out to surface at some point, and also that the ore may be remarkably rich at some point, and in a few feet the same reef or lode may be valueless.

In most reefs or lodes the best ore is generally on one wall, and it can be easily imagined in such cases that when the cap of a reef starts to weather the walls will go first and probably be carried some dis-

tance away, and the centre of the reef disintegrate later and cover the higher value ore for some distance on either side. In such cases it is quite possible that a prospector dollying prospects from the cap would get poor results, while the ore covered would be highly payable.

Where water is available the usual recognised method of prospecting is by loaming, and this method will test the ground both for alluvial and reef gold, and also give some indication of any other minerals of commercial value if present in sufficient quantity to pay.

In Western Australia it is unfortunate that the country the genuine prospector wishes to examine is generally a considerable distance from water, and the fact is very often overlooked that a good dryblower, made with a "snuff-box" attached, is equal to a dish for loaming purposes, and very little water is required. If, after a run has been put through, the contents of the snuff-box are washed it will show if any fine gold is present. I have seen gold that has been caught in a snuff-box of a dryblower so fine that after it has been washed off in a dish and left to dry, and then water put into the dish, some of the fine gold could be seen floating on the water. One notable result of persistence in prospecting for a shoot of ore that was thought to exist by the prospects obtained by loaming was that obtained by Daniells and mate at Lake Austin. The main lode had been prospected and shafts sunk in different places; eventually another lode was found carrying rich ore, and over £2,000 worth were taken out up to the end of the year. Probably there has been a number of shoots of ore similar to this passed over owing to samples having been taken only from where the prospector considered the gold should be. If a mine manager were to follow this system, and only sampled where he thought the values should be, many a good mine would soon be shut down.

Prospecting is like general mining, and all country passed through should be tested in each case, particularly when dealing with gold where a few penny-weights per ton mean all the difference.

In this district extending from Yalgoo to Egerton, a distance of over 350 miles, gold, copper, tin, wolfram, molybdenite and bismuth have been found and worked, and emeralds have been found also, but up to the present, only small ones of gem quality. When the general public realise that this is a great mineral and metal country we shall see more prospectors at work."

EAST MURCHISON GOLDFIELD.

Mr. A. W. Winzar, Inspector of Mines, report dated 4th March, 1916:—

"I have the honour to submit my report on the above goldfield for the year 1915.

"There have been no discoveries of note made during the year, and the whole of the field is very quiet from a mining point of view.

"Lawlers shows an increase of 1,725 ounces of gold and 5,307 tons crushed, all the material coming from old mines. A few tons of copper ore were mined about two miles from the township, and returns gave approximately 20 per cent. copper, and the holders are still working it,

"At Wiluna the state mill has been equipped with an up-to-date slimes plant and tube mill. Operations were commenced towards the close of the year, and the plant is expected to help the district considerably.

"The number of actual mine inspections made was 151, necessitating the travelling of 4,074 miles. Among other duties carried out were inspections and reports on application for leases, etc., for the information of the Warden.

"There were 15 persons prosecuted by the Inspector for breaches of the "Mines Regulation Act, 1906," 14 convictions were obtained, and one case was withdrawn.

"The ventilation of the mines has had careful attention, and temperatures have been kept as low as possible. The dust nuisance on this goldfield is practically non-existent, and in no cases have I found cause for complaint.

"In no cases have there been complaints made *re* explosives. In one case where two men were killed by an explosion the question was raised as to whether the fuse had run. I made several tests of portions of the fuse used by these two men and found the burning rate normal.

"*Accidents.*—There were 39 accidents reported during the year. Of these 13 were minor, 23 serious, and three fatal. Twenty-eight occurred underground, and 11 on the surface. Of the fatal accidents two men were killed by an explosion in a winze about 35 feet deep. The men had bored out and charged the cut, and after lighting up had climbed to the brace and pulled the chain ladder up. From the evidence they must have been standing on the brace when the shots fired. When found one man was dead on the level, and the other man unconscious down the winze, and he expired shortly after being removed to the hospital.

"The second fatal accident happened at the State Battery at Wiluna. The man in charge on night shift had occasion to stop the cam shaft by removing the driving belt; he attempted to do this, whilst standing on the platform, with a bar, and was thrown head foremost to the ground and killed. In all cases careful investigations were made, and no contraventions of Act and Regulations revealed.

BLACK RANGE DISTRICT.

"The output from this district shows a big decrease in yield, returning 45,489½ fine ounces from 81,030 tons of material treated. The Oroya Black Range has ceased operations entirely. The Youanmi mine has cut out the oxidised portion of the mine and the whole of the product has now to be roasted.

"The option on the Wanderie group taken by the Yuanmi Gold Mines, Limited, was not exercised, and the mine has been under exemption. The Black Range West G.M. started operations and got a few rich pockets, but at the time of writing has again closed down. Owing to the lay-out of the mine, expenses are heavy and make the mine a difficult proposition to handle.

"*The Black Range Mine* has been operating in the upper levels and let the water rise to the No. 7 level. They have had no new developments of note and expect to have the mine worked out early in 1916. The yield for the year amounted to 14,759 fine ounces from 25,389 tons.

"The Black Range West treated 558 tons for 361.64 ounces and doliied 51.6 ounces. The shoot was cut at the bottom level and a rise holed through the level above.

"The Oroya Black Range G.Ms. have been worked by tributers, who crushed 2,460 tons for 2,128 ounces. The company has ceased operations entirely, and is dismantling the plant.

"The Trafalgar was under option to the Yuanmi G.M., Ltd., who treated therefrom 1,885 tons for 1,152½ ounces. The company sunk the shaft and worked the shoot of ore down to the bottom level. The values were good, but the shoot was short. They also pumped out the Wanderie shaft and sampled the workings. Since the throwing up of the option the Wanderie group has been under exemption, and it is stated that the property is under offer, and is to be examined on behalf of Victorian investors.

"The Pyx G.M. crushed 462¾ tons for 307 ounces. Very little work is being done at present, the water being heavy and the reef small.

"From their P.A. No. 6590B Messrs. Blackmore Brothers and Pigdon obtained 93¾ ounces from 20 tons of stone. The shaft is down 70 feet, and is opened up also at 40 feet. Not enough work has yet been done to form an opinion of the value of the show, which is situate near the Sandstone Railway Yards and between the Oroya and Black Range mines, and the strike of the reef is identical with that of the latter mines. The reef, where operated on, is 1 foot 6 inches to 3 feet in width, and the values are in patches.

"At Hancocks the Comedy King has returned some good patches, 443 ounces being doliied and 430 ounces recovered from the treatment of 170 tons. A fair amount of development work has been carried out at the bottom level with good results.

"The Great Kohinoor recovered 193 ounces from 871 tons, and is now under exemption. The Yuanmi G.M., Ltd., threw up their option over this property as the grade was too low and the values erratic.

"The Royal Oak has been secured by Messrs. Fardy and party, who treated 126 tons for 111 ounces of fine gold.

"There are several shows being worked round about Hancocks, but the yields are small. At Maninga Marley no work is being done at present.

"*Yuanmi Centre.*—The Yuanmi mine has been sunk to below the 600ft. level, and is opening up well at the bottom. The whole of the product of the mine has now to be roasted, and it is probable that another roaster will be added to the plant in the near future, and a larger tonnage milled. A total of 43,030 tons were put through during the year for 21,605 ounces. The prospects of this mine are very bright, and it should eventually rank as a large producer.

"The United treated at the State Mill 2,442 tons for 316 ounces. Very little work of importance has been done on this mine.

"At *Curran's* the Red, White, and Blue G.M. treated 1,206 tons for 348 ounces. This show has been worked fairly continuously during the year. The reef is rather erratic in size, and the value of the gold low.

"At *Birrigrin* two P.As. were being worked at the Prominent Hills, the veins are small and very little prospecting is being carried out around this centre.

"At *Barrambie* slimes treatment has been continued at the *Barrambie Ranges G.M.*

"The *Lilyveil* crushed 171 tons for 104 ounces. Practically no prospecting is being done around this centre at present.

Lawlers District.

"The yield shows an increase for the year's work. A few rich patches have been discovered by loaming, but nothing permanent to date. The yield for the present year should show a further increase. There are 25 head of stamps in use, and there will be an additional five head operating in 1916.

"The *Great Eastern* have a 5-head mill working, and the power is derived from a suction gas plant. The syndicate have a cyanide plant, and the yields for the year have been satisfactory. Most of the material crushed has been procured on and near the surface, but it is the intention of the manager to un-water the mine and operate on the stopes below water. They have treated for the year 743 tons for 494 ounces.

"The *Queen G.M.* have erected a five-head mill driven by a suction gas engine. The reef is in granite, and hard. The average yield has been well maintained, and the mine looks well and should prove a profitable venture for the owners. The tonnage crushed amounted to 576½ tons, from which was recovered 680 ounces over the plates. The tailings are stacked for future treatment, and are a valuable asset.

"The *May Bee* put through 867½ tons for 387 ounces over the plates. Owing to the distance from the battery the profit is small, and the mine is now being worked by tributers.

"*Waroonga G.M.* crushed 6,598 tons for 1,551 ounces. This mine, though low grade, is cheaply worked, and shows a profit. The water has been taken out to the No. 3 level and work commenced there. It is the intention of the owners to erect another gas plant to work a compressor, and instal rock drills.

"*Sunrise G.M.* has been got ready for working. A five-head mill and wood producer plant is erected and everything about the mine put in order. The trouble will be to procure suitable labour, the number of workmen seeking employment being far below the demand. The same applies to all parts of the goldfield.

"There are a fair number of P.As. being worked, and some good yields have been obtained. The cyanide works at the *Cinderella* have been working constantly, and approximately 600 ounces were obtained from this source.

"*Darlot.*—Mining has been practically at a standstill. *Manaton* and *Metzke* have put through 10 tons from P.A. 701 for 253 ounces, mostly dollied, and the cyanide works at the old *British King G.M.* recovered 194 ounces; a few ounces were obtained from other P.As., the total for the district being 465½ ounces.

"At *Wilson's Patch*, *D. Mackay* worked a P.A. in the west end of the *Great Western G.M.* A fair body of stone is showing and gives payable prospects. Owing to no crushing plant being within 25 miles no stone has been crushed.

"The *Victory G.M.*, near *Mount Clifford*, has been worked during the year, two men only being employed.

"*Sir Samuel.*—At this centre the yield was 418.8 ounces from 583 tons. There are eleven leases and P.As. working, and in some the prospects are very good.

"The *Bellevue South* is working on the *Bellevue East lode*. Forty tons were crushed for 69 ounces, and a fair body of lode stuff was showing on my last visit.

"The *Canberra* returned 15 ounces from 19 tons. The reef is small and the country very hard. This show will be equipped with a small petrol engine and pump, and stone worked below water level early in the coming year.

"*Kathleen Valley.*—The *Yellow Aster* is the only show working at this centre, and crushed 1,086 tons for 620.74 ounces. The reef is well opened up at 70 feet and shows strong all along the level, whilst values are good.

Wiluna District.

"Mining has been quiet in this district owing to the State mill being closed pending the erection of a slimes plant. The total yield amounted to 6,508 ounces from 11,205 tons. Very little development work was done by the mines during the year.

"*Violet G.M.*—*Dawson's* tribute returned 3,546 ounces from 7,461 tons. This ore was treated at the *Bulletin* plant, and was taken out of the old open-cuts, and there appears a large body of stuff to operate on.

"*Moonlight* crushed 2,213 tons for 803 ounces. No fresh developments occurred in this mine.

"*Happy Jack.*—Development work has been continued during the year, and a large body of ore at the 90ft. level has been opened up for 70 feet with ore still in the face; the average width would be 15 feet and values 60s. per ton. The water is very heavy and hampers operations considerably. On present appearances this mine should open up well, and employ a fair amount of labour.

"*Mossman's P.A.* adjoins the *Happy Jack* on the south, and payable ore is being worked right up to the *Happy Jack* boundary. Both these mines have a large tonnage of ore at grass.

"At *Mt. Keith* the *Aurora* treated 661 tons for 487 ounces. This mine looked very well on my last visit and should prove a payable proposition for the owners.

"There are several shows working round this centre; most of them have fair prospects, and the owners make more than wages working them."

MOUNT MARGARET AND NORTH COOLGARDIE GOLDFIELDS.

Mr. H. P. Rockett, Inspector of Mines: Report dated 16th February, 1916:—

"I have the honour to present to you my annual report on the *Mt. Margaret* and *North Coolgardie Goldfields* for the year 1915.

"The mines in these goldfields have been inspected as frequently as possible, which, owing to the scattered positions of the mines, and the large area of the Inspectorate, entailed over nine thousand miles of travelling.

Mines Regulation Act, 1906.

"The provisions of the Act have, on the whole, been well observed, but certain breaches of the Regulations occurred, necessitating one prosecution under Section

32 (3) (g) for neglect in providing canisters for carrying explosives into stopes; and two prosecutions under Section 32 (3) (u) for neglecting to give proper firing warning.

Sunday Labour Permits.

"In all, eight Sunday Labour Permits were granted under Section 46, 'to avoid loss of time in the subsequent working of the mine.'

"In several instances it was found afterwards that no permit was required, as the cases rightly came within the limits of Section 45.

Fatal accidents.

"In the Mt. Margaret Goldfield there were three fatal accidents, and in the North Coolgardie Goldfield two. The scene of each accident was inspected, and the circumstances carefully investigated in every case.

Dust and Ventilation.

"These important matters have received unceasing attention. Every known instance of an underground temperature approaching the maximum permitted by the Regulations has been remedied with the least possible delay. In the North Coolgardie Goldfield the temperature in no case exceeded 80deg. 'dry,' 79deg. 'wet,' but in the Mt. Margaret Goldfield, owing to the greater depth and extent of workings, higher temperatures have been recorded in isolated instances, and have been reduced as soon as detected.

"Water sprays from 'atomisers' have been found thoroughly efficient in laying dust from machines. In the earlier stages after the introduction of these sprays there was some opposition to their use on the ground that the humidity and, consequently, the 'degree of discomfort' would be increased. This was proved not to be the case. The percentage of water in the air was found to have increased slightly, but the 'degree of discomfort' was lowered in every instance. Dust from shovelling, and from shoots is prevented by the use of sprays, hoses, buckets of water or, where mine water is available, by running water down the foot-walls in quantities just sufficient to stop the dust from rising.

Filling depleted Stopes.

"For some time past experiments in filling depleted stopes with pulp residue from the Vacuum Filter have been carried out in the Sons of Gwalia mine, and it is expected that within the next few months a satisfactory scheme will be evolved. Twenty per cent. of this pulp will pass a 150-mesh test, and in consequence of the impracticableness of delivering it where required with less than 30 per cent. of water, the difficulty of retaining the solid in the stopes, while allowing the water to filter off at an economical speed, has proved formidable.

Mining.

"The total quantity of ore raised during the year is approximately 328,900 tons. From this approximately 164,200 ozs. of gold were obtained, valued at £697,475.

"No new discoveries of great importance have been made, but the outlook of one or two fields has improved considerably. There is every indication the output at Laverton and Linden, in 1916, will be much in excess of that from these districts for several years past.

MT. MARGARET GOLDFIELD.

"*Leonora.*—There has been a decrease in the output from the smaller mines in this district due, in some measure, to the owners of the leases being absent on active service with the expeditionary forces.

"*Sons of Gwalia Mine.*—In the matters of gold yield and employment of labour, the Sons of Gwalia mine stands about fifth in importance amongst the mines in the State. Some 280 men are regularly employed underground, while the number all told employed on the Sons of Gwalia leases exceeds 410. In addition to these, about 30 men are engaged maintaining the supply of firewood.

"Within the last two and a-half years the mine plant generally has been, to a large extent, remodelled. The ore-treatment section now includes a gyratory rock-breaker, 50 heads of stamps, 10 grinding pans, three tube mills, and a vacuum filtration unit, operated by gas or gas electric power.

"The Company's water scheme is now nearly completed. This consists of a series of five wells with their water storage and connecting drives. The pump is electrically driven, and is controlled from the switch-board at the mine, two miles away. The supply of water is expected to exceed 50,000 gallons a day.

"The salt water from the mine is now being raised partly by electric pumps, and the old Cornish lift will be discarded in a month or two's time.

"Throughout the year a vigorous development policy was continued with most satisfactory results in proving large bodies of pay-ore. More than 7,000 feet of development work was completed in levels Nos. 19, 20, 21, and 22, and the main shaft was sunk 166 feet to a total depth of 3,288 feet. The year's operations resulted in gold to the value of £248,561 being won from 163,380 tons of ore.

"*Gwalia Central Co., Trump Mine.*—On this mine 710 feet of prospecting and development work was done, and two lodes—one 15in. wide and the other 24in. wide—were exposed, and 97 tons, worth 216ozs. were crushed at the local State battery. In consequence of the abnormally heavy rains in the early part of the year this mine was much handicapped with water getting into the workings.

"*Tower Hill Mine.*—Two attempts were made during the past twelve months to re-open this mine, and put it on a profit-earning footing. About 1,100 tons were crushed, but the ore proved too low grade to allow of profitable handling in such small quantities as could be treated in a five-head mill.

"The *Leonora Gold Blocks* mine has been in the hands of tributers the whole year, and is now under option of purchase to a company. At the mine battery 223 tons were crushed for 205ozs.

"*Rajah.*—This little mine has yielded to its fortunate owners 735 ozs. of gold for less than a year's work. In March last the lease was surrendered by its then owners, and shortly afterwards applied for by another party. These latter worked the show for a little while, and then some of them left it.

"*Ping-Pong.*—171 tons raised from less than 50 feet deep were crushed from this mine for a return of 444 ozs.

"*Auckland.*—The owners of this lease formed a company some months ago, and with the capital raised they put up a plant including a head frame and ore bin, winding engine, air compressor, and machine drills. Before erecting a battery it was

necessary to locate a sufficient water supply. Much expense was incurred on this account, and it is thought that the water problem has now been solved. In consequence of pressure of other work the year's output, 135 tons for 56 ozs., is below the usual return.

"King of the Hills.—The owners of this mine have discarded their old steam-power plant and replaced it with a wood-gas engine. The King of the Hills battery is a great boon to prospectors in the Diorite and Dodger's Well districts, as parcels of ore of any size are accepted for treatment, which enables prospectors to get their trial crushings through with the minimum of lost time and expense. 148 ozs. were recovered by amalgamation from 184 tons broken in 1915, and in addition 101 ozs. were obtained by cyaniding 330 tons of sand and slime.

"Artful Dodger.—Crushed at the King of the Hills battery 66 tons, gave 90 ozs.

"P.As. at Dodger's Well.—From about 160 tons raised from several P.As. in this locality and crushed at the King of the Hills battery, 110 ozs. were obtained. Mining is nearly at a standstill here.

"Starlight.—Except at the Starlight there is little or nothing doing in the vicinity of Pig Well, and in the Starlight work has been more or less intermittent from various causes. The flow of water into the mine was heavy, and the boilers and pumps gave trouble. Later it was decided to put in machine drills and this meant another temporary stop. Finally, operations for 1915 ceased with 151 tons of one-ounce stone crushed.

"North Star.—This mine, the mainstay of Malcolm, shut down in October. The Company stopped work in it about August for lack of funds with which to sink the main shaft another 100 feet and crosscut to the lode. It was then taken over and worked by tributers who gave it up after a couple of months' trial. In all 1,140 tons were crushed for 483 ozs.

"Nine of Hearts.—In the last quarter of the year the Nine of Hearts was unwatered and some ore raised. This was sent to Kalgoorlie for treatment and the gold return is not yet to hand. The mine is situate about 500 yards east of the Malcolm railway station.

"Triangle.—At Randwick, with the exception of 28 tons carrying 93 ozs. from the Triangle, very little ore was broken.

"Lancefield.—The re-opening of the Lancefield mine is a very important feature of the year's operations in the Mt. Margaret Goldfield. The success of the venture appears now to be assured and, after many vicissitudes, the mine is at last said to be within sight of the profit-earning stage. The mine's monthly distribution of over two thousand pounds has greatly benefitted the Laverton district in particular, and the community generally. Many alterations have been made in the surface equipment—chiefly in minor details; but these small alterations taken together have proved a very important factor in the ultimate success of the undertaking. The large ore-body is said to be maintaining its size and value, and a steady output of over six thousand tons a month is now practically certain.

"Lady Harriet.—This mine's output has been well over the thousand-ton-a-month mark, totalling 14,925 tons for 2,688 ozs. A 10-head battery, rock-breaker, four grinding pans, etc., a 72 h.p. Crossley gas engine, a 56 h.p. Crossley gas engine, and a 100 h.p.

wood-gas producer have been erected. It is proposed to sink the main shaft from the 225ft. level to water level, approximately 80 feet and, if the prospects warrant the expenditure, to introduce machine drills. About 50 men are employed by the mine.

"British Flag.—This mine is well known locally as a producer of high grade ore, but it is patchy. The last crushing of 68½ tons returned 568 ozs. The mine is on the northern continuation of the Craigie More Mary Mac lode, about half a mile from Laverton. In the early part of the year a Melbourne company held the lease, but it has lately reverted to its former owners.

"Bega.—The Bega, another producer of rich ore, has had small success this year. A heavy continuous flow of water into the workings gave much trouble, and the owners had finally to procure a petrol-driven pump.

"Augusta.—There has been considerable trouble at this mine with the plant and machinery, and other matters, and the claim is now shut down temporarily at least.

"British Lion (late Cock of the North).—During the first half of the year the northern extension of the Ida H. line of lode received some attention. Several parties were at work in this locality, and from the old Cock of the North—renamed the British Lion—500 tons were sent to the Laverton State battery. The result of the crushing, though not profitable, was encouraging. Work on the mine has ceased for the present.

"Ida H.—On this mine extensive alterations have been made both underground and on the surface. Nearly the whole of the surface equipment, including the battery, has been moved about a thousand feet north to near the mouth of the new incline shaft.

"A new connection has been made, rising and sinking through six hundred feet of ground, between the top of the incline shaft at the 500 feet level and the surface.

"The new erections include a 'National' gas engine and producer. The development work includes sinking and rising 611 feet, and 924 feet of driving, etc.

"In 1915 gold to the value of £45,616 was recovered from 14,747 tons. The equivalent of £623,048 in gold has been won from this mine.

"Burtville.—There has been a marked decrease in the gold yield from this centre. None of the mines have reached last year's figures, while some, the Black Swan and the Edith Hope, were not working at all.

"Nil Desperandum Mine.—The Nil Desperandum is again at the head of the list of Burtville mines, with 1,517 tons for 595 ozs. A wood-gas producer plant and a Krupp ball mill have been erected. The ball mill, crushing 'wet,' is said to give satisfaction.

"Golden Bell.—This mine was unwatered, and a level cleaned out but stopped work again within a couple of months.

"Black Swan and Sons of Westralia.—A Melbourne syndicate has acquired these leases and has eight or nine men engaged on development work. The assays are said to be encouraging.

"Redeemed.—The Redeemed is the only mine operating in the neighbourhood of Mt. Weld. The operations for the year were confined to development chiefly.

"Childe Harold.—This lease has been re-named the Lone Star. The battery and plant which were

brought over from the Mikado in 1914, has run almost continuously. The mine is not being worked below the 70ft. level as the volume of water is too much for the pump. The 2,240 tons of ore raised yielded 650 ozs. and returned a satisfactory dividend to the local syndicate which owns the lease. It is hoped that during 1916 a pump sufficiently large to keep out the water from the lower levels will be erected. The records show that to the end of 1915 the total gold from the mine is not less than 11,690 ozs. obtained from 29,690 tons.

"Westralia Mt. Morgans.—Here an energetic development policy has resulted in the mine again showing a profit. In 1914 68 feet of driving, etc., was done, but in 1915 1,854 feet of driving, cross-cutting, and rising resulted in large bodies of payable ore being located. The year's operations produced 26,994 tons worth £27,230 as against 15,992 tons for £14,857 in 1914. No. 2 mill of 10-head was renovated and practically re-erected, and a 200-ton bin was built, while other additions to the plant in the shape of a new winding engine, boiler, rock-breaker, and a small air compressor were made. The Company's leases, the Guests and the Lily, are being worked by tributers.

"Millionaire.—This mine is let on tribute. The battery, the property of the Westralia Mt. Morgans Company, was put in order early in the year and has done much to assist prospectors and tributers. When it becomes more widely known that there are crushing facilities locally, for parcels of any size, there should be a revival of interest in this district.

"Mt. Morven.—This is the only mine now working in the vicinity of the old Mt. Margaret townsite. There are a 5-head battery and a cyanide plant on the lease. Work underground has ceased, temporarily, pending flotation into a larger company, but some 2,000 tons of accumulated sand and slime are being cyanided.

"Murrin Murrin.—There was no gold ore raised in this neighbourhood in 1915, and the copper ore won was below the average of the last few years, both in quantity and in value.

"West Australia Copper Co.—At this Company's Eulammina mine work is now confined almost entirely to breaking ore in the Eulammina shaft, and little else than prospecting is being done in the main shaft. The output was 4,356 tons of copper-sulphur ore valued at £5,624. The same company's Nangaroo mine produced just half what it did last year, namely 745 tons, while the value, £1,117, shows a falling off also.

"Duketon.—Mining at this centre is still very quiet. There is far less prospecting being done here now than formerly.

"Mulga Queen Mine.—This mine was worked for some months by a local syndicate, and latterly by tributers, but the great distance, 95 miles, from the rail-head, and the increased cost of supplies combined to make the undertaking barely profitable.

"Mulga Queen Consols.—554 ozs. were recovered from 367 tons from this mine, crushed at the Mulga Queen battery.

"Erlistoun.—For years past this centre has been almost deserted. This year, however, there was a slight revival which resulted in 681 ozs. being taken out of the Great Dolerite No. 1.

NORTH COOLGARDIE GOLDFIELD.

"Comet Vale District.—Several small mines in this district have been sampled by representatives of

larger concerns, but none have changed hands. Outside the three principal mines the district is very quiet.

"Sand Queen Mine.—The Sand Queen has kept up its gold output to last year's standard, but the tonnage was slightly less. The main shaft was sunk 174 feet, and pay-ore proved for 270 feet at the 650ft. level. In all, 1,460ft. of driving, sinking, etc., was done and 22,300 tons yielded 20,560 ozs.

"Gladsome.—This mine crushed 7,320 tons for 4,690 ozs. The work has been confined mostly to stoping.

"Happy Jack.—Work in the Happy Jack was intermittent and consisted chiefly of stoping. 458ozs. were obtained from 1,222 tons raised in about nine months.

"Goongarrie District.—This district is receiving more attention from prospectors than it has done for a long time past.

"The New Boddington obtained 323ozs., including 'dolloed' gold, from 75 tons. A Kalgoorlie syndicate has an option over the mine and has equipped it with a winding engine. Considerable exploratory work was done, and the erection of a battery is under consideration.

"Davyhurst, Mulwarrie, Ularring Districts.—These districts are very quiet—quieter even than they were in 1914. In the middle of the year there was some activity at the Dardanelles, formerly the Waihi, near Davyhurst. A machine drill, supplied with compressed air from the Golden Pole compressor, was at work for a couple of months, and later a gas engine was erected and a start made on a battery. Suddenly operations were stopped.

"At Ularring 104 tons from the old Red Leap mine yielded 43ozs.

"At Mulwarrie a little rich ore was taken out from near the surface. The total was less than 100 tons.

"Mulline District.—There has not been any renewed activity in this district. The largest crushing, 178 tons for 96 ozs., came from the Lady Gladys, while the largest gold yield was obtained from 65 tons raised at the Young Australian, which returned 123ozs.

"Riverina.—The Riverina South mine is the one mine working here. A Melbourne syndicate took an option over the mine and since then much useful exploratory work has been done. Crushings totalling 1,016 tons yielded 499ozs. The North drive is now being sunk, and it is proposed to extend the North drive some 200 feet to open up some ore of known value.

"Menzies.—There has been a falling-off of interest in mining about this centre, and work is confined to 'shows' producing less than 100 tons a month. At present the district seems to be unfashionable, but I feel confident that several of the mines here are well worth the attention of strong syndicates. In February last a phenomenally heavy fall of rain caused floods which did much damage in the mines.

"The Balkis was filled to the collar of the shaft, and about a thousand tons of sand, valued at 20s. a ton, were swept away completely. Some of the returns from this centre are—

From the Lady Shenton ..	773 tons for 638 ozs.
From the Flying Fish South ..	436 tons for 321 ozs.
From the Menzies Exploration ..	275 tons for 153 ozs.
From the Robinson Crusoe ..	354 tons for 153 ozs.

"Woolgar District.—Except the Menzies Consolidated there are only a few P.As. working in this locality.

"Menziess Consolidated Mine.—This mine continues to hold first place for general importance in this goldfield. The output for the year was 28,600 tons, from which were recovered 14,790ozs. Sinking in the main shaft was continued to the depth of 1,581 feet; other development work totalled 1,650 feet. It is intended to remove the battery to near the main shaft, and a start has been made on the erection of a wood-gas plant at the new battery site. This alteration will eliminate some 2,000 feet of surface haulage between the main shaft and the battery.

"Mt. Ida District.—In this district, also, the February rains did much damage to mining property, and are, in fact, largely responsible for the reduced output from this group of mines. The Unexpected, and the Unexpected South mines were completely flooded, the storm water running two feet deep over the collars of the shafts. In each mine the top part of the shaft collapsed for 60 or 70 feet down from the surface, and no efforts have been made to re-open the old workings.

"In the Unexpected some new ground has been opened.

"The Forest Belle mine suffered at the same time, but in a very much less degree.

"A couple of stopes and the lower part of the shaft became filled with mud and rubbish from the surface, but by June the mine was again in full swing.

"The best crushings from this district were—

From the Forest Belle	300 tons for 237 ozs.
From the Copperfield	318 tons for 91 ozs.
From the Wild Rose	103 tons for 55 ozs.

"Kookynie and Niagara.—At Kookynie a party of tributers struck a good shoot of ore in the Cosmopolitan No. 2 mine, formerly the Altona South, from which they obtained 1,689ozs. from 1,117 tons. Nearly the whole of the rest of the mining in these districts is confined to that on Prospecting Areas.

"Yerilla District.—There is still a little prospecting going on, but none of the leases are doing more than complying with the 'labour conditions.'

"Yarri District.—A dozen or so men are still prospecting in this neighbourhood, but they have met with small success. The Yarri Proprietary, which worked the old Wallaby lease, crushed 1,172 tons at the State battery, but the net return was not satisfactory and the mine shut down.

The Dortmund was acquired by a small syndicate who are just now getting the mine into order after an expenditure of over three hundred pounds in equipment.

"Edjudina District.—There are ten or more parties working on this line of lode. The Senate with 155 tons for 196 ozs. was the largest producer. The Neta battery crushes for the public as occasion offers.

"Pingin.—At Pingin the Anglo-Saxon crushed 185 tons for 118ozs.

"Linden District.—There has been increased activity at this centre. The number of leases held, and applied for, as well as the gold yield, is in excess of that for several years past. All the mines except the Devon mine are now owned and worked by local syndicates to whom is due, almost entirely, the credit for the increased prosperity of the district. The Democrat mine is now down 360 feet and looking well. No crosscuts have been made and neither foot nor hanging wall found, but the lode is proved over nine feet wide. 135 tons returned 458ozs. To the end of October the Olympic mine had yielded 381ozs. from 156

tons. This mine is now under option to a syndicate, and a new main shaft has been sunk.

"Operations have lately been resumed at the Devon. The main shaft has been sunk to the 100ft. level, and drives are being put in north and south. A pump capable of keeping the water out of the mine has been erected, and it is anticipated that stoping will commence at an early date.

"A new pump has been placed in the Great Carbine, and the owner intends to give the mine a good trial.

"Yundamindera District.—Yundamindera returns show a large increase of output. The Queen of the May has been re-opened with very satisfactory results. 544ozs. were returned from the treatment of 274 tons crushed at the Battlesville battery. The shaft is 146 feet deep.

"No work is being done underground in the Battlesville lease, but the battery has been of very great service in testing many small parcels of ore from the Yundamindera, Eucalyptus, and Pennyweight Districts."

EAST COOLGARDIE GOLDFIELD.

Mr. W. F. Greenard, Inspector of Mines, Report dated 14th June, 1916:—

"I have the honour to submit, for the information of the Hon. the Minister for Mines, my annual report on the administration and working of 'The Mines Regulation Act, 1906, and Amendments,' within the East Coolgardie, Kanowna, and Broad Arrow Goldfields.

"A systematic and continuous inspection has been maintained throughout the year on all mines in the above Goldfields.

"The filling of all stopes, (other than shrinkage stopes) and to have all ground timbered, has been enforced strictly.

"The cutting and re-shoeing of ropes every six months, and careful examination and lubricating daily, have been recommended and enforced.

"The storage of dynamite above and below in all mines has been strictly enforced in accordance with the Act.

"The testing of safety appliances has also been carefully attended to, both cages and hooks.

"Signals.—Return signals are in operation in all shafts where continuous work is in process.

"Foreigners.—The language test has been strictly enforced.

"Certificates for Holman's Hoist.—Careful examinations have been made, and all hoist drivers are registered.

"Medical Certificates for Winding E.D. Reg. 7.—All engine-drivers employed on large winding engines are compelled to have a medical certificate; the Regulation has been strictly enforced and a register is kept in the office.

"Dust.—Dust underground has been suppressed to a minimum. Pipes and sprays are in use in all working places; water is now available for every miner to use on any broken rock likely to give off dust; all bins are equipped with sprays for laying dust.

"Dust on the surface and in the dry-crushing plants has also received considerable attention, and has, through coverings and spraying, been considerably curtailed. Exhaust fans, pipes, and receivers are continually under repair, and a strenuous effort is made to attain a high standard of dust suppression.

Fatal Accidents.—Kanowna 1, Broad Arrow 1, Kalgoorlie 13. There were 608 serious accidents at Kalgoorlie, none at Kanowna, and two serious and five minor in the Broad Arrow Goldfield. Careful inquiries were conducted into all these happenings. This large accident list has been the cause of considerable reflection to me, and I have not hesitated to ask myself, Is there anything that can possibly be done to reduce these constantly recurring results?

Prosecutions.—Seven prosecutions were undertaken for contravention of 'The Mines Regulation Act, 1906,' various amounts of fines were inflicted in six cases, and one case was dismissed without costs against the Department.

Ventilation.—Ventilation has received a considerable amount of attention during the year. A number of open-running fans have been installed to assist the natural ventilation.

The ventilation of the Great Boulder Proprietary has been still further improved, and practically every air-current in the mine has been governed with excellent results.

The ventilation in several of the other mines is all that could be desired. This is a very large and important question.

I may say I am not entirely in accord with the methods adopted by Mr. Inspector Hutchinson to secure improvements.

Mining Generally.—When it is considered that there are two (2) to three (3) hundred miles of underground workings to be inspected, and that over one hundred thousand tons of ore are treated monthly, it will be realised that there is a large amount of detailed work to be done. The Ivanhoe Mine have now completed their main shaft down to 3,500 feet, and are now sinking another lift of 150 feet, which will make a total depth of 3,650 feet. The Golden Horseshoe Mine have also sunk down to 3,000 feet and are continuing sinking. In this mine the Boulder Lode entered at about 2,500 feet, and is known as the No. 4 Lode; this lode was very prolific in the Great Boulder for 2,500 feet, and continues in the Horseshoe as a large ore-channel carrying large quantities of ore and high values.

There have been no sensational developments in the other mines, but there are very great possibilities, and we may anticipate that when normal times arrive great development schemes will be undertaken with good results. A good deal of prospecting is still being done on the North end of the Field, which has large ore deposits insufficiently tested."

Mr. E. Gourley, Inspector of Mines: Report dated 14th January, 1916:—

I have the honour to submit to you my annual report for the year ending 31st December, 1915, of the mines in the district which I inspect.

Golden Ridge Gold Mine.—Development work in the bottom levels of this mine has been discontinued for some time, and the water allowed to rise to the No. 4 level. Stopping has been confined to taking out pillars chiefly, but a large quantity of ore has been won by open cut down to the 80ft. level.

Tributes have already been let in certain parts of the upper levels, and a promising run of ore discovered some distance north of the main shaft in the new ground; the tribute having expired, the Company are now developing this at the 200ft. level.

A total of 903 feet of development work has been done in the upper levels.

Kanowna.—Lily Australis G.M.—This mine has been entirely worked by tributers, some of whom have been doing very well taking out pillars. No development work of any extent has been done for the year, but recently the mine has been unwatered to the No. 9 level, and work has been resumed at this level. 9,410 tons have been treated for 4,922 ounces.

White Feather Main Reef.—Tributers have been working the 200, 300 and 400ft. levels, but have not been very successful. No new machinery has been erected on these mines.

Ballarat Lease.—This mine has been taken up by Messrs. Willmott and Harrop, and head gear, winding engine, Cornish lift, and four-drill air compressor have been erected, and the mine is being unwatered.

Sunbeam Lease.—This mine has been worked by a party of miners, and, although the stone raised was of good value, owing to the hard ground, narrow reef, and the appliances to cope with the water, the expenses were too heavy to show a profit, and the mine closed down. The rich stone is still going down under the 200ft. level in a winze that has been sunk to a depth of 20ft.

The Robinson Mine, Louise, Last Chance, Golden Crown, and the Red Hill leases are being worked by small parties of men with varying success.

Beek's Reward Mine.—This mine has been taken up by a Melbourne company, and the workings are being unwatered.

Alluvial Leads.—Moonlight Lead.—This claim has been under exemption for the greater part of the year, and a few men are still making a living, mining the leavings in places on the other leads.

Balagundi.—Three inspections have been made of the mines in this district, where two or three parties of tributers are following contact leaders, but nothing of any note has been discovered.

Barton Black's P.A. 493Y has been sampled under instructions from the Mines Department, and the results have been sent to that Department.

Bulong.—Three visits have been made to this district but mining is very quiet, the chief work in progress being the quarrying for magnesite, which employs about 20 men.

Bardoc.—Early in the year a new find was made by Messrs. Hampton and McCarty about two and a half miles north of the townsite. This caused a good many prospectors and others who peg out leases for speculation purposes to go to this district. Gold was discovered on some of these leases over an area of about five miles in length by about half mile in width, and shoots of ore worked so far have been short and rich; and although several representatives of capital have inspected the mines, no business has been done and the place is again somewhat neglected, but I am of opinion that it did not get a fair trial.

Zoroastrian Mine.—Messrs. Jessop and party have erected a five-head stamp mill oil engine and lowered a two-throw pump to the 300ft. level in the main shaft for a water supply. A start has been made to crush ore from the old stopes over the 100ft. level, but on my last visit they were having trouble with their extraction, which they thought was caused by the water. However, a sample of water tested

for them at the School of Mines discovered nothing to interfere with the amalgamation, so it is evident that there is something in the ore which is giving them the trouble.

"Leich Bros. by loaming discovered a rich patch of 600ozs. ore on the surface south of this mine and also another patch of 500ozs. some distance north. This party appear to be experts at patch hunting. They have found several patches on the Murchison, and are now working on another at Lawlers.

"*Ora Banda*.—The Victorious Mine has been the mainstay of this district, and although development work in the bottom levels has been somewhat disappointing, there is still a large quantity of ore reserves to be worked.

"The Slippery Gimblet Mine has been taken over by this Company, and the two mines worked together should ensure operations being continued with good results, the ore body in the bottom level being rich and well defined.

"The Gimblet South Mine.—This mine has been crushing throughout the year with a 10-stamp mill, the ore being broken chiefly from the stopes over the 100ft. level and by open cut workings. Ore body is very wide but of low grade.

"Christmas Reef.—Some rich patches have been obtained from this locality near the surface, but no lode or reef has been discovered so far of any length or width.

"*Waverley*.—The Siberia Consols mine having closed down during the year mining has been very quiet, yet some good returns have been obtained from the Siberia Reward and Bonnie Doon leases.

"*Broad Arrow*.—Messrs. Borland and Rudd discovered a rich lode formation in an old shaft at a depth of 45ft., from which they have dollied 810ozs. They have a good quantity of ore at grass ready for the mill. This find has brought a good many prospectors to the place who are doing good work, and payable ore has been found on two or three leases, but sufficient work has not been done to give any idea as to the permanency of these lodes or otherwise.

"*Lady Evelyn Mine*.—A syndicate of working miners acquired this mine in the early part of the year and they extended the north level a further distance of 200ft., where rich ore was struck, and parcels treated by their own five-stamp mill enabled the syndicate to discharge all their liabilities and make a good profit. This lens of ore is being followed below this level by a winze on good values. The main underlie shaft has been straightened up and timbered, with a view to developing the mine at the 300ft. level. The hanging wall is very heavy, and I have visited it regularly to inspect the work in progress, for the management were inclined to be careless in their method of timbering and filling the stopes.

"*Yellow Jacket*.—A Kalgoorlie syndicate has been working this mine for some time, and payable ore has been mined from the 80ft. level and sent to Kalgoorlie for treatment. The mine was under option to a Melbourne company when I last visited it.

"*Smithfield*.—Messrs. Barrett and Rasmussen have erected a Huntington mill, friction winch, gas engine 20 h.p. with producer (charcoal). They have a large body of lode material with veins of iron and quartz. These veins are very rich in places, and they are looking forward to successful operations for a long time.

"*Spin of the Coin P.A.*—A. Percy has been working this area, and has obtained two small crushings

for an average of 2ozs., but the vein is small and hard, and he had just about made a living out of it.

KALGOORLIE.

"*Idaho G.M.*—During the year the 200ft. level at this mine has been driven south a further distance of 100ft. on the course of the lode, and approximately the same distance north at the 150ft. level, and a considerable amount of payable ore has been opened up. The stopes over these levels have yielded some rich patches from both hanging and foot wall lodes, but on account of a very heavy hanging wall the lode is expensive to work, timber and filling having to be kept right up to the back continuously.

"*Star of Aberdare Lease*.—This is being worked by the same owners, and a crosscut has been driven from the main shaft at 100ft. to cut the lode worked in the open cut. A level has been driven 200ft. south on this lode on payable ore, stopes have been opened up which average 12ft. in width for the whole length of this level, and from this lease and the Idaho a five-stamp mill and a Huntington mill have been crushing continuously about 1,200 tons a month.

"*Lake View South Extended*.—Elliott and party have taken up this lease, and negotiations are in progress to secure a plant to unwater the mine, which, according to assay plan, appears to have a good chance of success.

"*Lake View South Mine*.—Prosser and party have been working this mine on tribute, treating ore from the upper levels with a Huntintdon mill, and obtaining payable returns.

"*Central and West Boulder*.—This mine is entirely in the hands of tributers, but the returns have been disappointing from the main shaft workings. Louden and Horn's syndicate have been doing well from their workings on the Lake View boundary.

"*New North Boulder*.—The Company have been prospecting in different parts of the mine from the 400ft. level upwards, and several short lenses of sulphide ore have been discovered which have yielded a fair profit. Unfortunately these lenses have been very short and are quickly worked out. Nothing of any note has been discovered in a number of prospecting shafts sunk by tributers. 265ft. of development work has been done.

"*Boulder No. 1*.—Oates and party obtained payable parcels of ore from their tribute block down to the 100ft. level. Smith and Wells have the ground under them, and have driven a level from Albert's shaft a distance of 300ft. at 160ft. in depth. They have now reached the point where the chute of ore should be, but have not found it yet; so they have started a rise to hole through. Several other tributers are making a living in the old workings.

"*North Kalgurli G.M.*—This mine is entirely in the hands of tributers and development work is almost at a standstill. A winze 60ft. sunk below the 600ft. level gave good returns for a depth of about 40ft., where the values cut out and no further work is being done. A party at the 400ft. level are stoping out a body of ore which gave them wages, in addition to which a number of parties are working in the upper levels and other parts of the lease, but with the exception of one or two rich parcels the tributers have not been very successful.

"*Paringa G.M.*—During the year 330 feet of diamond drilling has been done by the Company at the No. 1, and 2 levels. Lode material was cut in each of

these bores, but values were low and no development work has been undertaken to further explore these lodes. Tributers have done well on some blocks, and further prospecting is being carried out.

"Brownhill Extended G.M.—A tribute syndicate made an attempt to unwater the east shaft during the year to work a body of ore at the 600ft. level, but on account of the large quantity of water and the skid fastenings being eaten away with rust they did not succeed, and the venture has been abandoned for the time. Tributers have been turning over the broken ground from a huge fall of rock on the fringe of the Oroya-Brown Hill rich chute on the boundary at the 200ft. level, and after warning the men of the danger, they persisted in getting down between the cracks of the large rocks, chipping telluride veins. Two of these men have been prosecuted and fined, also the manager for not keeping his record book written up.

"Croesus South G.M.—Hannans Central Milling Co. still hold this mine and tributers are at work in different places. The 200ft. level has been driven north for 150ft. and two pipes of ore discovered, but they have proved to be very short. The No. 2 shaft has been repaired to the 300ft. level, poppet heads braced up, and a winch and boiler placed in position, and the mine is to be given a further trial.

"Associated Northern G.M.—This mine is entirely worked by tributers, both treating the residue dumps and underground. Development work has been confined to the shallow workings on the west lodes, but nothing of importance has been discovered in the main shaft workings. The tributers have been working out rich telluride leaders which have been left in the walls of the rich ore pipes, and some rich parcels have been mined.

"Ironsides North G.M.—Work has been confined to the development of the No. 3 and 4 levels, and stopping between these levels.

"Maritana Hill and Lord Nelson Leases.—A number of tributers have been employed working on leaders which are very small but rich in places.

"Cassidy Hill Mine.—During the year the main shaft has been unwatered and repaired to the 300ft. level, head gear and boiler and winch placed in position. A rich patch of ore was discovered in the south level, which proved to be of no extent. These workings, and also the other parts of the mine, are being worked by tributers down to the 200ft. level. Quartz veins are narrow and the ground very hard.

"Hannans Reward and Hannans Reward North Mines.—These mines are being worked by Mr. H. Raven. Ten-stamp mill is constantly employed on ore broken from the 400ft., 100ft., and open cut workings. The winding engine and boiler has been overhauled at the Reward shaft, and the shaft unwatered to the 400ft. level. It is intended to erect Huntington mills on this part of the mine. About 1,200 tons of ore per month are being treated.

"North End Mines.—Tributers have been working these leases but nothing of importance has been discovered, but on the small lease to the south, known as the Sunrise, sold to Messrs. Regan and Lowe, a rich pipe of ore was discovered, and two or three rich crushings have been obtained; they appear to have lost the chute at the 100ft. level on a fault.

"Adelaide Enterprise G.M.—This Company are working a continuation of the Hannans Reward lode on a small lease adjoining the reservoir, and have been obtaining regular payable returns. They have

recently purchased about six acres to the north-east from Hannans Reward Company, and development work is in progress on this area, the mill being employed two shifts on ore broken from the 145ft. level to the surface, about 500 tons a month being treated.

"Creswick Lease.—A three-stamp mill and Berdan pan driven by electric power has been erected on this property, and is at work crushing ore from a rich leader above the 100ft. level.

"Hidden Secret G.M.—This mine is being prospected below the 400ft. level by a local syndicate. A winze has been sunk to a depth of 90ft., and a drive at this depth on the course of the lode south on low values is being pushed on.

"Golden Zone G.M.—The machinery on this and Hannans North lease has been sold during the year, with the exception of the cyanide plant, winding engine, and air compressors on the Star lease. No mining work is being done at present. Owners are treating their accumulated slimes.

"Golden Dream Mine.—A party of miners have picked up a continuation of this lode. Some distance north of the old workings payable ore is being broken over a width of 4in. at the 80ft. level.

"Mystery, Lone Hand, and North Collier leases.—Returns for the year have been low; development work done disclosed nothing of importance. I have made regular inspections of the underground workings, ropes, safety appliances, etc., and paid particular attention to dust and ventilation of the different mines.

"Accidents.—Three fatal accidents have occurred in my district, five serious and five minor. The fatal accidents were inquired into by the coroner and jury, and in no case was negligence disclosed.

"Three prosecutions for breaches of the Mines Regulations Act were taken, and in each case a conviction was obtained.

"Special inspection has been made of the open shrink stopes on the Perseverance, Lake View, and South Kalgurli mines, and reports have been sent to head office."

Mr. W. Phoenix, Inspector of Mines, report dated 16th March, 1916:—

"I have the honour to submit for your information Annual Report for 1915.

"The mines in my district have been regularly inspected. Defects likely to cause danger have been remedied. I have kept in close touch with the workings in every mine, and matters of a dangerous nature have received immediate attention.

"Dust.—Hearing so much about the dust evil of underground mining, many are induced to form wrong conceptions of existing facts. A great deal has been accomplished to prevent the dust evil. I have worked strenuously to have this evil remedied. The laying of dust has received special attention, although my inspections have been of a general nature.

"My previous reports have fully explained the method adopted in each mine. These methods are proving satisfactory. The humidity caused by spraying in some of the deeper workings has caused a revulsion of feeling against it. The effect on health of a hot and humid atmosphere must be considered, and also the effect of spraying and laying the dust. These must have practical trials before the full effect of spraying can be ascertained.

"Heat and moisture are conditions favourable to the spread of disease. The health of a miner must be

considered from many points. The dust has been kept down by the water being used judiciously on the ore after it has been broken. Every possible means has been taken to reduce the amount of dust inhaled to a minimum. The dust prevention is not confined to rock-drilling alone, but applied also to Boggers and trucking from ore shoots.

"It has been already demonstrated that when no means are employed in damping the ore a considerable quantity of dust is floating in the air.

"The problem of high temperatures met with at a depth will have to be faced, particularly where the humidity is high.

"Endeavours are now being made to have sufficient currents of air where the temperature is high and the air humid. It seems clear that as these mines become deeper those in control will have to face the problems of high temperatures.

"Then, on the other hand, a considerable draught playing on a miner who is wet from work is very injurious.

"I mention these facts chiefly because of their relation to the future means that must be adopted for minimising the danger from dust in the deep levels. The dust evil underground is well under control. Dust from dry mills is receiving attention, and a considerable improvement has been made.

"*Accidents.*—It is to be regretted that we have had several fatal accidents from falls of ground. This matter has received close attention. I still find that they are mainly due to want of individual care. Many men have a disregard of the provisions established for their safety. Where ground is considered treacherous men take means of making it secure, hence we have had but few accidents in ground of this nature. If the same individual care is exercised in all parts of the workings, accidents from fall of ground would be considerably reduced.

"*Ropes.*—The system of examining ropes is fairly satisfactory, and every care appears to be taken by them. We had a rope break at the Horseshoe main shaft, the cage got jammed in the shaft, and the driver in trying to extricate it broke the rope. It was found that 6ft. of this rope showed signs of internal corrosion, the remainder of the rope was quite new,—which was not detected when the rope was put on. This corrosion must have got into the rope before it was put on to the drum.

"*Gates on Cages and Travelling Chairs.*—Gates on cages are giving every satisfaction, and travelling chairs are adopted in most of the deep mines, and are also working satisfactorily.

"*Safety Appliances.*—Safety appliances are well looked after and regularly tested.

"*Explosions.*—Explosives used are of a fair quality, and every provision is made to safeguard the men from accident due to explosions.

"*Development.*—No new development of note has been made. These mines continue to maintain their regular output."

Mr. W. Hutchinson, Inspector of Mines, report dated 26th January, 1916:—

"I have the honour to report that since taking up the duties of Inspector of Mines in the Kalgoorlie District, my attention has been specially given to the ventilation of these Kalgoorlie mines, in accordance with the instructions given by the State Mining Engineer. Many of my inspections have been of a more or less general nature, but in all of them the ventila-

tion of the mine under inspection has been specially inquired into. The laying of dust and general matters relating to the big mines are specialities to which my fellow inspectors have devoted their special attention, and they will therefore report on those matters. This report will be exclusively devoted to matters relating to ventilation.

"I beg here to state that in following my work Mr. Greenard, the Senior Inspector, and Inspectors Phoenix and Gourley, have always placed at my disposal their valuable help and views.

"The mines under my inspection have been—

The Great Boulder Proprietary.
The Great Boulder Perseverance.
The Associated.
The Lake View and Star.
The Eclipse.
The Brownhill.
The Ivanhoe.
The Golden Horseshoe.
The Kalgurli.
Lake View Group.
The South Kalgurli.

Method of Inspection.

"1. The method of inspection adopted has been one calculated to test—

- (a) The stability of the ventilation of the mine, *i.e.*, the constant direction or otherwise of the air currents, and the constant quantity of air ventilating the mine.
- (b) The efficiency of the ventilation, *i.e.*, the ventilation pressure produced by natural means or other means where adopted, to produce sufficient ventilation to meet the requirements of the mine.
- (c) The total quantity of air entering the mine, and how that air was distributed through the workings of the mine.
- (d) The temperature and hygrometric state of every working place in the mine.

"The observations made in order to test these matters have been—

- (a) The directions of the currents have been noted, and anemometer readings have been taken on each visit to every mine.
- (b) Temperatures have been taken in the downcast shaft and upcast shaft or upcast air currents in order to ascertain the difference of temperature between the two columns, for the principal factor governing the quantity of air produced by natural ventilation is the difference of temperature between the descending and ascending columns of air. The greater this difference the greater the ventilation pressure will be, and the larger the quantity of air. The mines have therefore been inspected to ascertain if there are sufficient brattice cloths and doors to effect a judicious separation of the two columns and allow sufficient of the downcasting column to reach the lower levels, and give the workings sufficient air to keep them cool.
- (c) In order to test the quantity of air and its distribution through the workings of the mine, measurements of the amount of air entering the mine have been taken on various levels, and also of the amount of air going up the return shaft on the same

levels; in addition to this, the quantity of air passing through the various stopes has been measured. By these means it has been ascertained if the air entering the mine has been properly distributed through the workings, or whether it has been allowed to escape from the down cast shaft or intake into the upcast shaft before having done its work in ventilating the workings of the levels and stopes.

- (d) In order to ascertain the hygrometric state of the working places of the mines hygrometrical readings have, and are, being constantly taken in every working place in the mines. These observations have been recorded in Table form, some of which have been forwarded to head office with accompanying reports; some will be attached to this report.

Inspection of Mines throughout.

"2. When making a thorough examination of the ventilation of any one mine that particular mine has been visited continuously day after day until the whole of the working portions of the mine have been gone through and all the old workings, levels, winzes, passes, shafts and opencuts communicating with the mine, and which had any bearing on the ventilation of the mine, have been traversed and examined. In addition and, at varied intervals, single day inspections have been made between the throughout inspections.

"To show the state of the mines as regards their ventilation, their hygrometrical state and temperature, the improvements which have been made, improvements which are now under contemplation, and improvements which are needed, it is proposed to deal with each mine separately.

The Great Boulder Mine.

"3. This mine divides itself into two parts, which are usually referred to as the 'Main End' and the 'Hamilton End.'

"The Main End is the southern portion of the property, and the Hamilton End the northern portion. The strike of lodes being worked is about north-west and south-east, but is usually spoken of as if the strike were north and south; drives on the lodes are spoken of as North drives and South drives, and in this report the common usage of the terms north and south will be adopted. The plan of the property is divided into 60ft. sections, numbered consecutively from 1 to 61; No. 1 section being at the south end of the property and No. 61 section being at the north end. Any place in the mine is denoted by the depth of the level and the number of the section.

"The underground workings of the Hamilton End are entirely separated from the Main End, with the exception of one connecting crosscut or drive on the 1,200ft. level; but so far as ventilation is concerned, they are each ventilated independently of the other, and will therefore be dealt with separately.

"*The Ventilation of the Main End of Great Boulder Mine.*—(a) Shafts and Outlets.—There are two shafts reaching the deepest workings of the mine: the main shaft which is in Section 28, and which is the upcast shaft, and the Edwards shaft, the downcast shaft, which is in Section 20,

"There is another shaft, which is known as the Lane shaft, situated in Section 4, but this shaft, which I believe is sunk to a depth of 1,200 feet, is only connected with the workings of the mine at and above the 500ft. level. This shaft is also a downcast shaft, and the air descending it reaches the 500ft. level, travels along the drive and crosscut, and enters the Edwards shaft and descends from that level. There are four main sand-passes which follow the lode from the surface to the lower workings; these are all open to the surface.

"One is in Section 32 and another is in Section 30. Both these sand-passes are upcasts, and each has a chimney stack of a height of about 70ft. above it, built with the object of increasing the quantity of air in the mine.

"The other two sand-passes are situated in Sections 24 and 17, respectively, and are usually downcasts to about the 1,200 or 1,300ft. levels. The stopes and levels being more or less open to the upcast sand-passes in Sections 30 and 32, most of the air coming down the sand-passes in Sections 17 and 24 courses through the levels and stopes, and goes up the sand-passes in Sections 30 and 32. Some finds its way into the upcast shaft.

"The air supplied to the stopes down to the 1,200ft. level by sand-passes in Sections 17 and 24 is usually more than sufficient to supply the requirements of the few men who are sometimes working in the levels above the 1,200ft. and this enables the manager of the mine to brattice off the Edwards shaft entirely to prevent any air being drawn off from it in the upper and middle levels, thus compelling the whole volume of air descending the Edwards shaft to reach the lower levels of the mine.

"(b) *Temperatures and Air Currents.*—As previously mentioned, the mode of inspection is sometimes to spend several days on one mine and inspect it right throughout, and allow these throughout inspections to be sandwiched by periodical one-day inspections.

"Between June 23rd and July 5th, inclusive, a throughout inspection was made of the Great Boulder Mine. Temperatures and hygrometrical readings were taken in every level and every part of the mine, and air measurements were made in various levels and places in upcast shaft, downcast shaft, sand-passes and outlets from stopes. These observations have been tabulated and forwarded to Head Office.

"An official of the mine accompanied the Inspector on this inspection. At the time of this inspection about 25,000 cubic feet per minute of fresh air were going down the Edwards shaft, and reached the 2,200ft. level, some going forward to the 2,500ft. level, but it was found that only a small proportion of this air was actually circulated in the stopes between the lowest working level and the 1,600ft. level, where most of the workings of the mine are. Although the Edwards shaft had been fairly well bratted off in order to confine the downcast air in the shaft and ensure it being brought down to the lower levels, it was found that on it leaving the downcast shaft it had a far too easy course into the upcast shaft, and a large portion of it went into the upcast shaft instead of going through the working stopes. Moreover, there was an open connection at the 2,800ft. level between the

Great Boulder main shaft and the Golden Horseshoe Mine, and a good portion of the air from the Boulder descended the lower portion of the Main shaft and entered the Horseshoe Mine. Out of the 25,000 feet of air per minute coming down the Edwards shaft, 10,000 cubic feet per minute were going into the Horseshoe mine, and on the 1,900ft. level 4,200 cubic feet per minute had already reached the upcast shaft, showing that only $(25,000 - (10,000 + 4,200)) = 10,800$ cubic feet per minute were circulated in the stopes from the 2,500ft. level to the 2,050ft. level.

"At the 1,600ft. level the amount of air measured in the upcast shaft was 9,600 cubic feet per minute. The downcast shaft (Edwards shaft) is in section 20 and the upcast shaft is in section 28, therefore the general tendency is for the air to travel north towards the upcast shaft, and the upcast sand-passes in sections 30 and 32. When air enters the upcast shaft before it has done its work all the stopes above the level of entry suffer, but the north end of the mine suffers most. The temperature and hygrometrical observations showed this to be the case.

"The part of the mine having the highest temperatures and containing the highest percentage of moisture in the atmosphere was the northern part of the mine between the 1,600ft. level and the 2,350ft. level. The following table shows the highest temperatures found in the mine, and it will be noted they are on the north end of the workings. The average extreme north of the workings below the 1,600ft. level is about section 33.

"Table I.—Showing temperatures and humidity of air of the mine. These were the highest temperatures in the mine. Observations taken from 23rd June to 5th July, 1915:—

Level.	Section in Mine.	Dry Bulb Temp. F.	Wet Bulb Temp. F.	Percentage of moisture.
Feet.		deg.	deg.	deg.
1,600	30	80	80	97
1,600	32	81	80½	97
1,750	30	79½	79	87.5
1,750	32	80	78½	92.5
1,900	34	81½	78½	85
1,900	31	83	80½	87.5
2,050	30	80	77	85
2,050	24	83	79	80
2,050	32	83	79	80
2,200	31	83½	77	72
2,200	32	83½	78	73.5
2,350	30	84	77½	69.5
Average ..	..	81.8	78.7	84

"Prior to the above inspection the management had carried out a system of bratticing calculated to effect an improvement in their ventilation, and since have applied themselves very vigorously to it. The stoppage of the leakage into the Horseshoe mine gave them more air for their own working stopes. They almost completely bratticed off the Edwards downcast shaft except at the 500ft. level, where the downcast air from the Lane shaft entered it, and at those levels where it was thought necessary to draw off a stream of fresh air; and even in these cases brattices were placed in the drives immediately on the north side of the Edwards shaft crosscuts so as to compel the air to enter the stopes on the south end of the

mine instead of taking the otherwise easiest course to the upcast shaft and sand-passes. In addition to this, brattices were placed in some of the crosscuts leading to the upcast shaft, and the air was thus kept circulating through the working stopes until it had reached a point where it had done its work. Moreover, all unnecessary obstructions were removed from passes, ladderways and sand-passes, which are the only inlet and outlets to advanced working stopes, so as to make the passage for the air through the working stopes the easiest possible course, and thus reduce the resistance to the air current to a minimum.

"The results were most decidedly beneficial. The velocity of the air currents in the stopes, and consequently, the quantity of air, was largely increased. The general temperatures were reduced, the average temperatures of the hottest parts of the mine were reduced by 2° F. and the percentage of moisture in the air was reduced by 4 per cent.

"The following Table No. II. shows temperatures and hygrometrical observations taken in places almost identical with the observations shown in Table I. A comparison of the two tables will show improvement, but the fact of there being an increased quantity of air circulating intensified the evaporative and drying effect upon men's perspiring bodies.

"Table II.—Showing temperatures and humidity of air on the north side of mine between the 1,600ft. level and the 2,350ft. level on 10th August, 1915:—

Level.	Section in Mine.	Dry Bulb Temp. F.	Wet Bulb Temp. F.	Percentage of Moisture.
Feet.		deg.	deg.	deg.
1,600	30	78½	77½	95
1,600	32	78½	77½	95
1,750	30	79	77	90
1,750	32	79	77½	92
1,750	34	81	76	76
1,900	31	81	77	80
1,900	32	80½	76	77.5
1,900	30	79	76½	87.5
2,050	32	81	75½	73.5
2,050	30	81½	77	77.5
2,200	30	81	74	67
2,200	32	82	75.5	69.5
2,200	30	80	73	67
Average ..	..	80	76	80

"In speaking of the improvement made it is by no means intended to imply that the limit has been reached. Since the advent of the hot weather towards the end of the year there has been a distinct diminution in the quantity of air going down the Edwards shaft. This is naturally what would be expected to take place, for since the principal factor causing natural ventilation is the difference of temperature between the air in the downcast and the air in the upcast or rising column, and since the air entering the downcast shaft from the surface must be of a higher temperature in summer than in winter, it follows that the average temperature in the downcast shaft will be much higher in summer than in winter, the density of the air will be less, and consequently the ventilating pressure will be reduced, and since the resistance remains the same it follows that there will be a reduced quantity of air.

"In order to maintain the same quantity of air through the stopes, and to keep the working stopes as cool in summer time as in winter, the natural ventila-

tion requires a little mechanical assistance. This may be done by placing an open running fan in the crosscut from the Edwards shaft on the 1,900ft. level, and another in the crosscut from the same shaft in the 2,500ft. level, or the lowest level at work.

4. *Contemplated Improvements.*

"As previously stated, the Lane shaft, which is situated in section 4, is a downcast shaft to the 500ft. level. Although it is sunk to the 1,200ft. level it has no connections with the workings below the 500ft. The Edwards shaft is a dry shaft, and in warm weather is a very indifferent downcast above the 500ft. level; it only becomes a comparatively vigorous downcast below the 500ft. after the air from the Lane shaft has entered it.

"On the other hand, the Lane shaft is a naturally wet shaft, and the water exuding from the sides of the shaft during the first few hundred feet of depth mixes with the descending air, and not only rapidly brings it to its own temperature, which is about the temperature of the ground from which it exudes, but in falling down the shaft it lends mechanical aid to the current.

"The management of the Great Boulder mine has already started to make a connection with the Lane shaft on the 1,200ft. level. On this connection being made a decided increase in the quantity of air is anticipated.

5. *The Hamilton End of the Great Boulder Mine.*

"The Hamilton end of the Great Boulder is worked from the Hamilton shaft; there are comparatively few workings, and these are well ventilated. The Hamilton shaft forms the downcast shaft for the Ivanhoe mine. Some of the air from it ventilates the workings of the Hamilton end, and then returns through the Ivanhoe mine.

"When dealing with the Ivanhoe mine it will be necessary to refer to the Hamilton shaft, therefore any further comments will be left till then.

Ivanhoe Mine.

"The Ivanhoe mine has worked three lodes in the upper and middle levels: the East lode, the Middle lode, and the New lode; each of these lodes is being worked at the present time, but only the East lode is being worked in the lower levels.

"The mine depends almost entirely upon the Hamilton shaft of the Great Boulder mine for its intake air, this shaft being the downcast shaft for the Ivanhoe mine.

"There are three shafts to the mine—the Wigg shaft, sunk to the 200ft. level; the Drysdale shaft, which reaches the 700ft. level, and the Main shaft, which at present reaches the 3,400ft. level, a depth far below the workings of the mine.

"The Main shaft and the Drysdale shaft are permanent upcast shafts, the Wigg shaft is generally an upcast, but is sometimes affected by the climatic changes and becomes a downcast, but it only affects a small portion of the upper levels, and has no effect upon the main ventilation of the mine.

"The Hamilton shaft is an ideal downcast shaft for natural ventilation; water oozes from the sides of the shaft in the first few hundred feet of its depth, and rapidly cools the descending air. In addition to this, the water falling freely down the shaft gives considerable mechanical aid to the ventilating current.

"The air from the Hamilton shaft enters the Ivanhoe mine on the 1,371ft., 1,519ft., and 1,671ft. levels at the north end of the mine. A series of winzes are sunk at this end and brattice doors are placed on the south side of them, and by these means these winzes are made the downcast for the mine below the 1,671ft. level.

"From the north end of the mine the air from the downcast winzes enters the levels and working stopes, divides itself among the three lodes, and naturally rises through the workings, thus making the whole mine one upcast with the exception of the downcast winzes on the north end. The air is well distributed through the workings.

1. *Quantity of air entering the mine.*—The average quantity of air entering the mine on the 1,371ft., 1,519ft., and 1,670ft. levels is 32,000 cubic feet per minute, which is distributed as described above.

"2. *Temperature.*—The temperature of the air as it enters the mine on the 1,519ft. and 1,670ft. is 67° and 68° F. respectively; at the 1,371ft. level it is somewhat higher, owing to some of the air having passed through the stopes in the Boulder mine. In the other two levels it travels along the Boulder drives and crosscuts almost direct from the shaft. The general temperature throughout the workings of this mine is somewhat regular and uniform above the 2,570ft. level, this being the lowest working level of the mine at the present time, though much sinking and development work have been done below this level. There is no place in the mine where the temperatures exceed 80° F. above the level of 2,570ft., but throughout the whole of the mine the atmosphere is very humid, the average percentage of humidity being 91.4; it is therefore essential to have a fair current of air circulating wherever a man is working, for in an atmosphere of such a highly humid state, if the current is not perceptible, working is somewhat oppressive even in temperatures of under 80° F. The reasons of this high state of humidity are: (a) the downcast shaft being a wet shaft the air enters the mine highly charged with moisture; (b) many parts of the mine are naturally wet, and, moreover, all the sand filling of the stoped ground is done with sand more or less wet; therefore, as the air courses through the working stopes and levels it takes up moisture even at a greater rate than it takes up heat, for it becomes more humid than at the point of entrance to the mine.

"The following table shows the temperatures and hygrometrical state of the air as it enters the mine, and at various points in its descent as a downcast current at the north end of the mine.

"Table I.—Showing hygrometrical state of downcast current after entering the mine:—

Level.	Section.	Dry Bulb Temp. F.	Wet Bulb Temp. F.	Percentage of Moisture.
Feet.		deg.	deg.	deg.
1,371	2	72	67	74
1,519	3	68	63	73
1,670	3	67	64	83
1,820	4	68	66	89
2,120	4	72	69	83
2,420	7	76½	73½	84
2,570	8	76	75	94
Averages ..	..	71.3	68.2	83

"The air coming in at the 1,371ft. level traverses part of the Great Boulder workings, hence the higher temperature.

"It will be seen that after the air enters the mine, and gradually gets warmer on its descent, it takes up moisture more rapidly than heat.

"The observations made at the 2,570ft. level were made at the top of a downcast winze going to the 2,720ft. level, and at this point the air current was rather feeble.

"The following table shows the general hygrometrical state of the workings of the mine. The observation on each level is that taken in the mine above the 2,570ft. level, and all are not on the same lode. The temperatures taken are typical of the temperature of that particular level.

"Table II.—Showing the general hygrometrical state of the mine above the 2,570ft. level:—

Level.	Section.	Dry Bulb Temp. F.	Wet Bulb Temp. F.	Percentage of Moisture.
Feet.		deg.	deg.	deg.
300	10	73	70	83.5
400	12	76	75	94.5
500	14	75½	74	91.5
600	12	77	75½	91.5
700	12	77	76	94
700	15	79	78½	95
865	7	77½	96	91.5
1,000	11	78	77	94
1,203	15	79	76	85
1,519	13	77	75	89
1,670	12	77	75	89
1,820	11	76	75	95
1,970	12	76½	75	91
2,120	10	77	74	84
2,270	11	79	77	89
2,420	9	77	75	95
2,570	Main shaft upcast.	80	75.5	95

—	Dry Bulb Temp. F.	Wet Bulb Temp. F.	Percentage of Moisture.
	deg.	deg.	deg.
Average	77	75.5	91.4
Average from 1,203ft. level	77.6	75.5	89.7

"The last temperature in the table was taken in the upcast shaft on the 2,570ft. level; there were no higher temperatures in the mine above this level.

"The observations in the above tables were made last November. In April the temperature of the bottom of the Main shaft, which was then in process of sinking, and was 3,300ft. deep, was 48 deg. dry bulb, and same wet. Water was falling freely down the shaft, which made it cooler than it otherwise would have been.

"It will be seen that the average temperature of the workings of the Ivanhoe mine is 77deg., and the average per cent. of the humidity of the air is 91.4.

. "In comparing Table I., which represents the downcast of the mine below the 1,670ft. level, with Table II., which represents the state of the air as it ascends through the mine and courses along the levels and stopes, the difference of temperature between the downcast and upcast or rising air can be observed between the 1,370ft. level and the 2,570ft. level. It is well known to those who have the ventilation of a mine in hand, and when they are dependent entirely on natural ventilation, that a reliable up and down current can only be looked for when there is a difference of temperature between the descending and ascending columns between two horizontal planes, and if the descending column increases in temperature as it descends, and a horizontal plane is reached where the two columns are of equal temperatures, then reliable ventilation ceases.

"Therefore, in natural ventilation it is of the utmost importance that the downcast air must be entirely closed off from the workings by doors and brattices, except on the levels where it is necessary to draw off the air for ventilating these workings, so as to maintain a difference of temperature between the downcast and any part of the mine it is essential to ventilate on the same horizontal plane.

"In the case of the Ivanhoe mine there is a very great difference of temperature between the downcast air in Hamilton shaft and the ascending air of the mine above the 1,670ft. level, for, down to this point, almost entire separation exists, and results in a good current of air entering the mine between the 1,370ft. and the 1,670ft. levels, which are the levels of contact with the upcast shaft.

"Below this level the separation is by means of brattice cloths hung in the drives on the south side of the downcast winze; there is a gradual leakage at every level as the air descends and the diminishing current is brought into contact with the heat of the mine, consequently at the 2,570ft. level a plane is reached when the temperatures are almost equal, and the downcast column begins to lose its power of descent.

"A study of Table I., and its comparison with Table II., will show this very clearly, and it is borne out by practical air measurement tests.

"The ventilation records of the Ivanhoe mine are herewith attached.

"3. *Contemplated improvement on the Ivanhoe Mine in its ventilation.*—As previously stated, the downcast shaft for the Ivanhoe mine is the Hamilton shaft of the Hamilton end of the Great Boulder mine, situated north of the Ivanhoe. The air from this shaft enters the Ivanhoe mine at the north end of the 1,371ft., 1,520ft., and 1,670ft. levels.

"The Hamilton shaft is sunk to the 1,950ft. level, but it has no communication with the Ivanhoe mine below the 1,670ft. The Hamilton shaft has three compartments, two winding compartments and one pump and ladderway compartment. It is proposed (a) that the pumps compartment be cased off entirely from the Great Boulder Mine by strong air-tight doors being fixed at each plat and the partition between that and the winding compartment be made as near air-tight as possible from the surface down to the 1,670ft. level; (b) that a movable air-tight covering be placed in the two winding compartments immediately below the 1,670ft. plat; (c) that a con-

nection be made between the Hamilton shaft and the Ivanhoe mine at the 1,950ft. level. The Ivanhoe mine would then have for its own exclusive use the pump compartment in the Hamilton shaft as its downcast to the 1,950ft. level.

"The Hamilton shaft is a naturally wet one and the water enters it from the country rocks in the upper portion of it. This water rapidly cools the air in the shaft, and would keep it cool until it left the shaft at the 1,950ft. level. The arrangement will give the Ivanhoe mine a large volume of cool air at the 1,950ft. level, and make it much easier to ventilate the workings below it.

"In addition to this, the quantity of air coming down the two winding compartments would be far in excess of the requirements of the Hamilton end for some time to come, and the excess could be used in the middle levels of the Ivanhoe mine.

The Golden Horseshoe Mine.

"*Introduction.*—From a standpoint of mine ventilation, the Golden Horseshoe mine is the most interesting mine on the belt. The ventilating problem facing the management of this mine exists on no other of the Kalgoorlie mines. This mine is being vigorously worked, and extensive stoping is being done at the depth of 2,900 feet. Other mines, and also the Golden Horseshoe, have sunk and done considerable crosscutting, drilling and winze sinking, at a much greater depth than this, but no other mines have done any stoping at a depth lower than the 2,500 feet.

"The Golden Horseshoe Co.'s mine are only working their No. 4 lode from the 2,480ft. level downwards; this lode having re-appeared in their property at this depth. How to get sufficient cool fresh air with the present existing shafts down to their 2,900ft. to efficiently ventilate and keep the temperature of the working stopes between this level and the 2,480ft. level within the limits allowed by the Mines Regulation Act is the question which is at present, and has been for some time past, exercising the minds of the management. About April, 1915, there was a connection between the Great Boulder and the Horseshoe mines at the 2,480ft. level. The direction of the air current continually varied between the two mines; when the current was from the Great Boulder to the Horseshoe mine, the Boulder working places were deprived of a portion of their fresh air, and when the direction was reversed, the heat from the lower depths was carried into the Great Boulder. It was, therefore, found necessary to close off the opening. It was also found necessary to close off a connection which was subsequently made at the 2,780ft. level.

"The management set themselves vigorously to devise means to efficiently ventilate the workings of their lower levels, and by sinking cross-country winzes from their No. 3 lode on the 2,200ft. level, and connecting it with their No. 4 lode at the 2,480ft. level, and also by installing a fan in the 2,900ft. level, they very creditably succeeded in getting a current of fresh air direct from the main downcast shaft of 17,700 cubic feet per minute down to their 2,900ft. level, every cubic foot of which circu-

lated through the working stopes between the 2,480ft. and the 2,900ft. levels.

"Notwithstanding this quantity of air circulating in these stopes the temperatures still reached 82 deg. F., although the fresh air reached the 2,900ft. level at a temperature of 76½ deg. F.

"The management have now under consideration a means for increasing the quantity of air in the lower workings.

1. "*Shafts and Lodes.*—There are three shafts on the Golden Horseshoe mine, the main shaft, No. 2 shaft, and No. 3 shaft.

"The plan of the property is divided into sections of 100 feet square. Taking the so-called north and south line and east and west line passing through the main shaft as 0, the position of No. 2 shaft is in section 85th and Section 1 east of main shaft, and No. 3 shaft is in Section 7 north and Section 7 east.

"The main shaft is sunk below the 3,000ft. It is an upcast shaft from the 1,800ft. level, and is a downcast from the 2,000ft. level. No. 2 shaft is sunk to the 2,000ft. level, and is an upcast entirely.

"No. 3 shaft is sunk to the 2,000ft. level, and is the main downcast shaft for the mine.

"The mine works three lodes, Nos. 2, 3, and 4. No work is going on above the 1,500ft. level. No. 2 lode is worked to the 2,000ft. level, and No. 3 to the 2,200ft. level, whilst No. 4 is being worked from the 2,480ft. level to the 3,000ft. level.

2. "*Direction of Air Currents and Distribution of Air.*—There is one downcast shaft to the mine, i.e., No. 3 shaft. It is a very wet shaft, and the water comes into it from the country rock in the upper portion of it. The water falls more or less freely down the shaft, and therefore, like all similar wet shafts on the belt rapidly brings the downcast air to a temperature of about 64deg. F., and keeps it at that temperature until it leaves the shaft. The average quantity of air which this shaft supplies to the mine at the 2,000ft. level is about 35,000 cubic feet per minute. On the 2,000ft. level it is divided into three splits, one going to the No. 2 lode, one to the No. 3 lode, and the third is taken down the main shaft to ventilate the No. 4 lode below the 2,480ft. level. The latter split is about 18,000 cubic feet per minute, and therefore by far the largest split of the three. A fan is fixed in the 2,900ft. level, which induces the No. 3 split to come down the main shaft from the 2,000ft. level and enter the working stopes at this level. A sub-split at the 2,900ft. level ventilates the development work in the 3,000ft. level.

"On the air reaching the lodes it rises through the stopes, passing from level to level through passes and winzes and gradually coursing into the upcast shafts at and above the 1,800ft. level. There is no work going on above the 1,500ft. level.

3. "*Temperatures.*—The Golden Horseshoe mine has opened out stopes at a greater depth than any other mine on the Kalgoorlie belt. The greatest depth at which stoping has been done on any mine other than the Golden Horseshoe is, as before stated, 2,500ft., whilst this mine is doing extensive stoping between the 2,480ft. level and the 2,900ft. level.

"In the absence of tests it cannot exactly be said what the rock temperatures are below the 2,500ft. level, but there is no reason to suppose that the tem-

peratures of the rocks in the Kalgoorlie mines have increased beyond the usual increase of temperature with depth, so far as the greatest depth at the present time is concerned, but even with the ordinary increase of temperature with increased depth, the 2,900ft. stopes in the Horseshoe mine will have a natural rock temperature of about 4deg. F. higher than the deepest stopes of any other mine. What has been done during the last year by the management of the Horseshoe mine in ventilating their working stopes between the 2,900ft. and 2,480ft. levels forms a very interesting guide as to the quantity of air necessary to ventilate their stopes of various lengths and sectional area at these and greater depths; the temperature at which the air enters the stopes would, of course, be an important factor in the matter.

"The developing of the No. 4 lode in the Horseshoe mine has been fairly vigorous during the past year from the 2,480ft. level down to the 3,000ft. level; but up to date no stoping has been done in the latter level. It would appear that as the lode was opened out and the stopes extended there has been a simultaneous requirement for increased ventilation in order to keep the temperatures within the limit allowed by the Mines Regulations.

"The following table shows the amount of development work done on the No. 4 lode below the 2,480ft. level.

TABLE I.—Showing Development Work in Golden Horseshoe Mine below the 2,480ft. Level during the year 1915:—

Level.	Driving.	Cross-cutting.	Winzes and Rises.	Main Shaft.
Feet.	Feet.	Feet.	Feet.	Feet.
2,480	503.5	...	233	..
2,630	420.0	131	258.5	..
2,780	315.5	...	88.5	..
2,900	246.0	20	258.0	112
3,020	303.0	204.5	4.0	..
Totals ..	1,788	355.5	842	112

"As the lode opened out, and stoping operations were carried on, the area of rock surface exposed to the air current was correspondingly increased, and the air became so heated that the temperatures became comparatively high. In the meantime the management were endeavouring to get air from the No. 3 shaft at the 2,000ft. level down the main shaft from that level to their workings.

"To effect this, cross-country winzes were sunk from the No. 3 lode at the 2,200ft. level to the No. 4 lode on the 2,480ft. level to ensure a return, and a fan was placed in the crosscut at the 2,900ft. level. These arrangements gave a circulation of 17,700 cubic feet of fresh air per minute through these stopes, the air coming direct from the downcast shaft and reaching the 2,900ft. level at a temperature of 76½° F. This air very rapidly increased in temperature after it entered the drive and stopes; but there was a very great difference after the change.

"The following tables show the temperatures and hygrometrical state of the stopes before and after the improvements were made.

"TABLE II.—Showing the Temperatures and Hygrometrical State of the Workings in the Horseshoe Mine below the 2,480ft. Level on 26th July, 1915:—

Level.	Section.	Dry Bulb Temp F.	Wet Bulb Temp. F.	Percentage of Moisture.
Feet.		deg.	deg.	deg.
2,900	5	80½	79½	91
2,900	6	83	88	85
2,780	Leading Stope N.	84	80	80
2,780	7	84	80	80
2,780	5	84	81	85
2,780	3	83	80½	87.5
2,780	End of S. Drive.	85	81½	85
2,630	130.E.	82	80	90
2,630	6	83½	79	77.5
2,630	3	83½	80	82.5
2,630	3	85	81	80
Average 2,900	.. Plat.	83.3	80.3	84
		80	78½	91

"TABLE III.—Showing the Temperatures and Hygrometrical State of the Workings in the Horseshoe Mine below the 2,480ft. Level on 28th October, 1915, after improvement in Ventilation:—

Level.	Section.	Dry Bulb Temp. F.	Wet Bulb Temp. F.	Percentage of Moisture.
Feet.		deg.	deg.	deg.
2,900	6	78½	76	87.5
2,900	3	80	78	90
2,900	2	79	77	90
2,900	3	80	78	90
2,900	4	80	77½	87.5
2,780	7	81	77	80
2,780	6	81	78	85
2,780	4	81	78	85
2,780	3	81½	79	85
2,780	4	80	77	85
2,630	180 E.	81	80	92.5
2,630	3	83	80	85
2,630	8	81	78	85
2,630	Leading Stope, S. Drive.	81	78½	87.5
..	..	80.6	78	86.8
2,900	Plat.	75½	74½	94

"It will be seen that the average temperature in these lower levels before the installation of the fan and the connection of the No. 4 lode with the No. 3 by cross-country winzes was 83.3° F., and the average reading of the wet bulb was 80.3° F., whilst the average temperature after the improvements was 80.6° F. and the average wet reading was 78° F., showing an average reduction of 2.7° temperature and 2.3° on the wet bulb.

"On comparing the average percentage of moisture before and after the change it will be seen that the percentage of moisture in the air is 2.8 per cent. higher after the change than before. The probable reason of this is that, in the interval between which the observations were made, extensive sand filling of the stopes and in the formation of the timbered drives had been carried out, and as the sand used was wet more moisture was provided for the air to take up.

"At the end of No. II. and No. III. Tables the temperatures of the 2,900ft. plat are given. Before the change the temperature of the air on the 2,900ft. plat near the shaft where the air was supposed to be coming down was 80° F., whilst after the change it is 75½° F., and even this temperature can, in all probability, be reduced by making the main shaft a downcast right from the surface.

"As already stated, the main shaft is an upcast above the 1,800ft. level, and the comparatively warm water condensed from the return air freely falls down the shaft and mingles with the intake air which descends the same shaft from the 2,000ft. level; the temperature of this intake fresh air taken on the 2,000ft. plat immediately before it enters the shaft is 68° F. Taken again in the shaft at the 2,200ft. level, it has gone up to 75½° F., and then remains at this temperature to the 2,900ft. level. There is no doubt that this sudden rise in temperature is due to the warm water condensed from the return air going up the shaft above the 2,000ft. level, which falls down the shaft in a fine spray-like form, and which would not exist if this shaft were a downcast right from the surface, and No. 2 shaft acting as the main upcast for the mine.

"It is very interesting to note the rapidity with which the temperature of the air rises immediately it enters the stopes at the 2,900ft. level. The temperature of the air as it leaves the shaft at this level is 75½° F. From the shaft it travels along the east crosscut about 150 feet, through the fan at the end of the crosscut, and thence into the drive and rises through the various passes and over the ends of the timbers into the stopes.

"There is 17,700 cubic feet per minute passing through these stopes, and it will be seen from Table III. that the temperature rises to 80° F. in the 2,900ft. stopes and 81° F. in the 2,780ft. stopes. These figures show that, in order to keep the temperature below 80° F. in stopes of this depth, a much larger volume of air than the above quantity is needed even when the temperature of that air reaches the level at about 76° F. The reason of 80° F. being mentioned as the limit is that this is the highest wet bulb reading on the thermometer allowed by the Mines Regulations, and as the air is so near saturation point the temperatures should not be allowed to exceed this limit as far as is practical. The management of the Horseshoe mine have now under contemplation a scheme for increasing the quantity of air in the lower levels and stopes.

"Table IV. shows the temperatures and hygrometrical state of the workings of the No. 3 lode between the 1,500ft. level and the 2,100ft. level. There are no

working places above the 1,500ft. level. The Golden Horseshoe mine, October, 1915:—

Level.	Section.	Dry Bulb Temp. F.	Wet Bulb Temp. F.	Percentage of Moisture.
Feet.		deg.	deg.	deg.
1,500	13 and 14	80	78	90
1,600	13	80	78	90
1,600	14	80	78	90
1,800	North Drive.	79	76	85
1,800	South Drive	78	76½	91.5
2,000	7	77½	75	87
2,000	Drive 9	78	77	94.5
2,100	5	78	76	89.5
2,100	9	80½	79	92.5
2,100	6	78	77	94.5
Averages ..	..	78.9	77	90.45

"Table V.—Showing the temperatures and hygrometrical state of the workings on the No. 2 lode, October, 1915. No work is being done above the 1,600ft. level, and the lode is only opened up down to the 2,000ft. level.

Level.	Section.	Dry Bulb Temp. F.	Wet Bulb Temp. F.	Percentage of Moisture.
Feet.		deg.	deg.	deg.
1,600	2	79	75	79.5
1,600	2	79	77	90
1,700	2	79	77	90
1,700	4	78	75	89.5
1,700	14	79	77½	92
1,700	12	80	77½	87
1,700	11	80	77½	87
1,700	9-10	78½	75	82.5
1,800	6	76½	73	81.5
1,800	4-5	77	75	86.5
1,800	11	75	72	84
2,000	5	74	70	79
2,000	7	72	67	44
Averages	..	77.4	74.5	84.8

"From Table IV. it will be seen that the average temperature of the workings of the No. 3 lode is 78.9deg. F. and the average percentage of moisture is 90.45. Table V. shows the average temperature of the workings of No. 2 lode to be 77.4deg. F. and the average percentage of moisture in the air to be 84.8. The reason of the workings of the No. 2 lode having a lower average temperature than the workings of No. 3 lode is that the No. 2 lode gets its air direct from the downcast shaft on the 2,000ft. level, and as it is not connected with the lower levels below this point is not affected by any heat rising from the stopes below; whilst the No. 3 lode is connected by cross-country winzes with the lower workings on No. 4 lode and receives some of the heat rising from these workings.

4. "Contemplated improvements in the ventilation of the Golden Horseshoe Mine.—At the present time the fan situated in the 2,900ft. level does not in any way increase the total quantity of air entering the mine, which is on the average about 35,000 cubic feet per minute at the 2,000ft. level. The fan brings 17,700 cubic feet of air per minute from the 2,000ft. level to the 2,900ft. level, the air passing down the

main shaft. This arrangement necessitates the fan being removed to lower levels as they are opened out and worked. It also requires that there shall be good air-tight doors to the shaft at each plat, and good doors or brattices in each crosscut between the shaft and the lode at each level above the fan so as to avoid recirculation of the air.

"The management are contemplating fixing a fan above the workings on the No. 4 lode and exhausting the air through the stopes; the fresh air descending the shaft as at present. In this case any leakage of air through the shaft plat doors would have a cooling effect on that level; of course, care would have to be exercised that this was not carried out to an extent that would rob the lower levels of their air.

"It is also anticipated that by making the main shaft into a downcast right through, and the No. 2 shaft into the main upcast, the quantity of air would be very greatly increased. Splits from the No. 3 shaft could then be used for ventilating the workings

above the 2,000ft. level and the return air from the workings below this level passed directly into the upcast shaft.

Other Mines.

Having given a somewhat detailed description of the ventilation of the Great Boulder Mine, the Golden Horseshoe Mine, and the Ivanhoe Mine, and these being the deepest and hottest mines on the Kalgoorlie belt, it is not regarded as necessary to give such a description of the other mines. The following tables will, nevertheless, show the temperatures and the hygrometric state of each of the other mines. The month in which these temperatures were taken is given in the table, and is chosen because in that month a throughout inspection was made of that particular mine; but the temperatures with little variation correspond with those taken on subsequent inspections.

TABLE I., showing the Temperatures and Hygrometrical State of the Kalgurli Mine.

Month, 1915.	Level.	Block or Place in Mine	Dry Bulb. Temp. F.	Wet Bulb. Temp. F.	Percentage of Moisture.
September	Feet.				
Do.	100	F-9	57	53	75
Do.	100	E-12	70½	69½	94
Do.	200	B-16	71	70	94
Do.	200	203 West Lode Stope	72	70½	91.5
Do.	750	F-15	74	71	84
Do.	850	F-9 and 10	73	69½	81.5
Do.	850	F and G-12	78	74	79.5
Do.	850	F-13	75	73	89
Do.	850	D-10	73	67½	71.5
Do.	850	F-10	71½	67½	79
Do.	850	F-11	73½	70½	84
Do.	920	F and G-12	74½	70	76.5
Do.	920	D-10	73½	69	77
Do.	1,000	Intake air coming from the Brookman, Boulder and North Kalgurli Shafts, 14,630 cubic feet per minute	..	..	..

Month, 1915.	Level.	Block or Place in Mine.	Dry Bulb. Temp. F.	Wet Bulb. Temp. F.	Percentage of Moisture.
September	Feet.				
Do.	1,000	F-7	70	65½	75.5
Do.	1,000	E-30	73½	71	85.5
Do.	1,150	H-14	77	76	94.5
Do.	1,150	G-14	75½	71½	79
Do.	1,150	G-14 Intermediate	74	69	74
Do.	1,150	F-3	72½	67½	74
Do.	1,150	E-10	76	66½	71.5
Do.	1,150	E-14	73	68½	76.5
Do.	1,150	D-15	76	73½	86.5
Do.	1,250	H-14 Intermediate	79	77	90
Do.	1,250	E-15	78½	76½	89
Do.	1,350	F-7	74½	71	80.5
Do.	1,450	East Stope	79	77	90
Do.	1,450	East Stope	79½	77½	89
Do.	1,350	North Sand Pass	77	72	74
Do.	1,450	Stope	77	71½	71.5
Do.	1,450	Stope	78	76½	92
Do.	1,450	Stope	78½	76	86.5
Do.	1,450	West Stope	79	76	85
Do.	1,550	Winze to 1,650ft.	81	78½	87.5
Do.	1,550	Winze to 1,650ft., Intermediate	80	77	85
Do.	1,650	Stope North	79	77	90
Do.	1,650	Stope	81	78	85
Do.	1,650	South-West Drive	78½	76	87
Do.	1,650	Stope, Intermediate	81	77	80
Do.	1,750	Stope	79	74	76
Do.	1,851	Stope	80	74	72
		Average	75.6	72.3	82.3

TABLE II., showing Temperatures and Hygrometrical State of the Great Boulder Perseverance Mine.

Month.	Level.	Part of Mine.	Dry Bulb. Temp. F.	Wet Bulb. Temp. F.	Percentage of Moisture.
	Feet				
November ..	300	Stope, Lake View Lode	72	70	89
Do ..	300	South Stope, El Ora Lode	75	72	84
Do ..	400	Stope, Furness Lode	73	70	83.5
Do ..	400	North Drive, F Lode	72	69	83.5
Do ..	400	South Drive F Lode	72	69	83.5
Do ..	400	Winze, El Ora Lode	76	74	89
Do ..	700	North Stope, El Ora Lode	75	71½	81.5
Do ..	500	Connection with Associated Gold Mine ..	80	75	76
Do ..	1,750	Connection with Associated Gold Mine ..	79½	75	77.5
Do ..	1,900	.. .. .	80	76	80
Do ..	1,900	Connection with the Lake View Mine ..	79	74	76
Do ..	2,050	Stope No 3	82	76	72
Do ..	700	No 13 Stope, Perseverance Lode	76	63½	63
Do ..	700	Connection with South Kalgurli	70	64	69
Do ..	700	Leading Stope, El Ora Lode	72	67	74
Do ..	900	Stope No. 3, F. Lode	75	72	84
Do ..	900	Exploration Drive, off No. 5, West Crosscut	77	74	84.5
Do ..	900	Stope No. 5, D. Lode	77	74	84.5
Do ..	900	Stope No. 2, D. Lode	77	74	84.5
Do ..	900	North End of D. Lode Stope	77	75	89.5
Do ..	900	Exploration Drive off Main West Crosscut	75	72	84
Do ..	900	Furness Lode, No. 1 S.	77	74	84.5
		Average	75.8	72.6	80.8

TABLE III., showing Temperatures and Hygrometrical State of the Lake View and Star Mine.

Month.	Level.	Part of Mine.	Dry Bulb. Temp. F.	Wet Bulb. Temp. F.	Percentage of Moisture.
	Feet.				
July ..	175	Crosscut from Morrison Shaft	65	60	72
Do ..	175	Stope, Morrison East Lode	55	50	69
Do ..	175	Stope; Morrison West Lode	54½	51½	75
Do ..	175	Morrison Lode, 160ft. N.	72½	70	85.5
Do ..	300	Stope, Morrison Lode, 460ft. N.	64½	61½	82.0
Do ..	300	Morrison Lode, 310ft. N.	69	62	65
Do ..	300	Morrison West Lode, 310ft. N.	76½	63	81.5
Do ..	500	Morrison Lode, 280ft. N.	68	66	89
Do ..	500	Morrison Lode, 200ft. N.	72½	71	91.5
Do ..	500	Morrison Lode, 110ft. S.	71	67	78
Do ..	500	Morrison Lode, 55ft. N.	71	67	78
Do ..	500	Morrison Lode, 265ft. N.	75	73	89
Do ..	500	Morrison Lode, 160ft. N.	71½	69½	89
Do ..	500	Morrison Lode, 20ft. S.	68	67	94
Do ..	500	Morrison Lode, North End	64	62	88
Do ..	700	Crosscut from James' Shaft	66	62	78
Do ..	700	Morrison Lode, 20ft. S.	72	69½	85.5
Do ..	700	Morrison Lode, 130ft. N.	71½	70	91.5
Do ..	700	North Drive	75	72	84
Do ..	700	Winze, 130ft. N.	73	71½	91.5
Do ..	700	Winze, 20ft. S.	72	70	89
Do ..	700	Morrison Lode, 130ft. N.	73	71	89
Do ..	700	Morrison Lode, 50ft. S.	73½	71	85.5
		Average	69.3	66	83.5

TABLE IV., showing Temperatures and Hygrometrical State of the Lake View Group Mine.

Month, 1915.	Level.	Place in Mine.	Dry Bulb, Temp. F.	Wet Bulb, Temp. F.	Percentage of Moisture.
July	Feet.				
..	1,900	Winze, E. Lode, 135ft. W.	75½	72	81·5
Do.	1,900	Winze, 500ft. N.	77½	71½	70
Do.	1,900	Winze, 285ft. W.	78	72½	70·5
Do.	1,900	Winze, 90ft. N.	77½	72	70·5
Do.	1,900	Connection with Perseverance Mine	78	73	74
Do.	2,100	Stope E. Lode, 500ft. N.	80	78½	92·5
Do.	2,100	Leading Stope, E. Lode	83	77½	73·5
Do.	2,100	North Drive, E. Lode	83	78	76
Do.	100	Stope E. Lode 565ft. E.	61	57½	79
Do.	100	Intermediate E. Lode	64	60	77
Do.	300	Stope, 200ft. N.	66	62	78
Do.	200	N. Drive Main Lode, 1,000ft. N. ..	55	50	70
Do.	300	Stope, 900ft. N.	55	50	70
Do.	300	Fan of South Drive	70	68½	91·5
Do.	400	Winze, 40ft. South	67½	66	91·5
Do.	400	Winze, 800ft. South	70	68	89
Do.	400	Winze, 400ft. N.	67½	63½	78
Do.	400	Winze, 897ft. N.	66	62	78
Do.	1,000	Perseverance Lode, 420ft. W. ..	74½	73	91·5
Do.	1,000	Drive, 100ft. S.	63½	56½	63
Do.	1,200	Winze, East Lode	75	72	84
Do.	1,200	Perseverance Lode	77	73	79·5
Do.	1,200	Winze, Main Lode, 970ft. N. ..	77½	73½	79·5
Do.	1,400	Main Lode, 800ft. N.	77	74	84
Do.	1,600	Bullfinch Lode, 115ft. W.	74½	72	86·5
Do.	1,600	West Lode, N. end of Stope ..	77	73	79·5
Do.	1,600	Bullfinch Lode, Intermediate ..	75	71½	81·5
Do.	1,600	E. Lode, 500ft. N.	77	71½	71·5
Do.	1,600	E. Lode, 700ft. N.	78	73	74
Do.	1,600	E. Lode, 350ft. N.	79	74	75
Do.	1,600	E. Lode, Intermediate	79	75	80
Do.	1,800	Winze, 370ft. N.	76½	72	76·5
Do.	1,800	Stope E. Lode, 1,900ft. S. ..	77	72	75
Do.	1,800	Winze E. Lode, 500ft. N. ..	77½	71	67
Do.	1,800	Winze, Bullfinch Lode, 180ft. N.	75	72½	86·5
Do.	1,800	Winze, West Lode	76	73	84
Do.	1,800	Stope, West Lode	76	72½	81·5
		Average	73·4	69·4	78·6

TABLE V., showing Temperatures and Hygrometrical State of the Eclipse Mine, Oroya Links, Ltd.

Month, 1915.	Level.	Part of Mine.	Dry Bulb, Temp. F.	Wet Bulb, Temp. F.	Percentage of Moisture.
August	Feet.				
..	750	Winze, Main Lode, 180ft. N.	71½	68½	83
Do.	750	Stope, Main Lode, 180ft. N.	73	69½	81
Do.	900	Stope, Main Lode, 180ft. N.	72½	68½	78·5
Do.	900	Stope, Main Lode, 15ft. N.	74	70	79
Do.	600	Winze, Main Lode, 155ft. S.	70	68	89
Do.	600	Winze, Main Lode, 15ft. N.	71	66½	75·5
Do.	600	Winze, Main Lode, 180ft. N.	72½	70	86
Do.	600	Stope, Main Lode, 155ft. S.	70	65	74
Do.	600	Stope, Main Lode, 140ft. S.	69½	66½	83
Do.	500	Winze, Main Lode, 288ft. S.	68	63	73
Do.	500	Winze, Main Lode, 840ft. S.	65	69½	75·5
Do.	500	Stope, Main Lode, 15ft. N.	67	64	83
Do.	400	West Drive, 325ft. S.	61½	53	55·5
Do.	400	Break through to level, 650ft. S.	62	55	63
Do.	500	Stope Main Lode, 25ft. N.	68	65	83
Do.	300	Intermediate Drive	60	50	50
Do.	300	Stope, Main Lode, 330ft. S.	59	54	71
Do.	200	Stope, Main Lode, 140ft. S.	61	50	46·5
		Average	67·5	63·1	73·8

TABLE VI., showing Temperatures and Hygrometrical State of the Associated Gold Mine.

Month, 1915.	Level.	Place in Mine.	Dry Bulb, Temp. F.	Wet Bulb, Temp. F.	Percentage of Moisture.
April ..	No. 1 ..	Main Lode, near Sand Shaft ..	66	64	88
Do. ..	No. 1 ..	Tetley Lode ..	73	71	89
Do. ..	No. 1 ..	McCallum Lode, East ..	64	62	88
Do. ..	No. 2 ..	East Lode Stope ..	67	65½	91.5
Do. ..	No. 2 ..	East Lode Drive ..	67	64	83
Do. ..	No. 2 ..	Australia Lode, North End ..	69	66.5	85.5
Do. ..	No. 2 ..	Drive, Dead End, No. 7 Lode ..	69	67	89
Do. ..	No. 3 ..	No. 4 Stope ..	66½	65	90.5
May ..	No. 10 ..	Old Stope, Perseverance boundary ..	78	76½	91.5
Do. ..	No. 17 ..	Plat, Main Shaft ..	76½	74½	88
Do. ..	No. 16 ..	Main North Drive ..	78	76	89
Do. ..	No. 16 ..	Intermediate ..	81	79	90
Do. ..	No. 12 ..	Stope, Australia E. Lode ..	81	77	80
Do. ..	No. 14 ..	Winze ..	78½	74½	79
Do. ..	No. 14 ..	Stope ..	79	77	90
Do. ..	No. 14 ..	North-West Lode ..	79	74	76
Do. ..	No. 14 ..	Main South Drive ..	76	72	79
Do. ..	No. 14 ..	West Stope, E. Leg. ..	78	74	79.5
November ..	No. 1 ..	Face of Drive ..	74	63	52
Do. ..	No. 2 ..	Stope ..	65	55	54
Do. ..	No. 2 ..	E. Lode Crosscut ..	69	65	78
Do. ..	No. 2 ..	Intermediate Level ..	75	71	79
Do. ..	No. 2 ..	Australia Lode, E. Branch ..	69	67	89
Do. ..	No. 2 ..	Australia Lode, W. Branch ..	69	65	78
Do. ..	No. 2 ..	Tetley Lode ..	70	69	94
Do. ..	No. 2 ..	No. 2, North Lode ..	72	69	83.5
Do. ..	No. 2 ..	North Lode Intermediate ..	67	61	69
Do. ..	No. 2 ..	North Drive, Tetley Lode ..	71	68	83
Do. ..	No. 2 ..	South Drive, Tetley Lode ..	71	68	83
		Average ..	72.3	69.2	82.4

COOLGARDIE, YILGARN, AND DUNDAS GOLDFIELDS.

Mr. J. Crabb, Inspector of Mines, Report dated 29th January, 1916:—

"I beg to submit my Annual Report for the year 1915 relating to the mining industry and the administration of the Mines Regulation Act on the Coolgardie, Yilgarn, and Dundas Goldfields.

Coolgardie Goldfield.

"Mining on the Coolgardie Goldfield has been somewhat dull, there having been a marked decrease in the yield of gold.

Higginsville.

"At the Sons of Erin G.M. mining operations have been carried on by a party of tributers. During the early part of the year little or no profit was made, and the outlook of the mine was not particularly bright, but latterly rather promising developments have taken place, and the tributers are hopeful of obtaining better results than hitherto.

Eundymie.

"The Hidden Secret has been worked by a party of tributers, but owing to the high cost in connection with the treatment of ore, which was due in a great measure to scarcity of suitable water for steaming and milling purposes, little profit was made.

"In order to overcome the disadvantages as far as possible a producer gas plant has been erected, and it is anticipated that this plant will enable the cost of treatment to be reduced at least two-fifths. By making such a reduction it will allow the tributers to treat a large quantity of ore that has been considered too low-grade to handle with steam power.

"The quartz vein is maintaining its size and value in the lower workings, consequently the outlook of the mines is considered rather good.

Widgiemooltha.

"No new developments of much importance have taken place at this centre, and generally speaking mining has been rather quiet.

Burbanks.

"Very little work has been done at either of the two principal mines, viz., the Burbanks Birthday and the Burbanks Main Lode. The former has been worked by a party of tributers during the whole of the year with varying results. The latter was taken on tribute during the latter part of the year, but after a few weeks' work results were so unsatisfactory the tribute was discontinued.

"From the Ivanhoe Burbanks a fairly large quantity of ore has been obtained from development work, and a little stoping at the No. 2 level, which has given an average return of about 12dwts. per ton by amalgamation. Although mining has been done in a skilful and economical manner the owners have not been able to show as good results as might at first be expected. Seeing, however, that the quartz vein does not average more than about 15in. in width, that it is machine ground, and that the ore is carted a considerable distance to Coolgardie for treatment, it seems rather remarkable that the owners do so well. The main factor in keeping working expenses low enough to enable this grade of ore being dealt with is the producer gas plant, which operates an air compressor, supplying air for hoisting and rock-drilling machines.

"Gilbert and party, owners of the Lord Bobs, are erecting a Huntington mill near the Londonderry

G.M., where a good supply of water for steaming and milling purposes is available. It is reckoned that there is a large quantity of ore at the Lord Bobs which can be treated profitably by carting and crushing at the above mentioned place.

Londonderry.

"Some very satisfactory returns have been obtained from some of the small shows in this centre recently. From the Vice-Regal, which is owned by A. Laidlaw and party, a parcel of 18½ tons, treated at the State battery, Coolgardie, gave a return of 228ozs. over plates, or an average of 12ozs. 3dwts. 5grs. per ton.

"C. Migro and party, who took up a P.A. near the Vice-Regal a short time ago, struck an exceptionally rich patch in a small quartz vein that was being worked near the surface. From a parcel of 5 tons, 223oz. 5dwt., or an average of 44oz. 13dwt. per ton, was obtained.

"From the Cheapside G.M. some satisfactory parcels have been treated, the most recent being 64¼ tons, which gave a return of 12dwt. 13gr. per ton. The ore was obtained from the bottom of the main incline, at which point the lode is reckoned to be about 10ft. wide.

Gibraltar.

"During the early part of the year a little excitement was caused in this district in consequence of an exceptionally rich patch of gold being found by Clayton and party near the Reform G.M., and an option being taken on same by a Melbourne company. But after doing a fair amount of prospecting developments were not sufficiently good to warrant purchase. Several leases and prospecting areas were applied for and a good deal of prospecting done, with the result that some promising discoveries were made. They did not, however, come up to expectations, and this centre has again been almost deserted.

Coolgardie.

"The output of gold from this district has been obtained almost entirely from shows that are being worked by prospectors. The most satisfactory returns have been from the Benjamin George Lease, which is owned by Mr. A. L. Hanson. A recent crushing, which may be taken as a fair guide as to the grade of ore that is being mined, gave a return of 102ozs. from 59½ tons.

"Mr. R. Wakefield, whilst dryblowing in a gully some little distance south of Tindal's mine a few weeks ago, discovered a promising show. The lode, which strikes N.-S. and dips almost vertically, has been developed to a depth of 20ft., and a crushing of 15 tons, treated at the Coolgardie State mill, gave a return of 1oz. per ton by amalgamation, and the tailings are reckoned to contain 19dwt. per ton.

"The Huntington mill, erected on Griffiths G.M. during the latter part of 1914, was started a few months ago, but owing to want of capital to tide over the initial expenses, and disadvantages generally connected with the treatment of low-grade ore, had to be shut down.

"The crushing and producer gas plant, erected on the Daisy G.M., is now ready to commence crushing. It is thought that there is a large quantity of ore on this property that can be profitably dealt with.

Bonnievale.

"There have been about ten men at this centre prospecting different places, but nothing of much importance has been discovered, consequently the outlook has not improved since I last reported.

"At the Vale of Coolgardie a party of tributers are sinking a shaft to a depth of about 40ft. at a point where they expect to intersect high-grade ore.

Kunanalling.

"Developments at the Turn of the Tide G.M. have been very satisfactory. Recently a parcel of 31 tons, treated at Ware's Blue Bell battery, gave a return of 95oz. 15dwt. by amalgamation, or an average of 3oz. 2dwt. per ton. This ore was obtained in driving from the incline shaft at a depth of 145 feet.

"Messrs. De Gracie and Kelly recently put through a crushing of 47½ tons from their show, the "Sadie," for a return of 78oz.

Carbine.

"A heavy ten-stamp mill and a gas producer plant have been erected on this property, and it is anticipated the output of gold will be practically doubled. The mine is said to be looking well.

DUNDAS GOLDFIELD.

"No new discoveries or developments of much importance have taken place in this goldfield, and the yield of gold from the different mines has been much about the same as recorded for the previous year.

"At the Mararoa G.M. 32,190 tons of ore have been treated, valued at £57,912, or an average of just on 36s. per ton.

"The cost of treatment (exclusive of development work) was 18s. 9d., which allowed of a good profit being made, and the distribution of £15,000 in dividends. To date the company has paid £130,000 in dividends.

"Good results have been obtained from the Viking No. 1 G.M., and as the lode is maintaining its size and value in the lowest workings (750ft.) the outlook of this mine is said to be much better than it was twelve months ago.

"During the year 7,850 tons were treated for an average return of 1oz. per ton. The total output of ore to the end of the year amounted to 29,263 tons, and the total value of gold won £130,252.

"To date £39,550 have been distributed in dividends.

"Several other small shows have been worked, some of which have given very satisfactory results.

YILGARN GOLDFIELD.

"There has been a steady expansion of the mining industry on this field during the period under review, and judging by the present outlook of mining the gold returns for 1916 should show a very substantial increase on 1915.

"During the year 184,395 tons of ore were treated for a return of 90,480ozs., or a value of 41.68 shillings per ton. Including 26.82ozs. of dollied gold the total output for the year amounted to 90,507 fine ounces, which shows an increase of 1,755ozs. compared with 1914.

"There are 218 G.M. leases in force, covering an area of 4,381 acres, and 100 prospecting areas, covering an area of 1,775 acres.

Diema's.

"A little attention is again being paid to this centre, which is about 140 miles north from Southern Cross, and some encouraging results have been obtained, but owing to scarcity of water and there being no crushing facilities nearer than Marda, prospectors are unable to test this part of the field to the extent it seems to warrant.

Marda.

"At the Butcher Bird, good progress has been made considering the disadvantage in not having a sufficient supply of water to run the mill continuously. Great benefit has been derived through laying on of water from the Marda Tank to the mine by the Mines Department. It has enabled the owners of the Butcher Bird to do a considerable amount of crushing for the public, and at the same time to develop their own property, which is said to be looking exceptionally well.

"The main incline has been continued to a depth of about 179 feet, and it is reckoned that a few more feet of sinking will cut a sufficient supply of water for milling purposes.

"The vein, which has been proved to contain about 1oz. per ton at the bottom of the incline, is also improving in width and value at each end of No. 1 level.

"At Allen's Find, a considerable amount of development work has been done, and the mine is said to be looking well. A fair supply of water was cut in the main incline a short time ago, and it is reckoned an abundant supply can be obtained by sinking a few more feet.

"The Great Unknown still continues to produce high-grade ore, and as the vein maintains its size and value in the bottom workings the prospects of the mine are said to be rather good.

Enwin.

"Mining at this centre has been a little brighter, and, seeing that the returns from some of the shows have been highly profitable, it will no doubt act as a stimulus for further prospecting. From Messrs. Cox and Heffernan's show 45½ tons recently treated gave a return of 140ozs. 3dwts., and the sand is reckoned to contain 14dwts. per ton.

"From a parcel of 87 tons from the Marionette, which is situated a short distance from Cox's mine, a return of 13dwts. of gold per ton was obtained.

Golden Valley.

"Several parcels of ore have been treated at Lang's Battery, all of which have been satisfactory.

"A fairly large lode formation is being worked by Atkinson and party, about one mile from the above-mentioned mill in a north-easterly direction. A fair amount of development work has been done, and the prospects of the show are rather promising.

"Profitable ore has been mined at the Violet G.M. from a depth of 120 feet. The lode at this depth averages 2.5 feet wide, and is worth £8 10s. per ton.

"A fair amount of development work has been done at Marie's Find, but the vein so far as proved is small.

Manzman.

"During the latter part of the year the sinking of the vertical shaft at the Glideaway was continued from a depth of 100ft. to a little below where the

reef was cut in the shaft. The reef, which averages 2 feet wide, is reckoned to be worth £6 per ton.

"The sinking of the vertical shaft at the Three Brothers has been steadily carried on, and it is anticipated the rich vein that was worked down to water level will soon be cut.

Bullfinch.

"Good progress has been made at the Bullfinch Mine. An average of 6,500 tons are being treated monthly for an average return of a little over £8,300 worth of gold. During the year 76,880 tons were treated, producing bullion to the value of £100,035 6s. 2d., making an aggregate since the commencement of treatment operations of 203,963 tons treated for bullion valued at £353,323 1s. 1d.

"The average number of men employed underground amounted to 114, and at surface 47, making a total of 161.

"The cost of mining for the year was 8/8.86d. per ton and treatment 6/10.38d., making a total of 15/7.24d. per ton, which is inclusive of general expenses. A monthly profit of about £2,500 is being made.

"The amount of water obtained from the Goldfields Water Supply was 13,761,000 gallons, costing at the rate of 7s. per 1,000 gallons, or a total of £4,816 7s. The price of firewood delivered on the mine is 8s. per ton.

"The rates of wages paid to employees are the same as at Kalgoorlie, excepting the truckers.

Corinthian.

"Good progress has been made at the Corinthian North G.M. during the year under review. The new sulphide plant recently treated 3,227 tons for a return of bullion valued at £3,561. As an excellent extraction is being obtained with the plant it is intended to add to the large Edwards duplex furnace, which is now handling about 65 tons per day. A substantial profit is now being made, and as there is a fairly large reserve of ore the outlook of the mine is decidedly encouraging.

Westonia.

"At the Edna May G.M. a great deal of development work has been done, and the lode at the 300ft. level proved to be of considerable value. During the year 35,743 tons were treated for a total yield of £150,464, which enabled the distribution of £77,130 in dividends. This brings the total amount paid in dividends up to £149,975.

"The cost per ton of ore treated, including development work, is 23s. 6d. The average number of men employed is 168.

"A new 350 H.P. mill engine has been erected and housed, also a pumping plant. The latter consists of a vertical Allen steam engine of 250 H.P., with electric generator attached. It generates power for transmission to three electric pumps in three units located at the 300ft. level, each pump having an estimated duty of 20,000 gallons an hour against a head of 300 feet. In addition there are other pumps capable of raising 500 gallons per minute. In order to prevent flooding of the plant at the lower workings a dam has been constructed 8 feet in thickness, in the main crosscut about 30 feet from the main shaft. The dam consists of concrete in which a door has been fixed so that it can be opened and closed as occasion demands.

