SOUTH AUSTRALIA.

DEPARTMENT OF MINES.

MINING REVIEW

FOR THE

HALF-YEAR ENDED JUNE 30TH, 1934.

No. 60.

ISSUED UNDER THE AUTHORITY OF THE

HONORABLE GEORGE RITCHIE, M.L.C.,

MINISTER OF MINES.

ADELAIDE:
HARRISON WEIR, GOVERNMENT PRINTER, NORTH TERRACE.

1935.

RECENT PUBLICATIONS OF THE SOUTH AUSTRALIAN GEOLOGICAL SURVEY.

ANNUAL REPORTS (NEW SERIES) OF THE GOVERNMENT GEOLOGIST

WARD, L. KEITH

Annual Reports, 1913-1933 (issued as Parliamentary Papers).

GEOLOGICAL MAP.

Geological Map of South Australia, colored; scale, 32 miles to an inch. February 10th, 1928.

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1. WARD, L. KEITH, and JACK, R. LOCKHART—
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   Notes on—
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   II. Wet Gravity Concentration of Pyritic Ore from Nairne.
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   IV. The Treatment of Copper Ore from the Prince Albert Mine. March 19th, 1917.

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5. JACK, R. LOCKHART—
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   Also Appendices on Flora of the Country between Oodnadatta and the Musgrave and Everard Ranges, by Captain S. A. WHITE, M.B.O.U.; and on Results of Magnetic and Astronomical Observations, by G. F. DODWELL, Government Astronomer. September 6th, 1915.
6. JACK, R. LOCKHART—
   The Geology of the Moonta and Wallaroo Mining District (with maps). May 22nd, 1917.
7. JACK, R. LOCKHART—
   The Phosphate Deposits of South Australia (with maps). May 19th, 1919.
8. JACK, R. LOCKHART—
   The Salt and Gypsum Resources of South Australia (with maps). December 1st, 1920.
9. JACK, R. LOCKHART—
   The Iron Ore Resources of South Australia (with maps). February 6th, 1922.
10. JACK, R. LOCKHART—
    The Building Stones of South Australia (with maps). March 13th, 1923.
11. JACK, R. LOCKHART—
    Some Developments in Shallow Water Areas in the North-East of South Australia (with maps). December 15th, 1924.
12. JACK, R. LOCKHART—
    Clay and Cement in South Australia. May 17th, 1926.
13. JACK, R. LOCKHART—
    Pigment Minerals in South Australia. March 26th, 1928.
14. JACK R. LOCKHART—
    Geological Structure and other Factors in Relation to Underground Water Supply in Portions of South Australia.
15. JACK, R. LOCKHART—
    Report on the Geology of the Region to the North and North-West of Tarcoola (with map).

MINING REGULATIONS.

Mining Regulations with Index. Price, 2s. 6d.

RECORDS OF THE MINES IN SOUTH AUSTRALIA.

BROWN, H. Y. L.—

Record of the Mines of South Australia (Fourth Edition, with map). 1908.

Reviews of Mining Operations in the State of South Australia. A Short Review of Mining Operations in the State of South Australia during the Year 1903. No. 1 (*out of print*)*.

Reviews of Mining Operations in the State of South Australia, published half-yearly, commencing January 1st, 1904. Nos. 2 to 26 inclusive. (*Nos. 2 to 8* inclusive and Nos. 16, 18, and 19 out of print*).

Mining Reviews for the State of South Australia, published half-yearly. Nos. 27 to 60 inclusive.

*Nos. 1 to 8. Reviews of Mining are incorporated in the Record of Mines.

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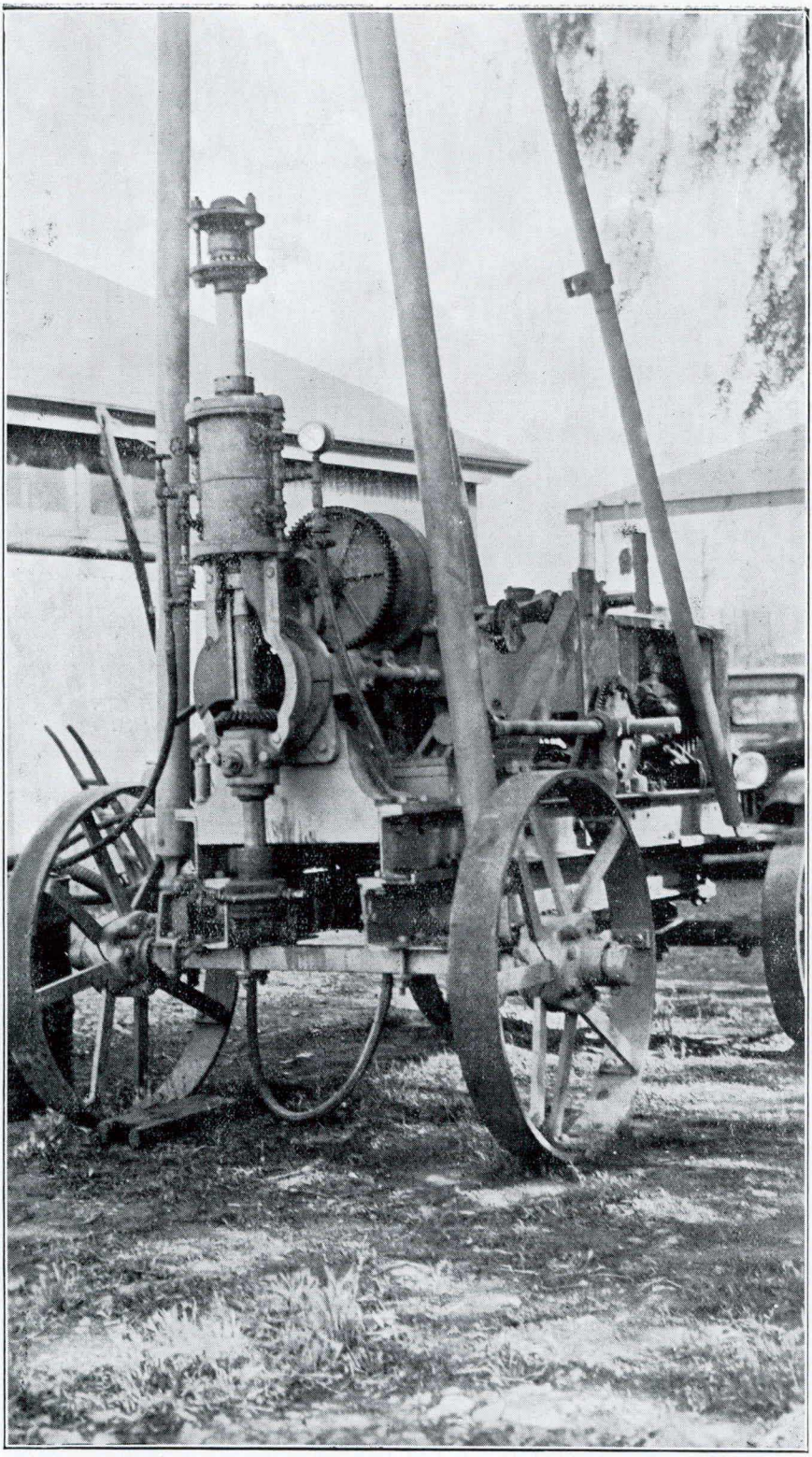

Frontispiece.] Government Rotary-Percussive Drill (see page 39).

PREFACE.

THE six monthly period concerned in this Review closed with the financial year ended on 30th June, 1934, but a few reports of later date have been included to save delay in publication.

Throughout the period there has been considerable gold mining activity on all the fields, and reports on these operations are published herein. Many of the old gold mines, abandoned when gold had its former fixed price, have received attention, and it is expected that the gold output of the State in 1935 will be increased materially. Particular interest attaches to the notable revival of mining in the Woodside, Palmer, Glenloth, and Wadnaminga districts, and this Review contains reports on the work in progress there and elsewhere.

A summary of the results of the operation of the Moonta Mining Scheme is given, together with a statement showing the distribution of the expenditure incurred during the whole of the productive period.

The Review contains also a report on a deposit of rutile situated near the Warren reservoir and on some experimental work carried out by Mr. H. W. Gartrell in the Bonython Laboratory in order to determine the best way in which to produce high-grade rutile concentrates from the crude ore.

During the six months the general mineral production has been maintained, and it is expected that the total value of the production for the whole of 1934 will reach the amount recorded for the preceding year.

L. KEITH WARD.

Director of Mines.

20th December, 1934.

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NOTES ON MINING LEGISLATION.

A consolidation of various mining Acts has been effected, a new Act to regulate mining on private lands has been passed, and all mining operations in the State are now carried on under the following Acts:—

The Mining Act, 1930, the Mining Act Amendment Act, 1931, and the Mines and Works Inspection Act, 1920.

Copies of the Regulations under the Mining Acts, gazetted March 22nd, 1934, with index, may be obtained from the Department of Mines, price 2s. 6d. Copies of the Regulations under the Mines and Works Inspection Act may be obtained free, on application to the Department.

The following notes are condensed for the guidance of the miner and prospector, but reference should also be made to the full text of the regulations.

A valid miner's right (the currency of which is one year and the cost 5s.) must be held by every independent prospector, every claimholder, every applicant for a search licence or a permit to prospect for oil, every plaintiff in a Warden's Court, and every applicant for authority to enter on private land. They are obtainable at the Adelaide Mines Office; at the following Police Stations:—Beltana, Blinman, Carrieton, Clarendon, Cockburn, Cleve, Cowell, Echunga, Farina, Gawler, Gumeracha, Marree, Hawker, Kingscote, Mount Pleasant, Mannahill, Oodnadatta, Orroroo, Port Augusta, Port Lincoln, Peterborough, Port Pirie, Quorn, Renmark, Redruth, Tumby Bay, Terowie, Tarcoola, Wallaroo, Woodside, Yorketown, and Yunta; from Mr. G. F. Lewis, Copley; and from the Postmaster at Coober Pedy, Stuart's Range.

A miner's right may be issued to any "person"—that is, any individual of the age of 16 years or over. This right forms the basis of all operations under the Mining Acts. Without it a person has no protection, cannot legally prospect or mine, or peg out a claim, and, moreover, is liable to a penalty of £1 per day for unlawfully prospecting and mining.

