

from the sand drifts. Most of these inlets are very shallow, it being possible for a man to walk quite across Broke Inlet, where it is several miles in width. The reason these inlets are silting up so rapidly is that upon this coast the rise and fall of the tide is too slight to cause a scour.

In patches along this coast limestones of a more or less sandy nature occur, being due to deposits of shelly matter, which were thrown up at the same period as the sand hills.

From time to time great excitement is caused by the supposed discovery of coal, but it invariably turns out to be nothing but the brown boggy lake formation mentioned above. This brown coal occurs in seams often of considerable size, with underlying shale beds, which contain roots and pieces of wood, with pyrites, which latter is often found to have decomposed, forming red ironstone nodules and alum, this latter being met with as efflorescences on the cliff faces. Above these coal beds are sandstones, often containing large quantities of carbonaceous matter, whilst the coal itself varies very greatly in quality, often consisting largely of sand. There are no indications of true coal upon this coast, in fact the granite basins seem to be filled entirely with these recent lacustrine and estuarine deposits, for, wherever rock crops out, these formations are found mostly to rest directly upon it, and when they do not they are only separated by accumulations of clayey matter resulting from the decomposition of the granites, similar to the deposits met with around Albany, even high up the hills.

Most of these ancient basins are small, but even where large ones occur, as to the northward of Albany, there are no indications which would lead one to hold out the least hope that true coal will ever be found here, as brown coal, associated with sandstone shales and iron pyrites, are no indication that the carboniferous formation exists, as these same rocks occur in many different modern formations.

Behind these coastal plains and sand hills the country gradually rises, being heavily timbered in belts with karri forests and thickets of dense scrub, interspersed with which are open sandy plains and swamps, with here and there outcrops of granite.

This belt of country, which is from 20 to 30 miles in width, extends from Mt. Barker, near Albany, to the Donnelly River, and forms, like the Darling Range, the edge of the inland plain, but, unlike it, rises gradually from the coast. In this, the best watered portion of the colony, the land is extremely good in patches, but little has yet been done to utilise it, owing, as a rule, to its inaccessibility and the tremendous expense that would have to be incurred in clearing the land of timber, which is extremely thick and large.

The remaining section of this portion of the colony to be described is that situated between the Darling Range on the west and the Great Southern Railway on the east, or, roughly, the country which is drained by the Upper Blackwood River with its tributaries, and the small sandy basin of the Collie River, in which the coalfield of that name is situated (for full report see *ad interim* report of Department of Mines, June, 1894).

This tract, as a whole, is fairly level, lightly timbered, and possessing larger tracts of good land free from rock outcrops than any of the agricultural portions of the Colony, added to which it has a good average rainfall, its only drawback being the poison plant, which grows thickly upon it.

HARRY P. WOODWARD,  
Government Geologist.

## Appendix 2.

To the Honourable the Minister for Mines.

SIR,

16th August, 1895.

I have the honour to hand you with this my final report upon the boring at the Collie Coalfield.

The boring contract is now completed, but as all communication is interrupted by the flooded state of the river, the section of the last 150ft. bored at No. 4 has not yet arrived, and I cannot say when it will, so I have made up my report without it, since it really is of no value for my purpose, which was to prove the area of workable coal seams.

I have, etc.,

HARRY P. WOODWARD,  
Government Geologist.

### THE COLLIE COALFIELD.

Since publishing my report, a year ago, considerable development has taken place at the mine itself, from which a thousand tons of coal has been raised, and the seam followed down upon the underlay for a distance of 300 or 400 feet, the general dip of which is about one in seven.

An air shaft has also been sunk from the surface vertically to a point about 150ft. from the mouth of the drive, in which the following section is exposed :—

	ft.	in.	
Gravel ... ..	3	0	
Ironstone ... ..	5	0	
Clay and sandstone ... ..	7	0	
Yellow sandstone ... ..	6	0	
Dark Bind ... ..	2	6	
Coal ... ..	0	2	
Rock Bind ... ..	0	9	
Coal ... ..	2	10	} 20ft.
Dark Bind ... ..	1	3	
Coal ... ..	12	6	
Shale ... ..	0	3	
Total depth ... ..	41	3	

Dip—1 in 6·90, or rather more than 1 in 7.