"Edna May Central G.M.—The total tonnage mined and milled at this mine during the year amounted to 25,927 tons, which gave a total yield of 5,761.35ozs., valued at £22,969 15s. 4d.

"The cost per ton for mining was 8s., for milling 3s. 8d., and for development 5s. 9d.

"The depth of the main incline is 225ft. vertical, or 360ft. on incline.

"Good progress in connection with the sinking of the Edna May Deeps has been made through the water belt by means of the cement process. The process which was started at a depth of 259 feet, prevented a large inflow into the shaft and enabled sinking to be done through the water belt without the slightest trouble, and at a very low cost. This is the first time that this method has been adopted in connection with shaft sinking in Australia, and considerable credit is due to the manager, Mr. Stuckey, for the successful way in which he dealt with the water problem. Had any other method been adopted to cope with the water whilst sinking, many alterations would have been necessary, involving the expenditure of many thousands of pounds.

"Encouraging reports have been made from time to time regarding Westons Reward G.M. From a recent crushing of 220 tons 223ozs. were obtained by amalgamation, valued at £902. Tailings assayed 6½dwt., which made the gross value of the ore per ton crushed about £5 7s.

"A good deal of work has been done at the Edna May Battler, and its outlook is said to be most encouraging. It is estimated that the vein, which averages about 12in. in width, contains 2ozs. per ton.

Marvel Loch.

"Mining at this centre has not been very bright, and apart from a few good crushings obtained from a few small shows, nothing of much consequence has been done.

Nevoria.

"A little work was done by a party of tributers at the Never Never G.M., but owing to the ore being too low grade to enable them to make wages they were unable to continue.

Burbidge.

"A good deal of attention was paid to this centre, and the Bronco G.M. has been placed under offer to Mr. A. E. Morgans. There is a fine lode on this property, and it appears to be the general opinion that it has a good future.

"At the Great Victoria G.M. 11,638 tons of ore have been treated for a return of 986.30ozs., valued at £3,978 3s. 6d. Of sands 14,580 tons were treated for a return of 2,263.33 ozs., valued at £8,268 6s. 8d., which cost 4s. 10d. to treat. The cost of mining, milling, and treatment was 10s. 11d. per ton.

Parker's Range.

"There is very little to report from this centre apart from a new discovery made by Mr. Quinlan. As very little has been done to open up the line of reef it is impossible to form an idea of its importance.

Forrestania.

"A new discovery was made about 110 miles south from Southern Cross during the early part of the year by Hamersley and party, and in consequence

of reports that high values were being obtained along lines of floaters a number of prospectors rushed to the locality, but the prospects did not come up to expectations, and within a month or so the field was almost deserted.

"At present there are only two men left. These men are developing a show which gives promise of becoming profitable.

Mines Regulation Act.

"Generally speaking, the managers of the different mines throughout my district have complied with the requirements of the above in such a manner that it has not been found necessary to recommend any prosecutions.

Accidents.

"The whole of the accidents that have occurred have been reported to your office.

Ventilation.

"The ventilation of the mines has been good. In no case has the temperature exceeded 70 degrees F., and the percentage of humidity 94°. In consequence of it being quite evident that the temperature of the air at the different mines was considerably below the limit allowed by the Mines Regulation Act, I did not consider it necessary to take readings of same.

Sunday Labour on Mines.

"I have in a previous report submitted particulars of permits granted by myself."

COLLIE COALFIELD.

Mr. R. McVee, Inspector of Mines, Report dated 17th January, 1916:—

"I beg to submit my Annual Report on the Collie Coal Field for 1915.

"Five mines were in operation during the year producing coal, viz., Proprietary, Co-operative, Cardiff, Westralian, and Scottish.

"The total amount of coal produced was 286,568 tons as against 319,150 tons for 1914, a reduction for the year of 32,582 tons. Of the total output the Government Railways took 173,706 tons large and approximately 20,000 tons small and nuts, as against 181,095 tons large and same amount of small for 1914. The decrease supplied to railways for 1915 as against 1914 was 7,389 tons, whilst in the private and bunkering trade there was a decrease of 25,433 tons. Attached is a comparative table of 1914 and 1915 outputs, also men employed. The average number of men employed in the industry was 493, a reduction of 22 on the previous year's figures. The work at the mines has been very intermittent, and during the last few months some of the mines have not worked more than two or three days per week.

"The East Perth Pipe and Pottery Co.'s clay mine at Muja was closed down early in May owing to want of orders for clay. The mine is still closed, and there seems to be little hope of it reopening again for some time to come. During the time the mine was working an average of seven men were employed, and the weekly production of clay was about 50 tons. Ninety-six employees from the various mines have joined the colours since the beginning of the War. Four of these have given their lives for their King and country, whilst others have received wounds ren-

dering them unfit for further active service. Many more have volunteered for service, but have been rejected owing to their inability to pass the standard set down by the Authorities.

ACCIDENTS.

"There was a total of 100 accidents for the year. Two of these proved fatal, and another necessitated the amputation of the leg above the knee.

"The first of the fatal accidents occurred to a miner at the Westralian Colliery on 31st March, 1915. Deceased and his mate had gone back into their working place after firing a shot when a fall of stone took place, smashing the former's leg below the knee. He died the same evening from shock and hæmorrhage. None of the men who were present shortly after the accident occurred had any knowledge of first aid work, and it was not until half an hour had elapsed, and the injured man had been carried a distance of 500 yards, that a tourniquet was applied to stop bleeding, and the injured leg attended to. Had prompt measures been taken to stop bleeding, and the broken leg bound up to prevent further injury to blood-vessels from the jagged ends of the broken bones, I have not the least doubt that the injured man's chances of recovery would have been good.

"The other fatal accident occurred to a miner at the Co-operative Colliery on the 8th of December, who was filling a skip, when portion of the seam, called the stone band, came away and struck him on the head, causing death in a few minutes. On 23rd November at the same colliery another miner had his leg so badly injured by a fall of stone causing damage to the tissues and blood-vessels that it had to be amputated above the knee. The appended table shows details of accidents at the various mines. Miscellaneous accidents again account for the bulk of the accidents recorded. Inquiries were held on both fatal accidents, and in both cases the jury returned a verdict of accidental death.

PROSECUTIONS.

"There were no prosecutions during the year for breaches of Act or special rules.

SUNDAY LABOUR PERMITS.

"Seven permits, involving the employment of 29 men, were granted under Section 46 of "The Mines Regulation Act, 1906." Three of the permits involving seven men were granted for the purpose of dealing with accumulated water, the others were for work that could not be carried out during week days without seriously interfering with the operations of the mines.

VENTILATION.

"The ventilation of the various mines has on the whole been good. Defective ventilation may occur at times owing to derangement of brattices, but the mine officials show promptness in remedying such defects when they occur.

GENERAL PROGRESS.

"Steady development has been carried on in most of the mines during the period under review, and several of them have now sufficient places opened up to last them for several years at the present rate of output. The very large falling off in trade has

prevented much of the development work being done that might have been done under more normal conditions. The additions to plant at the various mines have also fallen off to some extent.

Proprietary Colliery.

"Further additions have been made to existing plant at this colliery by the installation of Bruce Pebbles electric generator of 200 K.W., driven by a Belliss Morcom H.S. engine, voltage 550.

One horizontal Tangye, three-throw pump with a capacity of 1,300 gallons per hour against a head of 400 feet driven by a Bruce Pebbles motor.

"One Jeffrey improved 28^A type electric coal cutting machine, the cutter bar of which is seven feet.

"In May of 1914 a fall occurred in the main dip back heading of this colliery, and an inrush of sand and water took place, which completely flooded the headings for a distance of 300 yards back. Up to the time the inburst occurred no great quantity of water had been met with, and the amount making in the main dip heading could easily be dealt with by bailing into tubs. The estimated flow due to the inrush was from 5,000 to 6,000 gallons per hour. This has now eased off to about 1,500 gallons per hour. The workings have now been recovered. The average width of headings and cut-thro's is 10 feet, and height of seam worked seven feet. The whole of the area affected was filled with sand to a depth of 6ft. 6in. The estimated quantity of sand brought into the workings by the inrush of water is approximately 2,000 tons.

"A sump has been driven to the dip of the face of main dip heading, and the permanent pumping plant installed. Plenty of room for the stowage of the sand was made to dip of suction of main pump, and the sand is now being flushed into these workings through a heading connected with main dip heading by means of water from a 4in. delivery pipe from a pump in another portion of the mine.

Co-operative Colliery.

"This company has materially improved the ventilation of the mines by an overhaul of old stoppings, building of many new ones, and additions of two auxiliary fans of Sun type, each 54 inches dia.

"One 15 h.p. motor and one 5 x 8 Goulds' triplex ram pump. Complete new plant installed.

Cardiff Colliery.

"This company has installed a coal crusher with a capacity of 350 tons in eight hours. The whole of the coal supplied to mail boats bunkered by this company is put through this crusher. A coal storage bin with a capacity of 200 tons is now in course of erection at the colliery for this class of coal.

Westralian Colliery.

"The main heading at this colliery has been advanced another section, and a district is now being opened out on either side. The two overlying seams, known as Nos. 1 and 2, have also been proved overlying the present one worked, No. 3. Tests have been taken from these, and I understand that it is the intention of the company, at an early date, to open up one of these seams on the strength of the tests obtained.

Scottish Colliery.

"Considerable trouble in dealing with the water at this Colliery, owing principally to defects in the power plant and the inability of the company to shut down the plant over sufficient time to effect necessary repairs, culminated on 31st December in the temporary closing of the mines, and the sending of portion of the Belliss Morecom H.S. engine driving 110 K.W. generator to Perth for repairs. The water is being held in check to some extent by the remaining generators in the meantime.

Premier Colliery.

"No coal was produced at this Colliery during the year, the company being engaged in boring to locate

a site for a new tunnel. Some 2,000 feet of hand boring has been done on the leases, and the outcrop of one of the lower seams of excellent quality located at a point some 600 yards south-west of the old mines. A tunnel 9ft. x 6ft. 6in. in the clear has been put down and driven some distance into the seam.

"The whole of the plant has been removed to the new site, and the gantry altered to suit the tramline from the new tunnel. The change of plant is about completed, and this mine should again rank among the producers in the course of another month."

COMPARATIVE TABLE OF OUTPUTS AND MEN EMPLOYED—1914 AND 1915.

Colliery.	Productions, 1915.	Productions, 1914.	1915. Men employed.		1914. Men employed.	
			Surface.	Underground.	Surface.	Underground.
	tons	tons				
Proprietary	73,782	73,569	25	78	31	70
Co-operative	63,501	82,013·45	25	92	27	101
Cardiff	59,096	75,224	19	70	20	83
Westralian	52,949	42,297	25	66	16	65
Scottish	37,240	43,407·54	23	63	26	66
Premier	Non-Producer	2,639·6	6	1	4	5
Totals	286,568	319,150	123	370	124	390

DETAILED TABLE OF ACCIDENTS DURING 1915.

Name of Colliery.	Classification.					Nature of Accident.			Total for each Colliery.	Per- centage for each Colliery.
	Explo- sions.	Falls.	In Shafts.	Misc. Un'grd.	Sur- face.	Fatal.	Serious.	Minor.		
Proprietary	Nil	2	Nil	13	3	Nil	12	6	18	% 18
Co-operative	Nil	Nil	Nil	17	2	1	20	2	23	23
Cardiff	Nil	4	Nil	12	4	Nil	12	4	16	16
Scottish	Nil	3	Nil	14	4	Nil	19	2	21	21
Westralian	1	3	Nil	11	5	1	15	4	20	20
Premier	Nil	1	Nil	Nil	1	Nil	2	Nil	2	2
Total for Field	1	13	Nil	67	19	2	80	18	100	100

PILBARA, WEST PILBARA, AND PHILLIPS RIVER GOLDFIELDS, GREENBUSHES AND NORTHAMPTON MINERAL FIELDS, AND SWAN MINING DISTRICT.

Mr. S. Cullingworth, Inspector of Mines: Report dated 20th February, 1916.

"I beg to submit my annual report on the Greenbushes, Phillips River, Northampton and Swan Mining Districts for 1915.

"During the year a large amount of relieving work has been done including four and a half months on the Murchison, two and a half months at Kalgoorlie, and one month on the East Murchison field. The districts under my charge have been visited as opportunity offered. The Nor'-West districts were not visited.

"Greenbushes.—During the earlier part of the year tin was at a comparatively low price, and there was

not much activity among the smaller claims; the long wet winter also made working underground impossible for some months. Most of the dredging plants continued working throughout, although in some cases operations were restricted to working day shifts only. Towards the end of the year the price improved, and there is now a fair amount of prospecting in consequence.

"The Greenbushes Development Company has one dredge working in Spring Gully, one close to the main road to the station, one further north, and one about one and a half miles westward of the town. A new dredge was erected and is operating near the railway station.

"Mr. Moss has two dredges working in Spring Gully.

"On Three C's flat, the Phoenix, and Messrs. Blackeney and Teed are working their plants.

"At Floyd's Gully several parties of tributers are working an alluvial run close to where the Floyd's Gully Company had their plant.

"The Southern Star dredge which has been idle for some time has been re-started. Also the sluicing plant of Messrs. Giese and Angus and Cole are at work; in addition there are several sand sluicing claims working.

"The Cornwall mine has been abandoned. The South Cornwall has been retaken up, and the owners are now working from shallow shafts north of the old main shaft, where the hanging wall of the lode for a width of three or four feet has been found to be payable.

"A new discovery has been made of alluvial close to the main road at the northern end of the town, which promised very well, but as it is on private property work has been suspended.

"There are many unregistered claims, the owners of which do not supply the department with any returns, and they apparently move their pegs at any time it suits them to do so.

"The following are some of the principal returns for the year:—

"Greenbushes Development Company—Yield 33.06 tons of black tin, value £3,041.

"Estano Dredge—Yield 50.30 tons of black tin, value £4,452.

"The Three C's (Phoenix Sluicing Company)—Yield 34.96 tons black tin, value £2,773.

"Champion—Yield 20.00 tons black tin, value £1,405.

"Stanhope Limited, F. A. Moss (No. 1 Dredge)—Yield 29.99 tons black tin, value £3,050.

"The various quarries situated at Boya, Parkerville, Grenmount, Statham's, Armadale, Beenup, and Coogee have been visited when possible, and improvements in methods of working and sanitation have been effected. Some of the above are worked on an extensive scale, and the faces are, in many cases, very high; in some cases the strata of the rock or the joints and cleavages are favourable to safe working, in other cases the rock fractures badly, and these faces require constant and careful attention by the foremen or managers. The explosive magazines on the quarries are visited by the Inspector of Explosives, and the quantities stored have not been interfered with although they generally exceed the amount allowed under the Mines Regulation Act.

"Roelands quarry, although not included in a mining district, was visited, and the result of the large blast which took place was examined, as the scale on which this was executed was greater than any attempted in Western Australia previously.

The face of the quarry was fairly perpendicular, and was 140ft. in height; the rock is hard granite and diorite. A tunnel was driven from the base of the cliff into the hill 95ft. in length, drives were then put in at right angles to form a T, each drive being 100 feet in length. The explosive, gelignite, was placed at each end of the drive and sealed up by 19 feet of concrete, the drives were filled with sand and stone, and at the intersection of drives and tunnel a block of concrete 20 feet in length was put in, and the remainder of the tunnel filled with sand and stone. Thirteen tons of explosives were used, six tons in one chamber and seven tons in the other. The charge was fired by electricity, the wires were taken into each

chamber in pipes, in addition fuses were laid in separate pipes to ignition charges of dynamite, the wires were also connected with ignition or bursting charges of dynamite. The blast resulted in an estimated quantity of 250,000 tons of rock being broken away from the hill.

"Northampton.—The only company operating on anything like a large scale in this district is the Fremantle Trading and Smelting Company, and their mines, the Baddera and Narra Tarra, were idle from July to just before the end of the year. The reason for this stoppage was the difficulty which had arisen of disposing of base metal ores satisfactorily, but this difficulty has now been overcome. Government assistance has been granted the Company to put a smelting furnace at Fremantle into commission; this work it is expected will be completed early in the year, when the Company will be able to smelt their own ore, and to purchase lead ores from other mines. For the present, I understand, only lead ores not containing appreciable values in silver and gold, can be dealt with, as most, if not all, of the lead ores of the Northampton district are of this nature. The arrangement should be of great assistance to other mine owners, as they will not only save shipping charges but will be able to get a quicker return, and the reducing charges will be less than those obtainable from smelting works in the Eastern States. Several parcels of ore from the smaller mines have been disposed of in England through Government agency, but this method has necessarily meant some delay in final adjustments, and if owners could dispose of their ore outright, as they will now be able to, it should be to their advantage.

"The privately-owned mines or small syndicates which have been working have generally been hampered by want of capital, and their funds have not always been expended to the best advantage. In one case a good three-compartment vertical shaft was started and reached 20 or 30 feet below water level, when, as so often happens, funds ran out long before the lode could be tapped. Another instance of a party of prospectors attempting to reach a lode by standing a long way off sinking a vertical shaft and crosscutting also ended in failure; probably a fault, or alteration of the strike of the lode occurred, and funds gave out when the crosscut reached the point where they expected to strike the lode. In another case machinery was erected to treat an unprofitable dump, and in yet another instance where a reduction plant was erected, a considerable amount of time and money was wasted by owners in endeavouring to treat unprofitable dumps, thus crippling themselves financially, when good profitable ore was showing in their mine.

"The Baddera.—Owing to the reasons before stated, this mine ceased active operations in July last. It is now again unwatered, and is being worked at Nos. 1, 2, and 3 levels, the latter being the bottom one. Judging from present appearances, the stopes above each level still appear to contain large quantities of payable ore. Arrangements are now being made to sink the main shaft another lift. Stopping has been carried out over a length of 630ft. at No. 1 level, 860ft. at No. 2, and 400ft. at No. 3 level.

The lode at Nos. 2 and 3 levels north of the main shaft is of considerable width, from 10ft. to 15ft., and more in places, and as the stopes are being taken the full width there is no doubt it all contains pay-

able values. The ore is all sent to the concentrating mill, and sent away as concentrates.

"Narra Tarra.—During the year a crushing and concentrating plant has been erected, consisting of rock breaker, rolls, jigs, and wilfley tables, driven by a powerful gas producer engine, and the main shaft has been equipped with a winding engine. The mine is opened to a depth of 250 feet, and arrangements are being made to continue sinking. There are levels at 105ft. 180 feet in length, at 165ft. 480 feet in length, and at 250ft. 640 feet in length. The length of ore in the bottom level being stoped is from 350 feet to 400 feet in length, and, judging from present appearances, the grade should be fairly high.

"Kirton's.—The owners have received Government assistance to purchase and erect an ore-dressing plant on their mine. The machinery consists of a rock breaker, rolls, pulsator jig, two wilfley tables with the necessary ore bins, trommels, etc.; the plant is driven by a gas engine. A new feature is the pulsator jig, which contains one compartment only, and is consequently a small machine; its inventor, Prof. R. H. Richards, claims it will dress as much ore per shift as an ordinary five-compartment jig. The mine owners state they have no trouble with it; it dresses the ore well, but I do not think they have given it a sufficiently long run on ordinary milling ore to state whether it is all its inventor claims. The property is an old one and was worked many years ago. The course of the lode throughout the property was fairly well defined by old workings. The present owners opened it up near the centre of their holding by sinking a shaft on the underlay of the lode to about 90 feet; at 80 feet, drives north and south revealed a good shoot of ore of some 100 feet in length; much of the ore was high grade, being clean galena requiring only to be bagged when broken to average over 70 per cent. lead. There was also a quantity of good milling ore. South of these workings the lode, showing lead, can be seen from the surface in several old shallow workings; but the owners, instead of developing their mine by continuing the shaft they had already sunk, erected their plant some distance away at the north end of their holding near an old shaft, which they have endeavoured to pick up so as to reach some workings where good ore was said to exist. The shaft had to be cleaned out and secured as they went down, and a pump put in when water level was reached; after spending some time in this work without reaching the old level, and in treating old mullock dumps which were found unpayable, the owners decided to go back to their original workings and raise some ore. At the time of my last visit they were stoping above 80 feet and raising very good ore, but they have the disadvantage of having to cart it to their dressing plant, and instead of having their mine fairly well developed, have all that work ahead of them.

"The Uga.—A Geraldton syndicate took up this old mine some two years ago. At first a plant was erected to treat the old tailings dump lying at the surface, but this was found to be unpayable; a shaft was then sunk to cut the lode below the old workings, which were said to be about 60 feet in depth. The shaft was continued down to 140 feet and a cross-cut put in which cut the lode, but, unfortunately, in a poor place. The syndicate's money was now exhausted, so a tribute was let. The tributers are driving north on the lode, and are raising ore of

fair grade, which should be payable to crush and dress. They have a jaw rock breaker, a hand jig, and a wilfley table erected on the ground; the breaker and table are operated by an oil engine, which also drives a three-throw pump and gives power for hauling. At the present time they have about 20 tons of dressed ore on hand.

"Kirton's Main Lode.—This is a small local syndicate which is working south of and adjoining Kirton's. A shaft was sunk 70 feet in depth; the lode was cut and driven on northwards; it proved to be somewhat erratic at this point, and there was a large flow of water to contend with. A small pump and oil engine were installed, but are hardly big enough to cope with the water. The country to a depth of 40 or 50 feet was of an alluvial nature, and below the soil almost to the back of the drive was a soft puggy clay. A good bunch of lead ore was struck in the drive, but no backs were available. It appeared to be the cap of an ore body which only rose up to the back of the drive. About 35 tons of dressed ore were sent away. The drive northwards, which had almost reached the boundary, was discontinued, and was continued southwards and is now in about 40 feet. Galena appears to have given place to zinc blende in this portion of the lode.

"Very little progress has been made at the Nooka, which was retaken up by a syndicate some time ago. The old workings were not touched, but a vertical shaft was started and equipped with a small oil engine and winch. The lode has not been cut, and operations have been suspended for some months. Nothing of importance has been done in the Geraldine district. A mineral lease for copper was taken up, and two prospecting areas were applied for in this locality, but, so far as can be traced, the holders have not yet begun to send away ore from them.

"Four P.As. were applied for at Northampton, and two or three small parcels of ore have been shipped from them.

PHILLIPS RIVER.

"There are no large companies operating here now. The holdings of the West Australian Gold and Copper Mines, viz., the Elverdton, Desmond, Marion Martin, and Benson, are being worked by tributers.

"The Mt. Cattlin is idle and under water. Of the above the Elverdton is the chief producer. During the year tributers have been working from the No. 2 level upwards, mostly on lenses of ore left by the old company, and there appears to be every prospect of their being able to work the mine for some time. During the year they have sent to the Smelter 1,853.9 tons of ore containing 180.9 tons copper and 129 ozs. gold.

"The Desmond is being worked at 100 feet and upwards, and at the time of my visit the tributers had several lenses of good-looking yellow ore available.

"Tributers on the Marion Martin raised 604.3 tons ore, yielding 74.6 tons copper and 42.2 ozs. gold.

"372.6 tons of ore were sent away from the Cattlin mine from surface dumps. This ore, although of low grade, the actual results being 29.1 tons copper and 54.7 ozs. gold, is notable for its high flux value, which reached as high as 20s. per ton, thus reducing the returning charges by that amount.

"At Kundip the owners of the Gem Consolidated have unwatered their mine to 200 feet, and are stoping from this level upwards. The lode strikes in an

easterly and westerly direction. The drive at present is 120 feet long east of the shaft, and is being extended; good sulphide ore shows in the face. The hanging wall has not been reached; the ore, a sulphide, occurs in lenses and bunches, and is of high grade. Its value, as sent to the Smelter, ranges from 3 to 5 per cent. copper, and from 30 to 40 dwts. of gold per ton. On the same lode eastward the "Two Boys" is working at about 200 feet depth, and raising ore of similar character, although I understand it does not at present contain such good gold values.

"The Hillsborough, adjoining the Gem Consolidated on the west, is also working at from 140 feet upwards. The ore occurs in bunches, and often a large amount of dead work is required to locate a fresh patch; it has always been of high grade both in gold and copper, and good ore is now being obtained, but it is evident the owners will have to sink deeper shortly unless parallel bodies are discovered.

"On the adjoining Fair Play the lode at 200 feet had just been struck, and was, so far as it had been opened, a high-grade sulphide, containing about 2 ozs. gold and 3.5 per cent. of copper. During the year this mine sent to the Smelter 562 tons of ore containing 14.5 tons of copper, and 1,274.7 ozs. of gold.

"The Harbour View was under water at the time of my visit, and could not be seen. 688 tons were produced during the year, containing 15.9 tons copper, and 619.4 ozs. of gold. Two other lodes have been discovered and worked at different times by tributers, and each has given good results. It is noteworthy that whilst the Harbour View lode strikes north-easterly and underlies to the west, the other lodes discovered underlie eastward.

"The Flag mine is being worked by tributers in the shallow levels above water level. They produced for the year 863.38 tons for 6.59 tons copper and 957.94 ozs. gold.

"Reynolds and Scott's mine lies to the north of the first-mentioned group. The ore body is of an oxidised gossany nature, and is of considerable width where it has been opened at 100 feet. The shaft is about 150 feet on the underlie, and a drive is being put in eastwards at this depth, but the width here has not been ascertained by crosscutting. The length opened

at 100 feet is about 90 feet eastwards. The ore carries from 23 to 28 dwts. gold per ton. There is no copper present, but the gold is not amenable, for some reason, to ordinary gold-saving methods, so is all sent to the smelter.

"The State smelter purchased 6,492.88 tons of ore from the district, which yielded 447.42 tons copper and 4,005.15 ozs. gold.

Accidents.

"The following accidents were reported during the year:—

"Greenbushes.—Stanhope United: one fatal (fall of ground).

"Phillips River:—

"Flag G.M.: one serious (fall of ground).

"Harbour View: one serious (fell down old stope).

"State Smelter: one minor.

"Swan.—Boya Quarry: two serious (struck by falling stones).

Prosecutions.

"There were no prosecutions during the year.

Sunday Labour Permits.

"Baddera Lead Mine: a permit for 19th and 26th April, for 19 men whilst sinking, was issued."

MINING ACCIDENTS.

The mining accidents for the year 1915 are tabulated in Tables 26, 27, and 28, with the previous year's totals for comparison, and forwarded herewith for the Secretary for Mines' Annual Report, together with diagram of the fatal accidents year by year, and their causes. As pointed out in previous years, the accidents tabulated in the above returns are restricted entirely to such as have happened to persons engaged in the occupation of mining, and which have been a result of their calling. The following statement, however, shows also the total number of fatal accidents recorded as having happened on mines, whether to persons employed on the mines or not, for the last five years.

	1911.	1912.	1913.	1914.	1915.
Total fatal accidents on Mines reported	44	38	26	26	36
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	7	3	..	..	2
Fatal accidents to men engaged in mining	37	35	26	26	34
Total men engaged in mining (average)	16,596	14,961	14,780	13,174	12,253
Accident death rate per 1,000 men engaged in mining ..	2.23	2.34	1.76	1.97	2.77

Table 26 shows the number of accidents in the various gold and mineral fields classified according to causes, and it will be seen from it that during 1915 34 persons were killed and 923 seriously injured, as compared with 26 killed and 831 seriously injured during the previous year.

The diagram shows graphically the totals of fatal accidents year by year since 1891.

In Table 27, the death rate per 1,000 persons employed on surface and underground in gold, coal and

other mines is shown, the general average rate for 1915 being 2.77 as against 1.97 for 1914. The rates per 1,000 are based upon the figures in Table No. 21 (Annual Report, Secretary for Mines, 1915), which gives a grand total for 1915 of 12,253 men employed at mines above and under ground, inclusive of alluvial workers.

Table 28 summarises all the fatal accidents for 1915 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 1914 being given for comparison. The number of men on which these rates are based is taken from Table No. 23 (Annual Report, Secretary for Mines, 1915), and does not include alluvial workers.

Attached hereto is a general table classifying the fatal and serious accidents during 1915 according to the gold or mineral field in which they occur, and also according to causes, the totals from each cause for 1914 being shown for comparison.

GOLDFIELD.	Explosions.		Falls of Ground.		In Shafts.		Miscellaneous Underground.		Surface.		Machinery.		Total.	
	Fatal.	Serious.	Fatal.	Serious.	Fatal.	Serious.	Fatal.	Serious.	Fatal.	Serious.	Fatal.	Serious.	Fatal.	Serious.
	1. East Coolgardie	1	10	7	61	..	15	3	373	..	151	1	11	12	621
2. Mt. Margaret .. .. .	..	..	1	7	2	3	..	50	..	15	1	7	4	82
3. Murchison .. .. .	..	1	2	15	..	2	..	28	..	13	..	2	2	61
4. East Murchison	2	..	..	8	..	1	..	7	..	7	1	2	3	25
5. Coolgardie	1	1	..	1	..	1	..	2	..	2	..	..	1	7
6. Yilgarn	1	2	1	2	1	..	..	15	..	8	..	2	3	29
7. North Coolgardie .. .. .	..	1	1	1	1	..	..	..	..	1	..	..	2	3
8. North-East Coolgardie .. .. .	..	..	..	..	1	..	..	..	..	..	..	..	1	..
9. Broad Arrow .. .. .	..	..	..	2	..	..	1	..	..	1	..	1	1	4
10. Dundas .. .. .	..	..	1	..	..	1	..	..	..	1	..	..	1	2
11. Pilbara .. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..
12. Peak Hill .. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..
13. Yalgoo .. .. .	..	..	..	..	..	..	..	2	..	1	..	..	..	3
14. Phillips River .. .. .	..	..	..	1	..	..	..	1	..	..	..	1	..	3
15. Collie .. .. .	..	1	2	9	..	1	..	53	..	16	..	1	2	81
16. Greenbushes .. .. .	..	..	1	..	..	..	..	..	..	..	..	..	1	..
17. Northampton .. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..
18. West Pilbara .. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..
19. Swan .. .. .	..	..	..	1	..	..	..	1	..	..	..	..	..	2
20. Ashburton	1	..	..	..	..	..	..	..	..	..	..	..	1	..
Total for 1915	6	16	16	108	5	24	4	532	..	216	3	27	34	923
Total for 1914 .. .. .	..	16	8	93	8	26	5	476	2	158	3	62	26	831

FATAL ACCIDENTS.

The following are brief particulars of each fatal accident reported during the year 1915:—

In Shafts.

At the Corinthian North, a platman took an empty truck from a cage that was resting on the chairs at No. 1 plat in the south compartment of the main shaft, and then proceeded to cage a full truck, but instead of running it into the cage, he ran it into the North compartment, the gate of which was not closed, and fell with it to the No. 2 level. The shaft was well lighted, and fenced with gates having a fall towards the shaft, but the gates were propped back out of use when the accident happened. The accident appears to have been due to deceased's own action as platman in not closing the door of the empty compartment, but the Coroner's jury, after considering the evidence, found that death was accidental, and that no blame attached to any person. (195/15.)

At the Riverina South G.M., North Coolgardie Goldfield, a man was killed through being struck by a descending cage. From the evidence adduced at the inquest, it would appear that deceased must have been crossing the shaft instead of going round by the proper way. The witnesses all stated that a bar across the shaft would not have prevented the accident, but the Coroner's jury added a rider to their verdict of accidental death recommending that bars be provided. The accident took place at the bottom of an inclined shaft. (943/15.)

At the Sunbeam G.M., Kanowna, a man, while adjusting the clack of the baling tank in the shaft slipped from the wall plate, on which he was standing, owing to the wood being wet, fell down the shaft and was killed. The accident was due to deceased taking a quite unnecessary risk. (1188/15.)

At the Sons of Gwalia Mine, Mt. Margaret Goldfield, a miner left the skip at the No. 8 plat in the main inclined shaft, but before stepping on to the plat, attempted to change his crib and can from one hand to the other, when he overbalanced and fell feet foremost down the shaft, death being instantaneous. An examination of the bearer showed no signs of it being worn or greasy. The accident would, therefore, appear to be due to a want of care on the part of deceased. The Coroner's jury returned a verdict of accidental death, no blame being attachable to anyone. As the shaft is an inclined one, men travelling in the skip have to exercise more care in getting in and out of the skips than is necessary with the cages used in vertical shafts. (1550/15.)

A man was killed at the Ida H. G.M., Mt. Margaret Goldfield, through riding on the check bar of the skip. There was insufficient clearance between the bar and one of the rope guide rollers in the shaft to allow of a man being on the bar, and the deceased's body was caught by the roller and he fell down the shaft. The Coroner's jury returned a verdict of accidental death. The accident was due to thoughtlessness or want of knowledge of the shaft on the part of the deceased (66/16.)

Explosions.

At the Golden Horseshoe G.M., East Coolgardie Goldfield, a man was killed through falling off the bucket whilst he was being pulled to the top of a winze by means of a Holman hoist. He had charged and lighted the fuses of three holes, and when he fell from the bucket the shots went off before he could get up again. The driver of the Holman hoist, who seems to have lost his presence of mind when his mate fell from the bucket, was prosecuted for driving without being the holder of a certificate, but there was nothing to show that he was not capable of handling the hoist or that the accident was attributable to any want of knowledge on his part of how to work the hoist. The Coroner's jury returned a verdict of death through falling down a winze at the 1,600ft. level, and from explosions that took place therein. No blame attachable to anyone. (258/15.)

At the Turn of the Tide G.M., Coolgardie Goldfield, two men were injured, one fatally, through an explosion occurring while they were boring out an old hole, a practice which is contrary to the General Rules under the Mines Regulation Act. The Coroner's jury returned a verdict of accidental death with no blame to anyone, and the following rider was added:—"The jury consider all men working with explosions on mines should be more conversant with the Mines Regulation which prohibits boring in holes previously fired." (910/15.)

At the Uaroo Lead Mine, Ashburton, a fatal accident happened through an explosion occurring while a man was drilling, owing to his striking an unexploded hole. Seven holes had been fired, and only six shots were heard, but deceased decided that—as on other occasions—two shots had gone off together, and therefore thought it was quite safe to go on with boring. The Coroner's jury returned a verdict of accidental death. (1117/15.)

At the Youanmi G.M., East Murchison Goldfield, two men were killed by an explosion in the No. 4 level. The two deceased had bored out the bottom charged the cut holes and warned all the men working near by. On one of the employees proceeding to the scene of the accident to inform the men it was time to knock off, he found one of them lying dead on the level, and the other in an unconscious state at the bottom of the winze. He died a few hours later. The chain ladder was found pulled out of the winze and fastened back by a piece of rope, and the Holman hoist taken off the bar. Most probably, the men were caught by the explosion while they were still at the top of the winze. The Coroner's jury returned a verdict of accidental death, no blame being attachable to anybody. (3698/15.)

Two miners were firing holes bored by the previous shift at the Corinthian North G.M., Yilgarn Goldfield. After lighting the fuses, and when the men had gone only about 20 feet away, an explosion occurred, killing one of them and badly injuring the other. The fuse was tested by the Inspector of Mines, and found to be normal. There is no evidence to show what caused the accident. The Coroner's jury found that deceased was killed accidentally by an explosion. (24/16.)

Falls of Ground.

While proceeding to his work in No. 3 stope of the Fenian G.M., Murchison Goldfield, a shoveller was killed by a rock about 2½ tons falling on him from the back. The Coroner's jury returned a verdict of

accidental death, with no blame to anyone, and added the following rider:—"That all working places be thoroughly examined at the beginning of each shift by a practical miner before any work is done." It seems very doubtful if this precaution would have been of any use. Section 50 of the Act provides for examination of working places by all persons employed in them, and the deceased was following two machine men and the underground manager, who would be as likely to notice anything wrong with the ground as any other person sent to examine it. They did not notice anything dangerous before the rock fell. (902/15.)

At the Mararoa G.M., Dundas Goldfield, two men were engaged in working down a piece of ground to enable them to rig a machine when a rock weighing about 5wt. fell on one of them, inflicting very serious injury, from which he died seven months later. The ground had been examined the day previous to the accident and was considered safe to work under. There does not appear to have been any reason to think that greater care and forethought could have prevented this accident. (911/15.)

Another fatal accident occurred at the Fenian G.M., Murchison Goldfield, through a fall of ground. At the time of the accident hauled ground was being worked down, when a large stone which had been previously bored fell on a shoveller, who was waiting near by while the working place was being made safe by the machine man. The Coroner's jury returned a verdict of accidental death with no blame to any person. Deceased appears to have come forward under the loose ground to point out a piece of it which he thought ought to be tried, and on touching it with his shovel, there was a fall of dirt, which killed him. (914/15.)

At the Golden Horseshoe G.M., East Coolgardie Goldfield, a man was killed by a fall of ground. He and his mate had been engaged in barring down bad ground, and thought they had made all safe, but a piece which must have been overlooked fell away unexpectedly and crushed the deceased. The Coroner's jury returned a verdict of accidental death. All ordinary care appears to have been exercised by all concerned. (1093/15.)

At the Westralian Colliery, Collie Coalfield, two men were injured, one fatally, by a block of the roof rock falling on them. When sounding the back after firing, the ground had appeared to be drummy, and props had been ordered, but the fall occurred before they arrived. The Coroner's jury found that death was due to an accidental fall of rock, and recommended that extra timber be kept on the spot whenever the rock roof is bared in this mine. The Inspector of Mines was of opinion that more timber ought to have been used. (1116/15.)

At the Great Boulder Proprietary G.M., East Coolgardie Goldfield, two men were injured, one fatally, through a fall of ground. At the time of the accident, the men were sitting in what they considered a safe place waiting for some holes they had fired to go off, when, without warning, some stone from the west wall fell on them, killing one and seriously injuring the other. The ground had been examined and was considered safe. The Coroner's jury returned a verdict of accidental death. (1124/15.)

In an open cut at Moss Brothers' Tin Mine, Greenbushes, a fall of ground took place whilst a man was boring a hole for firing, and a quantity of rock fell

on him, killing him instantly. The Coroner's jury returned a verdict of accidental death with no blame to anyone. (2059/15.)

At the Lake View and Star G.M., East Coolgardie Goldfield, a man was killed by a fall of earth whilst he was looking for candles among the debris left by the timbermen who had been putting in timber to support the place. A heavy lump of rock came away from the hanging wall, which knocked out two sets of timber and caught deceased. The ground had been examined that morning and was considered safe. The Coroner's jury returned a verdict of accidental death with no blame to anyone. (2333/15.)

At the Edna May Central G.M., Yilgarn Goldfield, a man received fatal injuries through a large piece of the ground he was working down after firing falling on him. The Coroner's jury returned a verdict of accidental death with no blame to anyone and added "That the management had used every precaution for the safety of the men." (2592/15.)

Two men were shovelling in a stope of the Great Boulder Proprietary G.M., East Coolgardie Goldfield, when a quantity of rock fell from the back, killing one man outright and inflicting such serious injuries on the other that he died two months later. Three toms had been placed in position and the back secured; one of the toms had been blown out by the previous shift and replaced, and after the replacement the machine men had tried to pull down a piece of the ground with bars, but without success. In such cases the general instruction given by the Inspectors of Mines is that ground which had been tried with bars should be secured by a tom, but this had not been put in. The shift boss had tested the ground previous to the accident and considered it safe. The Coroner's jury brought in a verdict of death from a fall of ground. The work appears to have been carried out in accordance with the usual practice of the Kalgoorlie mines, and there seems no reason to blame any person. (3348/15.)

A miner received fatal injuries in a prospecting shaft on the Star G.M., Kalgoorlie, through a piece of ground falling from a greasy wall. He was working by himself in shallow ground, and was the only person responsible for the state of his working place. (3725/15.)

A fatal accident occurred, involving the death of one man, on P.A. 410G, North Coolgardie Goldfield. Deceased had just sat down near the end of the north drive to have his lunch, when a large block of ground fell away from the back immediately over him. The place had been previously examined by him and considered safe. The Coroner's jury brought in a verdict of accidental death with no blame to anyone. (3861/15.)

At the Collie Co-operative Colliery, Collie Coalfield, a man was killed and another injured by a fall of a large piece of stone band from the centre of the seam. Prior to the accident, the men had examined the ground and considered it safe, but in the opinion of the Inspector of Mines they made an error of judgment in not setting props under the stone band. The Coroner's jury returned a verdict of accidental

death, and found that all ordinary working precautions had been taken by the injured men and the mine officials. (3925/15.)

At the Sons of Gwalia G.M., Mt. Margaret Goldfield, two men were injured, one fatally, by a fall of ground. Just previous to the fall the place had been examined by the shift boss, who considered it safe to work under. The Inspector of Mines, however, did not consider that the shift boss exercised sufficient care in his examination. The Coroner's jury brought in a verdict of accidental death and that no blame was attachable to anybody. (25/16.)

At the Kalgurli G.M., East Coolgardie Goldfield, two men were taking out "collared" legs supporting stulls carrying the mullock filling of a stope in order to put in a long carrier in their place when the stulls gave way and a quantity of earth fell and killed one of the men. Several witnesses, who saw what was being done, all thought the work could be carried out with perfect safety, but there must have been some unseen weakness in the supports of the mullock. At the Coroner's inquest a verdict of accidental death was returned, with no blame to anybody. (76/16.)

Miscellaneous Underground.

At the Great Boulder Proprietary G.M., East Coolgardie Goldfield, while attempting to open a pass which had become blocked with ore, a man was killed through the ore starting to run, knocking him off his feet and carrying him with it. It would appear that deceased was standing too near the edge of the pass while using the bar and took an unnecessary risk. The Coroner's jury found a verdict of accidental death, with no blame to anyone. (393/15.)

At the South Kalgurli G.M., East Coolgardie Goldfield, a man was killed through falling down an ore-pass. At the time of the accident, deceased was employed trucking to the pass, and a rock becoming jammed in the truck, he lifted it out and walked to the pass to throw it down, and apparently overbalanced or slipped and fell down the pass. The Coroner's jury returned a verdict of accidental death. (1450/15.)

At the Great Boulder Proprietary G.M., East Coolgardie Goldfield, two men were shovelling sand, when the pass runner warned them to get to a place of safety as he was about to fire a pass. One of the men disregarded the warning and was caught by the rush of sand and suffocated. The Coroner's jury returned a verdict of suffocation from an overflow of sand. The deceased appears to have underestimated the danger of a sudden rush of sand, and remained where he was in disregard of the warning given him to go to a place of safety. (2334/15.)

At the Victorious G.M., Broad Arrow Goldfield, a man met his death through falling down an ore pass. At the time of the accident, deceased was engaged in trucking and tipping ore down the pass, but as no one witnessed the accident, it is not known what caused him to fall. The Coroner's jury returned a verdict of accidental death with no blame attachable to anyone. The Inspector of Mines reported that he was at a loss to know how the man came to get into the pass. (3185/15.)

Surface (including Machinery).

Two men were repairing a belt driving the ore conveyor on the Great Boulder Proprietary G.M., when one of them, from some cause unknown, fell from the platform on to the cracker floor, sustaining fatal injuries. The Coroner's jury returned a verdict of accidental death, and added a rider to the effect that the gangway should be widened as much as possible. Instructions were issued by the Inspection of Machinery Branch to the Management of the mine to widen the gangway and place a handrail along it. Prior to the accident no one appears to have regarded the place as in any way unsafe. (1721/15.)

At the Lady Harriet G.M., Mt. Margaret Goldfield, a man working at a drilling machine in the Battery went to the main counter-shaft to take the belt off, and by some means was drawn on to the shafting and killed. No one actually saw the accident happen, and it can therefore only be surmised that deceased's hand or some portion of his clothing became caught by the moving belt. The machinery was apparently quite safe, and properly protected, so it would seem that deceased must have acted in some way without proper care. The Coroner's jury returned a verdict of accidental death; no blame attachable to any person. This accident adds another death to the long list of men killed through handling belts in rapid motion. (3283/15.)

At the Wiluna State Battery, East Murchison Goldfield, a fatal accident occurred to a man who was engaged in taking off the driving belt. On the previous shift, a head had come off in No. 1 battery, and in order to replace it deceased ascended to the cam shaft platform and attempted to lever the driving belt off with a piece of piping, with the result that he was either drawn on to the shafting or lost his balance and fell head downwards on to the ground and was killed. The accident was due to the deceased's own action in attempting to take off the belt without slowing down the engine. (3977/15.)

DEATHS IN MINES RECORDED, BUT NOT INCLUDED IN THE STATISTICS OF MINING ACCIDENTS.

There were two instances of deaths of persons in mines which could not be considered in any way due to their occupation, and which, therefore, have not been included in the figures relating to persons employed in mines.

In Shafts.

At the Hannan's Star G.M., East Coolgardie Goldfield, a man not employed on the mine, while under the influence of liquor, in some manner unknown got over the rope fence protecting the open cut, and falling down it was killed, his body being discovered by the mine surveyor six days later. The Coroner's jury returned a verdict of death, which they believed to have been accidental, through falling down an open cut on the mine, and added the following rider:—"We consider the fence bordering the road as at present constituted is absolutely unsafe, and whoever was responsible for the banking up outside the fence should have correspondingly raised the top rail; also, we consider that there should be a good clear light at that particular place." The matter having been

fully considered, it was not thought advisable to take proceedings against any person as a result of the jury's finding, but action was taken by the Inspector of Mines to obtain better protection of the open cut. (4008/15.)

Explosion.

Some children were playing about the Myrtle Lease, East Murchison Goldfield, and found some detonator caps. One of the children—a little girl of eight years—placed two of the caps on a stick and put it in the fire, when the caps exploded inflicting fatal injuries to the child. An inquest was held and the Coroner's jury found that the child's injuries were caused through the explosion of detonators found lying about in a shaft of the Myrtle Lease through negligence of some person or persons unknown. Inquiries were made, but no proof could be obtained which would enable proceedings to be taken against the person or persons responsible for leaving the detonators lying about. As these cases are not, properly speaking, mining accidents, they have been omitted in making up the figures of fatalities for the year 1915. (2833/15.)

SERIOUS ACCIDENTS.

Under Section 26 of "The Mines Regulation Act, 1906," all accidents which incapacitate the sufferer from attending to his ordinary duties for 14 days or more are termed "serious," but comparatively few of these accidents result in permanent disablement. For example, of the 923 "serious" accidents during 1915, 621 were recorded from the East Coolgardie Goldfield, but only 26 cases out of the number were breakage 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, etc., but sufficiently serious to cause the sufferer to be away from work for 14 days or more.

Explosions and Explosives.

During 1915, 16 persons were seriously injured through explosions. In eight cases, the explosion occurred sooner than the men expected it, and before they had reached a place of safety; in one case an explosion occurred while the men were boring into an old hole, contrary to the General Rules, and in two cases detonators exploded through stones falling on them. In another case, the charge exploded while being tamped, and in yet another, a detonator exploded through being struck by a hammer. Another detonator exploded while the fuse was being pushed into it. In another instance, while a fuse with detonator attached was being tested, the end of fuse was accidentally struck, causing the detonator to explode. One explosion occurred through some cause unknown.

Falls of Ground.

One hundred and eight serious accidents during 1915 were due to "falls of ground." In four cases, the injuries were received while the men were engaged in the dangerous but necessary work of taking down

loose ground after firing. The majority of accidents caused by "falls of ground" were purely accidental mishaps, inseparable from mining and unpreventable by the exercise of ordinary skill and care, but there were several instances in which the inspectors of mines considered the accidents might have been avoided by greater care on the part of the men working at the place. The use of more timber is being constantly insisted upon by the inspectors in all cases of doubtful security of the backs.

In Shafts.

Twenty-four serious accidents occurred in shafts from various causes as follows:—10 from objects falling down shafts, such as buckets, stones, timber, and drills; two from men falling down shafts; two from men receiving injuries through parts of their body protruding from cages and being caught by the shaft timbers; one from a truck capsizing; four through accidents to cages whilst men were riding in them; three through accidents to skips; one through a man being struck by a winding rope; and one man jarred his hand whilst working in the shaft.

Miscellaneous Underground.

Injuries of a more or less serious nature were inflicted on 532 men by miscellaneous accidents underground. In 115 cases, the injuries were received while handling and loading skips and trucks, through fingers and bodies being jammed against shoots 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 118 cases, the injuries were caused through falling and rolling loose rocks and stones, such as runs of ore and mullock, while shovelling, or stones running down rills and ore shoots; and eight men received severe cuts and bruises while handling sharp stones. Sixty-five were injured handling rock drills and coal-cutting machines and parts of same, and 10 by the stages on which machines were erected collapsing. Other falls in the working from stages and ladders in rills and passes, and so on, caused injury to 54 persons, and 25 were hurt by falling tools and pieces of machinery. Flying splinters of stone and steel were responsible for 20 men being injured, and 20 were hurt while handling timber, while four men were injured through falling down ore passes. The remaining 93 cases were due to various accidental causes—jarring of hands, feet, blows from tools, strains, burns, and so on. Doubtless, a number of these accidents could have been avoided by a little more care on the part of the injured persons, but the majority must be regarded as purely accidental mishaps.

Surface (including Machinery).

Two hundred and forty-three accidents on surface were recorded during 1915. Five men were scalded by hot water and 13 burnt in various ways. Thirty-one persons sustained injuries from falls caused by missing their footing, slipping, etc. Twenty-five 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 five men, and three got their hands jarred.

Falls of timber and pieces of machinery, while being handled, accounted for 46 cases of injury. Twenty-seven cases were caused by machinery in motion, six of these being caused by handling belts in motion. Twenty-seven men were hurt while handling timber, three men fell into ore bins, and seven were struck by stones. Three men fell from stages and three had their feet run over by drays. Other causes of 39 accidents were strains from lifting heavy weights, tools slipping and inflicting cuts and bruises, and so on. The majority of these accidents were mishaps of an accidental character, only preventable by greater care and forethought on the part of the workmen, and were not from causes which could be effectively dealt with by restrictive regulations.

WINDING MACHINERY ACCIDENTS

(Without serious injury to persons).

The following accidents have been reported by the Inspectors of Mines in compliance with Regulation 11 of "The Mines Regulation Act, 1906."

Overwinding.

An engine-driver at the Ivanhoe G.M. applied the brake and opened steam against the ascending load, but failed to stop the engine in time, and the safety hook sheared before he could apply both brakes. (369/15.)

At the Oroya Links G.M. the engine-driver overwound the North cage. No damage was done to the machinery or shaft. (369/15.)

At the Queen of the Hills G.M. the engine-driver overwound his skip, which was pulled up to the thimble, where the safety hook acted and freed the rope, leaving the skip hanging at the top of the guides: no damage. The engine-driver was not familiar with the new and larger winder put into use on the day of the accident. (1860/15.)

At the Great Boulder Perseverance G.M. the engine-driver forgot to reverse the lever when the empty cage was at the top brace, with the result that the cage went to the thimble, and the rope was released without damage being done. (369/15.)

At the Golden Horseshoe G.M. the engine-driver, deeming the foot brake sufficient to stop the ascent of the north cage, omitted to apply the emergency brakes, and the platman was unable to apply the chairs to the descending south cage owing to it travelling too fast. The north cage was therefore overwound. The Inspector of Machinery considered the accident was due to momentary inattention of the engine-driver. No damage resulted. (369/15.)

At the same mine on another occasion the driver's foot slipped while he was applying the foot-brake, and the cage was overwound and hung up in the thimble. (369/15.)

At the Baddera Lead Mine the engine-driver, after packing the stuffing boxes of the winding engine, gave a trial run to make sure the packing was not too tight, and being satisfied that everything was alright he started to haul ore. Thinking he saw smoke issuing from the packing as the cage neared the brace his attention was diverted from his engine, with the result that he overwound the cage; the safety appliances failed to act, and the cage went to the bottom and was destroyed. (2547/15.)

Breakage of Winding Ropes and Chairs.

At the Light of Asia G.M. the winding rope broke while a truck of ore was being raised. A new rope had been ordered. The point at which the break occurred was the only one at which the Inspector could see any serious defect after the accident. (897/15.)

At the Ivanhoe G.M., from some cause unknown, the winding rope broke 250 feet from the shoe. It had been carefully examined, and its failure must have been due to some invisible fault. (3358/15.)

At the Sons of Gwalia G.M. the north skip in descending fouled a drawlift rope which works the pumps at the No. 10 plat, with the result that the rope was broken and the skip derailed. (369/15.)

Mishaps to Cages and Skips in Shafts.

At the Kalgurli G.M. the skip caught in the shaft, owing to a stone having become jammed between the body of the skip and the east side of the shaft. The skip was thrown to the west side, where it caught under the plate holding back the old chairs. The safety hook broke, but the grippers caught and the skip came to rest within a few feet. (1372/15.)

At the Great Boulder Proprietary G.M. the clutch band broke and the left drum ran away, letting the cage go to the bottom. (369/15.)

During hoisting operations at the Sons of Gwalia G.M. the north skip became derailed, knocking several of the shaft timbers out, and breaking and displacing the rails. (369/15.)

At the Ida H. G.M. a skip became derailed owing to a joint in the line becoming loose. No damage was done to the shaft, but a man had his arm slightly injured through striking it against the timbers of the shaft. (369/15.)

At the Royal Standard G.M. the clutch on the loose drum broke, the load being apparently too heavy for its strength. The skip struck the bin, and went to the bottom, carrying away some of the timbers. (3110/15.)

At the Golden Horseshoe G.M. the engine-driver was pulling ore to the top brace, and in lifting the cage off the chairs he gave the engine too much steam, and sent the cage up to the thimble; the safety hook was sheared in the ring, but the safety hook and grips held the cage. (369/15.)

Striking Chairs.

At the Oroya Links the platman left the chairs in the shaft, and the cage descending struck them. Two men were slightly injured. (535/15.)

Miscellaneous.

At the Great Fingall G.M. the pinion on the internal shaft winder broke, and at the Lake View and Star the right hand drum had two of the spokes cracked inside. (369/15.)

PROSECUTIONS FOR BREACHES OF THE MINES REGULATION ACTS AND REGULATIONS.

During the year 1915 proceedings were taken against 28 persons for various breaches of the Mines Regulation Act and Regulations, viz., 21 miners, 1 platman, 1 shift-boss, and 5 managers. The charges

against one manager, one shift boss, and one miner were withdrawn after partial hearing, and in two cases against miners the charges were dismissed without costs. In all the other instances fines were inflicted. The following are particulars of the cases:—

Regulation 14.—A miner was fined £5 and costs for taking charge of a Holman hoist without holding a certificate for driving. While he was raising his mate from the bottom of a winze the latter fell from the bucket and was killed. (258/15.)

Another miner was prosecuted and fined £1 and costs for a similar offence. While in the act of raising his mate the rope gave a sudden jerk, causing the man to fall from the bucket to the bottom of the winze and fracturing his thigh. The manager could not be prosecuted in this instance as he had resigned and gone to the war. (1204/15.)

Section 32, General Rule 9.—Proceedings were instituted against two miners for working in a dangerous place. The Inspectors of Mines found loose ground ready to fall which ought to have been removed. The Warden dismissed the case without costs on the defence put up that the ground was liable to become loosened suddenly by stones springing out from it. Consequential informations against the shift-boss and mine manager were thereupon withdrawn. (3252/15.)

Section 31.—A manager was proceeded against and fined £1 and costs 6s. for employing an uncertificated engine-driver to drive a winding engine, and the man driving was fined 10s. with 6s. costs, for taking charge of an engine and lowering men without being the holder of a first-class engine-driver's certificate. (3568/15.)

Section 32 (3) (g).—Proceedings were instituted against a manager for failing to supply canisters for carrying explosives into the mine. He was fined £10, with £1 5s. costs. (712/15.)

Another manager was fined £3 and costs 3s. 6d. for neglecting to comply with the Act by enforcing the provisions as to storage of explosives, a miner being found in the workings using an open gelignite case as a distributing magazine. The case contained several packets and loose plugs of explosives, and it was shown that the drive to the proper magazine had been blocked for several days. (3932/15.)

Section 32 (3) (u).—Two miners were prosecuted and fined £1 and £1 10s., with 5s. costs each, for neglecting to give proper warning before firing a charge. (711/15.)

Section 40.—A manager and 12 men were proceeded against for working more than 13 consecutive shifts in a fortnight. The manager was fined £5 10s. with 6s. costs; 9 men were fined 10s. and costs 4s. 6d. each; and 2 men 5s. with 4s. 6d. costs each. One charge was withdrawn owing to an error in the dates in making out the information. (348/14.)

Section 57.—A platman was proceeded against and fined £2 and 5s. costs for neglecting to remove the chairs in the shaft, thereby causing an accident. (535/15.)

Two miners were fined £2 16s. and 4s. costs each for neglecting to give proper warning before firing a charge, thus causing an accident to one man. (3067/15.)

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

Exemption certificates were issued to 14 men during 1915 to take charge of machinery on mines where it was impracticable for various reasons to employ duly qualified engine-drivers. Inspectors of Mines examined the applicants on the machinery to which the exemptions applied, and reported that they were capable of handling and taking charge of it. These exemptions are allowed only in cases where there is not sufficient work to keep a certificated man constantly employed, or where the plant is unimportant in its dimensions or the nature of its work, or where the distance from centres of employment is so great as to render it impracticable to obtain certificated men. The raising or lowering of men is not allowed to be done by holders of such exemptions, and all men so exempted are expected to try to pass the examination for an engine-driver's certificate as a condition of being allowed any extension of the term of the exemption.

SUNDAY LABOUR IN MINES.

Forty Sunday Labour Permits were issued during 1915 to various mines for the purpose of rendering dangerous workings safe, coping with inrushes of water, road laying, regrading and repairing roads, constructing pent house, etc., or work which could not be performed on week-days without disorganising the ordinary work of the mines.

PHILLIPS RIVER SMELTING WORKS.

Report of Manager, Mr. Richard Shepherd, dated 25th February, 1916:—

"I have the honour to report as follows on the work done at the State Smelting Works, Ravensthorpe, during the year 1915.

The first campaign, which was still in progress at the beginning of the year, was concluded on the 30th April. During the four months, 3,034 tons of ore were smelted and 53 tons of the matte pile, previously made, retreated, producing 266.587 tons of blister. The estimated contents of the blister were 262.58 tons pure copper, 1,825 ounces of silver, and 2,311 ounces of gold.

As the remaining stocks of ore were small and of a composition unsuitable for blending on the furnace charge, treatment was suspended to allow of fresh accumulations. The second smelting campaign was begun on 18th June, and with the exception of time lost through occasional failure of coke supplies, flux, and firewood, due to the rough weather and unusual rainfall of the winter months, the furnace was continuously in blast until 22nd December. During this period, 4,931 tons of ore and sintered concentrates were smelted, and 316.578 tons of blister produced, containing 311.829 tons pure copper, 2,394 ounces silver, and 312.9 ounces gold.

Though the tonnage of ores mined in the district during the year was small, the figures show the unusually high average recovery of 7.21 per cent. copper, 10½dwts. of silver, and 13½dwts. of gold per

ton smelted. Although the composition of the ores has necessitated heavy fluxing, and limestone, owing to its high cost and bad quality, has been altogether dispensed with in favour of the ironstone quarried from M.L. 279, no difficulty has resulted in the running of the furnace, and the slags have been unusually clean, considering the high grade of matte produced. It appears that the superior fluidity of the ferruginous slags more than compensates for their greater weight in the settling out of the matte in the fore-hearth.

In September a siding was put in at the quarry for the carriage by rail of flux to the smelter, which, though no cheaper than cartage by dray, will ensure constant supplies during the wet season.

As considerable quantities of low-grade sulphides had been accumulated at the Cattlin & Elverdton mines when worked by the Phillips River Company, the overhauling and renovation of the concentrating mill was continued during the earlier part of the year. Short trial runs for adjustment were made in October, which gave better recoveries of copper than expected, and the mill has since been running regularly at the rate of one shift per day. During this time it treated 950 tons of 3 per cent. material, which had formerly accumulated at the mill as being worthless, effecting a 73 per cent. recovery in concentrates which, with the scarcity of sulphides offering, was a welcome addition to the smelting charge, and will, at recent copper prices, return a very fair profit.

The large dam at Cordingup has furnished 3,456,000 gallons of water for milling and smelting during the year, and, though no appreciable rain fell during the last quarter, an ample supply to carry over till the wet season is a practical certainty.

Transport difficulties, owing to the war, have so greatly delayed the marketing of the works' product that no final payments for copper ore purchased have yet been possible, and much more working capital has been locked up in metal values than would be under normal working conditions; but as the market price of the red metal has been steadily rising since shortly after the beginning of the war, the delay in payment will, on present showing, be very beneficial to the local mine owners."

ADVANCES ON ORES.

The policy of making advances to prospectors on parcels of copper, lead, antimony, and other ores was continued during the year, and proved to be a great convenience in many cases to men who otherwise could not get any return for their ore until five or six months after they had shipped it. A number of parcels of copper ore from Yampi Sound, Derby, Roebourne, Uaroo, Gabanintha, Lawlers, and Ilgarere were shipped to England, and sold there by the Agent General, and some also were sent to New South Wales smelters. Several parcels of lead ore from Northampton district were also shipped to England for sale, and one of wolfram from Mt. Singleton. One of bismuth ore from Yalgoo was unfortunate in being in the s.s. "Clan McTavish" when sunk in the Atlantic by an enemy raider. At the end of the year the Commonwealth Government refused to issue any more permits for the export of copper and lead ores, and

required them to be treated in Australia. The terms of treatment obtainable in Great Britain have, however, been very much more favourable to the shippers of ore than those given by the Australian smelting establishments, and it is against the interests of development of the base metals in this State that prospectors should be debarred from sending their ore to the best market available to them.

No advances were made on tin ores, though there was a standing offer by the Government to advance on these also if desired. The system of direct purchases in vogue at Greenbushes appears to suit the raisers of tin better than one by which the final payment has to be delayed for some considerable length of time.

NEW REGULATIONS UNDER THE MINES REGULATION ACTS.

During 1915 amended Regulations were issued relating to the surveys and plans of mines to be made and kept under "The Coal Mines Regulation Act, 1902," and to appointment of members of the Acci-

dent Relief Committee under the same Act. An amendment of General Rule 19 of Regulation 4 under "The Mines Regulation Act, 1906" was also brought in to ensure the use of water in laying the dust in mine workings. New special rules governing the use of electricity in coal mines were put forward, but were objected to by the colliery owners and carried to arbitration, and the matter had not reached finality at the end of the year.

APPENDIX.

Appended to this report are notes and tables showing the position reached in respect of the various transactions under the Mining Development Act and expenditures charged to the Mining Development Vote during 1915.

I have, etc.,

A. MONTGOMERY,

State Mining Engineer.

APPENDIX I.

LOANS AND SUBSIDIES UNDER "THE MINING DEVELOPMENT ACT, 1902," AND
MINING DEVELOPMENT VOTE: ACTION DURING 1915.

(Nos. in Italics represent Nos. in last year's report.)

(a) *Advances for Pioneer Mining and Prospecting.*

1. Sunset G.M.L. 1300X, Kanowna, formerly Sunbeam G.M.L. 1121X (1).—Development work continued on this mine, but the reef was found to be very small and the country very hard to work. A fatal accident also threw upon the tributers a heavy claim for compensation, and in August the lease was sold by the Baliff for £152. At the end of the year the mine was under exemption. (3212/15.)
2. Eclipse G.M.L. 1047X, Gindalbie (2).—No transactions took place during the year. (1144/12.)
3. Westralia Tasmania G.M.L. 1665T and Mt. Noungel G.M.L. 1745T, Erlistoun (3).—No transactions took place in connection with the loan during the year. (2427/11.)
4. Greenbushes Prospecting and Mining Company, Limited, Greenbushes, South Cornwall M.L. 300 (4).—There is nothing further to report on this transaction during 1915. (977/12.)
5. North End Mines Limited, Kalgoorlie G.M.L. 4037E, Devon Consols South Extended (5). There is nothing further to report on this matter, no transactions having taken place during 1915. (228/14.)
6. Jupiter G.M.L. 771M, Mt. Magnet (6).—£1 10s. were received during the year for sale of poppet legs and wheel. (319/12.)
7. Wheal May Lead Mine, Northampton (7).—No transactions took place on account of the loan during the year. (1807/09.)
8. W.E.G. G.M.L. 505G, Niagara (8).—The plant on this mine was sold by the first mortgagee in settlement of his claim, without any balance being available for repayment of the Government advances, which should now be written off. (4286/10.)
9. Klondyke Boulder G.M.L. 604, Warrawoona (9).—No crushings were put through by the tribute party during the year, and in December the Department foreclosed on its mortgage. (360/14.)
10. Britannia G.M.L. 953M (10).—The sum of £1 was received during the year for sale of tools. (909/12.)
11. Water Supply to Low Grade Mines (11).—No transactions took place on this account during 1915. (1098/14.)
12. V's United G.M.L. 271F, Mt. Morgans (12). No transactions have taken place in connection with this loan during the year. (2426/11.)
13. Balkis G.M.L. 5354Z, Menzies (13).—During the year this company had the misfortune to have its mine flooded owing to heavy rains, and a large quantity of slimes was washed away. Several crushings were put through the battery from adjoining leases. (1726/15.)
14. Lady Seddon G.M.L. 633B, Black Range (14).—During the year £166 6s. 3d. were realised for sale of winch and payments by the borrower, thus repaying the whole of the indebtedness. (4556/11.)
15. Riverina G.M.L. 123U, Mulwarrie (16).—Very little development work was effected during the year; a tribute party was formed and worked for six weeks when they disbanded. In December the Department was taking steps to foreclose. (925/16.)
16. Champion South G.M.L. 817N, Nannine (17).—Owing to the small amount of work going on in the mines of the Yaloginda district the battery could not be kept going, and in July the owner reported that he was trying to sell it. In October it was reported that the stamp battery had been removed to Cue, leaving on the ground only the power plant belonging to the Department. In December the hire purchase agreement was terminated, and possession of the goods resumed by the Minister. (999/14.)
17. Stanley G.M.L. 1271X, Kanowna, J. Rollo and M'Gregor (19).—No transactions took place on this account during 1915. (3730/13.)
18. Havilah Development G.M.L. 345B, Black Range (20).—The Department agreed to allow sale of the boiler for £65, the amount to be paid in reduction of the loan. The sale did not eventuate, however. No work was done on the mine during 1915. (2826/14.)
19. The Globe G.M.L. Syndicate G.M.L. 912N, Meekatharra (21).—Development work was continued with some success, and £41 9s. 6d. were paid to the Department on account of gold won from the mine. (830/13.)
20. The Bullrush Gold Estates N.L., Yuin, Erection of a Telephone Line, Yalgoo to Yuin (22).—This loan was paid off early in the year, and the transaction completed. (3715/12.)
21. Morning Star G.M.L. 4484 E, Boulder (24).—As the owners of the mine advised that they did not require the motor, the Hon. the Minister agreed to a refund of the £3 paid on account. Little or nothing was done in the mine during the year. 3786/12.)
22. Lake View G.M.L. 606, Payne's Find, Yalgoo Goldfield (25).—Several crushings were put through during the year, and a sum of £50 was paid in reduction of the loan. (2372/11.)
23. Comstock W.A. G.M.L. 1079Y, Randalls (26).—Very little work was done on this mine, and no reduction of the loan was effected during the year. (1104/13.)

24. Lubra Queen G.M.L. 734G, Kookynie (27).—The treatment of the sands resulted in a profit of £494 18s. in addition to gold in slags of gross value £32 12s. 5d. Various proposals were brought forward to deal with the mine, but no business resulted, and the mine was not working at the close of the year. (3363/14.)

25. Princess Royal G.M. Company, No-Liability, Princess Royal G.M.L. 106, Dundas (28).—No transactions took place in regard to the loan. (3821/15.)

26. Dostmund G.M.L. 788R, Yarri (29).—During the year the plant was sold to Mr. A. Mathews under a hire purchase agreement for £360. The loan was reduced by £95 8s. (3541/13.)

27. Hawk G.M.L. 725G, Niagara (30).—During the year the mine and plant were sold to Thompson and Party for £120, amount of purchase money to be paid out of gold won and 10 per cent. of actual amount received for sale of sands. The party found themselves unable to make the proposition payable, so abandoned it in May, and the plant was stored. (3254/14.)

28. Crème d'Or G.M.L. 389D, 421D, and 422D, Day Dawn (31).—During the year work was continued on this mine, all profits over and above working expenses going towards repayment of the Department's and the second mortgagee's advances. An old winch was sold for £30. At the end of the year six months' exemption was applied for to enable the owner to raise further capital to carry on the mine. The loan was reduced by £529. (3429/15.)

29. Metzke and Party G.M.L. 1180 (formerly P.A. 647) (32).—This lease was forfeited for non-payment of rent during the year, nothing further having been done to develop the deep ground. (2302/14.)

30. Maori Lass G.M.L. 2416, Yilgarn (33).—The owners of this mine applied for assistance to erect a cyanide plant, stating there were 3,000 tons of tailings on hand contained 6 to 7 dwts. of gold per ton. On measuring and sampling the tailings it was found that there were about 2,012 tons worth about 5s. 5d. per ton for the gold contents, and the tailings were therefore practically worthless. The application was refused. At the end of the year an attempt was being made to sell the mine in Melbourne. No reduction of the loan was effected. (3392/14.)

31. H. A. Ryan, Mt. Ryan Reward M.L. 45, Poonah, Mining for Emeralds (35).—No work was done on this mine during 1915. (3946/12.)

32. Tanawa G.M.L. 635B, Black Range (36).—No work was done on this mine during the year, and the lease was forfeited for non-payment of rent. (1403/14.)

33. Griffiths G.M.L. 4448 (38).—The loan of £100 for erection of machinery applied for in 1914 was granted early in 1915 on a basis of £1 for £1 expended by the owners of the mine; 5 per cent. of all gold won from the mine to be paid towards repayment of the principal and interest. A mortgage and bill of sale were taken over the mine and plant as security for the loan. The plant was erected, and a further loan of £50 granted as the applicant had exhausted all his funds on the erection. The Department also guaranteed his account with the Water Supply Department for one month's supply. The plant started running in August and some crushings were put through, but as the owner was unable to carry on, the Department had to foreclose

its mortgage, and at the end of the year steps were being taken to do so. (3647/15.)

34. Light of Asia G.M.L. 1148, Murchison (39).—Good progress was made on this mine during the year, and the transaction was brought to a satisfactory conclusion by the total amount owing to the Department being repaid. (2796/15.)

35. May Bee G.M.L. 1163, Lawlers (40).—During the year several crushings were put through, and the loan was reduced by £92 12s. 5d. (2429/14.)

36. Geneve G.M.L. 1010R and Neta G.M.L. 1011R, Edjudina (41).—Public crushing was carried on as ore offered throughout the year, and an amount of £5 18s. 6d. paid off the loan. In July heavy rains flooded the workings of the mine, necessitating unwatering operations. At the end of the year, owing to shortage of capital, the owner was trying to sell the mine. (1317/15.)

37. Premier Coal Mine, Coal Lease 260, Collie.—In October the owners of the Premier Coal Mine were granted a loan of £500 on a £1 for £1 basis, to be expended on work to be approved by the Inspector of Mines in opening and equipping a new pit, the loan to bear interest at 5 per cent., and to be repayable by quarterly instalments, commencing six months after the first instalment of advance made, the whole to be repaid in two years. A bill of sale and mortgage were taken over the property as security. Work was in progress at the end of the year. (3612/15.)

(b) *Assistance in erecting Batteries and Treatment Plants to be used for Ore treatment for the Public.*

38. Spring Hill G.M.L. 724, Parker's Range (42).—The company who took over this battery found themselves unable to carry on for want of capital, and in July they went into liquidation. At the end of the year the Department was considering an offer from W. A. Patterson to take over the battery and debt on it. (2840/15.)

39. Never Never G.M.L. 665, Yilgarn (43).—The company let the mine on tribute the greater part of the year. In September the company went into liquidation, and at the end of the year steps were being taken by the Department to foreclose its mortgage, allowing the tributers to continue to work. (633/15.)

40. Lady Pratt G.M.L. 1228X, Mulgarrie (44).—Work in connection with this battery was carried on as ore was available throughout the year 1915, and the loan was reduced by £65 10s. (4475/11.)

41. Malcolm Prospecting Company, No-Liability, North Star Mine, Mt. Malcolm G.M.L. 1175C (46).—In March the company became unable to carry on work in the mine, and asked leave to let it on tribute, which was agreed to. In July the tributers gave up their venture as the working costs were too great. The company then endeavoured to raise more capital or sell the mine in Melbourne, and also applied for further assistance to sink the shaft another 150 feet. From 1906 to November 1915, the return of gold was 14,734.95 fine ozs. from 26,232.5 tons crushed. The matter was under consideration at the end of the year. (4000/15.)

42. Randwick G.M.L. 978C, Mt. Malcolm (47).—There were no transactions during 1915 on this account. (1575/14.)

43. Hornsby G.M.L. 937N, Yaloginda (formerly North Pole and Gibraltar) (48).—This battery has been idle most of the year, no stone being presented for crushing, and there being only two parties prospecting in the district. An amount of £19 4s. 8d. was received, being 5 per cent. of amount received for treatment of sands. (2186/14.)

44. Southern Cross G.M.L. 1076 and 1067, Bulong (50).—Only one tender was received for the plant, and this was too low to accept. During the year parts of the plant were sold for £46 17s. (4726/11.)

45. Ravensthorpe Battery Company (51).—There were no transactions in connection with the loan during the year. (3683/12.)

46. Great Victoria G.M.L. 719, Yilgarn (52).—The owners of this mine have kept it working throughout the year under very considerable difficulties. New grinding pans were installed in the battery, but by an accident the battery engine was wrecked, and a new one had to be installed. At the end of the year the position of the loan on this proposition was before the Hon. the Minister for consideration. (1780/14.)

47. Battaglia and Party, Battlesville G.M.L. 931R, Yundamindera (52).—The owners not being able to find payable gold were allowed to abandon the lease and take up the ground on which their plant was erected as Machine Area No. 10R. Several crushings were put through the battery, but the party were not in a position to make any appreciable reduction of the amount of the loan and interest. (2404/15.)

48. Red, White and Blue G.M.L. 641B, Curran's Find, Yuanmi (54).—This mine was worked throughout the year with some prospects of becoming profitable eventually, and over 2,000 tons of slimes are stated to have been accumulated. The mine was sampled by prospective buyers, but was not taken over by them. The loan was not reduced. (1758/14.)

49. McMahon and Party, Cyanide Plant at Mt. Ida Battery (55).—There were no transactions during 1915. (363/12.)

50. Donovan's Find G.M.L. 768, Yilgarn (56).—The battery continued crushing for the public during the year, but no repayments were made on account of the loan. Arrangements were being made towards the end of the year to treat the accumulated slimes. (1384/16.)

51. King's Sound Mining Company, Limited, Taylor's Wolfram Reward M.L. 146H, Derby (57).—There is nothing to report for 1915, no work being done on the mine. (1064/13.)

52. Chunderloo G.M.L. 1084N, Yaloginda, the Lane Mill Syndicate (58).—Very little work was done on this mine during the year, the company being unable to finance it, and at the end of the year the Department was taking steps to foreclose. (3567/15.)

53. Star of Fremantle G.M.L. 645S, Kunanalling (59).—During the year the owner purchased a new baling tank and piping. Early in May the shaft collapsed owing to heavy rain, and it was the middle of June before work on the lode was resumed. No reduction of the loan was effected. (3912/12.)

54. S. Graham, M.A. 14, Hope's Hill (60).—The total amount of indebtedness to the Department was refunded at the end of 1914, and the matter is therefore satisfactorily closed. (94/13.)

55. Transcontinental G.M.L. 805Y, Santa Claus G.M. Company, Randalls (62).—This venture was

carried on during the year under great difficulties, and no reduction of the amount of the loan was effected. (303/14.)

56. Butcher Bird No. 1 G.M.L. 1933, Marda (64).—A considerable amount of development work was carried out during the year, but without obtaining the desired result of a good water supply. To meet the water difficulty the syndicate were therefore allowed a lease of the Water Supply Department's large tank conditionally on no water being pumped out after its level should have fallen to seven feet above the bottom; the public to be allowed to draw water for domestic purposes; syndicate to pay £20 per month for first ten months, and £15 per month after. The battery charges to the public were allowed to be increased to 11s. 6d. per ton or 10s. per hour. A good deal of crushing was done, but at the end of the year the battery was hung up owing to the water in the tank being almost exhausted. (293/15.)

57. Aurum G.M.L. 711, Warriedar, Yalgoo Goldfield (65).—At the beginning of 1915 the Yuanmi Gold Mines took an option over this mine for two years. Finding the water inadequate for running the battery full time, the company deepened the shaft to see if they could locate a good water supply, but only obtained enough to run five heads intermittently. A bore was put down on lease 774, and a well sunk, but only a poor supply was struck. In October the company advised that they were crushing for the public with 10 heads one shift daily at 10s. 6d. per ton, and 13s. per ton for cyaniding the sands, slimes to be removed by owners within a fortnight, otherwise they become the property of the company. About 3,700 gallons of water were being obtained, and a further water supply had been struck in a bore, about two miles away, at 110ft. depth. The water rose in this bore to 90 feet, and bailing at 60 gallons per hour made no appreciable difference in its level. The company were granted Water Right No. 8, on which they sunk a shaft 121 feet, at which depth they put in a drive seven feet, and obtained a water supply amounting to 30,000 gallons per day. (3507/13.)

58. Kirton's South M.L. 127, Northampton (66).—The mill was erected satisfactorily, and a quantity of ore won from the mine crushed ready for shipping to the Smelters. No reduction of the loan, however, was made during the year. (2939/14.)

59. Sunrise G.M.L. 910E, Murchison (67).—Work was continued on this mine during the year, and interest was met, but no reduction of the loan effected. (3215/05.)

60. Public Mill for Treatment of Sulphide Ore at Kalgoorlie, Loan to Allsop and Don (68).—The mill was completed and started treatment of ore on 1st April, 1915. Ore had been accumulating since July, 1914. The mill has proved very useful to the district, the purchases of ore and concentrates to end of 1915 amounting to £25,623 18s. 8d. (879/15.)

(e) *Boring.*

61. The King's Cairn Mining Company, Limited, Parker's Range (70).—During the year the Lord Kitchener Mining Company, Limited, were granted leave to occupy the Reserve conditionally on their taking over the outstanding liabilities, and on payment of £2 2s. (1583/13.)

62. Boring at Fraser's Mine, Southern Cross (72).—Nothing more was done in this matter. An amount of £37 10s. was repaid during the year. (109/14.)

SUMMARY OF EXPENDITURE FROM MINING DEVELOPMENT VOTE FROM 1ST JANUARY,
1915, TO 31ST DECEMBER, 1915.

Mine or Owner.	Mining Centre.	Amount.	Total.
<i>A.—Advances in Aid of Mining Work and Equipment.</i>		£ s. d.	£ s. d.
Yilgarn G.M. Co., Ltd.	Nevoria	149 11 11	
Cassey, Chas.	Yalgoo	76 0 0	
Atkinson Bros.	Marda	75 0 0	
McNeil, N.	Ravensthorpe	3,498 17 10	
Green, Mo. staka, and others	Black Range	0 10 0	
McDermott & Soanes	Yaloginda	25 7 6	
Cairns ("Crème D'Or"), J.	Day Dawn	1 0 0	
Howlett, G.	Donovan's Find	0 10 0	
Burbidge & McDonnell	Southern Cross	0 10 0	
Pearce, W. H.	Kunanalling	0 10 0	
Dimmick and party	Menzies	0 10 0	
McCulloch, Matthew	Phillips River	39 16 9	
Dower and others	Northampton	5 0 0	
Griffiths, John	Coolgardie	224 2 0	
Cumming, W. J.	Boogardie	1,000 0 0	
		5,097 6 0	
Less credits repayments, J. Cairns, F. Sonnenschein, and A. S. Mandelstam		6 10 8	5,090 15 4
<i>B.—Advances in Aid of Erection and Equipment of Batteries for Public Crushings.</i>			
Mandelstam, A. S.	Edjudina	35 8 0	
Thring Bros. & Dwyer	Northampton	301 14 0	
Allsop & Don	Kalgoorlie	1,000 0 0	
Parkinson & Dunn	Ravensthorpe	300 0 0	
			1,637 2 0
<i>C.—Boring.</i>			
Mt. McMahon	Mt. McMahon .. ..	..	223 19 5
<i>D.—Miscellaneous Expenditure.</i>			
Water Supply—Lease of	Marda Tank .. ..	..	114 0 0
Preliminary Investigations, Sampling Mines .. ..	.. ..	..	145 3 3
Rebates to Prospectors—Crushing at State Batteries (War Rates) .. ..	.. ..	..	3,566 16 10
<i>Subsidies Carting long distances to Batteries, etc.</i>			
Cox, A. E.	Ennuin	12 10 0	
Bonnar, L.	Yampi Sound	15 0 0	
Edhouse, R.	Boogardie	12 8 11	
Ulbrich, G. H.	Yampi Sound	10 10 0	
Heaphy, P.	Hawk's Nest	7 0 0	
McLennon, A.	Ilgarere	34 6 0	
Atkinson, W.	Bullfinch	4 11 3	
Lang, S. C.	do.	11 0 9	
Thomas, Jas.	Edjudina	3 5 3	
Robertson, H. B.	do.	4 16 0	
Blayney, —	Yalgoo	14 5 0	
Young, R.	Edjudina	4 13 0	
Thompson, H.	do.	0 15 0	
Brewer, D.	do.	6 11 3	
Thomas, J.	do.	1 1 0	
Miers, J.	do.	6 3 0	
Craze, J. M.	Yampi Sound	25 0 0	
		173 16 5	
Less credit repayment, H. Fey, £88; State Battery, Boogardie, ls.		88 1 0	85 15 5
<i>Subsidies to Batteries.</i>			
Santa Claus G.M. Co., 204 tons	Randall's	22 16 0	
Graham, S., 350 tons	Southern Cross	26 5 0	
White, G. W., 601½ tons	Lawlers	60 3 0	
Trude, F. B., 926 tons	Ruby Well	94 12 0	
Smith & Langford, 1,059 tons	Lawlers	105 18 0	
Stuckey, N. S., 883 tons	Carrabin	88 6 0	
Mandelstam, A. S., 293½ tons	Edjudina	22 0 3	
Spicer, J., 104 tons	Tampa	7 16 0	
Eastern G.M. Syndicate, 1,060½ tons	Lawlers	106 1 0	
King of the Hills G.M. Co., 142 tons	Leonora	10 13 0	
Johnson and party, 27½ tons	Pingip	2 1 3	
Gem G.M. Syndicate, 110 tons	Kundip	11 0 0	
Willis, F. W., 334½ tons	Lawlers	33 9 0	
			591 0 6
<i>Subsidies Development Work.</i>			
Burbanks Ivanhoe G.M. Syndicate	Burbanks	53 11 9	
Klantz, O. E.	Black Range	35 17 0	
			89 8 9
<i>Providing Transport for Prospectors.</i>			
Purchase of Horses, Camels, etc. .. ..	.. ..	..	754 13 4
Purchase of Tailings .. ..	.. ..	..	793 11 0
			£13,092 5 10

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

Mine or Owner.	Amount.	Total.
	£ s. d.	£ s. d.
ADVANCES REFUNDED.		
Lubra Queen	370 13 11	
Cairns, J. ("Crème D'Or")	529 0 9	
Rea, F. R. ("Light of Asia")	744 0 0	
Bullrush Gold Estates, Ltd.	25 10 0	
Richards & Poole	50 0 0	
Green and party	65 10 0	
Mandelstam, A. S.	5 0 8	
Burbidge & McDonnell	0 10 0	
Howlett, G. H.	0 10 0	
Pearce, W. H.	0 10 0	
Burt, J. E., and others	19 6 11	
		1,810 12 3
RECEIVED FROM SALE OF SECURITIES.		
Clayton, L. F.	26 19 9	
Young & Greenway	30 0 0	
Lady Seddon Lease	136 0 0	
Campbell and party	8 3 2	
Thompson and party	11 12 9	
Matthews, A.	95 8 0	
Togrioti, A.	1 10 0	
Kirkland, A. G.	6 14 5	
Palmer, J. F.	1 0 0	
		317 8 1
MISCELLANEOUS REFUNDS.		
Carting long distances to Batteries	88 1 0	
Refund Rail Tickets	18 6 2	
Payne's Find Development Co., on account Pipe Line	49 16 3	
Sampling Mines	12 15 8	
Prospecting—Refund of Fares	8 15 3	
Loss of Camel—Mandelstam	16 1 9	
		193 16 1
Amounts received on account of Purchase of Tailings .. .. .	..	6,654 10 4
		£8,976 6 9

MINING DEVELOPMENT EXPENDITURE.

Advances outstanding at 31st December, 1915.

No. of File.	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, 1915.	
					Previous to 1915.	During 1915.	Repaid, including Sale of Securities, etc.	Balance Outstanding.	Paid.	Outstanding.		
				£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	
A.—PIONEER MINING & PROSPECTING.												
90/12	Alicia	254F	Mt. Morgans ..	245 0 0	195 0 0	.. .. .	195 0 0	4 2 6	54 14 8	249 14 8	
909/12	Brittania	953M	Mt. Magnet ..	150 0 0	114 12 6	.. .. .	77 12 6	.. .. .	9 4 6	86 17 0	
3016/11	Balkis	5354z	Menzies	300 0 0	265 10 0	0 10 0	7 13 0	258 7 0	39 0 5	13 3 1	271 10 1	
2257/12	Champion South ..	817N, 1039N ..	Nannine	400 0 0	400 0 0	.. .. .	350 0 0	50 0 0	29 11 8	19 19 8	69 19 8
3323/08	Coolgardie P.D. and Mining Syndicate	4093, 4117 ..	Coolgardie ..	1,500 0 0	904 10 5	.. .. .	110 0 0	794 10 5	19 19 10	67 16 9	862 7 2
1986/10	Coolgardie Redemption	3918, 4052 ..	do.	1,000 0 0	1,020 16 9	.. .. .	59 17 9	960 19 0	.. .. .	73 2 8	1,034 1 8
2334/12	Creme D'Or	389, 421, 422D	Day Dawn	1,000 0 0	1,000 0 0	1 0 0	529 0 9	471 19 3	149 9 3	14 13 1	486 12 4	
427/11	Comstock	1079Y	Randall's	200 0 0	137 12 6	.. .. .	.. .. .	137 12 6	11 1 3	7 0 1	144 12 7
29/05	Dostmund	788E	Yerilla	360 0 0	.. .. .	360 0 0	95 8 0	264 12 0	.. .. .	4 1 0	268 13 0
1144/12	Eclipse	1047X	Gindalbie	450 0 0	498 19 1	.. .. .	252 5 0	246 14 1	62 8 11	.. .. .	246 14 1
2208/08	Elverdton .. .. .	.. .. .	Ravensthorpe ..	2,000 0 0	.. .. .	3,498 17 10	.. .. .	3,498 17 10	.. .. .	119 5 8	3,618 3 6
3166/09	Emily	1510	Day Dawn	400 0 0	372 1 9	.. .. .	.. .. .	372 1 9	.. .. .	44 7 10	416 9 7
3594/09	Globe G.M.	912M	Nannine	500 0 0	444 2 9	0 10 0	29 6 11	414 5 10	59 14 1	.. .. .	415 5 10
838/13	Griffiths G.M. ..	4048	Coolgardie	290 0 0	110 0 0	224 2 0	.. .. .	334 2 0	.. .. .	5 4 10	339 6 10
4689/06	Havilah Development	345B	Black Range ..	600 0 0	552 12 1	0 10 0	65 10 0	487 12 1	44 6 8	25 16 0	513 8 1	
3786/12	Hanley and Lugg ..	.. .. .	Kalgoorlie	30 0 0	30 0 0	.. .. .	3 0 0	27 0 0	.. .. .	0 9 9	27 9 9
4738/09	Hawk	725G	Desdemona	107 0 0	107 0 0	9 12 2	19 15 11	96 16 3	3 7 10	.. .. .	96 16 3
319/12	Jupiter	771M	Mt. Magnet	400 0 0	401 0 0	.. .. .	109 14 1	291 5 11	5 0 0	45 11 3	336 17 2
2255/11	Kalgoorlie North End Development Co.	3380, 4146E ..	Kalgoorlie	1,500 0 0	1,500 0 0	.. .. .	25 0 0	1,475 0 0	20 11 3	41 11 7	1,516 11 7
1101/09	Kanowna Prospecting Co. ..	323X	Kanowna	750 0 0	666 9 3	.. .. .	7 0 0	659 9 3	.. .. .	.. .. .	659 9 3
2825/07	Kingdom Come	M.L. 112	Northampton ..	200 0 0	204 14 0	.. .. .	.. .. .	204 14 0	5 8 6	15 11 0	220 5 0
4548/11	Klondyke Boulder ..	604	Warrawoona	1,000 0 0	999 10 7	.. .. .	88 5 6	911 5 1	34 5 4	150 12 7	1,061 17 8
2186/14	Kirkland, A. G.	Mach. A., 12N	Nannine	500 0 0	500 0 0	.. .. .	6 14 5	493 5 7	20 17 4	12 12 5	505 18 0
1035/10	Kincen, Bower, and others ..	635B	Black Range	100 0 0	86 6 6	.. .. .	.. .. .	86 6 6	.. .. .	2 13 0	88 19 6
363/06	Lady Florence	1265	Cue	1,000 0 0	1,000 0 0	.. .. .	.. .. .	1,000 0 0	.. .. .	259 19 9	1,259 19 9
3751/10	Lubra Queen	734/5, 744, 749G	Kookynie	1,500 0 0	1,500 0 0	.. .. .	476 6 8	1,023 13 4	18 11 4	170 16 8	1,194 10 0
3507/13	Loader and Nevill ..	711	Yalgoo	200 0 0	135 0 0	.. .. .	.. .. .	135 0 0	.. .. .	7 13 4	142 13 4
3444/10	Mars	1013 .. .. .	.. .. .	1,000 0 0	.. .. .	1,000 0 0	.. .. .	1,000 0 0	.. .. .	22 6 7	1,022 6 7
4000/05	Mindeloo	1518	Mindeloo	300 0 0	198 17 0	.. .. .	10 0 0	188 17 0	.. .. .	8 1 1	196 18 1
278/12	Morning Star	4484E	Boulder	368 0 0	284 19 4	.. .. .	105 0 0	179 19 4	.. .. .	6 8 9	186 8 1
2126/11	Maori Lass	2416	Yilgarn	600 0 0	600 0 0	.. .. .	0 2 5	599 17 7	30 0 0	46 5 1	646 2 8
4164/12	Metzke and others ..	P.A. 647	Lake Darlot	200 0 0	189 7 6	.. .. .	6 9 5	182 18 1	1 19 7	18 0 3	200 18 4
3461/08	North End Mines	4054, 4037, 4039, 4231	Kalgoorlie	1,000 0 0	436 10 0	.. .. .	.. .. .	436 10 0	.. .. .	.. .. .	436 10 0
3292/13	Pearl	1095M	Meekatharra	76 0 0	.. .. .	76 0 0	.. .. .	76 0 0	.. .. .	3 13 4	79 13 4
3573/12	Princess Royal	106, 187, 587, 840, 972	Norseman	2,000 0 0	2,000 0 0	.. .. .	.. .. .	2,000 0 0	.. .. .	309 15 7	2,309 15 7
2898/11	Do.	222, 653, 1016, 1048, 1114	Cue	1,000 0 0	1,000 0 0	.. .. .	3 10 0	996 10 0	80 0 0	14 16 8	1,011 6 8
3612/15	Premier Coal Mining Co., Ltd.	260/1/2/3/4/5/6 and 271	Collie	500 0 0	.. .. .	332 1 0	.. .. .	332 1 0	.. .. .	.. .. .	332 1 0
3409/12	Rupe and Young	Mach. Area ..	Nannine	848 17 5	848 17 5	.. .. .	500 0 0	348 17 5	.. .. .	24 13 5	373 10 10
1373/12	Riverina	123N	Mulgarrie	500 0 0	468 19 10	.. .. .	.. .. .	468 19 10	23 6 6	61 4 8	530 4 6
1240/12	Richards and Poole ..	1163	Lawlers	300 0 0	300 0 0	.. .. .	50 0 0	250 0 0	15 10 0	6 8 9	256 8 9
697/09	Sunbeam	1121X	Kanowna	1,000 0 0	1,038 4 4	.. .. .	399 14 0	638 10 4	116 16 8	45 13 9	684 4 1
499/11	Sunset	2253, 2240 ..	Southern Cross ..	100 0 0	90 0 0	.. .. .	5 17 0	84 3 0	.. .. .	.. .. .	84 3 0
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	2 6 0	14 10 5	126 10 5
2426/11	V's United G.M.	271F	Mt. Morgans	672 2 0	578 16 1	.. .. .	140 0 0	438 16 1	3 19 5	34 14 1	473 10 2
2239/12	Williamson & Pender ..	.. .. .	Kanowna	180 0 0	180 0 0	.. .. .	.. .. .	180 0 0	7 0 0	12 18 1	192 18 1

MINING DEVELOPMENT EXPENDITURE—Advances outstanding at 31st December, 1915—continued.

No. of File.	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, 1915.
					Previous to 1915.	During 1915.	Repaid, including Sale of Securities, etc.	Balance Outstanding.	Paid.	Outstanding.	
				£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
4286/10	W. E. G. Gold Mine	505c	Niagara	500 0 0	297 13 1	.. .. .	.. .. .	297 13 1	.. .. .	89 10 4	387 3 5
2427/11	Westralia Tasmania	1665, 1745t	Erlistoun	300 0 0	300 4 9	.. .. .	51 0 0	249 4 9	90 2 8	26 2 2	275 6 11
1807/09	Wheal May	Loc. 6	Northampton	300 0 0	302 4 6	.. .. .	40 0 0	262 4 6	5 15 9	14 9 8	276 14 2
B.—ASSISTANCE IN ERECTING BATTERIES AND TREATMENT PLANTS TO BE USED FOR CRUSHING FOR THE PUBLIC.											
2344/05	Allsop & Don .. .. .	.. .. .	Kalgoorlie	1,000 0 0	.. .. .	1,000 0 0	.. .. .	1,000 0 0	.. .. .	40 5 7	1,040 5 7
2120/09	Battlesville Mine	931R	Yundamindera	1,063 16 2	1,063 16 2	.. .. .	.. .. .	1,063 16 2	15 6 8	221 6 2	1,285 2 4
5651/10	Butcher Bird	1933oL	Yilgarn	1,500 0 0	1,485 17 9	75 0 0	.. .. .	1,500 17 9	.. .. .	132 3 10	1,693 1 7
3145/12	Donovan's Find	768	Jacoletti	1,000 0 0	1,000 0 0	0 10 0	0 10 0	1,000 0 0	.. .. .	182 3 7	1,182 3 7
3522/14	Gem Consolidated	151, 156	Phillips River	300 0 0	.. .. .	300 0 0	.. .. .	300 0 0	.. .. .	10 9 4	310 9 4
3155/11	Great Victoria Leases	719, 944/5, 1229	Southern Cross	2,000 0 0	1,641 15 0	0 10 0	1 7 9	1,640 17 3	230 15 9	84 18 9	1,725 16 0
1343/07	Hodder, E.	Mach. Area 64	Randall's	253 3 2	253 3 2	.. .. .	.. .. .	104 10 2	6 8 4	35 11 3	140 1 5
2106/12	Johnson and party	1086/7/8	Bulong	1,500 0 0	1,484 16 0	.. .. .	.. .. .	1,484 16 0	45 3 0	105 3 1	1,589 19 1
2322/11	King's Sound Mining Co.	M.L. 146H	Derby	500 0 0	500 0 0	.. .. .	.. .. .	500 0 0	.. .. .	28 10 11	528 10 11
4475/11	Lady Pratt	1228x	Mulgarrrie	250 0 0	205 4 10	.. .. .	126 1 6	79 3 4	38 1 5	2 0 6	81 3 10
3785/08	Lady Agnes	910Y	Bulong	480 0 0	486 12 3	.. .. .	93 4 9	393 7 6	.. .. .	27 7 5	420 14 11
3215/05	Langford, F.	910EM	Lawlers	800 0 0	585 17 0	.. .. .	29 7 0	556 10 0	35 8 5	14 14 1	571 4 1
4416/11	Malcolm Prospecting Co.	1175c	Malcolm	1,550 0 0	1,550 0 0	.. .. .	.. .. .	1,550 0 0	402 0 8	361 12 0	1,911 12 0
2985/13	Mandelstam, A. S.	1010R	Edjudina	200 0 0	164 12 0	35 8 0	5 0 8	194 19 4	0 17 10	9 19 0	204 18 4
363/12	McCahon and party .. .. .	.. .. .	Mt. Ida	400 0 0	400 0 0	.. .. .	.. .. .	400 0 0	.. .. .	27 14 5	427 14 5
15947/10	McDermott & Soanes	1084N	Nannine	2,032 12 8	1,704 12 8	25 17 6	.. .. .	1,730 10 2	.. .. .	218 16 2	1,949 6 4
4224/11	Never Never	665	Yilgarn	1,150 0 0	1,073 15 9	149 11 11	590 14 1	632 13 7	218 13 2	39 11 4	672 4 11
3911/10	Phoenix	622N	Quinns	250 0 0	250 0 0	.. .. .	16 5 9	233 14 3	17 2 1	17 5 11	251 0 2
2325/11	Ravensthorpe Battery Co. .. .. .	.. .. .	Ravensthorpe	1,300 0 0	1,038 8 2	.. .. .	.. .. .	1,038 8 2	.. .. .	292 17 4	1,331 5 6
1353/10	Red, White, and Blue	641B	Curran's Find	2,137 0 0	2,676 9 0	.. .. .	.. .. .	2,676 9 0	117 18 0	216 0 1	2,892 9 1
919/14	Rocklee G.M. .. .. .	.. .. .	Yaloginda	350 0 0	350 0 0	.. .. .	.. .. .	350 0 0	12 2 0	21 14 1	371 14 1
3551/10	Randwick	978c	Malcolm	560 0 0	577 3 5	.. .. .	43 4 6	533 18 11	.. .. .	45 3 5	579 2 4
4726/11	Southern Cross and Southern Cross S.	1067, 1067wb, and 27Y	Bulong	1,000 0 0	1,000 0 0	.. .. .	142 12 3	857 7 9	31 12 6	202 8 10	1,059 16 7
3362/11	Spring Hill	721	Parker's Range	655 0 0	655 16 5	.. .. .	19 2 0	636 14 5	189 2 10	87 17 5	724 11 10
4422/07	Star of Fremantle	645S	Kunanalling	325 0 0	320 0 0	0 10 0	0 10 0	320 0 0	32 3 7	24 14 10	344 14 10
1525/13	Thring Bros. & Dwyer	127	Northampton	2,050 0 0	1,731 15 9	296 7 0	.. .. .	2,028 2 9	0 4 4	123 6 3	2,151 9 0
C.—BORING.											
	Mt. McMahon .. .. .	.. .. .	.. .. .	.. .. .	.. .. .	223 19 5	.. .. .	223 19 5	.. .. .	.. .. .	223 19 5
D.—MISCELLANEOUS ADVANCES.											
	Mararoa .. .. .	.. .. .	.. .. .	.. .. .	394 4 3	.. .. .	.. .. .	394 4 3	.. .. .	.. .. .	394 4 3
	McCulloch .. .. .	.. .. .	.. .. .	.. .. .	25 3 3	24 16 9	.. .. .	50 0 0	.. .. .	.. .. .	50 0 0
	North Baddera .. .. .	.. .. .	.. .. .	.. .. .	40 0 0	.. .. .	.. .. .	40 0 0	.. .. .	.. .. .	40 0 0
	Payne's Find Development Co. .. .. .	.. .. .	.. .. .	.. .. .	98 6 6	.. .. .	49 16 3	48 10 3	.. .. .	.. .. .	48 10 3
	Ryan, A. H. .. .. .	.. .. .	.. .. .	.. .. .	100 0 0	.. .. .	.. .. .	100 0 0	.. .. .	.. .. .	100 0 0
				54,353 13 5	46,400 3 4	7,635 13 7	4,876 0 4	49,159 16 7	2,297 13 4	4,499 9 5	53,659 6 0
A.—Pioneer Mining and Prospecting				29,747 1 5	23,542 14 0	5,503 3 0	3,609 10 10	25,436 6 2	904 12 9	1,925 13 10	27,362 0 0
B.—Assistance in Erecting Batteries, etc.				24,606 12 0	22,199 15 4	1,883 14 5	1,216 13 3	22,866 16 6	1,393 0 7	2,573 15 7	25,440 12 1
C.—Boring .. .. .				.. .. .	.. .. .	223 19 5	.. .. .	223 19 5	.. .. .	.. .. .	223 19 5
D.—Miscellaneous Advances .. .. .				.. .. .	657 14 0	24 16 9	49 16 3	632 14 6	.. .. .	.. .. .	632 14 6
				54,353 13 5	46,400 3 4	7,635 13 7	4,876 0 4	49,159 16 7	2,297 13 4	4,499 9 5	53,659 6 0

APPENDIX No. 2.

PAPERS SET AT THE EXAMINATION OF CANDIDATES FOR APPOINTMENT OF
INSPECTOR OF MINES, 1915.

MINING—FIRST PAPER.

MONDAY, 22ND FEBRUARY, 1915, 10 A.M.
TO 1 P.M.

MAXIMUM MARKS, 300.

N.B.—The Candidates are not to answer more than eight questions.

1. Discuss the principal considerations which you would take into account in fixing maximum limits of speed of winding men and materials in vertical shafts—(a) with geared, and (b) with first-motion winding engines giving examples of allowable speeds.

2. What are the principal requirements to be considered in choosing a winding rope, and precautions to be taken in using and maintaining it so as to keep it in good order and condition?

3. Describe the methods you would follow and appliances you would use in order to test the safety appliances on a safety cage used in a vertical shaft.

4. Discuss the feasibility or otherwise of using safety catches on skips in inclined shafts.

5. A main vertical shaft of three compartments in hard rock is 500 feet deep with five levels at 100 feet intervals and is in active operation; describe fully the appliances you would instal to carry out the work of sinking the shaft another 200 feet with aid of an auxiliary air-driven winch at a level underground, and the method you would follow of carrying out the sinking, so as to interfere as little as possible with the work of the mine in the upper levels. Which compartment of the new part of the shaft would you use for winding purposes, and why?

6. What is meant by "square set" timbering, and by "full-set" and "half-set" and "framed set" timbering?

7. What is a "creep"?

To what causes and conditions is "creep" due? If danger of creep is suspected, what precautions must be taken to prevent its occurrence; and if a creep has started, what measures should be taken to deal with it?

8. Describe the "flat-back," "rill," and "shrinkage" methods of stoping, and discuss the relative advantages and defects of each system.

9. In sinking a main shaft for a mine expected to be worked to great depth and on a large scale of operation, what are the principal considerations which would guide you in deciding whether to make the shaft vertical or inclined, the lode having a fairly even inclination of 60 degrees from the horizontal?

10. Explain, with diagrams, the main principles governing "natural" ventilation of mines and discuss the principal practical problems met with in their application to deep metalliferous mines.

MINING—SECOND PAPER.

MONDAY, 22ND FEBRUARY, 1915, 2 P.M.
TO 5 P.M.

MAXIMUM MARKS, 300.

N.B.—The Candidates are not to answer more than eight questions.

1. What are the gases which most commonly cause vitiation of the air underground, and how do they originate?

2. How do fires originate in metalliferous mines? What effect have they upon the ventilation of the mines? On what lines would you proceed to prevent the spreading of a fire and ensure its extinction?

3. A mine has an influx of water equal to 30,000 gallons per hour, which has to be pumped to surface from the 800 feet level of a three compartment vertical shaft 10ft. 6in. long by 3ft. 6in. wide in the clear inside timbers; what is the theoretical horse-power required to lift the quantity of water, and what are the main considerations which you would take into account in choosing between (i.) a Cornish pump equipment, (ii.) an electric 3-throw pump installation, and (iii.) a steam-pump plant, as being most suitable for the position?

4. An underground dam in the crosscut from a shaft at the 600 feet level has water accumulated behind it up to the 240 feet level; what is the mean pressure per square foot on the dam? How should such a dam be constructed?

5. What is the composition of Gelignite, Blasting Gelatine, and Gunpowder, and what gases result from firing them in blasting operations? What explosive is usually employed in detonators, and what is its action in exploding nitro-glycerine compounds?

6. What are the principal causes of dust in mines, and what are the effects on the health of miners liable to be produced by inhalation of dust? Describe means of laying or minimising dust suitable for use under various conditions of underground practice.

7. Describe three methods suitable for ventilating "dead ends."

8. What is a water-gauge, and how is it used in connection with mine ventilation?

9. Describe three commonly used methods of capping winding ropes, and give your opinion of their efficiency.

10. Describe a good type of "crosshead" for use in sinking vertical shafts, and discuss the advantages and disadvantages of the use of these appliances.

METALLURGY AND ORE DRESSING,

TUESDAY, 23RD FEBRUARY, 1915, 10 A.M.
TO 12 NOON.

MAXIMUM MARKS, 200.

N.B.—The Candidates are not to answer more than six questions.

1. Describe a clean-up in a battery using amalgamation and cyanide treatment, including melting of the gold into bars.

2. Describe the construction and operation of a suction-gas producer for use of wood fuel. What are the principal gases produced?

3. Describe the working of a blast-furnace used for smelting copper ores to matte.

4. Describe the extraction of tin ore from alluvial material by dredging methods. How is the product converted into metallic tin?

5. Describe a Wilfley table and explain its operation.

6. A quantity of auriferous concentrates has been bagged up from time to time as produced at the mill, how would you proceed to sample the whole parcel to determine its value before shipment?

7. What are the chemical changes produced in the following minerals during roasting treatment, (a) iron pyrites, (b) copper pyrites, (c) arsenopyrite, (d) stibnite, (e) blende?

8. Describe the methods you would adopt in taking samples of tailings which have passed over the copper tables of a wet-crushing stamp-mill in order to obtain true values on which purchase of the tailings may be effected.

ARITHMETIC.

TUESDAY, 23RD FEBRUARY, 1915, 12 NOON
TO 1 P.M.

MAXIMUM MARKS, 100.

N.B.—The whole Paper to be answered.

- (a) Add together $8\frac{3}{4}$, $5\frac{5}{8}$ of $2\frac{1}{7}$ and $3\frac{7}{8}$.
(b) Multiply $15\frac{3}{4}$ by $\frac{2}{3}$ of 4.
- Express $\frac{2}{7}$ as a decimal, also $\frac{3}{5}$ and $\frac{2}{3}$ and convert .0625, .003, and .927 into vulgar fractions.
- How many cubic feet of air will pass through an opening 5ft. by 7ft. in one hour if the air travels at the rate of 25 yards in 20 seconds.

4. If a bar of bullion, weighing 500 ozs., is 825.6 fine in gold and 162.4 fine in silver, what is its value, taking gold at £4 4s. per oz., and silver at 2s. per oz.?

5. Calculate the diameter of a circular vat to hold 90 tons of crushed ore. The ore is to be five feet deep in the vat and 27 cubic feet weigh one ton.

6. If 42 tons of ore contain 12 per cent. of copper, 6dwts. of gold per ton, and 4ozs. of silver per ton, what quantity of each metal is present. Also taking copper at £60 per ton, gold at 84s. per oz., and silver at 1/10d. per oz., calculate the assay value of the ore.

7. Find the value of 256 tons 13cwt. 3qrs. at £3 16s. per ton.

8. Express 8 tons 7cwt. 3qrs. 18lbs. in tons and decimals of a ton, and also in cwt. and decimals of a cwt.

MINING GEOLOGY.

TUESDAY, 23RD FEBRUARY, 1915, 2 P.M. TO
4 P.M.

MAXIMUM MARKS, 200.

N.B.—The Candidates are not to answer more than six questions.

1. If on driving in a northerly direction along a lode which dipped 75 degrees to the West you met a normal fault which dipped 60 degrees to the North-East, show by a diagram in which direction you would proceed to recover the faulted lode.

2. Give an account of the origin of coal, and describe the main characteristics of the different classes of coal.

3. What is gossan, and how is it formed?

Describe a gossan, and enumerate ten minerals commonly found therein.

4. Describe physical characteristic tests by which you would recognise—

- Cassiterite.
- Black oxide of manganese.
- Molybdenite.
- Graphite.
- Magnesite.

5. Name and describe the five rock samples set before you.

6. What is a "deep lead"?

Explain how deep leads are formed, using a Western Australian example.

7. Explain what a dyke is, and how dykes affect mineral deposits.

8. Give a brief account of the main features of the geology of the Kalgoorlie Field.

BOOK-KEEPING AND MINE ACCOUNTS.

TUESDAY, 23RD FEBRUARY, 1915, 4 P.M.
TO 5 P.M.

MAXIMUM MARKS, 100.

N.B.—The whole Paper to be answered.

1. What is meant by the terms "single" and "double" entry?
2. What books would you require to keep account of all mining stores received and delivered on a mine? Give examples of the entries.
3. What system of time-keeping would you adopt on a mine employing less than 50 men daily? Give an example of a wages-sheet showing a fortnight's work of four men.
4. Make a specimen page of a Journal, showing not less than four disbursements and two receipts of moneys on each of three days.

MINE SURVEYING.

WEDNESDAY, 24TH FEBRUARY, 1915, 10 A.M.
TO 12 NOON.

MAXIMUM MARKS, 200.

N.B.—The whole Paper to be answered.

1. How would you proceed to carry true bearings from surface into a mine through a vertical shaft?
2. Describe a prismatic compass. What method would you adopt in a mine survey with loose needle in order to eliminate the errors due to magnetic attraction?
3. Describe the method you would employ and the precautions to be taken in measuring the horizontal distance between two points more than 50 feet apart on the rill of a stope, no instrument being available for measuring the angle of inclination of the rill.
4. A quartz reef has a dip of $62^{\circ} 30'$, and an average thickness of 6ft.; how many tons of quartz would be opened up between two parallel levels 100 feet apart vertically in a block 100 feet in length?
5. The following measurements were taken going down a winze on the underlay of a reef:—12ft. vertical, 13' 4" on underlay south at 82° from horizontal, 16' 8" on underlay south at $75^{\circ} 8' 6''$ vertical, 17' 3" on underlay north at $85^{\circ} 30'$ and 42' 9" on underlay south at $75^{\circ} 45'$; what were the vertical depth of the winze and the horizontal distance between the starting and finishing points?
6. Calculate the following traverse on meridian and perpendicular and plot it on the squared paper provided to a scale of 100 feet to one inch:—

110° 13' ..	..	214 feet.
175° 32' ..	..	145 feet.
237° 18' 30" ..	..	259 feet.
348° 45' ..	..	323 feet.

Calculate also the distance and bearing of the line connecting the starting and finishing points.

MINING ACTS AND REGULATIONS.

WEDNESDAY, 24TH FEBRUARY, 1915,
12 NOON TO 1 P.M.

MAXIMUM MARKS 100.

N.B.—The whole Paper to be answered.

1. What are the provisions of the Mines Regulation Act, 1906, regarding—
 - (a) The duties and responsibility of the mine manager.
 - (b) Certificates to be held by persons in charge of winding engines.
 - (c) The testing and care of winding ropes.
 - (d) Notices by the Inspector of Mines of dangerous or defective matters not provided for, and the procedure thereafter.
 - (e) The testing of safety fuse.
2. What are the requirements of the Mining Act, 1904, and Regulations regarding the conditions on which a Warden may register a tribute agreement?

SURFACE WORK.

WEDNESDAY, 24TH FEBRUARY, 1915, 2 P.M.
to 4 P.M.

MAXIMUM MARKS, 200.

N.B.—Candidates are not to answer more than six questions.

1. Describe with sketches the setting of a mortar block for a stamp battery.
2. Show with aid of sketch drawings the brick-work setting of an under-fired return-tube boiler.
3. Show by sketches with dimensions, the construction you would adopt for a sawn timber stand to carry a tank to contain 10,000 gallons of water, the bottom of the tank being 20 feet above the ground.
4. A rectangular tank is to be excavated in ground with a level surface, of length 200 feet by 100 feet at surface, depth 10 feet, and slopes of ex-

cavation 1 to 1; how many cubic yards of excavation will be required, and how many gallons of water will the tank contain when full?

5 Explain the method of setting out curves for a railway or tramway by means of offsets and equal chords.

6. Describe the application of a hydraulic test to a boiler.

7. Describe the preparation and composition of concrete suitable for foundations for a heavy winding engine, and the precautions to be taken in laying it.

8. Describe the methods you would use on a mine of testing wire ropes by tensional, torsional, and bending tests of the individual wires. How does the sum of the strengths of the component wires compare with the total strength of the rope?

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, W.A.,
30th April, 1916.

Sir,

The Annual Report of the Board of Examiners for 1915 is submitted for the information of the Hon. the Minister for Mines.

Two ordinary and two special meetings were held during the year.

Examination for Certificates.

No applications were received to sit for examination in response to advertisements in April and October, 1915.

Certificates issued.

(4855/03) A first-class Certificate of Service was granted to J. Robb on his producing evidence to show that he had been manager of a coal mine in accordance with Section 24, Subsection (3) of "The Coal Mines Regulation Act, 1915."

(1308/14) Andrew Watson was granted a second-class Certificate of Competency on his New Zealand second-class Certificate of Competency, and (2603/13) Thomas Burgess was granted a second-class Certificate of Competency on his United Kingdom second-class Certificate of Competency.

(2838/08) John McGeachie was granted a first-class Certificate of Service on his New South Wales first-class Certificate of Service.

(507/15) An application for a first-class Certificate of Competency was refused owing to the applicant being unable to satisfy the Board as to his sobriety in accordance with Regulation 28 of "The Coal Mines Regulation Act, 1902."

We have, etc.,

A. MONTGOMERY,
State Mining Engineer, Chairman.

A. GIBB MAITLAND,
Government Geologist, Member.

R. McVEE,
Inspector of Mines, Member.

F. A. LANE,
Acting Secretary.

DIVISION III.