The holder is authorised to prospect for any metal, mineral, precious stones, salt or gypsum, coal, or oil, the property of the Crown, with the right of possession when found. It is the authority to peg out a claim and, as a claimholder, to occupy for residence a quarter of an acre of Crown lands, from which the holder has the right to remove any buildings erected by him, and he may cut and use timber from Crown lands for his own mining and domestic purposes. Crown lands means, practically, land belonging to the Crown over which no reserve has been declared and no title granted other than the miner's own claim or lease (see "Definitions," Regulation 4). Each claim must be represented by a miner's right, and it must be noted that no person can hold more than *one* precious stones claim, or *one* alluvial gold claim, at the same time. A miner's right does not of itself confer the right to enter on private lands (see "Mining on Private Land").

The area allowed for a claim is to be pegged out in the following way:—Pegs are to be securely placed in the ground to mark each corner. Each peg must be not less than 3in. thick and project not less than 3ft. above the surface of the ground, and have clearly marked on it the number of the miner's right and date of pegging. From each peg two trenches must be cut in the ground not less than 3ft. long, 1ft. wide, and 6in. deep, pointing in the directions of the boundary lines of which the peg forms the

corner. In rocky ground stone direction piles may be made instead of the trenches. All these marks must be maintained in position while the claim is held, or the claim will be liable to forfeiture. Every claim must have its own pegs; pegs common to two or more claims are not allowed. The working conditions are as detailed below. Constantly employed means eight hours for five working days of the week, Saturday excluded. Claims must be registered within 30 days after pegging, and under exceptional circumstances this period may be extended for a further 14 days. Alluvial gold claims and precious stones claims must be manned immediately on pegging; salt and gypsum claims and miscellaneous claims cannot be manned (except by special permission) until notification of approval of the lease has been received; all other claims must be manned within 14 days of pegging. The registration must be made at the Adelaide Office, and the form of application is simple and readily obtainable. It must show name and address of applicant, number of miner's right, nature and dimensions of claim, locality, and sketch showing position. The miner's right must be attached to the application and a fee of 2s. 6d. paid. The certificate of registration is then issued from the Adelaide Office, and the miner's right returned to the applicant with the registered number marked thereon. Care must be taken that the miner's right, by virtue of which the claim is held, is kept valid by renewal at the proper time and not allowed to lapse, otherwise the certificate will become void and the title to the ground lapses.

Every holder of a lease or a claim is protected—

(*a*) While he is incapacitated from work by illness;
(*b*) While absent on urgent business;
(*c*) While in attendance at a court of law;
(*d*) During the continuance of floods or droughts;
(*e*) While he is engaged upon work in public or national interest;
(*f*) During public holidays; and
(*g*) During one calendar month commencing on the 15th December.

The onus of proof of good cause for absence lies on the claimholder. Notices should be placed on the claim and also forwarded to the Mines Office, Adelaide. Suspension of the labor covenants may also be obtained under certain conditions on all claims or leases other than alluvial gold or precious stones claims (see "Regulations"). Every applicant for the registration of a gold lease claim or a miscellaneous claim (salt, gypsum, etc.), must, after seven days but within 21 days of the date of pegging, apply for a gold lease or miscellaneous lease (salt, gypsum, etc.), otherwise the claim is forfeited.

AREAS AND WORKING CONDITIONS.

GOLD LEASES—Maximum area, 40 acres; working conditions, one man for every 10 acres.

MINERAL LEASES—Maximum area, 40 acres; one man to every 10 acres, but special conditions are obtainable as noted below, under Schedules E and F.

MISCELLANEOUS LEASES—

	maximum area	
Salt..	"	640 acres; special conditions.
Gypsum.	"	640 " "
Mining Works . ..	"	10 " one man for every lease.
SPECIAL MINING LEASES	"	area and conditions as arranged.
COAL OR OIL LEASES ..	"	640 acres; one man to every 40 acres.
GOLD DREDGING LEASES	"	200 " special conditions.
MINERAL CLAIMS	"	40 " one man for 20 acres except when under special schedule.
COAL OR OIL CLAIMS ..	"	640 " four men.
SALT OR GYPSUM CLAIMS	"	640 " special conditions.
GOLD CLAIMS	"	100ft. x 100ft., alluvial; 5 acres, ordinary.
GOLD LEASE CLAIM . ..	"	40 acres; one man for every 10 acres.
PRECIOUS STONES CLAIMS	"	150ft. x 150ft.

In respect to mineral claims and mineral leases the working conditions can now be arranged for either mining for all minerals or for any particular mineral as prescribed by Schedules E and F—

Barytes	Clay	Chinastone	Shell grit
Felspar	Magnesite	Talc	
Alunite	Whiting	Ochre	

Amalgamation of claims and leases allows concentration, but not reduction, of labor.

Gold, mineral, miscellaneous, coal, and oil leases are granted for a term not exceeding 21 years—the two former at a rental of 1s. per acre per annum, miscellaneous, at an assessed rental, and the two latter at a rental of 6d. per acre per annum until coal or oil is found in payable quantities, when 1s. per acre is payable. On all leases except dredging leases a royalty of 6d. in the pound on the net profits is payable.

A special mining lease may be granted where the circumstances are deemed to warrant it. A special mining lease is limited to a term of two years, but the area granted, the rent and royalty to be paid, the labor to be employed, and other conditions are at the discretion of the Governor on the recommendation of the Minister.

In order to allow for the useful concentration of labor, where more than one lease is held, the Minister may permit of the amalgamation of any number of contiguous gold, mineral, coal, oil, or miscellaneous leases.

This permission shall not continue for longer than two years at any one time, but may be renewed from time to time if the Minister approves.

Any number of gold, mineral, miscellaneous, salt or gypsum, coal, or oil leases may be held by one person.

Licences to search for twelve months for precious stones, mineral phosphates, oil, rare metals, minerals, and earths are issued on specific mineral lands, not exceeding five square miles in area for one person, a fee of 20s. being charged for each square mile or portion thereof. The licences for mineral phosphates, oil and rare metals, minerals and earths give a preferential right to a lease over a portion of the area, as prescribed (see Regulation 233), and in case of a licence to search for precious stones, to a precious stones claim not exceeding the prescribed area.

Permits to prospect for oil on specific mineral lands for a period of two years, over an area not exceeding 25 square miles, may be obtained, a fee of 10s. per square mile, or portion thereof, being charged. Conditions of work or expenditure of money are imposed, and the permit carries a preferential right to an oil lease of 640 acres.

Mining on or Under Roads.

By provision of the Mining Act Amendment Act, 1931, the Warden is granted authority to give consent to mine under a road if a Municipal Corporation or District Council withholds consent after an application has been made.

The right to mine on private land (where minerals are alienated from the Crown) since the passing of the Mining Act Amendment Act, 1931, is an exclusive right only for so long as continuous work is carried on with the full complement of men required by legislation dealing with ordinary mineral lands (where the minerals are reserved to the Crown) and for one month after such work ceases. If the land is not so worked any person may obtain the right to mine. The preferential right to a mining title

over a portion of a road can be granted, therefore, only to those who can afford proof that, up to a date not exceeding a month before an application for the right to mine on a road is received, they were working the land intersected by or abutting on the road concerned in the manner mentioned.

A period of 14 days is allowed by regulation for the exercise of the preferential right by those who are entitled to it, after notice has been given either by letter or by advertisement in the daily press.

The maximum length of a claim or lease on a road is 100ft. measured along the road, and the breadth is half the width of the road. The length is limited also by the length of the holding abutting on the road in those cases in which preferential rights are involved.

Only one claim or lease can be held on a road by a single individual, except where preferential rights are concerned.

The claim-holder or lessee must not disturb the surface of the road in such a way as to affect the enjoyment thereof.

Any damage sustained by any person as a result of injury done to the surface of the road must be made good by the claim-holder or lessee, and is recoverable by action at law.

Mining operations must be so conducted as not to endanger the safety of any traffic passing on the road, and the instructions of the Inspector of Mines regarding the use of timber or other measures to prevent subsidence must be obeyed. Any subsidence resulting from mining operations must be made good forthwith.

MINING ON PRIVATE LAND.

The Mining on Private Property Act, 1909, and the Mining on Private Property Act Amendment Act, 1916, have been repealed and mining on private lands is now regulated by the Mining Act Amendment Act, 1931, which is incorporated with the principal Act (the Mining Act, 1930), and is to be read as one with the latter.

The new Act is, however, limited in duration to a period of five years and will expire on June 30th, 1936, after which date the former Acts dealing with private lands will be revived, unless the limitation is removed by legislation.

Notwithstanding the possible lapse of the Act, however, every mining lease, claim, licence, or permit issued by its authority over private lands and in force at the date that the Act lapses will continue for its full term.

The Act does not apply to sand, gravel, stone, or shell on private lands where these materials have been alienated from the Crown, and in such case no right of mining over these materials can be obtained under the Act.

The Act applies to all private lands in the State with certain exceptions. Private land may be exempted by the Governor's proclamation, and certain private lands described in the following classes are exempt, namely:—

I. Land lawfully and *bona fide* used as a garden, orchard, or vineyard:

II. Any church, chapel, schoolhouse, college, hospital, or asylum, and any ground enclosing the same and occupied therewith:

III. Any park lands or ornamental or recreation grounds vested in any Municipal Corporation or District Council or in any other public body or trustees:

IV. Any land of less area than half an acre within any city, town, or township:

V. Any land within one hundred and fifty yards of any artificial well, reservoir, or dam, or of any dwelling-house, factory, or building, in any case in which the well, reservoir, dam, dwelling-house, factory, or building is of not less value than Fifty Pounds:

VI. Any land within one hundred yards of any spring, watering trough, or artificial watering place which is habitually used for stock.

Provision is made, however, that in the case of Class VI. a warden may abolish such exemption; and in the cases of Classes I., IV., and V., exemption may cease upon payment of compensation, determined by arbitration as prescribed.

The right of any owner to mine on his own property, or of others to mine on it by agreement with him, is recognised by the new Act "for so long as the said land is continuously and *bona fide* mined with the number of men and in the manner which would be necessary if the said land were held under a mining lease, and for a further period of one month after mining as aforesaid ceases to be carried on."

As long as these conditions are fulfilled, the provisions of the principal Act do not apply to such private land. Consequently claims and leases, licences and permits under the principal Act cannot be obtained over land held and worked in this manner.

Entry on private lands for the purpose of prospecting or mining thereon may be obtained now in any one of three ways:—

(1) By private agreement with the owner of the mining rights.

(2) By obtaining the written authority of the occupier of the land.

(3) By applying to a warden of the Department of Mines for authority to enter.