This section is interesting, since from it we can readily understand why this seam was sometimes supposed to be as much as 22ft. in thickness when passed through with a jumping drill, as all the "Bind" bands (hard shale), and probably underlying shale, might be mistaken for coal.

The Coal, as was to be expected from the deeper workings, is considerably superior to that nearer the surface, being a compact, splinty, bituminous coal of the non-caking class.

The following list of assays, with table comparing it with average samples of commercial coals from the other Colonies, will give an approximate idea of its value:—

#### ASSAYS OF COAL FROM THE COLLIE COALFIELD.

LOCALITY.	Water.	Gas.	Sulphur.	Fixed Carbon.	Ash.	Calorific Value.	Specific Gravity.	Date of Assay.
1. First sample obtained from River Bed, near T. 26	15.20	32.46	2.23	45.03	5.08	...	...	19-11-89
2. A few feet deep in the same seam ...	12.75	37.04	0.71	46.70	2.80	...	...	0-3-90
3. From 17ft. deep in the same seam ...	10.87	31.47	2.23	52.87	2.56	...	...	21-4-90
4. Same seam, sample from top ...	13.65	34.88	1.09	48.35	3.12	6.06	...	9-10-91
5. Do. bottom ...	13.85	35.90	1.18	45.93	4.32	6.06	...	9-10-91
6. Shaft sunk by Mr. Pendleton on the same seam, a few chains further east	7.94	29.70	0.00	55.75	6.61	7.7	...	23-2-93
7. Shaft sunk by Mr. Pendleton on the same seam, a few chains further east	13.30	22.08	0.53	56.36	8.26	7.7	...	10-4-93
8. From the same seam 100ft. from surface	11.40	35.94	0.00	50.85	1.81	...	1.291	21-5-95
9. From outcrop at T. 17 ...	11.70	21.83	2.99	54.17	9.31	...	...	2-4-90
10. Do. a little deeper ...	7.00	37.57	...	51.89	3.54	...	1.308	21-5-95
11. Diamond drill No. 2 bore, 61ft. from surface, 2ft. 7in. seam	11.00	33.98	...	52.83	2.19	7.26	...	17-1-95
12. Diamond drill No. 2 bore, another seam 133ft. from surface, 8ft. 3in. seam	11.27	32.76	...	53.51	2.46	6.93	...	17-1-95
Average of twelve samples ...	11.60	32.10	0.90	51.20	4.35	...	...	...

NOTE.—All these Assays, with the exception of No. 2, which was made at the Royal School of Mines, London, were made by the Government Assayer.

#### COMPARISON OF THE COLLIE COAL WITH COALS FROM NEW SOUTH WALES AND VICTORIA.

Average of	Valueless matter.			Fuel.			
94 samples of New South Wales coal	Water	...	2.22	Gas...	...	...	29.53
	Ash	...	8.57	Fixed Carbon	...	...	61.98
Totals	...	...	10.79	...	...	...	91.51
17 samples of Victorian coal	Water	...	5.78	Gas...	...	...	29.725
	Ash	...	8.57	Fixed Carbon	...	...	55.522
Totals	...	...	14.35	...	...	...	85.247
12 samples of Collie coal	Water	...	11.50	Gas...	...	...	32.10
	Ash	...	4.35	Fixed Carbon	...	...	51.20
Totals	...	...	15.85	...	...	...	83.30
Latest sample from the Collie	Water	...	7.0	Gas...	...	...	37.57
	Ash	...	3.54	Fixed Carbon	...	...	51.89
Totals	...	...	10.54	...	...	...	89.46

From this it will be seen that the average of 12 samples, mostly taken from the outcrop, are very nearly as good as those from the Victorian mines, whilst the best sample from the Collie is better than any Victorian coal, and very nearly as good as the average of the 94 samples of New South Wales coal now in the market.