REPORT OF THE SUPERINTENDENT OF STATE BATTERIES.

Department of Mines,
State Batteries Branch,
Perth, 20th March, 1916.

The Under Secretary for Mines.

Sir,

For the information of the Hon. the Minister for Mines, I have the honour to submit the following report of work done by the State Battery Branch during the year 1915. This is the eighteenth Annual Report, and to it are appended Inspector Browne's report and 11 schedules setting forth details of returns.

MILLING.

Number of Plants.—When the year closed, 30 batteries for the treatment of gold ores were being operated by the Department, comprising 220 head of stamps, and made up of 14 ten-head and 16 five-head mills. In addition, two mills were leased under terms which provided for the treatment of customs ore under State Battery regulations and rates (Tuckanarra 10-head and Pingin 5-head).

Tonnage Milled.—1,082 parcels of ore were milled, comprising 49,595 tons, the mean weight of parcels being 45.83 tons. The tonnage milled shows a falling-off of 6,975½ tons, or 12.4 per cent., when compared with the result for 1914, and a decrease of 10,978 tons, or 18.1 per cent., when compared with the tonnage milled during 1913. As a result of the small tonnage offered for treatment, our plants were kept employed less than one-fifth of full time (Sunday excluded). (Schedules 1 and 8.)

Duty per Stamp.—Conditions under which ore was milled practically remained unaltered, the number of drops per minute and length of drop being adjusted to suit requirements, whilst the use of wire-woven screens of varying gauges containing 700 and 800 holes per square inch was continued. The average duty per stamp per 24 hours was 4.01 tons.

Amalgamation.—Wiluna is the only plant where amalgamation is not always resorted to for the recovery of gold in milling operations. Quartz ores at Wiluna are amalgamated, but lode material is not. 49,018 tons of ore treated by amalgamation yielded 39,095½ ozs. of bullion worth £140,741, a recovery of 77.2 per cent. of the gross value of the ore (Schedule 5). The Batteries are called upon to treat a wide range of ores throughout the goldfields, and it is pleasing to note the percentage recovery from amalgamation, which is highest on record (Schedule 5).

Milling charges.—The special reductions initiated towards the close of 1914 for low-grade ores, and mentioned in last year's report, were continued throughout the year. The tonnage upon which reductions were allowed was 21,042, whilst the amount

of rebates allowed to customers was £3,026 0s. 4d. This amount was paid to revenue from the Development of Mining Vote.

Revenue.—Milling revenue amounted to £22,860 5s., equal to 9s. 2.61d. per ton. Included in these figures is the amount of £3,026 0s. 4d. referred to above. It will be seen, therefore, that our customers only paid £19,834 4s. 8d. for milling charges, equal to 8s. per ton. The revenue shows a decrease of 0.34 pence per ton, when compared with the result for 1914.

Expenditure.—Milling expenditure amounted to £29,502 10s. 8d., equal to 11s. 10.75d. per ton, a decrease of 8.13 pence when compared with the figures for 1914. Comments relative to the cost per ton will be found in a subsequent paragraph.

A loss of £6,642 5s. 8d. was incurred, which is £2,771 8s. 5d. less than the loss on milling operations during 1914. (Schedule 8.)

TIN TREATMENT.

Two plants at Greenbushes were operative during the year. The effects of the European War had not a little to do with the falling-off in tonnage offered for treatment, and it is doubtful if much improvement will be noticed until better facilities are available for realisation on Black Tin.

Tonnage treated.—1,767 yards of tin ore were treated, comprising 74 separate parcels. The decrease in tonnage was 1,573 when compared with the tonnage for 1914, equal to 47.2 per cent., and debarred us from showing good costs. The weight of Black Tin recovered amounted to 22,064 tons.

Revenue.—£351 17s. 8d. equal to 3s. 11.78d. per yard.

Expenditure.—£715 17s. 4d., equal to 8s. 1.23d. per yard. Loss, £363 19s. 8d. (Schedules 1 and 8.)

SAND TREATMENT.

The treatment of sand has been abolished. It is now mixed with slime and treated by the leaching process, particulars of which will be found under the heading of "Tailings Treatment."

SLIME TREATMENT.

Only 3,454½ tons of slime were treated, at a cost of £2,162 18s. 4d., the revenue being £1,700 8s. 8d. (Schedules 3 and 9.)

TAILINGS TREATMENT.

Arrangements had been made to handle a large tonnage of tailings during the year, in order to rea-

lise on the accumulations. Unfortunately, however, wet weather interfered with operations, with the result that only 31,887 tons were handled.

Revenue.—£12,847 19s. 7d., equal to 8s. 0.69d. per ton, an increase of 2.76 pence per ton compared with the revenue for 1914.

Expenditure.—£10,806 12s. 10d., equal to 6s. 9.33d. per ton, an increase of 7.07 pence per ton when compared with the cost during 1914. Frequent stoppages through wet weather, and the increased cost of cyanide, zinc shavings, and stores account for the increase in cost.

A profit of £2,041 6s. 9d. was made. (Schedules 3 and 9.)

Some interesting remarks are contained in Inspector Browne's appended report under this heading.

RESIDUE RETREATMENT.

At Menzies 13,230 tons of sand residues were re-treated at a cost of 4s. 1.94d. per ton. The values recovered were sufficient to defray the cost of treatment and show a small margin of profit. During 1914, 11,040 tons of sand residues were re-treated at Menzies, making a total of 24,270 tons.

LUBRA QUEEN TAILINGS TREATMENT.

864 tons of tailings, carted to the State plant at Niagara from the Lubra Queen mine, were treated at a cost of 6s. 1.05d. per ton. The tailings were not produced by the Department's mills, but were treated for the State Mining Engineer in order to recover moneys loaned under the Mining Development Vote.

During 1914, 2,052 tons were treated, making a total of 2,916 tons.

ADDITIONS AND EQUIPMENT.

£75 4s. 9d. was the small amount expended under this heading, and was charged up to working expenditure.

REPAIRS AND RENEWALS.

Repairs and renewals to the mills cost £2,445 14s. 7d., whilst the cyanide treatment plants accounted for £429 8s. 3d., a total of £2,875 2s. 10d., the amount being charged against working expenditure.

TOTAL OPERATIONS.

Gross Tonnage.—The gross tonnage handled in all departments of our operations totalled 99,933½ tons, compared with 116,139½ tons during 1914, a decrease of 16,206 tons. (In each case the tonnage of residue retreatment at Menzies is included, but "Lubra Queen" tailings treatment figures are excluded from this and the two following paragraphs.)

Gross Expenditure.—The expenditure for all operations was £46,742 12s. 2d., equal to 9s. 4.25d. per ton, a very satisfactory decrease of 8.97 pence per ton as compared with the cost for 1914.

Note.—The items Expenditure in the "Comparative Synopsis" and in Schedules 8 to 11 indicate the total expenditure including Head Office Administration, Inspection, and Managerial expenses, as well as Realisation on Bullion and all other incidental expenses.

Gross Revenue.—The revenue from all operations was £41,358 13s. 3d., equal to 8s. 3.32d. per ton, unfortunately a decrease of 4.96 pence per ton compared with the revenue for 1914.

The loss on the year's operations, exclusive of sales, etc., was £5,502 7s. During 1914 the loss was £7,418 12s. 3d., or £1,916 5s. 3d. more than during 1915.

Comparative Synopsis of Results at State Batteries for Twelve Months ending 31st December, 1915 and 1914.

Operation.	1915.			1914.		
	Tonnage.	Expenditure per ton.	Revenue per ton.	Tonnage.	Expenditure per ton.	Revenue per ton.
Milling	49,595	s. d. 11 10·75	s. d. 9 2·61	56,570½	s. d. 12 6·88	s. d. 9 2·95
Sand Treatment .. .. .	.. .. .	.. .. .	.. .. .	6,218½	8 4·87	9 8·90
Tailings Treatment	31,887	6 9·33	8 0·69	32,723½	6 2·26	7 9·93
Slime Treatment	3,454½	12 6·26	9 10·13	6,246½	10 10·27	9 0·04
Tin Treatment	1,767	8 1·23	3 11·78	3,340	7 10·65	4 6·60.

REVENUE AND EXPENDITURE, 1915.

Operation.	Tonnage.	Expenditure.	Revenue.	Profit.	Loss.
Milling	49,595	£ s. d. 29,502 10 8	£ s. d. 22,860 5 0	£ s. d.	£ s. d. 6,642 5 8
Tailings Treatment	31,887	10,806 12 10	12,847 19 7	2,041 6 9	.. .. .
Slime Treatment	3,454½	2,162 12 4	1,700 8 8	.. .. .	462 3 8
Tin Treatment	1,767	715 17 4	351 17 8	.. .. .	363 19 8
	86,703½	43,187 13 2	37,760 10 11	2,041 6 9	7,468 9 0
				Less Profit	2,041 6 9
				Loss	5,427 2 3
				Additions and Equipment	75 4 9
				Gross Loss	£5,502 7 0

PURCHASE OF TAILINGS.

20,679 $\frac{1}{4}$ tons of tailings (sand and slime) were purchased for £16,685 7s. 7d. net to customers. These figures represent the purchases completed during the year. (Schedule 7.)

40,515 tons of tailings (dry weight) were actually produced during the year from 49,595 tons of ore milled, equal to 81.7 per cent. Of the tonnage milled a large proportion was soft lode matter containing high percentages of moisture.

18,290 $\frac{3}{4}$ tons of tailings, having assay values of over 3 dwts. fine gold per ton, and containing 7,818.76 ozs. fine gold, were produced. Only 1,066 $\frac{1}{2}$ tons containing 342.05 ozs. fine gold were not purchased, the centres affected being Marble Bar and Mount Ida, being the only two places where tailings are not treated or purchased on account of their refractory nature.

The net amount payable to customers for the balance of the tonnage was £15,036.

22,224 $\frac{1}{4}$ tons of tailings, having assay values of less than 3 dwts. fine gold per ton and containing 1,947.725 ozs. fine gold, reverted to the Department under Regulation 11. (Schedule 7A.)

RECOVERY OBTAINED FROM ORE TREATED.

The 30 batteries under departmental control milled 49,595 tons of gold-bearing ore. 39,095.57 ozs. of bullion were recovered by amalgamation, valued at £140,741.

The gross value of the tailings was £41,487, and the gross value of the ore £182,228, equal to 73s. 5d. per ton. (Schedule 5.)

The Department received as milling charges £23,203 10s., leaving a net return to customers from amalgamation of £117,537 10s. (Schedule 8.)

The net amount payable to customers for tailings was £15,036.

The net return received by customers from the treatment of their ore was £132,573 10s., equal to 72.7 per cent. of the gross value. (1913, 72.1 per cent.; 1914, 72.6 per cent.)

In view of the ore being worth 5s. 6d. per ton less than in 1914 and 11s. 10d. less than in 1913, it is gratifying to note that the net return to customers has been maintained at over 72 per cent. As a matter of fact, the net return to customers during 1915 is, by a small margin, the highest on record.

NEW PLANTS.

A 5-head battery and tailings treatment plant replete with modern accessories was erected at Sandy Creek, but did not commence operations until after the close of the year.

A slimes plant of the latest pattern was installed at Wiluna and commenced work during September.

Tailings treatment plants were erected at Burtville, Boogardie, Laverton, Meekatharra, Mulwarrie, and Ora Banda.

The expenditure from Consolidated Revenue Vote and Loan Funds amounted to £14,727 13s. 2d. (Schedule 6.)

PLANT LEASED.

The 5-head battery and equipment at Pingin was leased to a party of prospectors, who are compelled by agreement to crush ore for the public when available, under State Battery regulations. There was, unfortunately, so very little ore offered for treatment for some time, that it was decided to lease the

plant on easy terms as an alternative to closing it down altogether.

OUTPUT SINCE INCEPTION.

From the inception of the State Battery system to the end of 1915, gold and tin to the value of £4,572,477.9 have been recovered.

1,067,154.94 tons of gold ore were treated and produced £3,834,494.45 by amalgamation; £533,936.15 by tailings treatment; £110,645.17 by slimes treatment, and £6,679.01 by residue retreatment.

70,026 $\frac{3}{4}$ tons of tin ore produced tin to the value of £86,723.12.

The Staff.

When the year closed 32 plants were being operated by the Department, in addition two being leased. The managerial staff consisted of 14 managers and one acting manager, compared with 15 managers and one acting manager at the close of 1914, when 33 plants were being operated.

One engineer was kept employed most of the year with construction work.

Head office staff remained unaltered, and consisted of the Inspector, Engineer and Draftsman, Assayer, and Clerk-in-charge.

Members of the staff have felt the tension of the year's work, during which period they cheerfully assumed greater responsibilities and less pay. I cannot speak too highly of their work, the successful result of their labours being clearly indicated throughout this report.

General Remarks.

The decline in the gross value of ore treated during the year to 73/5 per ton was resultant upon reductions in our milling charges for ores worth under 9dwts. per ton.

The falling off in tonnage is traceable in an appreciable degree to the great war. A large number of prospectors and leaseholders have given their services to the Empire, and some of the outlying mining centres have very small populations at the present time. The decline is also probably due, in some measure, to certain of the mines giving out. Had it not been for Coolgardie (9,793 $\frac{3}{4}$ tons) and Meekatharra (5,085 $\frac{1}{2}$ tons) supplying our batteries with approximately 15,000 tons, the year's work would have been very small. Of the other plants, 2 milled over 3,000 tons, 3 over 2,000 tons, 12 over 1,000 tons, 5 over 500 tons, 4 under 500 tons, and 4 rendered nil returns.

It was found difficult to obtain labour at many centres, and not a few of our plants have been dependent upon men who have had no experience, thus throwing great responsibilities upon managers.

When the year's work was commenced, it was recognised that many difficulties would present themselves on account of the effects of the European war. Precautions were taken, as far as practicable, to ensure an ample supply of commodities necessary to operations, and it is pleasing to note that our work proceeded without the slightest hitch in that regard. All commodities have risen in price very materially, and in some instances are double and treble the price now when compared with pre-war prices.

In view of these facts, appeals were made to the staff to exercise the strictest economy, and it stands to their credit that they achieved so much, in being able to reduce the cost per ton for total operations.

In several of the less prosperous centres in which State Batteries are operating, the plants are old and are not in good order. Old steam boilers are nearing the end of their term of usefulness, and it will be necessary during the coming year to consider the future policy at such centres.

Other plants, although old are in fairly good order and capable of doing much work, whilst the majority of the plants are in first class order and condition.

I have, etc.,

A. M. HOWE,

Superintendent of State Batteries.

Report of Mr. D. F. Browne, Inspector of State Batteries, dated 13th March, 1916.

I have the honour to report herewith on the work done at State Batteries for the year ending December 31, 1915.

The tonnage handled in all operations including the re-treatment of 13,230 tons of residues at Menzies, was disappointing, being only 99,933½ tons, as against the poor figures of 1914, namely, 116,139¼ tons, a falling off of 16,206 tons, or 13½ per cent.

Higher railway freights, a very big increase in the cost of stores, and the natural depression caused by the war, especially in tin centres, have made it difficult to keep expenditure down to normal lines, but I am pleased to be able to report that notwithstanding the difficulties mentioned, the actual loss for the year is £2,078 less than for 1914.

Milling.

Excluding Greenbushes tin plants, 14 ten-head and 16 five-head mills crushed for the public under our direct supervision while two were leased, namely, Tuckanarra and Pingin. The actual stamp hours run for the 30 mills were 281,200.

Allowing 10 per cent. for cleans up and stoppages the stamp hours would be brought to 309,320.

The theoretical stamp hours for the 30 mills for the year, excluding Sundays, is 1,652,640, so that our batteries ran less than 19 per cent. full time.

49,595 tons were crushed at a cost of 11/10.75 per ton and for a revenue of 9/2.61, inclusive of refunded rebate allowed on low-grade crushings, of 1/5.06 per ton.

Compared with the figures for 1914 the tonnage shows a falling off of 6,975½ tons, but notwithstanding this the costs have been reduced 8.13d. per ton.

Receipts have been well maintained, being 9/2.61, as against 9/2.95 in 1914, a decrease of 0.34 pence per ton.

Stamp Duty.—The average duty per stamp for 10-head plants, which are all more or less of old type, was 3.41, while for 5-head plants, which include our more modern ones, the duty was 5.06. These figures are good, using 800 and 900 holes to the square inch screens.

Low-grade Rebate.—The total tonnage crushed under this heading was 21,042, and the amount of rebate allowed £3,026 0s. 4d., equal to 1s. 5d. per ton on all ore crushed.

Profits were made after refunding low-grade rebates at Coolgardie and Mt. Egerton. Exceptionally good work was done at the above mills and also at Ora Banda, Yarri, and Ravelstone.

Cost per ton for 10-head mills was headed by Coolgardie with a cost of 7/1.61. For 5 heads Ora Banda comes first at 8/3.43.

Cost per hour is headed also by Coolgardie for 10 heads and Quinns for 5 heads, with costs of 12/8.97 and 9/6.53.

The net loss on milling for the year was £6,642 5s. 8d., including repairs and renewals, £2,385 4s. 1d.

Tailings.

During the year 22 plants were in operation, but owing to exceedingly wet weather the tonnage treated was less than in 1914, though several new plants were put into commission. 31,887 tons were treated, costing 6/9.33 per ton and producing a revenue of 8/0.69, while last year's figures were 32,723½ tons for 6/2.26 and 7/9.93 respectively.

The increase in the cost of treatment is due to the higher grade of tailings treated, lower tonnage treated and large increase in the cost of stores due to the war. Taking these figures into consideration, the work done has been good.

During the year the present method of tailings treatment has been installed at all our plants, with the exception of Mt. Ida and Marble Bar, where no treatment is undertaken, and Siberia, Ravelstone, Egerton and Darlôt, where the tailings are purchased by outside contractors; all batteries which purchase tailings have plants capable of treating them, a very satisfactory arrangement.

The present system of treatment, viz., the leaching direct of the dry accumulated sands and slimes was practically commenced in 1912 for the following reasons:—

- (a) Cheapness of treatment;
- (b) Economy in erection of plant;
- (c) Quickness in recouping Tailings Purchase Account with its consequent better check on Manager's sampling.

That the system has been effective is shown by the following statistics:—

- (a) Taking the operations extending over the three years ending 1910, we get the following figures:—

Tons sand treated	—166,695;	expenditure—	£51,686.
" slime "	51,382;	" "	£24,515.
Total "	218,077;	" "	£76,201.

Cost per ton sand treated 6.20 shillings.

" slime " 9.54 "

The average percentage of slime in all ore treated is approximately 35. (The above tonnages treated show a larger proportion of sand due to only a few mills treating slime.)

Taking the percentages of sand and slime at 65 and 35 respectively, the average cost for the years 1908 to 1910 inclusive would be 7/4.44 per ton as against 6/9.41 in 1915 and 6/2.26 in 1914.

Without war conditions I consider the cost for 1915 would have been about the same as in 1914, certainly not higher. On account of the small tonnages handled during 1915, Head Office expenditure has increased by 3d. a ton. With the same conditions experienced in the years 1908 to 1910, the cost of tailings treatment, under the present system, would be approximately 6/- per ton, equal to a saving of 1/4 per ton.

Cost of Erection.—(b) The cost of putting up a standard sand plant and "Cassel" slime plant as in use at Menzies and Leonora during the years 1908 to 1910 and capable of handling 650 tons sand, and equal to about 1,000 tons of tailings per month was—

Sand plant ..	£1,237	18s.	11d.
Slime plant ..	£2,780	3s.	11d.
Total ..	£4,018	2s.	10d.

The cost of recently erected tailings plant at Mulwarrie capable of handling the same output from the mill, or even more, in a district where the material is silicious, was £662 2s. 9d.

(c) Before the erection of a Cassel plant was deemed necessary, large tonnages of slime had to be accumulated, and, under our present system of purchase, large amounts were outstanding; the contents of these accumulations, estimated over long periods, were often less when actually treated than was anticipated. The present type of tailings plant being so much cheaper than even the original sand plant, allows of its being erected almost as soon as a battery starts. Everything is treated within a few months after it is paid for; the accumulations are always small and can therefore be easily checked by direct sampling and large discrepancies are impossible.

Erection.

No new batteries were erected, though the Sandy Creek Mill was almost completed. Wiluna Slimes Plant, including alteration and additions to the mill, was finished.

Tailings Plants were erected at Ora Banda, Mulwarrie, Meekatharra, Laverton, Burtville, and Boogardie, and new vats put in at Coolgardie, Youanme, and Yarri.

Inspection.

Owing to my absence on long leave, for the first three months I did not travel a big mileage—

Days travelling—122½.

Miles by road—2,103 = 17 miles per day.

Miles by rail—8,815 = 72 miles per day.

Cost of Inspection.

Salary—£438 15s. 0d.

Rail fares—£64 11s. 9d.

Sustenance, wires, etc.—£100 13s. 1d. = 16s. 5d. per day.

Motor and Vehicle hire and fares—£66 18s. 9d. = 7.97d. per mile.

Total—£670 18s. 7d.

Management.

No changes in the personnel of the staff were made. Payne's Find was coupled up with Boogardie with head-quarters at the latter place.

Summary.

On reviewing the work done, the results are highly satisfactory from the working point of view, but the low tonnage produced is disappointing and at present it looks as if it will show a further falling-off for 1916.

The decrease in the cost of milling and the keeping down of tailings treatment costs to 6s. 9.33d. per ton, under the conditions attending these operations reflects credit on the Managers. Economy has been studied and every endeavour made to keep the efficiency of the plants up to standard, and I consider that in the main this has been done.

Scarcity of suitable labour is still one of the worst difficulties Managers have to contend with and is becoming more acute.

The low percentage of payable tailings accumulated through the year is unfortunate. This fact will be reflected in the figures for 1916 and the necessity for segregation is likewise increasing.

Owing to the state of the industry at the present moment I think it advisable to consider the waiving, to some extent, of the minimum tonnage regulation regarding the starting up of mills.

SCHEDULE I.

Return showing the number of Tons Crushed, Gold Yield, Average per Ton in Shillings, and Total Value for Year ended 31st December, 1915.

Battery.	Tons crushed.	Gold Yield, Bullion.	Average per ton in shillings.	Total Value.
		OZS.		£
Bamboo Creek	2,133·75	2,918·70	98·48	10,507·32
Black Range	3,055·25	2,271·99	53·54	8,179·16
Boogardie	3,246·50	2,990·35	66·32	10,765·26
Burtville	188·00	333·30	127·64	1,199·88
Coolgardie	9,793·25	6,078·35	44·68	21,882·06
Darlot	89·00	45·95	37·17	165·42
Laverton	1,287·00	983·50	55·02	3,540·60
Leonora	669·00	1,942·35	209·00	6,992·46
Linden	1,034·00	1,989·70	138·56	7,162·92
Meekatharra	5,085·50	1,737·25	24·60	6,254·10
Menzies				
Marble Bar	1,424·50	2,236·80	113·06	8,052·48
Mt. Egerton	1,008·50	393·22	28·06	1,415·59
Mt. Ida	1,994·00	851·45	30·74	3,065·22
Mt. Keith	1,114·00	829·10	53·58	2,984·76
Mt. Sir Samuel	767·00	637·70	59·86	2,295·72
Mulline	965·75	993·77	73·88	3,567·58
Mulwarrie	394·00	484·20	88·48	1,743·12
Niagara	1,810·75	2,545·55	101·21	9,163·98
Norseman				
Ora Banda	1,285·50	636·65	35·66	2,291·94
Payne's Find	2,242·00	2,650·27	85·11	9,540·97
Pingin				
Quinn's	2,327·25	1,176·43	36·40	4,235·15
Ravelstone	1,330·50	2,186·55	118·32	7,871·58
Siberia	527·25	661·80	90·37	2,382·48
20-Mile Sandy				
Tuckanarra				
Wiluna	633·00	259·05	29·46	932·58
Yarri	1,794·50	677·85	27·20	2,440·26
Yerilla	229·00	130·40	41·00	469·44
Youanme	2,790·00	453·32	11·70	1,631·95
	49,218·75	39,095·55	57·19	140,733·98
Wiluna (Lode)	376·25	No	amalgamation.	
	49,595·00			

TIN PLANTS.

	Tons.	Yield Tons, Black Tin.
Bunbury End	1,212·00	15·942
Salt Water Gully	555·00	6·122
	1,767·00	22·064

SCHEDULE 2.

Return showing the number of Tons Crushed, Gold Yield, Average per Ton, and Value since inception to 31st December, 1915.

Battery.	Tons crushed.	Gold Yield, Bullion.	Average Gold per ton.	Value.
		ozs.	ozs.	£
Bamboo Creek	4,291·00	5,588·36	1·30	20,118·10
Black Range	60,985·40	63,892·33	1·05	230,207·72
Boogardie	49,943·15	30,219·89	·61	110,185·79
Burtville	29,900·50	65,526·71	2·19	237,201·97
Coolgardie	71,166·25	57,759·32	·81	207,990·63
Darlot	33,210·00	37,638·74	1·14	138,928·25
Laverton	13,879·00	14,825·71	1·07	54,544·28
Leonora	51,737·45	56,246·89	1·09	205,969·13
Linden	15,367·25	16,951·16	1·10	61,024·28
Meekatharra	65,198·50	75,490·39	1·16	274,444·79
Menzies	54,574·25	44,199·67	·81	158,966·21
Marble Bar	8,253·00	10,350·90	1·25	37,263·19
Mt. Egerton	4,763·75	2,980·66	·62	9,997·20
Mt. Ida	39,124·90	52,175·66	1·34	191,134·55
Mt. Keith	4,307·25	3,677·85	·86	13,240·26
Mt. Sir Samuel	7,887·75	6,379·80	·81	22,967·27
Mulline	74,644·20	96,597·29	1·30	346,920·39
Mulwarrie	30,687·15	35,583·16	1·16	131,356·07
Niagara	60,843·50	54,151·42	·89	197,133·31
Norseman	53,273·70	56,235·22	1·05	205,629·26
Ora Banda	7,989·75	3,327·69	·42	11,979·66
Payne's Find	10,008·00	11,873·06	1·18	42,743·01
Pinjin	17,088·65	12,912·63	·76	46,485·04
Quinn's	10,605·50	5,863·13	·56	21,107·27
Ravelstone	14,464·30	15,307·77	1·06	56,279·21
Siberia	13,835·25	15,114·09	1·09	54,336·05
20-Mile Sandy	10,536·15	17,357·22	1·65	62,815·56
Tuckanarra	15,476·85	21,276·06	1·37	78,217·53
Wiluna	52,908·25	28,609·45	·54	103,139·19
Yarri	43,341·00	27,664·16	·64	99,590·80
Yerilla	14,197·25	12,960·80	·91	43,857·80
Yonanme	23,622·00	8,238·01	·35	29,656·83
Batteries closed	98,667·79	89,389·36	·91	329,063·85
	1,066,778·69	1,056,364·56	·99	3,834,494·45
Wiluna (Lode)	376·25	No	amalgamation.	
	1,067,154·94			

TIN PLANTS.

	Tons.	Yield, Tons Black Tin.
Greenbushes—Bunbury End ..	49,805·50	682·196
Salt Water Gully	4,417·00	41·148
Plants Closed	15,804·25	189·531
	70,026·75	912·875

MILLING.		CYANIDING SANDS—continued.		Tons.	
Up to	Tons.	ozs.	Up to	Tons.	
1901 (3 years)	68,791	75,533	1909	61,265	
1902	39,517	57,255	1910	43,915	
1903	49,233	58,305	1911	27,444	
1904	71,616	78,309	1912	18,599	
1905	85,018	92,327	1913	18,300	
1906	95,831	94,187	1914	6,219	
1907	95,280	97,962	TAILINGS.		
1908	95,624	89,875	1913	13,078	
1909	94,218	83,127	1914	32,723	
1910	89,278	80,074	1915	31,887	
1911	59,373	56,265	SLIMES TREATMENT.		
1912	56,636	53,868	Up to 1904	691	
1913	60,573	52,515	1905	7,028	
1914	56,570	45,641	1906		
1915	49,595	39,095	1907	8,220	
CYANIDING SANDS.		Tons.	1908	5,818	
Up to 1902	29,255		1909	16,848	
1903	33,369		1910	28,819	
1904	42,559		1911	20,821	
1905	54,420		1912	8,085	
1906	60,422		1913	6,089	
1907	63,778		1914	6,246	
1908	62,081		1915	3,454	

SCHEDULE 3.

Sands and Tailings Treatment, 1915.

Battery.	Tons.	Yield, Fine ozs.	Value—£.
Bamboo Creek	2,016	582·50	2,474·50
Black Range	3,200	679·12	2,884·84
Boogardie	1,020	477·59	2,028·79
Burtville	1,230	321·19	1,364·51
Coolgardie	3,762	475·77	2,021·15
Laverton	3,195	889·53	3,778·67
Leonora	300	66·66	283·19
Linden	2,580	692·62	2,942·36
Meekatharra	2,160	268·89	1,142·41
Menzies	900	84·76	360·07
Mt. Keith	1,230	138·28	587·36
Mt. Sir Samuel .. ..	..	3·65	15·49
Mulwarrie	224	65·02	276·22
Niagara	2,128	234·87	997·71
Ora Banda	1,026	203·59	864·83
Quinn's	1,032	119·96	509·56
Wiluna	672	292·26	1,241·52
Yarri	5,200	425·77	1,808·58
Yerilla	240	17·76	75·45
Youanmi	784	87·24	370·59
Sandy Creek	707	174·67	593·33
	33,603	6,301·70	26,621·13

Less treated Dec., 1914 :

	tons.
Wiluna	532
Mt. Keith	480
Sandy Creek	707

1,719**31,887**

SCHEDULE 3—continued.

Slimes Treatment, 1915.

Battery.	Tons.	Yield, Fine ozs.	Value—£.
Mulwarrie	71·50	23·84	101·28
Wiluna	3,383·00	1,072·00	4,553·84
	3,454·50	1,095·84	4,655·12

RESIDUES RETREATMENT.

Menzies Residues	13,230	798·63	3,362·90
Lubra Queen	864	107·31	455·87

SCHEDULE 4.

Sands Treatment since Inception to 31st December, 1915.

Battery.	Tons.	Yield, Fine ozs.	Value—£.
Bamboo Creek	2,016	582·50	2,474·50
Black Range	36,018	9,611·52	40,542·44
Boogardie	30,452	8,185·53	34,239·32
Burtville	16,788·75	5,464·13	22,793·76
Coolgardie	36,306	5,758·81	24,176·81
Darlot	23,654	2,699·17	11,042·16
Devon	261·50	120·44	511·64
Duketon	2,083·50	250·51	1,025·77
Laverton	12,545	1,980·67	8,217·91
Lennonville	24,309	6,592·43	26,653·23
Leonora	35,655·50	8,816·56	36,679·79
Linden	13,537	4,092·46	17,385·27
Meekatharra	36,350	7,288·71	30,342·95
Menzies	31,487·50	7,975·80	33,434·78
Mt. Ida	3,570	357·97	1,423·64
Mt. Keith	3,008	357·92	1,520·37
Mt. Sir Samuel	4,746	1,037·47	4,407·19
Mulline	41,804·50	11,704·27	47,497·17
Mulwarrie	23,809·25	4,673·13	19,209·91
Nannine	3,650	410·12	1,742·50
Niagara	40,254	6,294·91	26,160·23
Norseman	37,106·50	7,596·29	31,509·91
Ora Banda	1,026	203·59	864·83
Payne's Find	5,437	729·02	3,096·92
Pig Well	11,379	2,373·25	9,962·50
Pinjin	11,718	1,243·07	5,256·01
Quinn's	7,486	686·56	2,916·43
Randalls	791	56·05	224·80
Sandy Creek	9,038·25	2,815·09	11,676·68
Siberia	5,550	1,201·56	5,105·20
Southern Cross	3,471	452·75	1,815·18
Wiluna	17,852	7,930·79	33,590·87
Yarri	39,140	3,573·95	14,918·14
Yerilla	13,160	1,576·71	6,697·73
Youanmi	9,151	2,568·39	10,910·36
Yundamindera	4,977	920·33	3,909·25
Totals	599,588·25	128,182·43	533,936·15

Slimes Treatment since Inception to 31st December, 1915.

Battery.	Tons.	Yield, Fine ozs.	Value—£.
Black Range	13,040	2,604·59	11,064·71
Boogardie	2,100	426·35	1,811·08
Burtville	1,643	519·00	2,204·71
Darlot	570	52·61	223·55
Laverton	273	45·24	192·19
Leonora	12,440	2,198·09	9,338·73
Linden	419	87·30	370·90
Meekatharra	1,980	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
Mulwarrie	71·50	23·84	101·28
Niagara	13,875	2,175·45	9,242·12
Norseman	16,177·50	3,577·15	15,195·06
Pig Well	340	64·65	274·57
Sandy Creek	293·50	75·00	318·68
Siberia	347	104·47	443·73
Wiluna	5,980	1,985·21	8,433·27
Yarri	3,792	364·06	1,546·62
Yerilla	424	44·55	189·33
Totals	117,247·75	27,097·92	110,645·17

Residue Re-Treatment to 31st December, 1915.

Battery.	Tons.	Yield, Fine ozs.	Value—£.
Menzies	24,270	1,579·26	6,679·01
Lubra Queen	2,916	375·95	1,597·04

SCHEDULE 5.

Return showing Number of Parcels treated and Tons crushed at State Batteries for Year 1915.

Number of parcels crushed.	Name of Lease or Holding.	Tons.	Yield by Amalgamation.	Yield by Amalgamation.	Gross Contents of Tailings.	Total Contents of Ore.	Average per ton.		Gross Value of Ore.			
			Bullion.	Fine Gold.	Fine Gold.	Fine Gold.	Fine Gold.	dwts.	grs.	£	s.	d.
			ozs.	ozs.	ozs.	ozs.						
36	Bamboo Creek ..	2,133.75	2,918.70	2,473.47	563.95	3,037.42	28	11	6	0	10	
52	Black Range ..	3,055.25	2,272.00	1,925.42	811.78	2,737.20	17	22	3	16	1	
130	Boogardie ..	3,246.50	2,990.35	2,534.19	1,185.56	3,719.75	22	22	4	17	3	
7	Burtville ..	188.00	333.30	282.45	66.55	349.00	37	3	7	17	8	
272	Coolgardie ..	9,793.25	6,078.35	5,151.14	1,326.89	6,478.03	13	5	2	16	1	
4	Darlot ..	89.00	45.95	38.94	8.03	46.97	10	13	2	4	9	
34	Laverton ..	1,287.00	983.50	833.47	254.31	1,087.78	16	22	3	11	8	
23	Leonora ..	669.00	1,942.35	1,646.06	158.36	1,804.42	53	21	11	8	9	
30	Linden ..	1,034.00	1,989.70	1,686.19	1,155.00	2,841.19	54	23	11	13	6	
43	Marble Bar ..	1,424.50	2,236.80	1,895.59	195.44	2,091.03	29	8	6	4	6½	
65	Meekatharra ..	5,085.50	1,737.25	1,472.24	638.95	2,111.19	8	7	1	15	2	
17	Mt. Egerton ..	1,008.50	393.22	333.23	195.86	529.09	10	12	2	4	7	
33	Mt. Ida ..	1,994.00	851.45	721.57	306.10	1,027.67	10	7	2	3	8	
12	Mt. Keith ..	1,114.00	829.10	702.63	80.56	783.19	14	1	2	19	8	
15	Mt. Sir Samuel ..	767.00	637.70	540.42	237.06	777.48	20	6	4	5	11	
39	Mulline ..	927.50	993.77	842.18	173.84	1,016.02	21	21	4	12	10	
18	Mulwarrie ..	394.00	484.20	410.34	146.55	556.89	28	6	5	19	11	
31	Niagara ..	1,810.75	2,545.55	2,157.25	279.79	2,437.04	26	22	5	14	2	
24	Ora Banda ..	1,318.00	636.65	539.53	154.20	693.73	10	12	2	4	8	
59	Payne's Find ..	2,242.00	2,650.27	2,246.00	321.49	2,567.49	22	21	4	17	2	
43	Quinns ..	2,347.25	1,176.43	996.97	275.63	1,272.60	10	20	2	6	0	
34	Ravelstone ..	1,330.50	2,186.56	1,853.02	184.32	2,037.34	30	15	6	10	0	
13	Siberia ..	527.25	661.80	560.85	119.94	680.79	25	19	5	9	6	
111	Wiluna ..	418.00	259.05	219.53	130.61	350.14	16	18	3	11	1	
17	Yarri ..	1,794.50	677.85	574.45	170.88	745.33	8	7	1	15	2	
8	Yerilla ..	229.00	130.40	110.51	28.45	138.96	12	3	2	11	6	
9	Youanmi ..	2,790.00	453.32	384.17	347.88	732.05	5	6	1	2	3	
1,079	Total tonnage treated	49,018.00	39,095.57	33,131.81	9,517.98	42,649.79						
3	Wiluna Lode ..	376.25	No amalgamation.		248.51	248.51	13	5	2	16	1	
1,082	Less Estimated Tonnage under treatment, 31st Dec., 1914 ..	49,394.25										
		52.50										
		49,341.75										
	Estimated—Add tonnage under treatment 31st Dec., 1915 ..	253.25										
		49,595.00	39,095.57	33,131.81	9,766.49	42,898.30	17	7	3	13	5	

TIN PLANTS.

No. of Parcels.	Battery.	Yards of Tin ground treated.	Yield.	Average per yard.
50 24	Greenbushes—Bunbury End ..	1,212.00	Tons. 15.942	grs. lbs. 1 1
	Greenbushes—Salt Water Gully ..	555.00	6.122	0 24.84
		1,767.00	22.064	1 25.84

SCHEDULE 6.

Expenditure from Consolidated Revenue Vote and Loan Expenditure Funds on Erection of State Batteries for year ending 31st December, 1915, and Totals since Inception.

Battery.	From Revenue.	From Loan.	Total.
	£ s. d.	£ s. d.	£ s. d.
Quinn's Cyanide Plant Erection .. .. .	..	2 5 0	2 5 0
Wiluna Slimes Plant Erection .. .. .	..	7,758 1 3	7,758 1 3
Bamboo Creek, Tailings Plant .. .. .	..	102 2 8	102 2 8
Black Range, Tailings Plant .. .. .	..	69 16 1	69 16 1
Boogardie, General Overhaul .. .. .	..	38 1 0	38 1 0
Meekatharra, Tailings Plant .. .. .	..	328 18 11	328 18 11
Ora Banda, Tailings Plant .. .. .	..	432 16 5	432 16 5
Laverton, Tailings Plant .. .. .	..	327 12 8	327 12 8
Yarri, Tailings Plant .. .. .	..	235 12 5	235 12 5
Burtville, Tailings Plant .. .. .	..	77 9 9	77 9 9
Youanme Battery, Water Supply .. .. .	..	33 19 3	33 19 3
20-Mile Sandy Creek, Erection of 5-Head Mill and Tailings Plant .. .. .	..	4,298 16 4	4,298 16 4
Boogardie, Tailings Plant .. .. .	..	498 16 9	498 16 9
Bamboo Creek, Tailings Plant .. .. .	..	142 11 3	142 11 3
Mulwarrie Slimes Plant .. .. .	..	480 14 8	480 14 8
Coolgardie, Purchase and Renovation of Cyanide Plant .. .. .	..	148 3 1	148 3 1
		14,975 17 6	14,975 17 6
Cr. by Stores transferred to Working Account .. .. .	..	248 4 4	248 4 4
		14,727 13 2	14,727 13 2
Erection of State Batteries:—			
Expenditure to 31st December, 1907	91,981 1 8	..	..
Loan Expenditure to 31st December, 1914 .. .. .	..	251,230 8 9	343,211 10 5
Grand Total	91,981 1 8	265,958 1 11	357,939 3 7

SCHEDULE 7.

Direct Purchase of Tailings, 1915.

Battery.	Tons.	Amount.
		£ s. d.
Bamboo Creek	2,353.75	1,636 11 3
Black Range	1,442.25	948 8 7
Boogardie	2,283.00	3,909 11 5
Burtville	439.25	209 15 1
Coolgardie	1,824.50	1,568 13 4
Laverton	722.25	284 19 3
Leonora	294.75	174 5 11
Linden	1,221.25	2,484 14 10
Meekatharra	1,171.00	463 19 7
Mt. Jackson	8.75	283 14 10
Mt. Sir Samuel	415.00	38 7 9
Mt. Keith	176.50	72 14 8
Mulline	497.50	190 8 4
Mulwarrie	325.50	220 7 6
Niagara	632.00	200 9 10
Norseman	53.00	9 5 6
Ora Banda	322.75	234 5 5
Payne's Find	826.25	329 15 3
Pig Well .. .. .	..	381 15 4
Pinjin	10.00	209 14 2
Quinn's	1,883.75	748 17 5
Sandy Creek	697.25	266 0 1
Siberia	293.50	648 8 3
Wiluna	949.00	825 17 3
Yarri	339.00	136 5 8
Yerilla	88.00	64 6 1
Youanmi	1,409.50	143 15 0
	20,679.25	16,685 7 7

Direct purchase of Slimes for 1915—Nil.

SCHEDULE 7A.

Return showing Gross Contents of Tailings, 1915.

Battery.	Tailings Purchased.		Tailings having Assay Value under 3dwts. per ton.		Total.	
	Tons.	Gross Contents.	Tons.	Gross Contents.	Tons.	Gross Contents.
		ozs. d. grs.		ozs. d. grs.		ozs. d. grs.
Bamboo Creek	1,443 $\frac{1}{2}$	533 19 8 $\frac{1}{2}$	300	29 19 15	1,743 $\frac{1}{2}$	563 18 23 $\frac{1}{2}$
Black Range	1,891 $\frac{1}{2}$	730 14 7 $\frac{3}{4}$	675 $\frac{1}{2}$	81 1 10 $\frac{1}{2}$	2,567	811 15 18 $\frac{1}{2}$
Boogardie	1,781 $\frac{1}{2}$	1,090 0 23 $\frac{1}{2}$	807 $\frac{1}{2}$	95 10 6	2,588 $\frac{3}{4}$	1,185 11 5 $\frac{1}{2}$
Burtville	137 $\frac{1}{2}$	63 10 6 $\frac{3}{4}$	23	3 0 9	160 $\frac{1}{2}$	66 10 15 $\frac{1}{2}$
Coolgardie	2,013 $\frac{3}{4}$	864 12 12	6,298 $\frac{3}{4}$	462 5 1 $\frac{1}{2}$	8,312 $\frac{1}{2}$	1,326 17 13 $\frac{1}{2}$
Darlot	8	2 11 0	62	5 9 13	70	8 0 13
Laverton	856 $\frac{3}{4}$	238 12 2	173	15 14 3 $\frac{1}{2}$	1,029 $\frac{3}{4}$	254 6 5 $\frac{1}{2}$
Leonora	334	126 5 4	234 $\frac{1}{2}$	32 2 0 $\frac{3}{4}$	568 $\frac{1}{2}$	158 7 4 $\frac{3}{4}$
Linden	844 $\frac{1}{2}$	1,150 2 23	33	4 17 2 $\frac{1}{2}$	877 $\frac{1}{2}$	1,155 0 1 $\frac{1}{2}$
Marble Bar	*425	134 15 7 $\frac{1}{2}$	714	60 13 14	1,139	195 8 21 $\frac{1}{2}$
Meekatharra	1,382	376 18 10 $\frac{3}{4}$	2,686 $\frac{1}{4}$	262 0 15	4,068 $\frac{1}{4}$	638 19 1 $\frac{3}{4}$
Mt. Egerton	520 $\frac{1}{2}$	163 12 22	283	32 4 9	803 $\frac{1}{2}$	195 17 7
Mt. Ida	*641 $\frac{1}{2}$	207 5 22 $\frac{1}{2}$	953 $\frac{1}{2}$	98 16 3 $\frac{1}{2}$	1,595	306 2 1 $\frac{1}{2}$
Mt. Keith	9 $\frac{1}{2}$	3 0 23	890 $\frac{3}{4}$	77 10 7 $\frac{1}{2}$	900 $\frac{1}{4}$	80 11 6 $\frac{1}{2}$
Mt. Sir Samuel	586	233 0 4 $\frac{1}{2}$	27	4 1 0	613	237 1 4 $\frac{1}{2}$
Mulline	432	140 3 22 $\frac{1}{4}$	310	33 12 20	742	173 16 18 $\frac{1}{2}$
Mulwarrie	307 $\frac{1}{2}$	145 8 9	8	1 2 16	315 $\frac{1}{2}$	146 11 1
Niagara	648 $\frac{1}{2}$	171 5 17 $\frac{1}{2}$	877 $\frac{3}{4}$	108 10 1	1,526 $\frac{1}{2}$	279 15 18 $\frac{1}{2}$
Ora Banda	185	91 8 12 $\frac{1}{4}$	868 $\frac{1}{2}$	62 15 13	1,053 $\frac{1}{2}$	154 4 1 $\frac{1}{2}$
Payne's Find	636 $\frac{1}{4}$	199 4 0	1,143 $\frac{1}{4}$	122 5 22	1,779 $\frac{1}{2}$	321 9 22
Quinns	574 $\frac{1}{2}$	204 5 16	1,297 $\frac{1}{2}$	71 7 1	1,871 $\frac{1}{2}$	275 12 17
Ravelstone	319	138 5 9	752	46 1 3	1,071	184 6 12
Siberia	235 $\frac{3}{4}$	104 0 21 $\frac{1}{4}$	186	15 17 22 $\frac{1}{2}$	421 $\frac{1}{4}$	119 18 19 $\frac{3}{4}$
Wiluna	199 $\frac{1}{2}$	113 16 14 $\frac{1}{2}$	153	16 15 12 $\frac{1}{2}$	352 $\frac{1}{2}$	130 12 3
Yarri	307 $\frac{1}{2}$	103 8 10 $\frac{1}{2}$	1,156	67 8 21 $\frac{1}{2}$	1,463 $\frac{1}{2}$	170 17 8
Yerilla	58	13 1 0	138	15 8 0	196	28 9 0
Youanmi	1,136 $\frac{1}{2}$	226 14 8 $\frac{1}{2}$	1,173	121 3 9 $\frac{1}{2}$	2,309 $\frac{1}{2}$	347 17 18 $\frac{1}{2}$
	17,914 $\frac{1}{2}$	7,570 5 6 $\frac{1}{2}$	..	..	40,138 $\frac{3}{4}$	9,517 19 18 $\frac{1}{2}$
Wiluna Lode	376 $\frac{1}{2}$	248 10 5 $\frac{1}{2}$	..	..	376 $\frac{1}{2}$	248 10 5 $\frac{1}{2}$
	18,290 $\frac{3}{4}$	7,818 15 12	22,224 $\frac{1}{4}$	1,947 14 12	40,515	9,766 10 0

* Tailings not purchased.

SCHEDULE 8.

ANNUAL REPORT, 1915.

Statement of Receipts and Expenditure for year ending 31st December, 1915 (excluding additions and Equipment).

Plant.	MILLING AND TIN.													
	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.	£ s. d.
Bamboo Creek	2,133½	150 13 11	1,029 12 8	475 1 9	1,655 8 4	15 6.19	102 14 4	150 15 3	1,908 17 11	17 10.70	1,315 9 11	12 3.96	..	593 8 0
Black Range	3,055½	165 14 11	585 0 8	561 3 6	1,311 19 1	8 7.05	134 2 6	142 0 4	1,588 1 11	10 4.72	1,494 6 1	9 9.38	..	93 15 10
Boogardie	3,246½	212 16 2	908 1 11	490 19 5	1,611 17 6	9 11.13	179 13 9	161 7 4	1,952 18 7	12 0.36	1,531 13 8	9 5.20	..	421 4 11
Burtville	188	17 5 4	111 6 1	60 11 3	189 2 8	20 1.44	45 0 5	58 16 6	292 19 7	31 1.99	99 13 11	10 7.27	..	193 5 8
Coolgardie	9,793½	279 16 3	982 17 11	1,549 2 9	2,811 16 11	5 8.90	251 19 3	430 5 0	3,494 1 2	7 1.60	4,183 14 10	8 6.52	689 13 8	..
Darlôt	89	42 14 2	104 12 8	64 18 1	212 4 11	4 9.21	10 0 0	15 3 3	237 8 2	5 4.00	56 5 2	12 7.70	..	181 3 0
Laverton	1,287	56 9 5	253 13 10	245 6 8	555 9 11	8 7.58	106 18 4	123 8 8	785 16 11	12 2.54	605 16 9	9 4.96	..	180 0 2
Leonora	669	89 5 8	212 16 1	100 14 4	402 16 1	12 0.50	34 17 5	78 5 11	515 19 5	15 5.08	354 1 6	10 7.00	..	161 17 11
Linden	1,034	101 12 8	219 0 8	171 15 7	492 8 11	9 6.28	168 16 0	63 15 8	725 0 7	14 0.26	588 4 8	11 4.51	..	136 15 11
Marble Bar	1,424½	132 3 2	611 17 8	353 3 3	1,097 4 1	15 4.84	34 3 3	101 6 10	1,232 14 2	17 3.67	866 5 9	12 1.94	..	366 8 5
Meekatharra	5,085½	291 11 6	971 15 11	798 15 4	2,062 2 9	8 1.29	79 0 0	243 6 10	2,384 9 8	9 4.51	1,808 15 2	7 1.34	..	575 14 6
Menzies	10 0 0	..	..	0 2 3	10 2 3	..	11 8 6	16 3 0	37 13 9	..	..	..	..	37 13 9
Mt. Egerton	1,008½	120 10 8	206 18 4	148 14 1	476 3 1	9 5.30	17 5 1	86 15 1	580 3 3	11 6.04	473 2 0	9 4.58	..	107 1 3
Mt. Ida	1,994	253 10 0	530 19 9	204 17 9	989 7 6	9 11.06	14 8 7	82 13 11	1,086 10 0	10 10.75	869 6 4	8 8.61	..	217 3 8
Mt. Keith	1,114	107 17 6	365 1 9	168 19 3	641 18 6	11 6.28	40 6 2	58 1 8	740 6 4	13 3.48	526 3 3	9 5.35	..	214 3 1
Mt. Sir Samuel	767	202 13 4	321 18 3	204 1 7	728 13 2	19 0.00	144 15 4	79 15 6	953 4 0	24 10.24	393 7 6	10 3.07	..	559 16 6
Mulline	965½	204 16 2	266 11 7	219 15 11	691 3 8	14 3.74	70 7 9	66 1 9	827 13 2	17 1.68	688 10 9	14 3.09	..	139 2 5
Mulwarrie	394	40 7 8	167 0 7	112 10 5	319 18 8	16 2.88	31 4 9	66 3 2	417 6 7	21 2.20	209 19 0	10 7.87	..	207 7 7
Nannine .. .. .	..	..	..	41 13 7	41 13 7	..	..	..	41 13 7	..	..	..	..	41 13 7
Niagara	1,810½	76 16 4	429 14 10	406 9 10	913 1 0	10 1.00	188 1 4	132 9 9	1,233 12 1	13 7.48	917 18 9	10 1.65	..	315 13 4
Norseman .. .. .	..	..	113 2 4	15 13 11	128 16 3	..	3 6 1	15 3 9	147 6 1	..	Dr. 4 4 0	..	..	151 10 1
Ora Banda	1,285½	133 19 11	211 16 6	74 8 6	420 4 11	6 6.45	28 4 0	58 6 7	506 15 6	7 10.60	303 5 10	4 8.61	..	203 9 8
Payne's Find	2,242	184 2 8	767 4 11	366 14 4	1,318 1 11	11 9.09	261 11 0	167 6 6	1,746 19 5	15 7.00	1,134 14 0	10 1.46	..	612 5 5
Pinjin .. .. .	..	..	4 17 1	10 3 5	15 0 6	..	..	..	15 0 6	..	22 4 3	..	7 3 9	..
Quinn's	2,327½	41 0 0	747 14 10	297 17 3	1,086 12 1	9 4.05	55 0 5	135 18 3	1,277 10 9	10 11.73	1,130 6 5	9 8.54	..	147 4 4
Ravelstone	1,330½	195 17 2	229 2 11	159 19 11	585 0 0	8 9.50	22 13 8	65 13 5	673 7 1	10 1.46	631 10 0	9 5.90	..	41 17 1
20-Mile Sandy .. .. .	..	..	69 8 8	3 7.3	72 15 11	..	..	2 11 3	75 7 2	..	0 18 0	..	..	74 9 2
Siberia	527½	62 7 11	116 10 0	47 3 7	226 1 6	8 6.88	19 2 6	50 2 1	295 6 1	11 2.41	242 7 4	9 2.30	..	52 18 9
Wiluna	1,009½	226 11 0	423 5 7	397 17 11	1,047 14 6	20 9.14	172 8 11	68 10 7	1,288 14 0	25 6.43	455 1 11	9 0.21	..	833 12 1
Yarri	1,794½	97 0 9	330 16 3	299 13 8	727 10 8	8 1.29	101 18 8	132 3 10	961 13 2	10 8.61	936 2 7	10 5.18	..	25 10 7
Yerilla	229	18 15 0	157 14 5	45 10 11	222 0 4	19 4.68	11 0 0	34 0 6	267 0 10	23 3.86	138 2 4	12 0.74	..	128 18 6
Youanmi	2,790	147 0 0	544 11 1	255 14 3	947 5 4	6 9.48	56 4 6	207 9 5	1,210 19 3	8 8.16	878 8 10	6 3.55	..	332 10 5
Mt. Jackson .. .. .	..	..	..	..	..	..	..	..	..	..	2 0 0	..	2 0 0	..
Tuckanarra .. .. .	..	..	..	..	..	..	..	..	..	..	6 12 6	..	6 12 6	..
Laverton Sales .. .. .	..	..	..	25 8 2	25 8 2	..	..	..	25 8 2	..	25 8 2	..	..	..
Linden Sales .. .. .	..	..	..	0 11 0	0 11 0	..	..	..	0 11 0	..	0 11 0	..	..	..

Menzies Sales .. ..	..	..	..	12 18 1	12 18 1	..	..	..	12 18 1	..	12 18 1	..	..	..
Ora Banda Sales .. ..	..	..	..	25 17 6	25 17 6	..	..	..	25 17 6	..	25 17 6	..	..	..
Pig Well Sales .. ..	..	..	..	96 4 7	96 4 7	..	..	..	96 4 7	..	96 4 7	..	..	..
Pinjin Sales .. ..	..	..	..	15 18 2	15 18 2	..	..	..	15 18 2	..	57 11 6	..	41 13 4	..
Payne's Find Sales .. ..	..	..	..	105 6 6	105 6 6	..	..	..	105 6 6	..	105 6 6	..	..	..
Siberia Sales .. ..	..	..	..	383 13 2	383 13 2	..	..	..	383 13 2	..	383 13 2	..	..	..
Wiluna Sales .. ..	..	..	..	136 1 3	136 1 3	..	..	..	136 1 3	..	136 1 3	..	..	..
Mt. Jackson .. ..	..	..	..	..	..	..	..	..	..	..	1 10 0	..	1 10 0	..
	49,595	3,653 9 3	11,995 5 9	9,154 17 8	24,803 12 8	10 0-02	2,385 4 1	3,082 8 6	30,304 9 1	12 2-47	23,705 6 9	9 6-69	748 13 3	7,347 15 7	
TIN PLANTS.															
Greenbushes—Bunbury End	1,212	173 3 11	75 3 0	66 11 8	314 18 7	5 2-35	34 0 1	46 13 5	395 12 1	6 6-33	211 16 11	3 5-92	..	183 15 2	
do. S.W.G. ..	555	173 3 11	65 8 0	42 9 8	281 1 7	10 1-53	15 1 11	10 1 9	306 5 3	11 0-43	140 0 9	5 0-55	..	166 4 6	
Wodgina .. ..	..	..	14 0 0	..	14 0 0	..	..	..	14 0 0	..	..	..	..	14 0 0
	51,362	4,009 17 1	12,149 16 9	9,264 1 3	25,423 15 1	9 10-77	2,445 14 7	3,150 16 9	31,020 6 5	12 0-93	24,057 4 5	9 4-39	748 13 3	7,711 15 3	

SCHEDULE 9.
ANNUAL REPORT, 1915.

Statement of Receipts and Expenditure for twelve months ending 31st December, 1915 (excluding Additions and Equipment).

Plant.	TAILINGS AND SLIMES.														
	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	2,016	93 13 5	380 7 11	53 3 11	276 5 7	803 10 10	7 11-64	..	136 13 3	940 4 1	9 3-91	962 19 6	9 6-62	22 15 5	..
Black Range	3,200	61 7 1	440 2 1	85 17 2	330 5 10	917 12 2	5 8-80	31 18 10	149 11 11	1,099 2 11	6 10-41	1,527 1 9	9 6-52	427 18 10	..
Boogardie	1,020	34 0 0	123 0 0	20 4 11	125 3 11	302 8 10	5 11-16	..	51 3 9	353 12 7	6 11-18	473 14 10	9 3-45	120 2 3	..
Burtville	1,230	96 12 8	181 15 0	33 9 3	174 1 10	485 18 9	7 10-81	29 6 4	62 5 10	577 10 11	9 4-68	380 19 2	6 2-32	..	196 11 9
Coolgardie	3,762	66 11 6	416 3 8	35 3 7	356 9 7	874 8 4	4 7-77	91 13 6	167 19 9	1,134 1 7	6 0-33	1,141 13 9	6 0-81	7 12 2	..
Laverton	3,195	161 19 6	355 11 10	61 1 0	257 15 0	836 7 4	5 2-80	3 2 6	168 10 2	1,008 0 0	6 3-69	1,572 11 3	9 10-10	564 11 3	..
Leonora	300	8 13 3	37 6 0	5 13 3	18 2 3	69 14 9	4 7-77	..	30 7 0	100 1 9	6 8-06	120 14 10	8 0-57	20 13 1	..
Linden	2,580	122 17 2	341 3 5	50 19 11	275 13 1	790 13 7	6 1-53	16 7 5	83 19 10	891 0 10	6 10-87	1,278 1 8	9 10-87	387 0 10	..
Meekatharra	2,160	60 16 4	262 18 6	23 11 8	169 6 0	516 12 6	4 9-38	..	80 9 4	597 1 10	5 6-33	865 2 8	8 0-12	268 0 10	..
Menzies	900	21 2 8	108 4 6	6 18 11	64 9 0	200 15 1	4 5-53	4 17 6	42 16 7	248 9 2	5 6-25	370 14 9	8 2-85	122 5 7	..
Mt. Keith	750	35 14 0	84 0 0	16 13 5	49 12 6	185 19 11	4 11-49	1 2 6	38 17 1	225 19 6	6 0-31	271 13 10	7 2-92	45 14 4	..
Mulline .. .. .	..	..	..	..	0 5 0	0 5 0	..	..	..	0 5 0	..	..	..	..	0 5 0
Mulwarrie	224	18 19 8	46 15 0	31 12 2	77 13 10	175 0 8	15 7-53	41 11 7	13 13 5	230 5 8	20 6-72	139 5 10	12 5-23	..	90 19 10
Niagara	2,128	36 4 6	288 3 4	27 19 0	130 4 7	482 11 5	4 6-40	..	72 11 2	555 2 7	5 2-59	903 0 6	8 5-83	347 17 11	..
Ora Banda	1,026	30 0 0	147 8 0	58 15 9	127 6 9	363 10 6	7 1-03	..	43 5 7	406 16 1	7 11-13	540 6 2	10 6-38	133 10 1	..
Payne's Find .. .. .	..	..	6 15 0	..	..	6 15 0	..	12 19 1	..	19 14 1	..	..	..	..	19 14 1
Quinn's	1,032	..	111 1 8	70 5 2	69 9 0	250 15 10	4 10-32	..	58 16 10	309 12 8	6 0-00	283 0 10	5 5-80	..	26 11 10
20-Mile Sandy .. .. .	..	..	..	..	..	..	..	..	8 14 7	8 14 7	..	..	..	..	8 14 7
Wiluna	140	30 0 0	56 1 8	28 19 11	24 18 10	140 0 5	20 0-02	..	26 13 2	166 13 7	23 9-72	93 9 2	13 4-20	..	73 4 5
Yarri	5,200	202 7 1	534 2 3	59 17 5	463 8 3	1,259 15 0	4 10-12	50 10 0	236 15 4	1,547 0 4	5 11-40	1,542 0 8	5 11-16	..	4 19 8
Yerilla	240	4 15 0	36 17 10	4 10 1	13 8 0	59 10 11	4 11-54	..	15 8 2	74 19 1	6 2-95	55 5 11	4 7-29	..	19 13 2
Youanme	784	32 0 0	120 9 5	14 3 8	42 1 2	208 14 3	5 3-88	78 13 3	24 16 6	312 4 0	7 11-56	326 2 6	12 8-25	13 18 6	..
	31,887	1,117 13 10	4,078 7 1	689 0 2	3,046 0 0	8,931 1 1	5 7-21	362 2 6	1,513 9 3	10,803 12 10	6 9-33	12,847 19 7	8 0-69	2,482 1 1	440 14 4
SLIMES.															
Mulwarrie	71½	28 12 7	52 12 10	5 12 6	39 18 1	126 16 0	35 5-61	2 5 0	3 17 10	132 18 10	37 2-23	33 1 2	9 2 95	..	99 17 8
Wiluna	3,383	89 16 10	802 9 10	301 5 0	614 14 7	1,808 6 3	10 8-28	48 13 5	172 13 10	2,029 13 6	6 11-97	1,667 7 6	9 10-20	..	362 6 0
	35,341½	1,236 3 3	4,933 9 9	995 17 8	3,700 12 8	10,866 3 4	6 1-77	413 0 11	1,690 0 11	12,969 5 2	7 4-05	14,548 8 3	8 2-78	2,482 1 1	902 18 0
Menzies Residues	13,230	195 14 4	1,025 7 0	159 17 1	762 3 8	2,143 2 1	3 2-85	16 7 4	593 11 2	2,753 0 7	4 1-94	2,753 0 7	4 1-94	..	..
Niagara Lubra Queen	864	7 0 0	113 12 0	25 11 5	67 4 7	213 8 0	4 11-25	..	49 12 4	263 0 4	6 1-05	306 4 4	7 1-05	43 4 0	..
	49,435½	1,438 17 7	6,072 8 9	1,181 6 2	4,530 0 11	13,222 13 5	..	429 8 3	2,333 4 5	15,985 6 1	..	17,607 13 2	..	2,525 5 1	902 18 0

SCHEDULE 10.

STATE BATTERIES.

Balance Sheet from Inception of Scheme to 31st December, 1915.

	£	s.	d.	£	s.	d.		£	s.	d.	£	s.	d.
To Capital Expenditure—								By Batteries Cyanide and Slimes Plants					
From General Loan Fund	265,958	1	11					Less Depreciation ..	246,749	1	3		
From Consolidated Revenue	91,981	1	8								111,190	2	4
				357,939	3	7		„ Stores			11,450	0	11
To Treasury					73,214	15	6	„ Sundry Debtors			6,593	12	10
„ Interest and Sinking Fund					182,319	4	9	„ Profit and Loss Account			488,451	15	6
„ Sundry Creditors					4,212	7	9						
				617,685	11	7					617,685	11	7

Profit and Loss Account.

	£	s.	d.	£	s.	d.		£	s.	d.	£	s.	d.
To Expenditure—								By Revenue	969,963	18	11		
Head Office and all Batteries	1,029,283	18	1					„ Loss on Working carried down	59,383	9	6		
„ Bad Debts	63	10	4						£1,029,347	8	5		
				1,029,347	8	5							
„ Loss on Working brought down	59,383	9	6										
„ Interest at 3½ per cent. and Sinking Fund at 1¼ per cent. on Capital Expenditure	182,319	4	9										
„ Depreciation	246,749	1	3					By Gross Loss			488,451	15	6
				488,451	15	6							

SCHEDULE 11.

Working Profit and Loss Account for Year ending 31st December, 1915.

	£	s.	d.	£	s.	d.		£	s.	d.	£	s.	d.
To Expenditure, as per attached statement—								By Revenue, as per Statement—					
„ Batteries and Tin Plants	31,020	6	5					„ Batteries and Tin Plant Charges ..	24,057	4	5		
„ Tailings and Slime Plants	15,985	6	1					„ Tailings and Slimes Charges	17,607	13	2		
				47,005	12	6					41,664	17	7
„ Loss on Working brought down	5,340	14	11					„ Loss on Working carried down			5,340	14	11
„ Additions and Equipment (paid from Revenue)	75	4	9								47,005	12	6
				5,415	19	8		„ Net Loss on Year's operations			£5,415	19	8

DIVISION IV.

ANNUAL PROGRESS REPORT

OF THE

GEOLOGICAL SURVEY

For the Year 1915,

WITH AN INDEX MAP.

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Map of Western Australia, showing the four miles per inch series of Geological Sketch Maps, etc., issued since 1896.

Annual Progress Report of the Geological Survey for the Year 1915.

This report contains a summary of the operations of the Geological Survey during the calendar year 1915; these were carried out more or less on the lines of previous years. When viewed broadly, it may be said that the time of the staff has been pretty well divided between work in connection with (a) mining, (b) agriculture, (c) water supply, (d) general geological surveys, (e) engineering questions, (f) chemical and physical research work relating to mineral products, and (g) petrological and palaeontological investigations.

THE STAFF.

While the work of the year under review has been carried out by eighteen classified officers, the effects of the war have been felt to such an extent as to materially dislocate the operations of the survey.

Mr. H. W. B. Talbot, field geologist, was absent on military duty, in the capacity of Assistant Censor, during the whole of the year. This officer held the rank of Captain.

Mr. A. J. Robertson, Assistant Mineralogist and Chemist, joined the Expeditionary Forces in April, as Lieutenant in the 11th Battalion, and met his death by Turkish bullets while in action at the Dardanelles on the 6th August, within a quarter of an hour of taking up his position in the trenches. Lieut. Robertson was educated at Saint Andrew's College, Victoria, from which he proceeded to the Melbourne University where he spent five years, and obtained the degree of Master of Science and Bachelor of Engineering. While at the University he won the Final Honour Scholarship and the Kernot Research Scholarship in Geology, and subsequently he was engaged on post-graduate geological research work, along petrological lines. Quitting the University, he spent a year in Queensland, acting as lecturer in Science at the Brisbane Technical College, prior to joining the Staff of the Western Australian Geological Survey. By his early death the Survey has lost the services of an unusually promising officer, and one whose scientific work was ultimately destined to take a prominent place in Western Australia.

Mr. J. D. Glover, junior clerk and typist since 2nd November, 1914, joined the Signalling Corps of the 11th Battalion in September, and duly proceeded to the front.

The Laboratory Assistant, Mr. A. V. Smith, who first entered the Survey in 1906, also responded to his country's call, and joined the Expeditionary Forces in October last.

The Department also suffered the loss of Mr. A. Butler, who as a trooper in the 10th Light Horse, met his death at Gallipoli in the celebrated charge of the 7th of August. Mr. Butler first joined the Survey as general camp hand in the spring of 1904; he accom-

panied me during all the field seasons spent in the north, and subsequently served with most of the senior officers in their field operations, chiefly in the exploratory work carried on. In his special sphere of labour, Mr. Butler has rendered signal service to geological science in Western Australia, and by his death the Survey has lost the services of one, whom it will be difficult to replace, for in addition to his special bush knowledge he possessed a conscientious sense of duty and a very high character.

OFFICE WORK.

Administrative duties have, as usual during recent years, left me with few opportunities for carrying out systematic investigations in the field or at headquarters. The return hereunder shows in tabular form the volume of editorial work found necessary and carried out during 1915, with the assistance of the Clerk-in-charge and Librarian.

Table showing editorial work, 1915.

Report.	Pages.		Figures.	Maps and Plates.
	M/S.	Type.		
Bulletin LVIII. ..	67	59	..	9
" LX. ..	325	215	..	..
" LXII. ..	82	66	19	6
" LXIII. ..	233	189	31	19
" LXIV. ..	209	165	35	17
" LXV. ..	75	54	..	2
" LXVI. ..	88	38	17	9
Annual Report, 1914	142	41	..	1
Total ..	1,221	827	102	63

No inconsiderable portion of my time, when at headquarters, has been taken up in the ever increasing routine work of imparting miscellaneous information to the public, personally and by correspondence, chiefly in regard to the applied side of geology. This labour has been considerably lightened, owing to the assistance which the two resident scientific officers, Messrs. Simpson and Farquharson, have been able to render.

The housing of the Geological Survey has, as has been repeatedly pointed out in previous reports, become quite inadequate to meet growing requirements, and it has become more than ever necessary to take into serious consideration the broad question of office, laboratory and museum accommodation for the whole of the staff and the Survey's collections. The latter, which are required for ready reference by the staff in the ordinary course of their official duties, are under present conditions packed away and stored in

three separate buildings. Grave inconvenience exists in the present arrangement of having portions of the staff and collections in separate buildings. The cramped quarters provided for the field staff, where their reports have to be written, plans and sections drawn, specimens examined, and other incidental duties performed, is such that each officer can only be provided with a floor space, inclusive of furniture, of about seven by seven feet, or having regard to the height of the rooms, 392 cubic feet. This want of accommodation has recently been to a slight extent overcome by two rooms in the unoccupied portion of the Museum being placed at our disposal. The absolutely inadequate accommodation is a matter which has been brought under the notice of the Government during a number of years past, and until definite steps are taken in this direction the work of the Survey cannot be efficiently and effectively carried out.

FIELD WORK.

The time of the field staff has been pretty well equally divided between reconnaissance and detailed field work.

The systematic geological surveys, the results of which are issued on the scale of four miles to the inch, have been carried on during the year; the attached general map shows the present condition thereof, and the areas covered by geological maps on the scale of four miles to the inch, and district maps are now available for approximately one-third of the State. In addition to these, 124 maps of individual centres have already been published, and a large number are in hand.

The attached table shows the distribution of the field work, and the officers engaged in the different districts during the year under review.

Table showing the Distribution of Field Work for the Year 1915.

Goldfield or Land Division.	H. P. Woodward.		T. Blatchford.		J. T. Jutson.		E. de C. Clarke.		F. R. Feldtmann.		C. S. Honman.	
	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.	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.
Murchison .. .. .	..	..	..	..	..	..	48	13.1	..	..	..	..
North Coolgardie .. .. .	..	..	..	..	256	70.1	..	..	..	..	98	26.8
North-East Coolgardie .. .. .	..	..	..	..	..	..	..	..	61	16.7	..	..
East Coolgardie .. .. .	..	..	..	..	..	..	..	..	23	6.3	..	..
Yilgarn .. .. .	..	..	270	73.9	..	..	..	..	..	..	25	6.9
Dundas .. .. .	..	..	7	1.9	..	..	..	..	..	..	..	..
Phillips River .. .. .	..	..	32	8.8	..	..	..	..	..	..	..	..
South-West Division	57	15.6	..	..	..	..	3	.8	2	.5	4	1.1
Totals	57	15.6	309	84.6	256	70.1	51	13.9	86	23.5	127	34.8

Despite the fact that administrative duties occupied a very considerable portion of my time, opportunity was taken to carry out some field work, chiefly in the Yalgoo Goldfield, about which least is known officially.

Between the 23rd February and the 16th March I spent in inspection work with Mr. Jutson on the North Coolgardie Goldfield. The interval between the 20th and the 27th of May was spent in the Yalgoo Goldfield, in the country to the north of Yowergabbie. From the 17th of June to the 5th of July, the 23rd of August to the 16th of September, and the 1st of November to the 10th of December were spent in outlying portions of the Yalgoo Field, special attention being paid to the geological structure of the area near Mount Singleton (Ninghan) occupied by the auriferous conglomerates at Bonnie Venture.

The auriferous conglomerates are situated in a belt of rugged country, lying to the south of Ninghan (Mount Singleton), of which Yandhanoo Hill forms the best summit. The beds comprise grits and conglomerates of as yet undetermined geological age; these have been subject to a considerable amount of folding and faulting. Associated with the beds is a narrow band of tough fine-grained black blocky andalusite slate, resembling at first sight a porphyritic rock; the rock in all probability owes its origin to the alteration induced by the underground mass of granite, which does not reach the surface in the immediate neighbourhood, but which outcrops about a mile to the south. The conglomerates and associates outcrop over a length of about a mile; the beds are vertical and strike generally north and south. The two beds

upon which mining operations have been concentrated occupy the centre of the area. The westernmost conglomerate outcrops over a length of about 700 feet, and has been opened out by five shafts put down to varying depths; the easternmost lies about four chains distant, and one shaft has been put down upon it. There seem sound reasons for believing the conglomerates to be merely the exposed portions of the limb of an acute anticlinal fold, which, however, cannot have any great horizontal extent. No ore has been milled, though it is understood that a trial crushing is to be put through the nearest battery at an early date. The importance of the occurrence of these auriferous conglomerates lies in the fact that they point to the possibility of there being other areas of ancient sediments which are also gold-bearing.

In close proximity to these conglomerates are two small wolfram lodes.

The tungsten ore (wolfram) occurs in the neighbourhood of Yandhanoo Hill, a few miles to the south of Mount Singleton, in scattered and irregular patches principally in quartz veins, though occasionally in the adjacent decomposed country rock. The thickness of these tungsten-bearing quartz veins varies from about an inch up to one foot or eighteen inches.

None of the veins have as yet been opened up to any extent, and it is at present impossible to even approximately estimate the ore contents of any of them. Official assays showed the wolfram to be very high grade and to be quite free from all deleterious associates. Only a small quantity of wolfram, however, has been turned out from this locality.

It seems more than likely that the wolfram-bearing quartz veins are genetically connected with that large mass of granite lying to the south and east, which penetrates the rocks in the vicinity.

While in the neighbourhood opportunity was taken to visit Mount Gibson, which forms one of the most conspicuous hills in the vicinity. The hill consisted of what has usually been termed a quartz-hematite-schist, in which thin veins of iron oxide alternating with jasper and other siliceous bands occur. Some of the bands of iron ore reach considerable size.* A very brief and preliminary inspection was, owing to the lateness of the season and other causes, all that was found possible. Observations were of necessity somewhat restricted, hence no attempt at a broad geological study of the ore deposits could be undertaken. This, however, will, it is hoped, be undertaken during the course of the next field season. With the exception of the main mass of Mount Gibson, the obviously high percentage of silica which the ores contain render them of little value, as sources of iron, unless after concentration. The geographical situation of the deposit places well-nigh insuperable difficulties in the way of profitable exploitation under present conditions.

Owing to the cessation of the production of the mineral magnesite by the belligerent nations, the question of the adequacy of any known local deposits to make the State industrially independent becomes a factor of almost national importance.

Magnesite is known to occur in many parts of Western Australia, and has a fairly wide distribution, chiefly, however, in the form of boulders occurring on the surface. So far as is at present known, deposits of magnesite which may be capable of development on commercial lines are those of the Phillips River, Siberia, and Bulong. The magnesite from Siberia is of great purity and well above the average of good commercial magnesite, whilst that from Phillips River, owing to its high grade was found to answer very well for the purpose to which it was put. The occurrence of magnesite at Bulong has been known to the Department since 1897, but it is only quite recently that there has been any serious attempts at its exploitation. The analyses made in the Survey Laboratory show it to be of an excellent grade of commercial magnesite. In view of the importance of giving special attention to what may be called latent natural mineral resources, geological investigations in the area occupied by the magnesite-bearing rocks in the vicinity of Bulong were undertaken with the view of determining the mode of occurrence, extent, distribution, and probable value of the deposits.

Mr. Feldtmann, to whom this duty was entrusted, devoted about two months to work in the field. As a result of the survey it appears that in their geological relationships the magnesite deposits conform to similar occurrences of the mineral in other parts of the world. At Bulong the magnesite is found in a serpentine rock, which forms a mass about two miles in length and averaging 18 chains in width, thus covering an area of about 300 acres. There are, in addition, some other smaller areas occupied by magnesite-bearing rocks, the largest covering about 80 acres. The serpentinised rock is traversed by a series of short irregular veins of magnesite of varying size, which in certain parts of the mass, however, are sufficiently plentiful to form a stockwork. A surface coating of a magnesite cement is exposed and covers

an area of about 20 acres, near the northern end of the principal mass of serpentine. The result of the field observations demonstrates that there is a large quantity of high-grade magnesite available in the deposits exposed near Bulong. A full and detailed report, illustrated with plans, sections, photographs, etc., will be prepared in due course, and form a separate Bulletin.

It has been generally understood that as far as possible the sites for store water reservoirs with high dams should not be located in those districts where there has been any great dynamic disturbance, as the crevices, clefts, fissures, etc., formed by earth movements may serve the purpose of gathering the water, and forming channels for carrying it off beneath the embankment; thus possibly endangering the safety of the structure. In this connection the Department of Public Works sought the advice of the Geological Survey in connection with the site of No. 2 Dam on the Canning River. The country in the vicinity of the site of the dam was found to be made up of granitic rocks intersected by dykes of dolerite. A series of bores was put down, having for their object the testing of the depth of superficial material, the nature of the rocks at different points, the degree and depth of weathering, and the occurrence, or otherwise, of faulting, shearing, or jointing in the rocks at possible points of weakness. The results of these observations showed the cover of superficial detritus to be not great, the rocks to be fresh, hard and tough, and unlikely to result in any differential settlement of the foundations.

During the year, one of the senior members of the Field Staff, Mr. T. Blatchford, was attached as consulting geologist, to a large prospecting party organised by Mr. McIntyre of Southern Cross, to test the country in the southern portion of the Yilgarn Goldfield, as far as the Bremer Range. To the party was added an assayer and outfit, and placed under the control of the geologist. No payable reefs or lodges were met with during the time the party was in the field.

The despatch of this party was a first attempt to search for new deposits on more or less systematic lines, and ample time was afforded for demonstrating not only the advantages but also the disadvantages of the scheme. If in some respects the methods did not quite come up to the *beau ideal* of what such should be, there is no reason why any of the defects could not be rectified in the case of future prospecting parties sent out.

Representation having been made to the Department with regard to "indications of petroleum," said to have been found near Wonnerup in the South-West Division, an investigation was made by Mr. Clarke, an officer who has considerable experience in the domain of oil-field geology. It was not found possible either by work in the field or by the results of the laboratory tests at the hands of Mr. Simpson on samples collected by Mr. Clarke, to confirm the actuality of petroleum (see pages 125 and 126).

Examination of the records of the few bores put down in previous years in the search for water or coal in the neighbourhood, failed to yield any evidence that the sedimentary beds near Busselton and Wonnerup contain appreciable amounts of petroleum,

* An analysis made in the Survey Laboratory since this was written shows the ore to be of very high grade and well suited for steel-making by the acid process.

but the records are too scanty to enable any other conclusion to be arrived at than that the finding of petroleum by boring in the locality is unlikely.

H. P. Woodward, Assistant Government Geologist.

A considerable portion of the year was devoted by Mr. Woodward to assisting in administration and acting as deputy during my frequent absences from head-quarters on field duty.

Financial and other considerations precluded very much field work in the South-West Division being carried out, hence some portion of the year had of necessity to be devoted to the preparation of maps, plans, and sections on those portions of the area of which the field work had been completed.

In the month of April Mr. Woodward, at the request and in the interests of the Department of Agriculture and Industries, paid a visit to Dongara to report upon the foraminiferal calcareous sand dunes, which were found to be admirably suited for agricultural purposes.

Opportunity was taken by Mr. Woodward while in the neighbourhood, to visit Mt. Hill to examine the reputed glacial moraine, the existence of which had been reported by W. D. Campbell in 1909 (Bull. 38). The evidence showed it to be nothing more than a talus of stony débris, made up of rocks identical with those which cap the hills and ridges in the vicinity.

The month of May found Mr. Woodward at Denmark, examining certain limestone deposits in the interests of the Department of Agriculture, and advising that branch of the service regarding proposals for financial assistance in regard thereto, made by the Settlers' Association.

A second visit was paid to Dongara in August, with the Agricultural Commissioners, and afterwards the northern extension of the deposits in the direction of Geraldton was examined; with the exception of those at Dongara and those situated near Point Moore, on the south side of Champion Bay, these deposits proved to contain a percentage of silica too large to be of material value for purposes of agriculture.

In September, Mr. Woodward accompanied the Director of the School of Mines to Coolgardie, in regard to the removal to head-quarters of the mineral collection and show cases for departmental use. An inspection showed that the cases were such as could be utilised for exhibition purposes whenever required, and arrangements were made for their removal to Perth.

October found Mr. Woodward mapping the Darling fault scarp, and the areal distribution of the brick clay shales, which occur on its western side; these were traced from Gosnells to a point a little to the south of Mundijong.

While engaged upon this piece of work, the old mines at Armadale, Mundijong, Jarrahdale Brook, Serpentine, and North Dandalup were examined.

Later on Mr. Woodward visited the Capel River limestone deposits in the interests of the Department of Agriculture; and also examined and sampled the calcareous sand dunes occurring between Bunbury and Busselton; these deposits owing to the low percentage of lime proved to be valueless for agricultural purposes.

Mr. Woodward, having completed his field work about the end of November, wrote up the necessary reports, and thereafter took his annual recreation leave.

Mr. Woodward was engaged 57 working days in the field.

T. Blatchford, Assistant Geologist.

Having completed the survey of Westonia and the surrounding districts, the detailed field work in the belt of greenstones and associates extending northwards from Southern Cross was taken in hand and continued until June. The greater part of July was devoted to an examination of the new gold discovery near Mid-Ironcap, now known as Forrestania, about 100 miles south of Southern Cross.

On returning to Perth in September, Mr. Blatchford received instructions to accompany the McIntyre prospecting party as consulting geologist, a work which occupied him until the 18th of December, when the party was disbanded.

Mr. Blatchford spent in all 309 days in the field.

J. T. Jutson, Field Geologist.

Mr. Jutson's field work during the year embraced the detailed survey of the Niagara, Kookynie, and Tampa mining centres, which occupied this officer's time up to the 5th of August, with but a short interruption in February and March, when engaged on inspection work with myself. On the 6th of August Mr. Jutson left for Yilgangi, where and in its vicinity he was engaged until the 16th of the month. The remaining portion of the month was devoted to various details in connection with field work, and in making the arrangements for and the holding of a meeting of prospectors at Kookynie on the 30th of August, at which the results of the survey were fully explained.

On the 1st of September, Mr. Honman arrived at Niagara, to continue the survey of the mineral belts to the eastwards, and up to the 10th of the month Mr. Jutson's time was occupied in pointing out to him, in the field, the salient geological features of the mining centres and of the surrounding country.

Mr. Jutson returned to head-quarters on the 13th of September, after having spent 256 days in the field.

E. de C. Clarke, Field Geologist.

Practically the whole of January was devoted to field work in the Meekatharra District, the balance of the year, with the exception of the period between February the 3rd and April 11th spent on annual leave, was occupied on the multifarious work in connection with the preparation of the official report upon the geology, ore deposits, and mines of Meekatharra. This work, however, was subject to interruption in June and July, owing to Mr. Clarke's services being required in the South-West in connection with the reported occurrence of mineral oil near Wonnerup.

The period intervening between the 29th of November and the 19th of December, was spent in Meekatharra in clearing up one or two points which arose during the course of the preparation of the report on the field.

Mr. Clarke spent 51 days in the field.

F. R. Feldtmann, Field Geologist.

The months of January and February, with the exception of a few short visits to the site of the Caning River dam, were devoted by Mr. Feldtmann to work in connection with reports appearing in Bulletin

64, and in the examination of bore cores from the above dam site.

The intervening period up to the 28th April was spent in the preparation of maps and diagrams for the report on the North End of Kalgoorlie.

Mr. Feldtmann spent the time between the 30th of April and the 16th of May in field work at Kalgoorlie, proceeding afterwards to Bulong, where up to the 20th of July a special geological survey of the country occupied by the magnesite deposits was made. A few days in June were spent at Kalgoorlie in connection with the alienation of certain areas at the North end.

Returning to Perth on the 22nd of July, the balance of the year was spent in the preparation of reports on the Bulong magnesite deposits and the final report on the North End of Kalgoorlie.

In all Mr. Feldtmann spent 86 days in the field.

C. S. Honman, Field Geologist.

Up to the 24th of January Mr. Honman was engaged in field work in the Mt. Jackson and Koolyanobbing Districts. Four days of May and June were spent at North Dandalup reporting on the occurrence of gold in that locality.

From the 20th of September to the 7th of December found this officer on the North Coolgardie Goldfield, employed on the Geological Survey of the Yerilla District.

The total number of days spent in the field by Mr. Honman amounted to 127.

PRINCIPAL RESULTS OF THE YEAR'S OPERATIONS.

THE BUILDING STONES OF WESTERN AUSTRALIA.

(H. P. WOODWARD.)

In this State some of the most magnificent building stones exist, possessing both beauty and durability; few of these, however, have as yet been utilised owing to the fact that in a new land where cities are only in their infancy, the demand is not sufficient to warrant the expense of opening up quarry-faces to the fresh rock in the hard crystalline series. The consequence has been that until quite recent years, it has been found to be more economical to import the limited quantity of stone required for ornamental purposes in building than to incur the heavy expenditure which would be involved in opening up a new quarry, while, as a rule, in the main portion of the structure either brick or the soft coastal sandstones were used.

A few years ago, however, the Government opened certain quarries to supply itself with granite for certain public buildings which were at the time under construction, and this stone proved so highly satisfactory in spite of the fact that it was slightly weathered, that it has since been largely used. An excellent free-stone was also discovered at Donnybrook and several quarries opened, from which the stone is in considerable demand; several splendid piles of buildings have been erected with it.

In several of the goldfields and rural towns some very substantial and handsome buildings have

been erected with local freestone, which consists mostly of reconstructed rock material, but which answers the purpose well, as the blocks case-harden on exposure to the weather, while the cost of quarrying and dressing such material is insignificant compared with that of granite.

The building stones of this State come under four main heads or classes:—

- (A) Crystalline, consisting of granite.
- (B) Sedimentary, consisting of sandstone or slate.
- (C) Reconstructed rock, either argillaceous or siliceous.
- (D) Aeolian, consisting of calcareous sandstone.

(A.) The granites vary from fine-grained through coarse to very coarse and more or less porphyritic rocks, and in colour from grayish white to gray, all taking a fairly high polish.

(1.) The Boya Granite:—

This quarry is situated 14 miles from Perth, on the Darling Range Scarp, at a height of 266 feet above the sea level; it is easily worked, as the railway waggons can run into the face. In quantity, this rock may be said to be unlimited. It is a grayish-white medium-grained granite with chloritic biotite scales. The feldspars are orthoclase and microcline chiefly; the former usually considerably kaolinised, but occasionally micaicised; there are some epidote grains associated with the biotite aggregates. The kaolinisation and the presence of secondary minerals is due to the fact that the face has not yet been sufficiently advanced to encounter absolutely fresh rock.

(2.) The Mahogany Creek Granite:—

This quarry is situated upon the Eastern Railway line, 19 miles from Perth, at an elevation of 677 feet above the sea level. It is a coarse-grained grayish-white orthoclase-microcline-biotite granite, with orthoclase much kaolinised; plagioclase is also present. This quarry is still working in the area of the rock that has been subjected to considerable weathering.

(3.) The Meckering Granite:—

This quarry is situated upon the Eastern Railway line, 89 miles from Perth, and at an elevation of 636 feet above sea level. It is a chloritic-biotite-muscovite granite of very fine grain and of a grayish-white colour. The feldspars, which are chiefly orthoclase and microcline, are kaolinised and micaicised. There is an unlimited quantity of this rock, the quality of which will improve as the quarry is further opened up.

(4.) The Kellerberrin Granite:—

This quarry is situated upon the Eastern Railway line, at a distance of 133 miles from Perth, at an elevation of 807 feet above sea level. It is a very coarse-grained, grayish rock with rather large, more or less, porphyritic crystals of orthoclase and microcline, and with flakes of brown biotite. The rock is comparatively fresh and exists in practically unlimited quantities.

(5.) The Roelands Granite:—

This quarry, which was opened with the object of supplying stone for the construction of the Bunbury Harbour works, is situated upon the South-Western Railway line, 102 miles from Perth, and is 100 feet above the sea level. The stone is in prac-

tically unlimited quantity, while a branch line runs into the face, which has penetrated the Darling Range Scarp.

It is a coarse, gray biotite-microcline granite, with large, almost pseudo-crystal feldspars; the latter are in general kaolinised and micacised, owing to weathering action having proceeded as far as the face has yet been opened.

(B.) The sedimentary series consists of (a) Donnybrook Sandstone, (b) Stirling Range Slates.

(a) This is situated on the Bunbury-Bridgetown Railway line 132 miles from Perth and 208 feet above the sea level. A number of quarries have been opened, in which the stone varies considerably in quality, but it is very durable and can all be sawn into blocks and lends itself to carving. The geological age of the bed from which it is obtained has been provisionally classed as Permo-Carboniferous.

It is a fine-grained feldspathic sandstone, with kaolinitic cement, varying in colour from white through cream to yellow and brick-red, also sometimes variegated.

(b.) The Stirling Range slate quarries are situated on the Great Southern Railway line, near Cranbrook, 274 miles from Perth and 67 miles from Albany at a height of about 900 feet above the sea level. It is a massive slate of a brown chocolate colour, cleaving into large slabs, but it is not suitable for roofing slate. The geological age of these

beds has not been determined, but they have been provisionally classed as Silurian.

(C.) The reconstructed rocks, which have been used in many localities, where they are found *in situ*, are usually fine grained, compact, and completely kaolinised clayey rocks, which vary in colour from almost pure white to deep terra cotta. These, though soft when fresh from the quarry, develop a surface on exposure, which appears to be fairly resistant to absorptive agencies. Of this character are the Moora banded clay shale and the rocks from Walsh's quarry at Kalgoorlie.

(D.) These consist of Tertiary coastal calcareous sandstones, which are largely used for building purposes, both in the capital and in the port, where many fine piles of building have been erected with it, but its use since the advent of Donnybrook stone has been confined principally to foundations for brick work or villas. It is a soft free-stone of a creamy colour, which can be readily shaped into blocks with an axe, but does not lend itself, as a rule, to ornamental work, owing to its variable composition and pipy character.

The best stone of this class was quarried upon Rottneest Island, which lies a few miles off the coast at Fremantle, but numerous quarries have and are still being worked both north and south of the latter place.

The existing information regarding the building stones of Western Australia has been thrown into a tabular form to facilitate reference.

ACID IGNEOUS ROCKS.

Building Stone.	Locality.	Character.	Quantity.	Examples.
Granite (grayish-white)	Mahogany Creek, 19 miles from Perth, on Smith's Mill Railway Line	Coarse-grained orthoclase-biotite granite sometimes much kaolinised	Unlimited ..	Basement, ground and 1st floor of new G.P.O., Perth, rock-faced and fine axed work. A beautiful stone, taking a high polish.
Do. do.	Boya, 14 miles from Perth, on Smith's Mill Railway Line	Medium-grained orthoclase-microcline biotite granite with chloritic-biotite scales considerably kaolinised but occasionally micacised, while epidote grains are associated with the biotite aggregates. Appearance closely resembles that from Mahogany Creek	do. ..	No buildings. Used exclusively for granite cubes for street pitching and concrete work. Fremantle Breakwater.
Do. do.	Meckering, 89 miles from Perth, on the Eastern Railway Line	Fine-grained chloritic-biotite muscovite granite; the feldspars are orthoclase and microcline which are kaolinised and micacised. Weight per cub. ft., 175.7 lbs.	do. ..	Basement of Art Gallery and Museum and Supreme Court Buildings, where it stands well although looking rusty in places and rather lacking in appearance.
Granite (grayish) ..	Kellerberrin, 133 miles from Perth, on the Eastern Railway Line	Coarse-grained orthoclase-microcline granite with flakes of brown biotite. More or less porphyritic. Weight per cub. ft., 171lbs.	do. ..	New Public Library. Has a good appearance and takes a high polish.
Granite	Roelands, 100 miles from Perth, on the South - Western Railway Line	Coarse-grained biotite microcline granite with large pseudo-crystals of feldspar, the latter being generally kaolinised and micacised.	do. ..	Bunbury Breakwater

BASIC IGNEOUS ROCKS.

Epidiorite and partially amphibolised dolerite	Gooseberry Hill, Greenmount, and Parkerville, 13 to 19 miles from Perth	Fine-grained and consisting of hornblende, chlorite, augite, pyrites in varying amounts. Very hard and fairly fresh	Occurs in large dykes	Used so far for road-making and pitching.
Basalt (grayish-black)	Bunbury	Very fine-grained sometimes porphyritic black rock, the porphyritic variety showing large feldspar crystals	Sheet flow or sill of considerable extent.	Used for road-making and steps to local buildings.

SEDIMENTARY ROCKS.

Building Stone.	Locality.	Character.	Quantity.	Examples.
Slate	Bridgetown, 174 miles from Perth	Almost flinty, greenish and greenish-white rock of very imperfect fissility	Unknown ..	Not used so far. Un-suitable for roofing.
Slate (brown-chocolate) Silurian ?	Stirling Range, 274 miles from Perth	Massive slate, cleaving into large slabs. Not suitable for roofing owing to the imperfect nature of the fissility	do. ..	Not used so far.
Slate (gray-blue to chocolate) Permo-Carboniferous ?	Armadale, Beenup, and Cardup, 19 to 25 miles from Perth, on South-Western Railway Line	Massive slate, cleaving into large slabs. Not suitable for roofing	do. ..	Used for pavements but principally for dry-pressed bricks.
Sandstone, (white through cream to yellow and brick-red, also sometimes variegated) Permo-Carboniferous ?	Donnybrook, 132 miles from Perth on the Bunbury-Bridgetown Railway Line	Fine-grained felspathic sandstone with kaolinic cement. An excellent freestone suitable for rock-faced, dressed, and all sorts of tooled and carved work. Weight per cub. ft., 129 to 144lbs.	Large number of quarries over a large area but quantity unknown	Upper portion of Parliament House; Supreme Court; Police Court Station and Quarters; Museum, Art Gallery, and Library; A.M.P. Buildings; Millar's Jarrah Forests, Ltd.; G.P.O., Perth; Customs House, Fremantle; Dalgety's Buildings; Haynes, Robinson, & Cox; Telephone Exchange; Bunbury, Collie and Midland Junction Court Houses; Government Stores, Perth; Public Health Offices, Perth; Perth Technical School; Fremantle Railway Station; Guildford Grammar School Chapel (sculpture and carved work); Tower and Spire of St. John's Church, Fremantle.
Calcareous Sandstone, (creamy white) late Tertiary ?	Rottneet Island, 10 miles off Fremantle	A fine-grained freestone in which the sand grains are cemented by calcareous matter. Suitable for rock-faced, dressed, and, when selected, for tooled and carved work. Weight per cub. ft., 142-5lbs.	In large quantity, but not now worked owing to the superiority of the Donnybrook stone	Employed in first section of Museum Buildings and in Parliament Houses.
Calcareous Sandstone, (creamy white) late Tertiary ?	Cottesloe and Fremantle	A freestone of variable texture in which the sand grains are united by calcareous matter. Suitable for rock-faced work but not for dressing or carving.	Extensive deposits all along the coast	Government House Ballroom, and employed extensively in the older buildings of Perth and Fremantle, but now only used for foundations.
SEDIMENTS.				
Clay Rock (white to terra-cotta), Age ?	Walsh's Quarry, Kalgoorlie	Fine-grained compact kaolinised clay rock. Soft when freshly quarried but develops a resistant surface on exposure	Unknown ..	Public Buildings, Kalgoorlie.
Clay-shale, (banded brown and white) Permo-Carboniferous ?	Moora, 108 miles from Perth, on Midland Railway	Fine-grained compact kaolinised shale. Fairly resistant to absorption and developing a surface on exposure. Can be worked and moulded to suit all building requirements	do. ..	Court House, Post Office, and Police Buildings, Moora.
Diatomaceous Rock, (French-gray) Cretaceous ?	Gingin and Dandaragan, 40 to 80 miles north of Perth, on Midland Railway	A very fine-grained rock of the siliceous shells of diatoms with a little kaolin cementing material. It is easily worked and moulded, being soft when freshly quarried, case hardens on exposure to the weather	Unknown ..	School-house and Post Office at Dandaragan and private residences at Gingin.

Stone of a similar character has been used both at Coolgardie and Yalgoo in Public Buildings, but in both places it is of a red colour and looks exceedingly well when walled, but is not a good weathering material. At Mullewa, however, there is a supply of a similar stone which gives promise of being good for building purposes.

THE LIMESTONE DEPOSITS NEAR DENMARK.

(H. P. WOODWARD.)

At the request of the Agricultural Department a visit was paid to Denmark with the object of examining and reporting upon a limestone deposit situated in that locality.

The limestone was found to be situated upon a promontory upon the western side of the mouth of Wilson's Inlet.

This promontory is formed by high calcareous sand hills resting upon a foundation of granite, which latter rock outcrops along the beach and also rises into a bold prominence known as Mt. Hallowell (2030 feet) about one mile to the northward. This ridge, where seen in section, may be seen to possess the usual false-bedded structure so characteristic of dune origin, while its antiquity would seem to be demonstrated by the occurrence of well-defined and fairly thick beds of "cap-stone" which are exposed both in the cliff face upon the seaward side and also in the side of the deep valley which lies between the ridge and Mt. Hallowell. This "cap-stone" clearly indicates an old surface, while its thickness denotes that it must have existed as such for a considerable period. The main bed of "cap-stone" is buried beneath some 100 to 150 feet of incoherent sand yielding only a trace of carbonate of lime representing at some past time a sand dune piled upon the lower level limestone surface. Beneath the "cap-stone" layers are beds of calcareous sandstone containing little carbonate of lime, while the hard beds themselves vary considerably in composition, while samples taken from the outcrops are apt to be misleading owing to their containing a large proportion of the very high-grade re-deposited limestone crust.

This deposit is very similar to that worked near Albany, where the lime-burners have abandoned all idea of working the deposits in the face owing to their low value, and now confine themselves to collecting outcrop stone which is carted by drays to the kilns, and this method increases the cost so materially that the Fremantle article can compete with the local in spite of the haulage charges.

Even should the Denmark deposit prove to be of good quality beneath the hill, it would be impracticable to work this owing to the character of the over-burden, for as soon as a face was opened it would be buried with sand from above.

It will seem from the above that although this deposit is of considerable extent and of undoubted high grade in places it would not lend itself to working upon economic lines, while its situation would render transport costly. The Government, therefore, could not be advised to entertain the idea of starting lime works in this locality.

I was, however, informed by the secretary of the Settlers' Association, that they had not suggested such a course to the Government, but wanted assistance in order to enable them to work the deposits upon co-operative lines, their scheme, roughly outlined, being that:

First, the Government should allow them to remove what stone they require from Plantagenet reserve 14528/2114 situated at the mouth of Wilson's Inlet;

Second, that the Government supply them with about half a mile of the old rails which have been

removed from some of the timber tracks and which are only rusting away;

Third, and shall further assist them by advancing the sum of £200 to be expended upon the construction of the tram line, the erection of a landing stage both at the estuary mouth and at Denmark, and also the purchase and repair of an old barge which formerly belonged to the timber company.

They propose to raise the stone and transport it by tram to the inlet, then by barge to Denmark, where it would be burned on the ground where fuel is plentiful.

This scheme, of course, wants amending, as very few farmers can burn lime in this crude manner, particularly hard cap-stone, but upon the whole it seems a very reasonable suggestion, and was recommended to the Government for favourable consideration.

APPENDIX A.

(E. S. SIMPSON.)

Analyses of two limestones and a sand from Denmark.

No.	Result of Analysis.
7892	Calcium Carbonate .. per cent. 81.88
	Magnesium Carbonate .. 2.32
	Insoluble .. 11.68
	Iron and Alumina .. .62
	Organic, Moisture, etc. .. 3.50
	100.00
7893	Calcium Carbonate .. per cent. 65.68
	Magnesium Carbonate .. 1.46
	Insoluble .. 29.42
	Iron and Alumina .. .76
	Organic, Moisture, etc. .. 2.68
	100.00
7894	Calcium Carbonate .. per cent. trace
	Magnesium Carbonate .. trace
	Insoluble .. 99.30
	Iron and Alumina .. trace

Remarks.—In the raw state both limestones could be used for agricultural purposes.

The product obtained from burning 7892 would contain about 40 per cent. free lime; that from 7893 would contain no free lime whatever, and would therefore be useless for agricultural purposes.

THE FORAMINIFERAL SAND DEPOSITS OF DONGARA.

(H. P. WOODWARD.)

Situation.—Dongara, which is situated at the mouth of the Irwin River in the Victoria district, was at one time a fairly little important seaport town from which agricultural produce, wool, and copper were shipped, either by small coastal steamers, which called at regular intervals, or by sailing vessels, which visited periodically to take the wool with copper as ballast.

Since the completion of the Midland Railway Line, however, this port has sunk into oblivion, the main

portion of the produce coming from the Upper Irwin being conveyed direct to Geraldton, a distance of 43 miles, in order to save double handling.

Physiography.—The coast-line is comparatively low, being composed of a line of ancient and modern sand dunes fringed by out-lying coral reefs, which render the entrance to the port dangerous. At the rear of these sand hills is a broad alluvial flat which has evidently been formed by material brought down by the river, which at one time clearly discharged its water into a large lake-like expanse, the passage from which to the sea was blocked by a sand bar, which would be periodically broken by flood waters. In this inlet the river deposited its annual burden of sediment, until the general surface elevation of its bottom was raised above the sea level, after which the river cut a defined channel across it and through the sand hills to the sea.

Inland and to the eastward of these alluvial flats is an elevated sandy tract of country composed of Jurassic rocks.

Sand Dunes.—These present the usual wave-like appearance and lie in more or less parallel lines of variable height on the highest point of which—110 feet above sea-level—is situated the Dongara Trig. Station. These hills are for the most part densely clothed with scrubby vegetation, but south of the obelisk there is a considerable extent of loose sand drifts which are travelling rapidly inland.

The sand of which they are composed is of a fine, loose, incoherent nature presenting much the character of quartz sand from which it differs, however, in effervescing violently with dilute acid. Upon examination under the microscope it is found to consist almost entirely of the minute shells of foraminifera, some of which, in spite of having travelled for a considerable distance inland, are still in a wonderful state of preservation.

Individual Deposits.—Owing to the relative positions of these deposits with regard to the railway line and port, they may be divided into three groups, the first of which will be called Ularino Hill, the second Dongara Trig., and the third Denison Commonage.

Ularino Hill.—This hill ridge is situated upon Victoria Locations 1263, 771, and 1793, rising from the south bank of the Irwin River abruptly to a height of 95 feet. It is about 50 chains in length by about 25 chains in width, is densely covered with scrub, and lies in a direction a little west of south.

The average of the six samples taken from this hill yielded 82.13 per cent. of carbonate of lime, 5.76 per cent. of carbonate of magnesia, and about 9 per cent. of silica and alumina; in texture it was extremely fine, only 15.7 per cent. not passing through a 60-mesh screen, while 25 per cent. passed through a 90-mesh.

From the above it will be clear that the material is admirably suitable for direct application to the land, for not only is it in a very highly divided state, containing a low percentage of silica and a high percentage of carbonate, but the latter is in that organic form (aragonite) which is more readily soluble in soil acids than ordinary ground limestone (calcite).

On a rough computation the quantity of this calcareous sand that would be available for removal amounts to somewhere about 1,000,000 cubic yards.

The position of this deposit is most admirably suitable for its removal, since it is only a short distance from an old siding on the railway line between which lies the river valley, while owing to the superior elevation of the deposit it could be conveyed at little cost direct to the truck by means of a "flying fox." All the plant required would be screens to remove any rotten wood or other material which would interfere with its distribution on the land.

The most expensive item with regard to the removal of this material would be the sacks, but since it is not destructive, provided these were kept dry, they could be used several times.

To the southward of this area is a broken hilly region extending over locations 1261, 908, 1794, 1999, and 2328. Here the elevation is not so great as on the main ridge, but the deposit is of greater extent, and on the whole is estimated to contain a larger yardage, while in composition, to judge from the sample taken (No. 7759, Appendix B), it is practically identical.

Dongara Trig. Hill.—This is a long line of lofty hills lying between the sea coast and the railway line, the highest point being 110 feet above the sea level.

In general character it is identical with the Ularino Hill with this difference that the samples taken from the sea face and lower hills on that side, contained too high a percentage of silica to be of any value (Nos. 7753 and 7754, Appendix B). A reference to the certificate (Appendix A) showing the result of the mechanical analysis is of interest, since it clearly demonstrates the fact that the calcareous particles are the smaller, since in the siliceous ones mentioned 51 and 76 per cent. failed to pass the 60-mesh screen as compared to 12½ per cent. in the other samples.

As no extensive sampling was undertaken with the object of proving this area, no estimate can be framed as to the quantity of the material available, but since the hill ridge is of greater height and longitudinal extent than the Ularino Hill, it may with safety be stated that there is a larger quantity. Like the first mentioned deposit it is situated upon freehold property, while in regard to facilities for working it is little inferior to it, since the hill is only half a mile distant from the Dongara Railway Station, from which it is separated by a wide flat.

Denison Commonage.—The third deposit is situated entirely upon Crown Lands and consists of a belt of dunes following the coast-line in a southerly direction from the Irwin River. These hills are not individually so lofty as the two previously mentioned, since the highest is only 70 feet, but since they are much more numerous and the deposit more extensive, the quantity of the material available is very considerably greater.

In quality the material in this area is considerably superior to either of the others, as will be seen by reference to the assay certificate (Appendix B, Nos. 7760, 7761, 7762, and 7763), the average being 86.25 per cent. carbonate of lime, 6.69 per cent. carbonate of magnesia, and only 3.16 per cent. of silica and alumina, while on the average only 7.5 per cent. is retained upon a 60-mesh screen, and 45 per cent. passes the 90-mesh.

With regard to its position to the railway, this deposit is disadvantageously situated compared with the others, since it would necessitate the construction

of some 2 to 2½ miles of tram line, but on the other hand it is most advantageously situated with regard to the jetty.

Summary.—From the above it will be seen that in order of quality the Denison Commonage deposit ranks first with 86.25 per cent. carbonate of lime, and only 3.16 per cent. of silica and alumina; Ularino Hill second with 82 per cent. carbonate of lime and 9 per cent. of silica; and Dongara Trig. third with 81.30 per cent. carbonate of lime and 10 per cent. of silica. With regard to quantity and extent, Denison ranks first, Dongara second, and Ularino Hill third; while with regard to position, the first preference must be given to Ularino, closely followed by Dongara, while Denison is a bad third.

The next point to consider is the question of the ownership of the land. Ularino and Dongara, being both situated upon freehold property, must be resumed before the included deposits can be worked by the Government, therefore the question arises as to whether the sum it will be necessary to expend in this direction will not more than cover the extra cost in connecting the deposits situated upon Crown lands with the railway line by means of a tramway over which railway trucks could be hauled, but in this regard no opinion can be expressed until the price that will have to be paid for the resumption of these lands is ascertained.

Conclusion.—All the deposits examined are admirably situated for economic working, while the material itself is ideal for direct application to the land, owing to its extremely fine state of division. The material can be worked directly in the face and either loaded directly into trucks, or first bagged. It would be necessary, however, to pass all surface material (without it is discarded) through a screen, since the pieces of roots and other vegetable matter would choke the distributor.

The balance of evidence seems to be in favour of the working of the Denison deposit, which could in the initial stages be connected by a light horse tramway with the railway yard, since by adopting this method no serious outlay need be incurred until such time as the demand warranted it, while further, it could be worked in an intermittent manner by the employment of a gang of men and hiring a few horses for such period only as was found necessary.

Should it be desired to convert this material into caustic lime it would, of course, be necessary to erect rotary kilns, which would render the product costly unless Portland cement works were started in this locality; but this extra expense seems scarcely justifiable since, as before stated, the material is in such a finely divided state that it would be rapidly dissolved by the ground waters and organic acids.

APPENDIX A.

Sizing Tests of fifteen Samples of Foraminiferal Sand by E. S. Simpson, Mineralogist and Chemist in the Geological Survey Laboratory.

No.	Retained on 30 Mesh screen.	Retained on 60 Mesh screen.	Retained on 90 Mesh screen.	Passed through 90 Mesh screen.
7751	0.1	9.0	62.4	28.5
7752	trace	11.2	67.9	20.9
7753	0.4	51.2	41.7	6.7
7754	5.1	76.4	15.1	3.4
7755	trace	10.5	70.8	18.7
7756	trace	10.6	60.9	28.5
7757	0.6	25.2	53.1	21.1
7758	1.4	25.2	49.0	24.4
7759	1.1	21.7	52.9	24.3
7760	trace	5.3	48.2	46.5
7761	0.1	4.0	43.6	52.3
7762	0.1	19.6	54.6	25.7
7763	<i>Nil</i>	1.2	41.7	57.1
7764	trace	12.0	67.8	20.2
7765	trace	9.2	66.1	24.7

APPENDIX B.

Analyses of Dune Sands from Dongara, made under the direction of E. S. Simpson, Mineralogist and Chemist, in the Geological Survey Laboratory.

G.S.L. No.	..	..	7751.	7752.	7753.	7754.	7755.	7756.	7757.	7758.	7759.	7760.	7761.	7762.	7763.	7764.	7765.
CaCO ₂	..	..	83.22	79.69	32.09	20.28	82.92	83.58	82.19	81.58	82.53	86.74	86.33	85.27	86.65	79.05	83.19
MgCO ₃	..	..	5.02	5.02	3.16	2.09	5.19	5.23	5.54	6.60	6.02	7.02	6.98	7.06	5.73	5.85	6.35
FeCO ₃	..	..	1.45	1.58	3.90	3.78	1.27	.67	.76	.97	.65	.40	.39	.53	.39	3.33	1.32
Al ₂ O ₃	..	..	.45	.79	.79	1.48	1.31	.54	.67	.47	.21	.22	.23	trace	trace	.45	.03
SiO ₂	..	..	7.07	11.13	59.80	72.24	7.05	6.75	7.27	8.82	8.58	2.10	1.90	3.96	3.82	9.10	6.32
{ P ₂ O ₅ CaO	..	..	.15	.11	..	..	.11	.11	.11	.10	.09	.09	.09	.09	.11	.10	.11
	..	..	.20	.15	..	..	.15	.15	.15	.13	.12	.12	.12	.12	.15	.13	.15
NaCl	..	..	trace	.05	..	..	trace	.03	.05	.07	.05	.06	.11	.01	.02	.11	.08
Organic	..	..	2.04	1.06	..	..	1.62	2.46	2.62	.74	1.14	2.59	3.24	2.58	2.67	1.25	2.07
Moisture	..	..	.40	.42	..	..	.38	.48	.64	.52	.61	.66	.61	.38	.46	.63	.38
			100.00	100.00	99.74	99.87	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Total CaO	..	..	46.85	44.82	17.99	11.37	46.63	47.00	46.22	45.86	46.38	48.74	48.62	47.92	48.72	44.44	46.78
Total MgO	..	..	2.40	2.40	1.09	1.00	2.48	2.50	2.65	3.16	2.88	3.36	3.34	3.38	2.74	2.87	3.04
Total Fe ₂ O ₃	..	..	.90	1.09	2.69	2.61	.88	.47	.52	.67	.38	.28	.27	.37	.27	2.30	.91
Analyst	..	..	E.S.S.	E.S.S.	E.S.S.	E.S.S.	E.S.S.	E.S.S.	E.S.S.	H.B.	H.B.	H.B.	H.B.	H.B.	H.B.	H.B.	H.B.

THE COMMERCIAL APPLICATION OF THE
DONGARA FORAMINIFERAL SANDS.

(E. S. SIMPSON.)

The following notes on the possibility of utilising commercially the large dunes of foraminiferal sands lying to the south of Dongara are based upon samples of these sands and of the local clays collected recently by Mr. H. P. Woodward, Assistant Government Geologist, and analysed in the Departmental Laboratory.

The results of the analyses and sizing tests made are given in the tables shown in Appendices A and B to the preceding report by Mr. Woodward. With regard to the sands it is evident that Nos. 7753 and 7754, from the west of Dongara Trig., are valueless, as they consist mainly of quartz. All the others have a possible commercial value in proportion to their freedom from silica, those from the Denison Common being of the highest quality. With the exception of Nos. 7753 and 7754 all the sands consist mainly of the calcareous shells of foraminifera with smaller quantities of granular fragments of the calcareous remains of mollusca and algae, together with quartz sand and a little felspar and siliceous sponge spicules.

Three uses for these sands suggest themselves:

A.—As an *agricultural land dressing in their present condition*. For this purpose they are eminently suited owing to their high content in calcium carbonate, their evenly fine-grained condition, and the large surface exposed by most of the granules owing to internal cavities. The surface portions of the deposit are contaminated with a small amount (under one per cent.) of dead leaves, roots, and other vegetable debris which would need to be removed by a simple screening through a 20-mesh sieve to enable the bagged sand to pass freely through seed drills. The fabric of the bags used for bagging would need to be closely woven to avoid undue leakage in handling.

B.—As a source of *burnt lime for agricultural, metallurgical, or building purposes*. Owing to the mechanical condition of the sands the relatively cheap method of shaft-kiln burning would not be applicable to this material. The burning would necessarily be done in rotary kilns, which means increased capital expenditure and working expenses.

The samples may be grouped to indicate the average of three main deposits examined, viz.:

- (1.) Ularino Hill and its southward extension;
- (2.) Denison Common;
- (3.) Dongara Trig. Ridge.

From the average figures worked out in detail in connection with cement manufacture and given below it would appear that:

(1.) The Ularino deposits would yield a lime containing about 59 per cent. free CaO, well suited for building purposes, but somewhat uneconomical to handle for agricultural purposes. Still it would represent a saving in freight of 15 per cent. on the same sand unburnt, 85 tons of burnt sand containing approximately the same weight of available alkali (CaO plus MgO) as 100 tons of unburnt sand. It is not likely that for building purposes such lime, produced by an expensive process at an out-of-the-way locality, could compete with equally good lime produced close to a centre of population. For metallurgical use in cyaniding operations such lime

would be serviceable, but preference would be given to one of higher grade or less cost.