In case (1) any terms of royalty, rent, and duration of lease may be made with the owner, independently of the Act, and the land thus leased is exempt from the operations of the Act so long as the condition of continuous and *bona fide* mining is complied with, as stated above.

Under these circumstances no claim or other title can be registered in the Department of Mines, and it is not possible for the miner working under agreement to be granted the privileges available to those working under a title authorised by the Mining Acts, as, for example, the temporary suspension of the labor covenants and the amalgamation of holdings.

In all cases copies of private agreements should be lodged at the Department of Mines.

In case (2), when the written authority of the occupier of the land has been obtained, entry may be made forthwith, but within seven days of entry the person entering must give written notice to the mining registrar of the granting of the authority and the entry. In this case the provisions of the Mining Acts apply, and claims and leases can be obtained from the Department of Mines. The written permission of the occupier should be unqualified and unconditional, as no title granted under the Mining Acts and Regulations is subject to terms and conditions other than those prescribed by legislation.

In case (3) direct application may be made to a warden for authority to enter. The warden, if satisfied there is no occupier, may grant authority without notice, but otherwise sends notice to the occupier of the land and allows him fourteen days to make any representation he may wish. At the expiration of that time the warden may grant authority to enter.

The warden has discretionary power and may refuse to grant an application, or may cancel an authority granted.

In such case the rights and privileges conferred by the authority to enter are cancelled also, with the exception that no mining lease of any land comprised in such authority can be cancelled in this way.

When a claim or lease has been obtained on private land by virtue of an authority to enter, if such claim or lease is transferred to another person, such transferee must also obtain an authority to enter.

Any person prospecting or mining on private land under the provisions of the Act is liable to pay compensation for damage done to the land, as provided for by the Crown Lands Act.

The holder of any claim, lease, search licence, or permit to prospect for oil on private land under this Act must pay to the Minister of Mines 1 per cent. royalty on the gross amount obtained from the occupation and working of the land and the sale of the substances mined. This royalty, less one-tenth, is paid by the Minister to the owner of the mineral rights of the land.

The holder of a gold or mineral lease on private land under this Act must pay to the Minister an annual rental of one pound per acre, and the annual rental of any other mining lease must be not less than one pound per acre, and must also be paid to the Minister.

The rental paid to the Minister or fees paid under a search licence or permit to prospect for oil are paid by the Minister to the owner of the land, less a deduction of one-twentieth.

Under certain circumstances and with certain reservations, private land may be resumed for mining, compensation being properly provided for.

SEARCH LICENCES.

The Mining Act, 1930, Part V., allows the granting of licences to search on any specific mineral lands, not exceeding five square miles in area, for:—

(*a*) Precious stones:

(*b*) Mineral Phosphates:

(*c*) Oil:

(*d*) Rare metals, minerals, and earths, the mining for which, in the opinion of the Minister, has not been proved payable in any instance in any portion of the State.

The applicant must be the holder of a miner's right, and, in addition, the fee payable is £1 for each square mile or portion thereof.

No person shall directly or indirectly hold more than five square miles of land at one time under search licence.

Lands held under miner's rights or mining leases are exempt from search licences.

The licence is in force for 12 months from the date thereof, and authorises the licensee, his assigns, servants, and workmen—

To search and mine the land comprised in the licence for the mineral as specified therein:

To remove not exceeding 20 tons in the whole for testing purposes only.

The duties of the licensee are to employ, and keep constantly employed from the expiration of three months after the granting of the licence during the remainder of the term of the licence, not less than one man in searching for the mineral specified in the licence for every 640 acres or portion thereof granted under licence, but the Minister has power to grant an exemption, or partial exemption, for a period not exceeding three months on payment of the fee prescribed for the suspension of a lease (£1).

To furnish the Minister whenever required by him with satisfactory evidence of compliance with this provision.

To report to the Minister forthwith after the discovery in payable quantities of the mineral specified in the licence. In default of compliance with these provisions licence to be forfeited.

Licensees, during the currency of their licences, have preferential rights over any part of the land comprised in the licence, as follows:—

Rare metals, minerals, or earths, to a mineral lease not exceeding 40 acres.

Mineral phosphates—To a mineral lease not exceeding 100 acres.

Oil—To a lease not exceeding 640 acres.

Precious stones—To a precious stone claim of not exceeding the prescribed area (150ft. by 150ft.).

Upon the preferential right being exercised the licence ceases.

Persons holding miners' rights can prospect and register and acquire claims and leases for gold, silver, lead, or copper, on any lands comprised in a search licence.

PERMITS TO PROSPECT FOR OIL.

The Mining Act, 1930, Part VI., provides special facilities for the search for mineral oil, the area that can be held being 25 square miles, as against the 5 square miles allowed under a search licence; but, unlike the latter, this provision relates solely to mineral oil.

The applicant for a permit to prospect for oil must hold a miner's right, and must pay a fee of 10s. for each square mile or portion thereof.

No person may directly or indirectly hold more than 25 square miles at one time under permit under the Act, and lands held under miner's right, search licence, or mining lease cannot be taken up under a permit.

Permits will have a duration of term of two years, and if satisfactory evidence of full compliance with the conditions be given, a holder of a permit will have a preferential right to renewal.

The holder of a permit, his assigns, servants, and workmen are empowered to:—

(*a*) Search and test the land comprised in the permit for mineral oil.

(*b*) Remove from the said land an amount not exceeding 1,000 gallons of mineral oil for testing purposes only.

The holder of a permit is required to:—

(*a*) Carry out not less than 1,000ft. of boring or spend not less than £1,000 in searching for oil during each year.

(*b*) Give satisfactory evidence to the Minister before the end of each year of compliance with the above condition.

(*c*) Furnish to the Minister a quarterly record of drilling.

(*d*) Report to the Minister immediately after the discovery of 100 gallons of oil.

Failure to comply with these conditions may entail immediate cancellation of the permit.

Provided the Minister shall have first approved in writing of the methods proposed to be used, money expended on geophysical prospecting or geological surveying will be accepted as part or whole compliance with the conditions, provided that satisfactory reports and plans of the work done and proofs of expenditure on such work are furnished.

A permit carries with it a preferential right to one oil lease of not more than 640 acres over any part of the land held under permit; and, if this preferential right be exercised, the permit ceases. Such preferential right must be exercised when 1,000 gallons of oil have been produced, within 30 days of receipt of a notice from the Minister, and failure to comply may entail cancellation of the permit.

The work prescribed in fulfilment of the conditions of the Act may not be done within 150 yards of any borehole, well, reservoir, dam, dwelling-house, factory, or building, unless the owner of such has been properly compensated. A holder of a permit may, with permission, mortgage, sublet, or transfer the permit, but no exemption of the working conditions can be obtained.

DEPARTMENT OF MINES, SOUTH AUSTRALIA.

THE NATIVE INDUSTRIES ENCOURAGEMENT ACT, 1872.

NOTICE OF THE OFFER OF A BONUS FOR THE DISCOVERY OF OIL.

Adelaide, April 8th, 1920.

A bonus of £5,000 is offered to the person or body corporate which first obtains from a bore or well situated in the State of South Australia 100,000galls. of crude petroleum, containing not less than 90 per cent. of products obtainable by distillation.

No application for a bonus will be considered unless the following conditions have been strictly complied with:—

1. The applicant for the bonus must have furnished to the Minister of Mines during the progress of drilling operations—

   (*a*) A monthly record of work done;

   (*b*) A full log of all bores and wells sunk, whether successful or unsuccessful;

   (*c*) Samples of materials passed through by the bores, to be taken at every 50ft. sunk, and also at every change of country encountered;

   (*d*) A declaration pursuant to "The Statutory Declarations Act, 1835," of the exact locality of each bore or well. (This should be furnished with the first monthly report on the bore or well.)

2. The oil must have been stored at the bore or well from which it has been obtained until the whole 100,000galls. has accumulated.

3. The applicant must furnish with his application—

   (*a*) The certificate of a licensed surveyor nominated by the Minister of Mines as to the quantity of oil so stored;

   (*b*) The certificate of the Government Analyst of the result of his analysis of samples of the oil taken by a person nominated by the Minister of Mines;

   (*c*) A declaration pursuant to "The Statutory Declarations Act, 1835," that the whole of the oil for which the bonus is claimed was obtained from the bore or well where it is stored.

4. Within 24 hours of the first discovery of oil in the well or bore, notice of such discovery must be sent to the Minister of Mines.

5. Any person who desires at any time to inspect or test the well or bore on behalf of the Minister of Mines must be granted every facility for this purpose.

6. The applicant must have done nothing contrary to the provisions of "The Mining Act, 1930," or of any lease or licence granted to the applicant under this Act.

GEORGE RITCHIE, Minister of Mines.

NOTES ON THE SAMPLING AND VALUATION OF PROSPECTS.

The Department of Mines, Flinders Street, Adelaide, frequently receives for assay and advice, parcels of various minerals and ores. Such a parcel may have one or more of the following faults:—

(1) It may contain a single piece, obviously picked.

(2) The quantity forwarded may be of insufficient size either for assay purposes or to properly represent the material sampled.

(3) The parcel may be unaccompanied by any statement or request showing the information desired.

(4) It may carry no marks to identify it with the letter of advice.

(5) There may be no letter of advice.

(6) There may be no declaration of the exact locality, without which free assays cannot be made.

(7) The letter of advice may contain no information as to the width or size of the body from which the material has been taken—information which may be necessary before it is possible to advise as to the value of a deposit.

THE MEANING OF THE WORD "SAMPLE."

A specimen is not a sample. A specimen shows the nature of a rock or ore; a sample is intended to show its value, and must be representative of a pile of ore or of a lode at a definite place.

A "representative" sample is a small proportion of the original bulk, containing, in unchanged percentages, all the constituents of the original lot. Such a sample gives the value of a pile of ore. The average of a number of samples, broken from the workings of a mine, represents very closely the value of the material sampled. Both broken ore and mines are, in many cases, sold on the values arrived at by sampling.

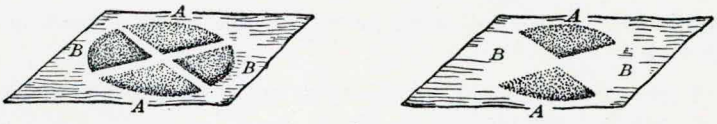
HOW TO TAKE A SAMPLE.

In sampling a lode, samples should be taken at definite intervals, and the lode should be sampled over measured widths at these localities. Widths should be measured at right angles to the lode, that is, along the shortest line between the walls.