After allowing for loss of fuel in converting contained moisture into steam, they bear the following comparison to one another:—

	New South Wales.	Victoria.	Average of 12 samples of Collie.	Best sample of the Collie Coal.
Loss per 100 tons ...	11%	15%	17.5%	11.5%

The best sample of Collie coal is therefore half a ton inferior to the average New South Wales coals, and three and a half tons better than the Victorian coals.

Besides the development at the mine, a series of diamond drill bore holes have been put down to test the extent of these coal seams.

No. 1 diamond drill bore hole was put down at a point on the Northern edge of the basin, about five miles in an East-South-Easterly direction from the mine, and about 3 miles in the same direction from No. 18, the last bore hole being put down with the jumping drill. In this bore hole granite was encountered at a depth of 420 feet, whilst only a few inches of coal were passed through near the surface, which clearly proves that the site selected was a little too far to the Northward of the outcrop of the coal measures, since only the lower shale beds of the series were met with.

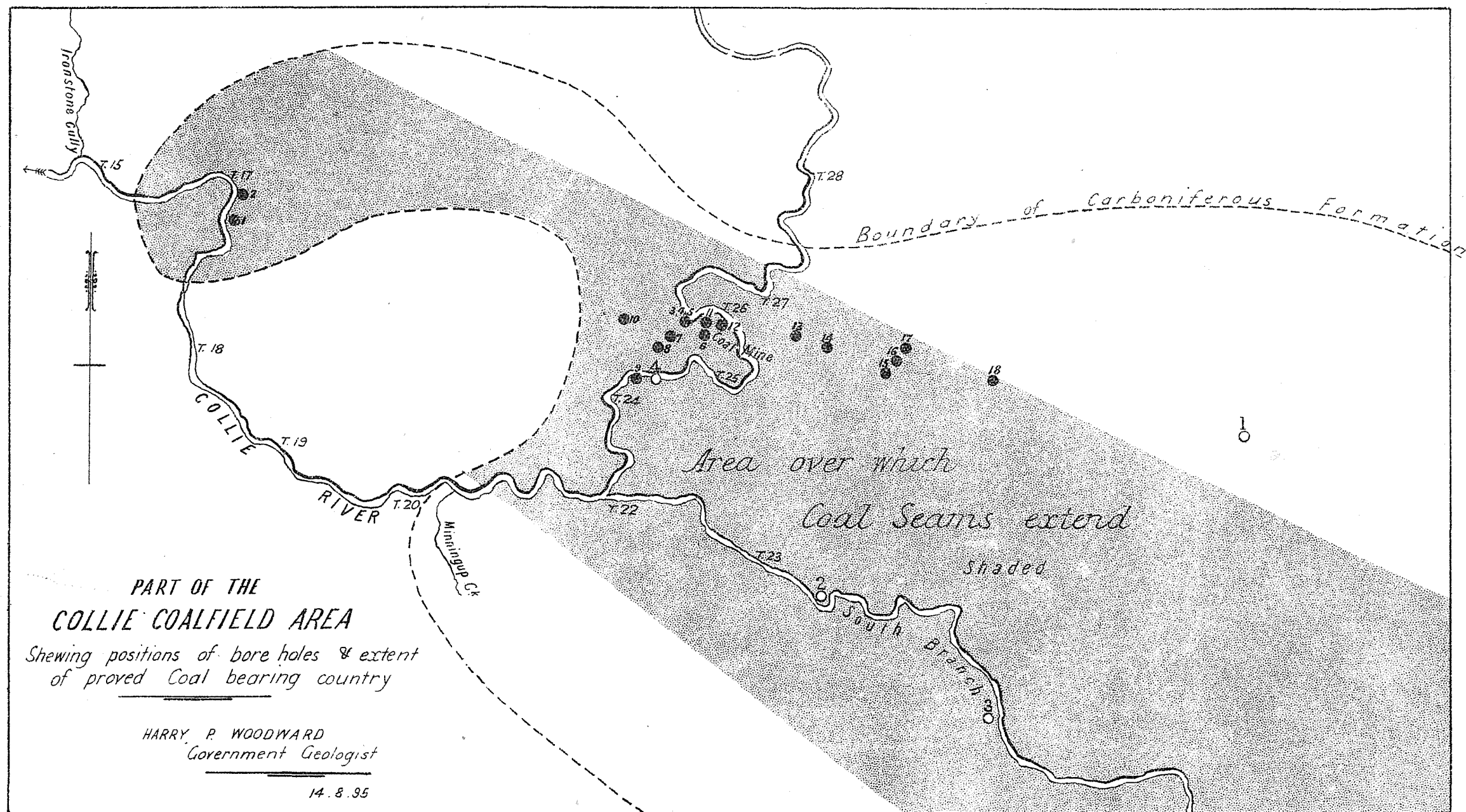
No. 2 bore hole is situated about  $2\frac{3}{4}$  miles South-East of the mine, upon the South branch of the Collie River. This site was selected as being well within the area, and probably near the centre of the basin, and this proved to be the case, since the coal measures series was passed through for a depth of 961 feet, at which depth boring was discontinued. In this bore hole thirteen seams of coal were passed through, the largest at 133 feet from the surface, being 8 feet 3 inches.