(2.) The Denison Common deposits are of much superior quality to either of the others, and the situation is more favourable for shipment, though less so for railway distribution. The burnt lime would average 85 per cent. free CaO, and would be a valuable product for all purposes. Its only drawback would be its initial cost and distance from points of consumption. For agricultural purposes a saving of 38 per cent. in freight would be effected by burning in this case, 62 tons of burnt lime containing the same weight of available alkali as 100 tons of the original sand.

(3.) The sand on the summit of Dongara Trig. Hill is rather high in silica (11.13 per cent.) for commercial use, particularly when higher grade sands are abundant in the immediate vicinity. Samples taken a short distance west of the Trig. show that the silica rises in this direction to a point at which the sand is valueless. On the south end of the same ridge, however, the silica falls to 7.05 per cent. The sand with 11.13 per cent. silica would yield burnt lime carrying 43 per cent. free CaO; that with 7.05 per cent. silica, 62 per cent. free CaO.

C.—As a source of *Portland Cement*. Other things being equal, the freer from silica the more generally useful is a limestone deposit for Portland cement manufacture. With a limestone containing more than 10 per cent. silica and only traces of alumina it becomes difficult to find a suitable, highly aluminous, clay for making the necessary clay-limestone mixture. In this connection the available clays must be considered. In the attached schedule are given the analyses of two Dongara clays, one of which (7990) is mixed with numerous pebbles of limestone ranging in size up to about 1½ inches in diameter. In 7989

the ratio $\frac{\text{SiO}_2}{\text{Al}_2\text{O}_3 + \text{Fe}_2\text{O}_3}$ is 3.3; in 7990, 3.0.

A recognised authority, Eckel, lays down the rule that in a clay for cement-making this ratio should lie between 2.0 and 3.5. Both clays, therefore, considered merely as a source of silica and alumina, may be looked upon as suitable for this purpose. In practice, however, it would probably be found that a clay such as 7990, containing large nodules of limestone, would vary greatly in composition and would not, therefore, lend itself readily to the exact calculation of charge so essential for the production of high-grade cement. The only defects in 7989 are a somewhat low alumina content and the presence of a moderate amount of rather coarse quartz grit, which would appreciably increase the cost of fine grinding.

Reverting to the sand: in order to determine the probable composition of these over considerable areas, averages have been calculated for the principal deposits. This is justified by the general evenness in grade. The results are:—

	CaO.	MgO.	SiO ₂ .	Al ₂ O ₃ .	Fe ₂ O ₃ .
Ularino Hill and its southward continuation	46.08	2.83	7.98	0.38	0.70
Denison Common	48.50	3.20	2.94	0.14	0.30
Dongara, Trig. Hill, excluding seaward slope	45.72	2.44	9.09	1.05	0.98

The sand from Dongara Trig. Hill is of doubtful utility owing to its notable variability in silica contents and to the fact that even the average of the two best samples contains rather a high percentage of this constituent.

The sands from the other two areas may both be considered suitable, that from Denison Common being by far the best owing to the very low percentage of silica. In both samples this constituent is present almost wholly as quartz, a component which increases materially the cost of the necessary fine grinding and at the same time does not so readily interact completely with the other constituents of the mixture as does silica in the form of clay. In the Denison Common deposit, however, the total amount of quartz is so small that it cannot appreciably deteriorate the quality of the sand as a whole.

Assuming that the Denison Common sand and the clay numbered 7989 are available in suitable quantities, a sound cement could be manufactured from them mixed in approximately the following proportions:—

	A.		B.
	per cent.		per cent.
Denison Common Sand	80	to	78
Clay, No. 7989	20	to	22

These mixtures would contain—

	A.		B.
	per cent.		per cent.
CaO	39.06	..	38.11
MgO	2.84	..	2.79
SiO ₂	14.90	..	16.09
Al ₂ O ₃	2.77	..	3.04
Fe ₂ O ₃	1.35	..	1.45

The Cementation Indices of these mixtures are 1.06 and 1.18. The Acidity Indices are 3.61 and 3.58.

The mixtures are quite satisfactory as regards Cementation Index, but the Acidity Index might well be lowered slightly; a condition only attainable by the use of a more aluminous clay than 7989.

If the more siliceous sand of Ularino Hill is to be used for cement-making a more aluminous clay than either of those collected by Mr. Woodward would be indispensable for admixture with it. In this clay the Acidity Ratio (SiO₂:Al₂O₃+Fe₂O₃) should not exceed 2.5. Such a clay would doubtless be found in the locality if carefully sought for.

ANALYSES OF TWO SAMPLES OF CLAY.

<i>Dongara Clays.</i>			
G.S.L. No.	7989		7990
SiO ₂	62.74	..	45.74
Al ₂ O ₃	13.32	..	11.01
Fe ₂ O ₃	5.56	..	4.26
MnO .. .. .	.45	..	.33
MgO	1.39	..	1.38
CaO	1.30	..	14.86
Na ₂ O .. .. .	.66	..	.54
K ₂ O	3.46	..	2.09
H ₂ O—	4.16	..	2.68
H ₂ O+ and Organic	6.46	..	4.68
TiO ₂ .. .. .	.70	..	.51
CO ₂ .. .. .	.38	..	12.10
NaCl	<i>Nil</i>	..	<i>Nil</i>
	100.58		100.18

Samples both air dried.
7990 contains numerous pebbles of limestone up to 1½ inches in diameter.

THE LIMESTONE DEPOSITS OF THE GERALDTON DISTRICTS.

(H. P. WOODWARD.)

On leaving the Agricultural Commissioners after our joint inspection of the Dongara calcareous sand deposits, Geraldton was visited with the object of examining the sand dunes in that locality.

This examination extended over that portion of the coast line which lies between the Greenough and the Chapman Rivers. The calcareous sand dunes were found to be of considerable extent and elevation but varying considerably in the amount of siliceous sand present, this being in much larger quantity near the mouths of the rivers.

The deposits were sampled at six points, the first being from the summit of a large dune one mile south of the mouth of the Greenough River, which proved to contain 17.88 per cent of insoluble matter, and therefore the analysis was not carried further as this percentage would render it valueless for agricultural purposes if calcined lime is required. The second sample was taken one mile north of the mouth of the Greenough River from the sand on the landward face of the dune, and as this was proved to contain an even higher percentage of silica than No. 1 the same remarks apply. The third sample was from Mahomet's Flat, which is on the southern boundary of the township, and was taken from the landward face of the dunes. This proved to be a high-class calcareous deposit similar to the best from Dongara, containing 84.43 per cent. of carbonate of lime and only 2.06 per cent. of silica; the magnesium carbonate was however rather high for burning. The fourth sample was taken from the dunes in the township itself one half-mile north of Mount Scott, and proved to be of little value, since it contained 24.67 per cent. of silica.

The fifth sample was taken from the dunes near Bluff Point two miles north of Geraldton, and proved to be quite valueless, as it contained 46.68 per cent. of silica.

The sixth sample was taken from the rifle range near Point Separation on the same line of dunes as Mahomet's Flat, to which the sample proved to be very similar in composition; it was however slightly higher in silica but considerably lower in magnesia.

A report on these samples furnished by Mr. Simpson, Mineralogist and Chemist, forms Appendix A.

APPENDIX A.

REPORT ON SIX SAMPLES OF DUNE SAND FROM THE GERALDTON DISTRICT.

(E. S. SIMPSON, Mineralogist and Chemist.)

These sands may be divided into two groups.

Group I.—Calcareous sands with much silica, viz.:

8151. No. 1—One mile south of mouth of Greenough River.
CaCO₃, 73.50 per cent.
Containing CaO, 41.20 per cent.
Insoluble matter, 17.88 per cent.
8152. No. 2—One mile north of mouth of Greenough River.
Insoluble (siliceous) matter, 22.19 per cent.
8154. No. 4.—Half-mile north of Mount Scott.
Insoluble matter, 24.67 per cent.
8155. No. 5—Bluff Point, two miles north of Geraldton.
Insoluble matter, 49.68 per cent.

The insoluble matter in all is mainly quartz, the soluble matter mainly calcium carbonate. These sands are valueless for cement making or for burning for structural or agricultural purposes. The burnt product from No. 1 would contain only about 13 per cent. of free lime, that from the others much less. Failing a supply of better material, Nos. 1, 2, and 4 might be used locally in the raw state as a calcareous dressing for soils deficient in lime.

Group II.—Calcareous sands with little silica, viz.:—

8153. No. 3—Mahomet's Flat, 1½ miles south of Mount Scott.

8156. No. 6—Rifle Range, near Point Separation.

The composition of these is as follows:—

No.	8153	..	8156
CaCO ₃	84.43	..	81.44
MgCO ₃	6.52	..	3.01
FeCO ₃	1.36	..	1.36
Al ₂ O ₃	1.36	..	2.66
SiO ₂	2.06	..	7.10
{ P ₂ O ₅ .. .. .	.13	..	.14
CaO .. .. .	.17	..	.19
Organic	3.51	..	3.68
Moisture .. .. .	.46	..	.42
	100.00		100.00
Total, CaO	47.50	..	45.84
Total, MgO	3.12	..	1.47
Total, Fe ₂ O ₃ .. .. .	.94	..	.94
Approx. free CaO in burnt product	84%	..	57%
Analyst	H. P. Webb	..	H. P. Webb

No. 3 is a sand identical in quality with that from Denison Common, Dongara. It is well suited for the production of Portland cement, cyaniding lime, building lime, or agricultural lime. For the latter purpose burning would result in a large saving of freight, viz., 40 per cent., 60 tons of burnt sand containing the same weight of available lime as 100 tons of unburnt sand.

No. 6 is similar in quality to the sand from Ularino Hill, Dongara. Mixed with a not too siliceous clay it would burn to a good Portland cement. Burnt by itself it would yield a good building lime or a medium grade agricultural lime. For the latter purpose burning would result in a saving in freight of 17 per cent., 83 tons of burnt sand containing the same weight of available lime as 100 tons of unburnt sand.

SUPPLEMENTARY REPORT ON THE LIMESTONE DEPOSITS AT YONGA (MARTYUP).

(H. P. WOODWARD.)

At the time the deposit at Martyup (December, 1913) was reported on, as the impression was that ground carbonate of lime was desired by the farmer, and consequently, in spite of the comparative lowness of the grade of this deposit, in consideration of the fact that this soft limestone could be cheaply reduced to a fine powder, it was favourably reported upon. It now, however, appears that burnt lime and not ground limestone is what the Department of Agriculture wants, for which purpose this material is of too low a grade to be of value, on account of the high percentage of silica which would render the resulting lime of little value as a neutralising agent owing to the affinity of the caustic lime for the silica with the formation of the silicate.

The following extract from a report by Mr. E. S. Simpson, B.E., B.Sc., Mineralogist and Chemist, to the Geological Survey, may be of interest:—

"In the case of pure CaCO₃ and SiO₂ finely ground and well mixed, each part by weight of the SiO₂, will combine, on strong heating, with 2.8 parts by weight of CaO. Under normal conditions of lime burning we may assume that only two parts of lime will combine with each one part of SiO₂. And on this basis the following table has been worked out:—

Limestone.		Burnt lime contains approx.
CaCO ₃ per cent.	SiO ₂ per cent.	Free CaO per cent.
100	.0	100
95	5	74
90	10	50
85	15	28
80	20	7
78	22	0

In referring to the above table it must be remembered that column 3 represents the percentage of free lime in the calcined product, and therefore must be divided by 2 if it is desired to arrive approximately at the percentage of free lime that would be yielded by a limestone of the composition given in columns 1 and 2. Therefore if we take the Martyup samples, two of them would yield no free lime after burning and of the other only 10 per cent. of the final product would be in this form.

Limestones of this character, it will be seen, although producing good hydraulic lime for building purposes, are absolutely of no value after burning for agricultural purposes, but if finely ground in their raw state are equal to their CaO contents.

YILGARN GOLDFIELD.

(T. BLATCHFORD.)

After completing the survey of the Westonia and surrounding districts, the field work of the belt of greenstones extending northward from Southern Cross was commenced late in the year 1914.

At the same time my colleague, Mr. Honman, was completing the survey of the Mount Jackson and Marda centres.

Early in July official instructions were received by me to proceed to a new discovery of gold near the Mid Ironcap, now known as Forrestania, about 100 miles south of Southern Cross.

On my return to Southern Cross on July 22nd, fresh instructions were issued for me to return and complete the survey of the southern portions of the Yilgarn goldfield, not included in Bulletin 63.

After completing the survey of the northern portion of the belt this was done.

On my second return to Perth on September 8th it was officially decided that I should accompany the McIntyre prospecting party as consulting geologist. This party returned to Southern Cross on the 18th of December.

The following are *resumés* only of the work done and may possibly require modifying when chemical and petrological information comes to hand.

COUNTRY LYING BETWEEN SOUTHERN CROSS AND ENNUIN.

Geologically, this is a continuation of the same greenstone belt which extends southwards to Cheriton's Reward, a full description of which may be found in Bulletins 49 and 63.

With few exceptions, what has been written about the geological formations of the southern portions of the belt applies to those found in the northern area.

The quartz conglomerates, however, are more pronounced, especially at Golden Valley and Ennuin than in any of the sedimentary beds south of the railway line. As in the beds at the Great Victoria the pebbles have been subjected to intense metamorphism. Cross fractures are very common, in fact, rarely or ever absent in the pebbles which have been drawn out to probably three times their original diameter.

On the other hand, foreign secondary minerals, such as graphite garnet, andalusite, are not as frequent in their occurrence in the northern beds as they were found to be in their southern representatives.

On the other hand, the greenstones do not show the intense shearing they do in the southern areas, more particularly near the Eastern granite: showing, perhaps, that there was not such intense pressure in the north as in the south.

One very interesting geological feature in the north was noticeable in the Glideaway Gold Mine, at Manxman—there a reef is seen passing through a series of granitic dykes. In all other instances noted the dykes have passed through the reef.

This establishes two ages either for quartz reefs or acid dykes. Taking in other considerations the latter seems the more likely in this particular case.

Following the contact of the greenstones and granite on the east, and at no great distance from the latter, the quartz-haematite lodes which have been traced from Cheriton's were found to continue to the north of Barnett's Find. As far as could be observed it is only at or near to this line of lode that payable gold values are found.

The two producing mines of any pretensions to size in the district under review, are the Corinthian North-cum-Corinthian, and the Bullfinch Proprietary. Of these, the former consists of a succession of extensive quartz veins lying in or on a massive quartz-haematite lode, which in turn forms direct contact with the massive Eastern granite. The granite at this point is much foliated and has been mistaken for quartz-mica schist, which it closely resembles. The western or hanging wall of the lode is much foliated greenstone.

Passing obliquely through the granite, the lodes and the greenstone, and with a decided underlie to the south-west are recent dolerite dykes. These dykes vary from a few inches to several feet in thickness.

There is no doubt that these dykes are the more recent rock, and possibly have had considerable influence on the subsequent distribution of the gold values in the ore channel.

A considerable amount of development work has been done on these two properties, and though the main workings are in the oxidised zone, the ore bodies were found to maintain, approximately, their size in the sulphide zone too.

It would appear that there is an abundance of low-grade ore in this mine, the great difficulty being

whether the gold contents are sufficient for profitable treatment. The working costs on the mine to date have been remarkably low.

The other and most important mine in the district is the Bullfinch Proprietary; though there are two distinct varieties of lode in this mine when considered from their composition only, they must nevertheless be placed in the same genetic class, as they undoubtedly both owe their origin directly to metasomatic replacement.

Their composition, however, readily allows another classification:—

Quartz-haematite lodes.

Dolomite lode.

In the first class are the "main series" (the original rich shoot), the "southern series," and various small pipes of ore probably indirectly connected with the southern series.

The second class is represented by the northern series.

Taking the first class as a whole, it does not materially differ from the prevailing quartz-haematite lodes of the Yilgarn Goldfield. In connection with this particular locality, however, there are three geological features worthy of note which are the exception rather than the rule.

- (1.) The proximity of the lode to the Eastern granite.
- (2.) The strike of the lodes, which is practically east and west, and not the prevailing north or south by west direction.
- (3.) An abnormal amount of faulting of the whole series.

This combination of geological phenomena has not been observed at any other point in this long line of quartz-haematite lodes, and is well worthy of notice.

The second, or "northern series," class of lode is unique as far as the Yilgarn goldfield is concerned.

In the upper levels representing the oxidised zone, the lode consists of a siliceous jasper, which changes suddenly into a dolomitic lode through which are numerous more or less horizontal quartz veins.

In the proximity of these quartz veins the gold-bearing minerals seem to predominate. These minerals are several in number, and include copper ores in their various oxidised forms, bornite, galena, marcasite, and pyrrhotite in appreciable quantities in the sulphide zone.

In rare instances native silver has been recognised in the oxidised zone, associated with copper carbonates.

The mine has been developed extensively to a vertical depth of 400 feet.

Coarse to fine-grained greenstones form the matrix in which these lodes occur, a detailed description of which will appear in a subsequent complete report.

MANXMAN, GOLDEN VALLEY, AND ENNUIN CENTRES.

Manxman Centre.—Well defined lines of lode of the quartz-haematite schist variety, pass through this centre, and run parallel to the contact of the greenstones and granite. Acid dykes are of very frequent occurrence. Of the mines working the Glideaway is the most important, and sinking to cut the lode well below the water level was in progress. The reefs being worked in two or three other mines in this locality are small but high grade.

Golden Valley.—Quartz-haematite lodes are very much in evidence in this centre, also ferruginous

lodes in the sedimentary series. Unfortunately, with one exception, the gold contents in both these varieties of lodes are too low to be properly extracted.

On the Violet lease some rich sulphide ore was being raised from a small spur lode from the main series. A few prospectors were at work on quartz reefs, but owing to the hard nature of the country rock not much stone is being raised for milling.

Ennuin.—These parties were working small quartz veins associated with the main quartz-haematite lodes. The returns from one of these leaders were particularly high.

An attempt was also being made to develop the Kathleen mine, the lode in which belongs to the quartz-haematite class. Picked ore from this lode was yielding payable returns.

THE SOUTHERN PORTION OF THE YILGARN GOLDFIELD.

In Bulletin 63 the mapping of that portion of the Yilgarn Goldfield was only extended as far south as Cheriton's Reward.

About four miles to the south of this point the surface conditions undergo a marked change. In place of the heavily timbered greenstone belt the surface is replaced by thick scrub, with occasional small belts of gum—until Mt. Holland is reached there is no pronounced rise or fall in the surface. The underlying rocks are for the most part masked with sand and other debris, and where outcropping, are found to be either granite or very much weathered sedimentary rocks. Crossing the old Holland track to the immediate east of the mount of that name and including the latter on its western edge, a belt of greenstone is seen exposed at the surface, resembling in lithological characteristics that of the main Yilgarn belt. This belt continues as far south as Hatter's Hill. Hugging the belt on the west is a narrow strip belonging to the sedimentary series. This belt extends practically from Cheriton's on the north, to Mid Ironcap on the south. The North Ironcap forms a rather conspicuous land-mark in this series.

As a general rule, the strike of these strata is approximately a northerly one with a prevailing dip towards the east at a high angle.

Mount Holland is another pronounced land-mark, and consists mainly of ironstone of the quartz-haematite variety.

About the middle of the year, reports came to hand of the discovery of extensive gold-bearing reefs at a point six miles north-east of Mid Ironcap.

The following is a copy of this discovery furnished shortly afterwards:—

THE NEW GOLD FIND (FORRESTANIA).

(South of Mount Holland.)

The new field south of Mount Holland, now known as Forrestania, is situated in the extreme south of the Yilgarn Goldfield at a distance of six miles north 60 degrees east from the Mid Ironcap, and 13 miles due east of the 95-mile post on the Rabbit Proof Fence.

Accessibility.—There are two main tracks leading to the field from the Eastern Railway. Of these the better is the one passing through Parker's Range, Cheriton's, and Mount Holland. This track is in fair order as far as Cheriton's, and though cleared of timber is very rough for general traffic the remainder of the distance. The other route turns off the Rabbit Proof Fence either at the 79-mile or 88-mile post.

The one followed was the former, and is extremely heavy as far as Wattle Rock, where the other one joins. From here the route passes by the North Ironcap and joins the Ravensthorpe track about five miles to the north of the Government tank. The road down the fence is very heavy, the sand having filled in the wheel ruts during the recent wet season.

From Southern Cross by the first route the total distance is 108 miles, and by the Rabbit-proof Fence 124 miles to the central leases. A somewhat shorter route from the railway line would be from Yelladine, a railway siding 20 miles east of Southern Cross.

Geology of the Field.—The leases are situated in granite country, apparently a portion of the main granite belt. Unfortunately the underlying rock is almost completely covered with an overburden of sand and ferruginous gravel, but there are sufficient outcrops of the decomposed rock to verify the above statement. Lying to the north-east of the leases is rather an extensive belt of greenstone of the Marvel Loch type, and probably a continuation of the same belt. Another small belt of similar rock outcrops about four miles south of the Reward Lease. The North and Mid Ironcaps are highly ferruginous beds, probably of the same age as the Stirling Ranges. There is little doubt that they are isolated fragments of that sedimentary series.

The Leases.—Unfortunately very little development work has been done on any of the leases, and to date only one reef can be positively said to exist. The indications from quartz floaters, however, would point to the possibility of other veins being exposed at an early date. There is a marked parallelism of the five lines of floaters, the general strike being north 70 degrees west. On account of this parallelism it seems more than likely that the granite will be found to be gneissic in character, the quartz veins following the planes of foliation.

On the reward lease two costeens, about 200 feet apart, reveal a reef at least seven feet wide in one place and three feet in the western end. The floaters extend over a distance of some 700 feet. Carefully broken samples of the reef exposed in these costeens gave a result in each case of slightly under 3dwts. of fine gold per ton.

Samples from the floaters on the Premier, Commonwealth, Potosi, and Allan's Find were crushed and panned off in the field, and the stone was found to be gold-bearing, but in the writer's opinion the values obtained were low and scarcely payable. It seems probable that higher values than justifiable have been given by prospectors on account of the low value of the gold being taken into account. This should be guarded against in the future.

Taken as a whole, the reports of the field have been very much exaggerated, and against such the public should be warned. On the other hand, gold has been found over an extensive area in new country, and as no development has been done, the expenditure of a limited amount of capital is justifiable.

Water Supply.—Both tracks are supplied with water at intervals sufficiently short to accommodate the travelling public. Appended is a list of the supplies and distances.

The main supply for the field itself would be obtained from a Government tank, 10,000 gals. capacity, on the Ravensthorpe Road, and situated about six or seven miles, as the crow flies, from the leases.

At present there is no direct road, and the distance by a rough track is at least 10 miles. Owing to the late rains, surface water is being obtained in shallow holes in the sand close to the leases. This supply should be exploited further as little expense would be entailed, and if successful would be extremely useful to augment the permanent supply. With economy there should be sufficient water to prove whether the field warrants further permanent water conservation. A justifiable expense would be incurred in cutting a direct track from the Government tank to the leases, and it would undoubtedly be much appreciated if the track from Cheriton's to the field were cleared of mallee roots and stumps.

The following is a list of water tanks, etc., with distances from Southern Cross to the New Find on 19th July, 1915:—

—	Distance in miles.	Nature of Supply.
Southern Cross to Marvel Loch	22	Scheme Water.
Marvel Loch to Parker's Range	14	Parker's Range Government tank ? Dingo tank 50,000 gals. full.
Parker's Range to Dulcie Jean	10	Dulcie Jean tank, 50,000 gals. full.
Dulcie Jean to Split Rock	16	Split Rock well 8,000 gals., about 6,000 gals. at present.
Mount Holland to Government tank five miles North of turn off to field.	20	Government tank, 10,000 gals., full.

There is sufficient (surface) water for travellers at certain rocks on the Rabbit-proof Fence, but such is not permanent during the summer months.

Since the above report was written it has been generally recognised locally that there are two distinct classes of gold to be found in the reefs at Forrestania, one a light-coloured light and low-grade gold, the other probably a secondary gold of much higher grade.

MCINTYRE PROSPECTING EXPEDITION.

The remainder of the year was taken up in the field as consulting geologist to the above expedition. This expedition was organised to search for gold and other metals and minerals by means of a larger party of prospectors than usual, and in places inaccessible to the average party of two or three. It was intended that the whole party should work from a common base.

With this object in view tenders were called for small parties representing contributing syndicates, each of these parties being subject to the conditions laid down by mutual arrangements with their supporters.

A general manager was chosen and subscribed for by the individual parties.

To convey stores and material to the common base, camels, drivers, and teams were supplied by the Government.

The camels were of the class that could be used either in a team or as pack-carriers. Thus, stores and water could be readily transported from the main base to isolated groups. An assayer with a complete equipment and an advisory geologist also supplied at the State's expense were added to the party.

The centres touched by the expedition were Forrestania, Bremer Range, and Hatter's Hill. On the return trip the country near Mid Ironcap and the southern portion of the Parker's Range belt were inspected.

A full and detailed description of the Bremer Range with complete maps has already been published in Bulletin No. 59 by Mr. C. S. Honman.

Between Bremer Range and Forrestania the country is sandy, monotonous, scrubby and flat. Occasional outcrops of granite are the only exposed rocks.

Water is scarce, but is obtained from "soaks" found at the base of the granite rises. In winter time this supply is ample, but in the summer months would be precarious unless the water were conserved.

After considerable time was spent at Bremer Range the party broke across country to Hatter's Hill. Hatter's Hill is situated near the end of the greenstone belt extending north to Mount Holland, and seven miles north of Mount Gibbs. A fair amount of prospecting had been carried on here previously, on small quartz veins, some of which carried payable gold, but no extensive deposits had been discovered. The prevailing country rocks are the coarse and fine-grained greenstones, through which are numerous pegmatitic dykes, the whole being surrounded by massive granite. The greenstone belt has no great width, and in this locality has a general strike of south-east north-west. Traces of molybdenite and scheelite were located in some of the acid dykes. No lodes or quartz veins of appreciable size were discovered here by the prospecting party.

Taken as a whole, the results of the expedition were more of a negative than positive value, as neither payable quartz reefs nor lodes of appreciable size were discovered.

On the other hand, the centres which may have reasonably contained payable lodes have been more thoroughly prospected than they would have otherwise been, and useful data gathered for further investigations.

The addition of an assayer and outfit to the expedition met with universal approval.

The expedition was a new type of attacking a very important side to the mining industry—prospecting for new deposits. A fair trial has been given to the scheme, and if wanting in some respects, there is no reason why the defects cannot be rectified in future expeditions.

KOOKYNIE AND TAMPA.

(J. T. JUTSON.)

As considerable detailed petrological work has yet to be carried out and the results require careful consideration, the following report is necessarily in the nature of a provisional one, and is liable to amendment in the final full account of the mining geology of the whole district.

Area.—The area dealt with comprises the mining centres of Kookynie and Tampa, and adjacent country, together with that portion of the Niagara centre west and north of the State Battery. This country occupies about 60 square miles.

Topography.—The ground is largely a slightly undulating plain similar to that of most portions of

the Eastern Goldfields of Western Australia. It is, however, broken by various hills and ridges of different types comprising laterite bluffs and "break-aways," knobs and ridges of granite covered with large boulders, long gentle rises of the same rock, and ridges and hills of varying steepness of greenstone. Commencing about three miles to the south of Kookynie and extending thence southwards, the most broken ground occurs, the country being dissected into numerous rather steep-sided gullies and flat-topped laterite and rounded greenstone ridges and hills. The height of the hills above the plains throughout the district would average perhaps from 40 to 60 feet, and the general uniformity of level suggests that such hills are the remains of a once continuous tableland, of which that at Niagara now forms a less broken portion.

Numerous drainage channels traverse the lower country, but except near their heads in the higher land they are not well defined. Wide areas are covered with superficial deposits (including "cement"). The bedrock is thus frequently hidden.

Vegetation.—Most of the country is covered with "mulga." The larger trees have been as a rule cut down for mining timber and firewood. Stunted salmon-gums grow along some of the watercourses, while in specially favourable spots taller trees of the same kind flourish. Salt-bush flats are fairly numerous.

Water Supply.—Abundant water can usually be obtained by sinking, the average depth being somewhere about 100 feet, and this water can be used as a rule for stock and battery purposes, and at times for domestic supplies.

General Geology.—The rocks of the area are mostly igneous although some possible sediments occur. The igneous rocks comprise both acid and basic. Pending the results of the microscopical examination, the rocks are here only provisionally classified according to their field occurrences. They include:—

Greenstones.

Rhyolites and Quartz Porphyries.

Granites.

Foliated Quartz Porphyries (?).

Sediments (?).

The *greenstones* include amphibolites and allied rocks, which will probably ultimately be found to be derived from gabbros and dolerites. They are fairly widespread and occur—amongst other places—as extensive outcrops in the broken country south of Kookynie, and in the more open country to the south of the old Tampa township. They are both fine- and medium-grained in texture, and both massive and schistose in structure, the schistose forms being in part hornblende schists. Some of the medium-grained rocks appear to be intrusive into the finer grained, and hence there may be two distinct series. The available evidence points this way, but the conclusion is not certain, it being possible that the medium-grained rocks are but a variation of the finer grained. There is no positive field evidence from the latter rocks themselves as to whether they are intrusive or extrusive, but from their mode of occurrence and relations with the other rocks of the district they probably represent, in the main, old lava flows. The greenstones are older than the granites, and also than the acidic dykes. The finer grained greenstones are probably contemporaneous with some of the rhyolitic rocks to be presently described.

Where schistose or sheared, the planes of schistosity or shearing run in various directions, but their dominant courses (at least to the north-west of Kookynie) are probably some degrees to the east or to the west of north.

The greenstones carry numerous auriferous lodes, either at or close to the contact of other rocks, or in schistose belts away from such contacts. The more massive greenstones carry few lodes.

An acid group of rocks, which may provisionally be classed as *rhyolites* and *quartz porphyries*, occurs in the northern portion of the area here treated, that is for about five miles to the south-east of the old Tampa township. These rocks occur in several moderately sized outcrops, which form either gentle rises or pronounced hills with a general north-westerly trend, and also in numerous thin dyke-like masses in the greenstones, having a similar trend. In places they are dense and fine grained, and in others are apparently fragmental and also amygdaloidal. From their field occurrence there appears to be little doubt that they represent, in part, lava flows, tuffs and agglomerates, and in part, sills and dykes. The former are apparently interbedded and contemporaneous with the fine-grained greenstones, while the sills and dykes are intrusive into the basic rocks. Little shearing has taken place. Traces of granite occur in the rhyolites, apparently as intrusive veins.

The rhyolites and quartz porphyries carry few auriferous lodes—one important exception, however, being the Grafter reef at Tampa—but such lodes sometimes occur in the greenstones close to the larger masses of these acidic rocks.

The "*granites*" comprise a rock group which will probably be found to include hornblende-granite and granodiorite. Some moderately large areas occur as well as smaller ones. The main outcrop is at Kookynie, where the country for some distance surrounding the town is composed of these rocks, in which are some "islands" of greenstone. Another large area occurs mainly to the south of the Niagara-Yerilla road between Niagara and Kookynie. Its southern limits have not been determined. Other fairly extensive occurrences are in the vicinity of the State battery at Niagara. Smaller areas lie about four miles to the north-west of Kookynie.

These granitic rocks are intrusive into the greenstones, and thin bands—apparently veins—may also be observed in the rhyolites. They are therefore younger than the greenstones and—if the bands observed are veins and belong to the main series—than the rhyolites. The granites are usually massive, but gneissose in limited areas. A feature worthy of note is the large number of "islands" of greenstone in the granite. They vary in length and breadth from many chains to a few inches. Numerous quartz reefs, including the largest and most important reef of the whole field, occur in these granitic masses. Small outcrops exist of rocks which are apparently intermediate between the more normal granitic types and the greenstones. The specimens from these have yet to be carefully examined.

The rocks which have provisionally been termed *foliated quartz porphyries* outcrop about 4½ miles south-east of Kookynie. They are more or less schistose and are associated with greenstones. From their field relations they mostly appear to be quartz-porphyries which have intruded the basic rocks.

Their schistose structure may be due to flow prior to consolidation or to crushing and shearing since their consolidation, or to both these processes. They are apparently not of any economic importance.

The possible *sediments* occur in a comparatively small area, the centre of which is about $1\frac{1}{2}$ miles east-south-east of Niagara township and south of the Niagara-Yerilla Road. They are associated with granite and greenstones. Their origin is at present uncertain. They may be sediments, or sediments interbedded with old lava flows and tuffs, or they may be chiefly igneous rocks whose apparent stratification is really due to flow prior to consolidation, or to earth movements subsequent to the original formation of the rock. Their general relations to the other rocks are not clear, and the question of their origin must remain open for the present. They possess some small irregular quartz reefs, but the latter have not yielded much gold.

The Lodes.—The lodes of the area mapped are practically all quartz reefs. Many strike close to north and south, usually a few degrees either to the east or to the west of north. Such occur at Kookynie, for some miles to the north-west of this town, and in the vicinity of the State battery. Others have a more pronounced north-westerly strike, as near Tampa. Others again are nearly east and west, as also near Tampa; while some few may be found striking in any direction. The underlie of the north and south and north-west trending reefs is usually towards the east, while that of the east and west ones is almost always to the south. The reefs vary in thickness from a few inches to perhaps 15 or 20 feet, but the majority are not more than two feet thick. Some barren "blows" occur, the most prominent one of which is the high ridge about three-quarters of a mile in length, two miles east-south-east of Niagara. This forms one of the chief landmarks of the district.

The reefs occur chiefly in the greenstones and granites, and frequently close to the junction of these two rocks. The rhyolitic and also the possible sedimentary rocks carry few reefs that have been payable.

The most important lode of the whole district, the Cosmopolitan, and another main line, the Altona, both situated at Kookynie, occur in "granite." The Champion line of reef, about three miles north-north-west of Kookynie, is in greenstone, but close to the granite junction. The Lubra Queen reef, between Kookynie and Niagara, is likewise in greenstone close to the granite. The group of reefs near the Treasure Well, about four miles north-west of Kookynie, are partly in granite and partly in schistose rocks. Farther north the old Britannia, London, Barrington, Homeward Bound, Standard, Mignonette, and Perseverance lines are in greenstone, while the Grafton reef at Tampa is in the rhyolite-quartz porphyry series close to greenstone. West and north-west of the State battery at Niagara the reefs are chiefly in granite.

A lode in which gold has occurred outside the quartz in possibly payable quantities is the McTavish, about $1\frac{1}{2}$ miles west of Kookynie. This lode consists of quartz veins and schistose material, both of which may carry some gold. The country at depth, judging by the dump, appears to be greenstone.

Throughout the district, reefs are numerous, and very many have been worked to shallow depths. Deep workings, however, are comparatively scarce, the

deepest being those of the Cosmopolitan Mine at Kookynie.

The length and mode of occurrence of some of the lines of reef suggest that they are in strong fissures, and should live to considerable depths. The more irregular shorter ones may, however, be expected to often give out.

Few minerals occur in the quartz reefs, pyrites being the commonest. So far as known, the bismuth minerals, which are comparatively common and valuable as probable gold indications in the Niagara district, practically do not occur in the Kookynie and Tampa areas.

The mode of occurrence of the gold calls for little remark. It may be coarse or fine, and is usually fairly evenly distributed, although sometimes restricted to the foot or hanging wall side or more towards the centre. So far as the writer is aware the gold has hitherto been free. In the Altona Mine free gold occurs in places associated with patches of pyrites. There is scarcely any information about defined shoots of gold.

A State battery exists at Niagara.

Alluvial Gold.—In the vicinity of Kookynie not much alluvial gold has been found, but near Tampa a considerable amount appears to have been obtained, judging by the extent of the areas that have been dry blown, and by the reports of finds in the early days.

Comparison with Niagara.—The salient geological features of the Niagara district were described in the Annual Report for 1914, so that they have not been recapitulated here. A few remarks, however, by way of comparison between the Niagara district on the one hand, and the districts of Kookynie and Tampa on the other, may not be out of place.

In its general geology, the Niagara area is characterised by greenstones with numerous small granite areas, and by an abundance of aplite-pegmatite dykes and later porphyry or porphyrite dykes. Many of the granitic rocks are so foliated that they must be classed as gneisses. The strike of the foliation varies, but in the main it is east-north-east and north-east, and the major quartz reefs conform to these directions with a southerly and south-easterly underlie. Near the Niagara Railway Station the reefs swing round much more towards the north and have an easterly underlie. The Kookynie and Tampa districts on the other hand are characterised by large areas of greenstone and massive granite with little gneiss; and by few aplite-pegmatite and the later porphyry or porphyrite dykes. There are, however, a moderate number of quartz porphyry dykes or sills associated with the apparent rhyolite flows and tuffs. (These rhyolitic rocks are absent from the Niagara district.) The majority of the quartz reefs have a more or less north and south strike with an easterly underlie. Both areas show a number of reefs at or close to the junction of the granite and greenstone.

Some results of the Survey.—Certain results of the survey may be stated, although these will be more elaborated in the final report.

(1) Emphasis may be laid on the value of junctions (or their immediate vicinity) of granite and greenstone for the occurrence of auriferous quartz reefs. The survey strongly confirms previous knowledge as to the Western Australian goldfields on

this point, and shows how important it is that prospectors should seek for such contacts. In places the junctions of the rhyolitic and greenstone rocks have also been proved favourable localities for auriferous reefs.

(2) The occurrence of large and payable reefs in granitic rocks show that this class of rocks may carry hitherto unsuspected possibilities, especially near greenstone areas. No rock should therefore be regarded as barren of payable reefs until prospecting has taken place, although, naturally, preference must be given to certain places, e.g., greenstone areas and the junctions of different rocks.

(3) The occurrence of very numerous reefs which have apparently in many cases been payable auriferous near the surface, is demonstrated.

(4) Apart from the Orion Mine at Niagara and the Cosmopolitan at Kookynie (and perhaps one or two others), the reefs have not been worked to any depth. Consequently it cannot be said that the districts as a whole have received any adequate mining test beyond a shallow depth.

(5) The sources of a considerable amount of the alluvial gold found at Tampa do not appear to have been discovered. The possibility therefore remains of the finding of new lodes in this district.

(6) It appears likely that the superficial deposits conceal undiscovered lodes, but, unfortunately, except in rare cases, such lodes (if they exist) are not likely to be found by the prospector.

ALBANY.

(J. T. JUTSON AND E. S. SIMPSON.)

The main geological features of the Albany district have been described by Mr. Gibb Maitland, Government Geologist, in Bulletin No. 26 of the Geological Survey. Some additional observations have, however, been made, which bear on both the geology and physiography of the district.

The fundamental rock of the district is a granite, which varies in texture from fine to coarse-grained, and is frequently porphyritic. Its constituent minerals are quartz, feldspars (microcline and oligoclase), hornblende, and biotite. It forms the high hills, the islands, and many of the sea cliffs, besides underlying the sedimentary rocks of the district. Its surface is extremely irregular, rising in places in huge domes, from which the rock is exfoliating on a great scale, and elsewhere being below sea-level. This result is at least largely owing to its long exposure to the eroding agents. It is traversed by numerous dykes and veins of pegmatite, basalt, and dolerite, of varying width from less than an inch to many yards.

In the hollows of the granite a series of marine beds has been laid down. These beds now form a low plateau to the north and north-east of Albany. The fossils found in these deposits (which are still practically horizontal) comprise mollusca, bryozoa, echinoids, and abundant siliceous sponges. Sufficient satisfactory material has not yet been collected to definitely determine the age of these sediments, but there is no doubt that they belong to the Tertiary period, and the presence in them of the cephalopod *Aturia australis*, whose range in Victoria is from Oligocene to Lower Pliocene, fixes their age within comparatively narrow limits. Similar beds occur over many portions of southern Western Australia, and

they will probably be found to be all of the same general age. Those in the vicinity of Albany have been named by the authors the "Plantagenet Beds," and they extend at least as far east as Bremer Bay.

Between the Southern Ocean and Princess Royal Harbour is a high, steep, serrated ridge, the backbone of which is granite, the surface, however, in many places being the coastal limestone. This latter rock represents calcareous sand dunes—now consolidated—which have been blown from the seashore on to the granite ridge.

The recent deposits include the silt and infusorial earth now being laid down in swamps and lakes, the present-forming sand dunes, and the sands of the bars along the coast.

Recent changes in the position of sea and land are strikingly illustrated at Albany. The Plantagenet beds show that during their formation the sea covered wide areas in the southern portion of Western Australia, with numerous islands and islets of granite projecting above the ocean. Uplift later took place, and as a result, the area occupied by land was greater than at present, probably extending over the present sites of Princess Royal and Oyster Harbours and King George's Sound, and even farther southwards. The King and Kalgan Rivers incised or deepened their channels on the new land surface, uniting into one stream below their present mouths, and probably passing between Bald Head and what is now Breaksea Island before entering the ocean.

Long, however, before the drainage basins were reduced to base-level, a positive earth movement occurred, by which the united King-Kalgan River, and the plain over which it meandered were drowned by the sea, and the river bestranded. By such submergence Oyster Harbour was brought into existence, and the present Princess Royal Harbour and King George's Sound (with the various islands of the latter) were formed, but probably at first as portion of a strait, which may have stretched westwards to (the present) Torbay Inlet, through the present Grassmere Valley, leaving the coastal limestone ridge to the south as an island. The then Southern Ocean coast line was also probably pushed to the north.

Since this submergence, the land area has been increased by the natural reclamation from the sea. This has been accomplished by silting, the latter being due to the deposition of stream-borne detritus from the land and wind-borne sand from the coasts, and by the formation, by the action of the wind and of the waves, of sand bars, by which such silting has been much facilitated. The best known example of such a bar is that forming Middleton Beach.

As a result of these agencies, the old Grassmere strait has become restricted to the sea-covered areas of Princess Royal Harbour and King George's Sound, and the entrance to Oyster Harbour has been reduced from a wide mouth to a very narrow one. There is also little doubt that at the time immediately following the latest submergence, there were three entrances from the east to the sea area now occupied by Princess Royal Harbour, but these have now been reduced to one, owing to the building of sand bars, by which the two former islands have now been connected or "tied" to one another and to the mainland to form the peninsula stretching northwards from Frenchman Bay to Possession Point.

THE REPORTED OCCURRENCE OF OIL NEAR
WONNERUP, SOUTH-WEST DIVISION.

(E. DE C. CLARKE.)

Introductory.—The days of May 31 and June 1 and 2, 1915, were occupied in travelling to and examining the neighbourhood of Block 687, near Wonnerup, where indications of petroleum were reported to occur.

Block 687 is about four miles in an E.S.E. direction from Wonnerup Junction, which is six miles from Busselton and 143 miles from Perth. It lies on the Coastal Plain of the South-West which is described by Messrs. Saint-Smith (*a*) and Jutson (*b*). Where uncultivated, the surrounding district is forest-clad. Bordering on the block, however, is a treeless area of about 1½ square miles, covered only with stunted vegetation. The Abba River, a meandering watercourse discharging into the Vasse Estuary, should cross the block in a north-westerly direction, but has no defined course in the part with which this report deals.

Character of "Indications."—The portion of Block 687 from which the most pronounced "indications" are reported, was, until cleared by the owners, covered with the ordinary forest. The surface is almost level with the exception of a low mound known as "the Bank," which rises about six feet above the surrounding plain, and, running in a general north-west and south-east direction for about 18 chains, passes gradually at both ends into the general plain. There is no evidence that "the Bank" marks an anticline or any other geological feature of importance. About 20 chains away from the farmhouse is another slight elevation occupied by a clump of trees and marking an occurrence of "ironstone" (ferruginous laterite), which also is of no significance for the purpose of this report.

Unfortunately, at the time when the visit of a geologist was requested, the "indications" had been almost entirely dispersed by heavy rains. Iridescent seams were pointed out to the writer on some of the pools occupying the course of the Abba River near Wonnerup, and also on the wells near the farmhouse. Some were apparently mobile, but did not, when disturbed, give the "rounded, curved, or convoluted figures" of undoubted oil films. Others were iron oxide films.

As no promising surface "indications" were to be seen at the time of the writer's visit, the following summary of the "indications" observed by the owners may be of some interest:—

"Indications" were first noticed about the end of 1910, when, on sinking well No. 1 to a depth of about 11 feet, a strong "smell of kerosene" was noticed. The water could scarcely be drunk either by man or beast. When a well is first sunk in new ground the water often improves with bailing, but this improvement did not take place in well No. 1. Sometimes the water would be covered with a sheet of oil so thick that a pint could have easily been collected. Moreover oily drops as much as one inch in diameter would often be seen floating on the water. If touched these drops would break up and form either an iridescent seum or chains of minute globules and at the same time a shower of fine red dust would sink to the bottom.

The best "indications" are seen during the hot weather from December to March. The winter rains almost completely disperse them. However, between July and November of each year oil films occur on all the puddles over the area under discussion.

The absence of trees from the area near Block 687 is thought to be due to the evil influence on plant life of petroleum and accompanying saline exudations.

The writer wishes to make clear that while he is not responsible for any of the observations in the last three paragraphs, he believes that they were recounted to him in all good faith. It is true that chemical investigations have failed to reveal any trace of petroleum in strata from these wells, but it has frequently happened in many parts of the world that disagreeable tastes and smells in water draining swampy ground have been mistaken for the taste or smell of "kerosene."

Geological Evidence as to the Possibility of the Occurrence of Oil in the Neighbourhood.—The area dealt with in this report is devoid of geological evidence as to the possibility or otherwise of the finding of oil. Regarding the whole surrounding district, moreover, the geological facts of value in this connection are very few. In Saint-Smith's report (*c*) the neighbourhood of Block 687 is shown to be underlain by recent and post-tertiary sand, clay, and gravel to a depth of one or two hundred feet, beneath which come 500 feet of doubtfully mesozoic rocks—the Donnybrook Beds—but the thicknesses of the respective series are largely conjectural. Underlying the Donnybrook Beds is granite, from which of course no petroleum can be obtained.

According to one widely accepted theory, petroleum and kindred substances originate most frequently, if not always, from the natural distillation of coaly matter. In support of this theory it is frequently found that the strata of a proved oil-bearing locality are devoid of coal seams, whereas if the same beds are examined in a neighbouring area where barren of oil they will prove to contain coal seams or traces of vegetable matter.

Thin seams of coal were cut, but no trace of oil or gas was recorded in any of the bores put down in this district.

Again, it is known that coal occurs in the Donnybrook Beds further east (*d*). It is, therefore, rather unlikely that in or near Block 687 those coal seams, which exist unaltered both to the east and to the west, will have been changed to petrolaceous substances.

Beds of the same character and probably of the same age occur in the Blackwood River District, and despite a good deal of effort have not been proved to be oil-bearing (*e*).

Summarizing, geological evidence as to the possibilities of oil occurring in or near Block 687 is, in the absence of outcrops and of bores in the immediate neighbourhood, very scanty. What little there is, is unfavourable.

Method of collecting Samples.—The collecting from the most favourable localities of fresh, reliable samples for analysis was undertaken. A new well was dug by the owners to a depth of 11 feet; a hole was bored by hand to a further depth of 11 feet.

(*a*) G.S.W.A. Bull., No. 44, pp. 8, *et seq.* (*b*) G.S.W.A. Bull., No. 61, pp. 41, 171, *et seq.*
(*c*) Loc. cit., Plate II. (*d*) G.S.W.A. Bull. 44, pp. 25, *et seq.* (*e*) G.S.W.A. Bull. 65.

Samples of the material sunk and bored through were taken. A bore was also put down from the bottom of No. 1 well a further 11 feet and the borings kept.

If oil is sufficiently abundant in these beds to exude in summer time to the extent reported above, we should expect that the piercing of hitherto untouched strata would, even in winter, liberate a noticeable amount more particularly as the clay passed through in both bores was well suited to prevent the escape of oil and so would presumably have kept considerable quantities sealed up.

After 12 hours the water which had collected in Well No. 4 showed such a very slight film that no satisfactory sample could have been taken. The owners, however, after allowing the material to accumulate for some days, obtained the sample of water which is reported on below.

Portions of a sample of sand and clay from Well No. 2 had been treated by Mr. M. A. Browne, at Ravenshorpe, and had yielded an appreciable amount of a substance which appeared to be a hydrocarbon. Mr. Browne records, however, that the sample had been moistened with water from No. 1 Well on which oil was said to have been floating at the time. Through the kindness of Mr. Browne the balance of this sample was secured for further examination and is referred to in Mr. Simpson's report as "Browne's sample."

In conclusion, I wish to record my thanks to the owners of Block 687 for their courtesy and ready help, both in giving information and in carrying through the resampling of the supposed oil-bearing rocks.

APPENDIX.

On Samples of supposed Petroleum-bearing earths and water from Wonnerup.

(E. S. SIMPSON.)

The samples submitted consisted of five lots of wet sand and sandy clay from shallow depths and a sample of water from a well sunk in the same.

There were no visible indications of petroleum residues in any of the samples.

Since liquid petroleum consists largely of oils which are volatile in the air at the ordinary ground temperatures reached in the day time in this locality, it is highly improbable that any liquid petroleum should exist in moderately porous earths obtained so near to the surface. Had petroleum at any time, however, penetrated into this earth, it would have left behind one or other of those non-volatile residuals, paraffin wax or asphaltum. Experiments were therefore made with a view to extracting any such residual and determining its nature and amount. Quantities of earth were taken such that one part per million of asphaltum or paraffin wax might be recognised. Three common solvents were available for extraction, viz., carbon bisulphide, ether, and petroleum spirit. Paraffin wax and liquid petroleum are completely and readily soluble in all three, asphaltum is completely soluble in carbon bisulphide, whilst ether and petroleum spirit dissolve from 40 to 100 per cent. by weight of this substance. At the same time it is to be remembered that all three are powerful organic solvents capable of dissolving many oils, resins and other substances of vegetable and animal origin, such as have been proved to exist in many soils.

For various reasons carbon bisulphide was not used as a solvent, but all five earths were extracted by both ether and petroleum spirit, and the extracts evaporated at room temperatures to recover any dissolved matter. No trace of petroleum or either of its typical residuals was found in any of the five earths. The five samples tested were marked 516C, 517C, 518C, 519C, and "Browne's sample." The last-named enclosed in its midst a dirty cork, which may or may not at some time have come in contact with a vegetable or animal oil.

No indication of petroleum or petroleum residues could be detected in the water sample, which, however, was greatly contaminated by dead and dying animal and vegetable matter.

MEEKATHARRA.

(E. DE C. CLARKE.)

As anticipated the correlation of the various rock-types obtained during the progress of the survey of the Meekatharra District has been a matter of considerable difficulty, and necessitated a brief re-visit to the field at the end of 1915.

The greater part of my own time while at headquarters was spent in collecting statistics, old records, etc., and in the preparation of plans, geological maps, and figures. Of these, about fifty have been handed to the draughtsmen, and are now practically ready for the printer.

The following notes are supplementary to the account of the geology of the Meekatharra District, published in the last Annual Report (pp. 23, 25), and state briefly the most important modifications of the views there expressed:—

Broader Geological Features.—The sketch map illustrative of the country surrounding Meekatharra has been extended to cover the whole of the area contained in lithograph 59/300 of the Department of Lands and Surveys. This map will be published on a scale of four miles to the inch, and will form one of the new series of maps on this scale. The western portion of this map covers country which has been little, if at all examined geologically, and is therefore from the geologist's point of view largely blank.

Work done in the north-east corner of this sheet by Mr. H. W. B. Talbot necessitates the addition of a fourth major group of rocks, consisting of steeply dipping and somewhat metamorphosed Sedimentaries to the three (Granite, Greenstone and horizontal Sedimentaries) referred to in the 1914 Annual Report.

Mr. Talbot considers that the Steeply Dipping Sedimentaries are the same as the Altered Sedimentary Rocks, and the Horizontal Sedimentaries the same as the Carboniferous (or Devonian) rocks of his report on the country between Wiluna, Hall's Creek, and Tanami (G.S., W.A., Bulletin No. 39).

Geology of Special Area.

GARDEN GULLY CENTRE.

Owing to the extremely decomposed state of the schistose rocks no very definite results are as yet available regarding their micro-structure and probable origin. The occurrence in this area of greenstones of two ages has been confirmed.

The younger massive greenstones are of considerable interest—presenting as they do, striking similari-

ties to rocks from Kalgoorlie and showing gradation in composition from serpentinised peridotites to dolerites.

MEEKATHARRA CENTRE.

A.—*Acid Rocks.*

1. *Granite.*—No fresh evidence for the existence of the two distinct varieties suggested in my last report having been obtained, that subdivision of the granite will probably be abandoned. However, some additional field work shows that between Yaloginda and Nannine—outside the area dealt with in detail—there occurs a biotite-microcline granite which closely resembles the Southern Cross granite, whereas hornblende-granite is the characteristic acid plutonic of the Meekatharra District.

2. *Porphyry.*—(i.) Paddy's Flat Dyke.—Mr. Farquharson has made a very extensive study of specimens from different portions of this important dyke, and finds it to be in the main an albite-quartz-porphyry. At its northern end it apparently undergoes very considerable modification in structure and composition. The discussion of this must, however, be left for the detailed report.

(ii.) Savage's Dyke proves to be a granite-porphyry.

(iii.) Beverley Dyke.—Microscopic examinations of the rock belonging to the supposed southern extension of this bar have enabled Mr. Farquharson to pronounce definitely that it is not a porphyry. The Beverley Dyke must therefore be considerably shortened.

(iv.) Haveluck's and Ralph's Bars are undoubtedly acid intrusives, but nothing further regarding their affinities can be asserted owing to their highly decomposed state where at present accessible.

B.—*Basic Rocks.*

1. *Dolerite.*—Microscopic work supplemented by observations in the field has considerably modified the mapping of the basaltic dolerite, which is extensively developed in the Ingliston Extended G.M. Rocks occurring north of the Ingliston Extended, identified in the field as dolerite, are now definitely proved to be something entirely different—and the microscope has also upset generally accepted notions as to the southward extension of the dyke, which has now been proved to cut across to the west side of the main lode channel near the Ingliston United workings, and then (with considerably less certainty) to resume its old course parallel to the lode channel.

2. The rocks tentatively classified as "Gabbro, etc." in the 1914 Annual Report, prove to be doleritic in character, and presumably are of the same period as the younger greenstones of the Garden Gully Centre.

3. There has been proved to exist to the east of the "Paddy's Flat" Belt a very considerable development of basic flows and tuffs. In part these rocks are but slightly affected by metamorphic agents, but in the belt itself they have been profoundly altered, and will be briefly referred to in the next subdivision.

C.—*Metamorphic Rocks.*

The remarks under this heading in the last Annual Report may be modified into the following general

statement. Most if not all of the metamorphic rocks of the Meekatharra Centre were originally basic volcanics—mainly fragmental. The majority of the fragmental rocks were rather fine-grained breccias, but a few very fine-grained ash beds are also represented. To the wide-spread alteration induced by dynamic metamorphism has been added in certain restricted zones, thermo-metamorphism consequent on the intrusion, at different periods, of the Paddy's Flat and other acid dykes and of the dolerite dyke. The acid intrusives or the hot solutions accompanying them were responsible for the alteration of the sheared breccia to fuchsite-carbonate rocks. The dolerite dyke has caused the alteration of its neighbours to a rock which bears a close resemblance to a peridotite.

The determination of the origin of the metamorphic rocks has been a difficult task, but from the present state of our knowledge it seems improbable that the fuchsite-carbonate rocks are as formerly thought, metamorphosed peridotites.

YALOGINDA CENTRE.

Beyond recording the confirmation by microscope work of the existence of several dykes of quartz-porphyry and allied rocks in this locality, and the discovery of a serpentinised peridotite at the old Karangahaki Mine nothing need at present be added to last year's account.

With the consent of the Minister for Mines, the notes for the address delivered in December, 1914, at Meekatharra, on the geology of the district, were published in the April number of the Journal of the Chamber of Mines of Western Australia.

THE NORTH END (KALGOORLIE).

(F. R. FELDTMANN.)

Owing to the more urgent need for geological work at Bulong, etc., the final report on the North End of Kalgoorlie has been unavoidably delayed, but is now practically completed.

In addition to the detailed maps on a scale of 100 feet to the inch, a map of the North End covering a larger area, viz., about five square miles, has been prepared on a scale of 10 chains to the inch. This map shows, in addition to the main geological features, contour lines at 10 feet intervals; for this purpose the contours shown on the map published by the Survey in 1902 have been thoroughly revised, whilst that portion of the area, mapped on the 100 feet scale, south of the Kanowna railway, has been re-contoured, owing to the extreme accuracy required for sections on so large a scale.

THE ROCKS.

The petrological examination of the rock specimens previously collected has now been completed, as well as that of a number collected over a wide area by Mr. Farquharson and myself, during the year, with a view to throwing further light on several doubtful points; it is therefore possible to give a detailed, and, it is hoped, final classification of the rocks of this portion of the Kalgoorlie field. The present

classification is a slightly modified form of that given in the Annual Report for 1914, extended to include the rocks of the area shown on the 10-chain map.

The classification now decided on is as follows:—

ROCKS OF THE NORTH END.

	Original Rocks.	Present Form of Rocks.
I.—Lavas (Older Greenstones)	Lavas	Fine-grained amphibolites [epidiorites (b)].* Fine-grained greenstones. Calc-schists.
II.—Intrusives— (1) Basic to ultrabasic (Younger Greenstones)	Quartz-gabbros or quartz-dolerites	Amphibolites [epidiorites (a)]. Greenstones. Bleached greenstones. Actinolite-zoisite amphibolites [epidiorites (b)], in part.
	Gabbros or dolerites	Actinolite-zoisite amphibolites [epidiorites (b)], in part. Greenstones.
	Hornblende-dolerites	Lustre-mottled amphibolites.
	Pyroxenites	Hornblendites. Talc-chlorite-carbonate rocks.
	Peridotites	Serpentines. Talc-mesitite rocks.
	? (Various)	Fuchsite-carbonate-quartz rocks.
(2) Intermediate to acid ..	Hornblende-quartz-porphyrites ..	Hornblende-quartz-porphyrites.
	Albite-porphyrites	Albite-porphyrites.
III.—Sediments	Sediments	Slaty beds.
IV.—Superficial deposits ..	.. .. .	Laterite. Sand, loam, etc.

* For a description and classification of epidiorites *vide* Teall on "The Geological Structure of the North-West Highlands of Scotland." Memoirs of the Geological Survey of Great Britain, 1907, p. 92.

I. THE OLDER GREENSTONES.

Within the limits of the 10-chain map, the rocks of this series occupy large areas both to the east and west of the main dyke of Intrusive (younger) Greenstone. Unweathered outcrops are not common, but the fine-grained greenstones—this term is here restricted to those rocks composed chiefly of chlorite and carbonates in place of the hornblende and feldspar (or epidote, zoisite, etc.) of the amphibolites—are fairly well exposed on various dumps, and, to some extent, in mine workings in the south-eastern portion of the area; the fine-grained amphibolites which occupy most of the north-eastern and part of the western portions are exposed only on a few, usually weathered, dumps in addition to the very meagre outcrops; the calc-schists are but poorly represented in this area, but reach a much greater development further south. The original forms of this series are rather obscure, but they were most probably lavas.

The Fine-grained Amphibolites.

These rocks vary considerably, but may be grouped into two main types, *viz.*, a very fine-grained, massive, greenish-grey rock showing, in sections, small lath-shaped feldspars, zoisitised in places, in a confused mass of fibrous hornblende and with, usually, the structure of a fine-grained basaltic dolerite; the second type is coarser in grain, the confused structure is more apparent, the lath-shaped feldspars are absent—the rocks consisting of sheaves of their fibrous hornblende needles, sometimes partially chloritised, and numerous small grains of zoisite and

epidote. In some varieties of the second type there is a development of numerous pale spherules usually about $\frac{1}{4}$ inch in diameter and composed of the same minerals as the rest of the rock, but with the zoisite present in greater proportion. This structure may be due to contact metamorphism, being found practically within a belt of about five chains in width round the eastern boundary of the younger Greenstones. From an economic point of view the fine-grained amphibolites may be disregarded.

The Fine-grained Greenstones.

These are fine-grained greenish-grey rocks somewhat paler than the corresponding amphibolites; they are usually massive but not infrequently schistose, particularly in the vicinity of the lode formations; they usually show considerable jointing. A spherular variety is also found in these rocks. As in the amphibolites the spherules are of the same minerals as the ground mica, *i.e.*, chiefly chlorite and carbonates, with the carbonates in greater proportion.

Lode formations are not numerous in these rocks but usually occur near their junction with the younger Greenstones. Although poorer as a whole than the lodes in the latter rocks, fair patches occasionally occur, usually under special conditions; these rocks cannot, therefore, be entirely disregarded.

The Calc-Schists.

These rocks occur within this area only as local modifications of the fine-grained greenstones, usually in the immediate vicinity of the lodes. Chlorite, which is a prominent constituent of the greenstones,

is almost completely absent from the rocks, which are composed chiefly of carbonates, sericite, and quartz.

II. INTRUSIVES (1) *Younger Greenstones.*

The rocks of this series occupy a wide extent of country between the eastern and western belts of the older series. The general strike of this belt is rather less than 30 degrees west of north; its eastern boundary can be followed comparatively closely, though doubtful at some points owing to the similarity between certain altered forms of the quartz-dolerite and dolerite derivatives and the fine-grained amphibolites; the western boundary is entirely obscured by surface deposits, but close examination has shown that quartz-dolerite derivations occur, in places, considerably further west than shown on previous maps.

The rocks of this series vary from basic to ultra-basic in composition, viz., from derivatives of quartz-dolerite or quartz-gabbro to probable peridotite derivatives. As the change from one type to another is usually gradual, the positions of boundary lines between the different members of this series are, to some extent, arbitrary. From their general occurrence in the field I am inclined to the view that the rocks of this series were intruded rather as one mass with considerable local variations in composition, rather than as a series of separate dykes with an interval of time between each. On the whole, at the North End the western portion of the dyke is more acid than the eastern, although small areas of quartz-dolerite derivatives occur along the eastern boundary.

Quartz-dolerite Amphibolites.

Some varieties of this group present a gabbroid appearance, but in the majority of cases the remains of structure shown in section are doleritic. These rocks as a rule occupy the westernmost portion of the Intrusive Greenstone dyke, but at the southern end of the map they extend over the whole dyke, splitting at the southern end of Mt. Gledden—the western branch running northwards through the western portions of the Cassidy Hill, Hannan's Reward, and Mt. Charlotte leases; thence through Mullingar and west of the Golden Zone leases; near the Hannan's North the quartz-dolerite greenstone spreads across to the western edge of the dyke, but north of the former Monte Carlo lease the amphibolite comes in again and continues to the limits of the map. The eastern branch runs between the eastern slope of Mt. Gledden and the western boundary of Williamstown to end apparently before reaching the Bulong-Parkestown road. Other small areas of this rock occur on the extreme eastern edge of the dyke, viz., along the eastern boundary of the Fair Play and in the Euclid and Devon Consols S.E. leases.

The type rock is a fairly fresh medium-grained, massive, speckled green and greenish-white rock, seen in section to consist chiefly of uralitic hornblende, felspar—usually saussuritised—interstitial quartz and some leucoxene; micropegmatite is usually present, but not in such quantities as in the quartz-dolerite greenstone. Other varieties are found, a very coarse pegmatitic variety with large hornblende crystals occurring on the former Eaglehawk United lease at the foot of Mt. Gledden.

But few lode formations occur in the quartz-dolerite amphibolite, and these are extremely low in grade. Some veins of quartz extend from the greenstone into the amphibolite, but these are seldom payable below the limit of the oxidised zone, which in

the amphibolite is usually not far from the surface. In the Kalgoorlie district, therefore, these rocks are practically of no economic importance although in other districts, where the ore-bodies are of a very different type, payable reefs are found therein.

Quartz-dolerite Greenstones.

By the development of chlorite and carbonates at the expense of hornblende and felspar the quartz-dolerite amphibolites pass into the quartz-dolerite greenstones. The passage can be traced through intermediate stages.

The main belt of these rocks starts at the southern end of Mt. Gledden and runs northwards through Cassidy Hill, Hannan's Hill, Mt. Charlotte, thence across the Kanowna railway line, and through the Golden Zone lease, apparently tailing out in the vicinity of the former Monte Carlo lease. Another small belt starts near the southern end of Williamstown and runs north to the small area of quartz-dolerite amphibolite east of the Fair Play.

These rocks are usually of a dark-greenish-grey colour and of medium to fairly fine grain; they are usually massive but frequently schistose. In section, micropegmatite is more common than in the amphibolite and there is much interstitial quartz.

Economically these rocks are of great importance. On "The Mile" they, together with the bleached greenstones, form the country rock of most of the rich lodes. At the north end the Golden Zone lode is the most persistent line of lode in them. Of considerable importance are the two series of cross veins, the one striking about 30 degrees north of east, and varying in dip from 60 degrees to the north to verticality.—the other striking nearly east and west and dipping to the north at about 30 degrees. Both series carry good values, there being little to choose between them. These cross veins have been worked to a very great extent in the Hannan's Reward, Mt. Charlotte Mine, also in the Cassidy Hill, Cassidy North, Maritana and Cunard mines.

Bleached Greenstones.—These are white to pale grey or pinkish rocks, usually of medium grain and somewhat granitic appearance, but characterised by the presence of pyrites in large quantities. Although attaining a large development on the Golden Mile, at the North end they are found usually as narrow bands, a few inches in width, on the walls of the cross quartz veins. They differ from the greenstones chiefly in the almost complete absence of chlorite and the development of pyrite, evidently resulting from the action of sulphur-bearing solutions on the quartz-dolerite greenstones.

Actinolite-zoisite Amphibolites.—The quartz dolerite and dolerite derivatives classified under this heading occupy a comparatively small area. Both in the hand specimen and in section they closely resemble the second type of fine-grained amphibolites and except on the field evidence it is almost impossible to distinguish between them. They are characterised by the development of actinolitic hornblende, whilst the original felspars have been zoisitised and epidotised. A small area of these rocks is found adjoining a small area of quartz-dolerite amphibolite at the western end of Hinemoa Street, and the gradual passage from one rock to the other can be followed. A somewhat larger area occurs between the Hidden Secret and Fair Play mines; this area is partly surrounded by dolerite-greenstone to which specimens of interme-

diate type show its relationship. Although small lode formations occur in their variety of amphibolite, they do not appear to carry payable values.

Dolerite Greenstones.—These rocks are of considerable economic importance, forming, as they do, the country rocks of the Hidden Secret and Fair Play lodes, whilst numerous cross quartz veins similar to those in the quartz-dolerite greenstones have been worked in the Bonnie Play and Red, White and Blue leases. Typical specimens show a comparatively fine grained, massive greenish-grey rock composed of chlorite, carbonates, some sericite, leucoxene and occasionally epidote; the structure is generally indefinite, but traces of an ophitic structure are found; the micropegmatite characteristic of the quartz-dolerite derivatives is entirely absent and there is little or no quartz.

A wide band of this rock extends northwards from Williamstown through the Red, White and Blue, and Devon Consols, to tail out near the Kanowna Railway line. Another small area is found on the Bonnie Play and Fair Play mines.

Lustre-mottled Amphibolites.—These rocks do not actually occur within the limits of the map, but an outcrop was found about 13 chains south of west from the Rifle Range hill. A specimen from this outcrop proved in section to consist of colourless to bluish-green hornblende, epidotised and zoisitised feldspars, and some leucoxene; an ophitic structure was apparent and a fragment of original augite was observed. In the hand specimen these rocks are massive, coarse in grain and of a dark greenish colour and the hornblende crystals show characteristic lustre mottling. They have been described in detail by Dr. J. A. Thomson in his able paper on the "Petrology of the Kalgoorlie Goldfield."* These rocks are of no economic importance.

Hornblendites.

Fairly fresh hornblendites are found near the eastern edge of the Younger Greenstone dykes, at the northern end of the Fair Play and the eastern end of the Bonnie Play leases; they occur also to the west of the North End mine. These are massive, dark greenish rocks of medium coarse grain, wholly or almost wholly composed of aggregates of platy hornblende crystals, of a pale greenish colour in section. By the development of talc, chlorite, and carbonates they pass into the next group, which bears a similar relationship to them as the greenstones to the amphibolites. They are of no economic importance.

Talc-Chlorite-Carbonate Rocks.

These rocks are found over a wide area, reaching their greatest development in the more northerly portion of the area mapped. North of the Kanowna Railway line they appear to occupy the eastern half of the dyke. A smaller band starts near the laterite-capped hill south of the Devon Consols, and runs south to the southern end of the Bonnie Play. Another area occurs between the Fair Play and Hidden Secret. These rocks have not, on the whole, proved of great economic importance, although low-grade lodes have been worked therein, for example, the Mystery line, which occurs at the contact with an albite-porphyrityte dyke. In the hand specimen these rocks are fine in grain and of a fairly pale greenish-grey colour; they are soapy in feel and small crystals of carbonate are commonly visible.

Talc-Mesitite Rocks.

These differ from the preceding group chiefly in the marked development of coarse mesitite crystals; their derivation from peridotites is by no means certain. Only one small area of this rock occurs, namely, to the east of G.M.Ls. 211E and 97E.

Serpentine.

The only specimens of serpentinous rocks from this end of the field are bore cores from the old Kapai mine; none were observed in the field, and no area, therefore, can be assigned to these rocks.

Fuchsite-Carbonate-Quartz Rocks.

Narrow bands of these rocks are of fairly common occurrence at the north end. The most persistent runs northwards from the Hidden Secret, where it joins the main lode at depth, west of the Bonnie Play as far as the Transcontinental Railway Line; north of this it has not been traced. Another band occurs on G.M.Ls. 211E and 97E to the west of the talc-mesitite rock. So far as can be judged from the oxidised zone, Smith's lode, west of the Mystery is another belt of this rock. Other smaller areas occur frequently associated with the lode formations. Numerous cross quartz veins, usually auriferous, round which the fuchsite scales are thickly aggregated, are a characteristic feature of these rocks. Typical specimens are hard, medium fine-grained, granular, pale green rocks, with numerous veinlets of quartz or carbonates. As regards their origin, these rocks have been put down by previous writers as highly altered peridotites; this is probable in some instances, but as they are found to pass insensibly into the surrounding country, which may be dolerite-greenstone, talc-chlorite, talc-mesitite, or other rocks, the inference is that they are the result of vein alteration of various types—usually pretty basic it is true—and are not an altered form of any one rock. Their close association with dykes of albite-porphyrityte is at least suggestive.

(2.) *Intermediate to Acid Intrusives.*

Although at Kalgoorlie there is but little evidence as to the relative ages of the hornblende-quartz-porphyritytes and the Younger Greenstones, at Bulong and elsewhere, where exactly similar rocks occur, the former are undoubtedly later than and intrusive into the latter.

The Albite-porphyritytes are found to intrude the Younger Greenstones as dykes of varying size and shape.

Hornblende-Quartz-Porphyritytes.

A wide band of these rocks occupies the low-lying ground to the west of the town, only a small portion coming within the limits of the 10-chain map. These rocks vary considerably in appearance and composition, but typical specimens show a dark-greenish or brownish-grey ground, with numerous white feldspar phenocrysts and occasional blebs of quartz; hornblende phenocrysts are fairly common in section, but are seldom visible in the hand specimen. At Bulong, where outcrops of these rocks are common, specimens from the one dyke show marked variation. In the hand specimen some closely resemble the next group and point to a possible connection between the two.

* Quart. Jour. Geol. Soc. Vol. LXIX., 1913, pp. 639, et seq.

Albite-Porphyrites.

These rocks are of commoner occurrence at the North End than was previously suspected. Outcrops are infrequent and close examination is necessary to distinguish the weathered rock from highly decomposed varieties of the greenstones. The largest dyke is that mentioned in Bulletin 51 as running through the Hyman, Mystery, and Lone Hand leases; it widens greatly to the south to approximately nine chains near the Transcontinental Railway, where it is exposed at the western end of the cutting; before leaving the Milanese lease it appears to split, one branch running through G.M.L. 213E, the other through the Red, White, and Blue G.M.L. 1228E, Raven's lode occurring on the east side of the dyke. Other large dykes occur, one east of the old Kapai shaft, and a series between the Mt. Charlotte-Reward Mine and Williamstown. Several smaller dykes are known and the presence of others is suspected. In the hand specimen these are fine-grained, hard, gritty rocks of a pale greyish or pinkish colour, and showing a blocky structure in the mass. They are composed largely of albite-felspar, with some quartz and frequently a little hornblende or chlorite. Both phenocrystal and non-phenocrystal varieties occur. These rocks are frequently associated with the ore bodies at the North End.

III. SEDIMENTS.

These are found only at the extreme north-east corner of the area mapped, being best exposed at the "Phoenix" brick pits, where they occur as weathered slaty beds with a slight westerly dip. They have so far proved of no economic importance.

IV. SUPERFICIAL DEPOSITS.

These have been described in previous reports and need not be discussed here.

THE ORE DEPOSITS AND GRAPHITIC SCHISTS.

"Jaspers" and graphitic schists are of common occurrence within this area—the former usually passing into the latter at depth. These bodies are sometimes of extreme length, as, for instance, one which starts south of the junction of the Bulong and Parkestown roads and runs northwards through the Lucknow, Devon Consols, Union Club, and Ivy leases to cross the Broad Arrow Road near the north corner of the former Sir John lease, and continue in a north-westerly direction beyond the limits of the map. Most of the gold from the Devon Consols was obtained on the western wall of this "Jasper," good patches occurring at its junction with flat cross quartz veins.

On the whole these rocks themselves are seldom auriferous, but are frequently associated with the ore-bodies. They are found both in the Older and Younger Greenstones and the albite-porphyrite, being usually closely associated with the latter, and sometimes with the fuchsite-carbonate-quartz rock. The origin of the graphite is by no means certain—it may have resulted from the decomposition of gaseous hydrocarbons or have been deposited from solutions. The graphitic schists frequently have an impoverishing effect on adjacent ore-bodies, but this is not invariably the case.

The Ore Deposits.

In such a brief report as this little can be added to what has already been stated in the previous Annual

Report, or has been mentioned in dealing with the various rock types, since a more detailed account would involve the description of individual deposits, which will be fully dealt with in the forthcoming Bulletin. It will have been noticed, however, from remarks made when dealing with the rocks that while the amphibolites are of practically no economic value, their altered products—the greenstones and their bleached variety—form the country rock of practically all the rich deposits.

THE MAGNESITE DEPOSIT AT BULONG,
N.E. COOLGARDIE G.F.

(F. R. FELDTMANN.)

The following is a brief description of the geology of the country between the town of Bulong and the western edge of Lake Yindarlgooda. Altogether about 40 square miles of country were mapped, and as the work was carried out in considerable detail and a large number of rock specimens were collected, there is material for a much more complete account of the geology of this area—illustrated by maps, etc.—than it is possible to give in the present account.

GENERAL GEOLOGY.—The mining township of Bulong is situated in the North-East Coolgardie Goldfield, about 19½ miles east of Kalgoorlie and 2½ miles west of the western edge of Lake Yindarlgooda. It lies in a greenstone complex, consisting for the most part of serpentine—derived, probably, from augite-peridotite,—gabbro, amphibolite—from gabbro,—together with occasional local developments of talc rocks. The various members of this complex occur so closely associated with each other in the field as to suggest that they represent local variations of a basic magma intruded as one mass. On this question it is hoped that petrological examination will throw further light. To separate the various members of this group for purposes of mapping is a matter of considerable difficulty, and the position of boundary lines between them would be largely arbitrary. On the whole the easternmost portion of the area occupied by these rocks is the most basic, being chiefly composed of serpentine with which the magnesite is invariably associated. The typical serpentine of this area is a dull, dark-greenish, almost black rock, fine in grain, which can be scratched with a pocket-knife.

East of the main greenstone area is a series of schistose rocks, apparently of clastic origin, associated with bands of conglomerate similar to those near Kurrawang. The usual strike of these rocks is approximately north and south, and they dip steeply to the west at varying angles. The extreme western edge of the lake forms the boundary between the greenstones and the conglomerate series. The relationship between this series and the greenstone cannot be discussed in the present report, but will be gone into fully in the more detailed account.

Intruding the greenstones are several large dykes also with an approximately north and south strike. The typical rock forming these dykes is fine in grain, grey in colour, and usually shows well-developed felspar phenocrysts; but specimens, even from the one dyke, vary considerably in texture, colour, and general appearance. Such specimens as have been ex-

amined are described by the petrologist as hornblende-quartz-porphyrates.

In addition to these large dykes are several small east-and-west dykes of a hard, dense, fine-grained, black rock which is also described as a hornblende-quartz-porphyrate, but with andesitic affinities: the black colour is due to a very fine dust disseminated throughout the rock, even through the felspar phenocrysts. These small dykes are probably closely related to the larger north-and-south series.

At and near the junction of the greenstones with the conglomerate series are a number of large white "buck" quartz reefs occurring as short thick lenses. Some of these reefs strike nearly north and south; others approximately east and west. Colours of gold are said to have been obtained from some of them, but in common with similar reefs in other gold-mining centres they may be disregarded as gold propositions.

THE MAGNESITE DEPOSITS.

The main area of magnesite-bearing country is situated with its northern boundary about $2\frac{1}{4}$ miles due east of the town, in a basin elongated approximately in a north-and-south direction and parallel to the western lake edge. This basin lies between a broken series of small steep hills fringing the lake and a well-developed and much higher ridge rather more than a quarter of a mile west of the lake; this ridge forms the southern portion of a range extending northwards practically to the Taurus group of leases, between three and four miles north-east of Bulong, the range being joined at a point about $1\frac{1}{2}$ miles north of the Government Tank by another ridge running in a south-south-westerly direction about half a mile east of the town. The ridge forming the western boundary of the magnesite area runs south for a considerable distance; at the southern end of the basin, about three miles south-east of Bulong, it widens out to a complex of hills, but further to the south it gradually becomes less defined and appears to find its most southerly expression in Mt. Magnetic, about five miles south-east of Bulong.

The main area of magnesite country has a length of a little over two miles; it varies considerably in width, from roughly 25 chains at its northern end to about 10 chains near its southern end, but probably averages about 18 chains—the total area being slightly under 300 acres. Other smaller magnesite areas occur, chiefly to the north of the main area—one about a mile to the north, occupying a basin of, roughly, 80 acres in extent.

The magnesite occurs, for the most part, as short irregular veins, of varying thickness, in the serpentine rock; in places these veins are so numerous as to practically form a stockwork; being less subject to weathering than the surrounding rock and of a dazzlingly white colour, they stand out conspicuously above the surface of the ground. In a few instances the mineral occurs as a surface "cement"; in this case it is usually more discoloured than in the veins. It probably corresponds to the travertine so commonly associated on the fields with the amphibolitic greenstones. The only place where this magnesite cement occurs to any great extent is an area of about 20 acres immediately to the south of the large creek near the northern end of the main area of magnesite country. This surface covering is, at the most, probably only a few inches in thickness, passing below

this into irregular veins such as those already mentioned.

The magnesite probably results largely from the action of carbonated vadose waters on the serpentine rock, though it may, in part, have been formed during the alteration of the original constituents of the parent rock into serpentine. In the immediate vicinity of the magnesite veins the surrounding rock is unusually much decomposed.

Possibilities.

At the time of my examination some work had been done at the northern end of the main area immediately south of the previously mentioned creek, several trial parcels having been taken from a small quarry about 150 feet south of the creek. One parcel of 58 tons was sent away during my stay in the district. A small trial hole put down in this quarry to a total depth of about 12 feet from the surface showed the magnesite to continue to that depth; this was the deepest working on the deposit. Seven other trial holes were put down in the vicinity to varying depths during my stay; veins of magnesite up to two feet in thickness were struck in each. The magnesite varies somewhat in quality and picking is necessary. Owing to the irregular nature of the deposit, the complete lack of evidence as to the depth to which it extends, and the fact that a good deal of the area is covered by soil and other detrital material, any estimate as to the quantity of magnesite present is impossible; but, without doubt, there is a very large quantity of material carrying over 90 per cent. of magnesium carbonate. When I left the district five men were engaged by the interested company in working the deposit, and it was proposed to open up the quarry and work the material over a wide face and give it a trial on a large scale. Its distance from manufacturing centres is the chief obstacle to successful working of the deposit, but owing to the very great quantity of high-grade material present, I consider that, if worked on a large scale, there is every possibility of its proving a payable proposition.

Other Deposits.

South of those previously referred to no other deposits of magnesite were seen by the writer—other than occasional small boulders—and from the nature of the country it is not likely that such occur. A few small patches, negligible from an economic point of view, were observed to the north of those mapped, and it is possible that others occur in the vicinity of Taurus, though not of sufficient size to be of any value.

Prospecting operations in search of the mineral should be confined to the serpentine rock. An additional guide, where the rock is obscured by surface *débris*, is the growth of ti-tree, usually associated with spinifex, which appears to be characteristic of the magnesite country. A capping of siliceous lateritic material, largely composed of common opal, on some of the small hills, is also characteristic.

The Properties and Uses of Magnesite.

Magnesite is a carbonate of magnesium ($MgCO_3$); it is usually snowy-white in colour, fine in grain, and possesses a flat conchoidal fracture. Its hardness, according to Dana, is 3.5 to 4.5, and its specific gravity 3.0 to 3.12, being greater than that of calcite (2.714), quartz (2.653 to 2.66), and kaolin

(2.6 to 2.63). Weathered surfaces of the mineral present a characteristic appearance, showing usually either a number of small, rough, jagged points or a strong resemblance to a cauliflower.

The mineral is used in the manufacture of carbon dioxide (carbonic acid gas), for which purpose it is superior to the carbonate of lime. By the conversion of the carbonate to the sulphate of magnesium, Epsom salts are produced. The manufacture of refractory bricks and furnace linings, largely used in the basic process of manufacturing steel, is another use to which the mineral is put—for this purpose the presence of silica is undesirable. Another very important use is the making of oxychloride cement—a mixture of the oxide and chloride of magnesium in the presence of water—for tiles, flooring, etc.; the presence of lime is prejudicial to the durability of this cement.

GEOLOGICAL REPORT ON THE CANNING RIVER DAM SITE, No. 2.

(F. R. FELDTMANN.)

The proposed alternative dam site on the Canning River is situated near the western boundary of Loc. 558 in the hills, five miles east of Kelmscott as the crow flies, and about eight miles following the course of the river.

SURFACE FEATURES.

At the proposed site the hills rise directly up from the bed of the river, which here runs in a general north-westerly direction. Above the site the hills diverge to form a comparatively wide basin. At the site the northern bank of the river is the steeper, with an average slope from the top of the hill of about 20 degrees, whilst the slope of the southern bank is about 12 degrees; this bank, is however, somewhat flatter near the river.

The slope of the present surface on both sides is fairly even, the slight irregularities of the original rock surface being hidden by detrital material consisting of clay and sand, with occasional boulders; the latter, which are frequently of large size, have apparently in some instances rolled some distance before finding their present resting-places, as boulders of greenstone are found resting above a bed-rock of granite and *vice versa*. This detrital material is overlaid by a covering of red soil, usually from 1 to 6 feet in depth, but averaging between 3 and 4 feet. The total depth of superficial material varies from nothing up to 26 feet 6 inches (trial hole No. 18), averaging about 10 feet.

THE ROCKS.

Occurrence.—On the northern side of the river the greater portion of the area covered by the proposed site is occupied by a greenstone dyke to which the more scientific term "dolerite" is applicable, and which here strikes approximately north and south, the middle portion of the upstream face of the site being almost entirely in dolerite. South-west of the river the dyke extends to about the 1100-foot peg on the centre line of the site.

Between the 1,100-foot and 950-foot pegs is a narrow belt of gneissic granite (or granodiorite) running north-west and south-east, dolerite occurring again on the south-western side of this belt. The dolerite was observed to occur south of the 900-foot peg, but was not mapped beyond it. As is the general case in the Darling Ranges, the main country

rock is granitic in character, the dolerite occurring as dykes in it.

As already mentioned the rocks are largely obscured by soil and detrital matter, outcrops occurring only sparsely within the area occupied by the site, whilst in many instances apparent outcrops prove, on examination by boring, to be only boulders which have either rolled down from the higher ground or been carried down by the stream when at a higher level; these boulders are apt to be misleading when mapping the rock boundaries. On my first brief examination it appeared as though the upstream face of the site was in dolerite approximately from about 1,070 feet to 1,400 feet from the datum peg, with the eastern boundary of the dolerite running very close to the face north of the river. Unfortunately, diagonal bores (Nos. 4 and 5) under the river disclosed the presence of granite occurring either as a small entangled block, or as a tongue, possibly running northwards from the previously mentioned granite belt. From an engineering point of view the presence of this granite mass, if a tongue, is extremely undesirable—junction lines between two rocks, even when both are of igneous origin and fairly similar in grain, being always possible lines of weakness—the bore cores, however, disclosed no signs of faulting or other results of severe dynamic action. The dolerite on the western boundary of this small granite area showed signs of shearing but not to any great extent, and apparently no serious dynamic action has taken place along this boundary.

No actual junction of the two rocks was observed at the surface within the area of the site, but a good example occurs at a point about 250 feet south of where the upstream face crosses the river. There appeared to be no faulting or shearing along this junction, which can be seen fairly plainly, both rocks outcropping at the surface.

Character.—The dolerite is, on the average, a medium and fairly even-grained, very hard, compact, dark greenish rock, fresh even at the surface, and consisting chiefly of augite and basic plagioclase feldspar. The bores showed the dolerite to be amphibolised in places and of apparent dioritic character in those specimens where the feldspars were present in large proportion. In the amphibolised rock the feldspar is usually epidotised. Close to its junction with the granite, the dolerite is finer in grain and pressure, probably assisted by pneumatolytic action, has converted it into a biotite-hornblende schist. Neither of these types of alteration should seriously affect the strength of the rock.

The granitic rock varies a good deal in texture, relative proportions of its mineral constituents, and general appearance. It is usually a pale grey rock, with narrow, stringy, darker bands, and is distinctly gneissic in appearance. It consists chiefly of feldspar, quartz, hornblende, and biotite. In places the rock is much coarser in grain, darker in colour, and presents a more speckled appearance, the hornblende being present in far greater proportion, with a corresponding diminution in the amount of quartz; this variety possesses the features of a diorite, both in the hand specimen and under the microscope. As a whole, the granitic rock may be described as a gneissic biotite-hornblende-granite, merging into a biotite-quartz-diorite. As a general field term the name "granodiorite" may be used. Microscopical examination shows that the gneissic structure is most probably due to pressure at depth prior to or contemporaneous with

the consolidation of the rock, and is not the result of subsequent dynamic action. It is, therefore, no sign of weakness in the rock.

THE BORES.

The general object of the boring was to test—

- (1.) The depth of superficial material;
- (2.) The nature of the rocks at different points;
- (3.) The degree and depth of weathering, if any, of the rocks; and
- (4.) The occurrence, or otherwise, of faulting, shearing, or jointing in the rocks at possible points of weakness.

(1.) The diamond drill bores and the survey party's trial holes prove the superficial matter to be, as a rule, of no great depth, the average being about 10 feet, whilst a depth of 20 feet was exceeded only in three instances, the greatest depth being 26 feet 6 inches, obtained in trial hole No. 18 already mentioned.

(2.) As regards the nature of the rocks, the boring enabled me to modify considerably the first rough sketch map drawn on the positions of apparent outcrops, and disclosed the presence of a small granitic block or tongue under the centre of the upstream face of the site.

(3.) Both the dolerite and the granodiorite show but little weathering near the surface, and the former, in particular, appears to be as fresh at its outcrops as at the bottom of the bores.

(4.) At the most likely points of weakness, viz., the boundaries of the two rocks, there were no signs of faulting or serious jointing or fracturing, although there is slight shearing and alteration of the dolerite for about a foot from the junction.

CONCLUSIONS.

Although the necessity for haste in carrying out the work made it advisable to restrict the bores to a number somewhat less than was theoretically desirable, that portion of the site which would be subjected to the greatest degree of stress has been fairly well tested.

Examination has shown that—

- (1.) The surface material is not of sufficient depth to cause excessive expense in clearing the site;
- (2.) The rocks themselves are comparatively fresh, exceedingly hard and tough, and should prove strongly resistant to pressure;
- (3.) Junction lines between the two rocks—*theoretically always possible lines of weakness—do exist within the area occupied by the site, and that at a point which would be subjected to the greatest pressure. As already stated, this is a very undesirable feature, although the bores have not disclosed faulting or extensive shearing at the point. Nevertheless, I do not consider it a serious objection to the site, taking into consideration the fact that it appears to be the most suitable in every other respect. It might be possible, however, to shift the site about fifty feet further downstream, but that would bring the toe of the dam over another junction line;*

- (4.) The rocks being both of igneous origin and not dissimilar in texture, hardness and comparative freshness, differential settlement is unlikely;
- (5.) Both rocks being very close-grained, there is no danger of seepage so long as fissures are absent.

Before a final decision can be arrived at with regard to the suitability of the site, it will be necessary to clear away the surface debris and expose the unweathered rock.

To sum up the available evidence, taking the geological features of the site, as disclosed by the boring and surface examination, in conjunction with its excellent position in all other respects from an engineering point of view, the balance appears to be in its favour. I might state that, judging from the general geological features of the district, it would be difficult to find a possible site entirely free from dolerite intrusions.

APPENDIX.

List of Bores at No. 2 Dam Site, Canning River.

No. 1 (vertical)—

0' to 61' 10". Fresh dolerite.

Rock Sections—

0' 6" Coarse-grained ophitic dolerite.
38' A coarser-grained and more felspathic variety of above.
61' A transition to a more epidioritic form.

No. 2 (vertical)—

0' 0" — 1' 9" Decomposed pegmatite (boulder).
1' 9" — 18' Clayey material.
18' — 19' 3" Pegmatitic granite, and pale granite (boulders?).
19' 3" — 21' 3" Clayey material.
21' 3" — 41' Amphibolite (amphibolised dolerite).

Rock Sections—

21' 6" Quartz epidiorite.
40' 6" More felspathic facies of above.

No. 3 (vertical)—

0' — 10' 6" Clayey material.
10' 6" — 33' Fresh dolerite (probably largely amphibolised).

Rock Sections—

26' Amphibolised gabbro (intermediate in structure between dolerite of No. 1 Bore and epidiorite of No. 2 Bore).

No. 4 (underlay — dip $46\frac{1}{2}^{\circ}$)—

0' — 17' Boulders and clay (open cut).
17' — 57' Dolerite.
57' — 58' Biotite-hornblende schist.
58' — 97' Gneissic granodiorite.

Rock Sections—

- 56' Fine-grained amphibolised and chloritised dolerite, with sub-ophitic structure, some pyrite present.
 58' Very fine-grained highly epidotic biotite-hornblende-schist.
 58' 3" Highly felspathic hornblende-biotite granite or quartz-diorite.
 62' Do. do. Partially epidotised.
 97' Gneissic granite.

No. 5 (underlay — dip 45° approx.)—

- 0' — 16' Soil and clayey material (open cut).
 16' — 28' Granite boulders and rubble.
 28' — 59' Gneissic granodiorite.
 59' — 61' Fine-grained biotite-hornblende schist.
 61' — 79' 9" Dolerite.

No rock sections.

No. 6 (underlay — dip 45° approx.)—

- 0' — 6' Soil and clayey material (open cut).
 6' — 26' Boulders.
 26' — 26' 10" Clayey material.
 26' 10" — 51' Fine-grained hard dolerite.

No rock sections.

No. 7 (underlay — dip 45° approx.)—

- 0' — 3' Superficial material (open cut).
 3' — 14' Clayey material.
 14' — 17' 4" Granite boulder.
 17' 4" — 27' 6" Clayey material.
 27' 6" — 51' 4" Gneissic granodiorite.

Rock Sections—

- 26' Microcline-quartz pegmatite vein in granulitic quartz-felspar-hornblende-biotite granodiorite.
 42' Basic granodiorite approaching a diorite.
 44' 6" A highly felspathic biotite-granite.

THE OCCURRENCE OF GOLD AT NORTH DANDALUP.

(C. S. HONMAN.)

According to instructions, I visited the locality of the gold discovery at Sexton's Hill, North Dandalup, on the 17th and 18th of May, and made a general examination of the district on the 1st and 2nd of June, and have to report as follows:—

The find is situated in Kronin Brook, just above its junction with the North Dandalup River, and 3½ miles due east of the North Dandalup Railway Station.

The gold occurs in the bed of the creek for a length of less than 100 yards. It is a coarse, flat kind of gold, but not thin enough to be called leaf gold. In a sample of gold obtained by panning off the wash of the creek, five distinct varieties of gold were visible.

(1) The majority is composed of flat pieces, varying in size from ¼ inch down to fly specks. It assayed 950 fine. It is rounded and water-worn at the edges and coated in places with a dark brown to black substance, which was too small in quantity

to be determined definitely. The pieces are tarnished with a brownish yellow stain.

(2) Some solid sub-angular fragments, one of which assayed only 713 of gold in a 1000.

(3) A number of perfectly spherical prills, which resemble the prills which collect in a slag obtained by smelting gold.

(4) One disc-shaped piece, which had the appearance of a button obtained from a gold assay.

(5) Minute fly specks with ragged edges, which are not tarnished like the larger pieces.

The gold undoubtedly occurs in the wash of the creek, most of the pieces being obtained from holes below large rounded outcrops of granite. A colour can be obtained from almost every large dish of wash from these holes. It also occurs in the crevices in the rocks at either side of the bed of the creek.

No tail of fine gold was obtained, only a single colour (sometimes two) being obtained at a time. Above and below the zone of this discovery no gold has been obtained, except an occasional fly speck colour.

From an examination of the surrounding country, there is no indication of the existence of any auriferous lodes in the vicinity, nor is it of such a nature as would be expected to yield payable auriferous deposits. The granite carries a few quartz and pegmatite veins, which are not likely to carry gold. A large crushed buck quartz reef occurs about one mile to the east and striking a little west of north. East of Sexton's Hill the ironstone laterite that universally caps the granite begins to predominate, while to the west it has been denuded away. This laterite capping does not usually carry gold.

In the face of all the evidence, I cannot arrive at any other conclusion than that the gold was put in the creek; but it is certainly water-worn and must, therefore, have been in the creek for a number of years.

The find is well within the boundaries of the late Dandalup Goldfield as declared in 1896, and is 2½ miles a little north of east of the old workings.

According to the Mines Department Statistics, no gold was ever won from this goldfield and the geological formation is certainly not promising for the occurrence of gold.

The country is, however, geologically favourable to the occurrence of tin ore and associated minerals. A trace of tin oxide was found in the tailings from the pannings off of two dishes of wash from Kronin Brook, and molybdenite has been determined in a felspathic phase of a chloritic schist lode in the locality of the old workings.

The creek at the time of my last visit was running a banker, and if any further prospecting should be undertaken I should recommend waiting until the water has subsided and then loaming across the small alluvial flat at the head of the gold find.

YERILLA DISTRICT.

(C. S. HONMAN.)

From the 20th September to the 1st of December, I was engaged on a geological survey of the Yerilla District.

The following is a progress report on the work:—

As the mapping of this district has not been completed, only an outline of the extent of the rock

formations examined will be given, and the geological descriptions left for the complete report.

The Yerilla district includes the mining centres of Yerilla, Edjudina, Pingin, Yundamindera, Eucalyptus, and Linden; and occupies an area of 9,000 square miles, which extends eastward for some distance into the desert. Of this area, the work completed to date occupies about 2,000 square miles in the south-western portion of the district.

The country is composed of the usual Pre-Cambrian series, and is divisible into two main groups.

- (1) Granite.
- (2) Greenstones.

The granite, which is the younger, occupies the greatest area of the country so far examined, and has a more or less massive and irregular distribution, giving it the appearance of a number of huge intrusive batholiths, the margins of which are generally gneissic in structure. There are two such batholithic areas, composed of two distinct types of granite:—

(1) The Manangina Batholith, which extends southwards from Yerilla to Emu Lake, and is composed of a medium-grained biotite-granite.

(2) The Calvalley Batholith, which extends southwards from Edjudina and is composed of coarse-grained granite, which almost invariably contains large porphyritic feldspars. This batholith appears to be more basic towards the margins of the greenstone.

The greenstones occupy elongated schistose areas, which have a more or less lenticular form and apparently represent residuals of an ancient series of volcanic rocks which have been squeezed between the batholithic areas of granite. Their strike is invariably N.N.W.

The greenstones are composed mostly of schistose amphibolitic rocks and are associated with a series of sedimentary beds, which extend for many miles in a N.N.W. direction from Mulgabbie, through Yilgangi, and can be traced again east of Eucalyptus. This sedimentary series is similar to the Kurrawang series, near Kalgoorlie.

A younger series of sediments resting unconformably on the greenstone and granites, occurs sporadically over the area. These outlines probably belong to a series of sediments which will be found to be more extensively represented in the desert, also some connection may exist between this younger series and the deep leads of the Eastern Goldfields as occurring at Kanowna and Bulong. Hence further investigation of these rocks has considerable importance.

Of the mining centres of the district, the most go-ahead at the present time is Linden where some promising shows are now being opened up. Detailed description of the working mines of the different centres will appear in the final report on the whole district.

LABORATORY WORK.

Mr. E. S. Simpson, as usual, continued in charge of the chemical and physical requirements of the Survey, and reports upon the work carried out under his more immediate direction in the following terms:—

Routine Work.—The routine work of the Laboratory has, as in previous years, been of a nature to assist the field officers of the Survey in the prepara-

tion of their geological maps and reports, and to aid the public in locating and opening up new or neglected mineral deposits; and in developing their industrial utilisation. It has embraced, *inter alia*, analyses of rocks and minerals for the field staff; determinations and physical and chemical investigations of minerals, and reports as to their commercial application or as to their interference with current methods of metallurgical treatment; assays for prospectors of ores from new or abandoned deposits; and finally a large number of check and umpire assays of tailings for the State Batteries Branch. In addition to these, during 1915 a number of assays of parcels of bagged ore were made for the State Mining Engineer, in connection with the advances made by the Government on such material during transit to smelters. A tabulated statement in the usual form is appended. This shows a total of 1695 samples dealt with. It is necessarily incomplete owing to the difficulty in tabulating much of the work done in the Laboratory.

Staff.—From various causes the staff at my disposal has, almost throughout the year, been below normal strength, a fact which has limited the amount of industrial research carried out. Early in the year my chief assistant, Mr. A. J. Robertson, M.Sc., entered an officers' training camp and subsequently joined the Australian Imperial Forces and proceeded to Gallipoli. There on August 6th, he fell whilst bravely resisting an attack on the Australian lines. By his death the Department has lost the services of a promising officer with a brilliant record as a student of science. Towards the end of the year the Laboratory Assistant, A. V. Smith, also enlisted. The vacancy caused by the death of Mr. Robertson was filled by promoting Mr. Bowley to act temporarily in his place and engaging the services of Mr. H. P. Webb, A.R.S.M.

In addition to those enlisting, other members of the staff used their scientific and technical knowledge in materially assisting towards the local manufacture of munitions.

Publications.—With a disorganised staff it was impossible to do much in the direction of placing on permanent record the more valuable results obtained by research in the Laboratory. Time was, however, found to prepare the greater part of a Bulletin which will contain a complete tabulation of all analyses of rocks and natural waters made in the Survey Laboratory since its inception, together with details regarding their nature and origin. The publication of this Bulletin will make available a large amount of information of great scientific interest and at the same time will prevent duplication of work already done but in process of time, lost sight of.

In conjunction with Mr. J. T. Jutson, and by permission of the Government Geologist, a paper was read before the Royal Society of Western Australia dealing with the Geology and Physiography of Albany, a locality the study of which sheds much light on the more recent geological history of the southern portions of the State.

Reports have also been written on the following subjects:—

- (1) The Industrial Utilisation of the Calcareous Dune Sands of Dongara and Geraldton;
- (2) The Chemical and Physical Properties of the Donnybrook Sandstones, investigated with a view to determining the relative durability and value as building material

- of the stone from various quarries, and from different horizons in the same;
- (3.) Supposed Petroliferous Earths and Water from Wonnerup;
 - (4.) The Metallurgical Treatment of a Bismuth ochre-Scheelite Concentrate from Yalgoo;
 - (5.) Reports on the Properties and Uses of Clays from Yuna, in the Chapman Valley.

New Mineral Records.—Large numbers of mineral specimens continue to be submitted for determination and report as to their commercial value and possible industrial utilisation. Amongst these the following are worthy of note:—

Pharmacosiderite (hydrated arsenate of iron and potash) and *Scorodite* (hydrated arsenate of iron), Marda. These minerals were plentiful in one portion of the auriferous quartz reef at the Butcher Bird G.M. They are obviously the result of oxidation of arsenopyrite which is associated with them.

Goethite (hydrated oxide of iron), Mount Jackson. This was collected by Mr. Honman, who reports that it is representative of a large outcrop. Similar ore occurs at Mt. Caudan (South Yilgarn), and in the Ravensthorpe Range, forming in each case the outcrop of a large lode which in depth consists largely of pyrrhotite, pyrites and magnetite. I am of opinion that the Mt. Jackson mineral forms the outcrop of a similar lode which may possibly carry valuable amounts of sulphur, copper or nickel below water level.

Haematite (oxide of iron), Koolyanobbing Range. An iron lode in this locality, 30 miles by road from the rail at Southern Cross, was found to be high grade haematite, containing 69.13 per cent. of metallic iron, with only a trace of sulphur, 0.016 per cent. of phosphorus and 1.04 per cent. of silica. In view of the possibility of electric smelting being undertaken in Perth, such valuable iron ores within reasonable reach of the railway are deserving of close investigation.

Kyanite (silicate of aluminium), Milly Milly Station, Murchison River. Very handsome specimens of this mineral are here associated with granular Andalusite (silicate of aluminium), Muscovite (potash mica), Fuchsite (chrome mica), and Rutile (oxide of titanium).

Bismuth Ochre, Melville, near Yalgoo.—Further specimens of this ore referred to in my Annual Report for 1913 have come to hand and two small parcels have been exported, its metallic value being approximately £600 per ton. The ochre is in compact masses of a yellow or yellowish-grey colour varying in size from one-eighth of an inch up to three inches in diameter. A partial analysis indicates that the masses do not consist of a single mineral but are complex in character, composed of an intimate mixture of Bismutosphoerite (carbonate of bismuth), Bismutite (hydrated carbonate of bismuth), and Bismite (oxide of bismuth), with a small percentage of Wulfenite (molybdate of lead).

Stibiconite (hydrated oxide of antimony), Leonora.—This is associated with a little Cervantite (oxide of antimony) in a gold ore.

Gadolinite (silicate of iron, yttrium, beryllium, and cerium), Payne's Find.—This is an interesting find, owing to the rarity of the mineral and its commercial value, approximately 2s. 6d. per lb. It is not known in the other States of the Commonwealth, but has previously been reported from Cooglegong,

in the North-West Division, where recently a small parcel was raised and shipped abroad.

Molybdenite (sulphide of molybdenum), Warriardar.—Ore assaying 6.2 per cent. of molybdenum sulphide has been received from this district. As clean concentrates are now quoted at five guineas per unit (about £500 per ton) on delivery to the Commonwealth Government, this deposit should be worthy of further investigation.

Esilomelane (hydrated oxide of manganese), Gorge Creek, Pilbara.—An unusual variety of this mineral carrying 11.75 per cent. of barium oxide.

Staurolite (hydrated silicate of aluminium, iron and magnesium), Chittering Brook.—Recognisable crystals of this mineral have been found in the form of small pebbles in a stream bed.

Stolzite (tungstate of lead), Westonia.—Masses of minute crystals of this rare mineral occur in a small vein of vughy quartz at a depth of 70 feet in the Edna May Deeps Gold Mine. The only previous records of its occurrence in Australia are at Broken Hill, Peelwood, and Mount Costigan, in New South Wales.

LABORATORY REPORT FOR 1915.

	Public Pay.	Public Free.	Geological Survey.	Other Departments.	Totals.
Samples	110	311	258	1,016	1,695
Gold assays ..	84	174	33	1,002	1,293
Silver assays ..	1	34	1	77	113
Copper assays ..	15	45	8	35	103
Tin assays ..	..	20	..	..	20
Lead assays ..	..	9	..	16	25
Bismuth assays ..	..	2	..	2	4
Antimony assays ..	..	1	..	2	3
Iron assays ..	..	2	..	..	2
Manganese assays ..	..	3	..	..	3
Platinum assays ..	..	3	..	..	3
Zinc assays ..	..	6	..	..	6
Tungsten assays ..	..	1	1	1	3
Lime assays ..	..	3	1	..	4
Phosphoric oxide assays ..	6	13	3	1	23
Sulphur assays ..	..	3	..	..	3
Petroleum assays ..	..	2	6	..	8
Complete analyses ..	..	1	31	7	39
Partial analyses ..	4	27	44	8	83
Determinations ..	1	136	205	8	350
Clay Tests ..	..	6	..	4	10
Coal Tests ..	3	..	..	..	3
Sizing Tests ..	..	..	15	..	15
Miscellaneous ..	1	7	1	3	12
Totals ..	115	498	349	1,166	2,128

PETROLOGICAL WORK.

During the year the resources of the petrological branch have been chiefly employed in connection with the surveys in hand, though a great deal of what may be called extraneous work has been carried out by Mr. Farquharson, who reports upon his year's work as follows:—

As in previous years, the petrological work performed during the year can be conveniently grouped under the following heads:—

- I. Determinations and Reports for the Geological Survey Staff.

II. Determinations and Reports for other Departments.

III. Determinations and Reports for prospectors and for the mining and general public.

I. *Determination and Reports for the Geological Survey Staff:—*

In addition to the various suites of rocks that will be considered later, there have been a considerable number of identifications and short descriptions made of specimens that have been forwarded by various officers of the staff, with the object of obtaining information that would facilitate the mapping or that would throw light upon some geological or particular mining problem. These include specimens from Kelmscott; specimens from the McIntyre Prospecting party, embracing among others fresh fine-grained amphibolite; specimens from Marda and Mount Jackson; from Marvel Loch, collected by Mr. Saint-Smith; rocks from the Mt. Holland shaft, and a suite of specimens from the Fenian Mine, forwarded by the manager. As the latter are identical with rocks collected by Mr. Clarke, they have been held over for treatment with the whole of the Meekatharra rocks.

Proofs of various reports have been corrected for publication in bulletin form, and a commencement has been made with the preparation of an article on the functions of Petrology in Mining Geology. The year has been a particularly busy one, no fewer than 905 sections having been cut and examined, while many others already in the collection have been revised. The suites of rocks examined during the year include those from:—

(1) Westonia, including bore cores from the Edna May Mine.

As a full account of the results obtained from these examinations will appear in the forthcoming Bulletin on Westonia, it will be sufficient here to give but the following short account of them. The rocks collected by Mr. Blatchford include:—

- (a) Granulitic hornblende-quartz-felspar rocks which are probably best described as granulitic hornblende-gneisses with somewhat imperfect foliation;
- (b) Coarse grey microcline pegmatite;
- (c) Fine-grained aplitic microcline granite;
- (d) Fine-grained finely schistose granular quartz-felspar amphibolite;
- (e) Banded hornblende-pyroxene rock—a medium-grained irregularly banded rock, composed of imperfect bands of greenish-black hornblende, separated by bands of very pale-greenish material in which are streaks of the hornblende facies.

In general, all the facies of the hornblendic rocks among the specimens are very similar both in composition and structure. Felspar is present subsidiary to the hornblende in most of them, and in others, the two are about equally developed. Quartz is present in all, either equally developed with the felspar as in most, or in small amount. All the facies have a decided quartz-diorite appearance, and all could be derived from such a magma by dynamic stresses. Doubtless in some specimens in the area an increase in the amount of the quartz would give the appearance of a foliated hornblende granite to the rocks, but those examined tend more to the quartz-diorite type. Naturally, the large amount of hornblende

present gives all the appearance of an amphibolite, but the presence of quartz and the imperfect foliated structure ally them to the gneisses.

Two bore cores have been examined from the area, viz.:—

(a) Duff's Core.

(b) The Edna May No. 3 Core.

(a) Specimens from the former were sent in from a depth of 180 feet to a depth of 800 feet. The examinations were made partly in hand specimens and partly from microscopic slides. Since in all more than 120 sections were prepared and examined, it will be realised that the expenditure of a considerable amount of time and labour was necessarily involved.

Three well-marked broad groups may be made out of the various portions of the core forwarded.

- (1) A gneissose brownish-red and white granitic group in which apparently the auriferous quartz occurs.
- (2) White aplitic or pegmatitic veins.
- (3) Greenish to greenish-black schists of many varieties, chlorite-actinolite rock, a serpentinous chloritic facies, green-and-brown chloritic schist actinolitic hornblendite, etc.

As the gneissose granite rock is, from an ore-bearing point of view, the most important, its general characteristics, as illustrated by the core at 180 feet, are here given:—

It is a granulitic (more or less), brown chloritic and biotitic gneiss. It has the composition generally of a granite, though in some places it is more felspathic than quartzose; at times it is characterised by large cracked quartz and twinned felspar plates with strain phenomena, occasionally exhibits a coarse mosaic or pavement structure in polygonal felspar and quartz plates. Generally, there are numerous small flakes of a reddish-brown mineral that in places is a pleochroic biotite, in places a brown chlorite. The brown mineral has, in all probability, been derived from green chloritic scales, of which a number are visible in each slide, some partially coloured brown, and these with micaceous characters. This change may be brought about by thermo-dynamic metamorphism, and the combination of alkalis (potash) with the chlorite. In places, notably at 245 feet, there is a development of much greenish hornblende in addition to the brown biotitic mineral, and it is feasible that the chlorite has been originally derived from hornblende. The felspars are largely kaolinised, and pyrites and pyrrhotite sometimes observable. Strain phenomena are common—cracks in the quartz, irregular extinction, etc.

The affinities of the rocks will be discussed in the full report.

(b) Edna May No. 3:

The cores forwarded were from a depth of 179 feet to 251 feet. The rock types encountered were chiefly a fine-grained fresh granulitic hornblende schist with veins of a grey-white fine-grained granite. At the bottom of the bore at 243-251 feet a fine-grained white garnetiferous granite was found with beautiful red euhedral garnets.

(2) The Canning River Bores:—

In the investigation of the proposed site for the Canning River Dam, a number of bores were put down at certain prescribed spots, and the cores obtained were submitted intact to the Geological Sur-

vey office for examination. Bearing in mind the essential features of a dam site so far as the character of the rocks is concerned, I undertook this examination along with Mr. Feldtmann with the object of determining:—

- (1) The depth of the superficial material.
- (2) The rock types present and their relation to one another, *i.e.*, whether rocks differing in appearance were merely facies of the same rock or were the result of the intrusion of one into another.
- (3) The nature, degree, and depth of weathering present in the rocks.
- (4) The occurrence or absence of faulting, jointing, shearing, or other structural characters which are possible elements of weakness in the site.

The results of the examination of the cores both in hand specimens and in several sections showed:—

(a) The superficial material does not extend to an inconvenient depth.

(b) The rocks consist of comparatively fresh pegmatitic granite, gneissic hornblende-biotite-granite, hard compact medium-grained dolerite, a biotite-hornblende schist, a variety with affinities to a quartz-dolerite, and a quartz epidiorite. Though there were junction lines noticeable between some of the types, the rocks were generally very fresh, hard, and compact; weathering was very slight, resulting in the production of only a slight chloritisation of the hornblende in some cases. At the junctions there were no signs of faulting, or serious jointing or fracturing, shearing or alteration. The rocks were all of igneous origin.

A general account of the site embodying these results will be found in Mr. Feldtmann's Report on the Canning River Dam Site.

(3) Specimens from Bulong:—

These were examined in connection with a preliminary Report on the Magnesite at Bulong prepared by Mr. Feldtmann. They included:—

Medium-grained gabbro, amphibolised fine-grained gabbro or dolerite which appears now almost as an amphibolite, a medium-grained greenish-black serpentine with original augite, a fine-grained serpentine with apparent poecilitic character more marked than in the former, and a fine-grained quartz-hornblende-porphyrite of various shades of colour.

A large series of rocks was collected of a very varied nature—some evidently sedimentary—but only those necessary for the Preliminary Report were examined in detail at this juncture.

The magnesite occurs in short irregular veins of varying thickness in the serpentine rock, and is doubtless due to alteration of the original rock from which the serpentine has been derived.

(4) Specimens from Meekatharra:—

Much the largest part of the work of the year has been the examination of numerous rocks, minerals and clays collected by Messrs. Clarke and Feldtmann during the course of their detailed geological survey of the Meekatharra and North End Kalgoorlie areas. In both cases the examinations have been attended by much difficulty. At Meekatharra, particularly, most of the rocks have been so altered by dynamic and chemical agencies that their original characters have been in nearly all cases almost wholly obliterated. Indeed, were it not for the fact that by a special treatment the clays have been in many cases rendered capable of being sectioned and certain

“relict” structures have been recognised, most of the area would continue to be a “terra incognita” from a geological point of view until sufficient work had been done underground to expose less altered rocks.

Altogether, 400 slides have been examined during the year from the area, of which 100 have been clays. A full account of the petrology of the whole field will appear in the forthcoming Bulletin, so that for the present it will be enough to give the following brief *resumé* of the results so far obtained:—

The rocks may be divided for the purpose of this report into—

- (1) Porphyries and Granitic rocks:
 - (a) Quartz porphyry, including specimens with little quartz.
 - (b) Felspar porphyry, in which the rock is mostly made up of felspar, and quartz is apparently absent. The felspar is in most cases albite and the rocks consist almost wholly of this mineral; a little mica and weathered actinolitic needles are sparsely developed in some.
 - (c) Granites:
 - (i.) Biotite granite.
 - (ii.) Microcline-granite with chlorite and epidote.
 - (iii.) Highly felspathic biotite-microcline granite.
 - (iv.) Hornblende chlorite granite verging on quartz-diorite.
 - (d) Granite porphyry.
- (2) Fresh Greenstones and schists. These include:—
 - (a) Fine-grained zoisitic amphibolites or epidiorites.
 - (b) Coarse partially uralitised and saussuritised quartz-dolerites, some with micro-pegmatite.
 - (c) Hornblende porphyrite.
 - (d) Amphibolites and hornblende schists.
 - (e) Chlorite-carbonate serpentines.
 - (f) Feathery felted fibrous amphibolites.
 - (g) Fine-grained epidotised and partially chloritised basaltic dolerite.
 - (h) Weathered yellow-stained epidotic basalt.
 - (i) Dull-green volcanic agglomerate and crystal tuff.
- (3) Carbonate Rocks and Talc-chlorite Rocks. These include:—
 - (a) Fuchs-site-quartz-carbonate rock.
 - (b) Highly sheared talc-chlorite-carbonate rocks varying in colour from greyish-green to dark-green, and characterised by much carbonate and the presence of peculiar small feathered flakes or flecks of dark-green chlorite. The origin of this rock will be discussed in the Bulletin on the area.
 - (c) Black fine-grained highly sheared talcose rock contiguous to the intrusive dolerite dyke in the Ingliston Extended Mine. This was at first regarded (see article on the Meekatharra Mines in Bull. 43) as probably of peridotite or serpentine origin, but lately doubt has arisen in regard to this interpretation. The character and probable origin of the rock will be discussed in the Bulletin.
- (4) Certain extremely fine-grained, imperfectly fissile, slaty rocks from the Commodore Mine.