A sample must be taken by breaking the same bulk for each foot of width. This should be done as evenly as possible over the whole width that the sample is intended to represent, and all the material that would be subsequently milled or smelted, whether rich or poor, should be included in the sample. The quantity taken might amount to one pound per foot of lode width; but the nature of the ore body and the distribution of the values (whether uniform or irregular) must be considered when deciding on the size of the sample. With uniform values the interval along the lode can be greater and the amount broken less than if the lode carries irregular values, as in the case of a lode carrying coarse gold.

THE PROPER WAY TO REDUCE THE SIZE OF A SAMPLE.

Such a sample, if of any considerable size, should then be broken into smaller pieces, well mixed, and quartered down. Quartering down means that the broken ore, after mixing, is piled into a cone on a floor or cloth, and that the cone is flattened and subdivided into four parts by two cuts at right angles. If the ore is sufficiently broken and mixed the sample obtained by taking the two opposite quarters, A A, has a value equal to the rejections B B, shown in the following diagram:—



HOW A SAMPLE SHOULD BE QUARTERED.

At each quartering care should be taken to sweep all rejections away.

By successive finer crushing and quartering, a sample, of 1lb. to 2lbs. is obtained that has the same value as the bulk first broken from the lode. This sample of 1lb. to 2lbs. should then be properly bagged, marked, and sent for assay. It would be well to enclose a specimen of 1oz. to 2ozs. of the uncrushed ore for inspection.

In reducing the large sample first obtained it is essential that the lumps of ore be broken smaller by at least half between each quartering. For example, a sample averaging, as broken, 1in. pieces, might be broken to $\frac{1}{2}$in., $\frac{1}{4}$in., and $\frac{1}{8}$in. particles before each successive quartering, to ensure uniform mixing and the even distribution of the valuable material.

THE USE OF ASSAY RESULTS.

Individual samples of standing ore may differ from the true value of the lode, but the average of a number of such samples will be very nearly that of the body of stone which they represent. Thus it will be seen that, in estimating the value of standing ore, reliance is to be placed, not on a single sample, but on the average value of a number of samples.

THE VALUATION OF BROKEN ORE.

Sampling a pile of broken ore may be done either by quartering, or by taking every second, tenth, or any other proportion of shovelfuls when shovelling the pile over, the proportion depending upon the way in which the values are distributed through the ore.

In sinking or driving on a lode, the value of the ore broken can be determined by making a separate pile with every fifth or tenth bucket of ore raised, and cutting down the small pile so made by shovelling and quartering. This procedure, if adopted, would in many cases prevent undue disappointment or the incurring of a loss through sending unpayable material to be treated.

ESTIMATION OF GOLD CONTENTS BY PANNING.

In estimating gold contents by panning during prospecting work, representative samples of constant weight or bulk should be taken. Too often a selected lump of kindly appearance is crushed, with the result that the value of the ore is over-estimated, and disappointment results when a parcel is sent to a battery. A record kept of all panning results, and the position and width of lode over which a sample is taken, will do much towards facilitating the opening up of a mineral property.

SUGGESTIONS FOR TAKING AND FORWARDING SAMPLES.

It is suggested that the following precautions be taken in sending samples for assay:—

(1) Each sample should be taken so as to be representative of the material sampled.

(2) Each sample should be properly marked so that it can be identified by the Department and by the sender.

(3) A letter of advice referring to these marks should be sent containing particulars as to—

  (*a*) The exact location of the material sampled relatively to some well-known point.

  (*b*) The width over which the sample has been taken.

  (*c*) The depth at which it was taken.

  (*d*) What valuable constituent is supposed to be present.

The Department reserves the right to refuse to make any particular assay of samples of insufficient promise or which do not conform to the conditions enumerated above.

No assays will be made of metallurgical products, and no umpire samples or materials showing free gold will be tested.

MINERAL PRODUCTION OF SOUTH AUSTRALIA FOR THE YEAR 1933. Ton = 2,240 lbs.

Metals, Ores, Minerals.	Quantity.	Value.
	Fine Ounces	£
Gold	6,361	49,277
	Tons.	
Copper	72	2,928
Pebbles (flint)	233	538
Iron ore and flux	721,185	829,363
Barytes	1,772	4,746
Silica	130	390
	Lbs.	
Bismuth	754	150
	Tons.	
Felspar and Chinastone	110	218
Fluorspar	198	669
Phosphatic material	26	26
Gypsum	50,561	37,921
Manganese ore	20	53
Magnesite	202	280
Kaolin	507	1,454
Limestone (cement, agriculture, flux)	68,512	25,692
Talc	541	1,479
Soapstone	836	2,482
Asbestos	13	113
Clay, fire and pottery	13,884	7,463
Salt	58,587	131,821
Opal	—	3,256
Total	917,389	£1,100,319
Building and Road Materials and Brick Clays.		
Building Stone—	Tons.	£
Sandstone	1,761	419
Limestone	3,163	834
Marble	803	1,206
Slate	702	4,113
Granite	246	173
Macadam Ballast, &c.—		
Sandstone	32,444	3,527
Ironstone	20,774	1,865
Quartzite	181,655	46,521
Limestone	273,985	30,337
Gravel	171,802	18,742
Sand	35,618	7,124
Slate, shale, and clay	12,221	1,403
Granite	6,941	2,131
Limestone Burnt for Lime	7,992	1,066
Clays and Shales—		
Brick clays and shales	66,970	8,371
Total	817,077	127,832
Total Mineral Production	1,734,466	£1,228,151

NOTE.—The gold value includes premium and exchange.

DECENNIAL RETURN SHOWING, SO FAR AS CAN BE ASCERTAINED, PRODUCED IN SOUTH AUSTRALIA.

	1924.		1925.		1926.		1927.		1928.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity	Value.	Quantity.	Value.
	ozs.	£	ozs.	£	ozs.	£	ozs.	£	ozs.	£
Gold	880	3,739	832	3,535	758	3,219	418	1,776	532	2,258
Silver	1,017	154	1,458	200	353	46	179	20	—	—
Lead	Tons 6½	219	Tons 37	1,455	Tons 28	819	Tons 5	123	Tons —	—
Copper	cwts. 8,094	26,046	cwts. 11,400	35,878	cwts. 4,630	14,681	cwts. 4,033	12,452	cwts. 3,836	13,321
Bismuth	—	—	—	—	—	—	—	—	—	—
Iron Ore and Ironstone Flux	Tons 580,308	667,354	Tons 586,652	674,649	Tons 583,745	671,307	Tons 722,425	830,789	Tons 618,316	711,063
Manganese Ore	316	1,128	—	—	—	—	—	—	—	—
Arsenic Ore	68	544	100	600	—	—	—	—	—	—
Radium and Radio Active Material (Uranium Ore)	—	—	—	172	—	—	—	1,088	—	—
Asbestos	cwts. 80	80	—	—	—	—	—	—	—	—
Fluorspar	—	—	—	—	—	—	—	—	—	—
Barytes	Tons 1,898	5,694	2,008	6,024	1,742	5,226	1,886	5,658	2,366	7,098
Silica	—	—	20	80	60	240	450	1,800	80	240
Felspar and Chinastone	—	—	9½	38	103	309	92	230	113	254
Fire and Pottery Clays	436	436	17,498	9,405	26,131	14,045	26,376	14,177	24,626	13,236
Gypsum	65,690	57,479	72,276	63,242	65,613	57,411	93,850	82,119	91,535	80,093
Kaolin	—	—	490	559	200	900	150	675	160	640
Limestone for Cement, Flux and Agricultural purposes	109,298	38,254	114,870	43,076	119,714	44,893	121,272	45,477	80,968	30,363
Magnesite	129	323	351	878	226	565	380	825	45	109
Mica	—	—	—	—	—	—	—	—	2	12
Ochre (crude)	710	4,260	87	887	36	297	21	288	55	705
Opal	—	4,000	—	9,070	—	10,330	—	9,157	—	11,540
Pebbles, Flint	390	1,365	101	354	116	406	79	385	3	19
Phosphate Rock	84	117	742	1,142	882	864	749	1,124	—	—
Salt (crude)	62,687	141,046	78,251	176,065	91,101	204,977	79,286	178,394	71,428	160,713
Soapstone	200	250	200	250	300	375	300	450	500	750
Talc	125	750	152	912	251	1,443	319	1,515	131	557
Whiting, natural	—	—	—	—	—	—	—	—	—	—
Graphite	—	—	—	—	—	—	—	—	—	—
£	—	953,238	—	1,028,471	—	1,032,353	—	1,188,522	—	1,032,952

This table does not include building and road materials, and brick clays, shown in separate group

OUTPUT AND VALUE OF THE VARIOUS METALS AND MINERALS

Ton = 2,240lbs. Gold and Silver in Ounces Fine.

1929.		1930.		1931.		1932.		1933.		1924-1933.	
Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Total Quantity.	Total Value.
ozs.	£	ozs.	£	ozs.	£	ozs.	£	ozs.	£	ozs.	£
1,009	4,289	1,311	5,569	2,782	11,817	3,014	*21,246	6,361	*49,277	*17,897	106,725
1,206	131	1,058	84	68	5	—	—	—	—	5,339	640
Tons 5·5	127	Tons 0·33	6	—	—	—	—	—	—	Tons 82·33	2,749
cwts. 5,531	22,982	cwts. 1,986	6,966	cwts. 44	934	—	—	Tons 72	2,928	2,069·5	136,188
—	—	—	—	lbs. 483	103	lbs. 475	109	lbs. 754	150	lbs. 1,712	362
Tons 847,813	974,985	Tons 928,392	1,067,651	Tons 289,179	332,556	Tons 537,928	618,617	Tons 721,185	829,363	Tons 6,415,943	7,378,333
—	—	—	—	13	78	—	—	20	53	349	1,259
—	—	—	—	—	—	—	—	—	—	168	1,144
—	—	—	—	—	—	—	1,050	—	—	—	2,310
cwts. 20	40	—	—	cwts. 120	100	cwts. —	130	13	113	43·7	463
—	—	—	—	—	—	Tons 40	133	198	669	238	802
Tons 1,969	5,907	1,535	4,605	Tons 1,445	4,335	1,701	5,104	1,772	4,746	18,322	54,397
50	150	23	69	34	133	124	372	130	390	971	3,474
—	—	—	—	—	—	64	122	110	218	491·5	1,171
21,618	11,620	12,948	6,960	4,281	2,301	9,700	5,214	13,884	7,463	157,498	84,857
95,613	83,661	40,827	35,724	24,207	21,181	44,962	39,342	50,561	37,921	645,134	558,173
140	560	521	1,278	639	1,800	375	750	507	1,454	3,182	8,616
81,053	30,395	64,187	24,070	40,882	15,331	40,671	15,252	68,512	25,692	841,427	312,803
135	270	36	72	—	—	115	173	202	280	1,569	3,476
—	—	—	—	2	10	—	—	—	—	4	22
58	450	17	93	21	115	50	325	—	—	1,055	7,420
—	11,056	—	1,142	—	3,127	—	3,060	—	3,256	—	65,738
13	71	15	76	158	523	154	374	233	538	1,262	4,111
—	—	—	—	515	2,060	644	1,912	26	26	3,642	7,245
76,457	172,028	58,766	132,224	68,666	154,499	60,063	135,142	58,587	131,821	705,292	1,586,909
400	600	406	609	207	311	418	856	836	2,482	3,767	6,933
364	1,186	392	884	597	2,089	636	1,248	541	1,479	3,508	12,063
99	297	12	156	50	150	—	—	—	—	201	603
—	—	—	—	—	—	70	1,367	—	—	70	1,367
—	1,320,805	—	1,288,238	—	553,558	—	851,898	—	1,100,319	—	10,350,354

of annual mineral production table. *Gold value includes premium and exchange.

