

## FEDERATED MALAY STATES.

### REPORT ON THE ADMINISTRATION OF THE MINES DEPARTMENT AND ON THE MINING INDUSTRIES FOR THE YEAR 1913.

#### PART I.

#### ADMINISTRATION.

#### EXPENDITURE.

1. The following table shows the departmental expenditure as estimated and as incurred:

Heading.	Estimated.	Supplement.	Total.	Expenditure.	Saving.
	\$	\$	\$	\$	\$
Federal ... ..	37,178	500	37,678	33,449	4,229
Perak ... ..	108,230	300	108,530	84,851	23,679
Selangor ... ..	57,136	...	57,136	49,730	7,406
Negri Sembilan ... ..	18,541	...	18,541	17,553	988
Pahang ... ..	21,424	...	21,424	16,540	4,884
Total ... ..	242,509	800	243,309	202,123	41,186

The expenditure in 1912 was \$203,317. In 1912 and 1913 Personal Emoluments and Duty Allowance entered in the Civil Service Estimates (Federal) were not included, and in the year under review \$9,643 was so provided. The actual total of expenditure under Federal account therefore was \$43,092 for the year. The principal savings were under Personal Emoluments and Other Charges.

2. The revenue collected by the Mines Department was as follows:

Perak ... ..	\$32,188
Selangor ... ..	30,958
Negri Sembilan ... ..	3,785
Pahang ... ..	187
Total ... ..	\$67,118

In 1912, \$67,816.77 was collected, so that there was a small difference in favour of that year.

The classification of revenue is as follows:

#### FINES, FORFEITURES, AND FEES OF COURT—

Wardens' Courts ... ..	\$ 8,990
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#### FEES OF OFFICE—

Tin-buyers' and Smelters' Licences ... ..	32,200
Dangerous Trades Licences ... ..	100
Survey of Boilers and Steam Engines ... ..	21,222
Examination of Engineers and Drivers ... ..	1,229

#### REIMBURSEMENTS—

Hire of Boring Tools ... ..	3,377
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Total ... ..	\$67,118
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3. The revenue from all sources relating to mining for the years 1911, 1912 and 1913 was :

State.	1911.	1912.	1913.
Perak ... ..	\$5,553,825	\$6,787,850	\$6,654,937
Selangor ... ..	3,061,653	3,812,458	3,582,790
Negri Sembilan ... ..	401,629	437,656	463,149
Pahang ... ..	399,672	524,603	556,220
Total ...	\$9,416,779	\$11,562,567	\$11,257,096

The classification of revenue from all sources relating to mining for the years 1912 and 1913 was as follows :

Heading.	1912.	1913.	Increase + or Decrease -
Wardens' Offices ... ..	\$ 67,817	\$ 67,118	- \$ 699
Premia on Leases ... ..	350,004	200,048	- 149,956
Rent on Leases ... ..	267,975	274,187	+ 6,212
Exemption from Cancellation ... ..	...	6,900	+ 6,900
Individual Licences ... ..	10,843	15,985	+ 5,142
Prospecting Licences ... ..	7,275	13,925	+ 6,650
Export Duty on Tin ... ..	10,850,121	10,670,512	- 179,609
Export Duty on Wolfram and Scheelite ... ..	7,603	7,561	- 42
Miscellaneous Duty ... ..	...	45	+ 45
Export Duty on Gold ... ..	203	41	- 162
Commuted Royalty on Gold ... ..	468	501	+ 33
Ore-buyers and Gold-smiths' Licences ... ..	258	273	+ 15
Total ...	\$11,562,567	\$11,257,096	- \$305,471

showing a decrease of \$305,471 as compared with 1912, mainly caused by the drop in the price of tin and the decrease in premia on leases.

#### STAFF.

##### FEDERAL.

4. Mr. W. Eyre-Kenny officiated as Senior Warden throughout the year. Mr. R. G. Evans, Inspector under the Mineral Ores Enactment, went on leave on 10th April, and Mr. J. Lovett, Inspector under the same Enactment, was transferred from Ipoh to Kuala Lumpur and took over Mr. Evans' duties in addition to his own. Mr. Lovett was confirmed in his appointment with effect from 1st April, 1912, on passing the required examination in Chinese.

The Federal Establishment of Supernumerary Inspectors of Mines remained the same throughout the year, Mr. C. I. Robinson being posted in Perak, and Messrs. A. G. Macdonald and A. T. Bennetts in Selangor.

##### PERAK.

5. Mr. G. D. Lucas officiated as Warden throughout the year. Mr. G. E. Greig was in the post of Assistant Warden until 21st April, when he went on leave, and again from 6th December to the end of the year. In the interim the duties of Assistant Warden were carried out by Mr. A. J. Dishman. Mr. J. S. Berger continued to officiate as Inspector of Mines, Taiping, until 19th March, when he went on leave, and was relieved by Mr. A. E. Kershaw. Mr. G. T. Holford did duty as Inspector of Mines, Kuala Kangsar and Upper Perak, with the exception of six weeks during which he did duty at Ipoh in relief of Mr. Harris, pending the return of Mr. J. S. Berger on 30th November. During this term of six weeks Mr. Kershaw did duty at Kuala Kangsar as well as at Taiping. Mr. H. G. Harris was in charge of the Inspector of Mines Office at Ipoh up to 31st October, when he went on leave. Mr. A. E. Kershaw was also stationed at Ipoh until he was transferred to Taiping. Mr. Berger assumed charge of the Ipoh office on 30th November. Mr. A. J. Dishman carried on duty as Inspector of Mines at Batu Gajah until his transfer to Kuantan on 10th December, and from 21st April to 6th December officiated as Assistant Warden, Perak, in addition. Mr. J. Laird continued to officiate as Inspector of Mines, Gopeng, until he went on leave on 20th September, when he was relieved by Mr. E. Nightingale.

Mr. C. I. Robinson was in charge of the Inspector of Mines Office at Kampar throughout the year, and Mr. E. Nightingale was posted at Tapah until his transfer to Gopeng, when Mr. Robinson took over his duty at the Tapah office in addition to the Kampar office.

#### SELANGOR.

6. Mr. M. A. V. Allen officiated as Warden throughout the year, as also did Messrs. Macdonald and Bennetts and Hatch as Inspectors of Mines at Kuala Kubu, Kuala Lumpur, and Serendah, respectively. Mr. Bayly, Inspector of Mines, proceeded on leave on 15th April, and spent a portion of his leave in China studying the Hakka dialect. Mr. Mynott returned from leave on the 29th May and did duty as Inspector of Mines, Kuala Lumpur, till the 9th June, when he was transferred to Negri Sembilan.

#### NEGRI SEMBILAN.

7. Mr. P. A. Satow carried on duty as Assistant Warden until relieved by Mr. G. E. Hughes on 25th February, and the latter officer was relieved of duty on 9th June, and retired on pension on 1st November on account of ill-health. For the remainder of the year Mr. A. R. Mynott, Inspector of Mines, Selangor Establishment, officiated as Assistant Warden.

#### PAHANG.

8. Mr. F. C. Marshall carried on duty as Assistant Warden, Ulu Pahang, until 1st May, when he went on leave, and was relieved by Mr. A. G. Mondy (Inspector of Mines, Perak Establishment). Mr. A. G. Mondy officiated as Assistant Warden at Kuantan until the return of Mr. P. A. Satow on 24th March. Mr. Satow proceeded on leave on 10th December and was relieved by Mr. A. J. Dishman (Inspector of Mines, Perak Establishment).

#### STEAM BOILERS AND ENGINES.

##### INSPECTION STAFF.

9. Mr. W. J. Trowell, M.I.M.E., Surveyor-General of Ships, Straits Settlements, supervised the technical duties of the staff in his capacity as Chief Inspector of Boilers, Federated Malay States.

In Perak, Mr. G. C. Marshall officiated as Inspector of Boilers throughout the year, and was assisted by Messrs. Cropley and MacIntyre as Assistant Inspectors. Mr. Cropley was on leave from 7th July to 31st August following on an attack of small-pox.

In Selangor (and also for duty in Negri Sembilan and Pahang), Mr. Basagoiti did duty as Inspector of Boilers, and was assisted by Mr. J. Graham, Assistant Inspector, until he went on leave on 17th April, and by Mr. Bristow, Assistant Inspector, throughout the year.

##### WARDENS' COURTS.

10. Three hundred and ninety-one cases were heard in the Wardens' Courts as against 399 in 1912, and there were in addition 269 prosecutions for breaches of the Mining Enactment before Magistrates' Courts, and 205 convictions were obtained. There were six appeals from the Wardens' Courts, of which four were dismissed and two were allowed; a satisfactory record.

##### LEGISLATION.

11. The Committee appointed to consider the Land Enactment, the Registration of Titles Enactment and the Mining Enactment presented their report, but the revised Mining Enactment was not brought into force by the end of the year. The Inspection of Machinery Enactment was passed and the rules thereunder were gazetted; this Enactment extends inspection to all classes of prime movers and to machinery other than electrical apparatus; it is to come into force on 1st January, 1914. The Electrical Enactment which provides for the control and inspection of electrical plant was passed; it is to come into force on the 1st March, 1914, and is to be administered by the Senior Warden. The Senior Warden assisted in drafting rules under the Traction Engines and Motor Cars Enactment.