These are much altered and their microscopic characters obscure. They may possibly represent former ashy beds.

In some respects there is a decided lithological resemblance between the rocks of Meekatharra and those of Kalgoorlie. This is seen in the occurrence in both areas of albite porphyry dykes, amphibolitic quartz-dolerite, serpentines, the fuschsite quartz-carbonate rock, fine-grained actinolitic zoisitic amphibolites, and felted fibrous amphibolites. More will be said later in regard to this resemblance.

The Paddy's Flat dyke is a white albite porphyry, in some cases remarkably fresh, in others altered to a yellowish-green micacised phase.

Microscopic work has caused a modification in the mapping of the dolerite of the Ingliston Extended Mine. From the study of specially prepared sections of weathered clayey rocks, most of what was formerly regarded as the dolerite has been shown to be most probably a much weathered iron-stained variety of a volcanic rock, while examination of other similarly prepared sections has caused a material alteration to the views as to the extension and strike of the dyke.

Moreover, study of Mr. Clarke's specimens has proved the occurrence to the east of Meekatharra, or Paddy's Flat, of a considerable development of basic, more or less crystalline, tuffaceous or agglomeratic rocks and fine-grained andesitic flows, which in some cases are fairly fresh, in others much weathered to a red, gritty clay, and in others apparently extremely altered by dynamic and chemical agencies. The latter would appear to have given rise to the peculiar flecked greyish-green chloritic carbonate-talc rock. The investigation of these altered rocks has been attended with great difficulty.

(5) Specimens from North End Kalgoorlie:—

The previous Bulletin, Part II., on this area marked the initiative of a scheme for the investigation of the whole of the Kalgoorlie district by studying first the outskirts where the rocks might be presumed to be less altered than in the vicinity of the big mines, and then gradually extending the work to finally embrace the close investigation of the more altered portions. The forthcoming Bulletin, Part III., on the North End, practically links up this outlying portion with the more altered area, of which Boulder and Boulder City may be said to form the centre. A very exhaustive examination has been made of the rocks of the North End. Besides the very numerous specimens collected by Mr. Feldtmann, a large number of those collected in past years by Messrs. W. D. Campbell and C. G. Gibson have been examined. During the course of the work I have been enabled to pay one or two visits to the area, and on my last visit in company with Mr. Feldtmann I made a collection of over 60 specimens illustrating the more important varieties, and affording what evidence it was possible to get in the accessible shafts of both lithological affinities and structural or genetic relationships. In all, more than 300 slides have been prepared and examined in connection with this area this year, and these, of course, exclude all those examined that had been previously cut and described by other investigators, such as Messrs. Campbell and Gibson, and those I reported on some years ago for the Health Commission on Miners' diseases. Moreover, as the petrological work has necessarily been the basis of the classification of the

rocks and consequently of the mapping, both Mr. Feldtmann and I have, of necessity, spent a considerable amount of time in discussion of the relationships and subsequently on the delimitation of the various boundaries.

A full account of the Petrology of the area examined will be published in the Bulletin (Part III.) on the North End, now nearing completion, and, therefore, on this occasion a brief *resumé* alone will be necessary.

The classification of the rocks that I have been able to draw up, which is unavoidably rather minute owing to the scale of the mapping (100 feet to 1 inch), will be found given at length in Mr. Feldtmann's account of the North End (page 127, *et. seq.*).

Following, however, are a few remarks on the different varieties:—

(I.) *The Fine-grained Amphibolites.*—These are either fine-grained massive greenish-grey rocks characterised by small laths of felspar, zoisitised in some cases in a confused mass of fibrous hornblende and with the structure of a fine-grained basaltic dolerite, or they are coarser in grain, with more prominent confused fibrous structure and no lath-shaped felspars. In some varieties of the second type there are numerous pale spherules composed mostly of small zoisitic grains with obscure fibrous structure. These may be due to contact metamorphism.

The Fine-grained Greenstones.—These are greenish-grey rocks paler than the corresponding amphibolites, generally massive, and occasionally showing spherules. They consist largely of chloritic scales and carbonates.

The Calc-schists.—These have not been investigated in detail, as they are just beginning to appear at the limits of the map of the area under examination. Chlorite, however, appears to be absent from them and sections show chiefly carbonate, sericite, and quartz.

(II.) The rocks of this division vary from quartz-dolerite to probable peridotite derivatives. There appears to be a more or less gradual change from one to another of the different types.

The Quartz-dolerite Amphibolites.—These rocks are fresh, medium to coarse-grained, massive green and white rocks consisting chiefly of uraltic hornblende, saussuritised felspar and some interstitial quartz, and some leucoxene. Occasionally a very coarse pegmatitic facies occurs.

Quartz-dolerite Greenstones.—These rocks are those which have resulted from the alteration of the hornblende and felspar of the former, and the production of chlorite and carbonate. They are usually of a dark-greenish-grey colour and of medium to fine grain; there is usually much quartz and much micropegmatite present.

Bleached Greenstones.—These are white to pale gray or pinkish rocks, sometimes almost aphanitic, and characterised especially by a granitic appearance and much pyrites. Their origin from the quartz-dolerite has been proved beyond doubt, the bleaching being due to sulphur-bearing siliceous or carbonate solutions. Instances have been seen of a quartz vein traversing the quartz-dolerite with the latter bleached on either side of the vein.

Actinolite-Zoisite Amphibolites.—These, both in hand specimens and in section, rather closely resemble the second type of fine-grained amphibolites. They are characterised by the development of actinolitic

hornblende, while the original feldspars have been zoisitised. Their origin and affinities will be discussed in the Bulletin (Part II.) on the North End.

Dolerite Greenstones.—These are rather fine-grained, massive, greyish-green rocks composed of chlorite, carbonate, leucoxene and rarely epidote, while traces of an ophitic structure can be observed though their general structure is indefinite. There is no development of the micro-pegmatitic structure, and there is little or no quartz.

Lustre-mottled Amphibolites.—Only one outcrop of these was discovered in the area mapped. The rock consisted of bluish-green hornblende, epidotised and zoisitised feldspars, and some leucoxene. An ophitic structure was evident, and a fragment of original augite was noticed. The rock is massive, coarse in grain, and of a dark green colour and with the hornblende crystals showing lustre-mottling.

Hornblendites.—These are massive, dark-greenish rocks of medium grain, wholly or almost wholly composed of aggregates of flaky hornblende. By development of talc, chlorite and carbonates they pass into talc-chlorite-carbonate rocks, which are pale greenish-gray in colour, soapy to the feel and with crystals of carbonate plainly showing.

The Talc-mesitite Rocks differ from the talc-chlorite-carbonate rocks chiefly in the large development of crystals of the ferriferous carbonate mesitite. Their origin is not certain; they may have arisen from a peridotite.

Fuchsite-quartz-carbonate Rocks.—Small bands of these rocks are not uncommon. They are hard, medium-grained, granular, pale-green rocks with numerous veins of quartz and carbonate. Hitherto, these rocks have been considered to have been derived from a peridotite, but while such an origin may be true in some cases, the fact that they are found to pass insensibly into the surrounding country rock which may be dolerite-greenstone, talc-chlorite, talc-mesitite or other rocks, it is possible that they are the result of alteration of various types. There is reason, at any rate, for regarding the chromium content as introduced by solutions.

The Hornblende-quartz-Porphyrites.—These rocks come, properly speaking, into the next area to be mapped and are, therefore, not considered in detail or in the present suite. It is noteworthy that a large development of them has recently been discovered near Bulong.

The Albite-Porphyrites.—The development of these rocks has been shown by the recent work to be greater than has been mapped by previous observers. As they have been fully described in Part I., there is no need to treat them in this place.

(III.) These are found exposed only at the extreme North-East corner of the area mapped at the Phoenix Brick Pits. They also will be treated more fully in future work.

II. *Determinations and Reports for other Departments:*—

Chief amongst these were Notes on the Building Stones of Western Australia for the Commonwealth Statistician. These involved an examination of the following rocks with regard to their mineral and structural character:—

- (a) The granite from Boya.
- (b) That from Roelands.
- (c) That from Kellerberrin.
- (d) That from Meckering.

- (e) That from Mahogany Creek.
- (f) The Donnybrook Sandstone.
- (g) The rock from Walsh's quarry at Kalgoorlie.
- (h) The slaty clay from Moora.
- (i) Slates from Bridgetown.
- (j) The coastal limestone.

III. *Determinations and Reports for prospectors, etc.:*—

In all, there have been 230 determinations of rocks and minerals made during the year under the above heading. Included in these and worthy of special mention are:—

- (a) Staurolite from Greenbushes.
- (b) Corundum crystals from the Shaw River.
- (c) Wolfram from the Montgomery Range.

In addition there have been:—

- (a) Reports on Mica as to suitability for commercial purposes.
- (b) Reports on Building Stones from Goomalling, etc.
- (c) Reports on Asbestos and Manganese.
- (d) Preparation of a collection of the commoner economic minerals of Western Australia for the Peak Hill miners and prospectors.

GEOLOGICAL SURVEY, MUSEUM, AND COLLECTIONS.

The additions during the year to the Survey Collections amounted to 735, bringing the total number of specimens registered up to 14,719. The number of microsections cut reached 409, bringing the total number of slides in the possession of the Department up to 3,128.

The resident and the field officers of the staff have, during the ordinary course of their official duties, taken a large number of photographs of geological, mining and microscopic subjects, bringing the total number of negatives registered up to 1,665.

Special acknowledgment must be made of the presentation to the collection of Crystalline Calcite (Iceland Spar) by Mr. Frank Moss; exceptionally fine specimens of Molybdenite, Tinstone, and Wolfram from Deepwater, New South Wales, by Mr. E. W. Finch; and a collection of plant remains from the Collie Coalfield, presented by the Inspector of Mines.

Little or no progress has been made in connection with the Survey's Collection, and the work, reference to which was again made in the Annual Report of last year, has been severely handicapped through the lack of the proper facilities alluded to.

LIBRARY.

Eight hundred and twenty-eight publications (*i.e.*, reports, memoirs, etc., from other national geological Surveys and cognate institutions) have been received by way of exchange for our own Reports and Bulletins; 91 volumes have been added to the Departmental library by purchase, and 114 volumes bound. The total number of accessions to the Survey Library for 1915 thus being 919.

An effort will shortly be made towards establishing a card catalogue of the library, on a modification of the Dewey decimal system, and in this way render the collection of greater value to the staff of the Survey. The Departmental publications distributed during 1915 amounted to 6,407, as against 7,760 of the previous year.

PUBLICATIONS.

The publications for the year have been as follows:—

Annual Progress Report for the year 1914.

Bulletin 58.—Palaeontological Contributions to the Geology of Western Australia, Ser. V., No. 10: by R. Etheridge, jun.

Bulletin 62.—Notes on the Geology and Mining at Sandstone and Hancock's, East Murchison Goldfield: by E. de C. Clarke.

Bulletin 63.—The Geology and Mineral Resources of the Yilgarn Goldfield, Part 11.—The Gold Belt South of Southern Cross: by T. Blatchford.

Bulletin 64.—Miscellaneous Reports, Series IV., Nos. 52-60—The Coal Resources of Western Australia; The Mining Geology of Yerilla; Certain Mining Centres at the South of the Yalgoo Goldfield; Classification of Kalgoorlie Rocks; On Concentration tests of a Tungsten-Molybdenum ore from Callie Soak, Poona, Murchison Goldfield; On Chloritoid and its Congeners, with special reference to the Chloritoid at Yampi Sound; The Geology of Western Australia; The Mining Fields of Western Australia; Geological Observations in the Mulline, Riverina and Ularring Centres, North Coolgardie Goldfield.

Bulletin 65.—The Reputed Petroliferous Area of the Warren River District, South-West Division: by H. P. Woodward.

In addition to these, there are now in the hands of the Government Printing Office:—

Bulletin 60.—General Index to Reports, 1870-1910.

Bulletin 66.—The Geology of the country South of Kalgoorlie, including the Mining Centres

of Golden Ridge and Feysville: by C. S. Honman.

The following are in hand and will shortly be ready for the Press:—

Analyses of Rocks, Meteorites, and Waters from the Geological Survey Laboratory, 1896-1915: by E. S. Simpson.

Contributions to the Study of the Geology and Ore Deposits of Kalgoorlie; Part III.—The North End of Kalgoorlie: by F. R. Feldtmann.

The Geology and Mineral Resources of the Yilgarn Goldfield; Part III.—The Districts North of Southern Cross: by T. Blatchford and C. S. Honman.

The Geology and Mineral Resources of the Maritime Districts of the South-West Division (Lime, Cements, Clays, etc.): by H. P. Woodward.


The Geology and Ore Deposits of Meekatharra: by E. deC. Clarke.

The Geology and Mineral Resources of the country South of Nullagine: by H. W. B. Talbot.

The Mining Geology of Niagara, Kookynie and Tampa, North Coolgardie Goldfield: by J. T. Jutson.

The Artesian Water Resources of Western Australia: by A. Gibb Maitland.

The Western Australian Mining Handbook: edited by A. Gibb Maitland.



Government Geologist.

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DIVISION V.

SCHOOL OF MINES OF WESTERN AUSTRALIA,

The Under Secretary for Mines.

School of Mines,
Kalgoorlie, February, 1916.

I beg to forward, for the information of the Hon. the Minister, my report for the year 1915.

Mr. A. C. Lloyd, B.E., B.Sc., commenced duty as lecturer in Mathematics and Assistant in Engineering subjects at the beginning of 1915, and has proved a welcome addition to the permanent staff. The class work has progressed steadily under his direction, and this department is now on a more satisfactory basis than it has been for some considerable time.

The staff of the School has remained unchanged throughout the year; lecturers have maintained their class work at the same high standard as in the previous years, and the results have been generally satisfactory.

The question as to the relation which the School is to bear to the University has been the subject of considerable discussion at various times by members of the staff. Professors and lecturers of the University have visited the School from time to time, and have made themselves familiar with the facilities existing at the School. Towards the end of the year, application was made under Statute No. 14 that the School of Mines of Western Australia be recognised as an affiliated institution of the University. This application was approved by the Senate subject to a set of regulations similar to those recently adopted by the University of Sydney for recognition of work done at the Sydney Technical College. It was further proposed that members of the University staff should confer with members of the staff of the School of Mines in order that the courses of instruction might be arranged to meet the requirements of the University. Owing to the University vacation, there has been no opportunity of holding the conference, but it is hoped that a meeting will be held at an early date, and that it will result in a satisfactory agreement as to working details.

Attendance at the School at the beginning of the year was above the average, and necessitated the temporary formation of additional classes, but as the year progressed the number of students in attendance, especially in the preparatory classes, decreased considerably. There is a feeling among the staff that under free tuition many youths join classes without having given full consideration to their future course of study. These youths do not exhibit the same steadfastness of purpose as those who came in under the former system of payment of class fees. Having little to lose, they join classes, more or less as an experiment, and when the increasing difficulties of the work demand close application, they become irregular in attendance and finally stay away altogether. This happens chiefly in the preparatory classes and is detrimental in that, on the one hand, the energies

of the lecturers are expended on students who cease work before any permanent good results have been secured, and, on the other, youths who would possibly have worked steadfastly have been excluded because the classes were full at the beginning of the year.

When students paid class fees, they had first clearly made up their minds as to their requirements. The payment of a fee was in a sense a guarantee of the student's earnestness and of his appreciation of the advantages to be derived from a course of study at the School. Regular attendance and steady application followed as natural consequences.

The members of the staff consider that the free admission of too many students lacking in fixed intention was, in a large measure, responsible for the falling off in the attendance during the third term. They advocate a stricter limitation of the number to be admitted into the preparatory classes, together with a careful scrutiny of the intentions of those admitted, and they consider that this will ensure a larger proportion of genuine workers.

During the year, many students enlisted, including some of the best students of the year, while others made up their minds early in the year that they would enlist after the completion of the annual examinations.

The military drills, attendance at the special School of Instruction, and the general unsettling effect which the war has had upon the majority of the students, have militated against that concentration upon studies which is necessary if the best results are to be obtained from the class work.

As shown by the Honour List, which is unavoidably incomplete, past and present students have responded well to the call to enlist. The names of a number of those who have gone to the front have appeared in the casualty lists, and the School mourns the loss of several who have lost their lives on active service.

A number of students have relinquished highly remunerative positions to join the forces, and in addition to those who have enlisted several who have proceeded to England at their own expense are now actively engaged there in munitions work.

The Engineering classes continue to be the most popular in the School. The applicants for admission to the Gas Engine classes were again in excess of the maximum that could be admitted. As the classes are becoming well known on the Goldfields, students who have passed the examinations find that the School Certificates for Gas Engine class work are of great assistance to them in obtaining suitable positions. Additional equipment would enable the usefulness of this department to be considerably increased,

In all departments of the School, special attention is given to the practical applications of theoretical principles in order that students may be the better fitted to occupy positions in outside practice. The frequent requests for students to fill responsible positions in Kalgoorlie and in other parts of the State show that the work of the School continues to be appreciated by managers and owners; but as the majority of students, apart from those devoting their whole time to study, are already occupying fair positions, the supply is not equal to the demand. As a rule, students are unwilling to leave Kalgoorlie to accept positions which necessitate the severance of their active connection with the School.

The following are positions gained by students during 1915:—

Name.	Position.
Banks, R.—	Assayer with Prospecting Party, Southern Cross District.
Burrows, M. F.—	Assayer-Surveyor, Palang Consolidated, Malay States.
Butement, J. C.—	Draughtsman, Aircraft Works, Royal Flying Corps, Farnboro, England.
Davies, W.—	Draughtsman, Ivanhoe Gold Mine.
Grigg, J.—	Assistant Surveyor, Ivanhoe Gold Mine.
Graham, L.—	Mill, Ivanhoe Gold Mine.
Hilton, L.—	Electrical position, Malay States.
Mundle, E. B.—	Draughtsman, Transcontinental Line, Kalgoorlie.
Pike, R. W.—	Mechanic, Woolwich Arsenal, England.
Pond, C.—	Assistant Assayer, Bullfinch Gold Mine.
Rosenberg, J.—	Electrician in Charge, Kalgoorlie Municipal Electric Light Station.
Stuart, C.—	Assistant Electrician, Cobar Copper Mine, New South Wales.
Thompson, E.—	Electrician, Kalgoorlie Gold Mine.
Griffiths, D.—	Assistant in Technical School, Victoria.

Five students have gained certificates at the Government Engine-drivers' Examinations.

During the year 335 free assays and mineral determinations were made for prospectors of material obtained from Crown Lands not held under lease for mining purposes:—

Assays for Gold and Silver	252
Assays for Copper, Lead, Tin, etc. ..	25
Determinations of Rocks, Minerals, etc.	58
Total	335

By this means a large amount of valuable information has been supplied to prospectors. The assays and determinations, which have entailed considerable labour, have all been performed in a careful manner by members of the staff in the metallurgical and geological departments of the School. By supplying apparatus and material for the assay equipment, some assistance has been rendered to the Government Prospecting Party, the Assayer for which is an associate of the School of Mines.

The Annual Demonstration took place during the last week in February. Several lectorettes were delivered by members of the staff, after which the visitors spent the evening in inspecting the apparatus and the equipment displayed in the various class rooms.

In view of the absence of many prominent students on military duty, the usual Annual Dinner of the Students' Association was not held in 1915.

During the year, a noteworthy donation has been made to the School of Mines. This is a Research Scholarship of £100 which Mr. Robert Falconer has made available for Associates of the School. The holder of the Scholarship is required to engage in systematic research work for one year on some problem of economic importance to the Mining Industry, and it is confidently expected that some valuable results will follow.

THE WORK OF THE SCHOOL.

The School of Mines was established in the first place to give instruction to those engaged in mining occupations. Laboratories have been equipped, and the classes arranged so as to give a thorough technical and practical training in Mining, Metallurgy, and Engineering.

In addition, the School offers to youths who do not intend to engage in mining pursuits, many opportunities of gaining some secondary education before they enter upon the serious business of life. The Preparatory Classes are very suitable for boys of 14 years and upwards who have just left the State schools, and afford an introduction to Science, which will be of great value to these youths whatever may be their future occupations. The advanced classes will enable students to obtain a training in the earlier portions of a University Course, and when by affiliation of the School of Mines with the University of Western Australia work done at the School of Mines receives recognition, considerable benefit will result to the students resident on the Goldfields.

The general work of the School embraces Courses in Mining, Metallurgy, and Engineering, in each of which students may gain an Associateship. Mathematics, Chemistry, and Physics, which enter into each of the courses, form the foundation upon which the work of the School is built, and the departments of Mining, and Metallurgy, the ones first inaugurated, possess very complete equipments in laboratories and apparatus. A thorough training in theory and practice has thus been provided which has enabled students to qualify themselves to occupy responsible positions.

In Preparatory Physics the student acquires skill in handling various kinds of apparatus and in making accurate measurements. He gains further experience in more delicate experiments during his second year and gathers together a valuable fund of information concerning natural phenomena. In a more advanced course, the higher work in sound, light and electricity receives a more specialised mathematical treatment. The Department is well equipped with apparatus for the demonstration of the lectures and for the conduct of laboratory experiments in all sections of the work. The Mathematical Department is divided into two main sections—(a) Pure Mathematics; (b) Practical Mathematics. In the former, students who intend to proceed with their science work and qualify for an Associateship or for entrance to the University are given a thorough training from the preparatory stages upwards. In the latter section, the work is arranged to suit the special requirements of artisans and those who desire to obtain a practical knowledge of the subject which shall be immediately useful to them in their daily work. Special attention is devoted to problems in mensuration, the use of squared

paper, logarithmic tables, the manipulation of pocket book formulæ and the calculations connected with every day problems in mining and engineering.

Students in the advanced class are taught the applications of the differential and the integral calculus.

In addition to the determination of large numbers of assay and mineral samples for *bona fide* prospectors, the work of the Department of Metallurgy embraces instruction in Chemistry, Assaying, and Metallurgy. A thorough training in the theoretical portions is given by means of lectures, but students are required to spend a considerable time in the laboratories. The courses are made as practical as possible, the aim being to so equip students that they may speedily become competent to fill responsible positions.

In addition to the preparatory course, the work in Chemistry covers three years. One section deals with physical and engineering chemistry, and in the final stages practical instruction is given in advanced inorganic analysis. This includes the analysis of ores and metallurgical products of iron and steel, of natural waters, flue gases, etc., the methods of examination of lubricating oils and fuels and the determination of calorific power.

In Assaying, the student makes tests as to the most suitable mode of treatment of various classes of ore and gains experience in the technical methods of analysis of ores and metallurgical products. The well equipped laboratories afford students excellent opportunities of gaining a thorough practical acquaintance with the technical methods used in outside practice.

The two years' course in Metallurgy deals generally with the metallurgy of the common metals and particularly with the metallurgy of gold. Students, before obtaining their Associateship in this course, are required to write a thesis on some phase of metallurgical practice, and to have 12 months' experience in an approved metallurgical works.

The Engineering Classes, developed at a later date, are now well organised and form a very important section of the School work. A practical course of instruction has been arranged in Electrical Engineering. The rapidly increasing demand for the electrical driving of sections of mining and manufacturing plants and for the reduction of maintenance costs, requires that the student should be thoroughly familiar with the various classes of machines and their operation under all conditions of load, and tests dealing with the efficiency, regulation and registration of the machines and instruments used in the electrical distribution of power are regularly conducted by the students as part of their course work.

In addition, classes of a more elementary nature are conducted in Practical Electricity for the benefit of electrical workers who are concerned more particularly with mechanical operations.

Four years ago a Mechanical Engineering Laboratory was erected and equipped with an experimental engine, a boiler, a surface condenser, an absorption dynamometer, steam engine indicators, a Carpenter's calorimeter, and all the necessary appliances for the determination of steam consumption, mechanical efficiency and the conditions for maximum economy. In all large mining centres the question of economy in power production, leading to the reduction of working costs, is receiving increased attention, and it

is of the highest importance that the Mining Engineer should possess thorough knowledge of all questions bearing upon the economical running of the engines under his charge, and also that he should be able to locate and remedy defective conditions which lead to losses in actual practice. Students of the School are given practice in taking indicator diagrams, in testing the quality of the steam by means of the steam calorimeter, and in carrying out actual working tests on efficiency, which, together with periodical visits to the engine rooms of the mines, will give the students a thorough grounding in the fundamental principles of Mechanical Engineering.

At the end of 1911, a Gas Producer Plant was installed and special classes dealing with the theory and practice of gas producer plants now form a feature of the school work. Instruction is first given in the operation and management of the various types—the ordinary updraft and downdraft and the larger pressure producers. The lecture work is supplemented by numerous experimental tests, and each student is afforded an opportunity of actually operating the producer in the School Experimental Plant.

The second term is devoted to Gas and Oil Engines. In the series of lectures dealing with the erection, operation and management of the suction gas engine, special attention is directed to the precautions necessary to prevent breakdowns and to the conditions requisite for obtaining economy in working.

In the Engineering Laboratory, the students take part in the practical demonstrations and learn to start and stop the gas engine and to manipulate the various appliances used in testing for efficiency.

During the first year of the Mining Course, the principles and methods of mining are dealt with from a broad standpoint. In the more advanced instruction of the second year, special attention is devoted to Mine Sampling, Mine Accounts, Mine Administration, and Ore Dressing. In Surveying, during the first year of the course, the student becomes acquainted with instrumental work and the calculations, tabulations, plotting, etc., connected with the more common types of mine surveying problems. In the second year, he is instructed in the measurement of stope work under various conditions and gains a working knowledge of plane table, tacheometric and topographical work, roads, dams and quantity work, in fact all the ordinary engineering problems likely to be met with by a mine surveyor.

Instruction is also given in sun and star observation for latitude, meridian, time, etc. Each student has regular practice with the instruments, of which the School possesses a good supply, and at the end of his course he is required to make a mine survey, construct a plan and hand in all field notes and calculations connected therewith.

Surveying students taking certain other classes laid down in the syllabus are able to qualify for a mine surveyor's certificate, the course for which is intended to equip the student with a sound knowledge of modern requirements. On the completion of his course, a student is able to do reliable work and his value will rapidly increase with experience. Not only should he be able to conduct all the instrumental work connected with the plumbing of shafts, the taking of the surface meridian underground, the making of connections, the laying out of work for the guidance of miners, the measurement of stopes, tacheometric

and contour work and the laying out of roads, cuttings and embankments, but he should be competent to conduct the survey of a large area involving some knowledge of astronomical work. Possessing a fair working knowledge of general and mining geology and mine sampling, he will be able to distinguish the common rocks and minerals, to determine faults and their influences, to record variations in the ore bodies and the enclosing rock masses, to plot mining and geological plans, to measure, sample, and value ore bodies, make assay plans, direct exploratory work and generally supply the management with timely and reliable data in connection with underground workings.

The classes in Geology, Mineralogy, and Petrology which form an essential part of the course in Mining and Metallurgy, have been suitably provided with apparatus and material, and there is a preparatory course for beginners. The department is of especial value to those interested in the application of geology to mining problems.

The district affords excellent examples of the main features of mining geology and the school possesses numerous rock sections and hand specimens illustrative of local conditions. Practical instruction in the preparation of maps, in the methods of mining and geological examination of properties and in the general principles of field geology, forms an essential portion of the course. The Museum contains representative collections of rocks and minerals which are set out in such a way as to be of educational value to the students and a source of interest and instruction to prospectors and the general public.

To meet the requirements of those who are unable to undertake a full course for an Associateship, partial courses have been arranged in several sections of the School work.

The Scholarships offered by the Mines Department fully meet the requirements of the local students and also afford youths resident outside of the Kalgoolie district facilities for attending the School and obtaining a training in School of Mines subjects. The School has been fortunate in securing valuable gifts of prizes and scholarships from those interested in the work of the institution, and the Mine Managers have afforded students every opportunity of gaining practical experience in the Mines and Batteries and have shown their appreciation of the work of the School by their readiness in giving employment to the students.

The students continue to secure responsible positions, which in many cases have been obtained directly as a consequence of the technical training given at the School, and the fact that the students who have been through a set course of study at the local School of Mines are so well able to take their place in outside practice is encouraging to the younger students and is a good criterion of the standard of instruction maintained in all the courses.

The Students have an active Students' Association, a Science Society, a School Magazine, and several Sports Clubs, all of which have been instrumental in binding together students who otherwise do not often come into very close contact with one another.

Practical Classes.—As far as possible, prominence has been given to practical work in connection with School classes. Students have excellent opportunities of gaining practical experience in Chemistry, Assaying, Metallurgy, and Engineering in the well equipped laboratories. Models for the Mechanics, Engine-driving, and Mining classes, suitable collections of rocks and minerals for the Geology and Mineralogy classes, and instruments for the Surveying Class, enable the lecture work to be thoroughly well demonstrated. A special testing room has been set aside for Practical Electricity, while increased accommodation has been provided for the practical classes in Physics. Field practice in Surveying is regularly carried on throughout the year, and in Geology the students make periodical excursions into the country and so gain a fuller understanding of the class work as well as an intimate knowledge of the geology of the district.

Examinations.—The examinations held annually in connection with the Diplomas and Certificates issued by the Mines Department have, in the past, been conducted by Co-examiners appointed by the Minister for Mines, but were, this year, conducted by members of the Staff. The appointment of outside examiners for the written papers has tended to maintain a high standard of work at the School. The practical examinations, covering the whole work of the students throughout the year, as well as the final test questions, are left in the hands of the staff.

Under the system by which the School makes Free Assays of material obtained from Crown lands not held under lease for Mining purposes, a considerable amount of useful information has been given to prospectors. The assay and mineral determinations have all been made by responsible members of the staff, who have spared no pains to insure accuracy in the results and to give full information to the prospectors.

A demonstration of students' work takes place usually at the commencement of the first term and the Annual Dinner is held by the Students' Association regularly at the close of the School year.

Throughout the year the Assistant Director and the members of the School Staff have rendered excellent service, and the thanks of the Director are due to them for their cordial co-operation in the proper conduct of the work of the School.

I have, etc.,

F. B. ALLEN,
Director School of Mines.

CONDITIONS TO BE APPLIED TO THE
ROBERT FALCONER RESEARCH
SCHOLARSHIP.

For the purpose of promoting the investigation of problems of economic importance to the Mining Industry, the Western Australian School of Mines accepts from.....(*Donor*) the foundation of a Research Scholarship to be known as the.....Research Scholarship.

The conditions governing this Scholarship shall be as follows:—

The purpose of this Scholarship is to furnish an opportunity for the technical investigation of such problems in Mining Engineering, Metallurgy, Mechanical and Electrical Engineering as are of economic importance to the Mining Industry of the State of Western Australia, to the furtherance of which purpose the holder of this Scholarship shall devote such time as shall be considered adequate by the Director.

The Research Scholar shall be appointed by the Director and Staff of the Western Australian School of Mines: he shall be a graduate of the School; he shall work under the direction and advice of the Lecturer in charge of that department to which the subject of his research is directly related, and he shall forward periodically through such Lecturer reports of the progress of his work to the Director and to.....(*Donor*).

The School Library and equipment will be available for use by the scholar, who may, however, find it

necessary to purchase additional books and equipment for himself.

For the support of this Scholarship, which shall extend for a period of one year from the date of appointment of the Scholar, or for a greater period at the discretion of the donor and the Director of the School of Mines, the donor agrees to pay £100 per annum, payable annually in advance to the School of Mines on..... This sum shall be paid by the School quarterly (or monthly) in instalments to the holder of the Scholarship.

If the research be not prosecuted in a manner satisfactory to the Director the Scholarship may be forfeited. In such case the unexpended balance of the Scholarship shall be returned to the donor.

On the expiration of the Scholarship the holder thereof shall have completed a comprehensive monograph on the subject of his research, containing what he and others may have been able to discover. A copy of this shall be forwarded to.....(*Donor*) and to the Director, and the School shall be at liberty at any time to publish such monograph for the benefit of the Mining Industry, provided that the Scholar has the sole right of making use of his discoveries for the purpose of profit for a period of five years from the termination of the Scholarship, and such monograph shall not be published by the donor or the Director during that period except with the consent of the scholar.

(Signature of Donor).....
Date.....

SCHOOL OF MINES OF WESTERN AUSTRALIA,

EXAMINERS.

The following Examiners conducted the Examinations in November, 1915 :—

Subject.	Examiners.
Preparatory Mathematics	F. B. Allen, M.A., B.Sc.
Preparatory Chemistry	D. McDougall, A.I.E.E.
Preparatory Physics	D. M. Dougall, A.I.E.E.
Preparatory Geology	C. O. G. Larcombe, F.S.T.C., F.G.S.
Preparatory Mechanical Drawing ..	D. McDougall, A.I.E.E.
Mathematics I.	A. C. Lloyd, B.Sc., B.E.
Mechanics—Theoretical	H. W. Sanders, B.A.
Physics I.	H. W. Sanders, B.A.
	D. McDougall, A.I.E.E.
Chemistry I. and II.	B. H. Moore, B.E., F.S.A.S.M.
	R. R. Baxter, B. Sc.
Chemistry III.	B. H. Moore, B.E., F.S.A.S.M.
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, A.S.A.S.M.
	B. H. Moore, B.E., F.S.A.S.M.
Petrology	C. O. G. Larcombe, F.S.T.C., F.G.S.
Mineralogy	F. C. Stockwell, A.S.A.S.M.
Geology	C. O. G. Larcombe, F.S.T.C., F.G.S.
Mining Geology	C. O. G. Larcombe, F.S.T.C., F.G.S.
Practical Mathematics	A. C. Lloyd, B.Sc., B.E.
Mechanical Drawing I. and II. }	M. Copland, B.M.E.
Machine Design	
Applied Mechanics	H. J. Clucas, B.C.E.
Building Construction	M. Copland, B.M.E.
Mechanical Engineering I. and II. }	
Surveying I. and II.	T. Butement, A.O.U.S.M.
Mining I. and II.	
Practical Electricity	C. H. Bircher.
Electrical Engineering I. and II. }	
Fitting and Turning I. and II. }	C. H. Bircher.
	J. Murray.
Engine Driving I. and II.	C. H. Bircher.
Gas Engine	
Indicator	M. Copland, B.M.E.

Junior Scholarship.

Subject.	Examiners.
English	B. H. Moore, B.E., F.S.A.S.M.
Physical Geography	C. O. G. Larcombe, F.S.T.C., F.G.S.
Mathematics	F. B. Allen, M.A., B.Sc.

WEST AUSTRALIAN SCHOOL OF MINES, KALGOORLIE.
ATTENDANCES, 1915.

Subject.	Total Enrolment.		
	1st Term.	2nd Term.	3rd Term.
Elementary Mathematics	12	6	5
Preparatory Mathematics	69	47	24
Preparatory Drawing	36	24	13
Preparatory Physics	37	30	21
Preparatory Chemistry	32	22	16
Preparatory Geology	12	10	6
Mathematics I.	21	18	9
Theoretical Mechanics	5	5	2
Practical Mathematics	5	4	3
Physics I. (Lectures)	13	12	8
Physics I. (Practice)	12	8	5
Chemistry I. (Lectures)	11	8	5
Chemistry I. (Practice)	7	5	4
Chemistry II. (Lectures)	1	1	1
Chemistry II. (Practice)	1	2	1
Chemistry III.	1	1	1
Assaying I. (Lectures)	5	4	2
Assaying I. (Practice)	4	3	2
Assaying II.	2	3	3
Metallurgy I.	4	4	4
Geology	3	2	2
Mineralogy	1	1	1
Petrology	2	1	1
Mining Geology	4	4	1
Mining I.	3	3	2
Mining II. (Ore Dressing)	4	4	4
Mining II. (Accounts)	2	2	2
Surveying I. (Lectures)	5	4	2
Surveying I. (Practice)	1	3	2
Surveying II. (Lectures)	3	4	1
Surveying II. (Practice)	2	3	..
Mechanical Drawing I.	14	13	9
Mechanical Drawing II.	10	9	9
Mechanical Engineering I.	22	22	20
Mechanical Engineering I. (Practical)	31	29	19
Engine Driving I.	13	8	3
Engine Driving II.	3	1	1
Practical Electricity	27	19	10
Electrical Engineering I. (Lectures)	14	12	10
Electrical Engineering I. (Practice)	14	9	9
Electrical Engineering II. (Lectures)	9	6	5
Electrical Engineering II. (Practice)	8	5	5
Fitting and Turning I. (Lectures)	23	15	8
Fitting and Turning I. (Practice)	33	26	17
Fitting and Turning II. (Practice)	6	7	6
Machine Design	1	..	..
Building Construction	6	5	4
Applied Mechanics	7	6	4
Mechanical Engineering II.	9	8	5
	570	448	297

	1914.			1915.		
	1st Term.	2nd Term.	3rd Term.	1st Term.	2nd Term.	3rd Term.
Total Enrolment ..	594	514	403	570	448	297
Individual Students	236	212	164	234	188	128

EXAMINATION RESULTS, 1915.

The following table shows the Passes obtained by Students of the Western Australian School of Mines, Kalgoorlie, at the Annual Examinations held in November, 1915:—

Subject.	Class.			
	1st.	2nd.	3rd.	Total.
Elementary Mathematics .. .. .	..	2	1	3
Elementary Mathematics, Arithmetic .. ..	..	..	1	1
Elementary Mathematics, Algebra and Geometry	1	..	..	1
Preparatory Mathematics	4	4	1	9
Preparatory Mathematics, Arithmetic .. ..	..	..	1	1
Preparatory Mathematics, Algebra .. .. .	..	1	2	3
Preparatory Mathematics, Geometry	1	..	..	1
Preparatory Drawing	4	..	6	10
Preparatory Chemistry	3	3	3	9
Preparatory Physics	5	2	..	7
Preparatory Geology	1	1	2	4
Theoretical Mechanics .. .. .	..	1	..	1
Practical Mathematics	1	1	..	2
Chemistry I. .. .. .	..	1	..	1
Chemistry II.	1	..	..	1
Chemistry III.	1	..	..	1
Assaying I. .. .. .	..	1	1	2
Assaying II.	1	..	1	2
Metallurgy I.	1	1	1	3
Geology .. .. .	..	1	1	2
Mineralogy .. .. .	..	..	1	1
Petrology	1	..	..	1
Mining I. .. .. .	..	1	1	2
Mining II., Mine Accounts (Administration) ..	..	1	1	2
Surveying I.	1	..	1	2
Mechanical Engineering I.—Gas Engine	2	8	2	12
Mechanical Engineering I.—Indicator .. ..	..	3	2	5
Mechanical Drawing I.	3	2	3	8
Mechanical Drawing II.	1	3	4	8
Applied Mechanics	1	1	1	3
Building Construction .. .. .	..	3	..	3
Practical Electricity .. .. .	..	2	2	4
Electrical Engineering I. .. .. .	..	2	3	5
Fitting and Turning I. .. .. .	..	..	4	4
Fitting and Turning II. .. .. .	..	..	2	2
Engine Driving II. .. .. .	..	1	..	1
Mechanical Engineering I. .. .. .	..	..	10	10
Mechanical Engineering II. .. .. .	..	4	1	5
Electrical Engineering II. .. .. .	..	4	..	4
Surveying II.	2	..	..	2
	35	54	59	158

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.
Leavers, J. C.	.. .. .	K.S.M.	.. .. .	November, 1911.
Kurth, E. E.	.. .. .	K.S.M.	.. .. .	November, 1913.

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.

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, 1915.

SCHOLARSHIP EXAMINATIONS, 1915.

Junior Scholarship.

Candidates (in order of merit).	District.	
Howard, H.	Kalgoorlie.
Crutchett, I. (did not complete)	Claremoat.
Scholarship not awarded.		

Entrance Scholarship.

Candidates (in order of merit).	District.	
Nairn, T.	Kalgoorlie.
Cecil, C.	Coolgardie.
Le Mesurier, A.	Kalgoorlie.
T. Nairn gains the Entrance Scholarship.		

Senior Scholarship.

Candidates.	District.
Terrell, J. H.	Kalgoorlie.
Eddy, J. T.	Kalgoorlie.
Scholarship not awarded.	

CRITCHLEY PARKER PRIZE.

The following has been recommended for the Prize offered by Critchley Parker, Esq., Melbourne:—

C. R. Le Mesurier: *Australian Mining Standard* for 1915.

KALGOORLIE MINERS' INSTITUTE PRIZES.

The following have been recommended for Free Membership of the Institute for 1916:—

W. Davies; T. J. McKay; V. E. Linklater; H. Taylor.

ANNUAL EXAMINATIONS, W.A. SCHOOL OF MINES, 1915.

K.S.M. denotes Kalgoorlie School of Mines.
P.T.S. denotes Perth Technical School.
F.T.S. denotes Fremantle Technical School.

Preparatory Mathematics.

Name.	School.	Result.
Nairn, T.	K.S.M.	First Class
Rowe, R. J.	P.T.S.	First Class
Phoenix, L.	K.S.M.	First Class
Pierssene, A. R.	P.T.S.	First Class
Eastwood, A. N.	P.T.S.	First Class
Le Mesurier, A.	K.S.M.	First Class
Cecil, C.	K.S.M.	First Class
Rowe, B.	K.S.M.	Second Class
Hill, H. E.	P.T.S.	Second Class
Hood, J. C.	P.T.S.	Second Class
McLeod, P.	K.S.M.	Second Class
Wilderspin, A. J.	P.T.S.	Second Class
Cairns, M. R.	K.S.M.	Second Class
Taylor, H.	K.S.M.	Second Class
Matheson, F.	K.S.M.	Third Class

Arithmetic.

Potter, W. H.	F.T.S.	First Class
Harris, C.	K.S.M.	Third Class

Algebra.

McCaskill, V.	K.S.M.	Second Class
Midgley, F. M.	K.S.M.	Third Class
Halliday, R. J.	K.S.M.	Third Class
Petterson, G. H.	P.T.S.	Third Class
Potter, W. H.	F.T.S.	Third Class

Geometry.

McCaskill, V.	K.S.M.	First Class
Petterson, G. H.	P.T.S.	Third Class

Elementary Mathematics.

Name.	School.	Result.
Head, T.	K.S.M.	Second Class.
Jensen, J.	K.S.M.	Second Class
Patterson, J. A.	K.S.M.	Third Class

Arithmetic.

Barnett, R. R.	K.S.M.	Third Class
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Algebra and Geometry.

Harris, C.	K.S.M.	First Class
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Chemistry (Preparatory).

Nairn, T.	K.S.M.	First Class
Cecil, C.	K.S.M.	First Class
Le Mesurier, A.	K.S.M.	First Class
Gregory, E.	..	..	..	K.S.M.	..	..	Second Class
McGill, A.	..	..	..	K.S.M.	..	..	Second Class
Hamilton, A. V.	..	..	..	K.S.M.	..	..	Second Class
Midgley, F. M.	..	..	..	K.S.M.	..	..	Third Class
Taylor, H.	..	..	..	K.S.M.	..	..	Third Class
Rowe, B.	..	..	..	K.S.M.	..	..	Third Class

Drawing (Preparatory).

Nairn, T.	..	..	..	K.S.M.	..	..	First Class
Cecil, C.	..	..	..	K.S.M.	..	..	First Class
Phillips, W. L.	..	..	..	K.S.M.	..	..	First Class
Rowe, B.	..	..	..	K.S.M.	..	..	First Class
McGill, A.	..	..	..	K.S.M.	..	..	Third Class
Cairns, M. R.	..	..	..	K.S.M.	..	..	Third Class
Le Mesurier, A.	..	..	..	K.S.M.	..	..	Third Class
Hamilton, A. V.	..	..	..	K.S.M.	..	..	Third Class
Roberts, T. J.	..	..	..	K.S.M.	..	..	Third Class
McLeod, P.	..	..	..	K.S.M.	..	..	Third Class

Physics (Preparatory).

Nairn, T.	..	..	..	K.S.M.	..	..	First Class
Cecil, C.	..	..	..	K.S.M.	..	..	First Class
Esdaile, A. N.	..	..	..	K.S.M.	..	..	First Class
Taylor, H.	..	..	..	K.S.M.	..	..	First Class
Le Mesurier, A.	..	..	..	K.S.M.	..	..	First Class
McLeod, P.	..	..	..	K.S.M.	..	..	Second Class
Rowe, B.	..	..	..	K.S.M.	..	..	Second Class

Geology (Preparatory).

Name.	School.	Result.
Nairn, T.	.. .. K.S.M.	.. .. First Class
Cecil, C.	.. .. K.S.M.	.. .. Second Class
Terrell, J. H.	.. .. K.S.M.	.. .. Third Class
McLeod, P.	.. .. K.S.M.	.. .. Third Class

Physics I.

Hayman, W. G. I.	..	..	..	P.T.S.	..	..	First Class
Tulloch, J.	..	..	..	P.T.S.	..	..	Second Class
Jenkinson, L.	..	..	..	P.T.S.	..	..	Second Class

Mathematics, First Course.

Tulloch, J.	..	..	..	P.T.S.	..	..	First Class
Illidge, E.	..	..	..	P.T.S.	..	..	First Class
Dale, W.	..	..	..	P.T.S.	..	..	Second Class
Duncan, K.	..	..	..	P.T.S.	..	..	Third Class

Theoretical Mechanics.

Illidge, E. H.	..	..	..	P.T.S.	..	..	First Class
Tulloch, J.	..	..	..	P.T.S.	..	..	Second Class
Rose, L. A.	..	..	..	K.S.M.	..	..	Second Class
Grace, J. A.	..	..	..	P.T.S.	..	..	Third Class

Chemistry, First Course.

Tulloch, J.	..	..	..	P.T.S.	..	..	First Class
Terrell, J. H.	..	..	..	K.S.M.	..	..	Second Class
Jenkinson, L.	..	..	..	P.T.S.	..	..	Second Class
Roeder, F. E. C.	..	..	..	P.T.S.	..	..	Second Class
Marr, H. V.	..	..	..	P.T.S.	..	..	Third Class
Hood, J. C.	..	..	..	P.T.S.	..	..	Third Class
Kinneen, W. P.	..	..	..	P.T.S.	..	..	Third Class
Stephen, C. J.	P.T.S.	Third Class

Chemistry, Second Course.

Esdale, A. N.	K.S.M.	First Class
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Chemistry III.

Le Mesurier, C. R.	K.S.M.	First Class
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Assaying, First Course.

Name.			School			Result.
Terrell, J. H.	K.S.M.	Second Class
Roeder, F. E. C.	P.T.S.	Second Class
Cliff, W. E. F.	..	..	K.S.M.	..	..	Third Class

Assaying, Second Course.

LeMesurier, C. R.	..	..	..	K.S.M.	..	..	First Class
Pond, C.	..	..	..	K.S.M.	..	..	Third Class

Metallurgy I.

Le Mesurier, C. R.	..	..	..	K.S.M.	..	..	First Class
Noall, J. C.	..	..	..	K.S.M.	..	..	Second Class
Roberts, T. J.	..	..	..	K.S.M.	..	..	Third Class

Geology.

Noall, J.	..	..	..	K.S.M.	..	..	Second Class
Grigg, J.	..	..	..	K.S.M.	..	..	Third Class
Tulloch, J.	P.T.S.	Third Class
Marr, H. V.	P.T.S.	Third Class

Mineralogy.

Mundle, E. B.	K.S.M.	Third Class
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Petrology.

Le Mesurier, C. R.	K.S.M.	First Class
Grace, J. A.	P.T.S.	Third Class

Mining I.

Grigg, J.	..	..	..	K.S.M.	..	..	Second Class
Davies, C. H.	..	..	..	K.S.M.	..	..	Third Class

Mining II. (Mine Accounts and Administration).

Mundle, E. B.	..	..	..	K.S.M.	..	..	Second Class
Leavers, J. C.	..	..	..	K.S.M.	..	..	Third Class

Surveying I.

Name.			School.			Result.
Kurth, E. E.	..	..	K.S.M.	..	..	First Class
Bicknell, H. C.	..	..	K.S.M.	..	..	Third Class

Mechanical Drawing (First Course).

Ingle, J. H.	..	..	..	K.S.M.	..	..	First Class
Terrell, J. H.	..	..	..	K.S.M.	..	..	First Class
Dunstan, G. T.	..	..	..	K.S.M.	..	..	First Class
Halliday, R. J.	..	..	..	K.S.M.	..	..	Second Class
Eddy, J. T.	..	..	..	K.S.M.	..	..	Second Class
Midgely, F. M.	..	..	..	K.S.M.	..	..	Third Class
Fenton, E. F.	..	..	..	K.S.M.	..	..	Third Class
McCaskill, V.	..	..	..	K.S.M.	..	..	Third Class

Mechanical Drawing (Second Course).

Le Mesurier, C. R.	..	..	..	K.S.M.	..	..	First Class
Smith, J. E.	..	..	..	K.S.M.	..	..	Second Class
Hardeman, J.	..	..	..	K.S.M.	..	..	Second Class
Davies, W.	..	..	..	K.S.M.	..	..	Second Class
Grace, J. N. A.	..	..	..	P.T.S.	..	..	Third Class
Halliday, R.	..	..	..	K.S.M.	..	..	Third Class
Rundle, H.	..	..	..	K.S.M.	..	..	Third Class
Rose, L. A.	..	..	..	K.S.M.	..	..	Third Class
Bicknell, H. C.	..	..	..	K.S.M.	..	..	Third Class

Applied Mechanics I.

Le Mesurier, C. R.	..	..	..	K.S.M.	..	..	First Class
Weselman, C.	..	..	..	K.S.M.	..	..	Second Class
Groves, C.	..	..	..	P.T.S.	..	..	Second Class
Cunningham, P. F.	..	..	..	P.T.S.	..	..	Third Class
Davies, W.	..	..	..	K.S.M.	..	..	Third Class
Holmes, A. W.	..	..	..	P.T.S.	..	..	Third Class
Stephens, L. V.	..	..	..	P.T.S.	..	..	Third Class

Mechanical Engineering I.

Cole, J. H.	..	..	..	P.T.S.	..	..	Third Class
Groves, C.	..	..	..	P.T.S.	..	..	Third Class
Turner, F.	..	..	..	P.T.S.	..	..	Third Class
Ingle, H. J.	..	..	..	K.S.M.	..	..	Third Class
Grigg, J.	..	..	..	K.S.M.	..	..	Third Class
Gregory, E.	..	..	..	K.S.M.	..	..	Third Class
Rose, L. A.	..	..	..	K.S.M.	..	..	Third Class
Watson, G.	..	..	..	K.S.M.	..	..	Third Class
Nowland, L. R.	..	..	..	K.S.M.	..	..	Third Class
Chatteris, W. A.	..	..	..	K.S.M.	..	..	Third Class
Mason, G. R.	..	..	..	K.S.M.	..	..	Third Class
Leevers, A. C.	..	..	..	K.S.M.	..	..	Third Class
Tschamper, G. C.	..	..	..	K.S.M.	..	..	Third Class
Raynes, S.	..	..	..	P.T.S.	..	..	Third Class

Gas Engine.

Name.	School	Result.				
McKay, T. J.	K.S.M.	..	..	First Class
Scott, T. C.	K.S.M.	..	..	First Class
Pilkington, W. H.	K.S.M.	..	..	Second Class
Aitken, R. J.	K.S.M.	..	..	Second Class
Wilkes, H.	K.S.M.	..	..	Second Class
Stacey, P. H.	K.S.M.	..	..	Second Class
Mullis, T.	K.S.M.	..	..	Second Class
Burke, R. W.	K.S.M.	..	..	Second Class
Nowland, L. R.	K.S.M.	..	..	Second Class
Linklater, W. E.	K.S.M.	..	..	Second Class
Jones, D.	K.S.M.	..	..	Third Class
Hunt, J. H.	K.S.M.	..	..	Third Class

Indicator (Mechanical Engineering).

McKay, T. J.	..	..	..	K.S.M.	..	..	Second Class
Nowland, L. R.	..	..	..	K.S.M.	..	..	Second Class
Stacey, P. H.	..	..	..	K.S.M.	..	..	Second Class
Burke, R. W.	..	..	..	K.S.M.	..	..	Third Class
Linklater, W. E.	..	..	..	K.S.M.	..	..	Third Class

Building Construction.

Le Mesurier, C. R.	..	..	..	K.S.M.	..	..	Second Class
Mundle, E. B.	..	..	..	K.S.M.	..	..	Second Class

Building Construction (Thesis only).

Edmondson, F. C. K.S.M. Second Class

Engine Driving II.

Cain, J. R. K.S.M. Second Class

Practical Electricity.

Head, B. K.S.M. Second Class
 Scott, T. C. K.S.M. Second Class
 McKay, T. J. K.S.M. Third Class
 Palmer, H. A. K.S.M. Third Class

Practical Electricity (Theory only).

Taylor, H. K.S.M. Second Class

Electrical Engineering I.

Name.	School.	Result.
Shepherd, J. P.	K.S.M.	Second Class
Rose, L. A.	K.S.M.	Second Class
Patterson, J. A.	K.S.M.	Third Class
Davies, C. H.	K.S.M.	Third Class
Godfrey, P. H.	K.S.M.	Third Class

Fitting and Turning I.

Linklater, W. K.S.M. Third Class
 Eddy, J. T. K.S.M. Third Class
 McKay, T. J. K.S.M. Third Class
 McCaskill, V. K.S.M. Third Class

Fitting and Turning II.

Rose, L. A. K.S.M. Third Class
 Wilkes, H. K.S.M. Third Class

Mechanical Engineering II.

Galt, W. K.S.M. Second Class
 (Thesis)
 Edmondson, F. C. K.S.M. Second Class
 Shepherd, J. K.S.M. Second Class
 Davies, W. K.S.M. Second Class
 Dunstan, G. T. K.S.M. Third Class

Practical Mathematics.

Kurth, E. E. K.S.M. First Class
 Rose, L. A. K.S.M. Second Class

Electrical Engineering II.

Lang, J. H. K.S.M. Second Class
 Butement, J. C. K.S.M. Second Class
 Edmondson, F. C. K.S.M. Second Class
 Galt, W. K.S.M. Second Class

Surveying II.

Godden, F. W. K.S.M. First Class
 Mundle, E. B. K.S.M. First Class

DIVISION VI.

OPERATIONS OF "THE INSPECTION OF MACHINERY ACT, 1904."

Office of the Chief Inspector of Machinery,
Treasury Buildings,
Perth, 31st March, 1916.

**Annual Report of the Chief Inspector of Machinery and Chairman of
the Board of Examiners for Engine-drivers for the Year ending
31st December, 1915, with Statistics.**

The Under Secretary for Mines, Perth.

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, 1915.

For convenience of 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) Mishaps to Machinery.
- (7) Engine-drivers' Examinations and kindred matters.
- (8) General.
- (9) Extracts from Inspectors' Reports.

DIVISION I.

Inspection of Boilers.

The number of boilers useful as steam generators on the registers at the end of the year was 3,021, as against 3,039 at end of 1914. There is, therefore, a decrease of 18 boilers. There were 28 new registrations, and one boiler which had been previously written off was resuscitated, making an *addition* of 29 to the registers. On the other hand, 23 were permanently condemned, two were converted into tanks or air receivers, and 22 were transferred beyond the jurisdiction of this Act, making a decrease of 47. The difference between increases and de-

creases gives the final *decrease* of 18 as above. Considering the bad year we have gone through and the gradual replacement of steam by suction gas in many districts, the result is not unsatisfactory.

New Boilers registered.

Only 28 boilers were registered during the year. This is very much the smallest number registered in any one year since the inception of "The Inspection of Machinery Act, 1904."

The new registrations were as follows:—Water tube, two (2); locomotive, three (3); locomotive (portable), five (5); Cornish, three (3); gas-fired cylindrical dish ended, one (1); vertical stationary, five (5); vertical multitubular stationary, two (2); vertical portable, three (3); digesters, four (4).

Seventeen (17) of these boilers were imported from the United Kingdom, four (4) from Norway, one (1) from the Eastern States, one (1) from the United States of America, one (1) from an unknown source (second-hand), two (2) were transferred from the Western Australian Government Railways and were originally imported from the United Kingdom, and two (2) only (Cornish boilers) were manufactured in this State.

The local output, it will be seen, has almost reached vanishing point.

Operations in the various Districts.

The following return shows the operations in the various proclaimed Districts in connection with boilers, as compared with 1914:—

*Return showing Operations in the Proclaimed Districts (Boilers only) during year ending
31st December, 1915.*

	TOTALS.	
	1915.	1914.
Total number of Boilers registered and capable of being used as Steam Generators	3,021	3,039
New Boilers registered during year	28	102
Boiler re-instated *	1	..
Inspections for year—Thorough	1,574	1,641
" " Working	246	103
Boilers condemned during year—Temporarily	86	52
" " " Permanently	23	38
Boilers converted into Tanks, air receivers, etc., during the year	2	1
Boilers sent to other States during the year	22	4
No. Notices for repairs issued during the year	385	325
No. Certificates issued (including those issued under Sec. 30) during the year	1,551	1,673
No. useful Boilers out of use at end of year	1,496	1,402
Total amount of fees for 1915	£ s. d. 3,346 3 0	£ s. d.
" " " 1914 .. .. .	.. .. .	3,537 17 0

* This Boiler was written off the Register owing to the owners having reported that they had cut it up. This proved incorrect. The necessary repairs were carried out and the boiler was re-instated.

There has been a decrease of sixty-seven (67) in the number of "thorough" inspections made, and an increase of one hundred and forty-three (143) "working" inspections as against the previous year. The great increase of "working" inspections is no doubt due to the Inspectors being able to give a little more time to this important work, owing to the falling-off in "thorough" inspections.

The total number of Inspections, "working" and "thorough," in all districts was 1,820 (an increase of 76 over previous year), out of which 1,130, or rather over 62 per cent., were made in the South-Western District. Out of the 28 new registrations, 26 were in the same district. The total number of certificates on boilers granted in all districts shows a decrease of one hundred and twenty-two (122), as against 1914. There was a decrease in the South-Western District of eighty (80), due to the stoppage of so many of the timber mills. The increases or decreases in the other districts are small and call for no special comment.

The total number of useful boilers out of use at the end of the year was 1,496, showing an increase of 94 as compared with 1914.

The revenue from boiler inspection fees was £3,346 3s., as against £3,537 17s. for the year 1914. This shows a decrease of £191 14s., about £125 of which is probably due to slackness in the timber trade. I fear there will be a still further decrease for the current year.

Number of temporarily and permanently condemned Boilers per 100 Inspections made since 1899.

Year.	Temporarily.	Permanently.
	per cent.	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	2.431
1914	2.97	2.178
1915	4.72	1.538

DIVISION II.

Explosions and interesting defects.

This State is again to be congratulated that no boiler explosion has occurred within its boundaries. The continued immunity from serious accidents to, or explosions of boilers, is a source of considerable satisfaction both to myself and the officers of my department. Many of the boilers in the State are of considerable age, but where this is the case they are watched with special care, and the fact that, in nearly all cases, their complete history is recorded, is a great safeguard. Inspectors, knowing their record, are enabled to deal with them intelligently, making due allowance for their age, quality of plates, workmanship, treatment in past years, etc., and

thereby can avoid many errors which they might easily fall into were our methods other than what they are. I trust that the immunity from accidents we have hitherto enjoyed may long continue.

In last year's report I referred to two second-hand boilers imported from the other States, which, though by no means new boilers, had been licensed to carry a considerably higher pressure than they were originally designed for. This year again the same thing has happened in three cases:—

- (1) A new portable locomotive boiler was bought by a firm in this State from an agent in Melbourne. A certificate was forwarded to the purchasers stating it had been examined by a Victorian licensed inspector, guaranteeing it suitable for a working pressure of 150 lbs. The boiler was not considered fit for that pressure in this State, and the pressure was accordingly reduced to 120 lbs. The makers of the boiler were communicated with, in England, and their reply confirmed my assessment. They also forwarded me a copy of original test certificate, *sent out with the boiler*, which states plainly that the working pressure is 120 lbs., and yet in face of this the Victorian inspector's certificate states that he has "calculated up" the boiler, and that he "certificates it as being suitable for a working pressure of 150 lbs." I may add that the present owners have informed me that the agent above mentioned wrote them as follows:—

"If it had been sent to New South Wales, as at first anticipated, you could no doubt have received a certificate from that Government for 160 lbs., or even more."

Comment is unnecessary.

- (2) A small vertical boiler, also imported from Victoria, was inspected at Fremantle by an officer of this department before being dispatched to its destination. The boiler was branded by a Victorian inspector as follows:—"B.I.A., T. 125, W.P. 80, 3/6/15," enclosed in a square following the usual custom of Victorian inspectors. There were no marks on it by which either its age or make could be determined. Its age was evidently great, and the quality of workmanship poor. It was granted a certificate by this department after mature consideration for a maximum working pressure of 65 lbs.
- (3) This also was a small vertical boiler similarly branded to case (2) with the omission of the letters "B.I.A.," and certified fit for a pressure of 80 lbs. It was found so thin, through external corrosion round the bottom of the fire-box, that holes were easily punched through the plate without the use of a hammer. In addition to its bad condition, the design was antediluvian, and its age quite unknown. The boiler was not at any time fit for 80 lbs., and had it been put to work in the condition in which it arrived here, I should, almost certainly, not be able to report "no explosions" next year. The necessary work to put it in working order for *any* pressure would involve so much

expense that there is little chance of its being executed. The boiler will probably be scrapped. It is only fair to add that in cases (2) and (3) the Chief Inspector in Victoria wired me as follows:—"No departmental record of these boilers—not inspected under our Act." This being so, the brand above mentioned should not have been used, as it is in the form prescribed under the regulations supplementary to the Victorian Act.

The above three cases add considerable point to my previously reiterated remarks as to the necessity for uniformity in the methods of dealing with steam boilers throughout the Commonwealth.

A rather unusual accident took place in connection with a locomotive boiler on railway construction work. Steam was being got up, and when about 30 lbs. showed on pressure gauge, both the safety valves were blown off their seats. The valves were of Ramsbottom type, and were held down by a gun-metal spindle attached, through the spring to the lever. This spindle broke just above the nut. It had probably been overstrained in screwing up, and possibly faulty material helped to precipitate the accident. No further damage was done.

An old saddle tank locomotive was found to be leaking somewhat freely from the bracket studs securing the tank to the barrel. The boiler was stripped and brackets taken off. When this was done it was found that the plates were cracked round five of the studs, the cracks varying from 1½ in. to 3 in. in length. The tank had been renewed at some time, and it was found that the seating on the underside of the tank, which should have rested on top of the barrel and carried all the weight, did not do so. Much of the weight was thus thrown on the bracket studs, causing the cracks referred to.

Two explosions occurred during the year in other States. The first was in Tasmania at a bone manure works near Hobart, and resulted in the death of two men, and injury to a third. The works were burnt down, and about 900 bags of manure were destroyed. The boiler was an underfired multitubular, 10 feet long by 5ft. 10in. diameter. It was built in 1886, and was, therefore, over 28 years old. The cause of the explosion is said to have been overheating of the back bottom plate, owing to an accumulation of hard deposit at this place. The water was very hard, owing to the dry season, and evidently sufficient attention had not been given to proper treatment of the water and internal cleaning.

The second case was that of a rubber vulcaniser at Sydney, and resulted in the death of one girl, severe injuries to another, and lesser injuries to five others (three girls and two young men). No particulars have been ascertained as to the cause of the accident. It is said that though the usual working pressure was 40lbs., the vessel only had a pressure of 23lbs. in it when the explosion took place.

DIVISION III.

Inspection of Machinery.

The following return shows a classification of the power-driven machinery in the proclaimed districts. The number of groups electrically driven easily tops the list, being 285 in excess of the number of steam-driven groups, and showing an increase of 155 new plants during the year. Oil engines again hold third

place, with an increase of 304 over those registered in previous year. Suction Gas plants come fourth, with an increase of 24 over previous year.

The chief point of interest in these figures is the very large increase in electrically-driven groups, and groups driven by oil engines.

Return showing Classification of various sources of Power driving Machinery in use or likely to be used again in Proclaimed Districts during the Year ending 31st December, 1915.

Classification.	Totals.	
	1915.	1914.
No. of groups driven by steam engines	1,315	1,303
No. of groups driven by oil engines ..	957	653
No. of groups driven by ordinary gas engines	30	34
No. of groups driven by suction gas engines	216	192
No. of groups driven by compressed air	36	35
No. of groups driven by electric motors	1,600	1,445
No. of groups driven by hydraulic pressure	11	12
Totals	4,165	3,874

The number of lift registrations has increased from 145 in 1914 to 159 at the end of last year. The increase during the year (14) has not been large, probably due to the impending change over to alternating current. People who might otherwise have installed lifts are naturally holding off until the change is completed.

The following table shows the number and description of all the lifts in the State:—

Passenger Lifts—	
Electrically driven	58
Hydraulically driven	1
Goods Lifts—	
Electrically driven	79
Hydraulically driven	10
Belt driven from a countershaft driving other machinery ..	11
	159

Considering the very large number of persons daily using these lifts, it is satisfactory to note that no accident has occurred during the year under review, in connection with a passenger lift. In one of our largest warehouses there is an "Express" lift running to a restaurant on top floor. On one day (a sale day) during the year, this lift made 212 trips up and down (i.e., 424 "trips" in all) and carried 4,357 persons, or an average of 10.27 per trip. In the same warehouse there are three other passenger lifts, and a goods lift fitted as an emergency passenger. These, though not so busy, must have carried a very large additional number. No record was kept, but from my knowledge of the place on a busy day, I should say the number carried by these other four lifts would not fall far short of 2,000. I think it can be fairly said that the lifts in all of the larger warehouses will compare favourably with those in other States or in the old country. Owners are beginning to see that it pays to have nothing but the best kind of equipment, and it necessarily follows

that such equipment demands, and gets the best of attention. The consequence is smooth running and freedom from accidents. Some years ago the lift in a warehouse was about the last thing to worry about. It was installed as a necessary evil, and left to look after itself to a great extent, until some serious breakdown stopped it.

This state of things has passed, and owners generally welcome inspection, and are most ready to adopt any suggestions from an inspector tending towards the mitigation of accidents.

Considering the complicated nature of modern lift machinery and the many points about them requiring constant and close watching (although such care is the duty of owners), I feel it my duty to again refer to the advisability of introducing fresh legislation dealing with lifts. One inspection per year, as required by the present Act, is, in my opinion, not sufficient.

It often happens, for instance, that a rope shows signs of wear at the time of the annual inspection. It is, however, nearly impossible to judge whether it will continue safe for the currency of the certificate, viz., a year. Indeed it generally happens that an experienced inspector can say definitely that it will not. At the same time, he knows it will be perfectly safe for, say, three to six months. He is thus put into the position of either condemning it before it has finished its useful existence and ordering its replacement before granting a fresh certificate, or of granting a yearly certificate when he has the best reasons for believing the rope will not run a year with the requisite degree of safety. The latter course is often adopted, and of course necessitates keeping the particular lift under notice and revisiting it during the certificate's currency.

The following return shows the work done in connection with machinery inspections:—

Return showing operations in the Proclaimed Districts (Machinery only) during the year ending 31st December, 1915.

	Totals.	
	1915.	1914.
Total Registrations useful Machinery	4,165	3,674
Total Inspections made	2,961	2,430
Certificates (bearing fees)	2,197	1,715
Certificates, Steam (without fees)	739	713
Notices issued "Machinery dangerous"	296	307
Total amount of Fees	£ s. d. 918 13 5	£ s. d. 760 15 6
Number of Inspectors	7	7

In the above Return the following points are noticeable:—

- (a.) The total number of registrations shows a most satisfactory increase, viz., 491 over the previous year. Of this number 439 were in the South-Western District, 53 in the Kalgoorlie group, and 21 in Murchison and Yalgoo and East Murchison. In Mt. Margaret and North Coolgardie group there was a decrease of 22,

- (b.) The increase in the total number of inspections made during the year was 531, of which the South-Western District contributed 445. There was an increase of 109 in the Kalgoorlie group, a decrease of 15 in the Mt. Margaret and North Coolgardie group, and a decrease of eight in Murchison and Yalgoo and East Murchison.
- (c.) The Revenue for Machinery Fees was £918 13s. 5d., and shows an increase of £157 17s. 11d. for the year. This is all the more satisfactory as last year's revenue also showed a decided increase, making together an increase of £272 10s. 5d. on the revenue collected from this source in 1913.

Dangerous Machinery.

Two hundred and ninety-six (296) notices were issued to owners of machinery, requesting them to provide guards of various descriptions, i.e., notices were issued in the case of nearly 10 per cent. of the inspections made. As, however, there were 491 new registrations during the year, this result is good, as practically all such notices would be issued on machinery not previously inspected. As the number of notices falls very much short of the number of new registrations, it shows clearly that the public is gradually becoming educated as to the necessity of more careful guarding than was the case some years ago.

DIVISION IV.

Prosecutions under the Act.

No prosecutions for breach of any provision of the Act in connection with boilers or machinery were instituted during the year, a fact which I am pleased to record.

DIVISION V.

Accidents to persons caused by Machinery.

It is gratifying to be able to report a marked decrease in the number of accidents to persons. In 1913, there were 127 such accidents; in 1914, there was a drop to 102, and in 1915, the total number was 64. This number, unfortunately, includes four in which the result was fatal.

The fatal accidents were as follows:—

No. 1.—The deceased was engaged in repairing a 6in. belt driving an ore conveyor on the Great Boulder Proprietary Gold Mine. After the repairs were finished, and the belt replaced on the pulley, he overbalanced and fell off the gangway on which he had been working on to a "trommel" about a foot lower, and from thence about 28 feet on to an iron plate over a "cracker." The cause of death was laceration of the brain. The verdict of the jury was that deceased "came to his death accidentally," and a rider was added suggesting making the gangway as much broader as possible. This has since been done.

No. 2.—This accident occurred in connection with a goods lift at G. & R. Wills' warehouse in Perth. A lad aged 15 was travelling in the lift, and it is supposed that on arrival at one of the floors opposite a door or gate the lad tried to look down to the floor just below while the lift was still travelling. He was probably thrown down on to the floor of the cage by coming in contact with a baton on, or just above the gate. He would thus be on the cage floor with portion of his body against the gate or lattice work above same, and was rolled out between the

two. The space was only 8in. in width, but the lattice would yield an inch or two, and thus allow the lad to slip through. He fell to the bottom of the lift shaft, a distance of about 45 feet, was picked up unconscious and died shortly afterwards. The verdict of the jury was that the lad "came to his death through falling out of a lift; there being insufficient evidence to show how the accident occurred, no blame was attached to anyone in connection with the matter."

No. 3.—This accident occurred at the Lady Harriet Gold Mine, Laverton. The deceased was working a small drilling machine erected temporarily. This is driven from a countershaft, which is in excavated ground, and the drill was placed up on the bank. The belt driving the machine was a very old and light one 3in. wide, with a speed of only 330 feet per minute. The deceased apparently tried to remove the belt from the pulley on the countershaft, and the only evidence on the point shows he adopted the very worst possible position to do this, viz., standing *behind* the pulley and leaning forward over it. He was caught, probably, by the arm between the pulley and belt, and was whirled round and horribly mangled. The trunk with the head were found immediately below the pulley, the left arm was found 40 feet away in the engine-room, and the legs and one foot scattered along the main drive. Of course death was instantaneous. The verdict of the jury was one of "accidental death through coming in contact with the belt, no blame being attachable to anyone."

No. 4.—The deceased in this case, which occurred at Wiluna State Battery, tried to take the cam shaft belt off while standing on the "feed" floor; not succeeding, he mounted the cam platform with a bar, obviously intending to try and remove it from that position. Immediately afterwards he was found below with his skull fractured and his neck broken. Whether he was caught by the belt or thrown down by the bar remains a matter of doubt. The plant is fitted with fast and loose pulleys and striking gear, and this being so, there was absolutely no necessity to take the belt off. The shaft could have been much more easily stopped by using the gear provided for the purpose. In any case, to attempt to remove a belt of this kind, without first slowing down the engine, was foolhardy in the extreme. No protection that could be devised would have prevented the accident. A Coroner's inquest was not held. The warden, therefore, held an inquiry on the matter, and the evidence taken at this inquiry is summed up by the Inspector of Batteries thus:—"I consider the cause of his death the result of some regrettable accident with no blame attachable to anybody."

Two other accidents which terminated fatally were reported, but neither case can be classed as a fatal accident due to machinery:—

(a.) An employee at Foy & Gibson's Furniture Factory, Perth, was "edging" a piece of matchboard on a buzzer. A guard is provided to cover the unused portion of the buzzer blades. It was admitted by the injured man that it was not close enough up to the work, and his fingers came into contact with the blades, which removed portion of two fingers. He was taken to a private hospital, and an anæsthetic administered. The unfortunate man collapsed under the anæsthetic and died.

(b.) The other case occurred at the Robin Adair Foundry, Boulder Road. An employee, a blacksmith,

was in the act of breaking up an old brass vacuum pump piston, 11 inches diameter and 6¾ inches thick. Thinking it was solid, he instructed his striker to get it hot so that it might be easily broken up under the steam hammer. Within a minute of being placed on the fire it exploded violently and hurled the striker into the corner of the shop, 15 feet away, with such force as to cause his death.

The explanation is that the piston was hollow and probably contained either a little water or oil, which on being heated, burst the casting and caused the fatality. Of course, it should not have been taken for granted that the piston was solid, and if a small hole had been drilled to ascertain whether it were or not this would have acted as a vent, and nothing would have happened.

The following table shows number of accidents and percentage of the total number caused by the various kinds of "Machinery" mentioned:—

No. of Accidents.	Class of Machinery.	Percentage of Total Accidents.
11	Belting	17·18 per cent. including 3 fatal accidents
9	Circular Saws ..	14·06 per cent.
8	Ore treating machinery	12·5 per cent.
5	Metal working lathes	7·8 per cent.
4	Buzzers	6·25 per cent.
3	Shafting	4·68 per cent.
8	Geared wheels, wind-engines, wind-scalds, chaffcutters (2 each)	each 3·12 per cent.
16	Other sources ..	each 1·56 per cent., including 1 fatal goods lift accident
64		

The only noticeable points about the above figures are the high percentage of belting accidents, and the occurrence of five accidents with metal working lathes. These latter are, I believe, the first reported due to this class of machine since the inception of the Act. Of the total number, the South-Western District provided 29, the Kalgoorlie group 19, North Coolgardie and Mt. Margaret 10, and Murchison and Yalgoo and East Murchison 6.

In nearly every case the direct cause of the accident was carelessness or foolhardiness, which no protection could have prevented.

As long as men will attempt to remove or replace belts on pulleys running at full speed, there will be accidents and serious ones.

DIVISION VI.

Engine-drivers' Examinations and kindred matters.

During the year four (4) Examinations were held in Perth, two (2) in Bunbury, and two (2) in Kalgoorlie. Examinations were also advertised to be held in Mt. Magnet, Geraldton, Albany, and Southern Cross. As, however, the necessary number of candidates were not forthcoming, the examinations were not held.

The personnel of the Board remains the same as in past years, viz., Messrs. H. L. Gill, J. Breydon, and myself as Chairman.

Seventeen (17) days were spent on actual examination work at the various centres, fourteen (14) days were occupied in Perth on applications, inquiries, marking Examination papers and other

Board matters, and twenty (20) days were occupied in travelling and looking into matters connected with engine-drivers at various outside districts.

One hundred and eighty (180) applications for certificates were dealt with, and one hundred and nineteen (119) certificates of all classes were granted during the year.

The following table shows the number of certificates granted and their classification:—

Return showing total number of Engine-drivers' Certificates (all Classes) granted in 1915 and compared with 1914.

Class of Certificate.	No. granted.	
	1915.	1914.
First Class Competency (including certificates issued under Reg. 27, and Sec. 63 of the Act)	9	20
Second Class Competency (including certificates issued under Reg. 27 and Sec. 63 of the Act)	22	33
Third Class Competency (including certificates issued under Reg. 27 and Sec. 63 of the Act)	57	57
Locomotive Competency	17	18
Traction	3	9
Interim	2	27
Copies	9	16
Total	119	180

There is a considerable falling off in the number of certificates granted in 1915, and this, owing to enlistments and the closing down of many plants, was only to be expected.

The total number of certificates granted up to 31st December, 1915, since the inception of the Act is now two thousand four hundred and eleven (2,411) as follows:—

No. of Certificates granted in—	
1905 ..	459 (of which 359 were Service Certificates.)
1906 ..	313 " 143 " "
1907 ..	211 " 34 " "
1908 ..	205
1909 ..	225
1910 ..	162
1911 ..	197
1912 ..	177
1913 ..	163
1914 ..	180
1915 ..	119

Total 2,411 (of which 536 were Service Certificates.)

The percentage of successful candidates as against applicants in 1915 was 66.11. This result is poor compared with the previous year, when over 80 per cent. were successful.

The revenue derived from engine-drivers' fees was £165 15s., and shows a falling off of £41 8s. 3d.

Inquiries, Prosecutions, etc.

During the year, no engine-driver or owner was prosecuted for any breach of the Act.

There were about the usual number of unimportant overwinds. No great damage was done in any of these cases, and no action was taken by the Board, other than to warn the driver involved and to record the occurrence on his file.

Two cases of neglect on the part of drivers were reported as follows:—

(1.) On the 8th June, the District Inspector reported that he had heard that there had been a smash of the Battery Engine on Great Victoria Proprietary Gold Mine, at Burbidge. The manager was communicated with, and replied stating that the accident had taken place on 28th April, and that the battery engine had been totally wrecked owing to the nuts on big end of connecting rod having come off. The Manager states that this was owing to gross carelessness on the part of the driver.

The Inspector also wrote to the driver in charge at the time of the accident, asking for his version. The driver, who holds a First Class Service Certificate, explained that there had always been a "bad knock" in this engine, and that there was nothing unusual in the sound when he took charge, and that at 10 p.m. when oiling round, he again noticed nothing unusual. He left the engine-room to clean his fires, etc., and fetch in a truck of firewood. When absent on this work he heard a great noise in the engine-room and ran to stop the engine, but was too late to do anything. The driver was slightly injured on the foot by a piece of flying metal. The driver left the district after the accident.

Owing to the time which had elapsed between the occurrence of this accident and its being reported, the want of any direct evidence as to negligence on part of the driver in charge, and the possibility of such negligence, if any, being partly that of the driver who preceded him on the previous shift, the Board decided that no good purpose would be gained by further investigation.

(2.) In this case the driver of a locomotive on a timber line got inebriated and abandoned his engine whilst in motion. Had it not been for the prompt action of the fireman and guard, much damage to property and loss of life would have occurred.

The driver at once proceeded to Blackboy Hill Camp and enlisted. On being interviewed by an Inspector, he freely admitted the charge and stated that he was done with liquor. As the charge was admitted, there was no necessity for a formal inquiry. The driver was, however, summoned to appear before the Board and was informed that it was its intention to recommend to the Hon. the Minister that his certificate be suspended during His Excellency the Governor's pleasure. He was also given to understand that on his return from the Front, he could make application for its restoration, but that the re-issue of the certificate would be subject to the approval of his conduct extending over a period acceptable to the Board. The suspension of his certificate was duly approved and gazetted.

DIVISION VII.

General.

Amendments to "The Inspection of Machinery Act, 1904."

I regret that the amending Bill has not yet been brought before Parliament, and I consider that this should be done as soon as possible. The passing of the Bill would give an increased revenue and grant greatly needed facilities that the Department does not possess under the present Act.

During the year, His Excellency the Governor in Executive Council approved of an additional Regulation as follows:—

24A. In addition to furnishing the Board with the medical certificate as required under Regulation No. 6, every successful candidate who is actually in charge of any locomotive engine, to which the Inspection of Machinery Act, 1904, applies, shall present himself for medical examination at intervals of not more than two years, and a medical certificate in the form of second schedule hereto, but specifying a locomotive engine, shall be forwarded by him to the Chief Inspector of Machinery for record purposes.

Any engine-driver who, in the opinion of a duly qualified medical practitioner, is not in a fit state of health to be in charge of a locomotive engine shall not take such charge, but may take charge of any stationary engine for which his certificate qualifies him, subject to the sanction of the Chief Inspector being first obtained.

Any certificated locomotive engine-driver having charge of a locomotive engine, and whose certificate at this date is more than two years old, must comply with this regulation before the first day of July, 1915, and as required thereafter."

This regulation has been in force since June 16th, 1915, and by the end of the year all engine-drivers under control of the provisions of the Act and in charge of locomotive engines had been medically re-examined in accordance with the new regulation.

Work done for other Departments.

During the year the Department has inspected, valued, and reported on various plants for several other Departments. This Department is, of course, in a peculiarly good position for undertaking such work, as in addition to the possession of the necessary trained Inspectors, it has in nearly all cases inside knowledge of the plants in question, in the usual course of its business. An Inspector from this Department is, therefore, frequently able to detect and point out defects which would be almost impossible of discovery to an outside consulting engineer.

New Installations.

With the exception of the machinery used for shell making, there are no new installations of any importance to report. A large number of small electrically and oil engine driven plants have been registered and several suction gas plants have been started. The largest of the latter was 125 HP.

The shell-making plant in Stirling Street is now in full swing. The plant is driven by an eighty-five h.p. suction gas engine, placed centrally in the length of the workshop. There are many lathes ranging from 8in. to 14in. centres, a radial drill, an 18in. shaper, cold saw with self-contained electric motor, hydraulic pump and accumulator, press for fixing copper bands, an air compressor and sand blast outfit, and in the tool making department a

universal miller and a grinder. All of these tools have been got together in the State, altered, fitted with turrets, and many most ingenious emergency outfits to render them suitable for the very special work in hand, and all of them are turning out most excellent work of such extreme accuracy as has never been attempted before in the State. The plant is an object lesson as to what can be done on emergency, and in the face of apparently impossible difficulties.

Good work in connection with shell making is also being done at the Government Midland Junction Railway Workshops, in Kalgoorlie, and at Millars' Timber & Trading Co.'s Works at Yarloop. At the latter place an ingenious machine has been made, practically out of scrap, to drill the steel bars after being cut to shell lengths. This machine drills the cut billets, four at a time, and at the same time takes a roughing cut off the exterior. While the four are being drilled, four more are fixed on same table, and the instant the first four are drilled, the table is shifted and operations started on the next four. The shells as they leave this machine are forwarded to the Stirling Street Works for the finishing operations.

Inspectorial Staff.

This remains as in 1915. The changes referred to in my report on the year 1914, viz., the closing of the Geraldton Office, and the transference of one of the Kalgoorlie Inspectors to Head Quarters in Perth, have worked satisfactorily, and have insured the results that I fully anticipated.

Clerical Staff.

No important change has taken place during the year. In my last report I referred to the fact of Messrs. Gover & Geddes having joined the West Australian Contingent. Both have been fighting for their country since then in Gallipoli, and it is with deep regret that I have to report the death in action of Lieut. Geddes. The country has lost a promising officer, and the public service a man who would probably have gone far in it.

Revenue.

The total revenue from all sources during the year was £4,511 18s. 11d., made up as follows:—

	£	s.	d.
Fees for Boilers	3,346	3	0
Fees for Machinery	918	13	5
Fees for Engine-drivers' Certificates	165	15	0
Incidentals (special expenses and fees for special inspections, etc.)	81	7	6
	<u>4,511</u>	<u>18</u>	<u>11</u>

This amount shows a reduction of £86 2s. 10d. as compared with revenue for 1914. I feel that, all the circumstances taken into consideration, the result is satisfactory.

During the year special efforts have been made to collect all accounts due. Three small amounts, totalling £2 19s., have been written off as bad debts. This amount is only about .06 per cent. of the total revenue and is altogether insignificant.

Mileage.

The distance travelled by the Inspectors during the year was 46,743 miles, of which 28,641 were by rail, 17,760 by road, and 342 by water. The mileage shows a decrease of 580 as against 1914, and the

miles travelled per inspection shows a decrease of 1.56, although there was a total increase of 607 inspections made.

Conclusion.

In conclusion, I wish to acknowledge with thanks the assistance of Officers of other Departments in matters connected with the administration of the

Act. I wish also to record my appreciation of the manner in which the various duties of my staff have been carried out through the year.

I have, etc.,

C. J. MATHEWS, M. Inst. C.E.,
Chief Inspector of Machinery and Chairman of
the Board of Examiners.

EXTRACTS FROM INSPECTORS' REPORTS.

Mr. B. P. Jones, Inspector of Machinery in charge of Coolgardie and Yilgarn, Dundas, East Coolgardie, and Broad Arrow Districts, remarks:—

Inspection of Boilers.—Taking boilers first, as being the most important part of our work, and considering my districts as a whole, there were 15 fewer inspections than in 1914. This is partly accounted for by the fact of the Commonwealth Railway Department taking over the control of their thirteen boilers. But for that, the number would have been about the same as last year.

Out of the 915 useful boilers registered, 516 are out of use and in very many cases are not likely to be ever put into commission again, unless a sudden and extensive revival in mining took place.

Three hundred and ninety-nine certificates were issued. Four boilers were permanently condemned, eight prevented from working until certain repairs are done, and twenty-two notices issued for minor repairs.

Comparing one district with another, the greatest falling off has been in East Coolgardie, with a drop of twenty-one (including thirteen transfers to the Transcontinental Railway). Coolgardie and Yilgarn show an improvement of eleven, mainly in the locality of Southern Cross. I expect the Burbanks Main Lode and Tindals Coolgardie Mines, which closed for a time, will not be idle much longer.

Two new boilers of Cornish type 26ft. long by 6ft. 6in. diameter were completed at the Kalgoorlie Foundry, early in the year. The firm have adopted a new design which was approved by the Department for a pressure of 130lbs. per sq. inch, and is in some respects an improvement on their old standard. These boilers were not supervised during construction, but the result of a severe hydraulic test was satisfactory in each case, and the workmanship appears to be good.

The maintenance and care of boilers remain good in all my districts. Two mines have adopted the Ferric Alumina process of water purification, and are satisfied with the results. In most districts the feed water is good, and owners are convinced that our steady insistence on careful maintenance is to their own advantage as well as for the safety of the public.

Prosecutions under the Act.—There have been no prosecutions for infringement of the Act during the year.

Machinery Inspections.—The number of groups registered has increased from 823 to 876, but are mainly small units. The increase of 53 is about equally divided between East Coolgardie and Coolgardie and Yilgarn; the other districts remaining the same. Six hundred and seventeen certificates were issued and forty-six repair notices sent out for guards and fencing. About twenty unimportant groups were overdue for inspections at the end of the year, but I suspect many of them to be out of

use, while none were sufficiently important to warrant the extra expense of being visited specially. They will most probably be all done before the end of next April.

The same care is being exercised in inspections as heretofore, but it occasionally happens that a slight injury to a workman reveals a previously unsuspected danger, and one must then provide accordingly.

Accidents.—The number of accidents is only nineteen this year, as compared with forty-eight in 1914. The sudden drop is difficult to account for. It may, however, be partly due to the fact that managers and foremen are realising their responsibilities with regard to seeing that all unsafe places are properly guarded.

I am strongly of the opinion that the Machinery Act should contain a similar section to No. 50 of the Mines Regulation Act, which provides that every person employed in a mine shall use ordinary and reasonable precaution to ascertain that the appliances he uses and the place in which he works "are not unsafe," and that it shall be his duty to report to his employer's representative in case he finds anything "likely to produce danger." A strange anomaly, that a miner shall see that appliances, etc., are safe, while a beltman or greaser need not mention defective gear or point out a place "that is unsafe or apparently unsafe." I know men who have accepted certain working conditions for years, and who after an accident declared that they always thought someone would be caught sooner or later. This is sometimes a question of being wise after the event, but I know that many men are deterred from complaining by fear of being black-listed. The majority, however, are more afraid of being considered nervous by their mates.

There was only one fatal accident during the year, and it was fully reported on by Inspector McCulloch during my absence. I visited the scene afterwards and perused all the evidence, but could not understand how it could have occurred, had reasonable care been exercised. It is not in human nature to be always strung to the highest point of caution and watchfulness, specially in men working on night shift in summer time, but machinery cannot be completely boxed in, and with reasonable care accidents should be rare.

Engine-drivers.—The behaviour of engine-drivers has been exemplary on the whole. A few overwinds have been reported, but in no case could gross carelessness be brought against the men. The contributing factor in most overwinds is that the brakes are allowed to wear into bad adjustment, so that at a critical moment the driver finds that when the foot-step of his break gear is down as far as the platform will allow it to go, the pressure on the brakes is not enough to pull the engine up quickly enough. A similar condition exists with steam brakes. For instance, in steam released dead-weight brakes the weight may be held up by the steam piston resting

on its cylinder bottom and consequently be exerting no pressure on the brakes. Until that resting point is reached the full effect of the weight is on the brakes, but in the event of a runaway the brake blocks might easily char enough to allow the weight to rest and thereafter have no effect on the drum. I have pointed out several times during the year both to engineers and drivers that care should be exercised to ensure good clearance in the brake donkey cylinders, so that in the event of a runaway a continuous pressure can be kept on the brake-blocks, even though they be charring and wearing all the time. It is for that reason that I like rack and pinion gear, as auxiliary to foot gear for medium sized engines, so that extra pressure can be applied and maintained after the footstep is touching the platform.

Interesting Developments, etc.—The lead-lined steel boiler feed water service which I mentioned last year is described as an unqualified success and will, no doubt, be adopted by other steam users in course of time, because the replacement of feed water connections on the Golden Mile has always, as you know, been a very serious item.

The Munitions Committee of Perth visited Kalgoorlie about the middle of the year and met with a good reception. Owners of lathes came forward readily and mechanics offered their services. The Chamber of Mines offered to donate five tons of steel, while managers of the large mines promised their skilled workmen the free use of suitable machines (after working hours) without charge for power and light. The offer was enthusiastically accepted by the men, and after a few unavoidable delays the steel was distributed among the big mines and work was commenced on the rough forming of 18-pounder high explosive shell cases. A friendly rivalry between the mines naturally ensued, and against many little difficulties the work was soon done.

Mr. H. L. Gill, Inspector of Machinery in the South-Western District (Metropolitan Area), remarks:—

Inspection of Boilers and Machinery.—During the year I inspected seventy-eight (78) boilers and granted 67 certificates. Nineteen repair notices were issued and two notices permanently condemning boilers. Six hundred and twenty-nine (629) groups of machinery were inspected, and certificates were granted in every case but one. Ninety (90) notices re guarding were issued.

The above inspections necessitated travelling 1,556 miles in and about the Metropolitan area, and trips to Holyoake and to Bunbury involved another 374 miles.

New Registrations.—Eight new boiler registrations only have fallen to my lot during the year. Of these, *not one* was locally made. Five were British, one American, and the remaining two were second-hand imported from Victoria. Both of these second-hand boilers carried Victorian Government Inspector's Certificates for a working pressure of 80lbs. One of them was found very severely wasted at the base of firebox and was permanently condemned, its construction being so antiquated that repairs were not warranted. The other was granted a W.P. of 65lbs.

Comment seems unnecessary, but it is hard to refrain from it. The boiler which was condemned was of unknown age and make. Its staying was a boiler-maker's nightmare, and it never was fit for 80lbs. at

any time. In its deteriorated condition it was not fit to carry 5lbs.

I registered 91 new groups of machinery in the year, many of which had been working for a considerable time. These were nearly all small plants at dairies, piggeries, and market gardens, and the owners in every case, and I believe honestly, professed ignorance of the Act.

The provisions of the Act are being carried out in a satisfactory manner as regards guarding dangerous machinery, and this is especially the case with passenger lifts, all of which are now fairly well equipped with various safety devices.

There are still a few which are rapidly becoming obsolete, though they cannot be classed as dangerous. I hope, however, that before the end of 1916, these will all be replaced by more modern installations. The coming introduction of alternating current throughout the city will necessitate a change of motors in every case, and I have been successful, in the case of many of the older lifts, in persuading owners to contemplate putting in entire new plants instead of patching up old ones.

With regard to this change of current, it will mean a large amount of additional work. Every motor in or near the city will have to be practically re-registered, and this will involve much writing and time.

The number of lifts registered in the State is now 159, showing an increase of 14 against 1914. All but seven of these are in Perth and Fremantle. The increase would probably have been greater if it had not been for the coming change of current. Those contemplating the instalment of lifts are naturally waiting until this is completed, so as to avoid changing motors.

There has been no accident during the year in connection with any passenger lift. There was, unfortunately, a fatal accident to a lad who was travelling in a goods lift. This is dealt with in your Annual Report.

Accidents.—During the year I had to inquire into 16 accidents, including the fatal goods lift accident referred to. The accidents were in almost every case caused by absolute carelessness, and resulted in the loss of a finger or two, a dislocated shoulder, and various bruises and cuts, but nothing very serious.

Engine-drivers' Board.—About 24 days of my time were spent in connection with examinations and other Board work. No case occurred in the Metropolitan division necessitating action by the Inspector, and as far as my experience goes, the engine-drivers have performed their various duties in a satisfactory manner.

The work in this district has been considerably eased by the fact of Inspector Lee's transference to the S.W. district, and also by the fact of Inspector Churchill being available with his motor car for several weeks in the year. Having this car has made it possible to make many new registrations in outlying districts, which it would be impossible to reach with any regard to economy by trap.

I am quite convinced that it would pay the Department handsomely to have a car for the Metropolitan Area. The time saved as against walking, travelling by trams and traps, could be employed in looking up new registrations, thus permanently increasing our revenue.

Reviewing the year's work, the results as far as the Metropolitan Area are concerned are well up to date and fairly satisfactory. There has been a de-

cided increase in registrations in spite of the war and drought of last season, though certain industries have been hard hit, notably the coachbuilders. Many firms employed in building spring carts, drays, sulkies, etc., are doing next to nothing and their machinery is lying idle.

Mr. P. G. P. McCulloch, Inspector of Machinery in charge of the North Coolgardie, Mt. Margaret, and part of the East Murchison districts, remarks—

Inspection of Boilers.—The number of useful boilers on the register is 479, as against 485 at the end of 1914, and shows a decrease therefore of six; while the number of boilers in use shows a decrease of 28, as compared with the figures for the end of 1914.

One hundred and fifty-seven (157) thorough inspections and fourteen (14) working inspections were made during the year.

No new boilers were registered.

The maintenance and care of boilers remain as last year.

There have been no explosions or interesting defects worth commenting on in the districts under my control.

Machinery.—One hundred and sixty-eight (168) groups of machinery were inspected, and six notices *re* guarding dangerous places were issued.

New Installations.—Several suction gas plants have been installed, the largest being 125 h.p.

The Ridgway Slimes Process has been installed at the Lancefield G.M., Beria, and under the new management this old and tried gold producer looks like taking its place once more on the list of profit-making mines in West Australia.

One feature worthy of note is that, whereas in both the Mt. Margaret and North Coolgardie districts the number of machinery groups dispersed exceeds (in the former case greatly) the number of new installations, in the East Murchison district the reverse is the case, there being only one group dispersed, and eight new installations.

Accidents.—Eleven accidents occurred during the year, including two fatal. One of these at Wiluna State Battery was inquired into by an Inspector of Mines and appears to have been entirely due to negligence on the part of the unfortunate victim. Of the remainder, all were either trivial in their nature or due to carelessness, with the exception of two belting accidents, one of which caused serious injuries and the other terminated fatally. Even these two cases must be put down to carelessness or ignorance as to the proper methods of handling belts. With all the care and precaution in the world, however, most belts *must* be handled at times, *e.g.*, after a breakage, and there always will be a certain element of danger in so handling them, which absolutely cannot be avoided.

In the first of above cases, the injured man was an old and experienced hand, who was in full charge of the machinery and could have had the engine stopped or run as slow as he pleased. The use of fast and loose pulleys, or else of a jockey pulley, is now, however, insisted upon in the case of all belts of any size or running at any speed.

Re Engine-drivers.—I have nothing to report this year.

General.—The mileage travelled during the year compared with that during 1914 is:—

	1915.	1914.	Comparison.
Road ..	3,542 ..	3,455 ..	87 more
Rail ..	3,590 ..	2,252 ..	1,338 ..
Total ..	7,132 ..	5,707 ..	1,425 ..

In considering these figures it must be remembered that a smaller number of boilers to be inspected does not necessarily reduce the distance to be travelled, and the increase is fully accounted for by the number of special trips made either for special inspections (expenses paid) or for accidents, etc.

In addition to the work done in my own districts as above, I have made 103 boiler and 185 machinery inspections in the Kalgoorlie districts, besides other work, such as machinery inspections for other Departments, winding engine, and accident inquiries, etc., entailing 966 miles travelled by road and 31 by rail, so that the total amount of work done is well up to the average.

Mr. J. Stone, Inspector of Machinery in the South-Western District, remarks—

Owing to the great European War, causing an abnormal increase in freights and generally disorganising business, the principal industry of the South-West, viz., the timber industry, has been much depressed during the year, and the export trade has been considerably reduced as compared with normal years; a number of mills are now closed down and are likely to remain so until trade conditions improve. Only two of the large mills owned by Millar's Timber and Trading Co. have continued working during the whole year, viz., Jarrahdale and Wellington. Whilst the engineering works carried on at Yarloop in connection with the above mills have been practically closed down for some months, the Swan Saw Mills have been closed for the whole year, and the Timber Corporation Mill, Greenbushes, was closed during the latter part of the year, as well as a number of small "spot mills" in various parts of the district. The State mills at Wuraming, Manjimup, Big Brook, however, have worked throughout the year, also those mills owned by private firms engaged principally in the local trade.

An innovation introduced during the year is the steam log-hauler, which has superseded horse whims in several places. This is in the form of a powerful winch with boiler, etc., mounted on a truck which is "run out" to the log-landings and used for hauling the logs from where the tree is felled up to the trucks on which they are loaded to be taken to the mills. This operation was previously carried out by horse teams.

A heavy steel wire cable is used for hauling purposes, and to facilitate transit a dished plate or "shoe" is placed under the "nose of the log"; after the cable is attached and the signal given, the log is simply hauled along the ground up to the loading stage. It is claimed that the scene of operations of these haulers is up to a radius of 800 yards.

On some of the haulers a second drum is fitted carrying a light wire rope which is used for hauling the main cable out to the scene of felling operations; and for signalling purposes a light wire attached to the whistle of engine is affixed to the trees along

the "log route," and the operator can signal from any part.

In the initial stages some difficulty was experienced in breakage of cables, winches, etc., principally caused by inexperience in both the designing and working of these plants. This is unavoidable in any new undertaking, but the plants are now proving effective and more economical than horse-teams, and notwithstanding the heavy cost of upkeep, due to the nature of the work, I am of opinion that the log-hauler has "come to stay," and upon return to normal times, I expect that many more of these plants will be brought into operation.

The Coal Mining industry has also been very quiet during the past year. Owing to the decrease in railway traffic (due to slackness in timber business and disastrous season in some of the agricultural districts), the Government orders have been considerably reduced. These causes, added to the usual practice of curtailing the use of Collie Coal on Government Railways during the summer months, owing to its "sparking properties," and the very small volume of "bunkering trade" done, have resulted in short time being worked in the mines. I am pleased to state that, with one exception, the plants have been well maintained and are gradually being improved, one high class electric generating set having been installed at the Proprietary Mine, and I expect several new boilers will be erected in the near future.

With the Tin Mining industry work has been fairly brisk. The market price of tin was well maintained during the year and is steadily increasing. The plants generally have been well maintained, and although no new ones have been erected, several that have been closed down for some time have been brought into use again.

The Government Land Clearing operations were entirely suspended for several months, but several plants are now in use again. These plants have been the means of reducing the cost of land clearing and generally assisting in land settlement, and when one considers the amount of land which is still in its virgin state and its wonderful possibilities, it is to be regretted that there are not more of these plants in constant operation.

The inspection of boilers has been carried out as usual, and during the year 502 inspections have been made; of this number 339 were thorough inspections, 312 certificates being issued; 45 boilers were temporarily condemned pending repairs of various kinds. In most of these cases the repairs have been effected and boilers brought into use again; eight boilers were permanently condemned, being unfit for further use as steam generators; 130 notices were issued for minor repairs, and 110 surprise visits and working inspections were made.

The maintenance of boilers generally has been satisfactory, although towards the end of the summer months the greatest care had to be exercised owing to the water supplies becoming seriously depleted and of very indifferent quality in many localities, probably the result of the exceptionally light rainfall of the previous winter. The feed water difficulty, which was so acute in connection with boilers used in the Coal Mining industry a few years since, has been practically overcome by a system of lime treatment of water before it

enters the boiler, and I am sure that with proper attention boilers can be kept in good repair, whilst using mine water for feed purposes.

I am pleased to state that the feeling existing between boiler owners and this Department is of the most cordial nature, and a large percentage are always willing to adopt any suggestion for the better working of plants, also to render any assistance required during inspection. The formidable list of boilers condemned and repair notices issued during the year is not the result of neglect on the part of owners or attendants, but is due principally to the fact that, in the portion of the State where I have been engaged, a large percentage of boilers are very old and the greatest care has to be exercised to keep them in a state of efficiency.

Only seven new boilers were added in my district during the year, and all of these were imported.

One very bad case of neglect came under my notice during the year in connection with a locomotive boiler used on railway construction work. Proper care had not been taken in cleaning operations, and the result was that the water space became "blocked up," causing overheating and serious damage to plates. As will be seen by the number of boilers condemned and repair notices issued, the repair list has again been very heavy and, so far as I can see, is likely to continue so.

The inspection of machinery has been carried out as usual and I have endeavoured to make plants as safe as possible, but I fully realise that to make some of the machines absolutely "fool proof" would in many cases make them inoperative, and it must be realised that so long as there is machinery in motion, so surely will there be an element of danger to those persons working in connection with the machines. I consider this Department is doing good work in reducing that danger to a minimum, and this is generally admitted.

During the year I have made in all 255 machinery inspections and of these 140 were steam-driven plants. The remaining 115 were driven by power other than steam. Seventeen Fourth Schedules were issued ordering guards to be erected for safety purposes, and 60 new groups were registered and inspected.

I am of opinion that the number of new registrations do not represent the whole of the new plants installed, and I know that in isolated places there are many small units which have not been registered up to date, and with the present facilities for travelling it is very difficult to deal with these without considerable expense to the Department.

Machinery generally has been well maintained.

I am pleased to state that the year has been singularly free from serious accidents, only a few minor cases being reported. I sincerely trust that this state of affairs will be continued.

The regulations regarding engine-drivers have been strictly observed during the year. Unfortunately, the closing down of so many plants has necessitated many of the drivers seeking other avenues of employment.

Only one serious misdemeanour occurred. This has been fully reported, and the driver's certificate has been suspended; and in one or two cases I had to complain of the lack of attention on the part of the drivers.

The new regulation dealing with periodical medical examination of locomotive drivers has been highly commended, and has given general satisfaction.

To carry out the above inspections and generally attend to the requirements of the Inspection of Machinery Act, I have travelled 8,666 miles during the year, viz., 6,890 miles by train and 1,776 miles by road; the latter in all sorts and conditions of conveyances from a motor-car to a "sleeper dray," and very many miles on foot. The localities visited include all towns between Perth and Cape Leeuwin in the far South, thence through the Bridgetown District, terminating at a point about half-way between Bunbury and Albany.

Mr. D. F. Booth, Inspector of Machinery in the South-Western District, remarks:—

Boilers.—During the year I have inspected 181 boilers thoroughly and made 32 working inspections. Forty-four notices ordering repairs were issued and 187 certificates were granted; six of these being granted on working inspections.

Most of the boiler owners are farmers who use their boilers less than six months per year, and therefore are not required to keep a certificated driver; but the greater number of them have owned their boilers for several years, and have learned how to take proper care of them when out of use. The principal faults which have necessitated the issue of repair notices have been the want of skill in making manhole and mud-hole joints.

There were three new registrations of boilers, none of which were made in this State, and four digesters at the Spermacet Whaling Co.'s Works, all of these made in Norway. One boiler was permanently condemned on account of having been left out in the weather until the corrosion had made it dangerous, and one on account of its age, viz., over 30 years. One temporarily condemned until certain repairs are done will probably never be used again, as the distance from boiler shops will make the cost of repairs so high as to make it more economical to buy a new source of power—either a new boiler or a gas engine.

Machinery.—I made 503 inspections of machinery and issued 487 certificates; 105 notices to fence or guard dangerous places were issued. Altogether 274 new groups of machinery were registered in the portion of the district worked by me, and of these 149 have been inspected. The remainder will be visited as opportunity occurs; many of them are in outlying districts difficult of access.

Most of this new machinery is very well guarded by the makers. This I take to be an eloquent testimonial to the usefulness of the Machinery Inspection Acts of this and other States.

During the year in all I travelled by rail 5,960 miles, by road 1,989 miles, and by boat 340 miles, making a total of 8,289 miles.

A somewhat interesting accident occurred at a suction gas plant in Albany during the year. The "expansion box" and pipes conveying the gas were burst, but fortunately did no damage to person.

The explosion was violent and did considerable damage to that part of the plant which is in the producer room. There were two men in the next room, but as there is a 14in. brick wall between these rooms neither of them was hurt. A new wood burning producer had lately been installed. The gas

testing pipe (1½in.) was covered with three thicknesses of wire gauze 28 S.W.G. and 16 wires per lineal inch. The engineer, who was one of the men in the engine-room, assures me that the fan was being turned at the usual speed at the time that he lighted the gas, therefore the gas must have been travelling through the pipes at its usual speed. Though pure suction gas is not explosive without an admixture of air, air is present in pipes, scrubbers, etc., when starting. Gas, therefore, should not be tested for some time after starting the fan, and never unless the testing cock is protected by suitable wire gauze. The testing pipe in this case was protected by gauze, but, as the result proved, the mesh was too large and allowed the gas in the pipes and expansion box to ignite.

From experiments which I have made since then, I find that of all the samples of wire gauze which are to be bought in Perth the largest mesh which is safe to use on producer gas test cocks is made of copper wire No. 38 S.W.G. woven 48 wires per lineal inch, and I think that this should always be specified in future.

Mr. W. Churchill, Inspector of Machinery in Murchison and Yalgoo, Sandstone, and portions of the South-Western District, remarks:—

Inspection of Boilers.—1915 commenced with 288 useful boilers on register and finished with 291 for Murchison-Yalgoo, the changes being due to addition of four boiler transfers from East Murchison to Murchison-Yalgoo, and one boiler in Murchison-Yalgoo being permanently condemned and converted to air receiver. During the year four boilers were temporarily condemned.

My portion of the East Murchison District commenced with 57 useful on register and finished with 53, a reduction of four, being due to transfer of four boilers from East Murchison to Murchison-Yalgoo. During the year two boilers were temporarily condemned.

In South-West part of the district one boiler was temporarily condemned; otherwise, no alteration in numbers.

During the year I have made 174 thorough inspections (76 Murchison-Yalgoo, 29 East Murchison, and 69 South-West), also 21 working inspections (10 in Murchison-Yalgoo, one in East Murchison, and 10 in South-West), necessitating issue of 174 ordinary certificates, 8 Section 30, and 9 certificates on working inspections. Repair notices to total of 87 have been issued, as follows: 35 in Murchison-Yalgoo, 14 in East Murchison, and 38 in South-West.

Total mileage travelled has been 9,092, being 4,874 by rail and 4,218 by road, divided as follows: 4,462 in Murchison-Yalgoo, 1,313 in East Murchison, and 3,317 in South-West. Taking average rate of travelling by rail 20 miles per hour, and by motor 12 miles per hour, this gives about 600 hours per year actually travelling; which means about 30 per cent of an inspector's time is occupied in travelling.

There have not been any new boilers registered in Murchison-Yalgoo, East Murchison, or part of South-West District worked by me during 1915.

During 1915 nine boilers have been temporarily condemned and two permanently condemned.

There are still many boilers in remote parts of my districts which, though classed as useful, will prob-

ably never be used again. None of these can be used without an inspection being previously made, and when (if ever) such inspection is made I feel sure that a large number of them will be permanently condemned. There is, however, no present justification for writing them off the register.

Maintenance and care of boilers generally, I consider, has in most cases much improved of late years, owing to recognition by owners of value of treating feed water, and further, owing to installation of suction gas engines for most of crushing plants. The necessity for forcing boilers has thus been decreased, as in most cases steam is only required now for winding engines and air compressors.

No prosecutions with regard to boilers or machinery have been necessary, owners realising that any requirements stipulated by this department are as much for their own benefit and safety as for that of employees, and for this reason are as a rule anxious to adopt any improvements which an inspector may require.

Machinery Inspections.—359 groups of machinery have been inspected, for which certificates were issued as follows: 126 in Murchison-Yalgoo, 40 in East Murchison, and 193 in South-West. I consider all machinery reasonably well guarded. Some 63 new groups have been added to register and 12 groups have been dispersed, leaving net gain of 51 for year.

Accidents.—Reviewing accidents which have occurred during the year, I find three out of the total of five have happened on ordinary stamper batteries caused by operator hanging up or releasing stamps when cam-shaft is in motion. This is an operation which might receive a little more care on the part of attendants than appears to be the practice at present. None of the accidents need special comment.

Engine-drivers I find, generally, a good, careful class of men, and in one or two cases where mishaps have happened they were of that nature which will happen sometimes to men, no matter how careful they may be.

No new plant of importance has been installed, any new machinery being in the nature of additions to existing plants.

A little more activity is taking place in some new localities, but this is mostly counterbalanced by decrease of work at some other centre.

Generally speaking, there has been some increase in work for the year owing to extension of district and opening up of mines in new localities, notably Warriadar in Yalgoo District, and Pinnacles and Big Bell leases in Cue District.

Portion of my time has been devoted to work in the Metropolitan and Suburban area, and also from Northampton southwards to Gingin.

Mr. E. P. Lee, Inspector of Machinery in the South-Western District, remarks:—

Boilers.—During the year I carried out 257 thorough inspections and 56 working inspections on boilers, making a total of 313 inspections, for which I have issued 245 certificates. Four boilers were temporarily condemned, and 59 notices were issued to various owners to have necessary repairs effected, which have been carried out in a satisfactory manner. There have been six new registrations of boilers, four of which were new (three vertical and one water tube type), whilst two were locomotives transferred from the Railway Department. I am sorry to say that the four new boilers were imported and not locally manufactured. One new air receiver, locally made,

was installed to replace one that was permanently condemned, and the workmanship in the new one was all that could be desired.

The maintenance of the boilers generally that come under my notice is still fairly good, and in some instances I have noticed a marked improvement, particularly in the Metropolitan area. I also note that the condition of the water as now supplied for feed purposes is of a very much better quality than it was some years ago before I went to the Goldfields, both at Perth and Fremantle and throughout the Metropolitan area generally. In the Agricultural Districts where the boilers are travelled a good deal and subjected to various classes of feed water, there is still a good deal of room for improvement in the maintenance.

With regard to boilers of the water-tube type, I find that there are many of this class that have been in use for a considerable number of years, and I would like to point out that when carrying out inspections of this type of boiler it is not possible to make complete visual inspection of the interiors of the tubes. These may be pitted or generally wasted by corrosion and so sealed over as to render detection almost impossible. In cases where there is reason to suspect corrosion, I would suggest that one or more of the worst tubes be withdrawn periodically, thoroughly cleaned of all scale, and then weighed and compared with the weight of a new tube.

By this means a fairly accurate idea of the average wastage of the rest of the tubes could be obtained, and suitable measures could be taken to prevent this becoming dangerous.

Many boilers in the State are becoming aged, and where this is the case, particularly in the case of locomotive type boilers, great care has to be exercised to ascertain whether the plates are becoming crystallised by obtaining samples of the plates, should any opportunity occur, such as when repairs are being executed, and having them tested.

Machinery.—As usual the inspection of machinery has been kept well up to date. During the year I have carried out 419 inspections of machinery groups for which 418 certificates have been issued; 42 of these groups were new registrations, consisting of 20 electrically driven, 18 oil driven, and four steam driven groups.

There were 10 notices issued giving instructions re guarding and fencing machinery, and such instructions have been duly carried out. 304 certificates were issued with fees and 115 without fees.

During the year I have travelled altogether 4,595 miles, 3,469 of which have been by rail and 1,126 by road, and I would again like to draw your attention to the fact that a considerable saving could be effected in time when touring country districts if one had a motor car, as owing to train services on country lines where there are only one or two trains a week, one is sometimes hung up for two or three days waiting to get along to the next place; also there are, I believe, numerous owners who have machinery which is not registered, which one would be enabled to pick up with suitable means of transit.

With regard to accidents, I have only had to hold inquiries into two cases, and both of these were pure mishaps, no blame being attachable to anyone.

With regard to engine-drivers, I have had no complaints. Everything has been satisfactory, and there is nothing fresh to report.

In conclusion, I wish to state that generally speaking, in the agricultural areas, the prospects are much brighter than they were this time last year.

DIVISION VII.

**Annual Report of the Government Analyst, Chief Inspector of Explosives,
and Agricultural Chemist, for 1915.**

To the Under Secretary for Mines, Perth

Sir,—

I have the honour to submit, for the information of the Hon. the Minister, my twentieth Annual Report on the work of my Department, dealing with the year 1915.

Like every other part of the community, the whole of the work of my office has been completely overshadowed during the year by the war, and my report this year must likewise bear evidence of the influence of this all-absorbing topic.

I propose, also, to make the report very brief, for various reasons.