No. 3 bore hole is also situated upon the South branch, about two miles further up it, and about  $4\frac{1}{2}$  miles in a South-Easterly direction from the mine. This bore hole was put down 272 feet, and in it 14 feet 3 inches of coal was passed through, the largest seam being 5 feet in thickness.

No. 4 is situated upon the main Collie River, about  $\frac{1}{2}$  mile South-West of the mine, and about 11 chains West of No. 9 jumper drill bore hole. This bore is not yet completed, but at a depth of 350 feet a small seam of coal was met with.

The following table gives full particulars of the seams of coal met with in all the bores put down upon the field, with their thickness and depth from the surface, whilst the map shows their position and proved area.

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EIGHTEEN BORE HOLES PUT DOWN WITH A HAND DRILL.

	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.
Number of bore hole ...	5 miles	5 miles	5 chains	5 chains	5 chains	10 chains	20 chains	30 chains	40 chains	40 chains	The mine.
Distance from mine ...	W.	W.	N.W.	N.W.	N.W.	S.	S.W.	S.W.	S.W.	W.	...
Total depth bored ...	50ft.	20ft.	...	200ft.	19ft.	136ft.	184ft.	150ft.	194ft.	245ft.	30ft.
Number of seams ...	1	1	0	9	1	5	0	1	2	2	1
Aggregate thickness of coal	2in.	3ft. 10in.	...	34ft. 4in.	11ft. 3in.	18ft. 6in.	...	11in.	9ft. 3in.	3ft.	12ft.
	Thickness of seam. ft. in.	Thickness of seam. ft. in.		Thickness of seam. ft. in.	Thickness of seam. ft. in.	Thickness of seam. ft. in.	Thickness of seam. ft. in.	Thickness of seam. ft. in.	Thickness of seam. ft. in.	Thickness of seam. ft. in.	Thickness of seam. ft. in.
	Depth from surface. ft. in.	Depth from surface. ft. in.		Depth from surface. ft. in.	Depth from surface. ft. in.	Depth from surface. ft. in.	Depth from surface. ft. in.	Depth from surface. ft. in.	Depth from surface. ft. in.	Depth from surface. ft. in.	Depth from surface. ft. in.
	0 2 at 37 0	3 10 at 2 9		17 11 at 40 0 1 7 " 64 0 0 3 " 120 0 4 0 " 124 0 2 9 " 130 0 4 0 " 152 0 2 0 " 167 0 3 6 " 172 0 0 2 " 178 0	11 3 at 10 0	1 0 at 42 0 7 0 " 62 0 2 0 " 91 0 1 0 " 102 0 7 6 " 127 0		0 11 at 123 0	0 11 at 58 0 8 4 " 110 0	1 0 at 77 0 2 0 " 80 0	12 0 at 17 0

EIGHTEEN BORE HOLES PUT DOWN WITH A HAND DRILL—continued.

FOUR DIAMOND DRILL BORES.