##### GENERAL.

12. Mr. F. C. Marshall, Assistant Warden, Ulu Pahang, while on leave was seconded for twelve months for service in Southern Nigeria, and may not return to these States until April, 1915. The staff was fully taxed and for a portion of the year was short-handed, mainly owing to officers proceeding on leave on urgent reasons. Steps have been taken to strengthen the staff in 1914 by an additional Assistant Warden for duty in Perak, and by an additional Supernumerary Inspector on the Federal Establishment. In view of the passing of the Machinery Enactment, arrangements have been made for the addition of two Inspectors of Machinery in 1914.

One application for remission of royalty on ore that was refractory to win or refractory to treat was dealt with, and Government approved of a rebate being granted. This makes four cases in which assistance has been rendered by a reduction in the rate of the royalty, and the total remission allowed in 1913 amounted to \$47,644.

In Selangor the inspection and licensing of motor vehicles and the granting of certificates to automobile drivers was handed over to the Inspector of Vehicles in January. The Senior Warden sat on a Commission appointed by the Supreme Court to report on a case before it that involved technicalities.

## PART II.

## TIN MINING.

## OUTPUT.

13. The total output in 1913 amounted to pikuls 842,129.53 as compared with pikuls 813,472.08 in 1912; an increase of pikuls 28,657.45 over the previous year. Of the total quantity for the year under review pikuls 85,502.57 were exported as block tin and pikuls 756,626.96 as tin in ore, as compared with pikuls 174,784.22 and 638,687.86 in 1912. There is therefore a decrease in block tin of pikuls 89,281.65 and an increase of tin in ore of pikuls 117,939.10. This shows that for the year under review there has been a considerable decrease in the quantity of ore smelted in the Federated Malay States and an increase in the quantity smelted in the large smelting establishments in the Straits Settlements.

14. The export from each State and its value at the average prices for 1912 and 1913—*viz.*, \$103.30 per pikul and \$99.57 per pikul, respectively, was as follows:

State.	1912.	1912.	1913.	1913.	Pikuls.	Value.
	Pikuls.	Value.	Pikuls.	Value.	In-crease.	Increase + Decrease—
		\$		\$		\$
Perak ... ..	477,240.51	49,298,945	493,966.92	49,184,286	16,726.41	-114,659
Selangor ... ..	255,381.99	26,380,959	258,825.42	25,771,247	3,443.43	-609,712
Negri Sembilan ... ..	29,070.85	3,003,019	31,658.61	3,152,248	2,587.76	+149,229
Pahang ... ..	51,778.73	5,348,743	57,678.58	5,743,056	5,899.85	+394,313
Total ... ..	813,472.08	81,031,666	842,129.53	83,850,837	28,657.45	-180,829

The percentages of increase of exports in Perak is 3.5, in Selangor 1.35, in Negri Sembilan 8.9, and in Pahang 11.4. Under "Perak," the above return includes tin in ore from other States amounting to 979 pikuls and excludes 765 pikuls of tin in ore produced in Perak that paid duty in other States, so that the actual production was 214 pikuls less than shown. Under "Selangor," 6,961 pikuls of tin in ore produced in other States are included and 900 pikuls of tin in ore produced in Selangor; but paying duty in other States are excluded; therefore the actual production was less by 6,061 pikuls than shown in the above return. In Negri Sembilan, 5,596 pikuls of tin in ore were produced and paid duty in other States, and are not included in the return; but 433 pikuls of tin in ore produced in other States are included; therefore the actual production was 5,163 pikuls of tin in ore above that shown in the return. Under "Pahang," the return excludes 1,578 pikuls of tin in ore that paid duty in other States and includes 466 pikuls of tin in ore from other States, so that the production shown should be increased by 1,112 pikuls. The following table shows the actual production in each State:

Perak... ..	493,753	pikuls
Selangor ... ..	252,765	"
Negri Sembilan ... ..	36,821	"
Pahang ... ..	58,791	"
Total ... ..	842,130	"

## LOCAL MARKET.

15. The local market, as is always the case, felt the conditions experienced on the London market, especially towards the close of the year, local (Singapore) prices were as follows:

Highest	\$114.80 on 2nd January
Average	99.57
Lowest	83.50 on 24th December
Fluctuation	31.30

The corresponding figures for 1912 being:

Highest	\$115.65 on 27th September
Average	103.30
Lowest	91.75 on 13th January
Fluctuation	23.90

The local average sterling value per ton was £202 9s. 4.3d. in 1912, and in 1913 it was £195 3s. 1.7d. The local value of the export in 1913 in sterling at £195 3s. 1.7d. per ton, accepting an exchange rate of 2s. 4d., equalled about £9,782,440 on a tonnage of 50,126,

## LONDON MARKET.

16. The conditions existing on the London market were much more unfavourable to the Tin mining industry in 1913 than in 1912. The year opened with the price per ton standing at £229; after various fluctuations it had dropped to £193 5s. at the end of June, and the year closed with the rate of £169 5s. per ton. The average for the year being £201 10s. 4d. as quoted by the "Mining Journal." The major cause of the drop in price was undoubtedly the increase of supplies and to a minor degree a falling off of the proportionate demand. As foreshadowed in the 1912 report, a lower average price was experienced, and in 1914 a still lower average may be reached, unless there is a change in the ratio of demand to supply.

## PART III.

## OTHER MINING.

## WOLFRAM EXPORT.

17. The total export of wolfram was pikuls 3,470.6, of an approximate value of \$138,824, as compared with pikuls 3,755.41 in 1912, and was made up as follows, the figures for 1911 being also given:

State.	1911.	1912.	1913.
Perak ... ..	1,186.8	2,250.5	892.0
Selangor ... ..	1,562.3	1,504.9	1,918.0
Negri Sembilan ... ..	36.6	...	574.8
Pahang ... ..	30.0	...	85.8
Total ...	2,815.7	3,755.4	3,470.6

Scheelite to the amount of pikuls 310 was also exported.

## CONDITIONS.

18. Negri Sembilan ore sent to other States for treatment produced 1,622 pikuls of wolfram that did not pay duty in the State of origin. As in previous years no workings were mined solely for the recovery of wolfram and it continued to be won in association with tin-ore, duty being collected at the rate of \$2 per pikul. Ore from outside sources was treated at the Separating Works in Kuala Lumpur and Ipoh; but is not included in return of exports.

## GOLD.

## OUTPUT.

19. The quantity of gold placed on the market was as follows for the years 1911, 1912, and 1913, in ounces Troy:

State.	1911.	1912.	1913.
Perak ... ..	1,309.5	1,888	1,842
Selangor ... ..	...	...	...
Negri Sembilan ... ..	241.8	92	50
Pahang ... ..	7,677.0	12,444	13,083
Total ...	9,228.3	14,421	14,975

The approximate value of the output for 1913 was \$497,391 (£58,029) as compared with \$478,983 (£55,881) in 1912, and with \$306,514 (£35,760) in 1911. As in previous years the Perak figures show the quantity reported as purchased by gold dealers, and in Pahang \$501.30 was paid as commuted royalty.

## CONDITIONS.

20. The total amount of gold saved at the Raub Mine was 13,087 ounces on a crushing of 97,254 tons as compared with 11,426 ounces and a crushing tonnage of 73,497 tons in 1912. The labour force employed and the power used showed an increase, and on this mine development was energetically carried on. The royalty on gold from the Raub Mine was not exacted for the year under review.

## COAL.

## RAWANG COAL AREA.

21. The Rawang Collieries Company, Limited, was floated locally in July with a capital of \$2,000,000, and the manager who had been engaged in England arrived at the end of the year. A commencement was made on the railway connection, and good progress is expected. The coal was successfully tried in a Dowson double action suction producer; but no experiments have been made with regard to briquetting. A considerable amount of preliminary work is under consideration by the company and they should be in a position to produce coal shortly after the completion of the railway connection. Further prospecting operations were also in hand at the end of the year.

## QUARRIES.

22. As in former years the bulk of stone quarried was used for road construction and maintenance. The output from Public Works Department quarries was as follows in tons:

State.	1911.	1912.	1913.
Perak	101,410	108,907	102,384
Selangor	138,634	165,717	225,478
Negri Sembilan	47,387	48,590	87,831
Pahang	102,787	110,265	112,311
Total	390,218	433,479	528,004

## CEMENT MANUFACTURE.

23. The cement company at Batu Caves in Selangor quarried 5,854 tons of limestone, and produced 3,444 tons of cement, so that this industry may be said to be fairly established.

## PART IV.

## LABOUR, MACHINERY, AND TIN MINING LANDS.

## LABOUR.

24. The total labour force employed in mining (inclusive of individual licences but exclusive of holders of dulang passes) when the Mines Department Census was taken at the end of the year was 225,405 (all of whom with the exception of 868 men were engaged on tin mining), as against 211,490 in 1912, and shows an increase for the year under review of 13,915 men.

25. The labour force in each State was as follows in 1912 and 1913:

State.	1912.	1913.
Perak	118,409	126,361
Selangor	68,584	74,410
Negri Sembilan	10,240	10,059
Pahang	14,257	14,575
Total	211,490	225,405

Each State had an increase in the labour force except Negri Sembilan, the largest increase being 7,952 in Perak; and the decrease in Negri Sembilan amounted to 181 men.

## DULANG PASSES.

26. Dulang passes were issued as follows, and as this class of labour is not employed continuously it is not included in the figures given in the preceding table:

State.	1912.	1913.
Perak	7,497	8,333
Selangor	3,567	4,532
Negri Sembilan	202	361
Pahang	765	929
Total	12,031	14,155

an increase of 2,124 over the figure for 1912. The nationalities of the dulang pass holders were: Malays 1,981; Chinese 11,858; and Tamils 316—all of the last named being employed in Perak.