CRUSHING AND CYANIDING PLANTS.

RETURNS FROM CRUSHING AND CYANIDING PLANTS FOR THE HALF-YEAR ENDING JUNE 30th, 1934.

Name of Producer.	Locality.	Weight of Ore.	Gold Bullion Recovered.	Total Value of Bullion.	Yield per Ton in Shillings.
		Tons cwts. qrs.	Ozs. dwts. grs.	£ s. d.	s.
MOUNT TORRENS BATTERY AND CYANIDE WORKS.					
Telfer North	Kersbrook ..	4 13 0	5 19 0	22 6 5	96
Curyers	Charleston...	24 0 0	25 6 3	97 13 6	81
Standish	Angaston....	—	41 7 2	149 18 2	—
New Era	Woodside ...	19 5 0	4 18 15	16 17 6	17
Starick	Mt. Pleasant	6 10 0	7 15 0	26 9 0	81
New Deloraine	Kersbrook ..	52 0 0	20 5 12	69 7 9	26
Sturt Meadows	Oakbank ...	10 0 0	5 3 10	19 10 6	39
Birthday Gift	Para Wirra..	13 0 0	13 17 8	53 10 1	82
Mines	Adelaide	—	9 3 10	35 10 8	—
Stockyard Gully ..	Para Wirra..	6 2 0	4 5 4	15 14 6	51
New Era	Woodside ...	15 0 0	3 8 5	12 16 0	17
Blue Gum	Para Wirra..	5 0 0	2 15 18	9 18 2	39
Stockyard Gully ..	Para Wirra..	18 4 0	7 1 23	26 7 10	29
Traav.....	Birdwood ...	7 4 0	2 11 3	9 13 2	26
Rendell	Mt. Pleasant	26 0 0	1 19 12	6 12 7	5
Sturt Meadows ...	Oakbank ...	3 11 0	4 2 4	15 9 9	86
Birthday Gift	Para Wirra..	6 18 0	7 4 18	27 12 11	80
Eureka	Woodside ...	9 4 0	3 15 14	11 6 9	24
Dicker	Charleston ..	3 10 0	0 13 3	2 1 9	12
Prediction	Kuitpo.....	3 6 0	1 8 19	5 4 10	31
Blackbird	Onkaparinga	5 10 0	3 16 4	11 5 0	41
Mt. Charles Main Reef	Charleston ..	3 7 0	1 12 11	5 17 0	35
Banksia	Oakbank	5 2 0	0 6 12	1 1 8	4
Banksia	Oakbank	5 1 0	2 2 4	7 15 0	30
Curyers	Charleston ..	8 0 0	6 5 19	23 14 5	59
Curyers	Charleston ..	9 15 0	12 11 0	44 17 3	92
Stockyard Gully ..	Para Wirra ..	6 17 0	3 16 1	13 18 4	40
Dewell	Mt. Pleasant	2 15 0	0 9 3	1 9 8	10
Great Northern Eureka	Woodside ...	7 10 0	2 7 18	6 12 10	17
Deloraine Blocks ..	Kersbrook ..	8 10 0	4 15 6	17 5 2	40
J. C. Symonds	Chain of Ponds	5 2 0	0 15 3	2 18 11	9
New Era	Woodside. ..	13 16 0	2 14 9	9 11 1	14
A. C. Smith	Forest Range	—	3 16 21	15 8 9	—
Sturt Meadows....	Oakbank ...	11 14 0	4 19 23	19 5 5	34
Telfer North	Kersbrook ..	7 0 0	5 0 23	19 0 8	54
New Deloraine ...	Kersbrook ..	75 0 0	14 6 18	39 18 3	10
Sturt Meadows ...	Oakbank ...	5 10 0	5 0 13	19 1 4	69
Rendell	Mt. Pleasant	25 0 0	2 9 15	7 1 7	5
		438 16 0	250 8 2	899 14 2	41
Grand total since starting of works..		15,422 7 3	11,288 6 15	42,078 8 9	54

Money values calculated on gold at £4 4s. 11½d. per fine ounce.

CRUSHING AND CYANIDING PLANTS.—RETURNS—*continued.*

Name of Producer.	Locality.	Weight of Ore.	Gold Bullion Recovered.	Total value of Bullion.	Yield per Ton in Shillings.
		Tons cwts. qrs.	Ozs. dwts. grs.	£ s. d.	s.
	PETERBOROUGH BATTERY AND CYANIDE WORKS.				
Rising Sun	Tennant's Ck.	11 5 0	115 5 9	463 11 11	824
New Milo	Wadnaminga	3 16 0	9 9 20	29 19 7	157
Mineral claim 13,969	Mt. Grainger	4 17 0	2 8 23	8 18 11	35
Rising Sun.....	Tennant's Ck.	11 8 0	47 0 12	191 18 8	336
Huonville South...	Broken Hill, N.S.W.	8 6 0	4 19 6	18 16 4	45
Reef Claim, 14,402	Parnaroo ...	5 0 0	6 9 8	25 19 0	103
Rising Sun	Tennant's Ck.	11 0 0	38 17 8	159 18 2	290
Lamberts.....	Nackara	4 15 0	0 8 0	1 11 6	6
New Milo	Wadnaminga	5 0 0	8 16 9	28 10 9	114
Huonville South..	Broken Hill, N.S.W.	5 16 0	0 11 9	2 3 8	7
Rising Sun	Tennant's Ck.	11 12 0	64 1 19	263 9 9	454
Altimeter	Pitcairn	6 0 0	11 16 18	47 13 10	158
Rising Sun	Tennant's Ck.	9 14 0	50 8 3	207 14 6	428
Wheal Doria.....	Tennant's Ck.	1 6 0	55 11 18	230 4 10	3,541
Queen Bee.....	Olary	3 4 0	2 5 12	9 2 2	56
L. Burtt	Broken Hill .	6 15 0	6 2 5	23 1 5	68
New Milo	Wadnaminga	3 10 0	7 5 15	24 1 3	137
New Esmonde	Wadnaminga	3 10 0	3 4 10	12 1 4	68
Claim 14,452	Mannahill ...	3 3 0	1 8 22	5 7 2	34
Altitude	Pitcairn	6 0 0	3 18 2	15 9 5	51
New Milo	Wadnaminga	7 6 0	11 3 14	37 14 6	103
New Milo	Wadnaminga	6 15 0	9 3 11	30 16 9	91
Gold lease 1,530 Lykke's Reef	Teetulpa	14 17 0	1 8 20	5 1 6	6
Wheal Doria	Tennant's Ck.	3 7 0	12 3 9	49 17 6	297
		158 2 0	474 8 18	1,893 4 5	246
Grand total since starting of works..		6,724 15 0	7,702 16 9	28,768 7 0	84
	MONGOLATA BATTERY AND CYANIDE WORKS.				
Golden Guinea	Mongolata ..	4 0 0	3 4 2	11 4 1	56
Curlew.....	Mongolata ..	38 0 0	10 12 0	42 8 10	22
Byles Mongolata .	Mongolata ..	154 0 0	186 13 20	741 8 2	96
Retriever	Mongolata ..	5 0 0	1 9 0	5 12 11	22
Baldina Mongolata	Mongolata ..	14 10 0	324 16 0	1,357 8 11	1,872
Golden Speck.....	Mongolata ..	3 14 0	3 7 0	13 2 5	71
Golden Guinea....	Mongolata ..	3 15 0	1 18 15	7 13 8	41
Block 8	Mongolata ..	4 17 0	2 2 22	8 5 4	34
Baldina Mongolata	Mongolata ..	25 0 0	67 10 0	279 2 7	223
Black Hill	Mongolata ..	6 5 0	0 16 0	3 2 6	10
Curlew	Mongolata ..	29 10 0	11 11 0	45 9 7	32
Retriever.....	Mongolata ..	5 0 0	0 18 16	3 11 10	14
Takati	Mongolata ..	26 0 0	67 10 0	269 5 1	207
Block 8	Mongolata ..	4 4 0	2 3 19	8 9 4	40
East View ..... (Mongolata No. 2)	Mongolata ..	6 0 0	8 15 20	34 9 1	115
Mongolata No. 4 .	Mongolata ..	4 8 0	1 11 0	5 17 10	26
East View	Mongolata ..	8 16 0	18 9 22	72 14 4	165
Curlew.....	Mongolata ..	10 0 0	12 15 0	50 11 5	101
Seaton's Mongolata (Alluvial)	Mongolata ..	50 0 0	4 0 6	14 12 0	6
Golden Guinea....	Mongolata ..	4 5 0	1 8 12	5 1 7	24
Byles Mongolata ..	Mongolata ..	5 6 0	0 18 13	3 12 2	14
Baldina Mongolata	Mongolata ..	25 5 0	38 14 0	156 12 7	124
Takati South	Mongolata ..	25 0 0	1 9 19	5 15 9	5
		462 15 0	772 15 18	3,145 12 0	136
Grand total since starting of works..		1,958 2 0	3,268 13 17	13,150 13 10	134

Money values calculated on gold at £4 4s. 11½d. per fine ounce.