In the first place, all statistics with regard to the importation of explosives are excluded from publication, at the special request of the Federal Government. Secondly, the contraction of normal departmental work has been very marked, and as it is only to be expected the activities of the office have been confined almost entirely to routine work, and progressive or investigatory work has had to be put aside. Owing to economic conditions, it has been necessary to keep all expenditure as low as possible, and the result is that the work carried out under my supervision did not possess last year many features of special interest.

GENERAL ANALYTICAL WORK.

The following table gives a summary of the laboratory work carried out in the Department during the last twelve months:—

Table I.

GENERAL CLASSIFICATION OF ANALYSES.

Explosives	.. .. .	1,385
Spirits	.. .. .	170
Waters	.. .. .	1,669
Soils	.. .. .	10
Fertilisers	.. .. .	64
Rocks	.. .. .	4
Essences	.. .. .	11
Oils	.. .. .	55
Foodstuffs	.. .. .	111
Sewage	.. .. .	493
Wheats and Flours	.. .. .	98
Criminal Investigations	.. .. .	55
Lime	.. .. .	4
Fabrics	.. .. .	42
Vinegar	.. .. .	7
Medicinal Compounds	.. .. .	42
Milk	.. .. .	420
Kerosene, Benzine, Turpentine, etc.	.. .. .	35
Toilet Preparations	.. .. .	8
Hydrometers	.. .. .	2
Miscellaneous	.. .. .	237
Powellising material	.. .. .	160
Total	.. .. .	5,082

Table II.

Departments for which work was performed:—	
Explosives	.. .. . 1,381
Commonwealth, Customs	.. .. . 313
Commonwealth, Other Departments	.. .. . 20
Health	.. .. . 608
Mines	.. .. . 5
Public Works	.. .. . 156
Railways	.. .. . 34
Water Supply	.. .. . 2,095
Agricultural	.. .. . 217
Police	.. .. . 98
Private	.. .. . 34
State Hotels and Inspection of	
Liquors	.. .. . 110
Miscellaneous	.. .. . 11
Total	.. .. . 5,082

WORK FOR FEDERAL CUSTOMS.

As was anticipated in my last report, the work of the Customs Department has been transferred to the laboratory established by that Department under their own staff, and I have had nothing to do with this work for the past six months.

IMPORTATION OF EXPLOSIVES.

As I have already said, I am unable to publish this year the customary tables dealing with the importation of explosives into Australia, which have formed a feature of my report for years past, the reason being it is not thought advisable that the figures showing the importation of explosives into this State should be published under present conditions, and I must postpone the discussion of any questions dealing with the supply of explosives for our industries in this State until after the war.

STORAGE OF EXPLOSIVES.

On the Explosives Reserves throughout the State there are erected 73 magazines, owned by private firms, with a total capacity of 976 tons; also three Government magazines with a storage capacity of 90 tons, making the total storage capacity 1,066 tons.

There are 54 magazines licensed for explosives but not situated on special explosive reserves. These have a storage capacity of 46½ tons.

STORES FOR THE SALE OF EXPLOSIVES.

There were 126 licenses for the sale of explosives and 179 for the sale of fireworks issued during the year.

INSPECTION WORK.

153 inspections were carried out during the year, but the inspections were confined to the metropoli-

tan area and the Eastern Goldfields owing to insufficient staff being available for more widely distributed journeys. The following places were visited:—Perth, Fremantle, Guildford, Midland Junction, Westonia, Southern Cross, Bullfinch, Coolgardie, Norseman, Kalgoorlie, Broad Arrow, Comet Vale, Menzies, Kookynie, Malcolm, Morgans, Laverton, and Leonora. As a result of these inspections the following prosecutions were instituted, and the following somewhat insignificant quantities of explosives it was found necessary to destroy:—

Date.	Offence.	Penalty.
1-6-15	Overstocking explosives on licensed premises	Fined 18s. ; 2s. costs.
21-8-15	Storing explosives on unlicensed premises	Stock seized, and afterwards sold by order of Court for £24 7s. 6d.
12-11-15	Overstocking explosives on licensed premises	Fined £1 ; costs 3s.

The following are the explosives destroyed:—

Date.	Locality.	Kind and Quantity.	Remarks.
18-1-15	Coolgardie ..	300 detonators	Damaged by water.
22-10-15	S. Cross ..	45lbs. Gelignite	Chemical deterioration.

One new reserve was declared during the year, namely, at Westonia, making the total in existence 50, with an area of 3,081 acres.

The amended Explosives Act which has been submitted for consideration of Parliament has not so far got beyond the departmental stages.

STAFF.

The staff has undergone no changes during the year, with the exception that I have to record with great regret the serious loss incurred by the department through the death on active service of Captain H. A. Southern of the 16th Battalion, A.I.F., an officer of this department who lost his life during the military operations on the Gallipoli Peninsula. Mr. Southern was an officer of brilliant abilities and high character, giving promise of a very distinguished career in the scientific work to which he had devoted himself, and his removal from the staff of this office has caused an irreparable loss. Not the least of the terrible effects of the present war is to be found in the deplorable wastage of special abilities such as those possessed by this officer, whose value to the community can never be properly estimated.

MANUFACTURE OF MUNITIONS.

During the year I have been called upon to perform a good deal of special work in connection with the movement which took place here towards promoting the local manufacture of munitions of war. My duties as a member of the State Munitions Committee, my selection as a special delegate to proceed to Melbourne in connection with this matter, and my subsequent appointment as secretary of the above-mentioned committee, made large demands upon my time during the last six months of the year, but the organisation of this work has now reached a satisfactory stage, and at the conclusion of the year I am able to hand the matter over to those who are better able to carry it on, and to return to my normal duties.

I beg to acknowledge with thanks the assistance rendered to me by the Commissioner of Police and the State Mining Engineer, and the officers under their control.

I have, etc.,

E. A. MANN,

Government Analyst, Chief Inspector of Explosives, and Agricultural Chemist.

31st December, 1915.

DIVISION VIII.

WOODS AND FORESTS DEPARTMENT.

Report by the Acting Inspector General of Forests.

Woods and Forests Department,
Perth, 8th May, 1916.

The Under Secretary for Mines.

Sir,

I have the honour to submit, for the information of the Hon. the Minister, my Seventeenth Annual Report upon the operations of the Woods and Forests Department for the year ended the 31st December, 1915.

I have, etc.,

C. G. RICHARDSON,
Acting Inspector General of Forests.

REVENUE AND EXPENDITURE.

The following statement shows the revenue and expenditure of the Department since its inception in 1895:—

Year.	Revenue.			Expenditure.		
	£	s.	d.	£	s.	d.
1st January to 31st December, 1895	3,175	5	2	1,108	5	5
1st January to 31st December, 1896	4,838	11	2	2,020	11	5
1st January to 31st December, 1897	12,320	6	4	3,489	14	4
1st January to 31st December, 1898	30,150	6	3	3,356	5	7
1st January to 31st December, 1899	16,999	11	3	2,438	7	5
1st January to 31st December, 1900	15,525	19	2	2,648	11	10
1st January to 31st December, 1901	18,477	16	2	2,747	6	3
1st January to 31st December, 1902	18,752	11	7	4,301	6	1
1st January to 31st December, 1903	20,478	9	1	3,789	3	4
1st January to 31st December, 1904	20,018	19	4	4,192	16	9
1st January to 31st December, 1905	18,479	18	6	5,089	18	6
6 months, 1st January to 30th June, 1906	10,973	18	4	3,385	1	9
1st July, 1906, to 30th June, 1907	22,783	1	5	6,207	15	2
1st July, 1907, to 30th June, 1908	23,498	13	3	8,801	14	3
1st July, 1908, to 30th June, 1909	29,484	3	8	9,030	12	6
1st July, 1909, to 30th June, 1910	31,549	6	11	8,531	0	9
1st July, 1910, to 30th June, 1911	37,477	3	5	8,862	16	8
1st July, 1911, to 30th June, 1912	44,560	10	10	10,469	4	10
1st July, 1912, to 30th June, 1913	48,236	14	0	11,463	2	11
1st July, 1913, to 30th June, 1914	53,038	16	0	12,092	15	3
6 months, 30th June to 31st December, 1914	22,906	0	0	5,468	14	0
1st January to 31st December, 1915	45,725	13	9	8,869	15	11
	549,451	15	7	128,365	0	11

It will be seen from the above statement that to the 31st December, 1915, the revenue exceeded the expenditure by the large sum of £421,108 14s. 11d.

Revenue and Expenditure for the year ended the 31st December, 1915.

The Revenue derived from the forests of the State for the year under review amounted to £45,725 13s. 9d., which is a decrease of £8,256 12s. 3d., as compared with the previous year.

The details of the revenue for the years ended the 31st December, 1914 and 1915, respectively, are as follow:—

	1914.		1915.	
Rents on Timber Leases	£9,144	14 9	£13,427	6 10
Timber Licenses, Royalty on Timber and Sandalwood	£37,870	4 9	£27,795	8 11
Timber Inspection Fees	£6,962	6 6	£4,502	18 0

The revenue from license fees, royalty, and inspection fees has markedly decreased every month throughout the year under review. This decrease is owing to the collapse of the timber industry; most of the mills having had to close down and the hewers having ceased cutting on Crown Lands, the conditions arising from the War having rendered the sale and shipment of timber overseas almost impossible.

The total expenditure of the Department for the year ended the 31st December last amounted to £8,869 15s. 11d., the details of which are as follow:—

<i>Total Expenditure of the Department.</i>	
Salaries and Allowances	£7,981 16 4
Maintaining State Nursery, Pine, Wattle, and Sandalwood plantations	163 17 10
Incidental Expenses	649 19 11
Workers' Compensation	15 0 0
Re-afforestation	59 1 10
	£8,869 15 11

PINE PLANTING.

During the year under review a further area of one hundred acres of land was planted with pines at the Ludlow plantation, near Busselton.

The plantation, which now embraces about 1,000 acres planted, presents a very fine appearance, and should do much to encourage the planting of softwoods in the future.

STATE NURSERY.

The following list shows the various species and numbers of trees raised during last season at the Nursery:—

List of Trees and Shrubs raised in the State Nursery.

<i>Acacia Baileyana</i>	Silver Weeping Wattle (N.S.W.)	1,540
" <i>decurrans</i>	Black Wattle (N.S.W.)	2,714
" <i>dealbata</i>	Silver Wattle (Queensland)	1,978
" <i>melanoxydon</i>	Blackwood Tree	484
" <i>podalyfloria</i>		242
<i>Araucaria Bidwilli</i>	Queensland Pine	28
<i>Agonis flexuosa</i>	Peppermint (W.A.)	80
<i>Ceratonia siliqua</i>	Carob Bean	3,340
<i>Cupressus macrocarpa</i>	Californian Cypress	7,000
" <i>sempervirens</i>	The common Cypress	5,254
" <i>torulosa</i>	The Nepal Cypress	1,848
<i>Eucalyptus corynocalyx</i>	Sugar Gum (S.A.)	9,644
" <i>globulus</i>	Blue Gum	4,156
" <i>ficifolia</i>	Red Flowering Gum	4,495
" <i>rudis</i>	Flooded Gum	966
<i>Erythrina indica</i>	Coral Tree	300
<i>Ficus macrophylla</i>	Morton Bay Fig	988
" <i>australis</i>	Pt. MacQuarie Fig	1,200
<i>Grevillea robusta</i>	Silky Oak	648
<i>Lagunaria Patersonii</i>	Pyramid Tree (N.Z.)	711
<i>Laurus camphora</i>	Camphor Laurel	2,238
<i>Pinus pinaster</i>	Maritime Pine	5,564
<i>Pinus insignis</i>	Remarkable Pine	138,921
<i>Pittosporum undulatum</i>	Cheesewood	1,470
<i>Platanus orientalis</i>	Plane Tree	2,484
<i>Phoenix dactylifera</i>	Date Palm	342
<i>Robinia pseudo acacia</i>	False Acacia	3,198
<i>Sterculia acerifolia</i>	Queensland Flame Tree	676
<i>Sterculia diversifolia</i>	Kurrajong Tree	4,200
<i>Schinus molle</i>	Pepper Tree	8,441
<i>Tristania conferta</i>	White Box	216
<i>Thuja occidentalis</i>	Arbor vitae	1,012
	Total	216,378

Distribution of Trees.

During the year under review numerous applications were received for trees for planting by Municipalities, Roads Boards, Schools, Churches, Public Parks, etc., etc., and from settlers throughout the State.

About 100,000 trees were distributed during the season.

Many letters have been received from public bodies and private persons eulogising the splendid manner in which the trees are packed and sent out from the Nursery at Hamel, under the supervision of the Manager, Mr. MacFarlane.

TIMBER IMPORTS.

The following return shows the quantity and value of the timber imported into Western Australia during the years ended the 31st December, 1914 and 1915, respectively, the various articles and the countries from which they were imported:—

Year ended 31st December, 1914.			Year ended 31st December, 1914.		
Articles and Countries.	Quantity.	Value.	Articles and Countries.	Quantity.	Value.
<i>Timber—Mouldings, etc.:</i>	sup. ft.	£	<i>Rims (N.E.I.):</i>	No.	£
Other States of Australia .. ..	..	662	United States of America	7	3
<i>Bent or cut into shape:</i>			Other States of Australia	544	122
United Kingdom .. ..	..	11		551	125
United States of America .. ..	..	66			
Norway .. ..	..	2	<i>Shafts, Poles, etc.:</i>		
	..	79	United Kingdom .. ..	..	50
			United States of America .. ..	..	229
<i>Dressed, N.E.I.:</i>			Other States of Australia .. ..	..	1,020
United Kingdom	9,400	88		..	1,299
United States of America	729,100	6,858	<i>Spokes (dressed) not Hickory:</i>		
Germany	144,200	1,063	Other States of Australia	69,150	1,419
Belgium	97,700	694			
Norway	1,360,300	8,858	<i>Spokes (dressed) Hickory:</i>		
Sweden	756,900	5,742	United Kingdom	600	17
Straits Settlements	18,800	177	United States of America	35,317	475
Other States of Australia	38,036	484	Other States of Australia	3,977	97
	3,154,436	23,964		39,894	589
<i>For making Boxes and Doors:</i>			<i>Staves:</i>		
United Kingdom	32,200	508	Other States of Australia	9,700	112
Germany	2,500	66			
Straits Settlements	24,800	170	<i>Undressed (N.E.I.), less than 7ft. x 2½in.:</i>	sup. ft.	
Norway	3,500	31	United Kingdom	33,300	493
Holland	1,800	39	United States of America	2,224,400	16,788
Sweden	20,600	196	Straits Settlements	54,400	697
Belgium	1,300	21	Sweden	63,300	412
Other States of Australia	121,502	1,381	Norway	90,900	422
	208,202	2,412		2,466,300	18,812
<i>Undressed for making Boxes and Doors:</i>			<i>Undressed (N.E.I.) in sizes less than 7ft. 6in. x 10in. x 2½in., for door stocks:</i>		
United Kingdom	104,400	1,094	United States of America	282,200	3,225
Germany	103,600	880			
Straits Settlements	133,500	717	<i>Undressed (N.E.I.) in sizes of 7ft. x 2½in. and upwards, and less than 12ft. x 6in.:</i>		
Norway	326,500	2,682	United Kingdom	1,800	45
Sweden	605,300	5,579	Straits Settlements	15,000	365
	1,273,300	10,952	United States of America	3,591,200	29,418
<i>Hickory (Undressed):</i>			Germany	14,300	162
United States of America	300	4	Norway	86,100	423
<i>Hubs (Elm):</i>	No.		Sweden	187,800	1,841
United States of America	384	67		3,896,200	32,254
<i>Hubs, prepared (other):</i>			<i>Undressed (N.E.I.) in sizes of 12ft. x 6in. and over:</i>		
Other States of Australia	232	22	United Kingdom	100	6
<i>Laths for Blinds:</i>			India	40,900	1,900
Other States of Australia .. ..	..	78	Java	600	1
<i>Laths (N.E.I.):</i>			United States of America	3,891,606	23,232
United States of America	1,484,000	1,644	Straits Settlements	300	3
Other States of Australia	11,000	21	Other States of Australia	698,064	8,867
	1,495,000	1,665		4,591,570	34,009
<i>New Zealand Pine:</i>	sup. ft.		<i>Veneers (3-ply):</i>		
Other States of Australia	155,866	2,118	United Kingdom	20,200	884
<i>Picture and Room Mouldings:</i>			Belgium	1,700	13
United States of America .. ..	..	1,147	Germany	47,200	1,315
Germany .. ..	..	931	Norway	1,500	35
Norway .. ..	..	83	Sweden	26,500	622
Other States of Australia .. ..	..	36	United States of America	400	30
	..	2,197		97,500	2,899
<i>Rims and Felloes of Hickory:</i>			<i>Veneers (N.E.I.):</i>		
United Kingdom .. ..	..	9	Belgium	400	96
United States of America .. ..	..	585	Germany	4,500	176
	..	594		4,900	272
			Total .. ..	..	139,829

TIMBER IMPORTS—continued.

Year ended 31st December, 1915.			Year ended 31st December, 1915.		
Articles and Countries.	Quantity.	Value.	Articles and Countries.	Quantity.	Value.
<i>Timber—Mouldings, etc.:</i>	sup. ft.	£		No.	£
Commonwealth of Australia, other States .. .. .	..	753	<i>Rims (N.E.I.):</i>		
<i>Bent or cut, dressed or partly dressed, N.E.I.:</i>			Commonwealth of Australia, other States	566	147
United Kingdom .. .. .	..	81	<i>Shafts (N.E.I.):</i>		
United States .. .. .	..	103	United States .. .. .	..	257
Norway .. .. .	..	39	Commonwealth of Australia, other States .. .. .	..	1,054
		223,			1,311
<i>Dressed (N.E.I.):</i>			<i>Spokes, dressed (Hickory):</i>		
United States	38,100	714	United States	22,080	446
Norway	29,600	299	Commonwealth of Australia, other States	5,216	159
Commonwealth of Australia, other States	96,590	1,555		27,296	605
	164,290	2,563	<i>Spokes, dressed (not Hickory):</i>		
<i>For Boxes or Doors, cut, shaped, and dressed:</i>			Commonwealth of Australia, other States	46,010	861
United Kingdom	16,200	233	<i>Staves (Undressed):</i>	No.	
Sweden	21,500	226	United States	6,000	192
Straits Settlements	800	15	<i>Undressed, less than 7ft. x 2½in.:</i>	sup. ft.	
Commonwealth of Australia, other States	58,835	726	United Kingdom	90,800	937
	97,335	1,200	United States	363,600	2,968
<i>For Boxes or Doors (Undressed):</i>			Japan	31,000	492
United Kingdom	8,200	75	Straits Settlements	33,800	282
Straits Settlements	201,900	1,038	Sweden	3,800	40
Norway	59,600	725	Norway	21,700	191
Sweden	843,000	8,144		544,700	4,910
	1,112,700	9,982	<i>Undressed, 7ft. x 2½in. upwards, and less than 12ft. x 6in.:</i>		
<i>Hickory (Undressed):</i>			United Kingdom	2,600	28
United States	1,700	57	United States	374,500	2,628
<i>Hubs (Elm):</i>	No.		France	3,000	20
United States	308	105	South African Union	2,500	5
<i>Laths for Blinds:</i>			Straits Settlements	16,700	166
Commonwealth of Australia, other States .. .. .	..	114	Japan	3,600	44
<i>Laths (N.E.I.):</i>			Sweden	1,700	19
United States	65,540	104	Norway	34,300	255
Commonwealth of Australia, other States	18,000	19	New Zealand	21,200	176
	83,540	123		460,100	3,341
<i>Logs, not sawn, and Spars in the rough:</i>	sup. ft.		<i>Undressed, (N.E.I.) 12ft. x 6in. and over:</i>		
Norway	511	22	United States	284,800	1,163
<i>New Zealand Pine:</i>			Commonwealth of Australia, other States	644,004	8,898
New Zealand	221,000	1,744		928,804	10,061
Commonwealth of Australia, other States	21,457	242	<i>Veneers (3-ply):</i>		
	233,457	1,986	United Kingdom	54,700	2,191
<i>Picture and Room Mouldings:</i>			United States	200	10
United Kingdom .. .. .	..	83		54,900	2,201
United States .. .. .	..	1,057	<i>Veneers (N.E.I.):</i>		
Norway .. .. .	..	124	United Kingdom .. .. .	..	17
Commonwealth of Australia, other States .. .. .	..	125	Commonwealth of Australia, other States .. .. .	..	255
	..	1,389		..	272
<i>Rims and Feloes:</i>			Total		42,829
United States .. .. .	..	406			

From the foregoing return, it will seem that for the year ended the 31st December, 1914, the value of the timber imported into Western Australia amounted to £139,829, while for the same period ended the 31st December, 1915, the imports amounted to £42,829, being a decrease of £97,000.

TIMBER EXPORTS.

The following return shows the quantity and value of the timber exported from Western Australia during the years ended the 31st December, 1914 and 1915, respectively, and the various countries to which same was sent:—

Year ended 31st December, 1914.			Year ended 31st December, 1915.		
Countries.	Quantity.	Value.	Countries.	Quantity.	Value.
	sup. ft.	£		sup. ft.	£
<i>Timber—Dressed (Other):</i>					
Commonwealth of Australia, other States	43	2			
<i>Undressed (Other):</i>			<i>Timber (Undressed):</i>		
United Kingdom	18,641,588	124,691	United Kingdom	8,083,745	54,890
Ceylon	1,077,540	7,871	Ceylon	4,804,518	33,163
India	20,696,743	134,060	India	2,423,376	16,157
South African Union	42,738,014	292,590	South African Union	21,958,443	152,360
Mauritius	388,344	2,589	Mauritius	654,895	4,366
New Zealand	12,351,169	81,803	New Zealand	7,099,637	49,186
Belgium	1,801,879	12,054			
Egypt	86,360	577			
Portuguese East Africa	317,484	2,116			
Uruguay	1,334,632	8,971	Straits Settlements	599	4
Germany	128,685	861			
China	2,582,441	17,764			
Commonwealth of Australia, other States	50,402,737	334,614	Commonwealth of Australia, other States	38,563,803	258,295
<i>Spokes, Rims, Felloes, Hubs (Undressed):</i>			<i>Spokes, Rims, Felloes, Hubs (Undressed):</i>		
Commonwealth of Australia, other States		144	Commonwealth of Australia, other States		107
Total	152,547,613	1,020,705	Total	83,589,016	568,528

From the above statements it will be seen that for the year ended the 31st December, 1914, the value of the timber exported from the State amounted to £1,020,705, while the exports for the same period ended the 31st December, 1915, amounted to £568,528, being a decrease of £452,177.

This falling off is accounted for by the unsatisfactory condition of the timber industry during the year under review. Trade with the Eastern States diminished considerably, and the export of timber overseas fell off tremendously, owing to the war and consequent scarcity of ships.

Nearly all the mills had to close down, and hold very large stocks of timber, which it was impossible to get rid of owing to the shortage of tonnage.

The hewing industry also was seriously affected by the above mentioned causes, with the result that there are now very few hewers left, and large quantities of hewn sleepers are lying stacked throughout the South-West awaiting shipment.

SANDALWOOD EXPORTS.

The following return shows the quantity and value of the Sandalwood exported from this State during the years ended the 31st December, 1914 and 1915, respectively:—

Countries to which Exported.	Year ended 31st Dec., 1914.		Year ended 31st Dec., 1915.	
	Quantity.	Value.	Quantity.	Value.
	cwt.	£	cwt.	£
Hong Kong	111,067	46,891	106,867	47,034
India	8,240	4,109	11,680	6,524
Straits Settlements	6,921	4,041	15,720	9,456
China	26,142	10,716	40,650	20,437
Japan	240	162	120	78
United Kingdom			3	2
Commonwealth of Australia and other States			160	123
Total	152,610	65,919	175,200	83,654

From the above it will be seen that for the year ended the 31st December, 1914, the value of the Sandalwood exported from the State amounted to £65,919, while the exports for the same period ended the 31st December, 1915, amounted to £83,654, being an increase of £17,735 over the previous year. The revenue derived from royalty on this wood during the year under review amounted to £2,048 17s. 4d.

MALLET BARK EXPORTS.

The following returns show the quantity and value of the Mallet Bark exported from Western Australia during the years ended the 31st December, 1914 and 1915, respectively:—

Countries to which Exported	Year ended 31st Dec., 1914.		Year ended 31st Dec., 1915.	
	Quantity.	Value.	Quantity.	Value.
	cwt.	£	cwt.	£
United Kingdom	113	46	1	1
Java .. .. .	..	..	3,640	1,547
Belgium	21,636	8,774	..	..
Germany	15,196	5,831	..	..
Commonwealth of Australia and other States..	16,081	8,172	11,156	5,784
Total	53,026	22,823	14,797	7,332

From the above returns, it will be seen that for the year ended the 31st December, 1914, the value of the Mallet Bark exported from the State amounted to £22,823, while the exports for the same period ended the 31st December, 1915, amounted to £7,332, being a decrease of £15,491.

FIELD STAFF.

At the commencement of the year the fieldstaff consisted of 24 permanent and five temporary rangers.

Owing to the closing down of sawmills and the cessation of sleeper hewing on Crown Lands, it became necessary to reduce the staff, which at the end of the year consisted of 20 permanent Rangers; the services of all the temporary rangers having been dispensed with.

SAWMILL PERMITS.

The following return shows the Sawmill permits in existence up to the 31st December, 1915:

Name.	Number.	Area.	District.
Bunning, Robert	8/11	4,700	Wellington.
Bunning Brothers	9/11	10,000	do.
Preston Valley Sawmills, Ltd.	10/11	19,800	Nelson.
Swan Saw Mills, Ltd.	13/11	2,633	Preston.
Swan Saw Mills, Ltd.	14/11	9,000	do.
Bunning, Robert	15/11	5,300	Wellington.
Adelaide Timber Co., Ltd.	16/11	15,775	do.
Swan Saw Mills, Ltd.	19/11	1,000	do.
Bunning Brothers, Ltd.	25/11	10,000	do.
South-West Timber Hewers' Co-operative Society, Ltd.	27/11	20,001	Collie.
Port & Co., Ltd.	34/11	28,510	Murray.
Timber Corporation, Ltd.	35/11	6,800	Nelson.
Bunning Brothers, Ltd.	36/11	10,000	Wellington.
Lewis, F. J. and Reid, F. W. S.	37/11	19,730	do.
Wilgarrup Karri and Jarrah Co., Ltd.	42/11	23,000	Nelson.
Buckingham Brothers	44/11	18,000	Wellington.
South-West Timber Hewers' Co-operative Society, Ltd.	60/11	38,000	do.
The Kauri Timber Co., Ltd.	61/11	58,000	Nelson.
Bunning, Robert	63/11	8,000	Wellington.
Wandoo Timber Co., Ltd.	68/11	35,800	Collie.
South-West Timber Hewers' Co-operative Society, Ltd.	69/11	4,997	Murray.
Trees, Ltd.	71/11	20,028	Wellington.
Young, F. M., Power, C., Steere, F. W.	72/11	1,500	do.
Nelson Co-operative Timber Society, Ltd.	73/11	7,000	Palgarup.
Behsmann, George	75/11	5,670	Murray.
Whittaker Brothers	76/11	20,000	do.
Denmark Timber Co., Ltd.	77/11	31,000	Denmark.
Commissioner of Railways	78/11	81,500	Dwellingup.
Minister for Works and Industries	79/11	36,870	Murray.
Minister for Works and Industries	80/11	25,740	Wellington.
Minister for Works and Industries	81/11	25,878	Murray.
Minister for Works and Industries	82/11	4,750	Wellington.

WESTERN



AUSTRALIA.

DEPARTMENT OF MINES.

MINING STATISTICS,

1915.

MINING STATISTICS TO 31st DECEMBER, 1915.

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EXPLANATIONS OF SIGNS AND ABBREVIATIONS.

Gf. Goldfield.	M.R.C. Mineral Reward Claim.
Mf. Mineral field.	M.A. Machinery Area.
D. District.	Mach. L. Machinery Lease.
G.M.L. Gold Mining Lease.	P.A. Prospecting Area.
M.L. Mineral Lease.	T.A. Tailings Area.
Loc. Location.	T.L. Tailings Lease.
L.C. Lode Claim.	W.R. Water Right.
Q.C. Quartz Claim.	S.L. Special License
R.C. Reward Claim.	

WESTERN AUSTRALIA.

SUMMARY OF MINERAL PRODUCTS.

GOLD AND OTHER MINERALS PRODUCED DURING 1915, AND THE ESTIMATED VALUE THEREOF, TOGETHER WITH A COMPARISON FOR PREVIOUS YEARS, AND THE TOTAL PRODUCTION TO DATE.

DESCRIPTION OF MINERAL.	1915.		1914.		1913.		1912.		PREVIOUS TO 1912.		TOTAL TO DATE.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
1. Antimony (Exported) statute tons	..	£ ..	..	£ ..	..	£ ..	..	£ ..	47	£ 860	47	£ 860
2. Asbestos (Reported) do.	..	..	..	..	..	..	..	..	43	1,754	43	1,754
3. Bismuth (Exported) do.	1	37	9	635	..	..	..	..	..	..	10	672
4. Coal (Reported) do.	286,666	137,859	19,210	148,684	313,818	153,614	295,079	135,857	2,028,057	933,578	3,242,830	1,509,592
5. Copper { Ore (Exported) do.	737	13,768	3,913	33,654	4,339	136,472	9,536	58,688	47,592	522,049	66,117	764,631
{ Ingot and Matte .. (Exported) do.	946	77,401	183	4,520	82	5,891	28	1,136	8,641	530,476	9,880	619,424
6. Godolinite (Reported) do.	..	..	..	..	1	112	..	..	..	..	1	112
7. Gold (Exported and Minted) fine ounces	1,210,112	5,140,228	1,232,977	5,237,353	1,314,043	5,581,701	1,282,658	5,448,385	24,448,467	103,850,48	29,488,257	125,258,154
8. Ironstone (Reported) statute tons	..	..	..	..	..	..	..	..	57,830	36,695	57,830	36,695
9. Lead (Ore and Concentrates) (Exported) do.	..	..	3,554	46,285	3,169	59,002	1,868	22,270	35,441	381,191	44,032	508,748
10. Lead and Silver Lead (Ore (Exported) and Concentrates) do.	2,883	39,032	..	..	..	..	..	..	940	8,071	3,823	47,103
11. Limestone (Reported) do.	..	..	..	..	..	..	..	..	93,706	18,290	93,706	18,290
12. Magnesite (Exported) do.	688	1,196	..	..	..	..	..	..	..	..	688	1,196
13. Mica (Exported) do.	*	26	4	323	..	..	..	..	*	304	..	653
14. Pig Lead (Exported) do.	13	302	..	..	..	..	..	..	684	13,303	697	13,608
15. Pyritic Ore (Reported) do.	6,558	2,368	9,759	3,485	10,216	3,658	7,626	2,543	9,999	3,529	44,098	15,583
16. Scheelite (Exported) do.	..	..	..	..	..	..	..	..	4	140	4	140
17. Silver (Exported) fine ounces	222,159	24,295	193,057	23,227	188,020	23,420	165,371	19,725	2,261,848	2,7495	3,030,455	358,162
18. Tantalite (Exported) statute tons	..	..	..	..	..	..	..	..	18	6,129	18	6,129
19. Tin (Ore and Ingot) .. (Exported) do.	429	41,391	363	35,649	484	72,142	651	79,738	11,508	980,577	13,435	1,209,497
20. Wolfram (Exported) do.	1	25	1	40	1	86	..	..	12	1,116	14	1,267
21. Zinc (Exported) do.	7	143	22	379	..	..	14	217	127	4,068	170	4,807
Unenumerated (Exported) .. ..	..	78	7	40	..	17	..	8	..	6,188	..	6,331
TOTAL VALUES .. ..	..	£5,478,149	..	£5,534,274	..	£6,036,115	..	£5,768,567	..	£10,566,303	..	£130,383,408

* Weight not stated.

The figures against silver and lead for the year 1914 in the above table differ from those published in the Report for that year, due to a revision upon information furnished after such Report was in print.

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 1915

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	1,210,112	£ 5,140,228	132,498	£ 562,819	249,711	£ 1,060,703	329,068	£ 1,397,793	18,547	£ 78,784	6,081	£ 25,830	398,931	£ 1,694,553			
Copper statute tons	946	77,401	6,793	234,437	19,704	1,428,793	..	..	7,901	709,167	7,725	561,247	..	..	
Copper Ore do	787	13,768					66	367
Pyritic Ore do	6,558	2,368				
Lead and Silver-																	
Lead do.	2,896	39,334	313,082	2,998,857	486	10,638	..	..	10,383	91,689	59	625	..	..	
Manganese do	..	3	..	..	200	820	97	337	..	..	250	563	..	..	
Platinum fine ounces	..	..	56	476	..	..	..	..	..	..	..	..	..	..
Silver do	222,159	24,295	3,237,432	322,244	239,748	23,972	11,687	1,250	..	..	2,462	277	957,541	95,583	
Tin statute tons																	
Black Tin do	429	41,391	2,188	266,780	..	..	96	9,447	2,599	292,306	..	..	..	..
Tin Ore do																	
Scheelite do	..	..	33	4,004	2	117	..	..	..	..	..	..	194	27,784
Wolfram do	..	25	50	5,031	416	54,300	14	833	95	11,115	..	35	..	..	
Zinc (Spelter and Concentrates) do	7	143	190,916	1,111,569	..	..	..	..	..	..	..	..	..	..
Antimony (Metal and Ore) do	..	..	637	12,519	193	3,425	11,113	49,320	..	..	..	..	..	..
Bismuth (Metal and Ore) do	1	37	18	4,981	3	772	..	..	6	1,203	..	..	..	..
Alunite do	..	..	1,420	5,680	..	..	..	..	..	..	..	..	..	..
Coal do	286,666	137,859	9,449,008	3,424,630	1,024,273	409,342	590,968	275,343	64,536	30,418	..	..	2,208,624	1,104,312	
Coke do	..	..	417,753	313,241	..	..	..	..	..	..	..	..	..	..
Shale (Oil) do	..	..	15,474	12,890	..	..	..	..	..	..	..	..	..	..
Iron do	..	..	76,318	267,000	..	..	..	..	..	..	..	..	..	..
Iron "Oxide" do	..	..	2,294	3,774	..	..	..	..	..	..	..	..	..	..
Ironstone do	..	..	..	..	45,686	37,436	..	..	..	..	237,375	264,612	..	..	
Lime do	..	..	33,010	42,756	..	..	..	..	..	..	..	..	..	..
Limestone do	..	..	71,720	15,631	149,917	38,352	..	..	..	..	71,723	22,413	..	..	
Magnesite do	688	1,196	..	..	..	..	189	567	..	..	80	160	..	..	
Molybdenite do	..	..	32	16,937	97	45,060	..	..	..	..	..	..	..	..
Phosphate Rock do	..	..	..	..	..	..	..	..	..	..	4,614	5,536	..	..	
Precious Stones do	..	..	..	7,110	..	1,100	..	..	..	..	..	..	..	..
Mica do	..	26	..	..	..	..	..	..	..	..	..	..	..	..
N.E.I. do	..	75	..	431,203	..	26,559	..	2,218	..	10,526	..	120,587	..	284,583			
Total Values ... ..	..	£5,478,149	..	£10,064,569	..	£3,324,861	..	£1,737,158	..	£1,225,575	..	£1,001,885	..	£3,206,815		

PART I.—GOLD.

TABLE I.

MONTHLY PRODUCTION OF GOLD, IN FINE OUNCES, SHOWING THE QUANTITY REPORTED TO THE MINES DEPARTMENT DURING 1915.

GOLDFIELD.	DISTRICT.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.		JULY.	
		District.	Goldfield.	District.	Goldfield.	District.	Goldfield.	District.	Goldfield.	District.	Goldfield.	District.	Goldfield.	District.	Goldfield.
Kimberley ...	...	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.
Pilbara ...	Marble Bar ...	215·48	10·45	...	33·97	...	43·99	...	17·42	...	...	...	24·39	...	...
Do. ...	Nullagine ...	202·55	418·03	576·59	631·16	1,468·79	1,743·84	378·73	843·69	552·81	632·73	453·87	527·97	589·54	642·63
West Pilbara ...	...	...	84·43	...	188·27	...	78·19	...	136·05	...	79·92	138·32	74·10	53·09	1·19
Ashburton ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Gascoyne ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Peak Hill ...	...	...	...	...	112·82	...	264·96	...	474·56	...	...	...	...	...	131·96
East Murchison ...	Lawlers ...	476·85	...	457·49	...	486·82	...	298·30	...	701·05	...	...	...	...	...
Do. ...	Wiluna ...	332·88	5,287·78	655·51	4,917·50	633·25	5,127·98	277·46	4,663·87	483·03	5,688·41	335·24	4,271·11	555·72	4,410·75
Do. ...	Black Range ...	4,478·05	...	3,804·50	...	4,007·91	...	4,088·11	...	4,504·33	...	3,476·56	...	3,483·96	...
Murchison ...	Cue ...	232·69	...	364·20	...	413·49	...	382·19	...	585·94	...	119·29	...	609·28	...
Do. ...	Meekatharra ...	5,719·38	9,212·63	5,339·25	8,167·57	6,103·93	8,862·08	6,043·99	8,416·91	6,710·84	8,265·06	6,101·75	8,267·53	5,757·22	9,939·40
Do. ...	Day Dawn ...	2,778·10	...	1,843·94	...	1,911·98	...	1,711·96	...	707·48	...	1,834·19	...	2,132·30	...
Do. ...	Mt. Magnet ...	482·46	...	620·18	...	432·68	...	278·77	...	260·80	...	212·30	...	1,440·60	...
Yalgoo ...	...	...	239·68	...	295·27	...	464·21	...	1,197·08	...	735·21	...	818·26	...	1,085·97
Mt. Margaret ...	Mt. Morgans ...	450·80	...	560·25	...	507·21	...	611·05	...	540·69	...	470·78	...	622·30	...
Do. ...	Mt. Malcolm ...	5,235·44	8,274·28	4,698·81	7,624·98	5,098·87	7,786·91	5,259·90	7,666·37	5,168·49	8,381·10	5,202·20	7,754·07	4,893·20	9,013·48
Do. ...	Mt. Margaret ...	2,588·04	...	2,365·92	...	2,180·83	...	1,795·42	...	2,671·92	...	2,081·09	...	3,497·98	...
North Coolgardie ...	Menzies ...	5,123·78	...	3,896·35	...	4,499·48	...	4,991·10	...	4,443·47	...	4,335·43	...	4,083·16	...
Do. ...	Ularring ...	...	5,276·33	291·19	4,609·56	242·32	5,313·33	118·44	6,417·19	435·09	5,200·00	116·71	5,287·61	447·43	5,751·00
Do. ...	Niagara ...	30·74	...	271·52	...	260·60	...	1,014·08	...	47·15	...	47·15	...	597·24	...
Do. ...	Yerilla ...	121·81	...	150·50	...	310·93	...	293·57	...	321·44	...	788·32	...	623·17	...
Broad Arrow ...	...	...	1,548·34	...	1,288·98	...	1,344·06	...	1,094·27	...	1,457·68	...	2,067·09	...	2,474·56
N.E. Coolgardie ...	Kanowna ...	538·24	...	704·26	...	592·77	...	1,132·90	...	821·29	...	844·98	...	984·08	...
Do. ...	Kurnalpi ...	...	538·24	...	704·26	...	599·03	...	1,537·82	...	821·29	...	853·55	...	984·08
East Coolgardie ...	East Coolgardie ...	53,264·02	...	53,882·25	...	58,455·77	...	56,992·02	...	57,440·18	...	58,338·11	...	57,711·31	...
Do. ...	Hulong ...	5·27	53,269·29	245·87	54,128·12	56·27	58,512·04	2·51	56,994·53	...	57,440·18	970·80	59,308·91	...	57,711·31
Coolgardie ...	Coolgardie ...	1,271·11	...	1,906·98	...	1,438·34	...	999·88	...	772·91	...	492·97	...	856·58	...
Do. ...	Kunanalling ...	526·99	1,798·10	595·51	2,502·49	389·77	1,828·11	916·28	1,916·16	926·25	1,699·16	1,033·85	1,526·82	129·37	985·95
Yilgarn ...	...	...	8,027·12	...	7,320·35	...	7,787·19	...	7,702·94	...	7,894·75	...	6,878·25	...	6,740·15
Dundas ...	...	...	1,953·91	...	1,696·22	...	2,186·77	...	2,227·55	...	2,024·44	...	1,907·59	...	1,759·85
Phillips River ...	...	...	19·40	...	444·89	...	304·41	...	297·37	...	214·10	...	179·16	...	842·07
State generally ...	...	...	6·17	...	6·27	...	53·22	...	47·98	...	50·23	...	7·26	...	46·08
TOTAL	Fine ounces ...	..	95,964·18	..	94,672·68	..	102,300·32	..	101,651·76	..	100,679·51	..	100,079·25	..	102,520·43
	Sterling value		£407,630		£402,144		£434,544		£431,789		£427,659		£425,110		£435,479

TABLE I.—Monthly Production of Gold, in Fine Ounces—continued.

GOLDFIELD.	DISTRICT.	AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.		TOTAL FOR 1915.	
		District.	Goldfield.	District.	Goldfield.	District.	Goldfield.	District.	Goldfield.	District.	Goldfield.	District.	Goldfield.
Kimberley ...	...	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.	ozs.
Pilbara ...	Marble Bar ...	257·94	274·92	615·71	671·73	496·66	799·66	382·87	882·24	473·37	473·37	6,462·36	8,541·97
Do. ...	Nullagine ...	16·98	...	56·02	...	303·00	...	499·37	...	...	...	2,079·61	...
West Pilbara ...	...	...	207·12	...	135·78	...	2·21	...	80·32	...	108·72	...	1,507·02
Ashburton ...	...	...	...	...	...	...	...	...	...	...	...	...	...
Gascoyne ...	...	...	...	...	...	...	...	...	...	...	80·85	...	80·85
Peak Hill ...	...	...	70·43	...	88·20	...	588·59	...	1,001·50	...	...	...	2,823·13
East Murchison ...	Lawlers ...	592·91	...	486·22	...	373·45	...	588·46	...	578·55	...	6,055·13	...
Do. ...	Wiluna ...	273·14	4,994·78	885·32	4,988·10	1,090·36	5,065·47	763·49	4,293·72	619·03	4,372·89	6,746·78	58,082·36
Do. ...	Black Range ...	4,128·73	...	3,616·56	...	3,601·66	...	2,941·77	...	3,148·31	...	45,280·45	...
Murchison ...	Cue ...	952·84	...	526·40	...	554·27	...	726·63	...	718·67	...	6,185·89	...
Do. ...	Meekatharra ...	6,193·80	10,591·99	5,925·75	9,671·63	6,427·29	9,355·18	6,941·25	8,705·02	6,570·12	8,594·78	78,834·57	108,049·78
Do. ...	Day Dawn ...	2,031·51	...	1,971·57	...	1,501·37	...	414·87	...	328·87	...	19,168·14	...
Do. ...	Mt. Magnet ...	1,413·84	...	1,247·91	...	872·25	...	622·27	...	977·12	...	8,861·18	...
Yalgoo ...	...	...	691·61	...	622·72	...	939·75	...	935·34	...	816·78	...	8,841·88
Mt. Margaret ...	Mt. Morgans ...	575·98	...	807·63	...	679·40	...	772·96	...	864·47	...	7,463·52	...
Do. ...	Mt. Malcolm ...	6,621·33	10,858·79	4,704·65	9,226·02	5,333·72	9,157·94	5,000·74	9,198·75	6,778·29	11,620·32	63,995·64	106,563·01
Do. ...	Mt. Margaret ...	3,661·48	...	3,713·74	...	3,144·82	...	3,425·05	...	3,977·56	...	35,103·85	...
North Coolgardie ...	Menzies ...	3,759·82	...	3,432·46	...	3,745·21	...	3,459·62	...	3,326·36	...	49,096·24	...
Do. ...	Ularring ...	103·68	4,364·96	335·01	4,105·65	19·30	4,146·75	124·77	4,414·66	240·16	4,626·18	2,474·10	59,513·22
Do. ...	Niagara ...	135·77	...	15·45	...	41·29	...	682·26	...	59·03	...	3,155·13	...
Do. ...	Yerilla ...	365·69	...	322·73	...	340·95	...	148·01	...	1,000·63	...	4,787·75	...
Broad Arrow ...	...	...	1,751·48	...	2,979·67	...	1,970·31	...	1,772·42	...	2,541·17	...	22,290·03
N.E. Coolgardie ...	Kanowna ...	775·22	...	1,112·87	...	748·43	...	1,044·50	...	777·69	...	10,077·23	...
Do. ...	Kurnalpi ...	...	775·22	...	1,112·87	26·44	774·87	...	1,044·50	337·56	1,115·25	783·75	10,860·98
East Coolgardie ...	East Coolgardie ...	56,535·01	56,535·01	55,215·91	55,502·12	55,956·17	56,109·63	54,446·36	54,546·17	50,676·05	50,730·93	668,913·16	670,788·24
Do. ...	Bulong ...	...	...	286·21	...	153·46	...	99·81	...	54·88	...	1,875·08	...
Coolgardie ...	Coolgardie ...	774·66	1,042·89	753·50	1,238·96	603·51	975·72	689·92	942·95	1,429·87	1,857·46	11,990·23	18,314·77
Do. ...	Kunanalling ...	268·23	...	485·46	...	372·21	...	253·03	...	427·59	...	6,324·54	...
Yilgarn ...	...	...	7,918·04	...	7,581·37	...	7,374·63	...	6,792·24	...	9,106·54	...	91,123·57
Bundas ...	...	...	1,490·53	...	2,181·69	...	2,148·00	...	2,011·77	...	2,295·86	...	23,884·18
Phillips River ...	...	...	143·46	...	36·29	...	568·98	...	441·49	...	325·14	...	3,816·76
State generally ...	...	...	...	...	...	...	55·38	...	...	...	...	...	272·59
TOTAL	Fine ounces ...	..	101,711·23	..	100,156·92	..	100,033·07	..	97,063·09	..	98,666·24	..	1,195,498·68
	Sterling value	£432,042	£425,440	£424,913	£412,298	£419,108	£5,078,156						

TABLE II.

TOTAL YEARLY PRODUCTION OF GOLD, IN FINE OUNCES, AS REPORTED TO THE MINES DEPARTMENT, TO 31ST DECEMBER, 1915.

GOLDFIELD.	DISTRICT.	1915.		1914.		1913.		1912.		1911.		1910.	
		District.	Goldfield.	District.	Goldfield.	District.	Goldfield.	District.	Goldfield.	District.	Goldfield.	District.	Goldfield.
Kimberley ...	...	...	144.34	...	453.29	...	...	...	271.63	...	171.45	...	265.53
Pilbara ...	Marble Bar ...	6,462.36	...	3,304.94	...	3,845.81	...	3,441.44	...	2,346.74	...	2,613.40	...
Do. ...	Nullagine ...	2,079.61	8,541.97	1,872.52	5,177.46	1,752.40	5,598.21	2,557.67	5,999.11	2,261.34	4,608.08	2,756.54	5,369.94
West Pilbara ...	...	...	1,507.02	...	1,022.70	...	1,421.15	...	1,118.20	...	983.17	...	1,483.62
Ashburton ...	...	...	...	...	...	...	11.70	...	38.73	...	256.33	...	247.63
Gascoyne ...	...	...	80.85	...	3.76	...	31.45	...	6.55	...	7.87	...	26.31
Peak Hill ...	...	...	2,823.13	...	2,602.62	...	2,765.59	...	1,861.64	...	1,747.01	...	4,327.02
East Murchison ...	Lawlers ...	6,055.13	...	4,324.57	...	4,843.05	...	7,307.72	...	27,193.85	...	45,203.50	...
Do. ...	Wiluna * ...	6,746.78	58,082.36	6,936.34	70,808.46	7,501.11	87,977.47	7,728.33	99,130.78	7,829.83	102,390.79	14,258.17	130,371.21
Do. ...	Black Range ...	45,280.45	...	59,547.55	...	75,633.31	...	84,094.73	...	67,367.11	...	70,909.54	...
Murchison ...	Cue ...	6,185.89	...	4,491.02	...	6,525.65	...	8,993.26	...	11,455.56	...	9,576.29	...
Do. ...	Meekatharra ...	73,834.57	108,049.78	80,400.07	115,722.42	72,701.81	122,027.56	50,558.20	105,372.78	54,241.79	119,653.40	50,046.60	124,351.38
Do. ...	Day Dawn ...	19,168.14	...	18,926.64	...	27,126.72	...	28,283.42	...	37,947.41	...	46,474.13	...
Do. ...	Mt. Magnet ...	8,861.18	...	11,904.69	...	15,673.38	...	17,537.90	...	16,008.64	...	18,254.36	...
Yalgoo ...	...	...	8,841.88	...	6,025.92	...	8,163.47	...	6,165.92	...	1,162.04	...	1,332.72
Mt. Margaret ...	Mt. Morgans ...	7,463.52	...	4,880.95	...	1,255.47	...	3,438.55	...	5,484.08	...	10,331.24	...
Do. ...	Mt. Malcolm ...	63,995.64	106,563.01	66,071.07	96,792.51	72,738.73	91,272.70	74,238.81	102,969.60	92,811.29	152,474.39	97,689.68	160,281.18
Do. ...	Mt. Margaret ...	35,103.85	...	25,840.49	...	17,278.50	...	25,242.24	...	54,179.02	...	52,260.26	...
North Coolgardie ...	Menzies ...	49,096.24	...	53,789.52	...	44,227.89	...	36,126.25	...	39,062.97	...	40,247.69	...
Do. ...	Ularring ...	2,474.10	59,513.22	5,026.09	72,188.05	7,710.48	68,526.60	9,526.65	58,270.47	9,472.85	64,759.69	8,669.96	72,747.55
Do. ...	Niagara ...	3,155.13	...	6,724.42	...	6,941.08	...	6,342.67	...	8,423.55	...	12,007.07	...
Do. ...	Yerilla ...	4,787.75	...	6,648.02	...	9,647.15	...	6,274.90	...	7,800.32	...	11,822.83	...
Broad Arrow ...	...	...	22,290.03	...	9,285.98	...	34,739.33	...	13,375.43	...	7,152.73	...	15,481.88
N.E. Coolgardie ...	Kanowna ...	10,077.23	10,860.98	9,560.02	10,134.10	11,133.30	12,392.88	11,864.53	13,855.71	17,958.07	19,554.75	22,203.96	23,027.27
Do. ...	Kurnalpi ...	783.75	...	574.08	...	1,259.58	...	2,491.18	...	1,596.68	...	823.31	...
East Coolgardie ...	East Coolgardie ...	668,913.16	670,788.24	680,494.61	682,895.41	719,323.42	719,928.72	755,368.56	756,795.14	775,050.60	776,493.74	777,893.83	778,479.54
Do. ...	Bulong ...	1,875.08	...	2,400.80	...	605.30	...	1,426.58	...	1,443.14	...	585.66	...
Coolgardie ...	Coolgardie ...	11,990.23	18,314.77	17,009.37	20,981.45	28,407.27	31,891.49	37,246.77	42,181.59	28,982.04	33,753.71	31,928.00	37,911.04
Do. ...	Kunanalling ...	6,324.54	...	3,972.08	...	3,484.22	...	4,934.82	...	4,771.67	...	5,983.04	...
Yilgarn ...	...	...	91,123.57	...	88,744.72	...	82,333.96	...	30,675.40	...	18,811.40	...	27,857.93
Dundas ...	...	...	23,884.18	...	26,590.76	...	27,039.47	...	25,314.35	...	28,989.86	...	29,627.34
Phillips River ...	...	...	3,816.76	...	4,665.42	...	2,788.47	...	4,201.36	...	5,656.54	...	8,194.90
† Donnybrook ...	...	...	...	...	...	...	...	...	...	...	...	...	...
State generally ...	...	...	272.59	...	144.16	...	178.60	...	240.40	...	359.99	...	847.41
TOTAL {	Fine Ounces ...	...	1,195,498.68	...	1,214,239.19	...	1,299,088.82	...	1,267,844.79	...	1,338,986.94	...	1,422,231.40
{	Sterling Value	£5,078,156	£5,157,760	£5,518,179	£5,385,462	£5,687,655	£6,041,254						

* 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.	1909.		1908.		1907.		1906.		PREVIOUS TO 1906.		TOTAL TO DECEMBER 31, 1915.	
		District.	Goldfield.	District.	Goldfield.	District.	Goldfield.	District.	Goldfield.	District.	Goldfield.	District.	Goldfield.
Kimberley ...	...	...	134.52	...	150.16	...	336.57	...	165.72	...	15,517.17	...	17,610.38
Pilbara ...	Marble Bar ...	2,523.16	6,764.49	3,179.76	6,965.61	5,856.44	10,042.96	2,256.97	5,711.90	77,965.60	121,452.12	113,796.62	186,231.85
Do. ...	Nullagine ...	4,241.33		3,785.85		4,186.52		3,454.93					
West Pilbara ...	...	...	1,539.62	...	1,005.60	...	464.08	...	749.16	...	15,258.53	...	26,552.85
Ashburton ...	...	...	436.32	...	161.71	...	143.01	...	278.24	...	7,303.07	...	8,876.74
Gascoyne ...	...	...	...	...	...	...	...	...	...	...	505.27	...	662.06
Peak Hill ...	...	...	7,918.79	...	7,980.10	...	8,111.14	...	2,008.20	...	204,359.64	...	246,504.88
East Murchison ...	Lawlers ...	77,542.23	155,908.60	72,109.75	144,792.31	61,259.79	119,207.31	60,351.20	95,771.49	520,753.39	549,719.90	886,944.20	1,614,160.68
Do. ...	Wiluna ...	*		72,682.56		*		57,947.52		35,420.29		28,966.51	
Do. ...	Black Range ...	78,366.37	...	24,702.50	...	25,878.80	...	18,337.11	...	194,518.18	...	676,215.92	
Murchison ...	Cue ...	21,271.13	...	38,820.52	...	31,792.41	...	26,572.08	...	182,827.05	...	331,935.39	
Do. ...	Meekatharra ...	50,992.21	133,105.86	84,422.44	157,848.40	101,591.06	169,397.46	124,047.58	182,395.82	723,645.38	1,338,329.22	1,256,080.81	2,676,254.08
Do. ...	Day Dawn ...	44,447.89		9,902.94		10,135.19		13,439.05					
Do. ...	Mt. Magnet ...	16,394.63	...	...	551.03	...	4,371.38	...	4,450.19	...	55,511.92	...	98,381.78
Yalgoo ...	...	...	1,805.31	...	...	...	...	...	...	...	...	...	...
Mt. Margaret ...	Mt. Morgans ...	25,722.76	155,864.99	28,912.13	153,597.15	28,755.18	169,466.07	30,206.54	166,258.94	337,472.16	1,177,267.91	483,922.58	2,532,808.45
Do. ...	Mt. Malcolm ...	90,436.33		86,018.61		81,709.00		94,095.06		570,428.83		1,390,283.05	
Do. ...	Mt. Margaret ...	39,705.90	...	38,666.41	...	59,001.89	...	41,957.34	...	269,366.92	...	658,602.82	
North Coolgardie ...	Menzies ...	35,851.38	...	37,023.87	...	37,053.24	...	33,237.86	...	452,938.78	...	858,655.19	
Do. ...	Ularring ...	15,286.66	79,398.99	21,598.97	91,251.59	19,072.73	86,790.67	25,210.13	110,957.04	154,102.34	1,061,455.06	278,150.96	1,825,858.93
Do. ...	Niagara ...	17,061.87		21,477.90		18,881.94		37,418.89		358,309.52		496,744.04	
Do. ...	Yerilla ...	11,199.08	...	11,151.35	...	11,782.76	...	15,090.16	...	96,104.42	...	192,308.74	
Broad Arrow ...	...	...	17,121.70	...	18,429.97	...	21,907.18	...	21,510.61	...	243,699.69	...	424,994.53
N.E. Coolgardie ...	Kanowna ...	23,785.63	25,462.38	26,355.22	27,072.72	29,244.99	31,197.96	37,267.87	38,098.74	470,062.22	485,798.86	669,013.04	697,456.35
Do. ...	Kurnalpi ...	1,676.75		717.50		1,952.97		830.87		15,736.64		28,443.31	
East Coolgardie ...	East Coolgardie ...	896,900.15	899,289.27	888,415.37	890,772.70	937,238.61	941,170.94	989,357.24	995,831.87	7,189,258.59	7,325,551.75	15,278,214.19	15,437,997.32
Do. ...	Bulung ...	2,389.12		2,357.33		3,932.33		6,474.63		136,293.16		159,783.13	
Coolgardie ...	Coolgardie ...	28,382.62	34,134.90	32,820.61	40,029.39	53,029.44	60,810.37	55,771.11	64,030.18	621,381.29	760,053.95	946,948.75	1,144,092.84
Do. ...	Kunanalling ...	5,752.28		7,208.78		7,780.93		8,259.07		138,672.66		197,144.09	
Yilgarn ...	...	...	20,909.12	...	22,162.87	...	19,291.98	...	23,546.75	...	244,515.04	...	669,972.74
Dundas ...	...	...	29,549.27	...	28,643.63	...	23,602.23	...	20,434.84	...	275,183.94	...	538,859.87
Phillips River ...	...	...	6,713.52	...	4,404.69	...	4,313.87	...	2,779.89	...	21,774.47	...	69,309.89
†Donnybrook ...	...	...	...	...	...	...	...	...	...	...	...	...	841.76
State generally ...	...	...	348.09	...	271.13	...	1,367.70	...	1,315.71	...	1,389.30	...	6,735.06
TOTAL	Fine Ounces ...	...	1,576,405.74	...	1,596,090.76	...	1,671,992.88	...	1,736,295.29	...	18,905,488.57	...	28,224,163.06
	Sterling Value	£6,696,146		£6,779,763		£7,102,174		£7,375,314		£59,066,761		£119,888,624	

* 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 1915.

GOLDFIELD.	DISTRICT.	DATE OF PROCLAMATION OF GOLDFIELD.				AREA IN SQUARE MILES.		LEASES IN FORCE.		PARTICULARS OF PLANT.					AVERAGE NUMBER OF MEN ENGAGED IN GOLD MINING.			
		Proclama- tion gazetted.	To take effect from	Latest Amendment of Boundaries gazetted.	To take effect from	Goldfield.	District.	No.	Area in Acres.	Milling.		Cyaniding.			Men employed.		Diggers	
										Stamps.	Other Mills.	Leach- ing Vats.	Agi- tating Vats.	Vacuum Filters and Presses.	Above Ground.	Under Ground.		
Kimberley	...	20-5-86	20-5-86	31-10-02	1-11-02	33,833	...	...	...	...	...	...	...	...	...	...	...	10
Pilbara	{ Marble Bar Nullagine }	1-10-88	1-10-88	1-3-07	1-3-07	32,696	{ 25,809 6,887	24 10	223 89	63 28	...	13 13	3 ...	...	41 44	39 12	...	16 24
West Pilbara	...	20-9-95	1-11-95	1-3-07	1-3-07	10,843	...	3	36	35	...	8	...	...	9	11	...	13
Ashburton	...	11-12-90	11-12-90	18-10-01	14-10-01	14,230	...	...	...	...	...	...	...	...	1	1	...	4
Gascoyne	...	25-6-97	15-4-97	18-10-01	14-10-01	5,313	...	4	28	1	...	...	...	...	1	...	...	3
Peak Hill	...	19-3-97	1-4-97	13-11-14	1-12-14	23,650	...	15	156	40	2	13	3	...	10	10	...	3
East Murchison	{ Lawlers Wiluna Black Range Cue }	28-6-95	28-6-95	1-11-12	1-1-13	28,746	{ 9,379 10,496 8,871 8,593	21 23 62 24	235 365 787 242	118* 85	4 16	39 26	...	...	61 67	56 47	...	6
Murchison	{ Meekatharra Day Dawn Mt. Magnet }	24-9-91	24-9-91	28-11-13	1-1-14	25,474	{ 12,250 896 3,735	98 46 45	1,317 507 485	182 55	27 12	47 22	18 11	4 2	323 121	404 146	...	23 15
Yalgoo	...	8-2-95	23-1-95	30-7-15	9-8-15	23,230	...	77	1,295	73	3	17	8	...	110	93	...	14
Mt. Margaret	{ Mt. Morgans Mt. Malcolm Mt. Margaret }	12-3-97	1-4-97	1-3-07	1-3-07	44,860	{ 1,637 3,330 39,893	18 65 75	286 1,290 1,303	55 135	6 20	23 16	6 5	2 5	46 192	42 347	...	14 14
North Coolgardie...	{ Menzies Ularring Niagara Yerilla }	28-6-95	28-6-95	10-10-13	1-11-13	26,116	{ 6,805 3,093 688 15,530	42 21 8 26	609 232 95 401	105 45	28 7	74 40	4 2	2 1	167 43	248 51	...	7 6
Broad Arrow	...	17-11-96	20-11-96	8-6-06	1-7-06	1,038	...	44	651	45	15	23	4	2	101	142	...	38
North-East Coolgardie	{ Kanowna Kurnalpi East Coolgardie }	20-3-96	15-4-96	27-3-08	1-4-08	20,604	{ 1,094 19,510 810	25 4 149	313 42 2,028	138 5	10 1	50 ...	...	...	63 13	88 10	...	22 14
East Coolgardie	{ Bulong Coolgardie Kunanalling }	21-9-94	1-10-94	27-3-08	1-4-08	1,800	{ 990 9,384 2,318	7 78 14	126 1,132 179	30 256	.2 13	7 98	...	...	37 166	29 150	...	6 9
Coolgardie	...	6-4-94	6-4-94	1-3-07	1-3-07	11,702	...	14	179	85	3	51	...	...	54	41	...	3
Yilgarn	...	1-10-88	1-10-88	10-10-13	1-11-13	17,478	...	218	4,381	152	26	84	9	6	444	496	...	...
Dundas	...	31-8-93	31-8-93	1-3-07	1-3-07	11,430	...	43	543	105	18	54	15	3	95	131	...	...
Phillips River	...	21-9-00	14-9-00	26-1-12	1-2-12	5,300	...	12	185	45	3	6	...	...	17	20	...	...
State generally	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...
Total	...	...	...	...	...	338,343	...	1,301	19,561	2,941	616	1,112	336	196	4,924	6,057	342	...

TABLE III.—Return showing for the respective Goldfields and Districts, etc.—continued.

Goldfield.	District.	1915 GOLD AND SILVER YIELD—DISTRICTS.						1915 GOLD AND SILVER YIELD—GOLDFIELDS.						
		Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Total Gold.	* Silver.	Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Total Gold.	* Silver.	
		Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.	Fine ozs.	
Kimberley	..	..	..	..	..	..	..	144·34	..	..	..	144·34	..	
Pilbara ..	Marble Bar ..	361·58	36·32	4,581·25	6,064·46	6,462·36	..	}	633·99	39·52	5,490·25	7,868·46	8,541·97	..
Do. ..	Nullagine ..	272·41	3·20	909·00	1,804·00	2,079·61	..							
West Pilbara	..	..	..	..	..	..	..	}	200·11	17·93	541·50	1,228·98	1,507·02	..
Ashburton ..	..	..	..	..	..	..	..
Gascoyne ..	..	..	..	..	..	..	..	}	..	..	78·00	80·85	80·85	4,744·00
Peak Hill ..	..	..	..	..	..	..	..
East Murchison	Lawlers ..	3·73	314·71	11,460·58	5,736·69	6,055·13	17·25	}	4·69	1,568·36	103,792·33	56,509·31	58,082·36	361·56
Do. ..	Wiluna ..	..	8·29	11,581·25	6,738·49	6,746·78	77·08							
Do. ..	Black Range	96	1,245·36	80,750·50	44,034·13	45,280·45	267·23	}	355·41	3,197·01	189,138·66	104,497·36	108,049·78	3,519·86
Murchison ..	Cue ..	27·84	302·09	8,458·00	5,855·96	6,185·89	..							
Do. ..	Meekatharra ..	279·70	712·15	131,153·41	72,842·72	73,834·57	1,188·68	}	..	..	18,240·50	8,703·88	8,841·88	90·24
Do. ..	Day Dawn ..	30·49	1,446·98	40,194·00	17,690·67	19,168·14	2,331·18							
Do. ..	Mt. Magnet ..	17·38	735·79	9,333·25	8,108·01	8,861·18	..	}	143·51	1,793·36	255,423·75	104,626·14	106,563·01	7,272·84
Yalgoo ..	..	..	..	..	..	..	..
Mt. Margaret	Mt. Morgans ..	18·41	87·65	27,962·00	7,357·46	7,463·52	..	}	..	138·00	..	..	..	..
Do. ..	Mt. Malcolm ..	98·30	248·52	149,799·00	63,648·82	63,995·64	5,189·07							
Do. ..	Mt. Margaret	26·80	1,457·19	77,662·75	33,619·86	35,103·85	2,083·77	}	30·57	241·76	75,893·05	59,240·89	59,513·22	1,230·28
North Coolgardie	Menzies ..	..	196·24	65,709·05	48,900·00	49,096·24	1,230·28							
Do. ..	Ularring ..	..	2·96	3,729·75	2,471·14	2,474·10	..	}	137·83	1,044·57	59,919·14	21,107·63	22,290·03	765·40
Do. ..	Niagara ..	28·50	23·26	2,172·75	3,103·37	3,155·13	..							
Do. ..	Yerilla ..	2·07	19·30	4,281·50	4,766·38	4,787·75	..	}	8·95	550·22	15,246·05	10,301·81	10,860·98	3·31
Broad Arrow	..	..	..	..	..	..	..
N.E. Coolgardie	Kanowna ..	38	42·54	15,221·05	10,034·31	10,077·23	3·31	}	18·33	2,424·31	1,603,850·09	668,345·60	670,788·24	105,723·47
Do. ..	Kurnalpi ..	8·57	507·68	25·00	267·50	783·75	..							
East Coolgardie	E. Coolgardie	18·33	2,356·87	1,596,697·51	666,537·96	668,913·16	105,723·47	}	215·64	464·09	30,458·93	17,635·04	18,314·77	4·60
Do. ..	Bulong ..	..	67·44	7,152·58	1,807·64	1,875·08	..							
Coolgardie ..	Coolgardie ..	183·83	449·68	24,845·43	11,356·72	11,990·23	4·60	}	12·14	19·29	205,331·94	91,092·14	91,123·57	4,676·66
Do. ..	Kunanalling ..	31·81	14·41	5,613·50	6,278·32	6,324·54	..							
Yilgarn ..	..	..	..	..	..	..	..	}	344·31	44,221·25	23,539·87	23,884·18	..	..
Dundas ..	..	..	..	..	..	..	..
Phillips River	..	..	..	..	..	..	..	}	..	..	2,867·21	3,816·76	3,816·76	94·84
State generally	..	..	..	..	..	..	..
Total for 1915	..	..	..	..	..	..	..	2,078·31	11,842·73	2,612,954·65	1,181,577·64	1,195,498·68	180,119·59	

*By-product in the treatment of auriferous ore, except Ashburton and State generally.

TABLE III.—Return showing for the respective Goldfields and Districts, etc.—continued.

Goldfield.	District.	TOTAL GOLD AND SILVER YIELD—DISTRICTS.						TOTAL GOLD AND SILVER YIELD—GOLDFIELDS.					
		Alluvial	Dollied and Specimens.	Ore treated.	Gold therefrom.	Total Gold.	* Silver.	Alluvial	Dollied and Specimens.	Ore treated.	Gold therefrom.	Total Gold.	* Silver.
		Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Tons (2,240lbs.).	Fine ozs.	Fine ozs.	Fine ozs.
Kimberley	..	..	..	..	..	..	..	..	..	..	..	..	..
Pilbara	.. Marble Bar	11,472·03	3,278·85	65,972·58	99,045·74	113,796·62	574·01	3,483·13	..	17,597·50	14,127·25	17,610·38	..
Do.	.. Nullagine	6,075·16	375·39	37,797·24	65,984·68	72,435·23	..	17,547·19	3,654·24	103,769·82	165,030·42	186,231·85	574·01
West Pilbara	..	..	..	..	..	..	..	5,405·34	262·10	17,807·71	20,885·41	26,552·85	314·94
Ashburton	..	..	..	..	..	..	..	8,561·10	315·64	..	..	8,876·74	6,543·22
Gascoyne	..	..	..	..	..	..	..	320·20	18·51	320·70	323·35	662·06	..
Peak Hill	..	..	..	..	..	..	..	1,826·76	3,870·22	479,687·26	240,807·90	246,504·88	2,287·59
East Murchison	.. Lawlers	5,608·38	6,356·98	1,962,855·57	874,978·84	886,944·20	24,820·49	..	..	..	..	..	..
Do.	.. Wiluna	90·79	197·27	107,536·50	50,712·50	51,000·56	144·19	7,139·81	20,574·68	3,112,397·28	1,586,446·19	1,614,160·68	37,890·26
Do.	.. Black Range	1,440·64	14,020·43	1,042,005·21	660,754·85	676,215·92	12,925·58	..	..	..	..	..	..
Murchison	.. Cue	992·79	4,259·55	372,832·30	326,683·05	331,935·39	400·11	..	..	..	..	..	..
Do.	.. Meekatharra	9,784·55	9,410·97	989,458·25	693,591·79	712,787·31	4,509·56	14,780·48	31,796·66	3,733,338·32	2,629·676,94	2,676,254·08	169,027·96
Do.	.. Day Dawn	2,285·32	5,781·00	1,869,093·58	1,248·014,49	1,256,080·81	162,985·86	..	..	..	..	..	..
Do.	.. Mt. Magnet	1,717·82	12,345·14	501,954·19	361,387·61	375,450·57	1,132·43	..	..	..	..	..	..
Yalgoo	..	..	..	..	..	..	..	1,310·92	1,582·10	143,786·14	95,488·76	98,381·78	93·54
Mt. Margaret	.. Mt. Morgans	1,716·26	3,384·69	834,925·66	478,821·63	483,922·58	5,758·43	..	..	..	..	..	..
Do.	.. Mt. Malcolm	2,424·98	6,717·68	2,553,432·38	1,381,140·39	1,390,283·05	54,624·90	7,304·12	15,436·31	4,578,647·17	2,510,068·02	2,532,808·45	95,270·92
Do.	.. Mt. Margaret	3,162·88	5,333·94	1,190,289·13	650,106·00	658,602·82	34,887·59	..	..	..	..	..	..
North Coolgardie	.. Menzies	972·08	2,864·85	963,235·77	854,818·26	858,655·19	14,214·29	..	..	..	..	..	..
Do.	.. Ularring	21·46	1,116·68	276,088·74	277,012·82	278,150·96	5,432·91	3,678·13	12,878·54	2,341,071·47	1,809,302·26	1,825,858·93	25,313·66
Do.	.. Niagara	1,445·84	1,329·02	892,217·04	493,969·18	496,744·04	5,603·42	..	..	..	..	..	..
Do.	.. Yerilla	1,238·75	7,567·99	209,529·92	183,502·00	192,308·74	63·04	..	..	..	..	..	..
Broad Arrow	..	..	..	..	..	..	..	18,844·97	5,587·93	727,645·19	400,561·63	424,994·53	2,181·96
N.E. Coolgardie	.. Kanowna	104,343·79	10,743·56	900,467·13	553,925·69	669,013·04	2,522·12	..	..	..	..	..	..
Do.	.. Kurnalpi	11,984·88	4,527·44	5,079·21	11,930·99	28,443·31	11·22	116,328·67	15,271·00	905,546·34	565,856·68	697,456·35	2,533·34
East Coolgardie	.. E. Coolgardie	26,379·76	26,985·08	22,901,678·69	15,224,849·35	15,278,214·19	1,250,093·36	..	..	..	..	..	..
Do.	.. Bulong	26,504·15	14,845·56	149,813·42	118,433·42	159,783·13	..	52,883·91	41,830·64	23,051,492·11	15,343,282·77	15,437,997·32	1,250,093·36
Coolgardie	.. Coolgardie	8,355·64	8,839·40	1,466,617·41	929,753·71	946,948·75	767·62	..	..	..	..	..	..
Do.	.. Kunanalling	585·49	4,952·45	253,043·47	191,606·15	197,144·09	48·67	8,941·13	13,791·85	1,719,660·88	1,121,359·86	1,144,092·84	816·29
Yilgarn	..	..	..	..	..	..	..	89·88	1,331·29	1,470,388·44	668,551·57	669,972·74	16,285·06
Dundas	..	..	..	..	..	..	..	2,027·12	9,265·15	759,136·55	527,567·60	538,859·87	34,948·22
Phillips River	..	..	..	..	..	..	..	472·20	775·33	79,197·04	68,062·36	69,309·89	15,328·06
† Donnybrook	..	..	..	..	..	..	..	23·24	..	1,653·30	818·52	841·76	..
State generally	..	..	..	..	..	..	..	124·89	155·90	27·00	6,454·29	6,735·08	8,551·57
Total to 31-12-1915	..	..	..	..	..	..	..	271,093·19	178,398·09	43,243,170·22	27,774,671·78	28,224,163·06	1,668,053·96

* By-product in the treatment of auriferous ore except Ashburton and State generally.

† Abolished 4th March, 1908.

TABLE IV.

PRODUCTION OF GOLD AND SILVER FROM ALL SOURCES, SHOWING IN FINE OUNCES THE OUTPUT AS REPORTED TO THE MINES DEPARTMENT DURING 1915, AND THE TOTAL PRODUCTION TO DATE.

Kimberley Goldfield.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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	..	
<i>From Goldfield generally :-</i>														
Reported by Banks and Gold Dealers			144.34	3,483.13	
Total			144.34	3,483.13	..	17,597.50	14,127.25

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Pilbara Goldfield.

MARBLE BAR DISTRICT.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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.	
Bamboo Creek	733 ..	Bamboo Queen .. ..	..	..	223.00	360.64	..	..	..	..	319.25	541.35	..
Do. ..	777 ..	Blue Bell .. ..	..	..	182.00	142.37	..	..	..	..	250.75	181.22	..
Do. ..	732 ..	Bonnie Doon .. ..	..	..	23.00	5.12	..	..	..	..	809.75	586.18	..
Do. ..	712 ..	Bonnie Dundee .. ..	..	..	46.00	24.77	..	..	..	..	98.75	77.83	..

Do.	(695)	Bulletin	59.00	37.38			456.00	1,179.06	
Do.	748	Federation	93.50	88.77			332.75	351.57	
Do.	707	Kitchener	747.00	1,402.88			1,024.25	2,360.00	
Do.	740	Mount Prophecy	255.00	216.19	1-11		408.00	298.84	
Do.	(751)	Mount Prophecy North	55.00	19.11			150.50	66.37	
Do.	789	Princess May and Charlie	18.00	41.20			18.00	41.20	
Do.	782	Wagtail	169.50	132.90			197.25	176.28	
Do.		Voided leases					454.61	11,495.25	19,129.62
Do.		Sundry claims	262.75	189.45			307.83	613.50	846.56
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	27.00	21.19				27.00	21.19
Do.		Voided leases						135.00	316.31
Do.		Sundry claims						2.75	9.22
Lalla Rookh..		Voided leases						224.50	2,186.65
Do.		Sundry claims	450.00	776.74			6,758.00	6,307.60	574.01
Marble Bar ..	781	Come Again	13.00	7.13				13.00	7.13
Do.	785	Franklin	15.00	17.66				15.00	17.66
Do.	768	Homeward Bound	94.00	70.81			6.17	214.00	215.54
Do.	694	Jo-Jo	278.00	169.46				1,686.50	1,765.87
Do.	793	Jo-Jo North	9.00	6.59				9.00	6.59
Do.	790	Rufu, Henry	94.00	376.76				94.00	376.76
Do.	762	True Blue	66.00	85.76				146.75	241.97
Do.	722	Viking	330.00	348.70				1,058.00	1,029.35
Do.	780	Yorkshire Lass	182.00	188.23				226.25	267.53
Do.		Voided leases					141.73	15,231.45	20,213.51
Do.		Sundry claims			20.57		38.68	3,815.14	4,254.95
North Pole ..		Voided leases						474.00	340.75
Do.		Sundry claims	13.00	16.99				13.00	16.99
North Shaw ..		Voided leases					7.53	351.45	674.72
Do.		Sundry claims					567.06		
Sharks		Sundry claims					145.08	19.37	24.50
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
Tambourah ..		Voided leases						1,438.50	1,739.44
Do.		Sundry claims			14.64		79.29	639.25	797.44
Warrawoona..	(604)	(Klondyke Boulder)						1,946.69	2,585.67
Do.	(604)	Klondyke Boulder G.M. Co., Ltd.	142.00	90.51				1,336.00	1,268.37
Do.	(627)	Klondyke Queen					3.80	462.25	603.78
Do.		Voided leases						13.19	6,327.86
Do.		Sundry claims	4.00	6.41			44.30	362.50	1,127.04
Western Shaw		Voided leases						1,222.50	957.80
Do.		Sundry claims					12.52	67.47	

TABLE IV.—Production of Gold and Silver from all sources, etc.—continued.

Pilbara Goldfield—continued.

MARBLE BAR DISTRICT—continued.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					TOTAL PRODUCTION.					
			Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.	Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.	
			Fine ozs.	Fine ozs.	Tons (2,240lbs.)	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Tons (2,240lbs.)	Fine ozs.	Fine ozs.	
Wyman's Well	744	Euro	..	..	37.00	41.07	..	..	..	230.00	260.85	..
Do.	..	Voided leases	..	..	..	..	..	..	33.55	115.04	493.98	..
Do.	..	Sundry claims	..	..	10.00	54.09	..	..	16.72	344.86	579.76	..
Yandicoogina	724	Thelma	..	..	..	..	..	..	..	68.70	226.24	..
Do.	..	Voided leases	..	..	..	..	..	..	140.76	2,664.50	5,597.99	..
Do.	..	Sundry claims	..	..	..	..	..	..	238.35	103.75	120.34	..
<i>From District generally:—</i>													
Sundry Parcels treated at:													
		State Battery—Bamboo Creek	..	..	..	332.30	..	..	..	..	332.30	..
		State Battery—Marble Bar	..	..	..	34.06	..	..	..	..	34.06	..
		Various Works	..	..	..	..	..	..	..	237.95	1,204.91	..
		Reported by Banks and Gold Dealers	..	..	..	..	..	..	11,173.66	226.50	..	..
		Total	361.58	36.32	4,581.25	6,064.46	11,472.03	3,278.85	65,972.58	99,045.74	574.01

NULLAGINE DISTRICT.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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.
Eastern Creek	180L	Crescent	..	..	33.00	84.09	..	..	..	733.75	1,241.62	..
Do.	176L	(Doherty Reward)	..	..	..	..	..	..	..	142.25	171.43	..
Do.	176L	Doherty Reward	..	..	625.00	731.02	..	..	..	825.00	1,152.37	..
Do.	176L, (177L)	(Doherty Reward leases)	..	..	..	..	..	..	..	219.00	1,007.68	..
Do.	203L	Harp	..	..	170.00	385.62	..	..	..	170.00	385.62	..
Do.	182L	Morning Star	..	..	..	..	..	..	4.19	367.00	834.03	..
Do.	205L	Rose	..	..	66.00	63.41	..	..	..	86.00	86.66	..
Do.	178L	Shamrock	..	..	..	..	..	..	4.00	350.25	590.47	..
Do.	..	Voided leases	..	..	..	..	..	..	..	267.50	214.00	..
Do.	..	Sundry claims	..	..	15.00	14.12	..	..	3.77	285.00	508.92	..

Elsie	Do.	..	..	..	..	..	..	..	..	..	..	408-25	1,323-85	..
	Do.	..	..	..	..	..	..	..	..	..	..	24-00	27-48	..
MoPhee's Creek	(208L)	..	..	..	..	..	..	..	..	..	..	14-50	46-51	..
Do.	196L)	..	..	..	..	..	..	..	..	..	..	91-00	80-79	..
Do.	..	..	..	..	..	..	..	..	..	..	..	7-50	10-62	..
Middle Creek	106L	..	..	..	..	..	..	..	..	..	..	5,627-65	7,002-46	..
Do.	(202L)	..	..	..	..	..	..	..	..	..	..	7-00	54-14	..
Do.	..	..	..	..	..	..	..	..	..	..	..	552-25	1,055-53	..
Do.	..	..	..	..	..	..	..	..	..	..	..	164-00	262-28	..
Mosquito Creek	(79L)	..	..	..	..	..	..	..	..	..	..	586-00	1,648-33	..
Do.	(79L), 145L)	..	..	..	..	..	..	..	..	..	..	1,592-50	2,792-61	..
Do.	..	..	..	..	..	..	..	..	..	1-07	21-42	5,081-30	8,023-06	..
Do.	..	..	..	..	..	..	..	..	..	..	166-47	2,154-94	3,084-93	..
Nullagine	..	..	..	..	..	..	..	..	..	..	..	7,453-25	11,335-12	..
Do.	..	..	..	..	..	..	..	..	..	104-70	102-29	3,908-75	8,324-35	..
Twenty-mile Sandy	(204L)	..	..	..	..	..	..	..	..	..	..	335-00	90-21	..
Do.	195L	..	..	..	..	..	..	..	..	..	..	1,470-00	1,190-11	..
Do.	136L	..	..	..	..	..	..	..	..	..	..	1,050-00	3,859-26	..
Do.	207L	..	..	..	..	..	3-20	..	..	..	3-20	208-00	190-20	..
Do.	..	..	..	..	..	..	..	..	..	..	..	1,012-70	1,561-51	..
Do.	..	..	..	..	..	..	..	..	..	33-10	20-55	2,552-40	3,592-35	..
<i>From District generally:—</i>														
Sundry parcels treated at:														
Doherty's Works 493-13														
State Battery—Twenty-mile Sandy 1,101-38														
Various Works 50-50														
Reported by Banks and Gold Dealers 272-41														
Total 272-41 3-20 909-00 1,804-00 .. 6,075-16 375-39 37,797-24 65,984-68														

West Pilbara Goldfield.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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.
Croydon	8-00	5-44	..	
Hong Kong	331-00	442-45	..	
Do.	21-40	9-00	3-15	..	
Lower Nicol	653-20	402-22	..	
Do.	10-44	10-00	11-51	..	
Mallina	141-60	128-44	..	
Nicol	30-00	11-47	..	

TABLE IV.—Production of Gold and Silver from all sources, etc.—continued.

West Pilbara Goldfield—continued.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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.		
Pilbara ..	..	Voided leases .. ..	..	..	..	..	..	..	..	..	..	..	..	..
Do. ..	..	Sundry claims .. ..	..	..	43·00	66·56	..	1·11	48·12	148·00	293·42	..	..	..
Roebourne ..	(M.L. 143) ..	Carlow Castle .. ..	..	..	..	..	..	..	..	..	2·93	4·85	..	..
Do. ..	..	Voided leases .. ..	..	..	..	..	..	..	..	113·36	570·98	233·06	..	..
Do. ..	..	Sundry claims .. ..	..	..	..	..	..	..	..	108·60	88·70	77·03	..	..
Station Peak..	165	Belladonna .. ..	..	17·93	..	..	..	..	17·93	..	..	..	..	..
Do. ..	..	Voided leases .. ..	..	..	..	..	..	177·74	23·44	9,993·00	11,084·49	..	..	..
Do. ..	..	Sundry claims .. ..	..	..	..	..	..	..	..	37·50	48·19	..	..	..
Lowranna ..	155	Tauri Tom Tit .. ..	..	..	381·00	793·72	..	..	..	1,740·00	2,485·54	..	..	..
Do. ..	..	Voided leases .. ..	..	..	..	..	..	..	..	1,934·80	2,088·26	..	..	..
Upper Nicol..	..	Sundry claims .. ..	..	..	..	..	..	..	..	6·50	2·57	..	..	..
Weerianna ..	(151)	(Hillside) .. ..	..	..	..	..	..	..	..	780·00	1,402·16	..	..	..
Do. ..	(2.P.P.), (151) ..	Hillside leases .. ..	..	..	90·00	332·97	..	..	..	220·00	396·92	..	..	..
Do. ..	(151), (152) ..	(Hillside leases) ..	..	..	..	..	..	..	..	640·00	704·69	..	..	..
Do. ..	160	Mount Veale .. ..	..	..	13·00	23·43	..	..	..	47·90	53·39	..	..	..
Do. ..	..	Voided leases .. ..	..	..	..	..	..	..	..	748·25	522·65	..	..	..
Do. ..	..	Sundry claims .. ..	..	..	14·50	12·30	..	..	..	64·00	62·90	..	..	..
		Reported by Banks and Gold Dealers	260·11	..	..	..	..	5,194·65	82·54	..	6·38	..	..	..
		Total	260·11	17·93	541·50	1,228·98	..	5,405·34	262·10	17,807·71	20,885·41	314·94	..	..

Ashburton Goldfield.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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. Mortimer	..	Sundry claims .. ..	..	..	..	..	..	354·37	315·64	..	..	..	..	..
Uaroo ..	M.L. 43, M.L. 49	Uaroo Silver-Lead Mines, Ltd.	..	..	..	..	4,744·00	..	..	..	..	6,381·20	..	..
Do. ..	..	Voided leases .. ..	..	..	..	..	..	..	..	..	..	162·02	..	..
		<i>From Goldfield generally:—</i>	..	..	..	..	..	8,206·73	..	..	..	..	..	..
		Reported by Banks and Gold Dealers .. ..	..	..	..	..	..	..	..	..	..	..	..	..
		Total .. ..	..	..	..	..	4,744·00	8,561·10	315·64	..	..	6,543·22	..	..

Gascoyne Goldfield.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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.
Bangemall ..	32	Gem .. ..	..	..	78.00	80.85	..	..	..	78.00	80.85	..
Do. ..	.. ..	Voided leases .. ..	..	..	..	..	..	..	6.22	236.70	218.49	..
Do. ..	.. ..	Sundry claims .. ..	..	..	..	..	..	..	12.29	6.00	24.01	..
<i>From Goldfield generally:—</i>												
		Reported by Banks and Gold Dealers .. ..	..	..	..	..	..	..	320.20	..	..	..
		Total .. ..	..	..	78.00	80.85	..	..	320.20	18.51	320.70	323.35

Peak Hill Goldfield.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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 .. ..	..	..	516.00	163.68	..	..	..	1,637.00	885.48	..
Do. ..	(452P)	Homeward Bound .. ..	..	..	140.50	84.86	..	..	..	221.50	214.87	..
Do. ..	.. ..	Voided leases .. ..	..	..	..	..	..	..	.91	3.75	16.13	..
Do. ..	.. ..	Sundry claims .. ..	..	..	395.50	111.24	..	..	23.51	905.75	428.15	..
Horseshoe ..	445P	Mahoney's New Brilliant .. ..	..	..	8.00	6.62	..	..	..	16.00	35.81	..
Do. ..	.. ..	Voided leases .. ..	..	..	..	..	..	..	1,902.09	712.38	1,937.65	2.00
Do. ..	.. ..	Sundry claims .. ..	..	..	..	..	..	..	632.37	16.05	45.14	..
Mt. Fraser ..	.. ..	Voided leases .. ..	..	..	..	..	..	..	..	389.50	320.96	..
Do. ..	.. ..	Sundry claims .. ..	..	..	..	..	..	..	..	80.00	55.41	..
Peak Hill ..	459P	Atlantic .. ..	..	..	60.50	137.84	..	..	..	60.50	137.84	..
Do. ..	(399P)	Bobby Dazzler .. ..	..	..	12.00	24.15	..	..	3.01	93.50	131.72	..
Do. ..	448P	Evening Star .. ..	..	..	168.00	691.43	..	..	..	418.00	1,400.46	..
Do. ..	364P, [1261N]	Harder to Find .. ..	..	..	..	..	..	..	46.29	14.00	30.62	..
Do. ..	370P, [1263N]	Lucky Call .. ..	..	..	..	..	..	..	..	23.00	42.94	..
Do. ..	5P, 306P	No. 1 North leases .. ..	..	..	464.00	150.82	..	..	..	786.50	730.12	..

TABLE IV.--Production of Gold and Silver from all sources, etc.—continued.

Peak Hill Goldfield—continued.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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.
Peak Hill	455P	North Star	..	..	31.00	60.82	..	..	..	31.00	60.82	..
Do.	386P	Pacific	..	..	25.00	33.43	..	..	4.57	166.00	188.85	..
Do.	461P	Patriotic	..	..	51.00	170.43	..	..	..	51.00	170.43	..
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), (243P), (252P), (262P), (274P), 306P, (313P)	(Peak Hill Goldfields, Ltd.)	..	..	..	..	..	..	191.46	462,057.01	223,273.59	2,285.59
Do.	(402P)	Ravelstone	..	..	12.00	10.51	..	..	..	52.00	48.50	..
Do.	456P	Reefers	..	..	87.00	83.02	..	..	..	87.00	83.02	..
Do.	398P	Temperance	..	..	197.00	130.01	..	..	6.65	511.00	296.64	..
Do.	..	Voided leases	..	..	..	..	..	..	467.67	4,424.12	3,565.32	..
Do.	..	Sundry claims	..	..	294.50	561.40	..	..	118.29	1,936.75	1,640.51	..
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	..
<i>From Goldfield generally:—</i>												
Sundry parcels treated at:												
State Battery—Ravelstone 290.07												
Various Works 30.00												
Reported by Banks and Gold Dealers 112.80												
Total			112.80	..	2,462.00	2,710.33	..	1,826.76	3,870.22	479,687.26	240,807.90	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.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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.
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: Yellow Aster G.M. Co., N.L.	..	..	1,086.00	620.74	..	..	10,359.75	5,425.26	..
Do. ..	..	Voided leases .. .. .	..	..	..	..	..	141.57	23,291.50	11,350.24	..
Do. ..	..	Sundry claims .. .. .	..	..	..	..	..	478.40	1,400.75	804.80	..
Lake Darlot ..	182	Amazon .. .. .	..	..	..	..	..	11.54	3,850.50	6,285.51	..
Do. ..	626	Filbandint .. .. .	..	..	..	..	..	..	999.00	918.19	..
Do. ..	(1181)	King of the Hills .. .. .	..	..	..	..	..	..	31.75	7.52	..
Do. ..	648	Monte Cristo .. .. .	..	..	..	..	..	..	71.25	54.08	..
Do. ..	648, (654), (852)	(Monte Cristo leases) .. .. .	..	..	..	..	..	..	6,762.60	3,279.52	..
Do. ..	273	St. George .. .. .	..	..	32.00	10.89	..	2,972.78	890.00	7,954.64	..
Do. ..	633	(Zangbar) .. .. .	..	..	..	..	..	..	997.00	505.75	..
Do. ..	633 (823)	Zangbar leases .. .. .	..	..	..	..	..	..	20,340.00	7,664.55	..
Do. ..	..	Voided leases .. .. .	..	..	..	..	..	934.38	31,214.20	21,712.69	..
Do. ..	..	Sundry claims .. .. .	..	232.61	57.00	222.71	..	1.16	474.45	3,794.64	2,591.42
Lawlers ..	(1177)	Eastern Star .. .. .	..	..	..	..	..	..	90.00	46.44	..
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)	(East Murchison United, Ltd.) .. .. .	..	..	..	..	..	..	291,797.00	155,594.26	900.48

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 1915.					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	1171	(Great Eastern) .. ..	..	..	418.00	121.29	..	..	927.00	337.72	..
Do.	1171, 1186	Great Eastern leases .. ..	..	..	145.00	221.61	..	..	145.00	221.61	..
Do.	1187	Lady Bird .. ..	..	37.42	5.00	14.64	..	..	37.42	5.00	14.64
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 Ex- ploration Co., Ltd.)	..	..	..	..	..	..	179,563.00	40,438.14	2,560.31
Do.	1163	May Bee .. ..	..	..	867.50	386.71	..	..	3,273.50	1,073.07	..
Do.	(1173)	Never Can Tell .. ..	..	..	..	..	..	6.90	182.00	270.91	..
Do.	(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.)	..	..	2,260.00	658.21	..	..	398,856.50	102,005.52	8,356.89
Do.	1172	Queen .. ..	..	..	576.50	680.28	17.25	..	910.50	1,183.42	23.72
Do.	(1184)	Skylark .. ..	..	21.26	9.00	16.38	..	21.26	9.00	16.38	..
Do.	910, 923	Sunrise leases .. ..	..	..	..	..	..	..	8,289.00	3,985.12	..
Do.	(1183)	Tom Tit .. ..	..	1.11	..	..	..	1.11	..	..	..
Do.	58, 62, 918	Waroonga G.M. Co., Ltd.	..	..	4,338.00	893.21	..	..	4,338.00	893.21	..
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 .. ..	..	..	..	..	..	421.71	283,846.48	146,557.35	1,794.21
Do.	.. ..	Sundry claims .. ..	..	22.31	899.58	458.79	..	14.81	98.92	8,877.93	5,749.25
New England	.. ..	Voided leases .. ..	..	..	..	..	..	57.54	899.00	720.25	..
Do.	.. ..	Sundry claims .. ..	..	..	..	..	..	4.32	554.50	465.23	..

Sir Samuel	1175	..	..	Bellevue North	..	..	..	..	..	4.45	53.75	37.46	..
Do.	1190	..	..	Bellevue South	..	..	..	..	..	..	40.00	68.86	..
Do.	(1176)	..	..	Canberra	..	..	..	..	..	..	19.00	15.18	..
Do.	..	..	..	Voided leases	..	..	..	..	..	9.04	264,846.25	137,866.11	10,225.58
Do.	..	..	..	Sundry claims	..	..	..	..	..	21.37	3,173.00	2,392.36	..
Wiluna	1137	[118j]	..	Aurora	..	..	..	..	..	..	8.00	46.38	..
Do.	(946),	([23j])	..	(Bulletin)	..	..	..	..	..	..	5,605.00	2,144.82	..
Do.	(140),	([2j]),	162	(Golden Age Consolidated, Ltd.)	..	..	..	..	..	..	42,521.00	19,750.45	..
Do.	[4j],	(163),	([5j],	Gwalia Consolidated, Ltd.	..	..	..	..	..	..	210,230.32	74,536.14	69.03
Do.	542,	[6j],	548,	[7j],	..	..	..	..	..	..	..	..	..
Do.	550,	[8j],	(906,	..	..	..	..	..	..	..	..	..	..
Do.	([11j]),	(930,	..	..	..	..	..	..	..	..	..	..	..
Do.	([13j]),	(931,	..	..	..	..	..	..	..	..	..	..	..
Do.	([14j]),	(932,	..	..	..	..	..	..	..	..	..	..	..
Do.	([15j]),	(937,	..	..	..	..	..	..	..	..	..	..	..
Do.	([17j]),	(938,	..	..	..	..	..	..	..	..	..	..	..
Do.	([18j]),	(943,	..	..	..	..	..	..	..	..	..	..	..
Do.	([21j]),	(944,	..	..	..	..	..	..	..	..	..	..	..
Do.	([22j]),	(952,	..	..	..	..	..	..	..	..	..	..	..
Do.	([26j])	..	..	..	..	..	..	..	..	..	..	..	..
Do.	(954),	([28j])	..	(Indicator)	..	..	..	..	..	..	767.00	143.44	..
Do.	162,	[4j],	(163),	(Lake Way leases)	..	..	..	..	..	..	630.00	369.60	..
Do.	([5j])	..	..	..	..	..	..	..	..	..	..	..	..
Do.	162,	[4j]	..	(Lake Way : Western Australian Gfs., 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	51,769.75	39,117.89	124.00
Do.	..	..	..	Sundry claims	..	..	..	..	5.30	..	2,841.15	1,516.76	..
<i>From District generally :—</i>														
Sundry parcels treated at :														
	Cinderella Battery	..	..	..	..	..	..	..	..	..	1,218.00	3,146.19	26.00
	Great Eastern Battery	..	..	..	..	..	..	..	..	..	..	153.96	..
	Lawlers Public Battery	..	..	..	..	..	..	..	..	..	284.00	2,730.80	..
	Parry's Cyanide Works	..	..	..	..	..	..	..	..	..	..	155.36	..
	State Battery—Lake Darlot	..	..	..	..	..	..	..	..	..	315.00	1,097.09	..
	State Battery—Sir Samuel	..	..	..	..	..	..	..	..	..	..	970.09	..
	State Battery—Wiluna	..	..	..	..	..	..	..	..	..	390.00	2,047.17	20.00
	Various Works	..	..	..	..	..	..	..	..	..	117.50	8,379.57	718.33
	Reported by Banks and Gold Dealers	..	..	..	..	..	..	..	..	5,587.11	67.15	5.74	..
	Total	..	..	..	..	..	..	..	..	..	..	..	..
					3.73	314.71	11,460.58	5,736.69	17.25	5,608.38	6,356.98	1,962,855.57	874,978.84	24,820.49

TABLE IV.—Production of Gold and Silver from all sources, etc.—continued.

East Murchison Goldfield—continued.

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.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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.
Collavilla	..	Voided Leases	..	..	..	..	..	..	1,518·00	496·28	..
Do.	..	Supdry claims	..	..	..	..	..	..	30·00	21·47	..
Mt. Keith	118J	Aurora	..	..	661·00	487·05	..	..	2,080·00	2,156·52	..
Do.	(167J)	Grand Schlam	..	..	..	..	..	..	983·00	678·61	..
Do.	(168J)	Little Schlam	..	..	..	..	..	..	194·00	166·51	..
Do.	195J	Starlight	..	8·29	220·00	39·58	..	8·29	220·00	39·58	..	
Do.	(176J)	Winifred	..	..	..	..	..	..	198·00	107·00	..
Do.	..	Voided leases	..	..	..	..	..	..	221·50	146·40	..
Do.	..	Sundry claims	..	..	233·00	146·84	..	78·26	534·00	396·35	..
New England	..	Voided leases	..	..	..	..	..	..	952·00	309·11	..
Do.	..	Sundry claims	..	..	..	..	..	..	115·00	100·62	..
Wiluna	91J	(Adelaide)	..	..	..	..	..	..	401·00	33·29	..
Do.	(23J)	(Bulletin)	..	..	..	..	..	..	5,787·00	1,427·81	..
Do.	(188J)	Comet	..	..	..	..	..	..	112·50	14·49	..
Do.	187J	Essex	..	..	..	..	..	..	1,045·00	263·74	..
Do.	6J, 7J, 8J, (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.	(161J)	(Lake View)	..	..	..	..	..	..	17·50	1·82	..
Do.	4J, (5J)	Lake Way Leases: Wiluna G.M.'s, Ltd.	..	..	..	..	..	..	2,044·00	975·78	..
Do.	198J	Margaret Yuin	..	..	17·50	18·88	..	..	17·50	18·88	..
Do.	10J	(Moonlight)	..	..	..	..	..	..	5,181·00	1,078·40	..
Do.	10J, 37J, 91J, 109J, (123J)	Moonlight leases	..	..	2,213·00	802·72	..	..	10,711·00	4,286·32	..
Do.	120J	Ullina	..	..	187·75	166·96	..	..	2,124·25	524·75	..
Do.	6J, 7J, 8J, (11J), (13J), (14J), (15J), (17J), (21J), (161J), (163J)	Western Machinery Co., Ltd.	..	..	7,461·00	3,546·21	..	..	13,188·00	5,594·87	..

Db.	12j, (23j), (28j), (30j), (33j), (36j), (43j), (76j), 113j 119j, 124j (1,37j)	Wiluna Gold Mines, Ltd.	..	..	..	..	..	..	..	18,278.50	6,572.61	..
Do.	..	Voided leases	..	..	..	..	..	..	27.92	7,049.50	4,165.01	..
Do.	..	Sundry claims	..	..	588.00	306.33	..	87.59	79.88	3,861.75	1,638.99	33
<i>From District Generally:—</i>													
Sundry Parcels treated at:													
		State Battery—Mt. Keith	..	..	..	71.46	..	..	..	..	363.77	12.68
		State Battery—Wiluna	..	..	..	1,152.46	77.08	..	..	155.00	8,116.69	110.89
		Reported by Banks and Gold Dealers	..	..	..	..	..	3.20	2.92	..	..	..
		Total	8.29	11,581.25	6,788.49	77.08	90.79	197.27	107,536.50	50,712.50	144.19

BLACK RANGE DISTRICT.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					TOTAL PRODUCTION.					
			Alluvial.	Dolled and Specimens.	Ore treated.	Gold therefrom.	Silver.	Alluvial.	Dolled and Specimens.	Ore treated.	Gold therefrom.	Silver.	
			Fine ozs.	Fine ozs.	Tons (2,240lbs.)	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Tons (2,240lbs.)	Fine ozs.	Fine ozs.	
Barrambie	773B, [1458], 774B, [1459], 1 ([1484]), ([1486]), ([1560])	Barrambie Ranges, G.M. Co., N.L.	..	..	97.00	452.96	..	..	..	147.00	1,458.91	..
Do.	809B	Lilyveil	..	..	141.00	75.22	..	..	..	275.00	194.34	..
Do.	..	Sundry claims	..	9.64	26.00	32.98	..	..	11.86	120.00	88.21	..
Bellechambers	..	Sundry claims	..	..	..	..	..	..	..	45.00	36.62	..
Birrigrin	(128B)	(Pelerin)	..	..	..	..	..	..	..	1,765.46	3,621.53	..
Do.	(128B)	Pelerin	..	..	46.00	89.97	..	..	..	812.00	752.77	..
Do.	(128B), (356B)	(Pelerin leases)	..	..	..	..	..	..	..	1,066.00	1,445.71	..
Do.	..	Voided leases	..	..	..	..	..	..	820.68	8,314.70	9,125.19	..
Do.	..	Sundry claims	..	..	18.00	22.03	..	..	34.52	731.00	488.69	..
Curran's Find	641B	Red White and Blue	1,118.00	331.50	24.58	2,760.00	914.11	..
Do.	..	Voided leases	..	..	..	..	..	..	107.70	164.50	71.82	..
Do.	..	Sundry claims	..	..	..	..	..	..	2.08	326.50	188.97	..
Erroll's	(814B)	Light of the World	..	..	..	..	..	..	..	18.54	..	..
Do.	(775B), ([1712])	Mystery: Lupton's G.M.'s, N.L.	..	..	..	..	..	..	..	..	363.76	..
Do.	..	Voided leases	..	..	..	..	..	..	14.17	..	24.82	..
Do.	..	Sundry claims	..	12.71	..	..	..	..	28.11	209.50	243.69	..

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 1915.					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.
Hancocks	(826B)	Allies	..	..	36.50	2.47	..	..	..	48.50	3.79	..
Do.	811B	Artesian	..	298.66	50.25	92.50	..	609.00	129.25	145.38	..	..
Do.	(830B)	Birthday Gift	..	..	52.00	8.95	..	..	52.00	8.95	..	..
Do.	382B	(Bull Oak)	..	..	..	..	..	..	725.00	956.77	..	..
Do.	(674B)	Comedy King	..	132.23	..	..	..	590.08	1,422.00	2,153.01	..	..
Do.	837B	Comedy King	..	311.14	169.75	425.77	..	311.14	169.75	425.77	..	..
Do.	(360B), (379B), 382B, 383B	(Comrades leases)	..	..	..	..	..	..	4,641.50	3,443.73	..	..
Do.	389B	(Faugh-a-ballagh)	..	..	..	..	..	..	139.00	109.31	..	..
Do.	389B, 495B, 710B	Faugh-a-ballagh leases	..	..	124.25	121.97	..	267.00	2,185.00	2,727.56	..	..
Do.	820B	Great Koh-i-nor	..	..	871.50	192.85	..	..	1,862.50	495.63	..	1.50
Do.	(835B)	Hard to get	..	8.90	..	..	..	..	8.90	..	..	..
Do.	(330B)	Koinoor North	..	..	41.00	10.00	..	..	29.76	1,753.50	1,198.65	..
Do.	(633B)	Lady Seddon	..	..	..	..	..	..	11.00	8.65	..	..
Do.	633B, (637B)	(Lady Seddon leases)	..	..	..	..	..	..	579.50	320.37	..	..
Do.	383B	(Maid Marion)	..	..	..	..	..	..	2.47	373.00	490.40	..
Do.	(813B)	Rambler	..	..	..	..	..	653.09	48.00	101.00	..	..
Do.	(369B), (379B), 382B, 383B	Royal Oak Mining Co., N.L.	..	..	126.00	110.79	..	..	1,832.75	1,006.72	..	..
Do.	(790B)	Sensation	..	..	..	..	..	..	109.50	64.33	..	..
Do.	(822B)	Titanic	..	..	..	..	..	..	21.75	1.76	..	..
Do.	..	Voided leases	..	..	..	..	..	3,809.01	9,495.25	12,273.50	..	50.58
Do.	..	Sundry claims	..	16.47	141.25	48.24	..	..	98.12	1,026.25	494.85	..
Maninga Marley	203B	Havilah	..	..	38.00	26.74	..	..	..	38.00	26.74	..
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, (243B), (289B)	(Havilah leases: Tailings Treatment, Ltd.)	..	..	..	..	..	..	..	371.00	2,086.50	..
Do.	(765B)	Maninga Marley, North	..	..	..	..	..	..	..	665.00	409.07	..
Do.	.. ..	Voided leases .. ..	..	..	..	..	..	..	195.20	11,312.23	14,033.28	..
Do.	.. ..	Sundry claims .. ..	..	35.50	88.00	23.69	..	..	158.16	677.50	591.49	..
Montagu	.. ..	Voided leases .. ..	..	..	..	..	..	..	94.39	9,133.40	7,223.46	..
Do.	.. ..	Sundry claims .. ..	..	..	102.00	102.52	..	..	45.67	741.50	434.72	..
Nungara	(793B)	Margaret .. ..	..	17.13	..	..	..	..	544.28	2,043.00	563.07	..
Do.	(619B)	Nungarra Junction .. ..	..	..	92.25	28.51	..	..	93.57	1,472.75	675.76	..
Do.	.. ..	Voided leases .. ..	..	..	..	..	..	25.94	241.47	8,626.50	7,538.70	3.64
Do.	.. ..	Sundry claims .. ..	..	105.55	526.50	102.11	..	46.67	1,441.10	3,235.15	2,053.79	..
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, 9B, 11B, 17B, 26B, 70B, 140B, 150B, 256B, 494B, 509B, 620B, 627B	Black Range Mining Co., N.L.	..	..	25,348.00	14,759.00	..	4.75	199.90	225,381.00	157,325.88	1,315.00
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	558.00	361.64	..	..	51.62	558.00	361.64	..
Do.	149B	(Golden Gate) .. ..	..	..	..	..	..	..	..	113.75	62.98	..
Do.	151B	(Golden Key) .. ..	..	..	..	..	..	..	..	883.00	1,412.75	..
Do.	815B	Jumbo .. ..	..	227.71	44.25	26.43	..	..	240.95	63.75	39.81	..
Do.	16B	(Kingoonya) .. ..	..	..	..	..	..	..	..	1,406.00	1,850.40	..
Do.	509B	(Mary S.) .. ..	..	..	..	..	..	..	275.60	70.00	84.09	..
Do.	810B	Myrtle .. ..	..	..	8.00	2.35	..	..	..	73.75	114.00	..
Do.	6B, 10B, 16B, (74B), (81B), 114B, 149B, 151B, (189B), (193B), (206B), (216B), (238B), (463B), (477B), (498B), (553B)	(Oroya Black Range, Ltd.) .. ..	..	..	..	..	..	..	..	283,330.00	157,307.04	6,154.63
Do.	789B	Pyx .. ..	..	..	462.75	352.19	13.50	..	..	849.50	685.42	13.50
Do.	(187B)	(Sandridge: Sandstone Development G.M. Co., N.L.)	..	..	..	..	..	..	..	263.00	102.22	..
Do.	6B	(Sandstone) .. ..	..	..	..	..	..	..	..	1,439.50	1,938.54	..
Do.	(174B), (187B), (196B), (229B), (231B), (232B), (236B), (283B), (284B)	(Sandstone Development G.M. Co., N.L.)	..	..	..	..	..	..	..	26,086.50	15,055.94	242.30

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 1915.					TOTAL PRODUCTION.				
			Alluvial.	Dolled and Specimens.	Ore treated.	Gold therefrom.	Silver.	Alluvial.	Dolled and Specimens.	Ore treated.	Gold therefrom.	Silver.
			Fine ozs.	Fine ozs.	Tons (2,240lbs.)	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Tons (2,240lbs.)	Fine ozs.	Fine ozs.
Sandstone ..	(174B), (187B), (196B), (229B), (231B), (232B), (236B), (283B), (284B)	(Sandstone G.M. Co., N.L. .. ..)	..	..	..	..	..	..	8,650·70	4,354·65	..	
Do. ..	766B	Trafalgar .. ..	..	12·03	1,885·00	1,152·56	27·30	..	306·73	2,444·50	1,909·22	27·30
Do. ..	10B	(Undaunted) .. ..	..	..	..	..	..	..	..	80·00	46·04	..
Do. ..	(74B)	(Undaunted East) .. ..	..	..	..	..	..	..	..	648·25	619·82	..
Do. ..	114B	(Undaunted East Extended) .. ..	..	..	..	..	..	..	..	276·00	181·34	..
Do. ..	794B	Wanderie .. ..	..	..	..	..	..	..	..	149·00	86·66	..
Do. ..	(174B)	(Wonoka) .. ..	..	..	..	..	..	..	..	68·50	36·35	..
Do. ..	(174B)	(Wonoka : Sandstone Development G.M. Co., N.L.) .. ..	..	..	..	..	..	..	..	165·00	156·12	..
Do. ..	6B, 10B, 16B, (74B), (81B), 114B, 149B, 151B, (174B), (187B), (189B), (193B), (196B), (206B), (216B), (229B), (231B), (232B), (236B), (238B), (283B), (284B), (463B), (477B), (498B), (553B)	Yuanmi G.M.'s., Ltd. .. ..	..	..	2,460·25	2,135·19	72·00	..	..	88,232·29	38,187·03	3,995·89
Do. ..	.. ..	Voided leases .. ..	..	..	..	..	..	..	1,657·33	9,102·63	7,249·60	..
Do. ..	.. ..	Sundry claims .. ..	..	6·07	209·00	199·30	..	24·01	760·22	1,804·75	1,058·35	..
Youanme ..	622B	(Edna) .. ..	..	..	..	..	..	..	..	320·00	210·17	..
Do. ..	526B	(Great Western) .. ..	..	..	..	..	..	..	9·71	553·75	417·43	..
Do. ..	(770B)	Hill End .. ..	..	..	177·75	10·79	..	..	..	1,821·25	225·25	..
Do. ..	564B	(Junction) .. ..	..	..	..	..	..	..	..	975·50	668·33	..
Do. ..	630B	(Oversight) .. ..	..	..	..	..	..	..	..	132·00	37·05	..
Do. ..	521B	(Peru) .. ..	..	..	..	..	..	..	..	98·00	126·86	..
Do. ..	514B	United .. ..	..	..	2,442·00	316·31	..	..	..	12,191·50	3,416·70	..

TABLE IV.—Production of Gold and Silver from all sources, etc.—continued.

Murchison Goldfield—continued.

CUE DISTRICT—continued.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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.
Cue	1901	Flowers of May	..	48.40	94.00	174.88	..	..	48.40	94.00	174.88	..
Do.	1637	Gem of Cue	..	..	..	..	..	..	..	901.00	896.59	..
Do.	1637	(Gem of Cue)	..	..	..	..	..	..	..	214.50	233.79	..
Do.	1637, (1663)	(Gem of Cue leases)	..	..	..	..	..	..	..	3,264.50	1,941.52	..
Do.	1783	Hidden Treasure	..	..	55.50	12.38	..	..	..	10,581.00	11,855.54	..
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	..	..	6,044.50	3,234.31	..	..	..	7,882.00	5,117.26	..
Do.	1151, 1252, 1362, (1391), 1498, (1689)	(Queen of the May leases)	..	..	..	..	..	..	..	6,926.00	6,974.06	..
Do.	(1897)	Never-Can-Tell	..	2.16	182.50	70.32	..	..	2.16	457.00	231.40	..
Do.	1248	Rising Sun	..	..	27.00	43.18	..	..	..	1,474.00	1,008.02	..
Do.	(1909)	Robinson Street	..	..	22.00	16.60	..	..	..	22.00	16.60	..
Do.	(1868)	Uncle Sam	..	..	..	..	..	..	3.84	692.00	223.94	..
Do.	1853	(Vera)	..	..	..	..	..	..	..	418.00	432.64	..
Do.	1853, 1855	Vera leases	..	..	352.00	387.13	..	..	..	430.50	443.76	..
Do.	..	Voided leases	..	..	..	..	..	..	34.72	457.90	160,133.12	108,886.57
Do.	..	Sundry claims	..	4.24	1,237.00	664.51	..	..	10.50	296.97	13,754.09	8,632.89
Eelya	..	Voided leases	..	..	..	..	..	..	..	8.78	966.00	1,774.03
Do.	..	Sundry claims	..	..	6.00	4.88	..	..	..	73.65	505.15	560.73
Erroll's	(1743), ([776B])	Great Saddle	..	..	..	..	..	..	..	..	1,729.00	721.81
Do.	(1712), ([775B])	(Mystery)	..	..	..	..	..	..	..	16.63	2,683.00	2,134.18
Do.	(1712), ([775B])	Mystery: Lupton's G.Ms., N.L.	..	..	..	..	..	..	..	..	1,545.00	783.36
Do.	..	Voided leases	..	..	..	..	..	..	..	3.62	8,141.50	5,262.89
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 ..	..	..	Voided leases ..	..	..	..	..	..	..	..	210-65	540-00	673-20	..
Do. ..	..	..	Sundry claims ..	..	..	..	..	..	136-94	..	17-76	195-05	116-52	..
Tuckabiano ..	1898	..	L. and P. Alliance ..	..	146-77	2-00	43-18	..	..	..	146-77	2-00	43-18	..
Do. ..	..	..	Sundry claims ..	..	3-70	27-50	14-20	..	..	..	3-70	27-50	14-20	..
Tukanarra ..	(1895)	..	Dryberra ..	..	..	..	..	..	..	..	..	6-00	12-71	..
Do. ..	1337	..	Nemesis ..	..	..	26-00	120-50	..	..	..	608-78	2,214-00	6,077-07	..
Do. ..	(1903)	..	Princess Ena ..	..	40-07	..	..	..	..	..	40-07	..	..	..
Do. ..	1913	..	Sure Thing ..	..	8-85	..	..	..	..	..	8-85	..	..	..
Do. ..	..	..	Voided leases ..	..	..	..	..	..	..	14-65	2,046-50	15,570-10	14,367-11	172-77
Do. ..	..	..	Sundry claims ..	..	27-84	47-90	114-00	190-92	..	31-60	88-29	2,653-70	5,429-34	..
<i>From District generally :-</i>														
Sundry Parcels treated at:														
Cue No. 1 Works														
Gem of Cue Extended Works.. .. .														
State Battery—Tukanarra														
Various Works														
Reported by Banks and Gold Dealers														
Total														
				27-84	302-09	8,458-00	5,855-96	..	992-79	4,259-55	372,832-30	326,683-05	400-11	

MEEKATHARRA DISTRICT.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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.	
Abbotts ..	..	Voided leases ..	..	..	..	..	..	..	..	..	35,165-60	37,103-60	..
Do. ..	..	Sundry claims ..	..	..	..	..	..	..	..	..	44-60	63-56	..
Burnakura ..	509N, 527N	(Federal City leases)	..	..	..	..	..	..	..	..	14,583-00	7,288-96	..
Do. ..	509N, 527N, (949N)	(Federal City leases)	..	..	..	..	..	..	..	..	2,084-00	1,120-21	..
Do. ..	509N, 527N, (949N), (1009N)	Federal City leases	..	..	..	..	..	..	..	..	4,019-00	1,330-40	..
Do. ..	..	Voided leases ..	..	..	..	..	..	..	..	3,239-43	17,794-95	20,829-43	26-90
Do. ..	..	Sundry claims ..	..	..	75-00	51-86	..	12-51	81-11	128-00	82-91	..	..
Chesterfield ..	..	Voided leases ..	..	..	..	..	..	29-02	409-15	6,756-26	7,445-01	..	80
Do. ..	..	Sundry claims ..	..	..	..	..	..	..	38-83	428-60	472-64	..	..