## METHOD OF EMPLOYMENT.

27. The method of employment was as follows :

State.	1912.			1913.			
	Open-cast.	Under-ground.	Hydraulic and lampan.	Open-cast.	Under-ground.	Hydraulic and lampan.	Bucket dredging.
Perak ... ..	95,615	7,948	14,755	99,654	9,889	16,590	228
Selangor ... ..	51,916	6,063	10,605	57,837	5,640	10,560	—
Negri Sembilan ... ..	6,033	2,156	2,051	7,180	1,443	1,436	—
Pahang ... ..	3,517	2,667	8,073	2,998	3,482	8,095	—
Total ...	157,081	18,834	35,494	167,669	20,454	36,681	228

In addition there were 373 men unclassified in Selangor.

## CLASSIFICATION.

28. The classification of the labour employed was as follows for the year 1913 as compared with 1912 :

State.	Contract.	Wages.	Tribute.	Individual licences.
Perak ... ..	34,443	29,382	62,536	—
Selangor ... ..	24,187	11,401	38,450	372
Negri Sembilan ... ..	2,780	633	5,725	921
Pahang ... ..	3,064	1,979	7,636	1,896
Total, 1913 ...	64,474	43,395	114,347	3,189
Total, 1912 ...	60,693	33,789	112,175	4,752

showing an increase under each heading except individual licences as compared with 1912.

## NATIONALITY.

29. The nationalities were as follows :

State.	European.	Chinese.	Indian.	Malay.	Other nationalities.
Perak ... ..	128	118,722	5,825	1,528	158
Selangor ... ..	13	73,885	301	153	58
Negri Sembilan ... ..	5	9,970	7	77	—
Pahang ... ..	49	13,654	230	615	27
Total, 1913 ...	195	216,231	6,363	2,373	243
Total, 1912 ...	172	201,208	6,865	2,340	924

## LABOUR CONDITIONS.

30. There was no important variation in the cost of labour as compared with 1911 and 1912, and the supply was up to all requirements. There were no epidemics of sickness, and the health conditions can be described as good, with the exception of a few localities where malaria was prevalent. During the year specially prepared tabloids of quinine supplied by the Medical Department were distributed by the Mines Department staff amongst the out-lying workings, and quite a demand has sprung up for this drug.

Again it may be said that the labour employed on mines earned a comfortable living. The dulang class did well, the total weight of ore won by them in the three Western States being pikuls 44,943.5 valued at \$2,213,775, which works out to \$166.88 per head. Few complaints were received with regard to this class of labour, which shows a considerable increase in numbers, though the value won per head has decreased.

## CHINESE IMMIGRATION AND EMIGRATION.

31. The following return shows the number of Chinese adult male immigrants and emigrants entering and leaving the States via ports for the years 1912 and 1913 :

State.	1912.		1913.	
	Immigrants.	Emigrants.	Immigrants.	Emigrants.
Perak ... ..	28,219	15,673	32,177	16,680
Selangor ... ..	38,665	20,296	38,174	22,074
Negri Sembilan ... ..	7,770	2,619	11,929	4,705
Pahang ... ..	5,266	4,246	5,148	4,310
Total ...	79,920	42,834	87,428	47,769

According to returns furnished by the Railway Department the excess of Chinese adult males leaving the Federated Malay States by rail over those entering by the same way was about 6,426; therefore the excess of immigrants over emigrants may be taken as about 33,000, as compared with 36,000 in 1912. The actual addition to the labour force employed in mining is calculated to be about 20,200 men, after all allowances are made.

## MACHINERY AND HYDRAULIC APPLIANCES IN MINES.

32. The total horse-power of steam, gas, oil, hydraulic, and electrical plant employed in mining is estimated at 25,756 (including Raub Mine) as against 23,188 in 1912, and is classified as follows :

State.	Steam.	Steam-electric.	Hydraulic.	Hydro-electric.	Suction gas.	Suction-gas electric.	Oil engines.	Total.
Perak ...	5,153	2,750	6,344	1,025	1,145	250	1,730	18,397
Selangor ...	2,491	650	410	...	416	...	...	3,967
Negri Sembilan ...	282	...	477	...	...	...	...	759
Pahang ...	1,425	...	8	600	...	...	600	2,633
Total, 1913 ...	9,351	3,400	7,239	1,625	1,561	250	2,330	25,756
Total, 1912 ...	10,751	862	6,918	2,092	1,318	...	1,247	23,188

The increase in the horse-power of plant employed on mining in the year under review is therefore 2,568, and the rate of advance in the direction in recent years has been more than maintained.

## TIN MINING LANDS.

33. The total acreage alienated for tin mining was as follows, exclusive of unsurveyed concessions :

State.	1911.	1912.	1913.
Perak ... ..	148,644	149,729	151,412
Selangor ... ..	73,448	73,734	71,296
Negri Sembilan ... ..	22,837	22,919	19,911
Pahang ... ..	32,552	35,033	39,583
Total ...	277,481	281,415	282,202

## PART V.

## DETAILS OF THE PRINCIPAL WORKINGS IN THE FEDERATED MALAY STATES.

## PERAK.

## OPEN-CAST MINING.

34. THE BEE THYE MINE, ASAM KUMBANG, TAIPING.—The labour force was reduced to 1,600 men, and the output obtained was 5,559 pikuls of ore.

35. KUA CHOOI SENG'S MINE, TAIPING.—Three hundred and twenty-six thousand two hundred cubic yards of overburden were removed and 19,164 cubic yards of karang were treated for a return of 2,047 pikuls. The labour force averaged 837 men and an 8 horse-power steam pumping plant was employed.

36. SUNGEI NYAMOK, KUALA KANGSAR.—This is the largest mine in Kuala Kangsar district, and is worked partly by shafting and partly open-cast; 6,161 pikuls of ore were won, mostly from the underground workings.
37. TAMBUN, IPOH.—This well-ordered mine shows a slightly reduced output of 7,582 pikuls. Overburden to the amount of 308,662 cubic yards was removed and 136,358 cubic yards of karang were treated, with a labour force of 1,006 men and plant aggregating 212 horse-power.
38. LAHAT MINES, LIMITED.—With a labour force of 1,263 men and steam plant of 629 horse-power, 76,415 cubic yards of overburden were removed and 284,673 cubic yards of karang were treated for a return of 8,604 pikuls of ore. This mine was faced with a large increase in pumping required to keep the mine dry in the lower levels: in January a lift of 25,000 gallons an hour sufficed; but in November it was necessary to pump at the rate of 100,000 gallons per hour. A Diesel-electric pumping plant of 320 horse-power capable of dealing with 240,000 gallons an hour was under erection at the close of the year.
39. ULU PIAH, LIMITED, removed 1,834 cubic yards of overburden and treated 105,602 cubic yards of karang and won 5,590 pikuls of ore, with a labour force of 414 men and plant of 191 horse-power. The original dumping ground had almost reached its limit of capacity at the end of the year and arrangements for utilizing other areas were commenced.
40. GUNTONG MINE.—This mine increased its output to 1,037 pikuls.
41. SUNGEI PARI MINE.—The Sungei Pari Mine started its suction gas plant in June, and by the end of the year had won 900 pikuls of ore.
42. KLEDANG MINE.—Work was prosecuted for a return of 2,080 pikuls of ore. Some lode indications were discovered that may prove to be of value.
43. JELAPANG MINE.—This mine was acquired by the Borneo Company, Limited; work was commenced in March, and realized an output of 1,100 pikuls of ore.
44. TRONOH MINES, LIMITED.—With a labour force of 4,661 men and plant totalling to 1,244 horse-power, 784,896 cubic yards of overburden were removed and 583,404 cubic yards of karang were treated for a return of 33,730 pikuls of ore. The bucket dredge which was installed for retreatment of the tailings was not operated. Number 5 mine was worked on tribute; and electrical energy, from the station constructed for its service, was transmitted for use in the main and south lombongs. The supply of a bucket dredge for treating certain areas of this property is under consideration. Work was much hindered by slips during the year under review.
45. TRONOH SOUTH, LIMITED.—This mine was worked with a labour force of 500 men and a steam plant of 300 horse-power. Two hundred and seventy-two thousand three hundred and five cubic yards of overburden were removed and 86,087 cubic yards of karang were treated for a recovery of 2,899 pikuls of ore. A puddling plant was erected in August, and development work was kept well forward.
46. CHUNG THYE PHIN'S MINE, TRONOH, employed a labour force of 814 men and steam plant totalling to 186 horse-power, removed 273,826 cubic yards of overburden and treated 101,347 cubic yards of karang for a recovery of 3,839 pikuls of ore. Work was confined, towards the end of the year, to the southern portion.
47. SIPUTEH TIN MINES, LIMITED.—Work was carried on principally on tribute, a new system of working was adopted—*viz.*, the overburden which carries some ore was sluiced down by the management and the karang thus exposed was let out on tribute. Some work was done on attempting to trace lines of mineralization in the limestone, with little success. An output of 5,291 pikuls was realized.
48. PUSING BHARU TIN MINES, LIMITED, were worked on tribute for a return of 5,562 pikuls of ore.
49. PUSING LAMA TIN MINES, LIMITED, were also worked on tribute and recovered 1,967 pikuls of ore.
50. CHEAH TECK'S MINE, SIPUTEH, is a well organized and laid out mine. It realized an output of 3,777 pikuls of ore.
51. KHOO SOO CHEOW'S MINE, GOPENG, removed 43,318 cubic yards of overburden and treated 126,105 cubic yards of karang, with a labour force of 600 men and steam plant of 194 horse-power, and recovered 4,753 pikuls of ore. In this mine the karang occurs amongst limestone pinnacles, is consequently expensive to work, and with a view to economy steam plant is being replaced by oil engines.
52. EU TONG SEN'S MINE, TEKKA, employed a labour force of 283 men and plant of 49 horse-power. One hundred and sixty thousand nine hundred and eighty-six cubic yards of overburden were removed and 116,881 cubic yards of karang were treated, giving a return of 2,380 pikuls of ore. A 200 horse-power Diesel-electric plant was in course of erection.