CRUSHING AND CYANIDING PLANTS.—RETURNS—*continued.*

Name of Producer.	Locality.	Weight of Ore.	Gold Bullion Recovered.	Total Value of Bullion.	Yield per Ton in Shillings.
		Tons cwts. qrs.	Ozs. dwts. grs.	£ s. d.	s.
		TARCOOLA BATTERY AND CYANIDE WORKS.			
Last Resource	Tarcoola ...	26 0 0	11 3 0	26 18 1	20
Sullivans	Tarcoola ...	4 13 0	7 2 12	26 1 8	112
Sullivans	Tarcoola ...	5 0 0	4 11 19	15 1 5	64
Sullivans	Tarcoola ...	6 15 0	7 9 17	24 19 11	80
Tarcoola Perseverance	Tarcoola ...	100 0 0	27 16 0	90 2 0	18
Fabian's No. 3	Glenloth	3 10 0	25 11 7	75 0 0	428
Tarcoola Perseverance	Tarcoola ...	30 0 0	5 10 16	18 7 7	12
Welcome Home ...	Tarcoola ...	31 10 0	10 7 10	32 15 8	20
Imperial Reef	Tarcoola ...	4 0 0	76 9 0	227 18 3	1,139
Welcome Home ...	Tarcoola ...	25 0 0	6 9 10	22 7 9	18
Wilgena Enterprise	Earea Dam..	26 0 0	12 14 0	46 11 9	35
Associated	Tarcoola ...	33 0 0	7 2 10	24 9 1	14
Sullivans	Tarcoola ...	5 8 0	3 18 10	10 18 1	40
Section 727	Tarcoola ...	4 16 0	21 0 9	69 18 10	292
Pioneer.....	Glenloth	7 0 0	17 19 4	66 0 4	188
Imperial	Tarcoola ...	5 0 0	5 16 16	17 16 8	71
Glen Markie	Glenloth	11 10 0	9 13 22	34 15 10	60
White Hope	Tarcoola ...	113 0 0	242 16 16	915 19 11	162
Warrigal South....	Tarcoola ...	5 10 0	10 8 22	36 7 8	56
Morning Star	Tarcoola ...	25 0 0	4 3 10	12 9 0	10
Last Resource.....	Tarcoola ...	31 0 0	5 13 15	16 11 0	10
Curdnatta	Tarcoola ...	13 0 0	10 3 0	32 12 7	50
Morning Star.....	Tarcoola ...	5 0 0	9 15 12	34 12 3	138
Sullivans	Tarcoola ...	6 0 0	3 11 22	11 19 11	40
Imperial	Tarcoola ...	5 0 0	87 6 6	274 8 1	1,097
Fabian's No. 3	Glenloth	8 10 0	21 11 18	73 3 10	172
Lake Labyrinth ...	Lady Labyrinth	5 10 0	4 11 2	14 19 1	54
Sullivans	Tarcoola ...	4 16 0	13 19 5	46 2 9	192
Section 726	Tarcoola	25 0 0	5 15 0	15 16 2	12
Imperial	Tarcoola ...	5 0 0	5 0 12	17 11 11	70
Tarcoola Perseverance	Tarcoola ...	100 0 0	17 19 0	53 0 8	10
Fabian's No. 3	Glenloth	6 2 0	67 5 13	201 13 1	661
Fabian's No. 3	Glenloth	18 5 0	32 2 6	111 8 6	122
Government Mine .	Tarcoola ...	30 0 0	12 19 12	41 16 8	28
Total		735 15 0	815 18 21	2,740 16 0	74
Grand total since starting of works..		19,427 13 3	21,115 1 19	72,854 7 0	75

Money values calculated on gold at £4 4s. 11½d. per fine ounce.

SUMMARY SHOWING TOTAL ORE TREATED AT STATE BATTERIES AND CYANIDE WORKS TO JUNE 30TH, 1934, FROM MINES HEREUNDER.

Name of Mine.	Locality.	Weight of Ore.			Gold Bullion Recovered.			Total Value of Bullion.			Yield per Ton, in Shillings.
		Tons.	cwts.	qrs.	Ozs.	dwts.	grs.	£	s.	d.	s.
Anderson	Carrieton	3	14	0	1	15	10	4	10	4	24
Allen & Gregory	Birdwood	39	17	0	38	11	23	145	8	11	72
Anderson & Co.	Palmer	13	10	0	10	7	0	39	17	3	58
Alma & Victoria	Waukaringa	47	13	0	10	18	0	36	1	2	14
Altimeter	Pitcairn	103	6	0	171	14	23	685	6	6	133
Altitude	Pitcairn	6	0	0	3	18	2	15	9	5	51
Aristocrat	Pitcairn	4	10	0	3	11	19	13	19	11	62
Associated	Tarcoola	637	5	0	296	18	4	645	13	0	20
Ajax	Waukaringa	146	8	0	105	15	14	413	10	1	56
Angepena Treasure	Mount Serle	4	7	0	17	10	3	69	7	5	318
Baldina Mongolata	Mongolata	64	15	0	431	0	0	1,793	4	5	560
Block 245	Wadnaminga	4	16	0	9	16	10	33	18	8	141
Block 249	Wadnaminga	4	13	0	4	15	12	17	8	10	74
Block 8	Mongolata	9	1	0	4	6	17	16	14	8	37
Blue Duck	Tarcoola	84	3	0	73	18	15	267	19	8	64
Bohun	Tarcoola	93	15	0	27	16	23	99	14	0	21
Boag	Charleston	53	6	0	63	10	6	244	12	7	92
Barossa Cement	Barossa	114	17	0	33	7	1	134	6	5	23
Barossa	Barossa	3	5	0	0	4	0	0	14	0	4
Banksia	Woodside	254	10	2	191	11	3	737	15	5	58
Bounty	Palmer	50	0	0	2	9	21	8	8	9	3
Beechworth	Ulooloo	8	0	0	3	8	21	12	13	9	31
Better 'Ole	Mongolata	1	12	0	1	13	0	5	10	11	69
Bertelsmier	Birdwood	4	0	0	2	9	15	8	15	6	44
Birthday Gift	Kersbrook	83	19	0	112	0	4	444	7	4	105
Blackbird	Onkaparinga	5	10	0	3	16	4	11	5	0	41
Black Dog	Birdwood	13	2	0	4	7	2	14	14	5	22
Black Hill	Mongolata	11	5	0	1	3	11	4	8	6	7
Black Nugget	Mt. Pleasant	31	0	0	9	19	22	34	15	1	22
Blumberg	Birdwood	699	12	0	600	7	22	2,257	8	4	64
Bristol	—	2	5	0	1	3	3	3	5	11	29
Buffalo (Victoria Tower)	Wadnaminga	6	18	0	298	19	15	999	3	7	2,903
Burkett	Woodside	4	13	0	0	10	8	1	11	10	7
Burra Mongolata	Mongolata	6	0	0	1	15	0	6	18	6	23
Burtt	N.S.W.	6	15	0	6	2	5	23	1	5	68
Blumberg Proprietary	Birdwood	481	2	0	213	6	4	769	17	4	32
Blumberg Boulder (Young Australian)	Birdwood.	51	16	0	9	16	22	34	5	10	13
Brind	Woodside	129	8	3	46	2	18	157	7	4	24
Bird-in-Hand	Woodside	168	19	0	56	18	12	275	0	4	32
Bison	Wadnaminga	2	8	0	8	9	4	28	6	8	237
Boomerang	Outalpa	80	15	0	69	12	16	227	19	6	56
Blue Gum	Para Wirra	5	0	0	2	15	18	9	18	2	39
Blunsdens	Peterborough	49	19	0	5	3	14	14	3	0	5
Brilliant	Macaw Creek	9	2	0	8	15	8	29	5	10	64
Byles Mongolata	Mongolata	1,180	9	0	2,203	4	13	8,761	5	1	147
Cahill Bros.	Birdwood	5	0	0	99	5	7	383	0	10	1,532
Callaghan	Wadnaminga	19	10	0	7	3	12	25	14	5	26
Camp	Teetulpa	0	10	0	0	16	7	2	18	5	116
Carr & Donoghy	Oakbank	5	10	0	1	14	2	6	3	7	22
C. Clark	Mt. Torrens	7	0	0	2	4	15	7	1	0	20
Claim 12395	Mt. Grainger	27	15	0	10	4	7	35	1	2	25
Crane's Reef	Birdwood	126	15	0	42	7	20	157	3	6	25
Crescent	Nrthn. Territory	2	2	0	2	17	1	10	8	11	99
Curdnatta	Tarcoola	1,539	0	0	1,438	16	13	5,212	1	9	67
Curyer	Charleston	128	11	0	141	12	8	541	16	2	84
Curlew	Mongolata	168	11	0	582	11	19	2,377	14	7	283
Cobra	Birdwood	7	3	0	1	15	4	5	6	0	14
Colleys G.M.	Woodside	6	16	0	4	13	9	17	12	6	52

All values in this table calculated on gold at £4 4s. 11½d. per fine ounce.