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 1915.					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.
Gabanintha ..	1324N	Hamburg Belle .. ..	..	..	319.50	236.45	..	..	..	341.50	250.79	..
Do. ..	(1323N)	Ivy .. ..	..	..	..	..	..	..	..	127.00	71.89	..
Do. ..	(1068N)	(New Brew) .. ..	..	..	..	..	..	..	..	815.00	575.89	..
Do. ..	(1068N)	New Brew .. ..	..	..	..	..	..	..	..	32.00	23.89	..
Do. ..	(1068N), (1070N), (1223N)	(New Brew leases) .. ..	..	..	..	..	..	..	..	705.50	387.06	..
Do. ..	1175N	Unexpected .. ..	..	..	..	*3.85	*25.00	..	..	193.00	94.51	25.00
Do. ..	.. ..	Voided leases .. ..	..	..	..	..	..	..	..	18,586.50	11,565.69	524.66
Do. ..	.. ..	Sundry claims .. ..	..	..	68.50	27.01	..	1.33	37.34	942.50	629.47	..
Garden Gully ..	1367N	Crescent .. ..	..	..	10.50	6.31	..	..	..	10.50	6.31	..
Do. ..	(1036N)	(Kanowna) .. ..	..	..	..	..	..	..	6.49	..	..	..
Do. ..	(928N)	(Kyarra) .. ..	..	..	..	..	..	..	..	761.00	1,145.88	..
Do. ..	(928N), (1036N), (1037N), (1077N), (1168N)	Kyarra G.M. N.L. .. ..	..	..	1,910.00	824.92	..	..	..	24,733.00	17,564.32	898.60
Do. ..	1344N	Kyarra G.M., N.L. .. ..	..	..	3,436.00	1,466.87	203.99	..	..	3,436.00	1,466.87	203.99
Do. ..	1342N	Lydia .. ..	..	18.69	101.00	155.07	..	..	38.11	101.03	164.25	..
Do. ..	1343N	Sydney .. ..	..	..	10.50	8.37	..	..	..	10.50	8.37	..
Do. ..	.. ..	Voided leases .. ..	..	..	..	..	..	26.36	30.31	691.53	996.84	..
Do. ..	.. ..	Sundry claims .. ..	..	..	38.50	47.63	..	..	3.32	238.10	306.16	..
Gum Creek ..	(1347N)	Alma May .. ..	..	..	25.00	3.81	..	..	..	25.00	3.81	..
Do. ..	.. ..	Voided leases .. ..	..	..	..	..	..	25.27	88.12	2,532.08	3,106.92	..
Do. ..	.. ..	Sundry claims .. ..	..	..	42.00	13.49	..	..	..	338.00	278.36	..
Holden's Find ..	(1283N)	Bulgarian .. ..	..	..	..	..	..	..	..	.95	..	..
Do. ..	1307N	Golden Horn .. ..	..	..	..	..	..	..	..	8.72	..	..
Do. ..	1278N	Junction .. ..	..	..	79.00	88.17	..	..	..	5.10	151.00	283.27
Do. ..	1277N	Woodrow .. ..	..	..	58.00	123.08	..	..	..	129.75	240.65	..
Jillawarra ..	(1337N)	Peep of Day .. ..	..	8.01	5.00	17.93	..	..	54.09	5.00	17.93	..
Do. ..	(1362N)	Third Brigade .. ..	..	27.35	..	..	..	..	27.35	..	..	..
Do. ..	.. ..	Voided leases .. ..	..	..	..	..	..	..	1,053.24	1,494.55	2,783.60	..
Do. ..	.. ..	Sundry claims .. ..	..	..	..	..	..	169.02	120.55	17.50	43.78	..
Meeka Pools ..	.. ..	Voided leases .. ..	..	..	..	..	..	..	..	111.58	82.27	..
Do. ..	.. ..	Sundry claims .. ..	..	..	..	..	..	..	2.84	211.72	184.83	..

Meekatharra ..	1357N ..	Britannia ..	16-53	189-00	139-10	..	..	16-53	189-00	139-10	..
Do. ..	597N ..	(Commodore)	..	..	..	..	..	..	498-00	1,268-71	..
Do. ..	597N, 1041N ..	Commodore G.M. Co., N.L.	..	6,500-00	3,558-32	..	..	..	34,911-00	13,062-25	..
Do. ..	477N ..	(Fenian)	..	..	..	..	..	..	8,831-75	18,289-22	..
Do. ..	477N, 814N ..	Fenian leases	..	33,427-00	26,599-64	..	..	..	161,456-00	142,893-89	..
Do. ..	1354N ..	Fenian West	..	169-00	25-66	..	..	..	169-00	25-66	..
Do. ..	912N ..	Globe	..	70-50	82-60	..	..	..	863-48	1,266-15	..
Do. ..	1163N ..	Golden Bracelet ..	..	62-00	23-74	..	..	2-69	1,150-52	989-17	..
Do. ..	1331N ..	Gwalia ..	..	26-00	76-34	..	..	..	26-00	76-34	..
Do. ..	(1228N)	Halcyon ..	..	90-00	13-36	..	..	..	103-00	36-33	..
Do. ..	635N ..	Halcyon Extended	3-60	1,009-00	132-55	..	..	3-60	2,171-50	1,184-34	..
Do. ..	1345N ..	Haveluck ..	8-92	773-00	153-56	..	..	8-92	773-00	153-56	..
Do. ..	555N ..	(Ingliston)	..	..	..	..	..	..	1,202-49	2,332-27	..
Do. ..	475N ..	(Ingliston Consols Extended)	..	..	..	..	..	..	1,536-25	4,248-25	..
Do. ..	475N, 515N, 729N, 822N	Ingliston Consols Extended leases	..	24,184-10	12,749-75	..	..	..	110,806-60	69,201-58	..
Do. ..	398N ..	(Ingliston Extended)	..	..	..	..	..	..	1,320-25	1,106-46	..
Do. ..	398N, 437N, 462N, 529N, 539N, 847N, 881N, 1033N	Ingliston Extd. G.M.s., Ltd.	..	10,092-00	4,877-52	..	..	..	99,212-95	52,345-15	..
Do. ..	555N, 1239N ..	Ingliston leases ..	..	3,313-00	3,480-64	..	..	..	3,923-85	4,450-02	..
Do. ..	902N ..	Ingliston North ..	..	..	..	..	..	..	10-00	25-05	..
Do. ..	1202N ..	Ingliston Proprietary South	..	54-00	89-12	..	..	..	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.	..	34,753-56	12,610-97	959-69	..	..	111,135-98	43,128-49	2,198-31
Do. ..	915N ..	Macquarrie ..	19-09	527-10	52-97	..	..	40-05	4,315-08	1,136-92	..
Do. ..	(734N) ..	Macquarrie North	..	..	..	..	..	29-85	85-25	25-08	..
Do. ..	533N ..	Marmont ..	..	1,673-00	953-10	..	..	..	54,083-00	37,903-92	..
Do. ..	580N ..	(Marmont Extended)	..	..	..	..	..	..	43-00	38-03	..
Do. ..	580N, 888N ..	Marmont Extended leases	..	..	..	..	..	..	152-00	129-61	..
Do. ..	372N ..	Pioneer ..	5-21	306-00	171-96	..	..	35-98	6,823-18	6,234-83	..
Do. ..	931N ..	(Queen of the Hill)	..	..	..	..	..	..	549-00	158-59	..
Do. ..	1233N ..	Victory ..	..	953-00	118-64	..	..	..	1,465-10	200-91	..
Do. ..	..	Voided leases ..	..	..	..	..	..	3-88	209-37	32,504-58	24,352-66
Do. ..	..	Sundry claims ..	22-68	516-50	214-02	..	181-83	139-61	2,943-55	1,613-73	..
Munara Gully	..	Voided leases ..	..	..	..	..	..	..	13,167-75	6,489-65	..
Do. ..	..	Sundry claims ..	..	..	..	..	..	7-95	63-00	21-75	..
Nannine	(1335N) ..	Caledonian ..	..	80-00	14-03	..	..	..	180-00	47-97	..
Do. ..	16N, 25N, 166N ..	Nannine leases ..	8-71	350-00	162-18	..	..	8-71	23,461-60	24,275-55	127-60
Do. ..	25N ..	(Royalist Consolidated)	..	..	..	..	..	19-18	762-53	3,500-70	..
Do. ..	..	Voided leases ..	..	..	..	..	34-02	342-77	67,154-49	39,500-06	39-85
Do. ..	..	Sundry claims ..	69-32	50-00	44-32	..	7-63	243-73	2,249-20	1,762-79	..
Quinn's	(1333N) ..	Advance ..	113-38	24-50	32-34	..	..	113-38	51-50	36-95	..
Do. ..	(1312N) ..	Advance Australia	..	..	..	..	..	47-03	7-00	16-95	..
Do. ..	1245N ..	Commonwealth ..	..	271-10	197-45	..	..	..	422-35	290-25	..
Do. ..	1334N ..	Kaladbro ..	5-50	134-50	31-08	..	..	11-81	171-50	46-44	..

* From Copper Ore.

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 1915.					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.
Quinn's	1353N	Murchison Wonder	..	62·50	100·60	69·93	..	..	62·50	100·60	69·93	..
Do.	1225N	Nowthanna	..	53·99	114·50	67·39	..	..	53·99	565·00	216·60	..
Do.	(1055N)	Parramatta	..	2·64	86·00	23·86	..	..	15·97	1,022·00	517·67	..
Do.	1244N	Phoenix Extended	..	..	453·10	119·19	..	..	..	1,291·85	518·87	..
Do.	1341N	Singapore	..	..	234·60	108·17	..	..	..	291·60	157·24	..
Do.	1370N	Suvia	..	..	391·00	33·47	..	..	..	391·00	33·47	..
Do.	..	Voided leases	..	..	..	..	..	7·30	879·51	14,161·26	6,822·91	90·70
Do.	..	Sundry claims	..	20·34	136·25	283·91	..	2·25	663·23	1,307·00	937·90	..
Ruby Well	1364N	Golden Grindstone	..	..	67·00	78·30	..	..	..	67·00	78·30	..
Do.	1261N, [364P]	Harder to Find	..	..	2,350·00	1,423·12	..	..	..	4,295·00	2,246·20	..
Do.	1263N, [370P]	Lucky Call	..	..	19·00	19·47	..	..	..	19·00	19·47	..
Do.	(1262N), [(369P)]	Trafalgar	..	..	61·00	14·39	..	..	..	154·50	55·14	..
Do.	..	Voided leases	..	..	..	..	..	..	..	106·00	57·36	..
Do.	..	Sundry claims	..	..	61·00	114·78	..	..	8·48	213·00	262·89	..
Stake Well	..	Voided leases	..	..	..	..	..	..	200·12	21,342·00	9,536·07	..
Do.	..	Sundry claims	..	..	83·00	82·65	..	..	31·79	173·00	157·11	..
Star of the East	..	Voided leases	..	..	..	..	..	..	..	27,244·00	20,305·40	..
Do.	..	Sundry claims	..	..	..	..	..	..	..	127·62	94·97	..
Yaloginda	1084N	Chunderloo	..	..	1,050·00	233·81	..	..	..	2,855·55	844·07	8·68
Do.	(1236N)	Mystery	..	..	..	..	..	..	..	460·10	330·74	..
Do.	(1260N)	Pariah	..	..	..	..	..	..	..	30·00	5·38	..
Do.	(891N)	Romsey	..	..	..	..	..	..	28·77	4,271·53	1,220·46	..
Do.	1373N	Roseview	..	105·77	..	..	..	..	105·77	..	..	..
Do.	..	Voided leases	..	..	..	..	..	..	463·37	18,094·34	10,625·87	..
Do.	..	Sundry claims	..	126·13	137·00	118·63	..	10·89	357·47	1,641·17	1,076·00	..
<i>From District generally :—</i>												
Sundry parcels treated at :												
Connecticut Battery			..	..	..	..	..	..	..	..	173·61	..
Hornsby Battery			..	..	33·00	111·31	..	..	..	33·00	111·31	..
Purcell's Cyanide Works			..	..	..	..	..	..	..	..	630·13	..
Margueritta Cyanide Works			..	..	..	..	..	..	..	..	31·37	..
State Battery—Meekatharra			..	..	..	140·64	..	..	..	14·00	10,034·23	19·00
State Battery—Nannine			..	..	..	..	..	..	..	..	404·11	..
State Battery—Quinn's			..	..	..	119·92	..	..	..	..	618·79	..
Various Works			..	..	..	..	..	..	..	139·75	3,124·89	342·17
Reported by Banks and Gold Dealers			279·70	13·79	..	..	..	..	9,273·24	13·79	..	..
Total			279·70	712·15	131,153·41	72,842·72	1,188·68	9,784·55	9,410·97	989,458·25	693,591·79	4,509·56

DAY DAWN DISTRICT.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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 ..	389D	(Creme D'or) .. ..	..	..	..	..	..	..	..	..	..	..	..	..
Do. ..	389D, 421D, 422D	Creme D'or leases .. ..	..	..	850.00	519.70	..	2.49	..	4,693.62	175.18	..	..	..
Do. ..	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. ..	..	..	39,024.00	16,845.96	2,331.18	..	..	1,777,724.63	1,140,283.05	162,985.62	..	..
Do. ..	(500D)	Parisian .. ..	..	..	9.00	4.30	..	..	..	372.39	240.57	..	..	..
Do. ..	(321D)	Richmond .. ..	..	..	..	..	..	..	4.12	..	..	..	..	..
Do. ..	119D	(West Fingall No. 16) .. ..	..	..	..	..	..	..	..	43.00	15.32	..	..	..
Do. ..	.. ..	Voided leases .. ..	..	..	..	..	..	123.81	506.91	39,824.37	27,012.58	..	..	..
Do. ..	.. ..	Sundry claims .. ..	..	4.53	247.00	108.03	..	..	132.06	1,816.58	1,338.77	..	..	24
Lake Austin (Island)	(443D)	Eureka	4.64	..	..	..	..	70.35	74.21	101.04	737.25	..	..	..
Do. ..	(407D)	First Chip .. ..	..	..	..	..	..	57.93	302.94	377.50	906.56	..	..	..
Do. ..	537D	Good Luck .. ..	..	420.26	21.00	95.65	..	..	420.26	21.00	95.65	..	..	..
Do. ..	.. ..	Voided leases .. ..	..	..	..	..	..	462.24	294.86	29,237.33	43,596.44	..	..	..
Do. ..	.. ..	Sundry claims .. ..	..	..	..	..	..	17.74	179.92	239.04	141.81	..	..	..
Mainland ..	(507D)	Enterprise .. ..	..	..	..	..	..	..	706.03	..	..	..	..	..
Do. ..	530D	Sydney .. ..	..	178.77	..	..	..	..	178.77	..	..	..	..	..
Do. ..	.. ..	Voided leases .. ..	..	..	..	..	..	..	41	1,821.46	7,272.13	23,129.51	..	..
Do. ..	.. ..	Sundry claims .. ..	..	46.07	..	..	..	3.24	58.15	77.45	89.03	..	..	..
Webb's Patch	(531D)	Brilliant .. ..	..	40.69	12.00	70.46	..	..	40.69	12.00	70.46	..	..	..
Do. ..	532D	Bustard .. ..	..	200.29	5.00	24.34	..	..	200.29	5.00	24.34	..	..	..
Do. ..	513D	Comet .. ..	..	..	..	..	..	..	..	67.20	36.23	..	..	..
Do. ..	(512D)	Eclipse .. ..	..	..	20.00	5.93	..	..	..	14.28	75.05	44.31	..	..
Do. ..	526D	Hill End .. ..	..	321.53	..	..	..	..	..	386.28	..	..	..	..
Do. ..	.. ..	Voided leases .. ..	..	..	..	..	..	..	..	83.76	5,959.50	4,893.76	..	..
Do. ..	.. ..	Sundry claims .. ..	..	234.84	6.00	16.30	..	..	4.90	355.92	84.00	324.41	..	..
<i>From District generally :-</i>														
Sundry parcels treated at:														
Various Works .. ..			..	..	..	..	..	..	16.61	940.75	1,537.30	..	..	..
Reported by Banks and Gold Dealers			25.85	..	..	..	..	1,542.21	3.48	..	..	..	..	..
Total			30.49	1,446.98	40,194.00	17,690.67	2,331.18	2,285.32	5,781.00	1,869,093.58	1,248,014.49	162,985.86	..	..

TABLE IV.—Production of Gold and Silver from all sources, etc.—continued.

Murchison Goldfield—continued.

MOUNT MAGNET DISTRICT.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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.
Lennonville ..	964M	(Empress) .. ..	..	..	..	..	..	..	1,649·00	7,361·81	..	
Do. ..	964M, 1078M, 1079M, 1115M, 1116M, 1117M	Empress leases .. ..	..	..	832·00	1,419·98	..	..	832·00	1,419·98	..	
Do. ..	1148M	Empress North-west .. ..	..	4·18	..	..	..	4·18	..	..	..
Do. ..	(767M)	(Galtee Moore) .. ..	..	..	..	..	..	6·80	3,025·00	1,180·85	..	
Do. ..	(767M)	Galtee Moore .. ..	..	..	42·25	31·18	..	..	5,917·25	1,438·48	..	
Do. ..	(767M), (807M) ..	(Galtee Moore leases) ..	..	..	..	..	..	..	578·00	171·97	..	
Do. ..	(1061M)	Long Reef: Great Boulder No. 1, Ltd	..	..	..	..	..	..	..	1,863·02	..	
Do. ..	.. ..	Voided leases .. ..	..	..	..	..	..	3,185·81	123,783·98	107,824·54	458·82	
Do. ..	.. ..	Sundry claims .. ..	..	30·35	69·25	100·16	..	7·11	78·66	1,745·67	1,044·06	..
Mt. Magnet ..	1125M	Bright Dawn .. ..	..	..	55·75	58·56	..	..	..	55·75	58·56	..
Do. ..	(1122M)	Diplomat .. ..	..	..	8·75	18·04	..	..	..	8·75	18·04	..
Do. ..	(1129M)	Disappointment .. ..	..	..	4·00	13·84	..	..	..	4·00	13·84	..
Do. ..	1136M	Dollar .. ..	..	..	12·00	15·25	..	..	..	12·00	15·25	..
Do. ..	1032M	Early Bird .. ..	..	..	90·00	196·21	..	..	114·00	1,182·00	1,349·81	..
Do. ..	(1105M)	Easter Gift .. ..	..	..	..	..	..	..	..	80·00	47·48	..
Do. ..	1144M	Fortune of War .. ..	..	..	128·75	67·48	..	..	..	128·75	67·48	..
Do. ..	(1120M)	Friend .. ..	..	..	15·75	64·69	..	..	..	15·75	64·69	..
Do. ..	(752M), (826M), (833M), (1025M)	Great Boulder No. 1, Ltd.	..	..	..	..	..	..	..	98,120·95	29,806·80	..
Do. ..	(1108M)	Hard Cash .. ..	..	..	..	..	..	..	5·37	..	..	..
Do. ..	(1048M)	Hesperian .. ..	..	..	36·25	4·02	..	..	105·99	818·28	794·84	..
Do. ..	(1143M)	Killarney .. ..	..	..	107·25	44·95	..	..	..	107·25	64·95	..
Do. ..	1013M	Mars .. ..	..	..	2,800·00	500·74	..	..	..	3,073·15	635·73	..
Do. ..	1097M	May Queen .. ..	..	..	37·75	15·56	..	..	..	111·75	47·98	..
Do. ..	1107M	Mint .. ..	..	51·17	8·50	12·50	..	..	166·99	42·75	65·84	..
Do. ..	1133M	Missing Link .. ..	..	113·13	27·75	71·59	..	..	113·13	27·75	71·59	..
Do. ..	(1121M)	Mistico .. ..	..	..	5·00	3·31	..	..	..	5·00	3·31	..
Do. ..	1146M	Mistico .. ..	..	..	48·75	18·03	..	..	..	48·75	18·03	..
Do. ..	(314M), (317M), (320M), (942M), (972M), (988M), (989M), 1049M, 1050M, (1051M), (1052M)	Morning Star G.Ms., Ltd.	..	..	273·00	199·39	..	..	..	17,660·50	6,798·74	..

Do.	(1098M)	Mountain View			5-15		278-00	49-50	355-61		
Do.	445M	Neptune	32-47	83-75	110-49		927-80	2,209-66	2,756-33		
Do.	1075M	New Havelock		543-00	211-51			543-00	211-51		
Do.	1046M	New Year		491-00	913-70			1,490-00	2,455-69		
Do.	1095M	Pearl		85-75	92-73		2-36	185-57	191-97		
Do.	(1085M)	Problem Solved						13-10	6-25		
Do.	1102M	Ready Money	78-19	72-25	75-23		552-66	280-25	488-57		
Do.	(1096M)	Return					120-35	267-50	677-55		
Do.	(1114M)	Revenue		39-75	10-33			39-75	10-33		
Do.	(911M)	(Saturn)						305-00	78-29		
Do.	(911M)	(Saturn: Black Hill Development Co., Ltd.)						64-00	38-50		
Do.	(911M)	Saturn: Morning Star G.Ms., Ltd.		19-00	15-19		15-03	4,680-75	1,527-77		
Do.	696M	Sirdar		638-50	337-58			16,397-35	5,941-57		
Do.	1119M	Sovereign		111-25	137-75			111-25	137-75		
Do.	(752M)	(St. George)						3,335-00	1,439-07		
Do.	1041M	St. Patrick		13-75	1-46			619-35	774-87		
Do.	(1141M)	Sydney	68-03	31-50	57-71		68-03	31-50	57-71		
Do.	(1123M)	Sydney Hugh	2-29	33-25	8-81		2-29	33-25	8-81		
Do.	1124M	Tattersall's	22-98	88-00	246-77		22-98	88-00	246-77		
Do.	1147M	Ticket		77-50	34-41			77-50	34-41		
Do.	(1118M)	Totalisator						78-00	10-29		
Do.	1069M	Turning Point					2-31	80-50	111-65		
Do.	1058M	Two Phills	38-51	49-50	96-33		38-51	139-00	216-16		
Do.	1055M	Worker		50-25	7-03			151-25	24-92		
Do.		Voided leases				27-83	4,667-37	189,497-32	138,715-59	672-61	
Do.		Sundry claims	45	220-15	1,701-50	853-48	45	803-82	13,285-83	8,472-32	
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	(1104M)	Kuranui		50-00	6-67			200-00	13-59		
Do.	1081M	Moonlight	5-08	68-50	213-90		5-08	87-50	317-08		
Do.	1099M	Moyagee		345-50	711-33			402-50	849-58		
Do.		Voided leases						1,765-65	2,086-07		
Do.		Sundry claims	5-29	117-00	23-80		94-47	523-48	576-73		
Paynesville	1139M	Aftermath	5-84				5-84				
Do.	(1112M)	Paynesville View	56-67				147-06	10-00	6-27		
Do.		Sundry claims	1-46		279-45		1-46		279-45		
Youanme		Sundry claims						33-00	44-58		
<i>From District generally:—</i>											
Sundry Parcels treated at:											
		Fremantle Trading Co.'s Works			136-87				136-87		
		Longreef Treatment Works							2,114-05		
		Morning Star Battery			178-91				863-23		
		State Battery—Boogardie		20-00	485-94			65-01	10,320-81		
		State Battery—Lennonville						18-06	6,576-77		
		Various Works						25-00	7,028-75	1-00	
		Reported by Banks and Gold Dealers	16-93				1,619-14	-35			
		Total	17-88	735-79	9,333-25	8,108-01	1,717-82	12,345-14	501,954-19	361,387-61	1,132-43

TABLE IV.—Production of Gold and Silver from all sources, etc.—continued.

Yalgoo Goldfield.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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.
Adavale ..	..	Sundry claims .. ..	..	..	..	..	..	..	10-00	12-56	..
Bilberatha ..	..	Voided leases .. ..	..	..	..	..	..	..	554-00	200-07	..
Carlaminda ..	..	Voided leases .. ..	..	..	..	..	..	..	947-32	524-72	3-30
Do. ..	..	Sundry claims .. ..	..	..	..	..	..	..	114-00	71-96	..
Field's Find..	680	Field's Find Extended .. ..	..	..	123-00	281-64	..	..	498-00	676-20	..
Do. ..	(752)	May Bird .. ..	..	13-42	1-00	18-10	..	101-78	1-00	18-10	..
Do. ..	(734)	Shot over .. ..	..	..	..	..	..	..	4-00	36-19	..
Do. ..	..	Voided leases .. ..	..	..	..	..	..	102-48	33,842-80	24,597-64	..
Do. ..	..	Sundry claims .. ..	..	37-97	20-00	64-68	..	145-91	211-75	258-44	..
Goodingnow ..	681	Aster Consolidated .. ..	..	..	402-00	291-90	..	..	988-50	849-53	..
Do. ..	690	Blend .. ..	..	10-51	127-50	85-96	..	10-51	483-00	326-90	..
Do. ..	603	Carnation .. ..	..	..	322-00	335-79	..	..	1,831-50	2,280-85	..
Do. ..	(615)	Daphne .. ..	..	..	27-50	20-78	..	2-55	291-00	376-23	..
Do. ..	(740)	Havela .. ..	..	..	15-00	15-06	..	..	15-00	15-06	..
Do. ..	606	(Lake View) .. ..	..	..	..	..	..	..	163-00	185-46	..
Do. ..	606	Lake View: Payne's Find Develop- ment Co., N.L.	..	..	518-00	830-86	..	..	2,477-00	2,201-39	..
Do. ..	733	Marigold .. ..	..	..	60-00	59-59	..	..	99-00	140-78	..
Do. ..	630	Marraposa .. ..	..	..	65-50	83-01	..	..	704-50	709-77	..
Do. ..	613	Orchid .. ..	..	..	271-00	422-71	..	..	835-00	1,851-74	..
Do. ..	607	Sweet William .. ..	..	41-87	387-50	515-78	..	41-87	533-50	648-32	..
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 .. ..	..	..	..	..	..	15-82	152-90	1,335-00	1,173-68
Do. ..	..	Sundry claims .. ..	..	..	421-00	236-66	..	148-00	4-32	1,760-50	959-08
Gullewa ..	744	Mugga King .. ..	..	..	215-00	199-32	..	..	215-00	199-32	..
Do. ..	..	Voided leases .. ..	..	..	..	..	..	..	21,679-50	14,334-31	..
Do. ..	..	Sundry claims .. ..	..	..	..	..	..	..	629-50	531-62	..
Kirkalucka ..	..	Sundry claims .. ..	..	..	..	..	..	..	8-80	4-01	..
Melville ..	..	Voided leases .. ..	..	..	..	..	..	..	14-37	2,716-50	1,420-76
Do. ..	..	Sundry claims .. ..	..	..	..	..	..	11-55	..	238-00	158-11

Messenger's Patch	(714)	Golden Acres							17-11				
Do.		Voided leases							298-88	587-20	305-89		
Do.		Sundry claims						463-12	273-45	304-30	181-28		
Mt. Farmer	(755)	Lindville			64-00	40-19				64-00	40-19		
Do.		Sundry claims								5-00	6-22		
Ninghan	722, 723	Golden Harp leases			3-00	356-55				3-00	356-55		
Noongal	728	Black Watch			23-00	6-46				23-00	6-46		
Do.	(672)	St. Michael			150-00	92-45			1-49	297-45	413-56		
Do.		Voided leases								50-00	6-88		
Do.		Sundry claims	34-23		10-00	3-43			34-23	10-00	3-43		
Nyounda		Voided leases							217-63	1,416-00	183-91		
Do.		Sundry claims								18-00	21-67		
Pinyalling	(743)	Golden Eagle								70-00	13-90		
Do.		Voided leases							1-36	2,211-60	888-13		
Do.		Sundry claims								42-50	22-14		
Rothsay		Voided leases								8,971-00	3,300-07		
Wadgingarra		Voided leases								541-61	600-91		
Do.		Sundry claims								71-50	38-21		
Warriedar	822	Golden Bar			44-00	22-23				44-00	22-23		
Do.	699	Iron Clad			439-50	128-69				477-50	141-14		
Do.	708	Mug's Luck			395-00	69-22				518-00	122-41		
Do.	731	Porcupine								23-00	4-45		
Do.	739	Porcupine South			76-00	14-37				81-00	16-99		
Do.	785	St. Patrick's Day			95-00	42-20				95-00	42-20		
Do.	727	Warriedar			100-00	30-26				145-00	75-47		
Do.		Sundry claims			82-00	58-95				82-00	58-95		
Yalgoo	(495)	(Ivanhoe)								6-00	5-98		
Do.	(495), (518)	Ivanhoe G.M. Co., N.L., Yalgoo			39-00	12-37				736-00	248-56		
Do.	(518)	(Ivanhoe Extended: Ivanhoe G.M. Co., N.L., Yalgoo)								123-00	41-69		
Do.	(782)	Onyx			270-00	24-39				270-00	24-39		
Do.		Voided leases							3-23	5,160-00	9,640-55		
Do.		Sundry claims			289-00	272-97			16-37	667-50	448-56		
Yuin	712, 735	Bullrush Gold Estates, N.L.			13,172-00	3,958-07	88-83			15,238-00	4,528-34	88-83	
Do.		Voided leases							127-12	31,381-50	14,957-04		
Do.		Sundry claims							4-70	276-50	57-88		
<i>From Goldfields generally:—</i>													
Sundry parcels treated at:													
		Field's Find Extended Treatment Works									71-44		
		Goodingnow (Payne's Find) State Battery			13-00	6-44				13-00	746-61		
		Tarrangower Works									293-00		
		Yuanmi G.M., Ltd., Works (Warriedar Options)				102-80	1-41				102-80	1-41	
		Various Works							9-42	664-00	1,039-45		
		Reported by Banks and Gold Dealers							663-01				
Total					138-00	18,240-50	8,703-88	90-24	1,310-92	1,582-10	143,786-14	95,488-76	93-54

TABLE IV.—Production of Gold and Silver from all sources, etc.—continued.

Mount Margaret Goldfield.

MOUNT MORGANS DISTRICT.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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.
Australia	..	Voided leases .. ..	..	..	..	..	..	1,911.63	15,913.69	23,305.76	1.76
United	..	..	..	..	..	..	..	272.61	781.55	2,029.33	..
Do.	..	Sundry claims .. ..	..	87.65	..	..	..	..	1,248.50	1,782.71	..
Federation Well	..	Voided leases .. ..	..	..	..	..	..	..	63.50	33.20	..
Do.	..	Sundry claims .. ..	..	..	..	..	..	..	..	..	..
Korong	..	Voided leases .. ..	..	..	..	..	17.95	72.23	2,722.00	3,473.45	..
Do.	..	Sundry claims .. ..	..	..	..	..	..	34.97	258.00	167.06	..
Mt. Margaret	314F	Mt. Morven .. ..	..	..	771.00	362.95	..	..	1,744.00	964.67	..
Do.	..	Voided leases .. ..	..	..	..	..	..	..	3,963.00	2,697.10	12.55
Do.	..	Sundry claims .. ..	..	..	..	..	16.61	44.03	365.50	281.86	..
Mt. Morgans	278F	Australian .. ..	..	..	..	..	..	..	71.50	19.99	..
Do.	6F	(Lily of the Valley South: Westralia Mt. Morgans G.M. Co., Ltd.)	..	..	..	..	..	..	1,587.50	808.18	..
Do.	6E	(Lily of the Valley South: Westralia Mt. Morgans Syndicate, Ltd.)	..	..	..	..	..	..	3,002.00	1,022.90	..
Do.	325F	Millionaire .. ..	..	..	144.00	486.40	..	..	144.00	486.40	..
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)	Westralia Mt. Morgans Mines, N.L. ..	..	..	26,994.00	6,416.81	..	..	42,821.00	10,278.54	..
Do.	..	Voided leases .. ..	..	..	..	..	..	76.56	33,966.25	20,174.80	77.86
Do.	..	Sundry claims .. ..	..	..	..	..	6.61	22.66	1,222.75	1,483.16	..
Murrin Murrin	..	Voided leases .. ..	..	..	..	..	10.43	222.93	127,364.72	100,606.89	29.60
Do.	..	Sundry claims .. ..	..	..	53.00	91.30	..	154.48	839.75	847.47	..
Redcastle	..	Voided leases .. ..	..	..	..	..	4.49	436.54	2,509.95	2,169.63	..
Do.	..	Sundry claims .. ..	..	..	..	..	..	103.58	139.00	163.01	..
<i>From District generally:—</i>												
Sundry parcels treated at:												
Mt. Morven Cyanide Works	129.48	..
Oratava Works—Kalgoorlie	14.16	..
Various Works	788.50	2,995.91	84.03	..
Reported by Banks and Gold Dealers			18.41	1,659.80	32.47
Total			18.41	87.65	27,962.00	7,357.46	..	1,716.26	3,384.69	834,925.66	478,821.63	5,758.43

MOUNT MALCOLM DISTRICT.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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.
Cardinia ..	..	Voided leases .. ..	..	..	..	..	..	..	1,568.29	1,628.24	3,550.42	..
Diorite King	(1449c)	Artful Dodger .. ..	..	..	66.00	89.90	..	..	..	137.75	369.27	..
Do.	1459c	King of the Hills .. ..	..	..	184.00	250.66	..	..	44.49	566.00	936.58	24.05
Do.	.. ..	Voided leases .. ..	..	..	..	..	..	..	774.66	32,412.78	29,243.48	..
Do.	.. ..	Sundry claims .. ..	..	..	..	..	..	..	65.50	2,310.30	2,810.22	..
Dodgers Well	(1317c)	Ivy .. ..	..	..	98.00	27.33	..	..	2.93	519.25	286.42	..
Do.	.. ..	Voided leases .. ..	..	..	..	..	..	..	54.97	780.05	1,641.52	..
Do.	.. ..	Sundry claims .. ..	..	..	66.00	82.63	..	..	3.37	786.25	644.95	..
Leonora ..	1473c	Auckland .. ..	..	..	135.00	55.96	..	..	..	226.50	82.22	..
Do.	(1447c)	Casino .. ..	..	..	..	..	..	..	7.66	350.00	520.84	..
Do.	198c	(Eastern) .. ..	..	..	..	..	..	..	..	302.00	321.72	..
Do.	(1360c)	Federal Mint .. ..	..	..	..	..	..	..	..	78.50	171.46	..
Do.	(1456c)	Harbour Lights .. ..	..	..	..	..	..	..	..	85.50	17.17	..
Do.	1482c	Leonora Gold Blocks .. ..	..	10.15	223.50	245.25	..	..	10.15	223.50	245.25	..
Do.	(195c), (196c)	Leonora Gold Blocks leases .. ..	..	..	..	38.65	..	..	..	17,207.00	14,587.42	..
Do.	1479c, 1480c	(Leonora Proprietary, Ltd.) .. ..	..	..	425.00	187.53	..	..	..	1,185.00	298.76	..
Do.	1479c, 1480c	Lloyd George G.M., Ltd. .. ..	..	..	600.00	110.80	..	..	..	600.00	110.80	..
Do.	(1413c)	Nil Desperandum .. ..	..	..	..	..	..	..	..	162.50	503.46	..
Do.	1485c	Ping Pong .. ..	..	..	39.00	85.28	..	..	..	39.00	85.28	..
Do.	(1216c)	Rajah .. ..	..	4.66	7.50	19.86	..	..	4.66	547.00	1,152.60	..
Do.	1486c	Rajah .. ..	..	48.72	36.00	162.31	..	..	48.72	36.00	162.31	..
Do.	190c, 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, 1223c, 1227c, 1228c, 1229c, 1230c, 1231c, 1232c, 1259c, 1291c, 1292c, 1341c, 1342c, 1343c, 1344c, 1345c, 1346c, 1347c	Sons of Gwalia, Ltd. .. ..	..	..	145,872.00	59,659.03	5,189.07	..	..	2,006,376.50	1,000,380.37	52,900.91

TABLE 4.—Production of Gold and Silver from all sources, etc.—continued.

Mount Margaret Goldfield—continued.

MOUNT MALCOLM DISTRICT—continued.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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.
Leonora	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.	(1453c)	Tiger	..	..	..	..	..	..	125.00	38.27	..
Do.	263c	(Trump)	..	..	..	..	..	..	562.50	2,393.40	..
Do.	263c	Trump: Gwalia Central G.Ms., Ltd.	..	..	97.00	236.83	..	..	530.00	2,065.23	..
Do.	263c, (774c), (793c)	(Trump leases)	..	..	..	..	..	..	21,794.45	16,002.07	..
Do.	(1307c)	Victor	..	56.25	..	1.91	..	921.07	452.55	674.52	..	
Do.	..	Voided leases	..	..	..	..	..	728.08	110,813.45	44,006.73	10.71
Do.	..	Sundry claims	..	126.50	331.00	1,006.57	..	171.56	8,240.55	7,373.71	..	
Malcolm	1175c	North Star: Malcolm Prospecting Co., N.L.	..	..	1,140.00	486.24	..	..	26,232.50	14,734.95	..
Do.	..	Voided leases	..	..	..	..	..	47.07	36,069.28	32,690.59	..
Do.	..	Sundry claims	..	2.24	164.00	28.30	..	8.88	2,932.40	2,054.66	..	
Mertondale	(638c), (644c), (645c), (648c), (653c), (1146c), (1178c)	(Merton's Reward G.M. Co., Ltd.)	..	..	..	..	..	..	75,476.50	37,151.80	1,497.58
Do.	(638c)	(Merton's Reward North)	..	..	..	..	..	..	11,396.50	20,033.09	..
Do.	(638c), (644c), (648c), (653c)	Merton's Reward North leases	..	..	..	278.75	..	..	503.00	2,716.60	..
Do.	..	Voided leases	..	..	..	..	..	..	1,287.00	938.51	..
Do.	..	Sundry claims	..	..	..	..	..	55.24	1,051.00	733.24	..

Mt. Clifford	1329c	..	..	Victory No. 1	..	..	..	21-00	162-74	..	..	..	641-46	5,822-22	..
Do.	..	..	..	Voided leases	..	..	..	..	..	..	..	1,364-45	3,265-50	6,996-22	..
Do.	..	..	..	Sundry claims	..	..	..	111-00	96-70	..	9-75	208-44	746-25	1,035-75	..
Pig Well	1295c	..	..	(Starlight)	..	..	..	..	..	..	..	..	181-50	695-73	..
Do.	1295c, 1324c, 1461c, 1475c	..	..	Starlight G.M. Syndicate, N.L.	..	..	..	151-00	151-44	..	..	..	151-00	151-44	..
Do.	1295c, 1324c	..	..	(Starlight leases)	..	..	..	..	..	..	..	..	75-50	235-87	..
Do.	..	..	..	Voided leases	..	..	..	..	..	..	..	..	12,982-07	13,538-20	63-68
Do.	..	..	..	Sundry claims	..	..	..	..	..	..	..	34-61	2,391-40	1,036-51	..
Randwick	1484c	..	..	Black Chief	..	..	..	4-00	8-03	..	..	..	4-00	8-03	..
Do.	1401c	..	..	Triangle	..	..	..	28-00	109-97	..	..	..	93-40	1,080-34	..
Do.	..	..	..	Voided leases	..	..	..	..	..	..	..	..	235-37	7,150-18	..
Do.	..	..	..	Sundry claims	..	..	..	..	..	..	66-57	105-66	1,246-35	890-24	..
Webster's Find	..	..	..	Voided leases	..	..	..	..	..	..	30-30	..	21,760-00	13,970-17	..
Do.	..	..	..	Sundry claims	..	..	..	..	..	..	36-37	15-73	1,365-30	916-47	..
Wilson's Creek	..	..	..	Voided leases	..	..	..	..	..	..	..	..	333-50	168-27	..
Do.	..	..	..	Sundry claims	..	..	..	..	..	..	..	4-24	5-00	19-04	..
Wilson's Patch	..	..	..	Voided leases	..	..	..	..	..	..	..	99-38	26,348-10	12,475-57	1-05
Do.	..	..	..	Sundry claims	..	..	..	..	..	..	..	1-50	638-00	354-85	..
<i>From District generally:—</i>															
Sundry parcels treated at:															
Fremantle Trading Co.'s Works 1-42															
King of the Hills Works 19-00															
North Star Battery 431-53															
Oratava Works—Kalgoorlie 15-90															
Richmond Gem Works 10-83															
State Battery—Leonora 66-15															
State Battery—Pig Well 95-50															
Various Works 22-00															
Reported by Banks and Gold Dealers 330-50															
Reported by Banks and Gold Dealers 98-30															
Reported by Banks and Gold Dealers 2,281-99															
Reported by Banks and Gold Dealers 131-00															
Total 98-30 248-52 149,799-00 63,648-82 5,189-07 2,424-98 6,717-68 2,553,432-38 1,381,140-39 54,624-90															

TABLE IV.—Production of Gold and Silver from all Sources, etc.—continued.

Mount Margaret Goldfield—continued.

MOUNT MARGARET DISTRICT.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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.
Burtville	1935T	Black Swan	..	..	44.00	89.11	..	..	..	567.00	953.52	50.97
Do.	(1952T)	Curiosity	..	..	..	..	..	1.50	..	70.00	25.50	..
Do.	1553T	Golden Bell	..	..	13.00	48.12	..	..	..	2,486.00	6,943.57	..
Do.	2021T	Joffre	..	..	64.00	73.12	..	..	..	64.00	73.12	..
Do.	1044T	Nil Desperandum	..	..	1,517.50	580.19	..	..	..	7,125.00	11,628.39	..
Do.	1885T	Nulla Nulla	..	..	39.00	49.39	..	..	22.20	422.00	492.90	..
Do.	1841T	Redeemed	..	..	153.00	215.48	..	..	221.97	992.00	1,264.35	..
Do.	(1993T)	Weneedit	..	..	9.00	21.13	..	..	..	9.00	21.13	..
Do.	..	Voided leases	..	..	..	..	..	2.29	128.78	52,088.18	78,593.51	224.30
Do.	..	Sundry claims	..	..	203.00	113.42	..	..	54.75	3,056.90	2,787.68	..
Duketon	(1989T)	Golden Spinifex	..	..	10.00	10.37	..	..	..	10.00	10.37	..
Do.	1938T	Great Dolorite No. 1	..	..	681.45	41.84	..	3.54	1,055.47	17.00	60.02	..
Do.	(1937T)	Limonite	..	..	23.44	65.73	..	..	432.15	123.00	279.85	..
Do.	2029T	Limonite	..	..	150.08	..	..	..	150.08	..	..	..
Do.	1990T	M. Iga Queen Consols	..	..	403.00	566.80	..	..	..	583.00	757.68	..
Do.	..	Voided leases	..	..	..	..	..	..	110.53	30,452.00	20,619.81	..
Do.	..	Sundry claims	..	..	4.33	68.00	95.75	..	19.00	186.50	259.95	..
Eagles' Nest	..	Voided leases	..	..	..	..	..	..	145.34	331.00	1,215.78	..
Do.	..	Sundry claims	..	..	15.00	3.44	..	..	..	70.00	45.65	..
Erlistoun	..	Voided leases	..	..	..	..	..	..	11.66	27,012.07	18,461.35	..
Do.	..	Sundry claims	..	..	9.00	6.06	..	1,175.43	116.81	2,118.90	1,815.75	..
Euro	1984T	Lone Star	..	..	2,310.00	570.06	..	..	..	2,310.00	570.06	..
Do.	..	Voided leases	..	..	..	..	..	..	65.14	83,964.25	35,957.12	..
Do.	..	Sundry claims	..	..	34.00	22.04	..	..	..	243.00	109.31	..
Laverton	371T	(Augusta)	..	..	..	..	..	..	..	11,216.00	11,670.72	..
Do.	371T	(Augusta : Golden Rhine G.Ms. (W.A.), Ltd.)	..	..	..	..	..	..	..	15,497.50	11,031.75	..
Do.	371T, 1650T	(Augusta G.M. Co., N.L.)	..	..	..	..	..	..	..	1,753.00	2,037.66	..
Do.	371T, 1650T	Augusta G.M. Co., N.L.	..	..	2,046.00	690.72	..	17.66	..	4,635.00	1,466.74	..
Do.	1918T	Bega	..	..	6.00	46.42	..	..	66.52	95.00	384.94	..
Do.	1999T	British Flag	..	..	343.21	139.25	925.18	..	343.21	139.25	925.18	..
Do.	1979T, 1985T	British Lion Gold Mines, N.L.	..	..	275.00	42.58	..	..	..	275.00	42.58	..

Do.	1985r	(British Lion South)			49-00	18-00				95-50	38-83	
Do.	(1957r)	Bulldog			16-50	28-05				34-50	44-57	
Do.	2028r	Bulldog			132-00	183-34				132-00	183-34	
Do.	838r	(General Wabash)								100-00	288-72	
Do.	829r	(Ida H.)								111-00	285-13	
Do.	829r, 838r, 846r, 1219r, 1310r, 1671r, 1894r,	Ida H. G.M. Co., Ltd.			14,747-00	10,778-91				199,231-00	147,793-13	4,674-69
Do.	715r, 806r, 1206r, 1207r, 1483r, 1523r, 1524r, 1525r, 1542r, 1544r, 1548r	Kalgoorlie and Boulder Firewood Co., Ltd.			39,746-00	14,062-33	2,083-77			50,723-00	17,017-30	2,500-95
Do.	1897r	(Lady Harriet)								991-00	98-94	
Do.	715r, 806r, 1206r, 1207r, 1483r, 1523r, 1524r, 1525r, 1542r, 1544r, 1548r	(Lancefield G.M. Co., Ltd.)								102,179-78	39,402-81	
Do.	715r, 806r, 1206r, 1207r, 1483r, 1523r, 1524r, 1525r, 1542r, 1544r, 1548r	(Lancefield G.M. Co., Ltd.)								153,829-00	58,842-47	5,824-39
Do.	715r, 806r, 1206r, 1207r, 1483r, 1523r, 1524r, 1525r, 1542r, 1544r, 1548r	(Lancefield G.M. Co., Ltd.)								260,749-00	103,535-54	21,612-29
Do.	1897r, 1900r, 1948r, 1950r, 1962r, 1974r, 1996r, 1997r	Mary Mac G.M. Co., N.L.			14,925-00	2,682-57				23,170-00	5,934-57	
Do.	1949r	Pinnacles								96-00	36-51	
Do.	2036r	Queen Mary			88-00	15-26				88-00	15-26	
Do.		Voided leases							1,313-80	146,454-10	51,364-33	
Do.		Sundry claims	2-79	254-68	554-50	416-06		46-35	1,075-03	3,481-20	3,124-46	
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				27-00	13-76	
<i>From District generally :-</i>												
Sundry parcels treated at :												
		Brown Hill Consols Works—Kalgoorlie									13-70	
		Craiggimore Works									110-28	
		Mulga Queen Works									140-39	
		State Battery—Burtville					323-45			62-00	6,422-71	
		State Battery—Laverton					821-18			49-50	1,562-02	
		Various Works								89-00	2,944-94	
		Reported by Banks and Gold Dealers	24-01					1,917-61				
		Total	26-80	1,457-19	77,662-75	33,619-86	2,083-77	3,162-88	5,333-94	1,190,289-13	650,106-00	34,887-59

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 1915.					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 ..	..	..	8,121.00	5,594.43	274.28	..	..	40,920.00	30,081.50	974.42
Do. ..	5300z	(Happy Jack)	..	..	..	..	..	..	..	1,363.50	776.10	..
Do. ..	5300z, 5325z	Happy Jack leases ..	..	..	1,222.00	449.30	..	..	..	7,294.50	3,790.42	..
Do. ..	5325z	(Iron King)	..	..	..	..	..	..	..	41.50	20.62	..
Do. ..	5410z	Lake View ..	..	..	67.50	20.99	..	..	..	186.82	74.11	..
Do. ..	5312z	(Sand King)	..	..	..	..	..	..	..	35.50	30.33	..
Do. ..	5211z	(Sand Queen)	..	..	..	..	..	..	..	3,436.75	3,639.12	2.00
Do. ..	(5208z), 5211z	(Sand Queen G.Ms., Ltd.)	..	..	..	..	..	..	..	6,803.50	2,949.83	..
Do. ..	5224z, 5320z	..	..	..	..	..	..	..	..	..	..	..
Do. ..	5211z, 5224z, 5312z, 5320z	Sand Queen G.Ms., Ltd.	..	..	22,382.00	20,560.28	526.00	..	..	30,428.62	72,279.55	652.79
Do. ..	..	Voided leases ..	..	..	..	..	..	..	409.70	9,960.60	5,513.14	2.00
Do. ..	..	Sundry claims ..	..	..	27.00	23.94	..	..	31.91	614.75	423.69	..
Goongarrrie ..	5414z	New Boddington	..	191.83	75.80	132.15	..	..	191.83	153.00	318.60	..
Do. ..	..	Voided leases ..	..	..	..	..	..	..	.94	446.13	14,905.29	9,878.41
Do. ..	..	Sundry claims ..	..	..	..	..	..	27.93	107.51	755.85	612.16	..
Menzies ..	5354z	Balkis ..	..	..	..	..	..	..	..	2,615.25	2,370.59	..
Do. ..	5409z	Black Jack ..	..	..	65.00	53.55	..	..	..	462.25	210.52	..
Do. ..	(5418z)	Bonnie Eileen ..	..	..	34.50	55.40	..	..	..	148.25	141.30	..
Do. ..	(5383z)	Brittania ..	..	..	28.00	2.65	..	..	..	214.50	192.40	..
Do. ..	(5411z)	Confidence ..	..	..	20.00	8.36	..	..	..	328.75	264.71	..
Do. ..	5377z	Coronation ..	..	..	105.25	43.50	..	..	..	671.25	554.65	..
Do. ..	(5415z)	Flying Fish ..	..	..	44.50	62.07	..	..	..	115.00	216.37	..
Do. ..	5416z	Flying Fish South	..	..	436.25	321.99	..	..	..	500.25	371.43	..
Do. ..	(5413z)	Gaeta ..	..	..	..	..	..	..	..	83.50	78.33	..
Do. ..	5420z	Goodenough ..	..	..	37.25	29.67	..	..	..	37.25	29.67	..
Do. ..	5302z	Lady Harriet ..	..	1.41	110.00	16.95	..	..	6.15	3,738.00	3,829.00	..
Do. ..	5424z	Lady Martha ..	..	..	77.00	103.59	..	..	..	77.00	103.59	..
Do. ..	5423z	Lady Shenton ..	..	..	773.00	638.54	..	..	..	1,122.75	769.24	..
Do. ..	4931z, 4934z, 4935z, 4936z, 5074z, 5075z, 5260z, 5261z, 5315z	Menzies Consolidated G.Ms., Ltd.	..	..	28,614.00	14,788.37	..	..	..	335,971.00	180,714.58	78.67

Do.	(2832z), (2844z), (3100z), (3138z), (4966z), 5392z	Menzies Mining and Exploration Corporation, Ltd.	..	..	275.25	153.56	..	..	..	26,139.25	29,809.41	..
Do.	5359z	No Name	..	..	124.00	28.89	..	..	..	1,163.00	496.40	..
Do.	5392z	(Revival)	..	..	..	..	..	..	..	22.50	5.90	..
Do.	2823z	Robinson Crusoe	..	..	354.75	153.31	..	..	13.24	3,569.25	1,791.16	..
Do.	2823z	(Robinson Crusoe: Crusoe Gold Claims, Ltd.)	..	..	..	..	..	..	..	33,135.00	32,978.74	1,038.47
Do.	5318z	Surprise	..	..	10.00	5.85	..	..	480.50	318.25	918.40	..
Do.	(3048z)	Warrior	..	..	..	..	..	..	..	111.50	21.32	..
Do.	(3048z), (5336z)	Warrior leases	..	..	..	..	..	..	..	8,099.00	4,733.00	5.00
Do.	(3048z)	(Warrior: Menzies GM. Co., N.L.)	..	..	..	..	..	..	..	1,165.00	731.48	..
Do.	..	Voided leases	..	..	..	..	..	45.42	548.82	286,529.46	341,022.80	10,219.59
Do.	..	Sundry claims	..	3.00	655.75	1,744.58	..	6.69	346.61	15,641.25	10,398.75	..	
Mt. Ida	(5307z)	(Copperfield)	..	..	..	..	..	..	..	120.00	24.89	..
Do.	(5307z)	Copperfield	..	..	572.00	97.08	..	..	..	2,603.00	1,790.76	..
Do.	(5306z), (5307z)	(Copperfield leases)	..	..	..	..	..	..	..	158.00	89.34	..
Do.	(5035z)	Federation	..	..	132.00	56.56	..	..	..	2,006.00	4,904.33	..
Do.	5250z	Forest Belle	..	..	372.00	286.95	..	..	..	4,184.00	3,720.95	..
Do.	(5243z), (5321z), (5322z), (5341z), (5355z)	(Mt. Ida Meteor leases)	..	..	..	..	..	..	..	9,472.00	7,148.80	39.00
Do.	(5243z), (5321z)	Mt. Ida Meteor leases	..	..	..	..	..	..	..	896.00	1,159.89	..
Do.	5382z	Mt. Ida West	..	..	..	..	..	..	..	398.00	611.78	..
Do.	(5321z)	(Timoni)	..	..	..	..	..	..	..	20.00	36.62	..
Do.	5177z	Unexpected	..	..	228.00	43.27	..	..	..	4,965.00	8,642.37	..
Do.	5290z	Unexpected South	..	..	348.00	47.11	..	..	..	1,122.00	702.78	8.25
Do.	5290z, (5329z), (5381z)	(Unexpected South leases)	..	..	..	..	..	..	..	4,524.00	8,179.29	35.64
Do.	5292z	Wild Rose	..	..	153.00	85.20	..	..	..	1,002.00	821.00	..
Do.	..	Voided leases	..	..	..	..	..	77.07	..	23,661.58	28,541.69	23.74
Do.	..	Sundry claims	..	..	170.00	66.84	..	..	9.57	3,929.50	2,537.77	..
<i>From District generally:—</i>													
Sundry parcels treated at:													
	Balkis Battery	..	..	..	33.25	506.69	..	..	..	33.25	2,308.23	..
	Crusoe Wedderburn Cyanide Works	..	..	..	..	346.54	..	..	..	..	1,319.68	..
	Fremantle Trading Co., Ltd.	..	..	..	..	..	..	..	..	..	212.98	..
	Lady Harriet Battery	..	..	..	32.00	595.58	..	..	..	94.50	1,447.83	..
	Menzies Mining and Exploration Corporation, Ltd., Works	..	..	..	..	..	..	..	..	639.50	732.04	..
	Menzies Residue Plant	..	..	..	..	..	..	..	..	..	120.22	..
	Mt. Ida Cyanide Works	..	..	..	..	..	..	..	..	..	3,323.96	..
	Mt. Ida Meteor Works	..	..	..	..	765.09	..	..	..	..	1,856.04	..
	State Battery—Menzies	..	..	..	..	998.40	430.00	..	..	1,043.50	15,128.71	916.50
	State Battery—Mt. Ida	..	..	..	9.00	12.77	..	..	..	1,842.25	4,484.34	..
	Various Works	..	..	..	..	..	..	..	..	763.55	3,152.49	122.93
	Reported by Banks and Gold Dealers	..	..	..	..	..	..	891.10	195.48	..	..	..
	Total	196.24	65,709.05	48,900.00	1,230.28	972.08	2,864.85	963,235.77	854,818.26	14,214.29

TABLE IV.—Production of Gold and Silver from all sources, etc.—continued.

North Coolgardie Goldfield—continued.

ULARRING DISTRICT.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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.
Davyhurst	(959v)	Expansion	..	..	313.00	43.85	..	..	..	2,108.00	330.83	..
Do.	(924v)	Golden Eagle	..	..	148.25	43.73	..	..	..	196.50	62.10	..
Do.	459v	(Golden Pole)	..	..	..	..	..	..	..	34.00	47.51	..
Do.	459v	Golden Pole	..	..	161.50	110.58	..	..	..	161.50	110.58	..
Do.	459v, (461v), (468v), (786v), (873v)	(Golden Pole G.Ms., Ltd.)	..	..	..	..	..	..	..	74,110.90	71,961.09	..
Do.	459v, (461v), (468v)	(Golden Pole G.Ms., Ltd.)	..	..	..	..	..	..	..	3,344.00	2,298.79	..
Do.	459v, (461v), (468v), (484v)	(Golden Pole G.Ms., N.L.)	..	..	..	..	..	..	..	970.00	2,321.69	..
Do.	(613v), (834v), (857v), (864v), (878v), (907v), (924v)	(Great Ophir Gold Corporation, Ltd.)	..	..	..	..	..	..	..	3,342.00	468.57	..
Do.	882v	(Lady Ellen)	..	..	24.00	17.10	..	..	20.33	824.25	1,201.89	..
Do.	882v, 965v	Lady Ellen leases	..	..	19.00	8.97	..	..	..	19.00	8.97	..
Do.	(907v)	North Pole	..	..	..	..	..	..	..	39.75	9.89	..
Do.	(438v)	(Waihi)	..	..	..	..	..	..	4.51	243.50	851.09	..
Do.	(438v)	Waihi	..	..	61.25	105.29	..	..	..	473.00	1,109.25	10
Do.	(438v)	(Waihi: Westralia Waihi G.Ms., N.L.)	..	..	..	..	..	..	..	1,437.00	1,526.94	58.90
Do.	(438v)	(Waihi: Westralia Waihi G.Ms., N.L.)	..	..	..	..	..	..	..	686.50	465.60	..
Do.	(907v), (924v)	(Westralia United Goldfields, Ltd.)	..	..	..	..	..	..	..	1,471.75	814.49	..
Do.	(438v), (792v)	(Westralia Waihi G.Ms., N.L.)	..	..	..	..	..	..	2.93	26,192.00	15,004.51	5,225.54
Do.	..	Voided leases	..	..	..	..	..	..	114.15	31,032.08	23,665.56	118.60
Do.	..	Sundry claims	..	..	164.50	123.61	..	..	30.12	5,298.35	2,859.11	..
Diemel's Find	..	Sundry claims	..	..	..	..	..	..	7.37	102.50	119.13	..
Mulline	955v	Belle Maie	..	..	53.25	61.83	..	..	..	137.25	296.66	..
Do.	139v, 235v, 555v, (670v), (671v), (679v), (732v), (862v)	(Lady Gladys's G.M. Co., N.L.)	..	..	..	..	..	..	..	16,871.50	17,777.42	..
Do.	139v, 235v, 555v, (670v)	(Lady Gladys's G.M. Co., N.L.)	..	..	..	..	..	..	..	1,220.50	512.52	..
Do.	139v, 235v, 555v	(Lady Gladys leases)	..	..	..	..	..	..	170.89	7,741.00	15,025.05	..
Do.	139v, 235v, 555v, (670v)	Lady Gladys leases	..	..	192.00	96.06	..	..	..	883.25	428.41	..

Do.	(960u)	Peach Tree	33-00	12-40				103-75	90-13		
Do.	123u	Riverina	655-00	155-55				6,552-00	3,438-67		
Do.	123u, (773u)	(Riverina G.M. Co., N.L.)						11,254-00	7,096-21		
Do.	324u, 600u, 760u	Riverina South leases	1,016-00	602-31			43-87	17,780-50	13,196-86		
Do.	763u	Young Australian	91-75	152-52				144-25	206-85		
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	21,646-97	23,021-26	2-71	
Do.		Sundry claims	402-25	310-88			35-53	4,812-50	4,079-90	69	
Mulwarrie	(966u)	Great Britain	41-50	17-05				66-00	25-44		
Do.	919u	Mulwarrie	39-50	30-53				627-50	392-15		
Do.	(967u)	Mulwarrie Main Reef	49-00	51-53				88-75	80-98		
Do.		Voided leases					56-84	17,486-89	24,924-26	26-37	
Do.		Sundry claims	85-00	105-02			19-24	1,938-75	1,641-30		
Ularring	954u	Cardinal	104-25	189-83	2-96			328-75	397-27		
Do.		Voided leases					526-63	8,963-85	13,051-86		
Do.		Sundry claims						143-00	113-15		
<i>From District generally :-</i>											
Sundry parcels treated at :											
Expansion Battery			64-50	105-37				64-50	143-68		
Golden Pole Battery				23-26					265-78		
Oratava Works—Kalgoorlie									54-39		
State Battery—Mulline			11-25	12-53				494-00	12,521-49		
State Battery—Mulwarrie				91-34				595-20	3,474-85		
Various Works							15-82	90-25	145-55		
Reported by Banks and Gold Dealers						18-53	77				
Total			2-96	3,729-75	2,471-14		21-46	1,116-68	276,088-74	277,012-82	5,432-91

NIAGARA DISTRICT.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					TOTAL PRODUCTION.				
			Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.	Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.
			Fine ozs.	Fine ozs.	Tons (2,240lbs.)	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Tons (2,240lbs.)	Fine ozs.	Fine ozs.
Desdemona	(725c)	Hawk			73-00	36-53			377-50	565-41		
Do.		Voided leases						5-73	9,207-75	6,905-98	12-04	
Do.		Sundry claims						8-99	1,331-70	634-19		

TABLE IV.—Production of Gold and Silver from all sources, etc.—continued.

North Coolgardie Goldfield—continued.

NIAGARA DISTRICT—continued.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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.
Kookynie	320g	Champion	..	..	49.00	160.25	..	..	..	20,230.00	9,884.93	2.28
Do.	320g	(Champion: Champion Proprietary, Ltd.)	..	..	..	..	..	..	..	36,310.00	18,381.09	425.32
Do.	320g, (347g), (335g)	(Champion leases)	..	..	..	..	..	..	..	2,157.50	2,554.15	..
Do.	320g, (347g), (335g)	(Champion leases: Guthrie & Co., Ltd.)	..	..	..	..	..	..	..	2,705.00	1,556.16	..
Do.	756g	(Cosmopolitan No. 1: Cosmopolitan Proprietary, Ltd.)	..	..	..	..	..	..	..	578.00	793.00	..
Do.	756g	Cosmopolitan No. 1: Western Machinery Co., Ltd.	..	..	91.00	113.13	..	..	..	206.00	217.23	..
Do.	757g	(Cosmopolitan No. 2: Cosmopolitan Proprietary, Ltd.)	..	..	..	..	..	..	..	710.00	909.66	..
Do.	757g	Cosmopolitan No. 2: Western Machinery Co., Ltd.	..	..	1,157.00	1,709.26	..	..	..	1,527.00	2,113.27	..
Do.	..	Voided leases	..	..	..	..	..	..	257.33	666,943.97	349,511.68	4,948.37
Do.	..	Sundry claims	..	..	53.00	28.13	..	30.59	74.79	3,927.50	3,938.66	..
Niagara	(419g), (461g)	(Hannan's Main Reefs G.M. Co., Ltd.)	..	..	..	..	..	..	..	11,119.00	5,910.89	..
Do.	768g	Justice Extended	..	..	37.50	34.30	..	..	..	37.50	34.30	..
Do.	(734g)	(Lubra Queen)	..	..	..	..	..	..	..	831.00	285.51	..
Do.	(734g), (744g), (749g), (735g)	Lubra Queen G.M. Co., N.L.	..	..	..	195.11	..	..	..	4,490.00	1,981.70	..
Do.	(734g), (735g)	(Lubra Queen leases)	..	..	..	..	..	..	..	1,230.00	966.71	..
Do.	(419g)	(Opal)	..	..	..	..	..	..	..	552.50	490.53	..
Do.	(419g)	(Opal: Hannan's Main Reefs G.M. Co., Ltd.)	..	..	..	..	..	..	..	119.00	70.99	..
Do.	(419g), (461g), (679g), (688g), (689g), (705g)	Orion Mines, Ltd	..	..	28.00	9.89	..	..	..	24,772.25	12,353.90	..
Do.	(461g)	(Pearl: Hannan's Main Reef G.M. Co., Ltd.)	..	..	..	..	..	..	..	398.00	224.38	..
Do.	..	Voided leases	..	..	..	..	..	..	104.54	40,506.25	29,315.40	..
Do.	..	Sundry claims	..	23.26	372.75	332.41	..	13.27	70.23	8,736.25	5,435.72	..
Tampa	(278g)	(Fortuna)	..	..	..	..	..	..	..	109.00	187.42	..
Do.	(278g)	Fortuna	..	..	40.00	30.19	..	..	..	70.00	57.25	..
Do.	(278g), (349g)	(Fortuna leases)	..	..	..	..	..	..	..	1,763.50	2,371.95	..
Do.	(753g), (754g), (759g), (760g)	Golden Butterfly G.M. Co., N.L.	..	..	..	..	..	..	..	31,379.32	7,808.27	174.24
Do.	..	Voided leases	..	..	..	..	..	..	15.66	15,950.05	11,748.91	..
Do.	..	Sundry claims	..	..	271.50	117.50	..	5.07	4.37	2,786.00	1,521.84	..

From District generally :-															
Sundry parcels treated at :															
Grafter Battery	24.50	..	..	..	82.00	295.78	..			
State Battery—Niagara	312.17	..	..	..	622.50	8,585.89	..			
Various Works	451.00	6,356.43	41.17			
Reported by Banks and Gold Dealers	28.50	..	..	1,396.91	787.38	..	..	
Total	28.50	23.26	2,172.75	3,103.37	..	1,445.84	1,329.02	892,217.04	493,969.18	5,603.42

YERILLA DISTRICT.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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.
Edjudina	994R	Digger	..	..	42.50	51.28	..	..	..	97.50	76.06	..
Do.	1018R	Neta Extended	..	..	108.50	101.96	..	..	..	277.75	338.88	..
Do.	1010R, 1011R	Neta leases	..	..	126.50	66.74	..	..	..	246.00	165.20	..
Do.	1015R	Senate	..	..	207.00	263.44	..	..	..	391.00	356.57	..
Do.	1026R	Two Jacks	..	..	166.50	42.52	..	..	..	166.50	42.52	..
Do.	..	Voided leases	..	..	..	..	..	..	14.06	29,213.59	38,860.01	37.79
Do.	..	Sundry claims	..	8.20	70.50	61.37	..	..	21.26	2,601.50	2,173.06	..
Encalyptus	..	Voided leases	..	..	..	..	..	..	2,864.77	1,351.35	3,020.68	..
Do.	..	Sundry claims	..	..	..	..	..	..	367.50	362.50	381.82	..
Linden	(1025R)	Andy Fisher	..	..	38.50	52.96	..	..	..	148.20	169.30	..
Do.	998R	Bindah	..	..	39.00	14.98	..	..	..	1,462.50	531.95	..
Do.	(965R)	Danube	..	..	29.50	19.75	..	..	..	803.00	874.12	..
Do.	871R	Democrat	..	..	134.50	389.56	..	..	..	9.01	1,960.25	4,354.18
Do.	(1019R)	Edna	..	..	20.00	25.74	..	..	..	..	51.25	48.06
Do.	1024R	Great Carbine	..	..	44.25	7.93	..	..	..	..	67.75	20.30
Do.	942R	Great Junction	..	..	95.00	105.85	..	..	6.11	984.75	914.30	..
Do.	971R	Linden Star	..	..	27.00	77.21	..	..	22.00	157.75	222.72	..
Do.	1005R	Olympic	..	..	229.25	555.86	..	..	..	266.25	573.79	..
Do.	1036R	Reward	..	..	54.00	45.06	..	..	..	54.00	45.06	..
Do.	903R, (904R), 985R, (992R)	Westralia United Goldfields, Ltd.	..	..	..	..	..	..	..	1,995.00	1,452.42	..
Do.	..	Voided leases	..	..	..	..	..	..	7.53	516.04	10,625.90	13,355.37
Do.	..	Sundry claims	..	..	323.00	387.78	..	..	77.81	35.11	6,068.00	4,443.52
Mt. 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	..

TABLE IV.—Production of Gold and Silver from all sources, etc.—continued.

North Coolgardie Goldfield—continued.

YERILLA DISTRICT—continued.

MINING ENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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.
Pinjin.	729R	Anglo Saxon	..	..	201·00	129·67	..	..	6,313·90	5,213·88	..
Do.	..	Voided leases	..	..	..	..	..	46·99	7,961·90	4,895·04	..
Do.	..	Sundry claims	..	..	27·50	13·44	..	99·36	3,235·35	2,160·50	..
Yarri	(788R)	Dostmund	..	..	8·00	7·87	..	..	838·00	1,679·35	2·00
Do.	947R	Dostmund West	..	..	..	..	..	..	467·00	633·60	..
Do.	(999R)	Wallaby Central	..	..	..	..	..	..	845·50	147·08	..
Do.	581R	Yarri Proprietary	..	..	1,196·00	130·83	..	41·36	12,407·50	4,289·14	..
Do.	..	Voided leases	..	..	..	..	..	6·30	45·72	21,952·75	12,298·58
Do.	..	Sundry claims	..	2·00	448·00	242·45	..	..	5·31	5,042·60	2,665·75
Yerilla	(850R)	(Central East)	..	..	..	..	..	..	244·00	166·12	..
Do.	(1020R)	Melba	..	..	44·00	17·55	..	..	50·00	22·29	..
Do.	(752R), (850R)	Viola leases	..	..	..	..	..	..	9·64	2,164·00	1,958·48
Do.	(851R)	Yerilla King	..	..	..	..	..	..	..	5,896·75	4,419·03
Do.	..	Voided leases	..	..	..	..	..	..	3,079·87	7,264·46	5,747·14
Do.	..	Sundry claims	..	..	185·00	88·31	..	19·30	15·88	2,226·00	1,250·06
Yilgantie	..	Voided leases	..	..	..	..	..	..	..	218·75	295·45
Do.	..	Sundry claims	..	..	..	..	..	121·67	29·83	25·50	46·17
Yundamindera	(931R)	Battles Ville	..	..	..	..	..	..	..	2,481·50	639·88
Do.	(1030R)	Brown Hill	..	9·10	..	..	..	..	9·10	..	..
Do.	(979R)	Potosi	..	..	..	..	..	..	..	41·00	94·53
Do.	..	Voided leases	..	..	..	..	..	..	71·37	66,010·10	44,750·25
Do.	..	Sundry claims	..	..	416·50	518·00	..	..	85·22	2,777·50	2,430·80
<i>From District generally:—</i>												
Sundry parcels treated at:												
Battles Ville Battery											302·46	
Fremantle Trading Co.'s Works											4·92	
Neta Battery											286·08	
Pinjin Cyanide Works											535·63	
State Battery, Linden											72·00	
State Battery, Pinjin											3,968·14	
State Battery, Yarri											125·50	
State Battery, Yerilla											231·50	
Various Works											72·00	
Reported by Banks and Gold Dealers			2·07						2·17		1,212·52	
											660·85	
									1,003·97		3,463·41	
									154·74		..	
Total			2·07		4,281·50		4,766·38		1,238·75		7,567·99	
											209,529·92	
											183,502·00	
											63·04	

Broad Arrow Goldfield.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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	1770w	Canopus	..	..	162.00	37.93	..	..	..	162.00	37.93	..
Do.	1756w	Gabatepe	..	..	76.85	94.53	..	..	..	76.85	94.53	..
Do.	1773w	Hillside	..	49.09	11.50	33.37	..	..	49.09	11.50	33.37	..
Do.	1743w	Zoroastrian	..	..	30.57	21.59	..	..	..	48.14	58.59	..
Do.	..	Voided leases	..	..	..	..	..	..	256.68	72,732.23	50,743.17	203.60
Do.	..	Sundry claims	..	119.11	200.83	231.50	..	..	299.81	2,780.80	2,062.98	..
Black Flag	(1752w)	Lady Bountiful	..	..	10.06	2.77	..	..	..	10.06	2.77	..
Do.	(1751w)	Wanderer	..	..	13.50	3.05	..	..	..	13.50	3.05	..
Do.	..	Voided leases	..	..	..	..	..	27.81	373.99	40,074.32	24,377.10	..
Do.	..	Sundry claims	..	11.00	..	..	..	686.51	165.78	1,913.26	1,786.09	..
Broad Arrow	1744w	Arrow Star	..	75.28	14.16	49.54	..	..	83.27	22.41	163.15	..
Do.	(1636w)	Eldorado	..	..	..	..	..	..	309.99	34.35	83.10	..
Do.	1771w	North Duke	..	29.78	..	..	..	..	29.78	..	..	..
Do.	1772w	Oversight	..	682.80	..	..	..	..	682.80	..	..	..
Do.	1707w	Pearl	..	..	8.70	6.91	..	..	18.61	44.80	47.14	..
Do.	1735w	Tara	..	..	42.00	144.08	..	..	..	114.60	562.86	..
Do.	1745w	Yellow Jacket	..	..	358.45	168.54	..	..	..	506.45	245.62	..
Do.	..	Voided leases	..	..	..	..	..	54.85	817.21	116,414.18	95,084.61	15.85
Do.	..	Sundry claims	..	..	149.62	108.72	..	967.96	1,072.93	6,909.65	4,657.00	..
Paddington	(1740w)	Indarra	..	..	..	..	..	..	..	14.55	5.14	..
Do.	1733w	Mount Eddy	..	..	..	..	..	..	..	67.50	409.21	..
Do.	1747w	Mt. Eddy Extended	..	..	78.40	52.76	..	..	..	114.65	125.31	..
Do.	(1658w)	Star of W.A.	..	..	40.00	60.17	..	..	..	222.15	469.90	..
Do.	..	Voided leases	..	..	..	..	..	5,557.72	257.75	173,252.17	80,769.93	18.96
Do.	..	Sundry claims	..	..	408.75	213.10	..	1,714.16	..	10,051.48	6,455.59	..
Siberia	1399w, 1424w, 1429w, 1442w, 1655w	Associated Northern Blocks (W.A.), Ltd.	..	..	39,599.00	14,531.50	765.40	..	..	163,118.09	49,461.52	1,664.70
Do.	1722w	Bonnie Doon	..	..	36.50	75.01	..	..	..	72.75	131.36	..
Do.	1739w	Gimlet Consols	..	..	..	..	..	..	..	24.00	3.02	..
Do.	1748w	Gimlet Duke	..	..	133.50	20.23	..	..	..	133.50	20.23	..
Do.	1371w	Gimlet South	..	..	15,145.00	2,023.56	..	..	..	53,524.50	9,803.15	..
Do.	1399w	(Gimlet South Extended)	..	..	..	..	..	..	..	525.00	835.44	..
Do.	1399w, 1424w, 1429w, 1442w	(Gimlet South Extended leases)	..	..	..	..	..	..	..	215.00	39.98	..
Do.	1338w	(Gimlet West)	..	..	..	..	..	..	..	680.50	482.83	..
Do.	(1286w), 1403w	Golden leases	..	..	..	..	..	..	374.82	205.73	538.82	..
Do.	1358w	Golden Mount	..	..	86.00	19.94	..	..	4.26	1,759.50	987.35	..
Do.	(1644w), (1673w)	Home Signal G.M. Syndicate, N.L.	..	..	..	..	..	..	..	12.00	15.59	..
Do.	(1434w)	Jack Hugh	..	..	..	..	..	..	44.41	176.00	653.23	..

TABLE IV.—Production of Gold and Silver from all sources, etc.—continued.

Broad Arrow Goldfield—continued.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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.
Siberia	1289w, 1308w	Lady Evelyn leases	..	..	1,009·00	1,608·74	..	..	25·26	4,693·25	4,821·01	..
Do.	(1737w)	Lorna Doon	..	2·59	..	..	..	7·89	17·75	11·80	..	..
Do.	(1746w)	May Day	..	..	..	..	..	..	5·50	9·50	..	..
Do.	1293w	Mexico	..	..	35·00	20·34	..	..	..	249·50	285·24	..
Do.	1293w, (1298w)	(Mexico leases)	..	..	..	..	..	..	..	457·00	999·75	..
Do.	1403w	Nuggety Hill	..	..	65·50	19·98	..	..	..	65·50	19·98	..
Do.	1736w	Pole	..	..	..	..	..	..	..	60·00	15·62	..
Do.	1375w	(Siberia Consols)	..	..	..	..	..	41·58	1,013·50	3,136·03	..	..
Do.	1375w, (1610w), (1720w)	Siberia Consols G.M. Co., N.L.	..	39·23	117·50	366·09	..	39·23	352·50	598·52	..	..
Do.	1336w	(Slippery Gimblet)	..	..	..	..	..	..	26,110·50	8,217·79	..	..
Do.	1336w, 1338w, (1419w)	Slippery Gimblet leases	..	..	704·00	318·44	..	..	4,697·00	1,774·52	..	..
Do.	(1741w)	Victorious Extended	..	..	415·50	29·36	..	..	..	415·50	29·36	..
Do.	(1683w)	Waverley	..	35·69	165·75	85·48	..	..	35·69	165·75	85·48	..
Do.	..	Voided leases	..	..	..	..	..	..	168·21	19,384·68	8,189·89	..
Do.	..	Sundry claims	..	..	580·50	502·93	..	126·49	405·10	5,183·52	5,755·11	..
Smithfield	..	Voided leases	..	..	..	..	..	..	..	1,027·00	200·90	..
Do.	..	Sundry claims	..	..	..	..	..	..	23·79	49·50	149·47	..
<i>From Goldfield generally :—</i>												
Sundry parcels treated at :												
Allsop and Howell's Works—Kalgoorlie			..	..	..	..	..	..	..	..	6·70	271·76
Brown Hill Consols Works—Kalgoorlie			..	..	..	..	..	..	..	38·99	15·32	..
Duke Cyanide Works			..	..	..	..	..	..	..	..	5·25	..
Fremantle Trading Co., Ltd., Works			..	..	..	..	..	..	..	..	80·10	..
Hannans Central Works—Kalgoorlie			..	..	..	..	..	..	..	8·70	15·47	..
Northey's Venture Works			..	..	..	..	..	..	..	..	613·24	..
Oratava Works—Kalgoorlie			..	..	..	..	..	..	..	..	94·89	..
Paddington Slimes Plant			..	..	..	..	..	..	..	..	789·17	..
Pole Works			..	..	..	..	..	..	..	..	356·07	..
Regan's Carnage Battery			..	..	..	..	..	..	..	27·00	598·81	..
State Battery—Ora Banda			..	..	8·00	213·47	..	..	..	27·00	228·55	..
State Battery—Siberia			..	..	..	..	..	..	..	40·00	746·57	..
Zoroastrian Works			..	..	..	..	..	..	..	116·50	1,082·23	..
Various Works			..	..	..	..	..	2,271·17	..	16,622·68	30,251·66	7·09
Cement from Alluvial Claims at Paddington			..	..	..	..	..	..	..	49·95	6·61	..
Cement from Alluvial Claims at Siberia			..	..	213·00	44·00	..	..	..	728·25	120·36	..
Reported by Banks and Gold Dealers			137·83	..	..	..	..	7,438·30	..	..	..	..
Total			137·83	1,044·57	59,919·14	21,107·63	765·40	18,844·97	5,587·93	727,645·19	400,561·63	2,181·96

North-East Coolgardie Goldfield.
KANOWNA DISTRICT.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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.	
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 ..	891x	(Sirdar) .. ..	..	..	..	..	..	..	..	32·60	168·50	1,319·35	..
Do. ..	891x	Sirdar .. ..	..	..	685·00	1,337·94	..	..	..	12·32	2,695·00	2,248·51	..
Do. ..	891x, (1222x) ..	(Sirdar G.M. Co., Ltd.) ..	..	..	..	..	..	..	..	..	35,988·00	5,759·77	..
Do. ..	(1223x), (1229x)	..	..	..	..	..	..	..	..	..	..	..	..
Do. ..	..	Voided leases .. ..	..	..	..	..	..	..	..	205·17	1,570·80	1,074·78	..
Do. ..	..	Sundry claims .. ..	..	..	..	..	..	..	..	54·65	630·50	577·80	..
Kanowna ..	1358x	Dreadnought .. ..	..	..	50·00	2·02	..	..	..	..	50·00	2·02	..
Do. ..	(1288x)	Golden Crown .. ..	..	..	149·00	77·44	..	..	..	10·89	1,951·00	617·41	..
Do. ..	(1302x)	Golden Valley .. ..	..	..	..	..	..	..	..	..	464·00	203·61	..
Do. ..	(1342x)	Hidden Boulder .. ..	..	..	..	..	..	..	..	..	1,064·00	403·81	..
Do. ..	1019x	Kanowna .. ..	..	..	641·00	227·33	..	..	..	691·94	7,568·50	9,342·57	..
Do. ..	1299x	Kanowna Consol .. ..	..	..	..	..	..	..	..	..	713·50	129·30	..
Do. ..	1353x	Leila M. .. ..	..	..	39·00	42·48	..	..	..	..	39·00	42·48	..
Do. ..	18x, 19x	(Lily Australis G.Ms., Ltd.) ..	..	..	..	..	..	..	..	..	197·00	119·18	..
Do. ..	1295x	Louisa .. ..	..	41·77	33·00	19·12	3·31	..	..	48·09	649·00	211·25	3·31
Do. ..	(1282x)	Luck at last .. ..	..	..	12·00	·62	..	..	..	..	603·50	508·79	..
Do. ..	1364x	Mascotte .. ..	..	..	31·00	63·94	..	..	..	..	31·00	63·91	..
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	..
Do. ..	12x, 13x, 14x, 15x, 18x, 19x, (72x), 855x, 974x, 1035x, 1103x, (1263x), 1278x	North White Feather G.Ms., Ltd. ..	..	..	10,189·40	4,403·94	..	..	..	..	38,104·90	17,724·40	..
Do. ..	(1261x)	Prince Foote .. ..	..	..	..	..	..	..	..	..	429·00	155·03	..

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 1915.					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	1330x	Robinson	..	..	853.00	703.52	..	..	..	2,922.00	2,208.11	..
Do.	1800x	Sunset	..	..	442.50	403.99	..	..	2.27	1,239.50	627.92	..
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.	(9x), (10x), (72x), (83x), (180x), (200x), (201x), (431x)	(White Feather Reward, Ltd.)	..	..	..	..	..	..	..	42,767.75	22,255.23	14.80
Do.	..	Voided leases	..	..	..	..	..	3.59	3,605.09	191,508.21	108,407.04	629.26
Do.	..	Sundry claims	..	..	348.50	236.86	..	88.95	1,355.29	12,533.06	6,093.06	1.50
Mulgarrie	1355x	Palm	..	..	539.00	408.22	..	..	..	539.00	408.22	..
Do.	1297x	Valentine	..	..	29.65	13.26	..	..	3.43	226.51	249.42	..
Do.	..	Voided leases	..	..	..	..	..	..	1,213.20	4,658.75	2,574.91	..
Do.	..	Sundry claims	..	..	40.00	31.31	..	..	13.29	795.00	495.38	..
Six Mile	..	Voided leases	..	..	..	..	..	..	1,595.63	559.00	767.72	..
Do.	..	Sundry claims	..	..	..	..	..	..	31.44	105.50	83.08	..
<i>From District generally:—</i>													
Sundry parcels treated at:													
											1,677.87	..	
											425.16	..	
											553.56	..	
											270.98	..	
											1,314.62	..	
											797.46	..	
											70.00	8,743.90	
											299.51	642.00	2,009.01
											356.20

State Battery Cyanide Works—Kalpini .. ..	..	..	..	..	..	..	..	95·12	..	
W.A. Slimes Co., Ltd. .. ..	..	..	..	..	..	..	..	2,420·35	..	
Various Works .. ..	..	..	..	..	..	25·01	..	903·10	16,044·63	
Total for Leases and Quartz claims	·38	42·54	14,082·05	9,809·85	3·31	142·25	9,875·18	744,220·97	443,967·15	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 :										
Kalgoorlie Foundry, Ltd. .. ..	..	..	..	..	..	..	..	50·00	12·75	..
Lady Pratt Works .. ..	..	..	..	..	..	..	..	15·00	3·18	..
Old Cement Works .. ..	..	..	117·00	28·01	..	..	..	10,591·00	3,454·67	..
Riedel and Norton's Works .. ..	..	..	1,022·00	196·45	..	..	..	14,059·00	2,057·67	..
State Battery—Kalpini .. ..	..	..	..	..	..	..	..	260·00	22·69	..
Various Works .. ..	..	..	..	..	..	..	..	77,090·21	54,895·82	..
Treated outside District (not reported by owners)										
Reported by Banks and Gold Dealers .. ..	..	..	..	..	..	103,896·13	86	27,804·55	36,711·17	..
Total	·38	42·54	15,221·05	10,034·31	3·31	104,343·79	10,743·56	900,467·13	553,925·69	2,522·12

KURNALPI DISTRICT.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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.	
Jubilee ..	..	Voided leases .. ..	..	..	..	..	..	..	..	..	..	..	..
Do. ..	..	Sundry claims .. ..	..	..	..	..	..	18·87	145·13	1,821·25	1,408·51	..	..
Kurnalpi ..	423K	Kurnalpi Pride .. ..	..	505·41	..	..	..	..	505·41	..	..	..	..
Do. ..	422K	Perseverance .. ..	..	2·27	4·00	6·02	..	..	85·88	9·00	32·61	..	..
Do. ..	..	Voided leases .. ..	..	..	..	..	..	371·18	1,700·07	2,796·31	2,212·78	6·27	..
Do. ..	..	Sundry claims	8·57	..	..	..	..	226·49	76·23	130·00	157·19	..	..
Mulgabbie ..	312K	Mulgabbie Perseverance .. ..	..	..	7·00	8·12	..	..	..	34·40	2,936·37	4·95	..
Do. ..	421K	Star .. ..	..	..	1·00	119·58	..	..	12·94	3·75	404·05	..	..
Do. ..	(338K)	White Elephant .. ..	..	..	..	..	..	..	34·68	3·50	225·69	..	..
Do. ..	..	Voided leases .. ..	..	..	..	..	..	..	514·69	41·00	3,511·60	..	..
Do. ..	..	Sundry claims .. ..	..	..	13·00	133·78	..	6·50	1,432·79	137·50	820·13	..	..
<i>From District generally :—</i>													
Sundry parcels treated at :													
Various Works .. ..			..	..	..	..	..	..	..	56·50	193·15	..	..
Reported by Banks and Gold Dealers .. ..			..	..	..	..	..	11,361·84	19·62	..	..	..	..
Total			8·57	507·68	25·00	267·50	..	11,984·88	4,527·44	5,079·21	11,930·99	11·22	

TABLE IV.—Production of Gold and Silver from all sources, etc.—continued.

East Coolgardie Goldfield.

EAST COOLGARDIE DISTRICT.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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.		
Binduli	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Do.	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Boorara	(4541E)	..	Balacava North	..	..	15-00	76-17	..	..	..	15-00	76-17	..	..
Do.	3908E, 3910E, 3912E, (4033E), 4045E, (4327E)	..	Golden Ridge G.M. Co., Ltd.	..	..	16,176-00	6,861-30	..	..	..	226,192-75	122,127-77	308-79	..
Do.	3908E, 3910E, 3912E, (4033E)	..	(Waterfall leases)	..	..	..	..	..	..	..	2,849-00	2,389-48	..	..
Do.	..	..	Voided leases	..	..	..	..	..	..	269-28	56,587-63	31,157-14	..	..
Do.	..	..	Sundry claims	..	..	98-00	8-92	..	..	49	2-30	158-25	106-25	..
Boulder	392E	..	(Acrobat : Paringa Consolidated Mines, Ltd.)	..	..	..	..	..	..	..	10-25	37-15	..	..
Do.	392E	..	Acrobat : Paringa Mines (1909), Ltd.	..	..	1,671-50	837-06	..	..	..	12,795-12	5,899-93	..	..
Do.	38E, 71E, 72E, (101E)	..	Associated G.Ms. of W.A., Ltd.	..	..	111,054-00	30,923-57	113-00	..	8-49	1,553,168-70	911,896-19	28,242-38	..
Do.	49E, 4211E	..	Associated Northern Blocks (W.A.), Ltd.	..	..	3,536-83	7,581-20	..	..	..	524-18	339,462-54	423,573-95	4,844-50
Do.	(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.	989E	..	(Brown Hill Central G.Ms., Ltd.)	..	..	..	..	..	..	..	2,957-50	2,071-92	..	..
Do.	558E, (1175E), 3961E	..	Brown Hill Extended, Ltd.	..	..	216-50	518-30	..	..	..	34,649-28	45,322-67	..	..
Do.	1163E	..	(Cassidy's North)	..	..	..	..	..	..	..	67-00	7-95	..	..
Do.	24E, (888E), 949E	..	Central and West Boulder G.Ms., Ltd.	..	..	3,079-00	1,032-65	..	..	..	61,589-87	31,659-42	..	..
Do.	352E	..	(Chaffers G.M. Co., Ltd.)	..	..	..	..	..	..	..	4,256-00	1,299-03	161-50	..
Do.	352E, 873E, 4334E	..	(Chaffers G.M. Co., Ltd.)	..	..	..	..	..	..	..	111,111-00	44,796-77	..	..

Do.	352E, 873E, 4334E	(Chaffers G.M. Co. (1913), Ltd.)	..	..	..	..	..	..	13,350-00	3,334-91	129-57
Do.	1621E	(Croesus Proprietary G.M. Co.)	..	..	..	..	..	..	79-00	45-87	..
Do.	13E, 90E, 302E, 989E	(Croesus South G.Ms., Ltd.)	..	..	4,008-10	1,110-77	..	..	71,882-07	26,984-05	..
Do.	351E, 1001E, 1002E, 1085E, 1113E, 1219E, 1326E, 1397E	Golden Horseshoe Estates Co, Ltd	..	..	43,564-00	105,293-15	41,295-18	..	3,521,030-00	2,295,002-09	332,847-78
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.	..	..	583-48	317-19	..	..	17,475-73	13,850-62	..
Do.	66E	Great Boulder Perseverance G.M. Co., Ltd.	..	..	21,657-00	57,895-74	13,499-61	..	2,602,659-23	1,473,572-69	127,477-06
Do.	16E, 51E, 61E, 102E, 280E, 1109E, 4366E	Great Boulder Proprietary G.Ms., Ltd.	..	..	195,524-00	137,340-96	20,193-00	..	2,553,542-00	2,408,144-48	218,235-36
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	(Hannans Block 45, Ltd.)	..	..	..	..	..	..	2,343-55	3,226-69	..
Do.	131E, 245E, 269E, 743E, 794E, 969E	(Hannans Central G.Ms., Ltd.)	..	..	..	..	..	..	6,098-00	3,360-33	..
Do.	739E	(Hannans Croesus G.M. Co., Ltd.)	..	..	..	..	..	..	4,256-75	4,416-90	..
Do.	1004E	(Hannans North Croesus G.M. Co., Ltd.)	..	..	..	..	..	..	50-00	13-21	..
Do.	15E, 60E, 902E, 923E, 986E, 1116E, 1124E, 1196E, 4075E	(Hannans 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	..	611-56	14,930-00	3,838-04	..	2,691-25	49,326-77	26,229-37	..
Do.	946E, 4370E	Ironsides North leases	..	..	8,591-00	16,972-08	..	..	43,907-50	68,365-14	..
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	..	..	212,957-00	89,540-52	18,358-49	..	2,949,025-00	1,971,477-86	291,295-01
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, 739E, 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	..

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 1915.					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	73E, (74E)	(Kalgoorlie Mint and Iron King G.Ms., Ltd.)	..	..	..	..	..	..	..	3,647·00	7,454·80	..
Do.	1004E	(Kalgoorlie Golden Eagle)	..	..	..	..	..	..	..	4,891·50	1,289·65	..
Do.	1004E	(Kalgoorlie Golden Eagle: Golden Links, Ltd.)	..	..	..	..	..	..	..	193·00	31·63	..
Do.	22E, 34E	Kalgurli G.Ms., Ltd.	..	..	111,566·03	53,036·18	..	..	..	1,362,124·25	925,729·22	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 and Star, Ltd.	..	..	192,096·33	57,532·86	5,524·18	..	..	991,641·69	329,099·05	36,793·99
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.	..	..	1,369·00	320·59	..	..	..	16,606·90	4,225·24	..
Do.	33E, 35E, 975E	New North Boulder G.Ms., Ltd.	..	..	1,826·10	1,407·28	..	..	..	19,146·24	11,761·52	..
Do.	33E, 35E, 975E	(North Boulder G.M. Co., Ltd.)	..	..	..	..	..	..	..	33,549·15	47,532·52	..
Do.	33E, 35E, 975E	(North Boulder G.M.s, 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.	..	..	4,093·93	1,763·28	..	..	..	17,788·83	6,827·42	..
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.	4211E	(Oroya East (Hannans) G.M., Ltd.)	..	..	..	..	..	..	..	625·00	288·39	..
Do.	6E, 73E, 131E, 245E, 269E, 301E, 410E, 448E, 532E, 578E, 698E, 739E, 743E, 750E, 794E, 944E, 969E, 1004E, 1395E, 1621E, (3031E), (4180E)	Oroya Links, Ltd.	..	..	128,046·32	36,859·09	4,175·88	..	..	720,203·30	226,276·22	22,243·88

Do.	4E, 392E	(Paringa Mines, Ltd.)							37,962.98	16,779.96	
Do.	4E, 392E	(Paringa Mines (1909), Ltd.)							26,890.74	12,599.54	
Do.	1208E, 3612E, 3643E	South Kalgurli Consolidated, Ltd.		105,614.00	35,429.78	2,097.03			260,553.00	83,313.15	5,623.62
Do.	1208E, 3612E	(South Kalgurli G.Ms., Ltd.)							826,909.00	347,222.75	17,609.67
Do.	4537E	Union Jack		110.00	41.00				110.00	41.00	
Do.		Voided leases					109.90	5,780.86	66,213.97	41,848.86	
Do.		Sundry claims					24.58		1,313.96	928.29	
Feysville	Block 48	Hampton Plains Estate, Ltd.					4,565.62		20,583.40	2,413.76	
Do.	Block 50	(Hampton Plains Estate (1906), Ltd.)							85.00	108.82	
Do.	Block 50	(Hampton Properties, Ltd.)						7.26	6,348.00	3,956.22	
Do.	Block 45	Hampton Properties, Ltd.						52.75	51.75	76.63	
Do.	Block 50	Hampton Properties, Ltd.		28.97	29.29			6.26	571.33	501.56	
Do.		Voided leases						22.86	305.70	111.90	
Do.		Sundry claims							156.01	48.73	
Kalgoorlie	4509F, 4530E, 4539E	Adelaide Enterprise Prospecting Syndicate, N.L.		5,083.00	1,209.83				6,765.00	1,540.77	
Do.	796E, 1228E	(Bonnie Lass leases)						160.69	6,011.00	5,945.22	
Do.	796E, 1228E, 3771E	Bonnie Lass leases)		585.00	529.65				11,892.65	6,991.17	
Do.	4088E	Bonnie Play							83.61	12.14	
Do.	4E	Cassidy's Hill	1,556.42	1,250.00	2,199.85			2,609.52	2,709.00	3,933.09	13.90
Do.	4E	(Cassidy's Hill: Paringa Mines (1909) Ltd.)						734.99	638.50	3,079.51	
Do.	4524E	Corn Cob							383.06	80.24	
Do.	4545E	Creswick	3.89	39.00	60.10			3.89	39.00	60.10	
Do.	4037E, 4039E, 4054E	(Devon Consols South Extended leases)							2,251.00	1,400.94	
Do.	4037E, 4039E, 4054E (4231E), 4368E	(Devon Consols South Extended leases)							8,269.14	2,712.76	
Do.	4037E, 4039E, 4054E (4231E), 4368E	(Devon Consols South Extended leases: Forwood Down & Co., Ltd.)							590.04	143.28	
Do.	4037E, 4039E, 4054E, 4368E	Devon Consol South Extended leases: Forwood Down & Co., Ltd.		453.36	267.68				453.36	267.68	
Do.	(4554E)	Dora		18.00	14.75				18.00	14.75	
Do.	3770E	(Eagle Hawk United)					109.01	828.69	4,161.56	3,180.60	
Do.	4509E	(Enterprise)							219.00	76.49	
Do.	4052E, 4063E, (4319E)	Fair Play leases		196.00	30.71			4.77	2,982.50	3,932.28	
Do.	(4331E)	(Gem)						30.75	57.00	10.40	
Do.	(4025E), (4293E), (4486E)	Golden Dream G.M. Co., N.L.							8,999.00	811.29	
Do.	(1694E)	(Golden Zone)							5,614.50	2,639.52	
Do.	(1694E)	(Golden Zone)						489.50	2,106.00	3,295.08	
Do.	(1694E), 4273E, (4274E), (4331E), (4380E)	Golden Zone leases		615.00	2,254.90			28.25	44,601.00	67,605.13	
Do.	4539E	(Gordon)							64.89	14.24	
Do.	14CE, 415E, 1163E	Hannans Consols leases					2.84	276.35	45,428.67	6,142.22	
Do.	14CE, 415E, 1163E	(Hannans Consols, Ltd.)							6,584.00	3,806.65	

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 1915.					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.
Kalgoorlie	4273E, (4274E)	(Hannans North G.Ms., Ltd.)	..	..	..	..	..	..	..	1,244·00	392·72	..
Do.	(97E), (160E), (211E), (212E), (213E), (1653E)	(Hannan's Reward and Mt. Charlotte, Ltd.)	..	..	..	..	..	2·58	..	121,605·10	47,203·84	..
Do.	(97E), (160E), (211E), (212E), (213E), (1653E)	Hannan's Reward, Ltd.	..	..	7,065·00	1,140·88	..	..	..	198,284·21	26,740·81	..
Do.	4546E, 4547E, 4548E, 4551E	Hannan's Reward, Ltd.	..	..	2,621·00	430·74	..	..	..	2,621·00	430·74	..
Do.	796E, 1228E	(Hannan's Reward North G.M. Co., N.L.)	..	..	..	..	..	16·87	..	334·00	247·34	..
Do.	4001E, 4035E, 4036E	Hidden Secret leases	..	..	..	..	..	105·65	..	10,643·95	15,279·18	43,383·29
Do.	(4532E)	Kalgoorlie	..	..	130·23	23·10	..	..	..	224·02	40·05	..
Do.	(4498E)	Levant	..	..	26·00	3·02	..	..	..	359·38	32·50	..
Do.	4346E	(Little Wonder)	..	..	..	..	..	..	..	3,796·00	1,530·61	..
Do.	4346E, 4347E	Little Wonder leases	..	..	832·00	433·96	..	..	..	6,103·55	2,265·53	..
Do.	4345E	(Lone Hand)	..	..	..	..	..	..	..	6,092·00	408·02	..
Do.	4345E	Lone Hand	..	..	..	175·22	..	..	..	175·22	..	..
Do.	4345E, 4459E, (4661E)	(Lone Hand leases)	..	..	..	..	..	..	..	6,560·00	1,721·71	..
Do.	4477E	Lord Nelson	..	..	233·86	171·09	..	..	83·86	2,258·24	842·59	..
Do.	4550E	Marian Catherine	..	..	95·00	21·38	..	..	..	95·00	21·38	..
Do.	2E, 279E	(Maritana G.M. Co., N.L.)	..	..	..	..	..	32·27	..	11,373·50	4,628·55	..
Do.	2E, 279E, 3770E	Maritana leases	..	79·63	672·00	719·14	29·29	24·19	724·13	21,019·63	8,674·19	29·29
Do.	(4293E)	(Milanese)	..	..	..	..	..	..	..	7,663·00	1,389·36	..
Do.	(4293E)	(Milanese: Golden Dream G.M. Co., N.L.)	..	..	..	..	..	..	..	29,528·00	3,175·71	..
Do.	4347E	(Mystery)	..	..	..	..	..	..	..	8,783·00	1,815·12	..
Do.	(1694E)	(New Golden Zone Co., N.L.)	..	..	..	..	..	..	..	344·00	175·61	..
Do.	4482E	North Collier	..	..	7·77	2·07	..	..	..	281·60	1,475·84	..
Do.	4037E, 4039E, 4054E	(North End Mines, Ltd.)	..	..	..	..	..	..	..	1,812·00	883·27	..
Do.	4037E, 4054E	(North End G.Ms., Ltd.)	..	..	..	..	..	..	..	5,876·00	2,425·03	4·00
Do.	4E	(Paringa Consolidated Mines, Ltd.)	..	..	..	..	..	..	..	216·00	157·80	..
Do.	1228E	(Red White and Blue)	..	..	..	..	..	..	..	130·00	25·56	..

Do.	4039E	(Rising Sun)								170.00	28.50		
Do.	4039E	(Rising Sun)								16.00	1.88		
Do.	4039E	Rising Sun			251.00	1,114.82				251.00	1,114.82		
Do.	4037E, 4039E, 4054E, (4231E)	(Rising Sun leases)								294.00	98.78		
Do.	3771E	(Sons of Gwalia—Kalgoorlie)								1,428.00	844.54		
Do.	4542E	Successful			20.00	10.12				20.00	10.12		
Do.	(4289E)	(Union Club)								700.00	257.45		
Do.	(4289E)	Union Club			238.00	140.45		61.09		2,756.00	901.76		
Do.	(4289E), 4320E	(Union Club leases)							53.28	4,626.00	1,437.28		
Do.	4037E, 4039E, 4054E, (4231E), 4368E	(Westralia United Goldfields, Ltd.)								1,719.77	504.80		
Do.	4499E	Williamstown			579.32	203.68				1,900.55	573.76		
Do.		Voided leases						45.35	1,061.99	223,713.37	90,495.99	586.64	
Do.		Sundry claims		105.37	1,217.65	442.14		207.69	263.16	13,561.48	3,270.44		
Wombola	(4349E)	Sudden Jerk							301.49	13.20	95.76		
Do.		Voided leases							312.37	4,708.78	1,882.55		
Do.		Sundry claims								481.46	107.54		
<i>From District generally:—</i>													
		Sundry claims						10,907.93	431.95	5,208.00	1,560.12		
Sundry parcels treated at:													
		Adeline Works				31.47		42.64	35.12	33.00	20,651.61		
		Allsop and Dons' Works			.82	37.46				.82	1,079.17	1,131.21	
		Associated Northern Works									287.41		
		Bonnie Lass leases								55.00	1,297.73		
		Brown Hill Consols Works			56.41	1,943.86				740.26	44,351.78		
		Croesus South Works								9,230.35	13,912.25		
		Dunstan and Cumming's Works				1,097.82					3,620.35	1,194.00	
		Fremantle Trading Co.'s Works				545.36	437.81				4,639.30	6,280.07	
		Golden Dream Works									85.87		
		Golden Zone Works									340.97		
		Hainault Sulphide Plant				278.53					501.37		
		Hannan's Central Lakeside Works								.25	4,622.02		
		Hannan's Central Works				3,816.84				142.80	40,623.23		
		Hannan's Consols Works									172.90		
		Ironsides North Works								73.00	10,515.97		
		Kalgoorlie Gold Recovery Works									2,196.84	202.37	
		Leviathan Tailings lease: Barnett's Works								208.58			
		North Kalgurli Battery				620.37					810.22		
		Oratava Works									1,458.29		
		Various Works						341.72	15.15	29,452.55	45,937.93	635.09	
		Reported by Banks and Gold Dealers		18.33				9,892.72	9,013.32		4.57		
Total				18.33	2,356.87	1,596,697.51	666,537.96	105,723.47	26,379.76	26,985.08	22,901,678.69	15,224,849.35	1,250,093.86

TABLE IV.—Production of Gold and Silver from all sources, etc.—continued.

East Coolgardie Goldfield—continued.

BULONG DISTRICT.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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.	
Balagundi	1080y	Balagundi											
Do.	1103y	Iron Knob		50.93					542.52	21.00		159.07	
Do.		Voided leases							50.93				
Do.		Sundry claims		5.27		2.51			1,815.53	1,079.68		1,247.22	
Bulong	(1067y), (1076y)	Southern Cross leases							69.66	206.40		149.44	
Do.		Voided leases											
Do.		Sundry claims		11.24	26.78	10.35			1,648.60	966.22	6,812.10	14,463.31	
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		357.80	220.18	
Randall's	1079y	Comstock, W.A.			115.80	42.92					553.04	224.87	
Do.	1086y, 1088y	Transcontinental leases			7,010.00	1,751.86					15,718.90	3,881.59	
Do.		Voided leases								60.04	11,453.10	5,592.16	
Do.		Sundry claims							20.45		1,867.55	478.49	
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	
Woodline		Voided leases									792.75	610.57	
Do.		Sundry claims									39.33	61.57	

From District generally:—												
Sundry claims	..	..	..	..	..	5·64	41·85	790·75	284·26	..	
Sundry parcels treated at:												
Hilda Mill	..	..	..	..	..	..	..	..	150·78	..	
State Battery—Randall's	..	..	..	..	..	..	..	..	131·73	..	
Various Works	..	..	..	..	..	..	..	6,102·15	5,565·74	..	
Reported by Banks and Gold Dealers	..	..	..	..	..	24,391·57	52·39	..	..	..
Total	67·44	7,152·58	1,807·64	26,504·15	14,845·56	149,813·42	118,433·42

Coolgardie Goldfield.
COOLGARDIE DISTRICT.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					TOTAL PRODUCTION.				
			Alluvial.	Dolled and Specimens.	Ore treated.	Gold therefrom.	Silver.	Alluvial.	Dolled and Specimens.	Ore treated.	Gold therefrom.	Silver.
			Fine ozs.	Fine ozs.	Tons (2,240lbs.)	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Tons (2,240lbs.)	Fine ozs.	Fine ozs.
Bonnievale	4433	Lorna	..	..	101·00	106·12	..	..	5·38	457·25	332·18	..
Do.	1552	New Victoria	..	..	140·00	93·36	..	..	210·00	119·02	..	..
Do.	1552	(New Victoria)	..	..	..	..	..	..	264·00	169·00	..	..
Do.	1552 (4313)	(New Victoria leases)	..	..	..	..	..	..	2,744·00	1,338·39	..	..
Do.	1552, (3947), (4353)	(Vale of Coolgardie G.Ms., Ltd.)	..	..	..	..	..	..	74,835·00	38,993·49	..	..
Do.	..	Voided leases	..	..	..	..	..	2·26	271,693·85	146,077·89	..	..
Do.	..	Sundry claims	..	23·54	210·78	135·38	..	23·54	1,495·28	835·81	..	..
Bulla Bulling	..	Voided leases	..	..	..	..	..	..	563·63	340·01	..	..
Do.	..	Sundry claims	..	..	..	..	..	12·82	314·60	182·17	..	..
Burbanks	4460	Aurifer	..	5·82	121·25	211·35	..	12·13	197·50	341·70	..	..
Do.	4484	Belgian Queen	..	49·10	87·60	129·82	..	49·10	87·60	129·82	..	..
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.Ms., Ltd.)	..	..	..	..	..	..	36,677·20	25,186·99	334·85	..

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 1915.					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.	
Burbanks ..	134, 135, 136, 1527, 2761, (3571), (3661)	Burbanks Birthday G.Ms., Ltd. ..	..	..	2,665·40	1,019·64	..	..	..	32,876·48	19,974·63	89·38
Do. ..	2985, 2986, 3444, (3870), (4059)	(Burbanks Main Lode, Ltd.) ..	..	..	..	..	..	..	..	3,209·00	1,671·63	..
Do. ..	2985, 2986, 3444, (3870), (4059)	(Burbanks Main Lode (1902), Ltd.) ..	..	..	..	..	..	..	..	4,824·00	3,214·50	..
Do. ..	2985, 2986, 3444, (3870), (4059)	(Burbanks Main Lode (1904), Ltd.) ..	..	..	..	..	..	..	..	76,844·10	44,924·94	..
Do. ..	(1705), 2985, 2986, 3444, (3870), (4059), (4446), 4447	Burbanks Main Lode (1904), Ltd. ..	..	..	2,341·00	1,409·16	..	..	..	61,500·00	36,510·22	..
Do. ..	4409	Burbanks Mainstay .. ..	..	..	480·00	136·39	..	..	..	1,639·00	452·94	..
Do. ..	4168	Glenloth South .. ..	..	..	..	..	..	..	79·67	892·00	1,288·48	..
Do. ..	4471	Ivanhoe Burbanks .. ..	..	..	447·50	323·26	..	..	..	610·50	443·38	..
Do. ..	4442	Ivanhoe North .. ..	..	..	..	..	..	..	..	81·75	39·27	..
Do. ..	2160	Lady Robinson .. ..	..	..	155·00	43·10	..	..	..	4,601·00	1,778·13	..
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. ..	4469	Lord Bobs .. ..	..	..	299·75	71·08	..	..	..	299·75	71·08	..
Do.	Voided leases	13·36	105·24	28,297·88	23,201·89	96·83
Do.	Sundry claims	1·65	61·75	35·10	43·37	58·25	3,153·75	2,257·23	..
Coolgardie ..	(4519)	Australasia .. ..	..	..	166·00	60·10	..	..	..	166·00	60·10	..
Do. ..	(133), (139), (142)	(Bayley's G.Ms., Ltd.)	882·14	89·41	76,402·97	99,179·62	..
Do. ..	(133), (139), (142)	(Bayley's leases)	7·18	171·21	7,820·80	8,904·15	..
Do. ..	(133), (139), (142)	(Bayley's Mines, Ltd.)	15·10	10·59	2,319·74	2,323·66	..
Do. ..	4444	Benjamin George	396·25	613·85	67·16	1,098·00	2,540·16	..
Do. ..	4542	Charlotte	5·00	15·14	5·00	15·14	..
Do. ..	(4461)	Coolgardie	205·25	100·17	..
Do. ..	4480	Ethel Doris	70·00	20·04	70·00	20·04	..
Do. ..	4474	Gift	144·75	45·90	208·50	73·36	..
Do. ..	4448	Griffiths Gold Mine	503·00	29·52	675·25	79·40	..

Do.	..	Block 35	..	Hampton Plains Estate, Ltd.	..	..	..	100.50	28.76	..	..	..	100.50	28.76	..
Do.	..	Block 49	..	Hampton Plains Estate, Ltd.	..	..	..	..	..	..	..	..	15.50	13.99	..
Do.	..	Block 53	..	Hampton Plains Estate, Ltd.	..	..	..	..	..	..	..	358.42	67.00	112.49	..
Do.	..	Block 59	..	Hampton Plains Estate, Ltd.	..	..	..	373.00	280.75	..	..	..	7,295.00	6,641.91	..
Do.	..	4486	..	Iron Duke	..	..	..	149.50	37.96	..	..	..	149.50	37.96	..
Do.	..	(4122)	..	(King's Cross)	..	..	..	..	..	..	..	..	792.00	561.39	..
Do.	..	4443	..	King Solomon	..	..	..	1,176.75	311.80	..	..	..	1,987.50	692.12	..
Do.	..	(4470)	..	Lady Mary	..	..	..	75.50	16.96	..	..	11.65	249.50	81.82	..
Do.	..	4478	..	Lizard	..	..	..	10.50	10.81	..	..	10.02	10.50	10.81	..
Do.	..	(133), (139), (4067), (4122), (4372)	..	New Bayley's Mines, Ltd.	..	..	..	..	..	..	..	..	596.25	1,179.71	..
Do.	..	4435	..	Prosperity	..	..	7.57	1,030.75	371.96	..	..	41.00	2,731.75	1,311.13	..
Do.	..	4479	..	Rio Tinto	..	..	..	120.50	30.67	..	..	..	120.50	30.67	..
Do.	..	33, 3824, (3830), (4227), (4323), (4326)	..	Tindals Coolgardie G.M. Co., N.L.	..	..	..	4,563.50	840.46	..	..	..	143,001.35	35,000.23	..
Do.	..	(4067), (4122)	..	(W.A. Sluicing Syndicate, Ltd.)	..	..	..	..	..	..	..	..	742.00	373.22	..
Do.	..	..	..	Voided leases	..	..	..	..	..	..	392.08	3,137.07	291,397.62	161,567.37	..
Do.	..	..	..	Sundry claims	..	18.14	214.72	4,527.50	1,116.01	..	62.74	1,131.25	24,934.05	10,872.35	.. 96
Eundynie	..	4253	..	(Hidden Secret North)	..	..	..	..	..	..	..	..	68.00	60.72	..
Do.	..	4253, 4266, 4351, (4405), (4406), 4462	..	Hidden Secret North leases	..	..	..	1,846.00	745.86	..	..	..	26,471.00	13,197.12	..
Do.	..	..	..	Voided leases	..	..	..	..	..	..	..	..	1,473.50	644.31	1.75
Do.	..	..	..	Sundry claims	..	..	..	..	..	..	..	..	117.00	31.11	..
Gibraltar	..	4530	..	Bulla Bulling	..	..	..	45.00	24.23	..	..	..	45.00	24.23	..
Do.	..	4487	..	Lloyd George	..	..	..	86.50	85.56	..	..	..	86.50	85.56	..
Do.	..	4504	..	Lord Kitchener	..	..	..	31.75	40.71	..	..	..	31.75	40.71	..
Do.	..	4535	..	Quartette	..	..	..	27.00	109.31	..	..	..	27.00	109.31	..
Do.	..	(4418)	..	Reform	..	..	..	..	..	..	..	..	154.00	48.29	..
Do.	..	..	..	Voided leases	..	..	..	..	..	..	..	..	227.50	70.20	..
Do.	..	..	..	Sundry claims	..	..	41.49	72.00	144.84	..	..	41.49	164.50	189.85	..
Gnarlbine	..	..	..	Voided leases	..	..	..	..	..	..	..	10.94	1,899.75	1,049.90	..
Do.	..	..	..	Sundry claims	..	..	..	30.25	10.18	..	..	1.31	167.75	87.87	..
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 and Co., Ltd.)	..	..	..	..	..	..	..	..	117.00	1,000.35	..
Do.	..	4184, (4185)	..	(Sons of Erin G.M. Co., N.L.)	..	..	..	..	..	..	..	..	4,742.00	2,938.77	..
Do.	..	(4184), (4185), (4191), (4206), (4207)	..	(Sons of Erin leases)	..	..	..	..	..	..	..	285.20	1,394.00	911.95	..
Do.	..	4184, 4428, 4432	..	Sons of Erin leases: Forwood Down and Co., Ltd.	..	..	..	741.00	429.90	4.60	..	..	1,368.00	901.00	7.01
Do.	Voided leases	2.06	5,274.00	1,020.45	..
Do.	Sundry claims	179.40	87.71	16.52	720.90	492.89	..