53. **EU TONG SEN'S MINE, TONG SHING, KAMPAR.**—Overburden to the extent of 478,000 cubic yards was removed and 157,400 cubic yards of karang were treated for a recovery of 5,790 pikuls of ore. Steam and oil engine plant with a horse-power of 300, and a labour force of 770 men was worked. Diesel engines totalling to 220 horse-power were in use.

54. **WONG FONG'S MINE (SOON HANG FOO)** was worked with a labour force of 1,000 men and steam plant of 69 horse-power. Three hundred and eighty-nine thousand cubic yards of overburden were removed and 189,000 cubic yards of karang were treated for a return of 5,500 pikuls of ore.

55. **CHU SHU MING'S MINE (HONG HENG)** employed a labour force of 1,192 men and steam plant of 32 horse-power. Overburden totalling to 980,000 cubic yards was removed and 68,700 cubic yards of karang were treated for a return of 11,030 pikuls of ore.

56. **SOCIÉTÉ DES ETAINS DE KINTA—LAM LOO KING MINE** removed 66,000 cubic yards of overburden and treated 44,000 cubic yards of karang, with a labour force of 400 men and steam plant of 105 horse-power, and made a recovery of 4,433 pikuls of ore.

57. **SOCIÉTÉ DES ETAINS DE KINTA—HONG CHUT MINE** handled 23,000 cubic yards of overburden and treated 34,000 cubic yards of karang for a return of 7,703 pikuls of ore. The labour force numbered 250 and the horse-power of the plant was 50.

58. **EU TONG SEN'S MINE, FONG LEE, CHENDERANG,** employed a labour force of 1,145 men and plant totalling to 62 horse-power. Overburden amounting to 387,879 cubic yards was removed and 196,255 cubic yards of karang were treated for a recovery of 2,728 pikuls of ore. A 50 horse-power Diesel engine is included in the plant on this mine.

59. **CHUNG THYE PHIN'S MINE, SUMPET,** removed 138,228 cubic yards of overburden and treated 120,040 cubic yards of karang for a return of 2,657 pikuls of ore, with a labour force of 450 men and plant of 28 horse-power.

60. **WONG HO MINE** cut 78,524 cubic yards of overburden and cut and treated 89,541 cubic yards of karang for a return of 2,708 pikuls of ore. The labour force being 200 men and the plant of 36 horse-power.

61. **LOOK FOOK MINE** worked with a labour force of 245 men and a 30 horse-power plant, removed 144,604 cubic yards of overburden and treated 77,746 cubic yards of karang for a yield of 2,170 pikuls of ore.

62. **KWANG SOON LI MINE** dealt with 26,000 cubic yards of overburden and treated 54,000 cubic yards of karang which gave a return of 3,225 pikuls of ore; 500 men were employed and plant of 25 horse-power.

63. **KHOO HENG WAN MINE** removed 24,000 cubic yards of overburden and washed 20,000 cubic yards of karang for a return of 1,315 pikuls of ore, with the aid of a labour force of 240 men and plant of 20 horse-power.

64. **LOKE POH MINE** obtained a return of 1,149 pikuls of ore by the removal of 128,900 cubic yards of overburden and the treatment of 36,100 cubic yards of karang, with a labour force of 350 men and plant of 8 horse-power.

65. **FRENCH MINING COMPANY—POH LOI KONGSI—TEMOH.**—This mine working on tribute with a labour force of 150 men and steam plant of 65 horse-power removed 65,000 cubic yards of overburden and treated 45,000 cubic yards of karang for a return of 2,736 pikuls of ore.

#### HYDRAULIC MINES WORKING UNDER NATURAL HEAD.

66. **HEAWOOD TIN AND RUBBER ESTATES, LIMITED,** treated a yardage of 187,000 for a recovery of 1,457 pikuls of ore, with a labour force of 80 men and a power equivalent of 306 horse-power. Operations were hindered by shortness of water.

67. **TIN TRUST, LIMITED, LARUT,** cut 90,000 cubic yards and recovered 1,551 pikuls of ore. Operations being considerably hampered by boulders. The labour force was 113 men and the power equivalent 277 horse-power.

68. **CHENDAI MERU HYDRAULIC MINE** cut 190,000 cubic yards for a return of 2,338 pikuls of ore.

69. **KINTA ASSOCIATION.**—Only a small amount of mining was done, attention being engaged on the construction of a new pipe line from the Sungei S' Noi.

70. **MERTENS AND COMPANY, LIMITED, SUNGEI CHOH.**—Work commenced in August, and 90,000 cubic yards were cut for a return of 900 pikuls of ore which occurs in schists. The new pipe line was completed.

71. **RAMBUTAN, LIMITED.**—The steam plant was not in commission during the year, work being concentrated on the new pipe line for the conveyance of 2,000 cubic feet of water per minute from the Kinta river under a head of 350 feet, which was completed by the end of the year. An excellent job has been made of the new work and it is the largest pipe line completed to date in the Federated Malay States.

72. AMPANG TIN MINING COMPANY, LIMITED.—The construction of the pipe line was completed by the end of the year and work was commenced.

73. GOPENG CONSOLIDATED, LIMITED, continued working on the same scale as in previous years and won 8,604 pikuls of tin-ore and 118 pikuls of wolfram. Work on the hydraulic project for the conveyance of 6,000 cubic feet of water per minute from the Kampar river was vigorously carried on, full details of this large work will be given in the report on 1914.

74. KINTA TIN MINES, LIMITED.—This Company which is associated with Gopeng Consolidated, Limited, in the Kampar river hydraulic project, carried on operations throughout the year and produced 3,546 pikuls of ore.

75. TEKKA, LIMITED, cut 400,000 cubic yards and obtained a yield of 5,772 pikuls of ore, with a labour force of 308 men and a power equivalent of 720 horse-power. Work was hindered by a heavy flood causing damage to the head works.

76. FRENCH TEKKA COMPANY monitored 650,000 cubic yards of ground for a production of 11,566 pikuls of ore. Elevation was effected by electrically-driven Dumont sand pumps. The labour force employed was 452 men and power equivalent works out as 965 horse-power. A duplicate pipe line was under construction.

77. KRAMAT PULAI, LIMITED.—This Company's hydraulic system is fed by a branch from the Tekka pipe line, and they also suffered hindrance due to the damage that occurred to the Tekka head works. The labour force numbered 215 men and the power equivalent was 915 horse-power.

78. EU TONG SEN'S MINE, TEKKA, carried on throughout the year with a labour force of 61 men and a power equivalent of 210 horse-power and recovered 1,640 pikuls of ore.

79. BRUSEH TIN AND RUBBER, LIMITED, cut 250,000 cubic yards for a return of 2,308 pikuls of ore, with a labour force of 85 men and a power equivalent of 255 horse-power. This mine is working deep down in tin-bearing schists and elevators are employed. The pipe line was extended during the year.

#### HYDRAULICING WITH POWER PLANT.

80. TEKKA, LIMITED, TAIPING.—This property was acquired by a new Company towards the end of the year. Operations were hindered by a large slip which, though it lifted the barge some 17 feet, fortunately did little damage to the plant. A return of 2,507 pikuls of ore was won from 256,500 cubic yards, with a labour force of 161 men and plant totalling to 560 horse-power.

81. NORTH TAMBUN TIN MINES obtained a return of 2,620 pikuls from 156,500 cubic yards and employed a labour force of 114 men and plant of 166 horse-power.

82. PENGKALEN, LIMITED, cut 539,770 cubic yards for a return of 5,239 pikuls. Work ceased on number 1 mine and the barge was removed to another site. Improvements and extensions were effected to the battery of boilers, and with the bringing into work of the steam turbine a large saving in fuel has been effected.

83. SOCIÉTÉ DES ETAINS DE KINTA, KAMPAR, worked under difficulties: in January the Kranji river broke into the mine, and trouble was experienced in elevating. A return of 822 pikuls of ore was obtained with a labour force of 40 men and plant of 430 horse-power.

84. KWONG TENG LEE MINE, TEMOH, cut 72,000 cubic yards during the last quarter of the year and recovered 410 pikuls of ore with a plant of 126 horse-power.

85. KAMPAR TIN MINING COMPANY, BLANGAH, obtained a return of 719 pikuls of ore from cutting and treating 85,500 cubic yards, with a labour force of 78 men and plant of 180 horse-power.

#### BUCKET DREDGING.

86. MALAYAN TIN DREDGING COMPANY, LIMITED, dredged and treated 579,014 cubic yards for a return of 3,780 pikuls of ore, with a labour force of 54 men and a 300 horse-power plant. A second dredge was under construction at the close of the year and it is proposed to eventually employ six dredges on this property. This is the first bucket dredging project of any magnitude to start operations in the Federated Malay States.