SUMMARY SHOWING TOTAL ORE TREATED, ETC.—*continued.*

Name of Mine.	Locality.	Weight of Ore.			Gold Bullion Recovered.			Total Value of Bullion.			Yield per Ton, in Shillings.
		Tons.	cwts.	qrs.	Ozs.	dwts.	grs.	£	*s.*	*d.*	*s.*
Cope.	Palmer	13	10	0	1	13	12	5	19	9	8
Crown	Birdwood	264	1	3	130	7	22	466	8	0	35
Copperlinka	Olary	165	3	0	111	3	0	419	3	6	50
Day Dawn	Tarcoola	997	18	0	1,558	11	6	5,210	18	6	104
Day Dream	Mannahill	2	7	0	1	13	17	4	1	2	36
Dark Hill	Near Tarcoola	31	2	0	8	11	0	28	14	2	18
Dedmans (see sec. 727)											
Duchess Neindorf	Tweedvale	52	4	0	54	5	4	198	0	8	75
Deloraine (Clark's)	Kersbrook	18	7	0	14	8	4	50	0	3	54
Uraparinga											
Delaney	Charleston	8	13	0	2	18	21	10	16	5	25
Deloraine	Kersbrook	555	19	2	708	15	20	2,665	8	4	95
Deloraine North (Deloraine Blocks)	Kersbrook	318	17	0	382	3	11	1,428	3	11	89
Deloraine (Pearce's Find)	Kersbrook	17	16	0	6	2	8	21	6	7	24
Deloraine Sth. (Prairie Deloraine) (Telfer North)	Kersbrook	94	16	0	95	9	17	362	0	3	77
Deloraine Queen	Kersbrook	22	2	0	3	19	7	14	18	2	13
Dewell	Mt. Pleasant	2	15	0	0	9	3	1	9	8	10
Dart's Syndicate	Mt. Torrens	64	14	0	19	0	0	74	0	0	22
Durdan	Birdwood	389	12	2	139	16	14	507	11	6	26
Durdan Extension	Birdwood	11	10	0	2	18	21	11	0	8	19
Dream of Hope	Mt. Grainger	4	15	0	2	15	13	8	12	9	36
Drew Bates	Kangaroo Island	1	0	0	0	3	12	0	10	8	10
Diamond Jubilee	Silverton, N.S.W.	12	6	0	4	7	7	13	5	10	21
Dicker	Charleston	3	10	0	0	13	3	2	1	9	12
Dustholes	*Vide* Myrtle		—			—			—		—
Emily	Williamstown	37	16	0	26	4	5	96	8	0	51
East View (*see* Mongolata No. 2)											
Enterprise	Tarcoola	30	0	0	19	10	7	71	7	10	48
Esmonde	Wadnaminga	71	9	0	65	6	19	237	4	6	66
Eureka	Woodside	770	6	3	489	18	15	1,568	17	2	40
Evening Star	Tarcoola	11	2	2	14	5	23	42	19	0	77
Eclipse	Tarcoola	53	7	0	44	1	11	155	9	2	58
Eudunda Hope	Mannahill	32	15	0	7	18	13	30	13	4	18
Federal	Tarcoola	44	3	0	2	6	0	7	1	4	3
Federal	Woodside	41	1	0	20	16	11	81	18	6	39
Flagstaff	Birdwood	10	2	0	3	16	9	14	2	8	28
Fabian's Glenloth	Glenloth	18	10	0	18	18	13	72	17	7	78
Fabian's No. 2	Glenloth	31	13	0	14	5	4	45	12	8	28
Fabian's No. 3 (New Glenloth Gold Mining Syndicate) (Nullarbor Sulphide Mine)	Glenloth	1,151	12	0	1,731	14	2	5,785	2	10	104
Faugh-a-Ballagh	Mannahill	1	12	0	0	7	9	1	3	5	15
Forest Range	Forest Range	5	12	0	1	14	15	5	19	4	22
Fulton	Birdwood	5	0	0	1	11	2	5	10	9	22
German Reef	Talunga	48	6	0	6	9	22	21	13	7	9
Grundy (Golden Ridge)	Second Valley	23	1	0	7	10	6	23	8	2	20
Great Eastern	Wadnaminga	21	16	0	31	10	21	109	15	5	100
Great Eastern	Palmer	19	15	0	2	10	8	9	4	11	9
Gallipoli (New Chum)	Tarcoola	435	4	0	291	12	2	959	3	5	44
Golden Guinea	Mongolata	20	10	0	8	13	10	31	10	7	31
Golden Hope	Tarcoola	68	3	0	110	1	15	357	10	10	105
Golden Key	Paracombe	38	4	0	16	15	6	64	5	3	34
Government Mine	Tarcoola	859	5	0	1,122	18	3	3,658	16	1	85
Great Talunga (Black Snake)	Birdwood	428	8	3	246	0	5	908	4	0	42
Golden Gate	Angaston	165	19	0	286	1	15	1,195	17	1	144
Gowland's Reef	Mt. Torrens	101	8	3	29	11	4	106	7	3	21

SUMMARY SHOWING TOTAL ORE TREATED, ETC.—*continued.*

Name of Mine.	Locality.	Weight of Ore.			Gold Bullion Recovered.			Total Value of Bullion.			Yield per Ton, in Shillings.
		Tons.	cwts.	qrs.	Ozs.	dwts.	grs.	£	s.	d.	s.
Golden Thorpe	Woodside	220	7	0	92	1	0	362	11	3	33
Golden Junction	Mt Grainger	239	7	0	175	18	16	675	9	4	56
Golden Reward	Mt. Pleasant	9	0	0	13	1	23	49	6	1	109
Gold lease 1733	Parnaroo	14	2	0	8	7	15	31	1	7	44
Glen Markie	Glenloth	591	13	0	232	9	22	824	2	8	27
Glenloth	Glenloth	26	10	0	8	4	17	30	3	11	23
Great Glenloth	Glenloth	26	10	0	5	19	11	22	16	11	17
Great Northern	Tennants Creek	7	15	0	29	18	7	121	3	3	312
Great Northern Eureka	Woodside	7	10	0	2	7	18	6	12	10	17
Glenloth Pioneer	Glenloth	37	19	2	29	5	9	106	18	8	56
Golden Earl	Tweedvale	9	2	0	15	18	5	60	1	0	123
Golden Stream	North-east	10	17	0	6	4	14	21	17	10	40
Golden Speck	Mongolata	3	14	0	3	7	0	13	2	5	71
Glenloth Well	Glenloth	26	0	0	23	11	16	83	19	10	64
Golden Record	Wadnaminga	24	15	0	33	16	17	122	4	9	98
Golden Victory Co. (see Curdnatta)											
Hennig's	Parnaroo	98	12	0	22	11	10	78	0	3	15
Heggies Hill	Greenock	3	12	0	0	11	6	2	4	1	12
Hall's Reef	Forest Range	50	10	0	68	10	1	247	13	11	98
Hakio	Birdwood	291	12	0	180	3	1	709	8	11	48
Haeusler	Mt. Pleasant	4	7	0	1	12	8	5	11	11	25
Harrison	Charleston	19	13	0	3	15	10	12	18	10	13
Homeward Bound	Mannahill	838	14	0	1,366	18	19	5,351	4	8	127
Hidden Secret	Birdwood	77	4	0	429	19	2	1,654	9	11	430
Hidden Treasure	Tarcoola	57	14	0	39	4	19	124	3	9	43
Hillside	Birdwood	33	11	0	8	15	3	31	16	5	19
Hill View	Birdwood	39	6	0	8	1	9	27	9	2	14
Huonville	N.S.W.	14	2	0	5	10	15	21	0	0	29
Imperial Reef	Tarcoola	286	3	0	977	1	10	2,799	11	0	180
Ireland, R.	Kangaroo Island	20	16	0	1	18	9	6	15	5	7
Iron Battler	Mongolata	2	15	0	6	7	10	25	9	8	185
Ironclad	Mt. Grainger	12	6	0	11	18	9	44	9	5	72
Junction United	Mt. Pleasant	82	12	0	38	19	14	133	11	9	32
Keats	Terowie	12	0	0	3	16	22	14	10	6	24
Khama	Mt. Pleasant	15	3	0	3	14	9	13	3	1	17
Kitticoola	Palmer	58	16	0	35	11	22	133	13	9	45
Kirkeek's Treasure	Nillinghoo	510	0	0	783	4	6	2,854	15	5	111
King's Bluff (Morning Star)	Olary	142	8	0	288	13	0	884	11	7	124
Kuitpo Mission	Kuitpo	5	0	0	0	6	16	1	5	0	5
Klondyke	Mannahill	59	9	0	105	19	7	408	7	5	138
Kooringa	Mongolata	5	5	0	0	7	9	1	5	6	5
Kluge	Lyndoch	6	17	0	0	12	3	2	0	0	5
Kurdnatta	Winnecke Depot	4	13	0	6	6	12	20	7	11	87
Lake Labyrinth	25 miles E. of Tarcoola	90	5	0	82	12	6	301	11	10	69
Last Resource	Tarcoola	316	0	0	171	8	13	580	4	6	36
Lease 938	Tarcoola	9	10	0	3	13	18	12	5	4	25
Lease 1022	Tarcoola	12	4	0	8	13	18	23	17	9	39
Lease 1665	Palmer	6	15	0	3	7	14	12	17	4	38
Lucky Hit	Birdwood	338	16	1	303	6	3	1,148	2	11	67
Little Crumb	Birdwood	77	11	2	136	14	7	516	5	7	133
Lux	Olary	265	8	0	156	4	21	550	17	0	41
Lady Alice	Barossa	24	1	0	49	15	22	195	13	4	162
Lady Edith	Peterborough	10	0	0	1	6	0	4	9	4	9
Lady Jane	Tarcoola	115	3	0	215	1	22	649	18	0	113
Lady Jane	Monarto	49	0	0	32	11	5	121	7	3	49
Lamberts	Nackara	4	15	0	0	8	0	1	11	6	6
Lambert	Cudlee Creek	11	10	0	2	2	22	7	10	9	9
Lone Hand	Glenloth	468	17	0	545	3	16	1,913	17	0	81
Lake View	Glenloth	18	7	0	25	3	10	88	6	2	96
Last Chance	North-east	11	0	0	2	18	11	11	3	3	20