	XII.	XIII.	XIV.	XV.	XVI.	XVII.	XVIII.	No. 1	No. 2	No. 3	No. 4
Number of bore hole ...	10 chains	58 chains	78 chains	115 chains	115 chains	115 chains	169 chains	5 miles	2½ miles	4½ miles	½-mile
Distance from mine ...	E.S.E.	E.S.E.	E.S.E.	E.S.E.	E.S.E.	E.S.E.	E.S.E.	E.S.E.	S.E.	S.E.	S.W.
Total depth bored ...	41ft.	63ft.	40ft.	84ft.	250ft.	101ft.	100ft.	420ft.	961ft.	272ft.	350ft.
Number of seams ...	1	2	0	3	9	2	3	1	13	8	1
Aggregate thickness of coal	22ft. 2in.	16ft. 4in.	...	2ft. 5in.	38ft. 5½in.	4in.	5ft. 11in.	3in.	18ft. 5in.	14ft. 3in.	6in.
	Thickness of seam. ft. in.	Thickness of seam. ft. in.		Thickness of seam. ft. in.	Thickness of seam. ft. in.	Thickness of seam. ft. in.	Thickness of seam. ft. in.	Thickness of seam. ft. in.	Thickness of seam. ft. in.	Thickness of seam. ft. in.	Thickness of seam. ft. in.
	Depth from surface. ft. in.	Depth from surface. ft. in.		Depth from surface. ft. in.	Depth from surface. ft. in.	Depth from surface. ft. in.	Depth from surface. ft. in.	Depth from surface. ft. in.	Depth from surface. ft. in.	Depth from surface. ft. in.	Depth from surface. ft. in.
	22 2 at 18 0	6 10 at 15 0 9 6 " 26 0		0 7 at 44 0 0 6 " 58 0 1 4 " 80 0	1 2½ at 53 0 10 1 " 92 0 0 7½ " 115 0 4 3 " 167 0 4 8 " 173 0 2 10 " 193 0 1 1 " 224 0 3 11 " 225 0 9 9½ " 230 0	0 3 at 35 0 0 1 " 45 0	1 1 at 47 0 3 4 " 65 0 1 6 " 85 0	0 3 at 117 0	2 7 at 63 0 8 3 " 133 0 0 2 " 246 0 0 10 " 254 0 0 8 " 302 0 0 4 " 313 0 0 4½ " 319 0 0 6½ " 324 0 0 8 " 367 0 0 9 " 430 0 1 0 " 721 0 1 0 " 767 0 1 3 " 960 0	2 8½ at 37 0 1 6 " 39 0 0 3 " 108 0 1 5 " 150 0 5 0 " 161 0 2 3½ " 180 0 0 7 " 227 0 0 6 " 239 0	0 6 at 350 0

These bores clearly prove that a belt of country of about 14 square miles, containing workable seams of coal, extends in a South-Easterly direction from the main Collie River for a distance of about four miles, or roughly speaking, it follows up the valley of the South branch lying immediately to the Eastward of the range.

This proved area must not in any way be confused with the entire area over which workable coal seams may extend, which will prove to be considerably larger.

Large seams of coal have been proved, by the means of drills, to exist, extending over a considerable area; the quality has both been proved by assays and practical tests in quantity from the mine; therefore, the Collie Coalfield is an established fact—the next stage in its development must be capital and labour.

HARRY P. WOODWARD,  
Government Geologist.

16-8-95.

### Appendix 3.

#### *Report by the Government Assayer to the Under Secretary for Mines.*

I have the honour to report, for the information of the Honourable the Minister for Mines, that during the year ending 31st December, 1894, I made two hundred and forty-eight (248) assays, viz.:—

Gold.		Silver.		Tin.		Tungsten.		Bismuth.		Lead.
230	...	8	...	7	...	1	...	1	...	1

and that during the twelve months from 1st July, 1894, to 30th June, 1895, the number was four hundred and sixty-four (464) as under:—

Gold.		Silver.		Tin.		Wolfram.		Bismuth.		Copper.		Mercury.
444	...	13	...	3	...	1	...	1	...	1	...	1

These figures show that the search for minerals is increasing very rapidly, although, at present, little is sought except gold.

A few specimens of mica and asbestos have been brought to me during the year.

BERNARD H. WOODWARD,  
Government Assayer.

6th August, 1895.