#### LODE MINING.

87. RAHMAN HYDRAULIC TIN COMPANY, LIMITED.—A mill site was under preparation at Kepayang, a working was opened out on Gunong Paku, and a cart-road, four miles in length, from Intan to Kepayang was under construction. A considerable amount of work on development was also done, and a return of 7,419 pikuls of ore was obtained. The labour force was 708 men and the power equivalent 213 horse-power.

88. RAHMAN TIN COMPANY, LIMITED, removed 265,000 cubic yards of overburden and treated 94,915 cubic yards for a return of 8,964 pikuls of ore with a labour force of 711 men and plant of 120 horse-power. With a view to reduction in fuel consumption, a Corliss condensing engine has been installed. Considerable additions have also been made to the mill and dressing plant, with a view to increasing efficiency.

89. MENGLEMBU LODE SYNDICATE recovered 4,726 pikuls of ore with a labour force of 454 men and plant of 158 horse-power. Suction gas and air compressing plant was installed, and the drive on the 300-foot level which is to connect the various workings with the proposed hoisting shaft was completed. The depth of the lowest workings is now over 400 feet and water is being met with.

90. SUNGEI CHENDAI PROSPECTING SYNDICATE.—Much useful information was obtained by the employment of tributers on the various outcrops and 1,325 pikuls of ore were won.

#### SELANGOR.

##### OPEN-CAST WORKINGS.

91. SUNGEI BESI MINES, LIMITED, removed 15,000 cubic yards of overburden during the year, installed an additional puddling plant, erected sluice boxes, and erected a tailings pump and delivery line. No work was done towards bunding the area on which it is proposed to dump tailings.

92. SOCIÉTÉ DES ETAINS DE KEPONG completed the erection of their steam electric plant, which in the generating station consists of two Boulte and Labordière vertical compound condensing engines direct coupled to two three phase Schneider alternators, each engine being capable of developing 650 horse-power. The distribution of energy takes place at 500 volts, and steam is supplied at a pressure of 210 lbs. per square inch by two Du Temple water tube boilers fitted with Green's economizers. The mine was de-watered at the end of the year, some tributing was done, stripping of the overburden was put in hand, and three inclines fitted with electric winches were put in working order. A force of 800 men was employed.

93. SALAK SOUTH MINE.—For the first half of the year operations were carried on by the Company, and in the second half the mine was worked on tribute. A new system of working is under consideration and it is proposed to put in inclined ways operated by a suction-gas electric plant of 560 horse-power. The average labour force was 270 men and the production was 1,327 pikuls of ore.

94. LOKE YEW'S MINE AT SUNGEI BESI worked with a labour force of 1,090 men and steam plant of 126 horse-power and secured a return of 6,756 pikuls. New arrangements for the disposal of tailings were under consideration.

95. OPEN-CAST MINES AT AMPANG.—These mines continued in vigorous operation. The Honourable Mr. Eu Tong Sen's Diesel-electric plant was under erection and will come into use in 1914. The mines owned by Loke Chow Thye, Tek Foh Chan Kongsi, Sang Choi Mining Company, and the Honourable Mr. Eu Tong Sen, together with several smaller workings, secured a total return of 25,385 pikuls of ore; the total labour force was 4,220 men, and the aggregate horse-power of the plant employed was 494.

96. TAN KIM BEE'S MINE, KUALA KUBU, obtained a return of 1,102 pikuls of ore, with a labour force of 450 men and plant of 12 horse-power.

97. POON YAIK KONGSI, KALUMPANG.—The output of this mine dropped to 6,735 pikuls of ore won by a labour force of 1,500 men and a 42 horse-power steam plant.

98. TAN CHIA'S DIVERSION OF THE SELANGOR RIVER, BATANG KALI.—Work was carried on with 2,200 men and plant aggregating 48 horse-power, and the return of ore won amounted to 7,254 pikuls.

99. CHOO KIA PENG'S DIVERSIONS OF THE SELANGOR RIVER, BATANG KALI.—Three diversions were worked during the year with a labour force of 1,100 men and plant of 46 horse-power, and a production of 4,040 pikuls of ore were secured. Two of these workings had only reached the producing stage towards the close of the year.

100. WONG QUEE LONG'S MINES, BATANG KALI.—Work was hindered by the increased depth to which it was found necessary to excavate, and the construction of two haulage ways was put in hand. The output was 2,793 pikuls.

101. LOKE YEW'S MINE, SERENDAH.—With a labour force of 1,000 men and steam plant of 37 horse-power a return of 6,500 pikuls of ore was secured.

102. FUNG WAH'S MINE, SERENDAH, won about 1,800 pikuls of ore and employed 600 men and plant of 22 horse-power.

103. TEH SUAN'S MINE, RAWANG, employed 230 men and plant of 34 horse-power and produced 1,320 pikuls of ore.

104. YAP KOW'S MINE, RAWANG, produced about 2,400 pikuls of ore during the year.

## LAMPAN WORKINGS.

105. BAN JOO KONGSI.—These workings produced 4,636 pikuls of ore with the aid of a labour force of 300 men. In the course of working a number of lode lines were exposed which will be further investigated.

106. CHANG AH PENG'S MINE, RINTING.—A considerable amount of work was done with a view to determining the extent of the stock work formation on the hills, with satisfactory results. The output was 1,688 pikuls of ore and the labour force was 290 men.

## HYDRAULIC WORKINGS UNDER NATURAL HEAD.

107. LOKE CHOW THYE'S MINE, ULU KLANG.—One monitor only was employed and work was confined to tributing.

108. SERENDAH HYDRAULIC COMPANY, LIMITED, worked on tribute throughout the year, the production being about 1,860 pikuls of ore. The tailings dams have reached the limit of their capacity and further storage room is required.

109. MALAYAN TIN MINING COMPANY, LIMITED, employed one monitor and one elevator, and was only worked on a small scale.

## LODE MINING.

110. MASON AND HEMMY'S WORKINGS, ULU BAKAU, gave an output of 7,661 pikuls of ore; but there are no details available with regard to quantity of stone treated.

## NEGRI SEMBILAN.

## OPEN-CAST WORKINGS.

111. There are no very large or very deep open-cast workings in operation in Negri Sembilan.

At Rahang, Toh Tua Poh employed 350 men and steam plant of 10 horse-power. At Rasa, Yap Loy worked with 300 men and a 10 horse-power engine; the firm of Kong Hup closed down their open-cast near the 3rd mile, old Jelebu road, and transferred 300 of their men to a new open-cast at Chukong. Kong Sang shut down the mine at Membau and moved about 250 men and a 12 horse-power engine to Rantau, near Kuala Sawah. At Geboh, near Mantin, Kong Sang's mine was worked on a reduced scale with 980 men and steam plant of 14 horse-power, and in the same locality Peh Joo Seng opened a mine with 170 men and a 10 horse-power engine.

## UNDERGROUND WORKINGS.

112. As has been the case for some years no underground workings of any magnitude have been mined.

At Rahang, Tung Foo had 120 men and a 12 horse-power engine at work; at Lenggeng, Ow Leong employed 150 men and a 10 horse-power engine; and at Lukut, near Port Dickson, L. J. Potocki worked with 135 men and a 12 horse-power engine.

The Titi Tin Mining Company, Limited, employed a considerable number of tributers at Titi on shafting.

## HYDRAULICING UNDER NATURAL HEAD.

113. THE SEREMBAN TIN MINING COMPANY, LIMITED, worked with one 3-inch and one 1½-inch monitor, and employed a labour force of 144 men, and obtained 1,041 pikuls of tin-ore and 153 pikuls of wolfram.

KENABOI, LIMITED, dealt with an estimated yardage of 70,000, and employed two elevators and two monitors with a labour force of 50 men. The total output was 2,700 pikuls of tin-ore and about 77 ounces of gold, of which 2,270 pikuls of tin-ore were from tribute workings.

## HYDRAULICING WITH POWER PLANT.

114. THE TITI TIN MINING COMPANY, LIMITED, worked one 2-inch monitor for a portion of the year, which was fed by a 70 horse-power duplex pump, and obtained an output of 946 pikuls.

## LODE WORKINGS.

115. THE TITI TIN MINING COMPANY, LIMITED, did a considerable amount of work in connection with opening up old abandoned lode workings, and from surface lode mining and shafting on tribute obtained a return of pikuls 8,001 of ore. This ore carried about 15 per cent. of wolfram, and was sent to Perak and Selangor for separation.

## PAHANG.

## UNDERGROUND WORKINGS.

116. PAHANG CONSOLIDATED COMPANY, LIMITED.—This mine is a splendid example of what can be effected by capable management as regards general organization, working and control. It is not generally known that the mine in question is probably the second largest producer of tin from lode workings in the world, the Aramayo Mine being possibly

the largest. This Company maintains its own flotilla of oil tank barges worked by two stern wheel steamers, for river transport from Kuantan to the present terminus of the Company's railway line at Kuala Reman, a distance of about 28 miles. From Kuala Reman to the site of the mill at Sungei Lembing, a distance of about 13 miles, the Company's railway line affords efficient means of transport, and is equipped with six locomotives, five passenger cars, sixteen firewood trucks, four oil tank wagons, four tank wagons, five goods vans, two platform wagons and one hundred ore trucks. The alignment of the railway between Kuala Reman and Sungei Lembing has been considerably improved and a number of bridges have been reconstructed. In order to facilitate transport during periods of low river, a railway extension of  $4\frac{3}{4}$  miles is under construction to Pasir Kamudi, about six miles downstream from Kuala Reman. When this extension is completed the total length of railway, including firewood branch lines, will be about 28 miles.