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 1915.					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.
Londonderry	3834	Cheapside	..	..	283.50	190.86	..	..	..	4,731.25	2,656.18	..
Do.	4485	Royal Standard	..	..	95.50	140.48	..	..	..	95.50	140.48	..
Do.	(4505)	Scottish Lass	..	..	74.00	51.73	..	..	..	74.00	51.73	..
Do.	4475	Vice Regal	..	..	60.25	302.48	..	..	..	89.75	432.39	..
Do.	..	Voided leases	..	..	..	..	..	..	46.25	14,518.66	13,143.13	..
Do.	..	Sundry claims	..	4.94	282.00	576.13	..	..	6.00	991.35	1,067.01	..
Do.	..	Voided leases	..	..	..	..	..	..	17.71	735.00	331.78	..
Mungari	..	Sundry claims	..	95.95	42.00	48.93	..	..	95.95	297.01	187.42	..
Do.	..	Voided leases	..	..	..	..	..	..	1,541.48	40,793.20	31,064.05	..
Do.	..	Sundry claims	..	..	3.25	110.23	..	..	34.62	147.82	234.55	..
Red Hill	..	Voided leases	..	..	14.00	20.66	..	..	..	14.00	20.66	..
Do.	..	Sundry claims	..	..	13.00	21.43	..	..	..	13.00	21.43	..
Ryan's Find	4500	Ryan's Reward	..	..	..	..	..	..	..	..	..	..
Do.	..	Sundry claims	..	..	..	..	..	..	..	..	..	..
Widgiemooltha	(4472)	Connie K.	..	..	5.00	21.19	..	..	23.98	17.93	20.90	..
Do.	4028	Flinders	..	..	..	..	..	..	29.11	432.10	2,306.95	..
Do.	..	Voided leases	..	..	..	..	..	..	739.99	8,618.35	3,626.08	..
Do.	..	Sundry claims	..	4.90	350.00	115.97	..	3.62	27.58	2,641.68	1,129.48	..
<i>From District generally:—</i>												
Sundry parcels treated at:												
Burbanks Main Lode Works			..	..	..	13.47	..	2.77	..	557.50	1,070.49	..
Carswell's Cyanide Works			..	..	..	..	..	..	..	..	668.99	..
Fremantle Trading Co.'s Works			..	..	..	..	..	..	..	..	20.08	..
Highgate Works			..	..	..	34.60	..	..	..	100.00	321.11	..
Lady Robinson Cyanide Works			..	..	..	..	..	..	..	70.00	348.28	..
Moore's Cyanide Works			..	..	..	..	..	..	..	..	17.94	..
New Victoria Works			..	..	..	..	..	..	..	..	98.56	..
Oratava Works—Kalgoorlie			..	..	..	..	..	..	..	..	171.81	..
Pickering's Cyanide Works			..	..	..	..	..	..	..	..	177.10	..
State Battery—Coolgardie			..	..	40.00	485.81	..	..	..	687.50	7,025.69	..
Various Works			..	..	..	..	..	4.98	..	3,083.61	14,483.72	108.89
Reported by Banks and Gold Dealers			165.69	..	..	..	..	6,928.30	543.04	..	..	..
Total			183.83	449.68	24,845.43	11,356.72	4.60	8,355.64	8,839.40	1,466,617.41	929,753.71	767.62

KUNANALLING DISTRICT.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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.
Balgarric ..	..	Voided leases .. ..	..	..	..	..	..	10·94	75·48	5,124·25	4,805·74	1·38
Do. ..	..	Sundry claims .. ..	..	..	..	..	..	..	18·57	912·25	358·01	..
Carbine ..	33s	(Carbine) .. ..	..	..	..	..	..	..	10·85	2,401·00	1,164·53	..
Do. ..	33s, 710s, 711s ..	Carbine leases .. ..	..	..	4,014·00	4,254·42	..	..	677·13	26,595·50	17,018·55	..
Do. ..	(776s)	Spearmint .. ..	..	..	..	63·55	..	..	..	522·00	697·11	..
Do. ..	..	Voided leases .. ..	..	..	..	..	..	..	..	2,002·00	2,022·43	..
Do. ..	..	Sundry claims .. ..	..	..	..	..	..	..	..	55·00	30·82	..
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 ..	822s	Resolute .. ..	..	..	52·00	130·97	..	..	..	271·00	910·80	..
Do. ..	..	Voided leases .. ..	..	..	..	..	..	..	..	822·75	1,097·78	..
Do. ..	..	Sundry claims .. ..	..	8·01	..	..	..	..	8·87	507·00	449·22	..
Dunnsville ..	..	Voided leases .. ..	..	..	..	..	..	..	181·12	17,407·10	7,982·23	..
Do. ..	..	Sundry claims .. ..	..	..	..	..	..	43	27·63	293·09	265·11	..
Jourdie Hills ..	369s, (661s) ..	(Jourdie Hills G.M. Co., Ltd.) ..	..	..	..	..	..	..	..	9,635·00	7,868·08	..
Do. ..	369s, (661s) ..	(Jourdie United G.Ms., Ltd.) ..	..	..	..	..	..	..	..	1,520·00	1,027·63	..
Do. ..	514s	Pride of Jourdie North ..	..	..	210·00	292·26	..	..	..	3,167·00	2,974·72	..
Do. ..	369s	(Pride of the Jourdies) ..	..	..	..	..	..	..	..	410·74	465·47	..
Do. ..	369s	Pride of the Jourdies : Forwood Down and Co., Ltd. ..	..	..	186·00	561·64	..	..	..	891·00	1,854·04	28·45
Do. ..	..	Voided leases .. ..	..	..	..	..	..	..	18·00	12,058·00	4,509·50	..
Do. ..	..	Sundry claims .. ..	..	..	..	..	..	..	..	760·50	405·00	..
Kandana ..	..	Voided leases .. ..	..	..	..	..	..	..	..	465·00	68·12	..
Kintore ..	..	Voided leases .. ..	..	..	..	..	..	..	143·66	43,027·14	31,747·44	..
Do. ..	..	Sundry claims .. ..	..	46	28·00	18·75	..	100·30	46	984·70	1,051·26	..

TABLE IV.—Production of Gold and Silver from all sources, etc.—continued.

Coolgardie Goldfield—continued.
KUNANALLING DISTRICT—continued.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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.
Siberia ..	(674s), [(1286w)]	(Golden) .. .. .	..	..	..	..	..	82.17	22.40	120.37	..
Do. ..	728s, [1293w] ..	Mexico .. .. .	..	..	..	..	..	..	216.50	427.07	..
Do. ..	..	Voided leases .. .. .	..	..	..	..	1.07	1,475.64	7,977.95	9,982.70	..
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 .. .. .	..	..	40.00	10.96	..	..	1,490.00	1,610.71	..
Do. ..	862s	Britannia .. .. .	..	..	35.00	7.29	..	..	35.00	7.29	..
Do. ..	(852s)	Premier .. .. .	..	..	90.00	24.33	..	..	716.00	212.43	..
Do. ..	845s	Sadie .. .. .	..	..	191.00	238.97	..	..	1,100.00	863.53	..
Do. ..	645s	Star of Fremantle .. .. .	..	..	53.00	20.44	..	..	5,217.00	3,479.00	..
Do. ..	603s	Sydney Mint .. .. .	..	..	..	..	..	213.30	1,083.75	2,738.02	..
Do. ..	847s	Turn of the Tide .. .. .	..	..	139.50	199.91	..	..	1,012.00	1,043.12	..
Do. ..	..	Voided leases .. .. .	..	..	..	..	..	453.30	86,127.99	66,116.83	18.84
Do.	Sundry claims	5.94	575.00	286.82	..	6.62	98.21	5,419.95	2,879.06	..
<i>From District generally:—</i>												
Sundry parcels treated at:												
Blue Bell Works	143.50	72.00	997.34	..
Hands Across the Sea Battery	24.51	24.51	..
Oratava Works—Kalgoorlie	71.90	..
Stanley Works	14.86	..	402.60	370.43	..
Various Works	9.22	..	1,276.66	1,896.68	..
Reported by Banks and Gold Dealers			31.81	167.59	1.10
Total]			31.81	14.41	5,613.50	6,278.32	..	585.49	4,952.45	253,043.47	191,606.15	48.67

Yilgarn Goldfield.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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.
Blackbourne..	..	Voided leases .. .. .	..	..	..	..	..	..	1,282.50	341.37	..	
Bullfinch ..	(2779)	Bell Bird .. .. .	..	..	7.80	2.31	..	..	..	17.80	7.24	..

Do.	2667	Bullfinch East Extension	16-00	39-20			16-00	39-20	
Do.	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.	68,636-00	23,631-17	4,655-28		183,678-42	88,619-53	11,840-63
Do.		Voided leases					326-85	318-23	
Corinthian	893	Corinthian					2,684-50	1,123-80	
Do.	896, 934, 946	Corinthian North G.Ms., Ltd.	47,147-00	9,218-17			114,590-00	23,687-43	
Do.		Voided leases					601-50	405-74	
Do.		Sundry claims	4-50	4-36			73-50	73-29	
Ennuin	2803	Star of Ennuin	45-50	125-93			45-50	125-93	
Do.	(2865)	Trigg Hill	16-40	18-45			16-40	18-45	
Do.		Sundry claims	87-00	49-87			87-00	49-87	
Golden Valley	2755	Deborah	114-00	174-19	2-00		114-00	174-19	2-00
Do.	2272	Glide Away					851-00	1,001-83	
Do.	2948	Greenharp New	14-00	11-40			14-00	11-40	
Do.	2790	Manxman Consols	28-65	29-97			33-00	36-95	
Do.	2389	Marie's Find					336-00	460-51	
Do.	2880	Mount Katrine	29-10	35-32			29-10	35-32	
Do.	(2541), (2542)	New Green Harp leases	17-00	9-31			665-90	430-70	
Do.	2739	Rosalie	30-00	33-62			30-00	33-62	
Do.	(2712)	Sand King					66-00	29-12	
Do.	2653	Violet	23-64	43-32			83-64	56-12	
Do.		Voided leases				18-05	2,861-35	3,162-82	
Do.		Sundry claims	2-75	80-10		2-75	1,070-75	1,080-32	
Greenmount	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.		Voided leases				31-99	70,297-00	17,459-88	364-72
Do.		Sundry claims					4-12	617-50	249-29
Hope's Hill	2544	Colleen Bawn	23-00	220-48			234-20	806-22	
Do.	(2523)	Parisian					4-24	797-50	561-50
Do.	(921)	Rodda's Reward					312-00	42-13	1-00
Do.	(2906)	Try Again	88-00	12-75			88-00	12-75	
Do.		Voided leases				52-73	128,687-35	33,283-40	
Do.		Sundry claims	104-50	34-74		22-55	1,204-00	369-59	
Kennyville	(2786)	Catherine	70-00	27-92			135-00	41-23	
Do.	776	Cornishman	163-00	159-68			1,859-00	1,629-15	
Do.	570	(Great Leviathan)				13-18	3,821-85	2,948-67	
Do.	570	Great Leviathan	332-00	127-55			3,689-00	2,919-64	
Do.	570	(Great Leviathan: Northern Blocks Syndicate, Ltd.)					10,705-00	2,974-64	
Do.	911	Trafalgar	230-00	124-82			1,317-00	1,102-12	
Do.		Voided leases				5-58	1,048-50	436-66	09
Do.		Sundry claims					277-00	151-42	
Koolyanobbing		Voided leases					308-00	116-74	
Do.		Sundry claims					55-00	11-24	

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 1915.					TOTAL PRODUCTION.				
			Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.	Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.
			Fine ozs.	Fine ozs.	Tons (2,240lbs.)	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Tons (2,240lbs.)	Fine ozs.	Fine ozs.
Marvel Loch..	923	Bohemian .. ..	..	..	914·00	1,211·13	..	..	17·44	2,924·00	2,884·44	..
Do. ..	1689	(Bronco) .. ..	..	..	..	..	..	..	..	217·00	22·17	..
Do. ..	1689	Bronco: Bronco Horseshoe Proprietary Mining Co., N.L.	..	..	1,075·00	390·69	..	..	..	1,075·00	390·69	..
Do. ..	(2703)	Bronco Link .. ..	..	..	..	..	..	..	..	43·00	7·53	..
Do. ..	1465	Comet .. ..	..	..	571·00	376·73	..	..	..	6,673·00	5,640·34	..
Do. ..	768	(Donovan's Find) .. ..	..	..	..	..	..	..	..	1,768·00	1,999·43	..
Do. ..	768	Donovan's Find: Greenmount Mines, N.L.	..	..	..	..	..	..	..	1,376·00	1,027·52	..
Do. ..	1463	Eclipse .. ..	..	..	413·00	394·05	..	..	..	1,600·00	1,163·61	..
Do. ..	(2794)	Eveless Eden .. ..	..	..	40·00	13·04	..	..	..	40·00	13·04	..
Do. ..	820	Gentle Annie .. ..	..	..	94·00	49·17	..	..	..	1,582·00	664·14	..
Do. ..	2885	Golden Cube .. ..	..	..	50·00	22·35	..	..	..	50·00	22·35	..
Do. ..	719	(Great Victoria) .. ..	..	..	..	..	..	..	..	1,356·00	281·53	..
Do. ..	719, 944, 945, 1227, 1228, 1606	Great Victoria leases .. ..	..	..	11,638·00	1,357·76	..	..	..	42,888·00	5,226·17	..
Do. ..	(490), (517), (558)	Jacoletti G.Ms., Ltd. .. ..	..	..	194·00	135·56	..	..	..	6,716·00	2,929·74	..
Do. ..	2907	Jacoletti No. 1 .. ..	..	..	63·00	40·69	..	..	..	63·00	40·69	..
Do. ..	(490), (517), (558), (559)	(Lady Loch Mines, Ltd.) .. ..	..	..	..	..	..	..	..	2,091·00	674·01	..
Do. ..	714	(Marvel Loch) .. ..	..	..	..	..	..	..	..	500·00	316·81	..
Do. ..	714, (723), (822), (869)	Marvel Loch G.M. Co., N.L. .. ..	..	..	1,696·00	642·59	..	..	..	49,235·50	18,590·18	379·96
Do. ..	(2662)	Marvel Loch North .. ..	..	..	..	..	..	..	..	96·00	49·52	..
Do. ..	852	May Queen .. ..	..	..	117·50	827·77	..	..	4·07	506·50	2,810·82	..
Do. ..	(2684)	Mountain King .. ..	..	..	..	..	..	..	19·77	188·00	152·53	..
Do. ..	803, (838), (948), (949), (950), (951)	(Mountain Queen leases) .. ..	..	..	..	..	..	..	..	748·00	208·39	..
Do. ..	803, (838), (948), (949), (950), (951), (2543), (2754)	Mountain Queen, Ltd. .. ..	..	..	1,507·00	329·34	..	..	..	103,909·00	29,222·44	376·17
Do. ..	665	(Never Never) .. ..	..	..	..	..	..	..	..	29,395·00	7,709·26	..
Do. ..	1011	Rising Star .. ..	..	..	..	..	..	..	..	140·00	11·48	..
Do. ..	(2575)	Saint George .. ..	..	..	..	..	..	..	..	1,266·00	443·93	..
Do. ..	(490), (517)	(Turnbull leases) .. ..	..	..	..	..	..	..	..	2,143·00	1,481·72	..
Do. ..	665, 765	Yilgarn G.M. Co., Ltd. .. ..	..	..	904·00	55·10	..	..	..	4,353·00	749·63	14·90
Do. ..	.. ..	Voided leases .. ..	..	..	..	..	..	..	54·14	12,359·50	6,110·43	..
Do. ..	.. ..	Sundry claims	7·72	..	1,075·50	791·68	..	7·72	65·10	4,623·75	2,680·84	..
Mt. Jackson ..	1979	Allen's Find .. ..	..	..	553·50	223·81	..	..	..	1,192·05	718·67	..
Do. ..	1933	Butcher Bird No. 1 .. ..	..	..	1,422·50	902·30	..	..	..	1,985·50	1,379·08	..

Do.	2053	..	Great Unknown	..	..	180-50	199-81	..	..	37-22	1,058-43	3,328-94	..
Do.	2190	..	Miner's Dream	..	..	349-00	93-81	..	..	..	425-00	129-34	..
Do.	2826	..	Unknown South	..	..	19-00	15-62	..	..	..	19-00	15-62	..
Do.	..	..	Voided leases	..	..	..	..	..	..	77-66	30,914-55	21,046-90	2,305-28
Do.	..	..	Sundry claims	..	4-42	208-75	134-58	..	4-42	12-53	1,267-25	798-46	..
Mt. Rankin	..	..	Voided leases	..	..	..	..	..	3-84	5-20	496-00	122-17	..
Do.	..	..	Sundry claims	..	..	..	..	..	..	..	170-00	54-38	..
Parker's Range	(508)	..	Australia	..	..	257-00	62-17	..	..	..	3,218-00	1,666-37	..
Do.	(2785)	..	Briton	..	..	23-00	20-97	..	..	..	51-00	46-29	..
Do.	2978	..	Gift	..	..	50-00	13-90	..	..	..	50-00	13-90	..
Do.	2656	..	Golden Dream	..	..	89-00	169-98	..	..	..	251-00	510-75	..
Do.	2606	..	King of the Range	..	..	57-00	68-86	..	..	..	331-00	624-06	..
Do.	2905	..	Lord Kitchener	..	..	16-00	3-11	..	..	..	16-00	3-11	..
Do.	2801	..	Scots Greys	..	..	10-00	6-25	..	..	..	10-00	6-25	..
Do.	2546	..	South Side	..	..	..	..	..	..	4-82	112-00	42-21	..
Do.	724	..	(Spring Hill)	..	..	..	..	..	..	..	3,232-00	607-21	..
Do.	724, 2633	..	Spring Hill G.M. Co., N.L.	..	..	916-00	66-87	..	..	..	916-00	66-87	..
Do.	724 (760)	..	(Spring Hill leases)	..	..	..	..	..	..	..	8,910-00	2,215-59	..
Do.	2806	..	Star of the Range	..	..	52-50	131-18	..	..	..	52-50	131-18	..
Do.	..	..	Voided leases	..	..	..	..	..	..	63-22	9,162-75	6,492-92	..
Do.	..	..	Sundry claims	..	..	172-00	58-06	..	..	..	1,469-75	987-57	..
Southern Cross	(881), (882), (888), (889), (890)	..	(British and Foreign Development Syndicate, Ltd.)	..	..	..	..	..	..	..	90,791-75	66,545-29	356-35
Do.	2744	..	Central	..	..	43-00	22-12	..	..	..	273-00	62-50	..
Do.	(889)	..	(Fraser's G.M. Co., N.L.)	..	..	..	..	..	..	..	151,771-00	67,870-33	..
Do.	(888), (889)	..	Fraser's G.M. Syndicate	..	..	..	17-33	..	..	..	287-25	681-79	..
Do.	2714	..	Fraser's North Extended	..	..	..	..	..	..	..	10-00	10-37	..
Do.	(888)	..	(Fraser's South G.M. Co., N.L.)	..	..	..	..	..	..	..	48,233-00	20,013-23	..
Do.	2342	..	Haddon Consolidated	..	..	627-00	201-02	..	..	..	3,810-50	1,320-84	..
Do.	2416	..	(Maori Lass)	..	..	..	..	..	..	..	250-00	52-31	..
Do.	2416	..	(Maori Lass, Ltd.)	..	..	..	..	..	..	..	483-00	54-47	..
Do.	(2651)	..	(Queen Ann)	..	..	..	..	..	..	..	388-00	129-23	..
Do.	2987	..	Sunset	..	..	80-00	9-47	..	..	..	80-00	9-47	..
Do.	(2651)	..	Yilgarn Consols G.M. Co., N.L.	..	..	..	..	..	..	..	598-50	155-42	..
Do.	..	..	Voided leases	..	..	..	..	..	2-13	211-22	134,602-20	54,073-23	8-06
Do.	..	..	Sundry claims	..	..	273-00	70-99	..	3-73	595-45	2,049-30	571-04	..
Westons	2769	..	(Battler)	..	..	115-00	170-64	..	..	..	115-00	170-64	..
Do.	2814	..	Battler West	..	..	11-00	8-35	..	..	..	11-00	8-35	..
Do.	2180	..	(Edna May)	..	..	..	..	..	..	..	581-00	919-27	..
Do.	2769	..	Edna May Battler G.M. Co., N.L.	..	..	243-00	195-97	..	..	..	243-00	195-97	..
Do.	2291, 2585, 2615	..	Edna May Central G.Ms., N.L.	..	..	25,027-00	5,424-47	..	..	..	32,056-00	6,870-70	19-38
Do.	2180, 2605	..	Edna May G.M. Co., N.L.	..	..	35,743-00	35,468-83	19-38	..	..	73,860-00	73,199-73	..
Do.	2775	..	Emma May	..	..	..	..	..	..	..	40-00	20-31	..
Do.	(2086), 2087, 2088, (2635)	..	Greenfinch Proprietary G.M., N.L.	..	..	240-00	43-30	..	..	..	7,816-00	2,827-03	..
Do.	2807	..	Hill End	..	..	126-00	93-44	..	..	..	126-00	93-44	..
Do.	2291	..	(Myrtle Central)	..	..	..	..	..	..	..	751-00	243-96	..
Do.	2168, 2238	..	Myrtle Consols leases	..	..	..	..	..	..	..	112-00	58-03	..
Do.	2570	..	Myrtle East	..	..	25-00	10-97	..	..	..	202-00	116-12	..
Do.	2867	..	Western Options	..	4-06	..	..	..	..	4-06	..	..	..
Do.	2724	..	(Weston's Reward)	..	..	35-00	57-24	..	..	..	35-00	57-24	..
Do.	2724, 2761	..	Weston's Reward G.Ms., N.L.	..	..	418-00	384-56	..	..	..	418-00	384-56	..
Do.	..	..	Voided leases	..	..	..	..	..	..	..	171-75	99-26	..
Do.	..	..	Sundry claims	..	10-79	253-00	451-96	..	..	11-04	710-75	698-32	..

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 1915.					TOTAL PRODUCTION.				
			Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.	Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.
			Fine ozs.	Fine ozs.	Tons (2,240lbs.)	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Tons (2,240lbs.)	Fine ozs.	Fine ozs.
<i>From Goldfield generally:—</i>												
		Sundry parcels treated at:										
		Allsop and Don's Works .. .. .	..	..	..	..	..	..	..	..	989·96	..
		Andre's Cyanide Works .. .. .	..	..	..	..	..	..	..	..	377·33	..
		Australia Battery .. .. .	..	..	38·00	..	..	..	..	38·00	124·94	..
		Donovan's Find Battery .. .. .	..	..	..	717·17	..	..	..	..	1,747·11	..
		Fraser's G.M. Works .. .. .	..	..	..	..	..	..	..	..	583·63	..
		Fraser's South Extended Tailings Works .. .. .	..	..	..	..	..	..	..	..	1,443·31	2·64
		Fremantle Smelting Works .. .. .	..	..	..	..	..	..	21·28	..	592·34	33·90
		Great Victoria Cyanide Works .. .. .	..	..	..	1,974·38	..	..	..	..	1,974·38	..
		Greenfinch Proprietary G.M. Works .. .. .	..	..	..	109·31	..	..	..	..	1,910·45	..
		Greenmount Works .. .. .	..	..	..	..	..	..	..	..	154·77	..
		Hope's Hill Cyanide Works .. .. .	..	..	..	128·59	..	..	..	..	1,153·78	..
		Jacoletti Works .. .. .	..	..	..	..	..	..	..	..	2,062·82	..
		Jones' Cyanide Works .. .. .	..	..	..	..	..	..	..	..	127·39	..
		Marvel Loch Mining Co., N.L. .. .. .	..	..	..	1,428·28	..	..	..	..	2,389·77	..
		Oratava Works—Kalgoorlie .. .. .	..	..	..	..	..	..	..	..	238·22	..
		Spring Hill Works .. .. .	..	..	..	..	..	..	..	..	235·44	..
		State Battery—Mt. Jackson .. .. .	..	..	..	..	..	..	..	..	7·59	..
		Sunbeam Works .. .. .	..	..	..	740·23	..	..	..	8·00	4,886·22	..
		Violet Works .. .. .	..	..	..	183·42	..	..	..	..	708·86	..
		Yilgarn G.M. Co., N.L., Works .. .. .	..	..	..	..	..	..	..	..	1,207·07	..
		Various Works .. .. .	..	..	..	..	..	..	..	59·00	6,507·96	..
		Reported by Banks and Gold Dealers .. .. .	..	..	..	..	..	22·05	3·53	..	..	..
		Total	12·14	19·29	205,331·94	91,092·14	4,676·66	89·88	1,331·29	1,470,388·44	668,551·57	16,285·06

Dundas Goldfield.

MINING CENTRE.	NUMBER OF LEASFS.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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.
Buldanía	Voided leases .. .. .	..	..	..	..	..	..	3·02	846·05	708·99	..
Do.	Sundry claims .. .. .	..	..	..	..	..	..	36·53	341·27	519·77	..

Dundas	..	..	..	..	..	..	..	..	..	..	4,543.23	2,208.48	..
Do.	..	..	..	..	..	..	..	..	..	385.37	182.50	143.88	..
Killaloe	..	..	..	..	..	..	..	..	..	..	20.65	6.88	..
Norseman	..	987, 1113	..	..	..	..	..	..	..	..	2,065.50	978.92	..
Do.	..	(1185)	..	..	..	18.15	12.00	56.83	..	382.08	12.00	99.61	..
Do.	..	1173	..	..	..	..	150.00	12.36	..	..	380.00	243.08	..
Do.	..	1199	..	..	..	27.72	167.00	176.57	..	27.72	229.00	254.47	..
Do.	..	(1184)	..	..	..	..	85.50	35.54	..	173.30	130.00	124.07	..
Do.	..	1183	..	..	..	13.47	61.00	68.38	..	272.76	132.50	289.13	..
Do.	..	966	..	..	..	..	..	..	..	..	689.00	948.88	..
Do.	..	938, (945), 988	..	..	..	..	..	..	..	9.50	8,493.00	2,229.24	..
Do.	..	938, (945), 988	..	..	..	..	18.00	177.79	..	..	34,018.00	8,192.98	..
Do.	..	1209	..	..	..	..	25.00	19.61	..	..	25.00	19.61	..
Do.	..	(1198)	..	..	..	..	..	..	..	..	52.50	62.01	..
Do.	..	1160	..	..	..	..	4,072.00	590.09	..	..	18,091.00	3,050.76	..
Do.	..	(945)	..	..	..	..	..	..	..	..	17.00	4.36	..
Do.	..	852	..	..	..	..	..	..	..	..	9,167.00	4,484.90	..
Do.	..	852, 912, 966, 977, 979, 980, 985, 987, (1031), 1166, 1190, 1192, 1203	..	..	..	..	28,740.00	13,633.94	..	..	214,146.00	109,559.05	23,014.38
Do.	..	1207	..	..	..	..	302.50	53.66	..	..	302.50	53.66	..
Do.	..	903	..	..	..	..	..	..	..	21.23	1,147.25	1,293.01	..
Do.	..	903, 1138	..	..	..	..	176.00	267.85	..	..	1,336.50	1,294.95	..
Do.	..	106, 187, 587, 840, (972)	..	..	..	..	1,054.00	869.35	..	..	168,932.50	143,053.79	9,364.14
Do.	..	1021	..	..	..	..	..	16.44	..	..	593.00	1,130.29	..
Do.	..	1021	..	..	..	..	..	..	..	..	1,311.00	1,197.01	..
Do.	..	187	..	..	..	..	..	..	..	..	358.00	568.05	..
Do.	..	1158	..	..	..	..	..	..	..	..	216.00	28.93	..
Do.	..	1092	..	..	..	..	128.50	181.58	..	..	367.25	766.91	..
Do.	..	1092	..	..	..	..	..	..	..	142.26	655.50	737.49	..
Do.	..	1092, (1125)	..	..	..	..	..	..	..	..	337.00	692.34	..
Do.	..	1210	..	..	..	..	..	46.43	..	..	..	46.43	..
Do.	..	(1103)	..	..	..	..	..	..	..	..	924.00	245.42	..
Do.	..	(1103), (1159)	..	..	..	..	37.00	7.87	..	..	985.25	157.61	..
Do.	..	986	..	..	..	..	..	..	..	2,019.37	299.25	752.26	..
Do.	..	1016	..	..	..	..	..	..	..	133.35	72.50	419.67	4.90
Do.	..	990	..	..	..	..	..	..	..	..	1,274.00	3,095.95	..
Do.	..	990, 1060	..	..	..	..	..	..	..	..	775.50	1,176.13	16.89
Do.	..	990, 1016, 1060, 1117, 1194	..	..	..	..	7,551.00	5,856.83	..	..	28,964.50	26,963.32	100.49
Do.	..	1180	..	..	..	..	52.00	93.07	..	..	337.25	281.17	..
Do.	..	(1204)	..	..	..	..	..	..	..	..	30.50	18.89	..
Do.	..	1193	..	..	..	7.53	64.00	37.41	..	58.09	167.00	73.38	..
Do.	..	..	..	..	..	..	..	..	..	4.23	3,620.75	232,353.45	177,663.51
Do.	..	..	..	..	..	277.44	965.75	556.32	..	996.60	1,906.73	15,297.15	8,141.53
Do.	..	..	..	..	..	..	..	..	..	..	..	..	59
Peninsula	17.61	7,764.00	4,705.10	..

TABLE IV.—Production of Gold and Silver from all sources, etc.—continued.

Dundas Goldfield—continued.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					TOTAL PRODUCTION.				
			Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.	Alluvial.	Dollied and Specimens.	Ore treated.	Gold therefrom.	Silver.
			Fine ozs.	Fine ozs.	Tons (2,240lbs.)	Fine ozs.	Fine ozs.	Fine ozs.	Fine ozs.	Tons (2,240lbs.)	Fine ozs.	Fine ozs.
<i>From Goldfield generally:—</i>												
Sundry parcels treated at:												
		Break-o-Day Cyanide Works .. .. .	..	..	..	..	..	..	..	..	195.72	..
		Lady Mary Works .. .. .	..	..	..	..	..	..	..	16.00	984.04	..
		Little Wonder Cyanide Works .. .. .	..	..	..	..	..	..	..	..	174.54	..
		Mararoa Crushing and Cyaniding Works .. .. .	..	..	..	..	..	..	..	232.50	2,543.56	38.75
		Rawlings, Bullen, and Rumble's Works .. .. .	..	..	27.00	503.49	..	..	..	27.00	2,354.89	..
		State Battery, Norseman .. .. .	..	..	..	..	..	..	..	376.00	10,050.75	885.41
		Various Works .. .. .	..	..	..	..	..	..	54.52	103.00	2,577.19	607.70
		Reported by Banks and Gold Dealers .. .. .	..	..	..	..	..	1,026.29	..	..	1.04	..
		Total .. .. .	..	344.31	44,221.25	23,539.87	..	2,027.12	9,265.15	759,136.55	527,567.60	34,948.22

Phillips River Goldfield.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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 ..	(M.L. 349) ..	(Christmas Gift) ..	..	..	..	..	..	..	..	169.50	23.26	..
Do. ..	(M.L. 349), (M.L. 355)	Christmas Gift leases ..	..	..	..	..	..	..	..	68.00	35.25	..
Do. ..	147, 179 ..	Fair Play leases ..	..	..	562.21	1,200.34	..	..	..	2,856.59	3,657.09	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 ..	..	..	782.37	821.82	..	..	..	2,062.20	1,792.82	..
Do. ..	184 ..	Gem ..	..	..	341.59	307.81	..	..	..	480.65	451.82	..
Do. ..	151 ..	(Gem Consolidated) ..	..	..	..	..	..	..	..	777.50	616.30	..
Do. ..	151, 156 ..	Gem Consolidated leases ..	..	..	149.45	157.84	..	..	..	3,780.46	1,861.25	8.00
Do. ..	M.L. 52, M.L. 94	Harbour View Gold and Copper Co., Ltd.	..	..	571.13	528.06 *57.30	..	..	..	1,081.48	1,202.23	..

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.	(M.L. 347)	Harbour View North		24.78	28.12			157.39	76.90	
Do.	98	Hillsborough		161.14	246.50			1,945.93	4,033.28	118.03
Do.	185	Mt. Iron		110.00	21.13			110.00	21.13	
Do.	M.L. 52, M.L. 94	(Ravensthorpe G.M. Syndicate, N.L.)						1,124.00	433.94	164.98
Do.	(182)	South Gift						273.39	146.94	
Do.	74	Two Boys		107.04	130.10			10,070.66	6,546.00	
Do.		Voided leases					113.28	172.41	8,992.14	1,991.82
Do.		Sundry claims		57.50	17.73		79.05	71.58	410.55	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			*24.15				24.15	
Do.	M.L. 208	(Desmond: Phillips River Gold & Copper Co., Ltd.)			*9.18				219.59	14.55
Do.	M.L. 95	Elverdton			*94.79				94.79	
Do.	M.L. 95	(Elverdton: Phillips River Gold & Copper Co., Ltd.)			*26.71				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 & Copper Co., Ltd.							.94	
Do.	(M.L. 357)	Ironclad							16.09	
Do.	M.L. 109	(Mt. Desmond)					1.40		36.97	
Do.	M.L. 109	Mt. Desmond: Phillips River Gold & 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 & Copper Co., Ltd.							3.14	
Do.		Voided leases						9.00	113.01	152.22
Do.		Sundry claims							29.50	51.01
Mt. Purchas.		Voided leases					4.38	298.05	260.96	
Do.		Sundry claims						4.75	4.68	
Ravensthorpe	(M.L. 116)	Last Chance			*3.83				37.30	46.57
Do.	M.L. 16	(Marion Martin)							20.09	
Do.	M.L. 16	Marion Martin			*32.88				32.88	
Do.	M.L. 16	(Marion Martin: Phillips River Gold & Copper Co., Ltd.)			*6.86				275.33	205.97
Do.	M.L. 175	(Mt. Benson)							287.88	
Do.	M.L. 175	Mt. Benson			*6.86				6.86	
Do.	M.L. 175	(Mt. Benson: Phillips River Gold & Copper Co., Ltd.)							482.20	199.83
Do.	(M.L. 351)	Mt. Benson East							5.01	
Do.	M.L. 15	(Mt. Cattlin)					.49	200.00	85.50	
Do.	M.L. 15	Mt. Cattlin			*48.71				48.71	
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 & Copper Co., Ltd.)							387.33	
Do.	M.L. 15	(Mt. Cattlin: Phillips River Gold & Copper Co., Ltd.)			*2.85				3,077.08	3,814.45
Do.	M.L. 342	Surprise			*5.82				17.64	
Do.		Voided leases					141.31	21,687.99	17,753.10	64.33
Do.		Sundry claims			*6.32		157.82	1,918.27	1,074.23	20.65

* From Copper Ore.

TABLE IV.—Production of Gold and Silver from all sources, etc.—continued.

Phillips River Goldfield—continued.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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.
West River	Voided leases .. .. .	..	..	..	..	..	..	..	..	10·34	31·06
Do.	Sundry claims .. .. .	..	..	..	*·05	..	..	..	..	1·74	3·44
		<i>From Goldfield generally :—</i>										
		Sundry parcels treated at :										
		Gem Battery .. .. .	..	..	..	..	..	..	..	..	138·89	..
		Phillips River Smelter .. .. .	..	..	..	31·00	94·84	..	..	..	261·39	493·66
		Two Boys' Works .. .. .	..	..	..	..	..	..	..	..	100·95	..
		Various Works .. .. .	..	..	..	..	..	..	..	..	4·76	..
		Reported by Banks and Gold Dealers .. .. .	..	..	..	..	..	122·05	..	..	..	..
		Total .. .. .	..	..	2,867·21	3,816·76	94·84	472·20	775·33	79,197·04	68,062·36	15,328·06

* From Copper Ore

† Donnybrook Goldfield.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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.
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	..

† Abolished 4th March, 1908.

State generally.

MINING CENTRE.	NUMBER OF LEASE.	REGISTERED NAME OF COMPANY OR LEASE.	TOTAL FOR 1915.					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.	
		Sundry parcels treated at:—											
		Fremantle Trading Co., Ltd.—Fremantle .. ..	..	..	..	272·59	1,632·53	..	..	..	2,043·15	8,069·80
		Hannan's Proprietary Works—Kalgoorlie .. ..	..	..	..	..	..	..	..	10·00	·90	..
		Oratava Works—Kalgoorlie .. ..	..	..	..	..	..	..	..	..	164·67	..
		Various Works .. ..	..	..	..	..	..	..	..	17·00	4,245·57	481·77
		Sundry Specimens .. ..	..	..	..	..	..	..	2·87	..	..	..
		Reported by Banks and Gold Dealers .. ..	..	..	..	..	..	124·89	153·03	..	..	..
		Total .. ..	..	..	..	272·59	1,632·53	124·89	155·90	27·00	6,454·29	8,551·57

TABLE VI.

COMPARATIVE RETURN OF GOLD BULLION ENTERED FOR EXPORT AND RECEIVED AT THE PERTH BRANCH OF THE ROYAL MINT, DURING THE YEARS 1913, 1914, AND 1915, SHOWING IN FINE OUNCES THE QUANTITY RECORDED EACH MONTH, AND ITS VALUE.

MONTHS AND QUARTERS.	1913.				1914.				1915.			
	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	9,738.44	94,966.58	104,705.02	444,758 13 1	9,762.33	102,260.64	112,022.97	475,843 6 7½	561.61	98,195.84	98,757.45	419,494 19 8
FEBRUARY	8,780.28	92,206.81	100,987.09	428,965 17 10	8,493.49	94,811.61	103,305.10	438,812 3 5½	606.80	103,661.48	104,268.28	442,903 10 0½
MARCH	754.13	97,014.63	97,768.76	415,295 5 10½	1,173.04	91,446.40	92,619.44	393,422 7 5½	1,892.11	91,872.09	93,764.20	398,285 0 1½
1st January to 31st March ...	19,272.85	284,188.02	303,460.87	1,289,019 16 9¾	19,428.86	288,518.65	307,947.51	1,308,077 17 6½	3,060.52	293,729.41	296,789.93	1,260,683 9 9½
APRIL	7,920.37	103,324.22	111,244.59	472,536 19 7½	8,773.75	90,233.07	99,006.82	420,554 4 9½	1,016.95	101,591.99	102,608.94	435,855 1 5½
MAY	7,094.03	103,084.87	110,178.90	468,010 4 4½	7,138.22	99,068.35	106,206.57	451,136 16 8	2,310.83	101,359.11	103,669.94	440,361 18 3½
JUNE	5,111.96	108,373.12	113,485.08	482,053 19 7	1,725.28	99,289.93	101,015.21	429,085 6 9	1,273.33	100,035.78	101,309.11	430,333 14 11
1st January to 30th June ...	39,399.21	598,970.23	638,369.44	2,711,621 0 5	37,066.11	577,110.00	614,176.11	2,608,854 5 9	7,661.63	596,716.29	604,377.92	2,567,234 4 5½
JULY	11,704.78	97,091.44	108,796.22	462,136 19 4½	8,293.67	88,305.48	96,599.15	410,327 2 1½	554.79	98,859.42	99,414.21	422,284 14 5½
AUGUST	7,610.81	102,558.22	110,169.03	467,968 5 10½	101.39	102,346.09	102,447.48	435,169 4 8½	1,079.11	99,941.49	101,020.60	429,108 4 8
SEPTEMBER	3,206.28	111,962.12	115,168.40	489,204 5 4½	1,534.96	103,577.74	105,112.70	446,490 7 4½	2,018.92	100,833.07	102,851.99	436,887 9 8
1st January to 30th September	61,921.08	910,582.01	972,503.09	4,130,930 11 0	46,996.13	871,339.31	918,335.44	3,900,840 19 11½	11,314.45	896,350.27	907,664.72	3,855,514 13 2½
OCTOBER	11,628.78	99,879.80	111,508.58	473,058 6 9¾	2,027.55	99,366.30	101,393.85	430,693 13 11¾	2,345.81	100,238.47	102,584.28	435,750 6 5¾
NOVEMBER	9,581.44	108,330.12	117,911.56	500,856 9 5	1,217.39	109,282.40	110,499.79	469,373 5 5½	797.16	99,205.88	100,003.04	424,785 18 3½
DECEMBER	3,123.83	108,996.22	112,120.05	476,255 14 0	1,213.58	101,534.16	102,747.74	436,444 13 1½	2,883.05	96,976.61	99,859.66	424,176 17 5¾
Total	86,255.13	1,227,788.15	1,314,043.28	5,581,701 1 2½	51,454.65	1,181,522.17	1,232,976.82	5,237,352 12 6½	17,340.47	1,192,771.23	1,210,111.70	5,140,227 15 5½

TABLE VII.

MONTHLY RETURN OF GOLD, CONTAINED IN BULLION, FURNACE PRODUCTS, AND ORE, ENTERED FOR EXPORT DURING 1915.

MONTH.	UNITED KINGDOM.			VICTORIA.			NEW SOUTH WALES.			SOUTH AUSTRALIA.			TOTALS.			Mintea Gold Exported.*
	Bullion.	Furnace Products.	Ore.	Bullion.	Furnace Products.	Ore.	Bullion.	Furnace Products.	Ore.	Bullion.	Furnace Products.	Ore.	Bullion.	Furnace Products.	Ore.	
1915.	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.	Fine ozs.
January	366.94	6.33	188.34	...	...	...	...	...	...	...	...	188.34	366.94	6.33	4,728.53
February	28.25	13.55	565.00	...	...	...	...	...	...	...	...	565.00	28.25	13.55	{ + 148.70
March	1,087.02	5.09	800.00	...	...	...	...	...	...	...	...	800.00	1,087.02	5.09	{ 8,310.89
April	513.68	8.89	404.38	...	...	...	...	...	...	...	...	494.38	513.68	8.89	{ 14,229.83
May	1,644.70	6.96	659.17	...	...	...	...	...	...	...	...	659.17	1,644.70	6.96	{ + 147.76
June	328.77	2.88	941.68	...	...	...	...	...	...	...	...	941.68	328.77	2.88	{ 11,819.97
July	269.72	1.16	282.50	...	...	...	...	...	...	1.41	...	282.50	269.72	2.57	{ 15,397.50
August	299.40	4.71	775.00	...	...	...	...	...	...	...	...	775.00	299.40	4.71	{ 9,470.11
September	182.65	...	1,836.27	...	...	...	...	...	...	...	...	1,836.27	182.65	...	{ + 174.10
October	932.90	...	588.00	...	...	824.91	...	...	...	...	...	1,412.91	932.90	...	{ 29,628.78
November	113.80	.64	682.72	...	...	...	...	...	...	...	...	682.72	113.80	.64	{ 7,108.94
December	696.55	.56	1,002.42	...	...	1,183.52	...	...	...	...	...	2,185.94	696.55	.56	{ + 165.00
TOTALS	6,464.38	50.77	8,815.48	...	...	2,008.43	...	...	...	1.41	...	10,823.91	6,464.38	52.18	{ 27,278.69
																{ 18,963.65
																{ 23,695.45

* When considering the total production of gold for this State, these amounts must be disregarded, having been already recorded in the total receipts of gold at the Mint.
 † To United Kingdom. All the other amounts in this column were fine bars of minted gold exported to India.

TABLE IX.—Minerals other than Gold, etc.—continued.

Period.	COPPER ORE—continued.													
	MURCHISON GF.				YALGOO GF.		NORTHAMPTON MF.		YANDANOOKA MF.		MT. MARGARET GOLDFIELD.			
	Meekatharra D.		Day Dawn D.		Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Mt. Morgans District.		Mt. Margaret District.	
	Quantity.	Value.	Quantity.	Value.							Quantity.	Value.	Quantity.	Value.
Previous to 1899	tons.	£	tons.	£	tons.	£	tons.	£	tons.	£	tons.	£	tons.	£
1899	...	...	...	...	...	...	98·0	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	...	...	...	...	...	...	...	...	...	...	18,965·00	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	...	...	...	...	...	...	...	...
Total	790·39	6,379	55·56	522	38·40	413	136·50	1,992	171·55	1,889	47,857·67	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	10,414·57	57,273	3·08	40	18,978·42	180,387
1908	1·42	18	...	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	1,318·88	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
Total	6·12	51	50·67	330	81,519·47	418,104	124·66	1,922	206,377·94	1,295,296

Period.	IRONSTONE.								LEAD ORE.		SILVER LEAD ORE.		COAL.	
	W. PILBARA GF.		E. COOLGARDIE GF.		STATE GENERALLY.		TOTAL.		NORTHAMPTON MF.		ASHBURTON GF.		COLLIE RIVER COAL MF.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Previous to 1899	100·00	300	...	...	...	...	100·00	300	...	...	...	...	3,508·00	1,761
1899	12,852·00	8,939	12,852·00	8,939	82·75	912	...	...	54,336·00	25,951
1900	12,251·00	9,258	12,251·00	9,258	268·00	533	...	...	118,410·10	54,835
1901	450·00	247	20,119·00	12,999	20,569·00	13,246	...	...	21·05	152	117,835·80	68,561
1902	4,800·00	2,040	4,800·00	2,040	...	...	35·85	277	140,883·90	86,188
1903	220·00	88	220·00	88	...	...	...	...	133,426·62	69,128
1904	1,441·50	577	1,441·50	577	...	...	...	...	138,550·04	67,174
1905	3,212·60	1,285	3,212·60	1,285	...	...	...	...	127,364·06	55,312
1906	1,279·87	512	1,279·87	512	...	...	...	...	149,755·27	57,998
1907	1,093·53	438	1,093·53	438	10·00	128	...	...	142,372·54	55,158
1908	57·00	461	727·25	6,914	175,247·92	75,694
1909	440·00	3,520	214,301·98	90,965
1910	10·50	12	10·50	12	185·10	1,777	...	...	262,166·06	113,699
1911	8,194·76	17,663	...	...	249,899·15	111,154
1912	11,098·50	24,412	...	...	295,078·91	135,857
1913	26,589·53	50,474	125·50	1,757	313,817·96	153,614
1914	15,334·62	38,351	715·10	9,807	319,210·32	148,684
1915	15,678·30	29,396	298·96	4,429	286,666·35	137,859
Total	100·00	300	450·00	247	57,280·00	36,148	57,830·00	36,695	77,498·56	164,107	2,363·71	26,856	3,242,830·98	1,509,592

† Iron ore from Koolan Island, Yampi Sound.

TABLE IX.—Minerals other than Gold, etc.—continued.

Period.	WOLFRAM ORE.		GODOLINITE.		ASBESTOS.		LIMESTONE.								DIAMONDS.	
	STATE GENERALLY.		PILBARA GF.		PILBARA GF.		MURCHISON GF.		YILGARN GOLDFIELD.		STATE GENERALLY.		TOTAL.		PILBARA GF.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	tons.	£	tons.	£	tons.	£	tons.	£	tons.	£	tons.	£	tons.	£	carats.	£
Previous to 1899
1899	17,593-00	2,838	17,593-00	2,838	...	...
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	40-00	1,600	...	...	...	...	...	...	...	...	...	...
1909	...	*5-00	90	...	2-83	154	...	...	...	...	...	...	...	...	...	...
1910	...	†42-00	115	...	...	...	...	...	...	...	...	...	...	...	...	...
1911	...	†194-00	877	...	...	...	...	...	...	...	...	...	...	...	...	...
1912
1913	...	‡4-64	69	1-00	112	...	...	...	...	...	...	...	...	...	...	...
1914
1915	...	**25	27	...	...	...	...	...	...	...	...	...	...	...	...	...
Total ..	245-89	1,178	1-00	112	42-83	1,754	298-00	772	2,548-85	1,607	90,858-88	15,911	93,705-73	18,290	...	24

MAGNESITE.

EAST COOLGARDIE GOLD-FIELD.

Period.

Bulong District.

Quantity. Value.

Previous to 1899

1899

1900

1901

1902

1903

1904

1905

1906

1907

1908

1909

1910

1911

1912

1913

1914

1915

Total

Tons.

£

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...

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601-50

601

601-50**601**

* 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 XXIV., pages 98-101.

TABLE X.—Quantity and Value of BLACK TIN, etc.—continued.

LOCALITY.	NUMBER OF LEASE, CLAIM, OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1915.				TOTALS TO DATE.			
			Quantity.			Value.	Quantity.			Value.
			Lode.	Stream.	Total.		Lode.	Stream.	Total.	
			tons.	tons.	tons.	£	tons.	tons.	tons.	£
GREENBUSHES MINERAL FIELD—continued.										
Greenbushes	504	Old Bunbury .. ..	..	..	..	..	..	35·05	35·05	3,129
Do. ..	498	Rat .. ..	..	..	..	..	..	·74	·74	84
Do. ..	505	Scotia .. ..	..	3·78	3·78	258	..	37·07	37·07	3,227
Do. ..	450, 458, 485, 486, 487, 488, 489	Stanhope United leases ..	..	29·99	29·99	3,050	..	378·98	378·98	41,033
Do. ..	569	Substitute .. ..	..	5·50	5·50	500	..	8·50	8·50	910
Do. ..	529	Three C's. .. ..	..	34·96	34·96	2,773	..	53·33	53·33	4,314
Do. ..	565	Turn of the Tide .. ..	..	..	..	..	..	3·09	3·09	263
Do. ..	218	(W.A. Mount Bischoff) ..	..	..	..	..	..	5·38	5·38	342
Do. ..	(381), (435), (436), 472, (478)	(Westralian Gully Tin Co., Ltd.)	..	..	..	..	6·38	34·38	40·76	3,235
Do. ..	35, (169), (195), 218, (221), (228), (272), 287, (293), 295, (299), (310), (375)	(Westralian Stanneries, Ltd.) ..	..	..	..	..	..	109·33	109·33	8,171
Do. ..	Loc. 289, 290	Freehold Ground (Clarth and others)	..	..	..	..	..	318·04	318·04	28,959
Do. ..	..	Voided leases .. ..	..	..	..	..	114·17	645·25	759·42	68,125
Do. ..	..	Sundry claims	2·22	109·54	111·76	9,654	24·53	6,046·11	6,070·64	428,257
		Totals	7·55	239·78	247·33	21,431	234·59	9,193·32	9,427·91	726,990

TABLE XI.

QUANTITY AND VALUE OF TANTALITE REPORTED TO THE MINES DEPARTMENT DURING 1915,
AND TOTALS TO DATE.

LOCALITY.	NUMBER OF LEASE, CLAIM, OR AREA	REGISTERED NAME OF COMPANY OR LEASE.	19.5.				TOTAL TO DATE.				
			Quantity.			Value.	Quantity.			Value.	
			Lode.	Stream.	Total.		Lode.	Stream.	Total.		
			tons.	tons.	tons.	£	tons.	tons.	tons.	£	
PILBARA GOLDFIELD.											
MARBLE BAR DISTRICT.											
Wodgina	... 86, 87, 95	H.M. and Anchorite leases	...	...	...	...	2.25	32.30	34.55	5,558
Do.	...	Sundry claims	...	...	...	...	...	51.50	51.50	6,124
		Totals	...	...	...	...	2.25	83.80	86.05	11,682
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 1915,
AND TOTALS TO DATE.

LOCALITY.	NUMBER OF LEASE, CLAIM, OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1915.		TOTAL TO DATE.	
			Quantity.	†Value.	Quantity.	†Value.
			tons.	£	tons.	£
MT. MARGARET GOLDFIELD.						
MT. MORGANS DISTRICT.						
Eulaminna	... 4F, 5F, 11F, 12F	West Australian Copper Co., Ltd.	5,146.37	1,794	37,808.96	13,139
Murrin Murrin	... 18F	Nangeroo: Nangaroo Mines, Ltd.	1,411.25	574	6,288.39	2,444
		Totals	6,557.62	2,368	44,097.35	15,583

† Represents the value of the sulphur only, the copper contents not having been treated yet.

TABLE XIII.

QUANTITY AND VALUE OF COPPER ORE REPORTED TO THE MINES DEPARTMENT DURING 1915,
AND TOTALS TO DATE.

LOCALITY.	NUMBER OF LEASE, CLAIM, OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1915.			TOTALS TO DATE.		
			Quantity.		Value	Quantity.		Value.
			Ore.	Metallic Copper.		Ore.	Metallic Copper.	
			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 Shore	...	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	..	Carlow Castle	..	..	..	59·28	9·50	662
Do.	..	Good Fortune leases	..	..	..	219·15	44·75	2,988
Do.	..	M.L. 143	..	..	..	..	..	..
Do.	..	(M.Ls. 145),	..	..	..	..	..	..
Do.	..	(146), (164),	..	..	..	..	..	..
Do.	..	(165)	..	..	..	..	..	..
Do.	..	M.L. 178	..	..	..	3·73	·57	46
Do.	..	M.L. 167	..	..	..	22·43	3·49	256
Do.	..	M.Ls. 179,	..	..	..	20·00	4·00	280
Do.	..	180	..	..	..	..	..	..
Do.	..	M.L. 144	..	..	..	7·90	2·55	190
Do.	..	Voided leases	..	..	..	1,721·67	317·68	25,971
Do.	..	Sundry claims	..	..	..	8·10	·74	55
Whim Creek	..	(Balla Balla Copper Mines, Ltd.)	..	..	..	2,009·00	166·33	12,036
Do.	..	M.L. 34	..	..	..	77·00	12·10	774
Do.	..	M.L. 34	..	..	..	..	..	..
Do.	..	Mons Cupri: Whim Well Copper	..	..	..	..	..	..
Do.	..	Mines, Ltd.	..	..	..	..	..	..
Do.	..	Whim Well Copper Mines, Ltd.	..	..	..	275·02	47·44	2,975
Do.	..	Voided leases	..	..	..	69,372·55	8,830·80	555,307
		Totals	..	..	..	314·75	55·30	3,546
			74,873·50	9,655·64	615,785
ASHBURTON GOLDFIELD.								
Red Hill	..	Voided leases	..	..	..	175·50	33·85	2,126
Uaroo	..	Victoria	..	..	..	146·00	55·24	3,744
Do.	..	Voided leases	..	..	..	23·25	7·25	444
		Totals	..	..	..	146·00	55·24	3,744
			344·75	96·34	6,314
PEAK HILL GOLDFIELD.								
Peak Hill	..	Bulla Downs	..	..	..	21·93	5·49	432
Do.	..	Resurgam	..	..	..	9·88	4·62	343
Do.	..	Sons of Gwalia	..	..	..	171·24	76·52	5,607
Do.	..	Sons of Gwalia, South leases	..	..	..	..	..	..
Do.	..	11P	..	..	..	..	..	..
Do.	..	M.Ls. (29P),	..	..	..	7·79	3·56	285
Do.	..	(30P), 31P	..	..	..	..	..	..
Do.	..	Voided leases	..	..	..	7·75	3·48	223
Do.	..	Sundry claims	..	..	..	26·74	12·22	951
		Totals	..	..	..	237·58	102·41	7,618
			350·28	149·65	10,027
EAST MURCHISON GOLDFIELD.								
LAWLERS DISTRICT.								
Kathleen Valley	..	Voided leases	..	..	..	6·77	1·32	69
Lawlers	..	Sundry claims	..	..	..	10·93	2·03	147
		Totals	..	..	..	10·93	2·03	147
			17·70	3·35	216

TABLE XIII.—Quantity and Value of COPPER ORE, etc.—continued.

LOCALITY.	NUMBER OF LEASE, CLAIM, OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1915.			TOTALS TO DATE.		
			Quantity.		Value.	Quantity.		Value.
			Ore.	Metallic Copper.		Ore.	Metallic Copper.	
			tons.	tons.	£	tons.	tons.	£
MURCHISON GOLDFIELD.								
MERKATHARRA DISTRICT.								
Gabanintha ..	G.M.L. 1175N	Unexpected	33·70	6·55	492	42·22	8·32	606
Do. ..	..	Voided leases .. .. .	..	..	..	741·50	83·60	5,639
Do. ..	..	Sundry claims .. .. .	..	..	..	6·67	2·06	134
		Totals	33·70	6·55	492	790·39	93·98	6,379
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	4·99	1·10	95
Twin Peaks ..	..	Sundry Claims .. .. .	..	..	..	19·50	3·49	227
Wadgingarra ..	..	Voided leases .. .. .	..	..	..	13·91	·98	91
		Totals	4·99	1·10	95	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 Mine... ..	..	..	..	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], (12c, 37c),	(Mt. Malcolm Copper Mine) ..	..	..	..	13,516·00	1,001·98	70,754
Do. ...	[10c, 11c], 4F, 5F	(Mt. Malcolm Copper Mine) ..	..	..	..	3,839·00	418·00	17,065
Do. ...	[10c, 11c], (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	1,976·03	80,199
Mt. Margaret ...	..	Voided leases .. .. .	..	..	..	11·53	2·40	163
Murrin Murrin	18F ..	Nangeroo: Nangeroo Mines, Ltd. ....	..	..	..	6·80	3·00	160
Do. ...	..	Voided leases .. .. .	..	..	..	1,525·29	248·04	16,662
		Totals .. .. .	..	..	..	47,857·67	4,443·00	230,820
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

TABLE XIII.—Quantity and Value of COPPER ORE, etc.—continued.

LOCALITY.	NUMBER OF LEASE, CLAIM, OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1915.			TOTALS TO DATE.		
			Quantity.		Value.	Quantity.		Value.
			Ore.	Metallic Copper.		Ore.	Metallic Copper.	
			tons.	tons.	£	tons.	tons.	£
PHILLIPS RIVER GOLDFIELD.								
Kundip	M.Ls. (349), (355)	(Christmas Gift leases) .. ..	..	..	..	8·00	1·13	72
Do.	G.M.Ls. 147, 179	Fair Play leases .. ..	..	14·50	820	130·09	42·13	2,555
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 .. ..	..	8·35	472	..	11·94	675
Do.	G.M.Ls. 151, 156	Gem Consolidated leases .. ..	..	1·98	112	48·00	5·33	341
Do.	M.Ls. 52, 94	Harbour View Gold and Copper Co., Ltd.	122·00	15·98	902	389·61	31·29	1,880
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.	(M.L. 347)	Harbour View North .. ..	..	..	..	6·55	·43	27
Do.	G.M.L. 98	Hillsborough .. ..	..	·35	20	692·84	28·08	1,816
Do.	M.Ls. 52, 94	(Ravensthorpe G.M. Syndicate, N.L.)	..	..	..	132·56	24·36	1,382
Do.	(G.M.L. 182)	South Gift .. ..	..	..	..	..	·39	22
Do.	..	Voided leases .. ..	..	..	..	949·50	104·67	6,772
Do.	..	Sundry claims	6·21	·96	54	72·39	10·52	741
Mt. Desmond	M.L. 203 ..	British Flag : Phillips River Gold and Copper Co., Ltd.	..	..	..	19·90	3·64	250
Do.	M.L. 208 ..	Desmond	202·05	29·21	1,651	202·05	29·21	1,651
Do.	M.L. 208 ..	(Desmond : Phillips River Gold and Copper Co., Ltd.)	41·64	5·52	312	1,234·05	215·74	14,956
Do.	M.L. 95 ..	(Elverdton) .. ..	..	..	..	130·00	5·70	570
Do.	M.L. 95 ..	Elverdton	1,465·74	143·28	8,094	1,465·74	143·28	8,094
Do.	M.L. 95 ..	(Elverdton : Phillips River Gold and Copper Co., Ltd.)	388·20	37·65	2,127	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) .. ..	..	..	..	18·48	2·39	119
Do.	M.L. 168 ..	Elverton South : Phillips River Gold and Copper Co., Ltd.	..	..	..	15·73	1·46	92
Do.	(M.L. 357)	Ironclad .. ..	..	..	..	69·21	10·94	649
Do.	M.L. 109 ..	(Mt. Desmond) .. ..	..	..	..	198·87	30·77	1,640
Do.	M.L. 109 ..	Mt. Desmond : Phillips River Gold and Copper Co., Ltd.	..	..	..	1,762·22	216·76	18,128
Do.	M.L. 199 ..	(P.L.P.) .. ..	..	..	..	208·66	33·69	2,277
Do.	M.L. 199 ..	P.L.P. : Phillips River Gold and Copper Co., Ltd.	..	..	..	17·56	1·88	121
Do.	..	Voided leases .. ..	..	..	..	945·96	155·77	9,121
Do.	..	Sundry claims .. ..	..	..	..	87·05	17·59	1,142
Ravensthorpe	(M.L. 116)	Last Chance	69·53	9·56	540	1,351·39	214·58	12,979
Do.	M.L. 16 ..	(Marion Martin) .. ..	..	..	..	865·69	130·61	6,650
Do.	M.L. 16 ..	Marion Martin	472·77	52·49	2,965	472·77	52·49	2,965
Do.	M.L. 16 ..	(Marion Martin : Phillips River Gold and Copper Co., Ltd.)	131·60	22·19	1,254	2,855·36	375·44	23,506
Do.	M.L. 175 ..	(Mount Benson) .. ..	..	..	..	605·19	73·64	3,702
Do.	M.L. 175 ..	Mount Benson	27·95	3·15	177	27·95	3·15	177
Do.	M.L. 175 ..	(Mount Benson : Phillips River Gold and Copper Co., Ltd.)	..	..	..	1,164·80	82·43	5,832
Do.	(M.L. 351)	Mount Benson East .. ..	..	..	..	36·71	5·88	365
Do.	M.L. 15 ..	(Mount Cattlin) .. ..	..	..	..	281·56	31·35	1,716
Do.	M.L. 15 ..	Mount Cattlin	358·64	27·18	1,537	358·64	27·18	1,537
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.)	14·01	1·97	111	14,432·25	714·90	40,313
Do.	M.L. 342 ..	Surprise	258·39	40·94	2,314	584·19	116·51	7,288
Do.	..	Voided leases .. ..	..	..	..	3,334·60	416·77	24,967
Do.	..	Sundry claims	117·15	10·33	581	454·48	42·00	2,467
Do.	..	Voided leases .. ..	..	..	..	44·04	7·41	414
Do.	..	Sundry claims	4·73	·53	30	123·02	22·73	1,728
Do.	..	From Goldfield generally	·42	·36	20	1,108·57	103·28	6,349
Totals			3,681·03	426·48	24,093	81,519·47	6,837·57	418,104
STATE GENERALLY.								
M.L. 227H	Holbrook	4·22	·94	64	4·22	·94	64	
M.L. 228H	Obagama	8·97	1·82	136	8·97	1·82	136	
M.L. 221H	Yampi Sound Copper Mine	54·36	13·59	1,047	92·86	22·80	1,473	
Λ97H	M. McCulloch	2·03	·23	16	2·03	·23	16	
	Voided leases .. ..	..	..	..	3·08	1·26	40	
	Sundry claims .. ..	..	..	..	13·50	2·27	193	
Totals			69·58	16·63	1,263	124·66	29·37	1,922

TABLE XIV.

QUANTITY AND VALUE OF IRONSTONE REPORTED TO THE MINES DEPARTMENT DURING 1915,
AND TOTALS TO DATE.

LOCALITY.	NUMBER OF LEASE, CLAIM, OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1915.		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
Coates' Paddock	4,712'00	3,277
Greenbushes	7,418'00	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 1915,
AND TOTALS TO DATE.

LOCALITY.	NUMBER OF LEASE, CLAIM, OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1915.			TOTALS TO DATE.		
			Lead Ore.	Metal therefrom.	Value.	Lead Ore.	Metal therefrom.	Value.
			tons.	tons.	£	tons.	tons.	£
NORTHAMPTON MINERAL FIELD.								
Geraldine .. ..	...	Voided leases .. ..	..	..	..	57'00	41'61	461
Narra Tarra	Loc. 833	Narra Tarra Lead Mine .. ..	..	..	..	744'05	540'13	10,318
Do. ... ..	...	Sundry Claims .. ..	..	..	..	225'00	27'00	185
Northampton	Loc. 1472	Baddera Lead Mine	15,124'80	1,433'35	27,954	75,783'26	8,439'48	150,313
Do.	M.Ls. 127 128, 129	Kirton's leases	550'00	84'50	1,395	550'00	84'50	1,395
Do. ... ..	...	Voided leases .. ..	..	..	..	116'75	72'58	1,176
Do. ... ..	...	Sundry claims	3'50	1'98	47	3'50	1'98	47
Victoria .. ..	...	Voided leases .. ..	..	..	..	19'00	12'54	212
		Totals.. ..	15,678'30	1,519'83	29,396	77,498'56	9,219'82	164,107

TABLE XVI.

QUANTITY AND VALUE OF SILVER-LEAD ORE REPORTED TO THE MINES DEPARTMENT DURING 1915
AND TOTALS TO DATE.

LOCALITY.	NUMBER OF LEASE, CLAIM, OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1915.		TOTALS TO DATE.	
			Quantity.	Value.	Quantity.	Value.
			tons.	£.	tons.	£
ASHBURTON GOLDFIELD.						
Ashburton ... ..	...	Voided leases ... ..	...	...	56'90	429
Uaroo	43, 49, 84	Uaroo Silver-Lead Mines, Ltd.	298'96	4,429	2,306'81	26,427
		Totals	298'96	4,429	2,363'71	26,856

TABLE XVII.

QUANTITY AND VALUE OF COAL REPORTED TO THE MINES DEPARTMENT DURING 1915,
AND TOTALS TO DATE.

LOCALITY.	NUMBER OF LEASE, CLAIM, OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1915.		TOTALS TO DATE.	
			Quantity.	Value.	Quantity.	Value.
			tons.	£	tons.	£
COLLIE RIVER MINERAL FIELD.						
Collie ..	197, etc.	Cardiff Coal Mining Co., Ltd.	59,195·49	25,207	586,532·57	249,556
Do. ..	151, etc.	(Collie-Boulder Coal Co., Ltd.) .. .. .	..	..	71,512·70	26,139
Do. ..	244, etc.	Collie Co-operative Collieries, Ltd.	63,500·35	32,277	619,963·85	296,941
Do. ..	88 (pt. of)	(Collie Proprietary Coalfields of W.A., Ltd.), (No. 1 Pit)	..	..	477,781·55	242,918
Do. ..	85-100	(Collie Proprietary Coalfields of W.A., Ltd.), (No. 2 Pit)	..	..	580,392·15	289,246
Do. ..	260-266	Premier Coal Mining Co., Ltd. .. .. .	..	..	79,962·26	36,943
Do. ..	151, etc.	Scottish Co-operative Collieries Co., Ltd.	37,239·90	17,142	430,656·95	171,253
Do. ..	88 (pt. of)	The Proprietary Coal Mines of W.A., Ltd. (No. 1 Pit)	..	..	109·00	54
Do. ..	85-100	The Proprietary Coal Mines of W.A., Ltd. (No. 2 Pit)	73,781·89	36,978	200,282·89	100,923
Do. ..	250-254, 256	Westralia Coal Mining Co., Ltd.	52,948·72	26,255	170,067·21	82,689
		Voided leases .. .. .	..	..	25,569·85	12,930
		Totals	286,666·35	137,859	3,242,830·98	1,509,592

TABLE XVIII.

QUANTITY AND VALUE OF LIMESTONE REPORTED TO THE MINES DEPARTMENT DURING 1915,
AND TOTALS TO DATE.

LOCALITY.	NUMBER OF LEASE, CLAIM, OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1915.		TOTALS TO DATE.	
			Quantity.	Value.	Quantity.	Value.
			tons.	£	tons.	£
MURCHISON GOLDFIELD.						
CUE DISTRICT.						
Cuddingwara		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 1915,
AND TOTALS TO DATE.

LOCALITY.	NUMBER OF LEASE, CLAIM, OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1915.		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

TABLE XX.

QUANTITY AND VALUE OF GODOLINITE REPORTED TO THE MINES DEPARTMENT DURING 1915,
AND TOTALS TO DATE.

LOCALITY.	NUMBER OF LEASE, CLAIM OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1915.		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 WOLFRAM REPORTED TO THE MINES DEPARTMENT DURING 1915,
AND TOTALS TO DATE.

LOCALITY.	NUMBER OF LEASE, CLAIM OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1915.			TOTALS TO DATE.		
			Ore.	Metallic contents.	Value.	Ore.	Metallic contents.	Value.
			tons.	tons.	£	tons.	tons.	£
MURCHISON GOLDFIELD.								
CUE DISTRICT.								
Callie Spring	...	Sundry Claims	...	...	...	4.64	.70	69
Cuddingwarra	...	Voided Leases	...	...	...	194.00	6.11	877
Do.	...	Sundry claims	...	...	...	20.00	.85	85
		Totals	...	...	...	218.64	7.66	1.031
YALGOO GOLDFIELD.								
Yalgoo	M.L., 36	Yandanoo King, North	..	..	..	.25	.12	27
		Totals	..	..	..	.25	.12	27
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 1915,
AND TOTALS TO DATE.

LOCALITY.	NUMBER OF LEASE, CLAIM, OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1915.		TOTALS TO DATE.				
			Quantity.	Value.	Quantity.	Value.			
			tons.	£	tons.	£			
EAST COOLGARDIE GOLDFIELD.									
BULONG DISTRICT.									
Bulong	^ 59H	(Sheppard, W.)	601.50	601	601.50	601
		Totals	601.50	601	601.50	601

TABLE XXIII.

QUANTITY AND VALUE OF DIAMONDS REPORTED TO THE MINES DEPARTMENT DURING 1915,
AND TOTALS TO DATE.

LOCALITY.	NUMBER OF LEASE, CLAIM, OR AREA.	REGISTERED NAME OF COMPANY OR LEASE.	1915.		TOTALS TO DATE.	
			Quantity.	Value.	Quantity.	Value.
			carats.	£	carats.	£
PILBARA GOLDFIELD.						
NULLAGINE DISTRICT.						
Nullagine	M.R.C.6L	(Morgans, A. E.)	...	...	...	24
		Totals	...	...	...	24

TABLE

RETURN OF ORE AND MINERALS OTHER THAN GOLD

YEAR.	COPPER.												Total Value of Copper Exported
	COPPER ORE.										COPPER INGOT, MATTE, Etc.		
	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	† 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	56,866	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
Total	...	...	...	...	...	...	...	...	66,117	764,631	9,880	619,424	1,384,055

† See Woodward's Mining Handbook, Perth: By Authority, 1895; page 123.

‡ Weight not stated.

XXIV.

ENTERED FOR EXPORT FROM 1850 TO 1915, INCLUSIVE.

T I N .											YEAR.
BLACK TIN (Dressed Tin).								TIN INGOT. (White tin.)		Total Value of Tin Exported.	
Pilbarra Gf.		Greenbushes Mf.		*†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
...	9
...	...	5	300	...	...	5	300	...	...	300	1890
...	...	68	5,400	...	...	68	5,400	...	...	5,400	1
...	...	204	10,200	...	...	204	10,200	...	...	10,200	2
...	...	265	13,843	...	...	265	13,843	...	...	13,843	3
...	...	171	7,664	...	...	228	11,134	...	...	11,134	4
57	3,470	371	14,325	...	...	390	15,274	...	...	15,274	5
19	949	277	9,703	...	...	277	9,703	...	...	9,703	6
...	...	137	4,338	...	...	137	4,338	...	...	4,338	7
...	...	96	3,275	...	...	96	3,275	...	...	3,275	8
...	...	68	2,760	...	...	68	2,760	...	...	2,760	9
30	2,025	278	21,138	...	...	308	23,163	...	...	23,163	1900
368	30,146	102	8,032	...	...	470	38,178	142	18,872	57,050	1
439	34,600	68	4,895	...	...	507	39,495	97	12,607	52,102	2
248	19,698	31	2,870	...	...	279	22,568	141	16,830	39,398	3
267	20,988	25	1,868	...	...	292	22,856.	235	29,277	52,133	4
64	4,932	24	1,389	379	20,797	467	27,118	129	16,155	43,273	5
188	16,853	119	8,177	666	51,748	793	76,778	†	1	76,779	6
329	28,375	444	46,254	624	64,005	1,397	138,634	45	8,746	147,380	7
...	1,424	151,414	1,424	151,414	78	14,725	166,139	8
...	1,093	83,294	1,093	83,594	†	1	83,595	9
...	698	62,989	698	62,989	...	...	62,989	1910
...	500	45,129	500	45,129	...	...	45,129	1911
...	495	55,220	495	55,220	...	...	55,220	1912
...	651	79,738	651	79,738	...	...	79,738	1913
...	484	72,142	484	72,142	...	...	72,142	1914
...	363	35,649	363	35,649	...	...	35,649	1915
...	429	41,391	429	41,391	...	...	41,391	Total
...	12,568	1,092,283	867	117,214	1,209,497	Total

*† Probably the produce of Pilbara Goldfield and Greenbushes Mineral Field.

TABLE XXIV.—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	...	...	†	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	...	...	18	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	...	...	†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	...	...	†7	155	...	...
7	...	...	3,956	47,466	...	...	†1	15	...	...
8	...	...	3,618	43,410	...	...	...	...	...	...
9	...	...	2,775	33,300	...	...	...	...	...	...
1880	...	...	1,921	15,368	...	...	†5	89	...	...
1	...	...	1,401	11,204	...	...	†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	...	...	†6	120	...	...
8	...	...	532	5,320	...	...	†2	40	...	...
9	...	...	250	2,500	...	...	...	...	...	...
1890	...	...	214	2,135	...	...	...	...	...	...
1	...	...	25	250	...	...	...	...	...	...
2	...	...	30	150	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...	...
7	...	...	...	...	...	...	...	...	...	...
8	...	...	†	4	...	...	†1	11	...	...
9	...	...	5	33	...	...	...	...	...	...
1900	28,749	3,594	16	96	...	...	77	1,077	...	...
1	60,869	7,609	27	242	...	...	...	...	...	...
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	176,843	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	...	...	...	...	14	217
1912	165,371	19,725	1,868	22,270	...	...	...	...	...	...
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
Total	3,036,455	358,162	44,032	508,748	3,823	47,103	697	13,608	170	4,807

† Weight not stated. †† Estimated. †† 4 cwts. †† Includes Cobalt ore, 2 tons, valued at £41: Plumbago ore, 1 ton, valued at £6. † Ore and Concentrates.

†† Includes Antimony ore, 25 tons ... = £630
Scheelite, 4 tons ... = 140
N.E.I., 71 tons ... = 817
Total ... = £1,587

†† Includes Tantalite ... = £400
N.E.I., 42 tons ... = £2,750
Total ... = £3,150

†† Includes Other Concentrates, 29 tons ... = £108
N.E.I., 234 tons ... = £627
Total ... = £735

†† Includes N.E.I., † ton ... = £100
†† Includes: Iron ore, 9 tons ... = £7
Ores, N.E.I., 5 tons ... = 400
Total ... = £407

entered for EXPORT from 1850 to 1915, inclusive—continued.

WOLFRAM.		NON-METALLIC MINERALS.						MINERALS NOT ELSEWHERE INCLUDED.		Total Value of Minerals other than Gold, Exported to Date.	YEAR.
State generally.		ASBESTOS.		COAL.		MICA.		Quantity.	Value.		
Quantity	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.			Quantity.	Value.
tons.	£	tons.	£	tons.	£	tons.	£	tons.	£		
...	55	1850	
...	1	
...	1,211	2	
...	2,440	3	
...	2,951	4	
...	2,218	5	
...	4,330	6	
...	10,751	7	
...	14,752	8	
...	9,006	9	
...	7,129	1860	
...	12,626	1	
...	14,508	2	
...	18,016	3	
...	21,726	4	
...	11,644	5	
...	15,929	6	
...	14,451	7	
...	10,719	8	
...	14,604	9	
...	5,040	1870	
...	4,368	1	
...	12,434	2	
...	26,723	3	
...	30,628	4	
...	30,638	5	
...	48,284	6	
...	43,545	7	
...	33,300	8	
...	15,577	9	
...	11,224	1880	
...	14,371	1	
...	7,341	2	
...	6,642	3	
...	5,048	4	
...	8,012	5	
...	5,175	6	
...	6,848	7	
...	4,704	8	
...	7,671	9	
...	14,912	1890	
...	2†	25	...	22,714	1	
...	2†	4	...	11,744	2	
...	15,274	3	
...	2†	3	...	22,658	4	
...	4,438	5	
...	2†	209	...	4,532	6	
...	7,060	7	
...	1	1	...	...	...	66,611	8	
...	...	2†	1	798	772	2†	50	...	95,261	9	
...	355	350	2†	3	...	171,453	1900	
...	971	969	...	...	...	4	1	
...	12	12	...	...	6† 3	47	2	
...	110	127	...	...	7† 22	230	3	
...	11	7	...	...	...	81	4	
...	108	87	...	...	8† 80	5,856	5	
...	86	65	...	...	...	1,035	6	
...	26	28	...	...	...	1,587	7	
...	*1,447	1,138	...	...	9† 100	402,906	8	
...	13	11	...	...	...	...	9	
...	...	2†	1,242	*9,612	7,747	2†	10	10†	3,150	10	
...	353	183	...	...	...	...	11	
1	100	...	...	*85,647	93,781	...	...	11† 263	735	12
...	3	2	...	...	...	...	13	
2	190	...	...	*48,876	38,400	...	...	12†	100	14
...	15	
9	826	...	...	*40,063	29,344	...	...	13† 14	407	16
...	6	6	...	...	...	...	17	
...	*42,802	30,721	...	...	14†	8	18	
1	86	...	...	*54,228	39,125	...	...	...	...	19
...	*54,416	38,244	...	...	...	...	20	
1	40	...	...	1,667	1,518	4	323	15† 16	675	21
...	*26,167	19,288	2†	26	16† 701	1,311	22	
...	23	
14	1,267	...	1,253	357,578	301,921	...	653	...	15,328	3,846,402	Total.

* Bunker Coal. 7† Antimony ore. 8† Includes Tantalite, 18 tons, valued at £5,729.

14† Includes Manganese, 2 tons ... = £4
N.E.I. ... = 4
Total ... = £8

10† Includes Bismuth, 1 ton ... = £37
Magnesite, 688 tons ... = 1,196
Fireclay, 12 tons ... = 75
Manganese, 3 cwt, ... = 3

15† Includes Bismuth, 9 tons ... = £635
Graphite, 7 tons ... = 40
Total ... = £675

Total ... = £1,311

PART III.—ALL MINES.

TABLE XXV.

MILLING AND CYANIDING PLANTS ERECTED IN THE RESPECTIVE GOLDFIELDS, DISTRICTS, AND MINERAL FIELDS ON THE 31ST DECEMBER, 1915, AND THE TOTAL VALUE OF MINING MACHINERY.

Mining Centre and Lease or Area.	NAME OF MINE, COMPANY, OR WORKS.	MILLING.									CYANIDING.			Value of all Mining Machinery.	
		Batteries.	Other Mills.								Leaching Vats.	Agitating Vats.	Vacuum Filters and Presses.		
			Number of Heads of Stampers.	Prospecting Mills.	Ball Mills.	Griffin Mills.	Huntington Mills.	Tremain Mills.	Puddlers.	Other Crushers.					Flint Mills.	Grinding Pans.
PILBARA GOLDFIELD.															
MARBLE BAR DISTRICT.															
<i>Bamboo Creek.</i> (695)	Bulletin	10										4			
^	State Battery, Bamboo Creek ..	5										5			
<i>Elsie.</i> 792	Trio	3													
<i>Lalla Rookh.</i> R.C. 112	Lalla Rookh G.M.	10											3		
<i>Marble Bar.</i> 694	Jo Jo G.M.	5													
^	State Battery, Marble Bar	5													
<i>Warrawoona.</i> (505)	Bow Bells	10													
^	Klondyke Boulder G.M. Co., Ltd. ..	5													
<i>Yandicoogina.</i> 604	Lady Adelaide Battery	10										4			
	Total	63										13	3		£9,378
NULLAGINE DISTRICT.															
<i>Eastern Creek.</i> M.A. 11	Doherty's Works	10										4			
<i>Middle Creek.</i> 106L	Barton	10										6			
<i>McPhee's Creek.</i> M.A. 12L	Judge	3													
<i>20-Mile Sandy Creek.</i> ^	State Battery, 20-Mile Sandy Creek ..	5									1	3			
	Total	28									1	13			£6,313
WEST PILBARA GOLDFIELD.															
<i>Station Peak.</i> 165	Belladonna	20													
<i>Tourana.</i> 155	Tauri Tom Tit	10										4			
<i>Weerianna.</i> M.A. 12	Porteminna Battery	5										4			
	Total	35										8			£3,700
GASCOYNE GOLDFIELD.															
<i>Bangemall.</i> 32	Gem	1													
	Total	1													£1,100
PEAK HILL GOLDFIELD.															
(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		£8,248

TABLE XXV.—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.							Leaching Vats.	Agitating Vats.	Vacuum Filters and Presses.	
		Number of Heads of Stampers.	Prospecting Mills.	Ball Mills.	Griffin Mills.	Huntington Mills.	Tremain Mills.	Puddlers.	Other Crushers.	Flint Mills.					Grinding Pans.
EAST MURCHISON GOLDFIELD.														
LAWLERS DISTRICT.														
<i>Bronzewing.</i> (1017)	Bronzewing	3	..	..	..	..	..	..	..	..	2	..	..	..
<i>Kathleen Valley.</i> (113)	Nil Desperandum	10	..	..	..	..	..	..	..	..	..	..	..	..
382	Yellow Aster G.M. Co., N.L.	10	..	..	..	..	..	..	..	..	4	..	..	..
<i>Lake Darlot.</i> 138H	Murie & Dowson's Cyanide Works	..	..	..	..	..	..	..	..	..	5	..	..	..
633, etc.	Zangbar	10	..	..	..	..	..	..	..	..	..	..	..	..
^	State Battery, Lake Darlot ..	10	..	..	..	..	..	..	..	..	..	..	..	..
<i>Lawlers.</i> M.A. 24	Cinderella Works .. .. .	..	..	..	..	..	..	..	..	..	12	..	..	..
1171	Great Eastern	5	..	..	..	..	..	1	..	..	5	..	..	..
M.A. 11	Lawlers Public Battery ..	..	..	..	..	..	..	..	..	..	4	..	..	..
M.H.L. 9	Leinster Homestead leases	..	..	..	..	..	..	..	..	..	4	..	..	..
1172	Queen Battery	5	..	..	..	..	..	..	..	..	..	..	..	..
1188	Try It	5	..	..	..	..	..	..	..	..	..	..	..	..
(908)	Vivien Gem	5	..	..	..	..	..	..	..	..	..	..	..	..
58, etc.	Waroonga G.M. Co., Ltd.	10	..	..	..	..	..	1	..	..	..	..	..	..
<i>Sir Samuel.</i> M.A. 28	Bellevue	40	..	..	..	..	..	1	..	1	..	..	..	..
^	State Battery, Sir Samuel ..	5	..	..	..	..	..	..	..	..	3	..	..	..
	Total	118	..	..	..	..	..	3	..	1	39	..	..	£19,041
WILUNA DISTRICT.														
<i>Collavilla.</i> 71J	May Queen Reward, Ltd. ..	5	..	..	..	..	..	..	..	..	..	..	..	..
<i>Mt. Keith.</i> ^	State Battery, Mt. Keith ..	5	..	..	..	..	..	..	..	1	4	..	..	..
<i>Wiluna.</i> M.A. 57	Christensen's Battery .. ..	..	1	..	..	..	..	..	..	..	..	..	..	..
10J	Moonlight	10	..	..	..	..	..	..	..	2	..	6	1	..
6J, etc.	Western Machinery Co., Ltd.	30	..	1	..	..	..	1	..	4	13	13	3	..
12J, etc.	Wiluna Gold Mines, Ltd.	25	..	..	..	..	..	1	..	3	9	3	1	..
^	State Battery, Wiluna	10	..	..	..	..	..	1	1	..	..	4	1	..
	Total	85	1	1	..	..	..	3	1	10	26	26	6	£63,144
BLACK RANGE DISTRICT.														
<i>Barrambie.</i> 773B	Barrambie Ranges G.M. Co., N.L.	10	..	..	..	..	..	..	..	..	6	..	..	..
<i>Birrigrin.</i> (128B)	Pelerin	5	..	..	..	..	..	..	..	..	3	..	..	..
M.A. 8B	Reply Works	5	..	..	..	..	..	..	..	..	4	..	..	..
<i>Curran's Find.</i> 641B	Red, White and Blue	5	..	..	..	..	..	..	..	..	..	..	..	..
<i>Errolls.</i> M.A. 9B	Great Saddle	10	..	..	..	..	..	..	..	1	8	..	..	..
<i>Maninga</i> <i>Marley.</i> 203B	Havilah	10	..	..	..	..	..	..	..	1	4	..	..	..
M.A. 6B	Maninga Marley	10	..	..	..	..	..	..	..	..	3	..	..	..
<i>Montagu.</i> (135B)	Montagu Boulder	10	..	..	..	..	..	..	..	..	2	4	..	..
<i>Sandstone.</i> 4B, etc.	Black Range M. Co., N.L.	20	..	..	..	..	..	2	..	4	11	5	32	..
6B, etc.	Yuanmi G.Ms., Ltd.	20	..	..	..	..	..	..	..	3	..	5	2	..
^	State Battery, Black Range ..	10	..	..	..	..	..	1	..	2	6	..	..	..
<i>Youanme.</i> 518B, etc.	Yuanmi G.Ms., Ltd.	20	..	1	..	..	..	..	1	2	6	3	1	..
^	State Battery, Youanme ..	5	..	..	..	..	..	..	..	..	2	..	..	..
	Total	140	..	1	..	..	..	3	1	15	57	18	35	£141,304

TABLE XXV.—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
		Batter-ies.	Other Mills.								Leaching Vats.	Agitating Vats.	Vacuum Filters and Presses.	
			Number of Heads of Stampers.	Prospecting Mills.	Ball Mills.	Griffin Mills.	Huntington Mills.	Tremain Mills.	Puddlers.	Other Crushers.					Flint Mills.	Grinding Pans.
MURCHISON GOLDFIELD.														
CUE DISTRICT.														
<i>Cuddingwarra.</i> (595)	Victory United	10												
T.A. 26 <i>Cue.</i> (1833)	Wright's Works										3			
203, etc. (1020)	Agamenon	5												
1148, etc. <i>Mindoolah.</i> (1609)	Cue, No. 1	20									8			
<i>Tuckabiana.</i> 1914	Gem of Cue Extended Light of Asia	15								1	5			
<i>Tuckanarra.</i> Λ	Mindoolah Battery	10							1					
	Triplicate	5												
	State Battery, Tuckanarra	10												
	Total	75						1		2	16			£18,582
MEEKATHARRA DISTRICT.														
<i>Burnakurra.</i> 509N, etc. (408)	Federal City leases	10												
<i>Gabarrintha.</i> 1324N M.A. 10N (1068N) (1016N) <i>Garden Gully.</i> 1344N	New Alliance	25								6	2	1		
<i>Gum Creek.</i> M.A. 11N	Hamburg Belle										2			
<i>Meekatharra.</i> 597N, etc. 477N	Mountain View Battery	5									2	1		
555N	New Brew Battery	5												
475N	Tumbulgum	10												
398N, etc. 533N	Kyarra G.M., N.L.	10						1		2		5	1	
507N, etc. Λ	Connecticut	5									6			
<i>Nannine.</i> 16N, etc. (984N)	Commodore G.M. Co., N.L.	10												
<i>Quinns.</i> Λ	Femian leases	15						2		6	10	6	1	
<i>Ruby Well.</i> 1261N	Ingliston	10												
<i>Yaloginda.</i> 1084N M.A. 14N	Ingliston Consols Extended	15									6			
	Ingliston Extended G.Ms., Ltd.	10								3	5	2	1	
	Marmont	10								2		3	1	
	Lake View and Oroya Exploration, Ltd.	2							2	2				
	State Battery, Meekatharra	5								1	5			
	Nannine leases	10												
	Welcome Stranger	10												
	State Battery, Quinns	5								1	5			
	Harder to Find	5												
	Chunderloo							1						
	Hornsby Battery	5									4			
	Total	182						4	2	21	47	18	4	£173,876
DAY DAWN DISTRICT.														
<i>Day Dawn.</i> 389D	Creme d'Or	5									5			
1D, etc. (138D)	Great Fingall Consolidated, Ltd.	40						4		8	17	11	2	
	Murchison Associated	10												
	Total	55						4		8	22	11	2	£203,300

TABLE XXV.—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.							Leaching Vats.	Agitating Vats.	Vacuum Filters and Presses.			
			Number of Heads of Stampers.	Prospecting Mills.	Ball Mills.	Griffin Mills.	Huntington Mills.	Tremain Mills.	Puddlers.					Other Crushers.	Flint Mills.	Grinding Fans.
MT. MARGARET GOLDFIELD—															
<i>contd.</i>															
MT. MARGARET DISTRICT.															
<i>Burtville.</i>															
1935r	Black Swan	1	..	..	..	..	..	..	..	..	1	..	..	..
723r	Specimen Hill	5	..	..	..	..	..	..	..	..	..	..	..	..
1044r	Nil Desperandum .. .. .	..	..	1	..	..	..	..	..	..	1	..	..	..
M.A., 17r	Sunrise	8	..	..	..	..	..	..	..	..	..	..	..	..
^	State Battery, Burtville	10	..	..	..	..	..	..	..	..	1	4	..	..
<i>Erlistoun.</i>															
M.A., 18r	Little Doris	5	..	..	..	..	..	..	..	..	..	..	..	..
1990r	Mulga Queen Consols	10	..	..	..	..	..	..	..	..	1	4	..	..
M.A., 20r	Westralia Tasmania	5	..	..	..	..	..	..	..	..	..	4	..	..
<i>Euro.</i>															
1984r	Lone Star	5	..	..	..	..	..	..	..	..	..	5	..	..
<i>Laverton.</i>															
371r, etc.	Augusta G.M. Co., N.L.	10	..	..	..	..	..	..	..	..	..	10	..	..
1797	Craiggiemore	10	..	..	..	..	..	..	..	..	..	4	4	..
829r, etc.	Ida H G.M. Co., Ltd.	10	..	..	..	..	..	..	1	..	2	..	3	..
715r, etc.	Kalgoorlie and Boulder Firewood Co., Ltd. .. .. .	..	..	5	..	..	..	..	1	..	8	..	6	3
1897r, etc.	Mary Mac G.M. Co., N.L.	10	..	..	..	..	..	..	..	..	4	..	..	..
^	State Battery, Laverton	10	..	..	..	..	..	..	..	..	1	3	..	..
	Total	99	..	6	2	..	18	35	13	3	£65,198
NORTH COOLGARDIE GOLDFIELD.															
MENZIES DISTRICT.															
<i>Comet Vale.</i>															
5217z	Gladsome	10	..	..	..	..	..	..	..	..	3	14	..	..
5300z	Happy Jack .. .. .	..	..	..	..	1	..	..	..	..	1	..	..	..
5211z, etc.	Sand Queen G.Ms., Ltd.	20	..	..	..	..	..	..	2	..	5	..	..	..
<i>Menzies.</i>															
5354z	Balkis	5	..	..	..	..	..	..	..	..	..	5	..	..
5420z	Goodenough	5	..	..	..	..	..	..	..	..	..	..	..	..
5302z	Lady Harriet	5	..	..	..	..	..	..	..	..	..	4	..	..
4895z	Maranoa	10	..	..	..	..	..	..	1	..	1	7	..	..
4931z, etc.	Menzies Consolidated G.Ms., Ltd.	20	..	..	..	..	..	..	..	..	9	15	4	1
M.A., 18z	Menzies G.M. .. .. .	..	..	..	..	..	..	..	1	..	1	4	..	..
3100z, etc.	Menzies Mining and Exploration Corporation, Ltd.	10	..	..	..	..	..	..	..	..	..	8	..	1
T.A., 46z	Gidney's Works .. .. .	..	..	..	..	..	..	..	..	..	..	8	..	..
T.A., 47z	Gidney's Works .. .. .	..	..	..	..	..	..	..	..	..	..	7	..	..
^	State Battery, Menzies	10	..	..	..	..	..	..	..	..	1	1	..	..
<i>Mt. Ida.</i>															
M.A., 34z	Mt. Ida Meteor	5	..	..	..	..	..	..	..	..	1	2	..	..
^	State Battery, Mt. Ida	5	..	..	..	..	..	..	..	..	1	..	..	..
	Total	105	1	4	..	23	74	4	2	£60,827
ULARRING DISTRICT.															
<i>Davyhurst.</i>															
(959v)	Expansion .. .. .	..	..	..	..	1	..	..	..	..	..	3	..	..
(613v)	Great Ophir .. .. .	..	..	..	..	1	..	..	1	..	..	15	..	..
(438v)	Waihi	10	..	..	..	..	..	..	..	..	..	6	..	..
<i>Mulline.</i>															
123v	Riverina	10	..	..	..	..	..	..	..	..	..	3	..	..
324v, etc.	Riverina South	5	..	..	..	..	..	..	..	..	1	3	..	..
^	State Battery, Mulline	10	..	..	..	..	..	..	..	..	3	4	2	1
<i>Mulwarrie.</i>															
^	State Battery, Mulwarrie	10	..	..	..	..	..	..	..	..	..	6	..	..
	Total	45	2	1	..	4	40	2	1	£12,174

TABLE XXV.—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.								Leaching Vats.	Agitating Vats.	Vacuum Filters and Presses.	
			Number of Heads of Stampers.	Prospecting Mills.	Ball Mills.	Griffin Mills.	Huntington Mills.	Tremain Mills.	Puddlers.	Other Crushers.					Flint Mills.	Grinding Pans.
NORTH COOLGARDIE GOLD-FIELD—contd.														
NIAGARA DISTRICT.														
<i>Kookynie.</i>	Champion Cyanide Works .. .. .	..	..	..	..	..	..	..	..	..	6	..	..	..
T.L., 128H	Champion	10	..	..	..	..	..	..	..	..	..	..	..	..
320G	Two Ds .. .. .	..	1	..	..	..	..	..	..	..	1	..	..	..
769G	Western Machinery Co., Ltd. .. .. .	..	..	..	..	..	..	..	..	..	..	6	..	..
757G		..	..	..	..	..	..	..	..	..	..	..	..	..
<i>Niagara.</i>	Eagle Hawk Heather	10	..	..	..	..	..	..	..	..	..	..	..	..
M.A., 35G	Lubra Queen G.M. Co., N.L.	5	..	..	..	..	..	..	..	..	..	..	..	..
(734G)	Orion Mines, Ltd.	10	..	..	..	..	..	..	..	1	6	..	..	..
(419G)	Bright's Cyanide Works .. .. .	..	..	..	..	..	..	..	..	..	3	..	..	..
T.L., 108H	State Battery, Niagara	10	..	..	..	..	..	..	..	2	6	..	..	..
^	
<i>Tampa.</i>	Golden Butterfly G.M. Co., N.L.	10	..	..	..	..	..	..	..	2	..	..	2	..
(753G)	Grafter	5	..	..	..	..	..	..	..	1	2	..	..	..
M.A., 59G		..	..	..	..	..	..	..	..	..	..	..	..	..
	Total	60	1	..	..	..	..	..	..	7	29	..	2	£6,824
YERILLA DISTRICT.														
<i>Edjudina.</i>	Neta Battery	10	..	..	..	..	..	..	..	..	3	..	..	..
1010R		..	..	..	..	..	..	..	..	..	..	..	..	..
<i>Linden.</i>	Devon	5	..	..	..	..	..	..	..	1	..	2	3	..
904R	Great Carbine	1	..	..	..	..	..	..	..	..	..	..	..	..
1024R	State Battery, Linden	10	..	..	..	..	..	..	..	2	6	..	..	..
^	
<i>Pinjin.</i>	State Battery, Pinjin	5	..	..	..	..	..	..	..	1	..	..	..	..
^	
<i>Yarri.</i>	State Battery, Yarri	10	..	..	..	..	..	..	..	1	5	..	..	..
^	
<i>Yerilla.</i>	State Battery, Yerilla	5	..	..	..	..	..	..	..	..	4	..	..	..
^	
<i>Yundamindera.</i>	Battles Ville	5	..	..	..	..	..	..	..	..	5	..	..	..
(931R)		..	..	..	..	..	..	..	..	..	..	..	..	..
	Total	51	..	..	..	..	..	..	..	5	23	2	3	£14,577
BROAD ARROW GOLDFIELD.														
<i>Bardoc.</i>	Zoroastrian	5	..	..	..	..	..	..	..	..	..	..	..	..
1743w		..	..	..	..	..	..	..	..	..	..	..	..	..
<i>Broad Arrow.</i>	Hill End Cyanide Works .. .. .	..	..	..	..	..	..	..	..	..	6	..	..	..
T.A., 33w		..	..	..	..	..	..	..	..	..	..	..	..	..
<i>Carnage.</i>	Regan's Carnage Battery	10	..	..	..	..	..	..	..	..	2	..	..	..
M.A., 22w		..	..	..	..	..	..	..	..	..	..	..	..	..
<i>Siberia.</i>	Associated Northern Blocks (W.A.), Ltd. .. .. .	..	..	1	..	2	..	..	..	10	..	4	2	..
1399w, etc.		..	..	..	..	..	..	..	..	..	..	..	..	..
1371w	Gimblet, South	10	..	..	..	..	..	..	..	..	8	..	..	..
1289w	Lady Evelyn	5	..	..	..	..	..	..	..	..	..	..	..	..
1736w	Pole Battery	5	..	..	..	..	1	..	..	..	3	..	..	..
^	State Battery, Ora Banda	5	..	..	..	..	..	..	..	1	4	..	..	..
^	State Battery, Siberia	5	..	..	..	..	..	..	..	..	..	..	..	..
	Total	45	..	1	..	2	..	1	..	11	23	4	2	£56,137

TABLE XXV.—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.							Leaching Vats.	Agitating Vats.	Vacuum Filters and Presses.			
			Number of Heads of Stampers.	Prospecting Mills.	Ball Mills.	Griffin Mills.	Huntington Mills.	Tremain Mills.	Puddlers.					Other Crushers.	Flint Mills.	Grinding Pans.
NORTH-EAST COOLGARDIE GOLDFIELD.															
KANOWNA DISTRICT.															
<i>Gindalbie.</i> (1047x)	Eclipse	5									6				
(1123x)	Gindalbie	10													
(394x)	Kalgoorlie Foundry, Ltd. .. .	10							3						
(1174x)	United	5									1				
<i>Gordon.</i> 891x	Sirdar	10										4			
<i>Kanowna.</i> (918x)	Government Well	3													
M.A., 19x	Martin's Works	15										8			
39x	Mudlark							1							
M.A., 56x	North White Feather G.Ms., Ltd. .. .	60									1	16			
Q.C., 57x	Reidel & Norton's Works .. .	10									1	6			
<i>Mulgarrie.</i> M.A., 58x	Lady Pratt	10										5			
1228x	Lady Pratt Cyanide Plant .. .											5			
	Total	138						1	3		6	50		£22,470	
KURNALPI DISTRICT.															
<i>Kurnalpi.</i> M.A., 2k	Success	5													
<i>Mulgabbie.</i> M.A., 1k	Simmons Battery		1												
	Total	5	1											£200	
EAST COOLGARDIE GOLDFIELD.															
<i>Boorara.</i> 3908E, etc.	Golden Ridge G.M. Co., Ltd. .. .	20										6	4	1	
<i>Boulder.</i> 38E, etc.	Associated G.Ms. of W.A., Ltd. .. .			12					1		20		6	9	
49E, etc.	Associated Northern Blocks (W.A.), Ltd. .. .			3					1				6	1	
352E, etc.	Chaffers G.M. Co. (1913), Ltd. .. .			3					1		11		4	1	
351E, etc.	Golden Horseshoe Estates, Ltd. .. .	170		1				1	6	15	24	20	22	20	
50E	Great Boulder No. 1, Ltd. .. .	10									1	3			
66E	Great Boulder Perseverance G.M. Co., Ltd. .. .			8					4	2	17		24	13	
M.A., 59E	Great Boulder Proprietary G.Ms., Ltd. .. .		1	4	13				9		20		25	14	
3643E	Hainault Sulphide Plant			2					1						
M.A., 5E	Hannans Central Battery	20							1			14	3	2	
4317E, etc.	Idaho	5				1						6			
946E	Ironsides North	10									2	7			
31E, etc.	Ivanhoe Gold Corporation, Ltd. .. .	100							3	2	25	32	11	9	
22E, etc.	Kalgorli G.Ms., Ltd.			9					5		18		16	9	
15E, etc.	Lake View and Star, Ltd.	75		1					6	8	21		27	18	
75E	Lake View South, Ltd.					1						6			
33E, etc.	New North Boulder G.Ms., Ltd. .. .					1					1	5	4		
281E, etc.	North Kalgorli (1912), Ltd. .. .	20										9	3	1	
6E, etc.	Oroya Links, Ltd.	55		2						6	3		13	8	
1208E, etc.	South Kalgorli Consolidated, Ltd. .. .	40		4					3		15	36	11	10	
<i>Kalgoorlie.</i> 4509E, etc.	Adelaide Enterprise Prospecting Syndicate, N.L.					1									
M.A., 65E	Adelins Crushing Mills					1					2	4			
796E ^v	Bonnie Laas (Raven Battery) .. .	10										20			
M.A., 5E	Brown Hill Consols. Ltd.	20										18	3	2	
4E	Cassidy Hill					1						4			
4545E	Creswick		1								1				
M.A., 64E	Dunstan & Cummings Plant .. .							1				12		1	
(97E)	Hannans Reward, Ltd.	20										3			
4347	Mystery					1						3			
	Total	575	2	49	13	7		1	42	38	182	208	182	119	£1,532,428

TABLE XXV.—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.		
		Batter-ies.		Other Mills.								Leaching Vats.	Agitating Vats.	Vacuum Filters and Presses.			
		Number of Heads of Stampers.	Prospecting Mills.	Ball Mills.	Griffin Mills.	Huntington Mills.	Tremain Mills.	Puddlers.	Other Crushers.	Flint Mills.	Grinding Pans.						
EAST COOLGARDIE GOLD-FIELD—contd.																	
BULONG DISTRICT.																	
<i>Randalls.</i> M.A., 68y 1086y, etc.	Hardcastle	20	..	..	..	..	..	..	..	1	..	1	..	7	..	..	..
	Transcontinental leases	10	..	..	..	..	..	..	..	..	..	..	..	7	..	..	..
	Total	30	1	..	1	7
COOLGARDIE GOLDFIELD.																	
COOLGARDIE DISTRICT.																	
<i>Bonnievale.</i> (595) 1552 (144)	Gem	15	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..
	Vale of Coolgardie	10	..	..	..	..	..	..	..	..	..	..	..	5	..	..	..
	Westralia and East Extension Mines, Ltd.	40	..	..	..	..	..	..	..	..	1	..	1	27	..	..	..
<i>Burbanks.</i> 134, etc. 2985, etc. 2160 (3918) (4392) 4448 M.A., 11 33 A	Burbanks Birthday G.Ms., Ltd. ..	60	..	..	..	..	..	..	..	..	..	..	..	6	..	..	..
	Burbanks Main Lode (1904), Ltd. ..	20	..	..	..	..	..	..	..	..	..	..	..	12	..	..	..
	Lady Robinson G.M. Co., N.L.	10	..	..	..	..	..	..	..	..	..	..	..	6	..	..	..
<i>Gnarlbine.</i> (4401)	Coolgardie Redemption	10	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Garden Gully	10	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Griffiths Gold Mine	10	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
<i>M.A., 11</i> 33 A	New Bayley's Mines, Ltd.	10	..	..	..	..	..	..	..	..	..	..	..	10	..	..	..
	Tindals Coolgardie G.M. Co., N.L.	10	..	..	..	..	..	..	..	..	..	..	1	6	..	..	..
	State Battery, Coolgardie	10	..	..	..	..	..	..	..	..	..	..	1	7	..	..	..
<i>Eundynie.</i> 4253	Hidden Secret, North	10	..	..	..	..	..	..	..	..	..	..	..	6	..	..	..
	Reform	5	..	..	..	..	..	..	..	..	..	..	..	3	..	..	..
	Baroota Wonder	10	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
<i>Higginsville.</i> 4184	Sons of Erin	10	..	..	..	..	..	..	..	..	..	..	..	6	..	..	..
	Edquist .. .. .	..	..	..	..	..	..	..	..	..	..	..	..	8	..	..	..
	Highgate Battery	3	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..
<i>M.A., 63</i> (3906)	Yorkshire Lass	3	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..
	Total	256	..	..	..	..	..	..	..	1	..	12	98	1	..	..	£87,901
	KUNANALLING DISTRICT.																
<i>Balgarrie.</i> M.A., 13s Carbine.	Stanley Battery	5	..	..	..	..	..	..	..	..	..	..	..	3	..	..	..
	Carbine	10	..	..	..	..	..	..	..	..	..	..	..	9	..	..	..
	North Coolgardie	20	..	..	..	..	..	..	..	..	..	..	..	4	..	..	..
<i>Dunnsville.</i> (17s)	Jourdie Enterprise G.M. Syndicate ..	5	..	..	..	..	..	..	..	1	..	..	..	6	..	..	..
	Pride of the Jourdies	10	..	..	..	..	..	..	..	..	..	..	..	5	..	..	..
	Pride of Jourdie, North	5	..	..	..	..	..	..	..	..	..	..	..	4	..	..	..
<i>Kintore.</i> M.A., 14s 25-Mile.	Hands Across the Sea	5	..	..	..	..	..	..	..	..	..	..	..	5	..	..	..
	Blue Bell	5	..	..	..	..	..	..	..	..	..	..	..	7	..	..	..
	Shamrock	5	..	..	..	..	..	..	..	..	..	..	..	4	..	..	..
<i>645s</i> (846s)	Star of Fremantle	10	..	..	..	..	..	..	..	..	..	..	..	4	..	..	..
	Swallow	5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Total	85	..	..	..	..	..	..	..	1	..	2	51	..	..	..	£10,838

TABLE XXV.—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.								Leaching Vats.	Agitating Vats.	Vacuum Filters and Presses.		
		Number of Heads of Stampers.	Prospecting Mills.	Ball Mills.	Griffin Mills.	Huntington Mills.	Tremain Mills.	Puddlers.	Other Crushers.	Flint Mills.	Grinding Pans.					
GOLD MINING.																£
KIMBERLEY .. .. .	.. .. .	63	..	..	..	..	..	..	..	..	..	13	..	..	..	9,378
PILBARA	{ Marble Bar	23	..	..	..	..	..	..	..	..	..	13	..	..	..	6,313
WEST PILBARA	{ Nullagine	35	..	..	..	..	..	..	..	..	..	8	..	..	..	3,700
ASHBURTON .. .. .	.. .. .	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1,100
GASCOYNE .. .. .	.. .. .	40	..	..	..	..	..	..	..	..	..	13	3	..	..	8,248
PEAK HILL .. .. .	.. .. .	118	..	..	..	..	..	..	..	..	..	39	..	..	..	19,041
EAST MURCHISON	{ Lawlers	85	1	1	..	..	..	..	3	1	10	26	26	6	..	63,144
.. .. .	{ Wiluna	140	..	1	..	..	..	..	3	1	15	57	13	35	..	141,304
.. .. .	{ Black Range	75	..	..	..	..	..	..	1	..	2	16	..	..	..	18,582
.. .. .	{ Cue	182	..	..	..	..	..	..	4	2	21	47	18	4	..	173,876
MURCHISON	{ Meekatharra	55	..	..	..	..	..	..	4	..	8	22	11	2	..	203,300
.. .. .	{ Day Dawn	60	1	1	..	..	..	..	1	..	5	23	..	1	..	27,709
.. .. .	{ Mt. Magnet	73	..	..	..	..	..	..	..	..	3	17	8	..	..	26,731
YALGOO .. .. .	.. .. .	55	..	..	..	..	..	..	..	..	6	23	6	2	..	7,709
MT. MARGARET	{ Mt. Morgans	135	..	..	..	1	..	..	1	3	15	13	16	5	..	232,725
.. .. .	{ Mt. Malcolm	99	..	6	..	..	..	..	2	..	18	35	13	3	..	65,198
.. .. .	{ Mt. Margaret	105	..	..	..	1	..	..	4	..	23	74	4	2	..	60,827
.. .. .	{ Menzies	45	..	..	..	2	..	..	1	..	4	40	2	1	..	12,174
NORTH COOLGARDIE	{ Ularring	60	1	..	..	..	..	..	..	..	7	29	..	2	..	6,824
.. .. .	{ Niagara	51	..	..	..	..	..	..	..	..	5	23	2	3	..	14,577
.. .. .	{ Yerilla	45	..	1	..	2	..	..	1	..	11	23	4	2	..	56,137
BROAD ARROW .. .. .	.. .. .	138	..	..	..	..	..	..	1	3	..	6	50	..	..	22,470
N.E. COOLGARDIE	{ Kanowna	5	1	..	..	..	..	..	..	..	..	..	..	..	..	200
.. .. .	{ Kurnalpi	575	2	49	13	7	..	1	42	33	182	208	182	119	..	1,532,428
EAST COOLGARDIE	{ East Coolgardie	30	..	..	..	..	..	..	1	..	1	7	..	..	..	16,000
.. .. .	{ Bulong	256	..	..	..	..	..	..	1	..	12	98	1	..	..	87,901
.. .. .	{ Coolgardie	85	..	..	..	..	..	..	1	..	2	51	..	..	..	10,838
.. .. .	{ Kunanalling	152	..	1	..	..	..	..	1	4	19	84	9	6	..	202,332
YILGARN .. .. .	.. .. .	105	..	..	..	..	..	..	2	..	16	54	15	3	..	35,279
DUNDAS .. .. .	.. .. .	45	2	..	..	..	..	..	..	..	1	6	..	..	..	12,390
PHILLIPS RIVER .. .. .	.. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	20,000
STATE GENERALLY .. .. .	.. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total Gold Mining Machinery		2,941	8	60	13	13	..	4	80	44	394	1,112	336	196	..	£3,098,435
LEAD MINING.																
NORTHAMPTON M.F. .. .. .	.. .. .	..	..	..	..	..	..	..	2	..	..	..	..	..	..	20,600
Total Lead Mining Machinery .. .. .		..	..	..	..	..	..	..	2	..	..	..	..	..	..	£20,000
TIN MINING.																
PILBARA	Marble Bar .. .. .	..	..	..	..	1	..	..	1	..	..	..	..	..	..	25,000
GREENBUSHES TINFIELD .. .. .	.. .. .	10	1	..	..	1	..	3	3	..	..	..	..	..	..	18,416
Total Tin Mining Machinery		10	1	..	..	2	..	3	4	..	..	..	..	..	..	£43,416
COPPER MINING.																
PHILLIPS RIVER .. .. .	.. .. .	..	..	..	..	..	..	..	10	..	2	..	..	..	..	81,350
WEST PILBARA .. .. .	.. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	101,067
MT. MARGARET	Mt. Morgans .. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1,750
Total Copper Mining Machinery .. .. .		..	..	..	..	..	..	..	10	..	2	..	..	..	..	£184,167
COAL MINING.																
COLLIE RIVER COALFIELD .. .. .	.. .. .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	63,089
Total Coal Mining Machinery .. .. .		..	..	..	..	..	..	..	..	..	..	..	..	..	..	£63,089
Total Machinery other than Gold Mining		10	1	..	..	2	..	3	16	..	2	..	..	..	..	£311,272
Total all Mining Machinery		2,951	9	60	13	15	..	7	96	44	396	1,112	336	196	..	£3,409,707

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:—

Weight before melting	...	...	...	...	Ozs. 47·41
Standard gold	...	...	...	...	38·19

The calculation would be as follows:—

$$\begin{array}{r} 47413819 \cdot 0 \cdot 805 \\ \underline{3792 \cdot 8} \end{array}$$

$$\begin{array}{r} 26200 \\ \underline{23705} \end{array}$$

$$\underline{2495}$$

$$805 \times \text{£}3 \text{ 17s. } 10\frac{1}{2}\text{d.} =$$

$$805 \times \text{£}3 \cdot 894$$

$$\underline{805}$$

$$19470$$

$$\underline{311520}$$

$$\text{£}3 \cdot 134(670)$$

$$\underline{20}$$

$$\text{s. } 2 \cdot 680$$

$$\underline{12}$$

$$\text{d. } 8 \cdot 160 = \text{£}3 \text{ 2s. } 8\text{d.}, \text{ value per ounce of gold as produced from the mine.}$$

22nd May, 1916.

J. F. CAMPBELL,
Deputy Master.