The Company have their own doctor and a well-ordered hospital; the health conditions were good, a result following on the care taken by the management. The town of Sungei Lembing, which was destroyed by fire in 1912, has been rebuilt by the Company on a well laid out plan with more substantial buildings than formerly, and special attention has been paid to sanitary measures. A spacious market has also been built and will afford a means of controlling the sale of, and quality of, meat and vegetables. A cold storage plant is run at this mine and is of great benefit to the employés, many of whom take advantage of it.

The outstanding features of the year's working under review are favourable development in Willinks Mine and the discovery of Nicholson's East Lode. The total tonnage of ore treated during 1913 was 143,623 tons with an output from the mill of 25,151 pikuls and from alluvial workings of 3,573 pikuls, showing an increase of 5,437 pikuls as compared with 1912. A decrease in the working costs was effected. The Diesel engines continued to give satisfaction; but at the close of the year the crank shaft of the 200 horse-power engine driving the battery failed and there will be some delay before replacement can be effected. Four units of Holman pneumatic stamps were brought into use, and this is the first occasion on which plant of this type has been used in the Federated Malay States. An electrical power station was practically completed by the end of the year designed to be driven by two 200 horse-power semi Diesel engines, the energy from which will be mainly used for driving pumps in the deep levels, capable of raising 1,100 gallons of water per minute to a height of 600 feet. The following plant was brought into work during the year: two Babcock and Wilcox boilers aggregating 160 horse-power, pumping plant aggregating 198 horse-power, six belt conveyors, one magnetic separator, one ore furnace and one dynamo for lighting. The oil tanks at Kuantan and Kuala Reman for the storage of liquid fuel were maintained in good order. The total power employed was 2,173 horse-power; the labour force was 4,246, inclusive of 526 wood-cutters and a staff of 30 Europeans. The work done during the year included 32,841 feet of development on drives, cross-cuts, winzes and rises, besides 158 feet of shaft sinking.

117. RAUB AUSTRALIAN GOLD MINING COMPANY, LIMITED.—In this mine the effect of good management was also very evident, working costs having been brought to a low figure, and the fact that for the third year in succession there have been no fatal accidents is a most creditable feature. No advance was made in depth, but development by driving and cross-cutting was vigorously prosecuted. With a tonnage crushed of 97,254 tons, the output of gold was 13,087 ounces, a large proportion of which was won from surface workings. At the hydro-electric power station the flume from the head works to the head of the pipe line was almost entirely reconstructed. In the power station a set of Isenthal lightning arresters have been installed and have given satisfactory results in lessening interruption by atmospheric electricity which was formerly a frequent cause of stoppages. The addition of new pumping plant and of twenty head of stamps is under consideration. The horse-power employed averaged about six hundred and the labour force aggregated 868, inclusive of twelve Europeans. In addition to the hydro-electric power plant, steam plant (mostly for stand-by purposes) of 136 horse-power is installed. The deepest working is at 840 feet as was the case at the close of 1912. The duty on gold exported was not exacted during the year under review.

#### LODE WORKINGS OTHER THAN THE PAHANG CONSOLIDATED AND THE RAUB GOLD MINE.

118. SUNGEI GAU, LIMITED.—It is reported that 4,732 tons of picked stone were crushed for a return of 2,368 pikuls of ore. Tributers also returned 367 pikuls from their lampan operations. The horse-power employed was 19 and the labour force averaged 236 men, of whom 85 were tributers working open-cast. About 248 feet of driving for development was executed. A small concentrating plant driven by 7 horse-power oil engine was practically ready for work by the end of the year. This Company continued to receive a rebate of 50 per cent. on the duty on ore won from their lode workings.

119. CHIN CHONG.—As the result of crushing 7,444 tons of picked stone, a yield of 3,378 pikuls is reported, and tributers are also credited with a return of 1,610 pikuls. A small mill is driven by an 8 horse-power Pelton wheel and a labour force of 423 men was employed, of whom 248 were tributers. The installation of an extension to the mill and a

12 horse-power semi Diesel engine is contemplated. The option mentioned in last year's report was not taken. The rebate of 50 per cent. of the duty on ore from lode workings was continued.

120. LAMPAN WORKINGS, GAPIB.—It is estimated that 57,600 cubic yards were treated (= about 86,400 tons) for a yield of 390 pikuls of ore. A 12 horse-power oil engine was employed to pump water to the workings and the labour force was 56, all but six of whom worked on contract.

121. BELAT TIN MINING COMPANY, LIMITED.—The principal workings of this Company were at Badong, where 400 men were employed on tribute with steam plant aggregating to about 40 horse-power. A return of 2,310 pikuls of ore was obtained.

#### LOKE YEW'S WORKINGS AT GAMBANG.

122. CHOP CHOONG HENG.—At the close of the year under review about 1,500 men with steam plant of 50 horse-power were at work; the returns are included in the total of 9,006 pikuls from all of Loke Yew's workings in this neighbourhood, some of which were open-casts.

#### HYDRAULIC WORKINGS UNDER NATURAL HEAD.

123. BRUANG, LIMITED.—This Company shut down their monitors at the end of August, and at the end of the year employed about 100 men on small open-cast workings. The output was 500 pikuls of ore.

124. SEMPAM VALLEY HYDRAULIC COMPANY, LIMITED.—This Company was floated in September, and the construction of their hydraulic works was put in hand, and orders were placed for plant. At the close of the year 566 men were at work, of whom 296 were on construction works and 270 were lampanning on the lower lands.

125. ULU PAHANG, LIMITED.—Hydraulic and water licences were issued during the year, but work was not commenced on construction of the necessary works.

### PART VI.

#### GENERAL REMARKS ON MINING OPERATIONS.

##### WEATHER AND ITS EFFECT ON MINING.

126. The weather, except towards the close of the year, was not unfavourable; though there were the usual shortages and surplusages of water in several districts at various times during the year.

##### TAILINGS.

127. In Upper Perak steps were taken to stop working in the Endak valley, which drains into the Rui, a tributary of the Perak river, as the physical features did not permit of the retention of tailings, and arrangements were made to compensate the miners whose workings were closed down. The whole tailings question at Klian Intan is a difficult one and until surveys are available it is impossible to give an opinion on any scheme for retention.

In the Ulu Gopeng valley the Public Works Department arranged to build some experimental dams; but up to the end of the year no progress had been made. In this locality permanent works are needed for the carrying off of storm water. Tailings caused obstruction on the Kramat Pulai road, and raising the roadway has become necessary; this trouble was largely due to wash from abandoned workings.

At Kuala Kubu a further shallowing of the river bed was experienced, but not sufficient to seriously alter the conditions existing at the beginning of the year. A scheme was prepared for scouring out the river channel, some experimental works were carried out, but at the end of the year this project was held in abeyance, pending consideration of alternative measures.

At Serendah conditions were not improved, further measures were taken and orders were issued to the mines concerned; the question in this instance is complicated by the fact that storm-wash off abandoned areas is a contributing factor.

At the  $4\frac{1}{2}$  and the  $5\frac{1}{2}$  miles on the Tranum-Bentong road tailings that were started by the big storm of December, 1911, are encroaching on the roadway and the only remedy is to raise the formation level.

If the hydraulicing operations of the Titi Tin Mining Company, Limited, are extended in volume, or even if continued on the scale of 1913, special measures will have to be taken for the retention of tailings, and if such working is increased by the employment of more monitors very extensive measures will be necessary to obviate damage.

It has been found necessary to prohibit the movable spill ways that it has been the practice to construct in tailings dams and to insist on fixed spills that cannot be tampered with. It has also been found imperative to construct permanent works, where tailings dams are built across valleys or main lines of drainage, and to provide them with storm water passes and spill ways of sufficient length to ensure a limiting depth of from 1' 6" to 2', as, if a greater depth is allowed, the tailings are liable to be washed out during storms.

Records of the depths of water-courses draining mining areas have been continued and will be amplified in 1914.

In several localities the condition of the principal streams is becoming serious and the first instalment of a vote to cover cost of surveys, with a view to concerting measures for their regulation, has been granted in the 1914 Estimates.

The condition of the lake at Kuala Lumpur affords an example of the difficulty of clearing water that has been stained by earthy matter, though there is a large area of practically still water, during periods of dry weather no improvement is shown. This lake is also an example of the effect of areas, that have been denuded of jungle, on storm water flowing off them.

#### TIMBER AND FUEL SUPPLY.

128. The condition of the timber market as regards material for structural purposes showed little alteration as compared with 1912. Firewood in some localities showed a tendency to rise in price, but generally there was little alteration.

The fuel consumption on mines in 1913 was as follows, as nearly as can be ascertained; the figures cannot be considered as strictly accurate but they are more so than in previous years:

State.	Tons.		
	Coal.	Oil.	Wood.
Perak ... ..	22,135	550	205,500
Selangor ... ..	13,500	...	65,500
Negri Sembilan ... ..	...	...	18,000
Pahang ... ..	160	931	14,500
Total ... ..	35,795	1,481	303,500

In view of the Rawang Coal Field, prospective purchasers of oil engines of all classes other than those of small power would be well advised if they were to consider the possibilities of gas engines using local fuel, especially when the uncertainty of the price of oil in the future is reviewed.

#### PROSPECTING.

129. The areas covered by prospecting licences and the areas selected were as follows in acres:

State.	Number of licences.	Area under licences.	Area taken up.
Perak ... ..	71	21,853	1,000
Selangor ... ..	34	11,836	396
Negri Sembilan ... ..	35	17,343	559
Pahang ... ..	27	15,380	771
Total, 1913 ... ..	167	66,412	2,726
Total, 1912 ... ..	198	54,996	3,799

showing no very great advance as compared with 1912. Government boring gangs continued to be employed in Selangor and obtained useful information for use in connection with the alienation of land.

#### GEOLOGICAL SURVEY.

130. The geological map of the Kinta district was published and is a valuable aid to the mining community; the geological survey was extended and investigations pushed further afield. In Negri Sembilan, where agricultural interests are treading closely on the heels of mining, the need of a geological map was much felt, and much the same condition existed in parts of Selangor. It is again to be recorded that no deep bores were put down, and knowledge of the country at depth still remains in a conjectural stage.

#### COLLECTION OF INFORMATION AND MINING STATISTICS.

131. The records under this head have been amplified, and figures previously obtained have been verified as far as possible. This work, as heretofore, has been in the hands of the Inspector under the Mineral Ores Enactment.

## MINING LANDS.

132. As nearly as can be ascertained 2,695 acres of mining land were converted for agricultural purposes—as compared with 2,536 acres in 1912—as follows:

Perak ... ..	Acres.
Selangor ... ..	463 *
Negri Sembilan ... ..	1,802
Pahang ... ..	430
	—
Total ... ..	2,695

The approximate areas of agricultural land converted for mining were as follows:

Perak ... ..	Acres.
Selangor ... ..	434
Negri Sembilan ... ..	252
Pahang ... ..	30
	44
Total ... ..	760

## ACCIDENTS.

133. The total number of deaths due to accidents were as follows for the years 1911, 1912 and 1913.

State.	1911.	1912.	1913.
Perak ... ..	86	110	122
Selangor ... ..	35	54	58
Negri Sembilan ... ..	4	9	12
Pahang ... ..	27	26	33
Total ... ..	152	199	225

Four holders of dulang passes also lost their lives but are not included as they were not employed on regular mining operations.

On a total labour force of 225,405, this gives a gross rate of 0.99 per thousand as against 0.94 in 1912. The death-rate per thousand in each State was: Perak 0.965; Selangor 0.779; Negri Sembilan 1.292; Pahang 2.263.

The following tables give an analysis of fatal accidents:

## MISCELLANEOUS.

Cause.	Negri				Total.
	Perak.	Selangor.	Sembilan.	Pahang.	
Due to electricity ... ..	2	...	...	...	2
On auxiliary operations ... ..	...	1	1	...	2
Surface accidents ... ..	2	...	5	2	9
Shallow workings ... ..	9	23	...	24	56
Cliff workings ... ..	2	...	...	...	2
Total ... ..	15	24	6	26	71

## DEEP OPEN-CASTS.

Falls of earth or rock ... ..	62	21	...	...	83
Rushes of water or mud ... ..	13	...	...	...	13
Other causes ... ..	11	6	...	...	17
Total ... ..	86	27	...	...	113

## UNDERGROUND WORKINGS.

Falls of earth, rock, or timber ... ..	3	2	1	5	11
Rushes of water or mud ... ..	11	...	1	...	12
Due to foul air ... ..	...	...	4	...	4
Falling down shafts ... ..	3	3	...	1	7
Due to blasting ... ..	3	2	...	...	5
Other causes ... ..	1	...	...	1	2
Total ... ..	21	7	6	7	41

\* Figures incomplete.

The death-rate on underground workings is 2.0 per thousand. The general death-rate would have been lower but for the unfortunate series of accidents in Perak towards the close of the year. An accident occurred at the Tronoh Mine in December which caused the death of fourteen persons, and some features of it were remarkable. A heavy slip took place on a slope mainly composed of lignite with stacks of sandy overburden near the crest, the toe of the slope was of hard clay, running out to the bed rock; the general inclination of the face was rather flatter than 1 to 1; and the slope was in process of being benched back and lightened near the crest. The so-called lignite appears to have slid with such momentum that it rushed, in what might be termed a wave, across the mine, a distance of about two hundred feet, and was then deflected through practically 90° and flowed up the mine in a diminishing volume to a distance of about six hundred feet from the centre of the fall. There was no rush of water or slimes, and the percolation on the slope after the slip occurred was barely perceptible. Of fourteen men who were engaged in benching back and lightening on the site of the slip, all but one escaped; two were carried on the moving material across the mine to the opposite slope and escaped practically unhurt. Thirteen persons were overwhelmed and killed at a point from three to four hundred feet up the mine, at right angles from the centre of the fall, in a position which was apparently safe, the manager having a narrow escape from a point close by. Every attempt has been made to obviate accidents by frequent inspections and by the enforcement of the provision of the Mining Enactment for the prevention of danger; and prosecutions were instituted in every case where enquiry disclosed default or negligence.

#### USE OF MACHINERY IN MINES.

134. There is a continued tendency towards an increase of the plant employed and also towards an improvement in type. Bucket dredges will be a feature in future, and the employment of Holman pneumatic stamps at the Pahang Consolidated Mine is a new feature.

#### MINES DEPARTMENT BORING PLANT.

135. The departmental boring plant has been kept in good order with the exception of some hand-boring sets that are practically worn out; it has been extensively used both by private users and by the department. The steam-driven Sullivan drill was on hire for most of the year, but no important results were obtained as no great depth was reached. The diamond crowns were not employed.

#### TIN WON BY MINES UNDER CHINESE MANAGEMENT AS COMPARED WITH MINES UNDER EUROPEAN CHARGE.

136. As nearly as can be estimated mines under Chinese management produced about 74 per cent. of the total output from the Federated Malay States.

### PART VII.

#### MINERAL ORES ENACTMENT AND DANGEROUS TRADES ENACTMENT.

##### MINERAL ORES ENACTMENT.

##### LICENCES.

137. The number of ore-buyers' licences issued in the three Western States was as follows in 1911, 1912 and 1913:

State.	1911.	1912.	1913.
Perak ... ..	181	169	170
Selangor ... ..	126	131	126
Negri Sembilan ... ..	26	25	23
Total ... ..	333	325	319

The year under review again shows a decrease in the total issue of licences; but there is no doubt that the number of ore-buyers was adequate.

##### SUB-LICENCES.

138. The following sub-licences were issued for the years 1911, 1912 and 1913:

State.	1911.	1912.	1913.
Perak ... ..	401	350	372
Selangor ... ..	156	138	145
Negri Sembilan ... ..	8	12	18
Total ... ..	565	500	535

which shows an increase of 35 sub-licences as compared with 1912, and a decrease of 30 in comparison with 1911.

## REVENUE COLLECTED.

139. The revenue derived from fees under the Mineral Ores Enactment, and credited to State revenue, was as follows for the years 1911, 1912 and 1913:

State.	1911.	1912.	1913.
Perak ... ..	\$18,300	\$17,075	\$17,186
Selangor ... ..	12,678	13,169	12,672
Negri Sembilan ... ..	2,604	2,506	2,309
Total ... ..	\$33,582	\$32,750	\$32,167

the total decrease of revenue being \$583 as compared with 1912.

## COST OF STAFF.

140. The cost of the Federal staff employed under the Mineral Ores Enactment was estimated at \$17,341 (inclusive of "Other Charges"), and an expenditure of \$15,288 was actually incurred as compared with \$14,374 in 1912.

## PROSECUTIONS.

141. Six prosecutions were undertaken, in each instance followed by conviction; and fines to the amount of \$405 were inflicted.

## INVESTIGATION OF CASES.

142. A large amount of time was unprofitably spent in investigating cases in which, though evasion of the Enactment had occurred, action was impossible owing to sufficient powers not being provided. As previously remarked, this Enactment requires to be made more effective.

## ORE-BUYING BUSINESS.

143. The following table represents the approximate extent of the ore-buying business in the three Western States and, as in former years, two large European Companies operated their reduction works in the Colony of the Straits Settlements.

State.	Places licensed.	Smelting houses.	Men smelting.	Men buying and dressing.	Total men.	Roasting furnaces.	Smelting furnaces.	Lan-chutes.	Foot stamps.
Perak ... ..	161	7	128	1,286	1,414	3	20	237	87
Selangor ... ..	107	4	124	542	666	1	19	147	102
Negri Sembilan	21	1	6	65	71	—	1	—	—
Total, 1913 ...	289	12	258	1,893	2,151	4	40	384	189
Total, 1912 ...	295	12	376	2,078	2,454	4	47	376	167

In addition there were 14 licences issued to European Companies in Perak, 12 in Selangor and two in Negri Sembilan. The total of the business transactions for the year under review was estimated at \$126,000,000 as compared with \$122,000,000 in 1912. To arrive at these figures the sums of all local purchases have been taken.

## STAFF.

144. Mr. Evans who has had charge of the work under the Enactment since its initiation went on leave on 10th April, 1913, and Mr. Lovett had charge from that date to the end of the year. The Sub-Inspectors continued to carry on their work as satisfactorily as could be expected, and three of them qualified in additional dialects under their salary scheme.

## MONTHLY NOTICES OF OUTPUT.

145. The monthly notices for the *Gazette* continued to be compiled and checked by the Mineral Ores Enactment staff, and printed slips were sent to forty-eight addresses.

## GENERAL.

146. As in previous years, a quantity of ore could not be entered in the records at the end of each month owing to the sellers quoting the source of origin incorrectly, and a great deal of time was spent in tracing it; by the end of the year all but 1,405 pikuls had been accounted for.

Quarterly comparisons with the figures recorded by the Treasurer and the Commissioner of Trades and Customs for reconciliation of returns were continued. A large amount of work was done in connection with recording returns and furnishing statements of outputs from the various districts.

## DANGEROUS TRADES ENACTMENT.

147. One licence was issued in Selangor for roasting arsenical ores; the furnace in use was periodically inspected and analysis made of the gases escaping at the stack, and its working was found to be satisfactory.

## PART VIII.

## STEAM BOILERS' ENACTMENT.

## DISTRIBUTION OF PLANT AND ITS HORSE-POWER.

148. Eighteen hundred and sixty-two boilers with a collective horse-power of 76,340 were registered and were distributed as follows:

State.	Number.	Horse-power.
Perak ... ..	820	35,306
Selangor ... ..	687	28,137
Negri Sembilan ... ..	215	5,559
Pahang ... ..	140	7,338
Total ... ..	1,862	76,340

In 1911 and 1912 the figures were:

State.	1911.		1912.	
	Number.	Horse-power.	Number.	Horse-power.
Perak ... ..	744	32,213	787	34,229
Selangor ... ..	609	22,719	630	23,544
Negri Sembilan ... ..	203	5,262	209	5,262
Pahang ... ..	128	6,429	135	6,792
Total ... ..	1,684	66,623	1,761	69,827

An increase in numbers and in horse-power is recorded, but requires to be qualified by an inspection of the table given below, which shows the amount of idle plant.

## CLASS OF EMPLOYMENT.

149. The following table shows the employment of steam boilers in each State for the year under review:

State.	Mining.		Agricultural.		General.		Government.	
	Working.	Idle.	Working.	Idle.	Working.	Idle.	Working.	Idle.
	No.	No.	No.	No.	No.	No.	No.	No.
Perak ... ..	473	194	14	42	31	12	46	8
Selangor ... ..	331	231	14	20	20	20	44	7
Negri Sembilan ... ..	41	89	15	30	1	2	25	12
Pahang ... ..	47	51	4	1	2	2	24	9
Total, 1913 ... ..	892	565	47	93	54	36	139	36
Total, 1912 ... ..	823	572	55	78	30	35	134	34

The percentage of boilers idle is 39 for the year under review as compared with 41 per cent. in 1911 and 1912, and when the increase in horse-power is considered an improvement in working conditions is manifest.

## EXAMINATION OF ENGINEERS AND DRIVERS.

150. Four candidates presented themselves for examination as first class engineers and two for the second class, all of whom passed. Sixty-one candidates were examined for first class drivers' certificates and fifty-one passed; and of two hundred and thirty-one candidates for second class drivers' certificates, one hundred and ninety-eight were successful.

## ACCIDENTS.

151. There were no fatal or serious accidents due to failure of steam engines or boilers.

## CHIEF INSPECTOR OF BOILERS.

152. The Chief Inspector of Boilers, Mr. W. J. Trowell, M.I.M.E., rendered valuable assistance in connection with the Machinery Enactment, which comes into force on 1st January, 1914.

#### WORK DONE BY BOILER INSPECTION STAFF.

153. There was a continued increase in the work done by the Boiler Inspection staff and a considerable increase in the mileage travelled on duty, and again it has to be recorded that there has been no serious or fatal accident during the year under review.

#### COST OF BOILER INSPECTION STAFF.

154. The cost of the staff working under the Steam Boilers Enactment was \$28,314, and the fees collected amounted to \$23,229. In 1912 these figures were \$26,179 and \$22,171. A very large mileage was covered by the Inspection staff in the year under review.

#### GENERAL.

155. The introduction of the Machinery Enactment in 1914 will extend inspection to all classes of prime movers and to machinery generally, and the staff will be strengthened by the addition of two Inspectors to cope with the consequent increase of duty.

#### CONCLUSION.

##### INCREASE IN OUTPUT, LABOUR FORCE AND PLANT.

156. The Federated Malay States tin output in 1913 reduced to a metallic basis is a little less than it was in 1908, but is more than in any of the intervening years. In Perak the output was again a record as was also the case in Pahang. The labour force and the power of the plant employed again showed an increase, and on the whole 1913 may be considered as a prosperous year for the mining industry, though a few small workings were compelled to close down towards the close of the year.

##### BUCKET DREDGING.

157. In the year under review the first large scale project for the recovery of tin-ore by means of bucket dredging came into operation, and a number of other projects of a similar nature were brought forward, some of which should be working in 1915 or possibly earlier. In connection with this system of mining it should be realized that it is not capable of general application to all localities, or to all classes of country, and that careful prospecting is as necessary to ensure success as it is in any other form of mining.

##### LODE WORKINGS.

158. There is no doubt that lode mining attracted more serious attention than in former years, though progress in this branch of the mining industry has been and is likely to be slow, mainly on account of the capital required and the impossibility—except in exceptional cases—of satisfactorily determining the nature of any particular case other than by actual work on development, with the accompanying uncertainty of what the result may prove to be.

##### CANCELLATION OF LEASES.

159. A general policy of enforcement of the cancellation of leases that were liable to such action has been adopted, chiefly in the three Western States; but the extent and character of the land so dealt with in 1913 was unimportant as far as effect on the rent-roll was concerned.

##### FUEL SUPPLY.

160. Oil fuel has gained a footing in the Western States as well as in Pahang; the increase of its use will depend very largely on the maintenance of prices at about the rate ruling in 1913, especially when coal from the Rawang Collieries becomes available.

The coal returns furnished in previous years were inaccurate, and the apparent drop in consumption of this fuel was probably due to too high a figure being quoted in 1912, and as far as an amount of about 7,000 tons is concerned to more economy in use. In connection with the question of fuel, the storage of a sufficient reserve on mines is a matter that should not be overlooked, as there are many possibilities of interruption of supply, some of which are entirely beyond local control.

##### NEGRI SEMBILAN.

161. Tin mining in Negri Sembilan received an impulse from the operations of the Titi Mining Company, Limited, at Titi, near Jelebu; it is hoped that certain abandoned lode workings will be reopened, and that the large scale workings of this Company will be extended.

##### NEW HYDRAULIC WORKS.

162. The hydraulic works of the Gopeng Consolidated and the Tanjong Rambutan Companies mark a great advance on any similar works in the Federated Malay States, and they both bear evidence of careful and capable engineering. In the report on 1914 full details and plans of both these large works will be given.

##### HIS EXCELLENCY THE HIGH COMMISSIONER'S VISIT TO MINES IN PERAK.

163. In July His Excellency the High Commissioner visited the Tambun, Tronoh, and the Malayan Tin Dredging Company's properties, and also inspected the hydraulic works being carried out by the Tanjong Rambutan and the Gopeng Consolidated Companies. His Excellency was pleased to express his appreciation of the work in progress.

## FEDERATED MALAY STATES CHAMBER OF MINES.

164. The question of forming a Federated Malay States Chamber of Mines was brought up by the Council of the Perak Chamber of Mines; it was carried into effect and the new Chamber is to be incorporated. It is hoped that this generally representative body will be of advantage to the mining community, and of assistance to Government.

## TOPOGRAPHICAL SURVEY.

165. The topographical survey now in progress in these States will, when maps become available, be of great assistance to geological and prospecting operations, and will facilitate the separation of mining areas from those likely to be taken up for agricultural purposes.

## SETTING OUT OF NEW RAILWAYS AND ROADS.

166. Attention should be directed when the location of new railways or roads is under consideration to so set them out as to minimize interference with mining operations and the drainage therefrom as experience has shown that in many instances slight changes of location would have obviated inconvenience and expense.

## DIESEL ENGINES.

167. A word of warning to the users of Diesel engines is necessary on the importance of skilled attendance and supervision, especially with regard to the larger sets, as an impression appears to have got abroad locally that these types of prime movers do not need to have trained men in charge of them; whereas their efficient and safe working entirely depends on the accuracy with which adjustments are made and maintained. Failure in respect of proper care, adjustment and handling of these engines has led to a number of fatal accidents and damage to property in the United Kingdom and on the Continent. There has been one accident in the Federated Malay States due to the failure of a crank shaft, fortunately unattended by serious or fatal injuries to those in charge.

## CONDITIONS AT THE END OF THE YEAR.

168. The tin mining outlook at the end of the year under review was not as favourable as it was at the end of the previous year, there were larger stocks and prices showed a downward tendency; but with an improvement of trade conditions in Europe and the United States, a recovery should be experienced. As remarked by a high authority, high prices to be well sustained must be supported by a proportionate demand and it is to an increase in demand that the industry must look forward.

## ILLUSTRATIONS AND CHARTS.\*

169. Illustrations of some of the principal mines, and five diagrams showing export and price for twenty-five years and the production in districts, are attached to this report.

W. EYRE KENNY, M. INST. C.E.,  
*Senior Warden of Mines, F.M.S.*

## LIST OF PLATES.\*

Plate	I.	Lahat Mine, looking North.
"	II.	Malayan Tin Dredging Limited's No. I Dredge.
"	III.	Tambun Mine.
"	IV.	Tronoh Mine—Main Open-cast, looking South.
"	V.	French Company's Mine, Tekka.—Open-cast.
"	VI.	French Company's Mine.—Hydraulic.
"	VII.	Gopeng Consolidated 43 inch Pipe Line, under construction.
"	VIII.	Tanjong Rambutan Pipe Line, under construction.
"	IX.	Pahang Consolidated Company's Mill at Sungei Lembing, Pahang.
"	X.	Pahang Consolidated Company's Head Gear, Teague's Mine.
"	XI.	Société des Etains de Kepong Mine, Selangor.
"	XII.	Société des Etains de Kepong—Power Plant.

\* Not printed.