SUMMARY SHOWING TOTAL ORE TREATED, ETC.—*continued.*

Name of Mine.	Locality.	Weight of Ore.			Gold Bullion Recovered.			Total Value of Bullion.			Yield per Ton, in Shillings.
		Tons	cwts.	qrs.	Ozs.	dwts.	grs.	£	s.	d.	s.
Lloyd H.	Charleston	14	14	0	12	16	6	49	3	11	67
Luderwigs	Cudlee Creek	3	0	0	0	10	0	1	10	3	10
Lykkes	Teetulpa	14	17	0	1	8	20	5	1	6	6
Matthiessen	W. Australia	0	0	1	2	12	0	10	2	5	—
May Day, Sec. 852–796	Tarcoola	50	0	0	19	6	4	72	9	11	29
Miss Constance	Birdwood	8	17	0	16	14	16	62	6	3	141
Miss Eileen	Birdwood	4	9	0	2	9	11	9	9	9	42
Mittopitta Deep Lead	Terowie	16	11	0	2	2	2	7	3	9	8
H. Markey	Parnaroo	5	0	0	6	9	8	25	19	0	103
Morning Star (see King's Bluff)	Olary										
Morning Star	Tarcoola	564	1	0	762	3	8	2,595	7	9	92
Menzies Barossa	Barossa	23	14	0	15	1	14	52	10	0	44
Mongolata No. 2	Mongolata	80	2	0	220	1	10	866	7	6	216
Mongolata No. 3	Mongolata	11	8	0	31	3	2	120	8	8	211
Mongolata No. 4	Mongolata	14	2	0	37	2	11	142	3	3	202
Mongolata No. 5	Mongolata	6	10	0	0	18	17	3	3	11	9
Mongolata No. 6	Mongolata	1	9	0	1	1	12	3	17	4	53
Mongolata No. 7	Mongolata	3	0	0	1	5	12	4	9	6	29
Mongolata No. 8	Mongolata	34	1	0	127	6	7	504	3	1	384
Mongolata Alluvial G.M. Syndicate	Mongolata	15	18	0	0	13	17	2	0	9	1
Mount Torrens	Mt. Torrens	1,258	6	0	654	3	15	2,490	4	4	39
Mt. Charles Main Reef	Charleston	26	5	0	20	4	16	77	4	7	59
Mount Grainger	Mt. Grainger	734	16	1	761	19	21	3,006	13	10	81
Myrtle (Dustholes)	Mt. Grainger	322	19	1	125	19	21	439	12	4	27
Mount Mitchell	Glenloth	28	9	0	7	6	6	23	5	5	16
Mount Monster	Nangkita	51	1	0	19	1	16	68	16	8	27
Medora	Mt. Grainger	200	0	0	182	6	23	694	9	9	69
Miners Dream	Mt. Grainger	18	13	0	9	3	18	33	11	10	35
Morgan & Mathews	Charleston	8	6	0	8	8	10	32	7	2	78
Mount Paratoo	Paratoo	50	0	0	5	0	16	15	7	0	6
Mount Lyndhurst	Lyndhurst	1	8	0	0	7	1	1	3	11	16
Mt. Avondale	Pitcairn	8	17	0	5	6	18	20	9	7	46
Nackara	Nackara	36	18	0	7	2	21	25	5	5	13
Nelson (Burton)	Mt. Torrens	24	18	0	11	11	12	43	12	1	35
Newbridge	Paracombe dist.	6	2	0	0	19	4	3	6	3	10
New Chum (see Gallipoli)											
New Deloraine	Kersbrook	1,292	12	0	1,421	18	20	5,268	6	0	81
New Era	Woodside	929	7	0	482	19	9	1,853	1	11	39
New Eclipse or LeHunte	Woodside	189	5	0	141	13	23	529	16	9	56
New Milo	Wadnaminga	370	3	0	424	6	2	1,426	4	8	77
Nectar	Mannahill	18	14	0	28	10	23	109	2	2	116
Nil Desperandum	Glenloth	121	5	0	31	6	5	99	9	9	16
Noble	Birdwood	5	4	0	12	12	8	49	0	6	188
North Nairne	Nairne	30	13	0	2	0	9	7	6	7	4
North German Reef	Birdwood	5	18	0	2	10	2	8	18	6	30
Nullarbor Sulphide Mine	*See* "Fabians No. 3"										
Outalpa	Outalpa	90	9	0	53	18	16	184	1	3	40
Only a Dream	Nr. Peterborough	11	5	0	3	12	19	12	6	9	22
Paddy's Gun	Oodla Wirra	0	15	0	1	19	14	7	5	3	193
Paracombe	Highercombe	36	1	0	13	5	15	50	9	1	28
Perseverance (Gourlay's Claim)	Earea Dam	34	10	0	16	7	11	62	17	7	36
Penrhyn (New Penrhyn)	Mt. Pleasant	80	2	0	37	3	12	136	14	2	34
Peter Pan	Echunga	3	15	0	1	14	20	6	2	4	32
Phyllis May	Birdwood	9	10	0	1	0	23	3	18	7	8
Pinnacles	Nrthn. Territory	5	18	0	60	9	23	235	13	10	79
Prairie	Cudlee Creek	4	15	0	3	14	3	14	9	1	61
Prediction	Kuitpo	3	6	0	1	8	19	5	4	10	31

SUMMARY SHOWING TOTAL ORE TREATED, ETC.—*continued.*

Name of Mine.	Locality.	Weight of Ore.			Gold Bullion Recovered.			Total Value of Bullion.			Yield per Ton, in Shillings.
		Tons.	cwts.	qrs.	Ozs.	dwts.	grs.	£	*s.*	*d.*	*s.*
Proprietary	Tarcoola	6	0	0	3	8	8	10	13	6	35
Picard	Birdwood	8	15	0	8	14	0	31	1	9	71
Pioneer	Callington	97	2	0	31	8	20	20	16	9	24
Pioneer	Glenloth	12	5	0	36	7	15	131	9	1	218
Phoenix	Gawler	11	15	0	6	6	8	21	9	6	36
Queen Bee	Olary	268	12	0	158	10	9	559	19	2	41
Rainbow End	Mannahill	5	15	0	1	13	11	6	7	4	22
Randell	Talunga	18	10	0	12	11	6	45	3	2	49
Rendell	Mt. Pleasant	169	11	0	56	7	14	205	8	5	24
Retriever	Mongolata	10	0	0	2	7	16	9	4	9	18
Reynolds	Mongolata	7	15	0	1	16	5	7	0	5	18
Riedel	Tanunda	5	7	0	1	8	1	4	10	0	17
Rising Sun	Tennants Creek	54	19	0	315	13	3	1,286	13	0	468
Royal Charlie	Mannahill	21	13	0	6	17	23	20	13	5	19
Royal George	3 m.W. Tarcoola	1,481	12	0	676	8	11	2,409	4	8	33
Royal Tiger	Glenloth	53	5	0	32	5	15	115	4	10	43
Rock Boulder	Olary	1	4	0	1	3	3	3	2	10	52
Roweatta	N.S.W.	6	12	0	4	15	10	8	11	1	25
Ruby	Barossa	16	2	0	23	7	23	88	13	4	110
Reddaway's	Mt. Torrens	266	1	1	79	1	20	268	8	4	20
Salt Creek	Mannahill	1	1	0	0	17	8	3	1	10	59
Seatons Mongolata (alluvial)	Mongolata	50	0	0	4	0	6	14	12	0	6
Scotchman	Teetulpa	14	17	0	9	18	20	34	4	8	46
Schuppan (Kluge)	Lyndoch	14	8	0	2	19	7	10	11	2	14
Section 121	Hd. of Talunga	3	15	0	2	2	9	7	15	6	41
Section 727 (Dedmans)	Tarcoola	980	0	0	1,114	15	0	3,504	5	9	72
Section 55	Mongolata	5	4	0	2	12	12	9	13	7	37
Section 728	Tarcoola	26	15	0	9	16	17	31	5	8	24
Section 30	Mongolata	1	17	0	1	4	3	4	12	8	49
Section 784	Tarcoola	7	3	0	4	8	7	14	11	10	41
Section 36w	Mongolata	15	15	0	4	18	1	18	18	3	24
Spanish American	Mannahill	21	3	2	10	12	11	39	6	3	37
Shamrock	Tarcoola	136	14	0	120	11	22	441	19	3	65
Shell Creek	Laura	6	5	0	2	11	19	9	3	5	29
Sheoak Ridge	Williamstown	19	10	0	19	6	0	73	15	5	75
Sims Section	Mt. Torrens	73	18	0	13	0	0	46	11	11	12
Schubert's Reef	Mt. Torrens	99	10	0	55	8	5	191	7	7	38
South Kanappa	Woodside	7	13	0	3	7	11	13	2	6	34
Stars and Stripes	Mt. Grainger	20	3	0	5	18	10	22	17	7	22
Starrick	Mt. Pleasant	6	10	0	7	15	0	26	9	0	81
Stirling Reef	Mylor	6	0	0	0	11	17	1	17	7	6
Stockyard Gully (Gehan)	Kersbrook	46	19	0	19	5	15	71	16	0	30
Sturt Meadows	Oakbank	37	11	0	23	19	11	90	19	6	48
Sullivans	Tarcoola	434	19	0	689	13	5	2,283	13	1	105
Symonds	Chain of Ponds	5	2	0	0	15	3	2	8	11	9
Sullivans No. 2	Tarcoola	5	0	0	15	2	10	53	19	0	215
Triumph	Wadnaminga	17	18	0	8	11	17	32	4	3	35
Takati	Mongolata	177	15	0	394	11	16	1,572	2	11	176
Takati South	Mongolata	25	0	0	1	9	19	5	15	9	5
Tarcoola Blocks	Tarcoola	650	3	0	950	12	8	2,917	8	9	82
Tarcoola Blocks, Enterprise Lease	Tarcoola	642	6	0	632	17	17	2,200	18	2	69
Tarcoola United	Tarcoola	56	10	0	100	0	15	331	4	3	117
The Gem	Tarcoola	42	12	0	90	6	19	277	16	11	130
Thistledome	Tarcoola	25	0	0	2	12	0	7	4	1	6
Thomas W.	Wadnaminga	3	3	0	1	8	22	5	7	2	33
Tarcoola West	Tarcoola	53	5	0	63	14	4	253	5	11	95
Tarcoola Perseverance	Tarcoola	4,178	5	0	5,210	16	11	19,080	12	2	175
Thunder Queen	Wadnaminga	159	5	0	167	15	3	588	0	10	74

SUMMARY SHOWING TOTAL ORE TREATED, ETC.—*continued.*

Name of Mine	Locality.	Weight of Ore.	Gold Bullion Recovered.	Total Value of Bullion.	Yield per Ton in Shillings.
		Tons. cwts. qrs.	Ozs. dwts. grs.	£ s. d.	s.
Tolmer's Hill.....	Tarcoola	6 0 0	1 11 16	5 8 0	18
Try Again	*See* "Vienna"				
Traav	Birdwood	13 0 0	5 0 20	19 0 8	29
Traw, A.....	Birdwood	5 16 0	2 9 17	9 7 6	32
Telfer North	*See* Deloraine South				
Union Jack	Waukaringa ..	17 2 0	2 16 13	9 18 9	11
Ulooloo	Ulooloo	34 8 0	14 8 17	57 3 3	33
Uraparinga	Williamstown..	*See* Clark's Deloraine			
Vienna (Descovitch's Reef), Try Again	Mt. Pleasant ..	42 3 0	19 14 3	68 19 7	32
Virginia	Wadnaminga .	19 13 0	22 2 8	80 3 8	82
Virtue.....	Willunga.....	7 0 0	0 9 3	1 10 5	4
Ward's Reef (Tarcoola Blocks)	Tarcoola	226 10 0	409 13 8	1,376 1 2	121
Warrigal East	Tarcoola	3 15 0	13 6 17	47 0 9	250
Warrigal South	Tarcoola	272 13 3	284 5 18	833 2 6	61
Watkins	Mt. Grainger ..	7 10 0	3 7 10	12 15 2	34
Wadkaloo	Olary	6 5 0	0 11 8	1 19 9	6
Wondergraph	Tarcoola	81 6 0	122 17 7	405 1 10	100
Warrigal North.....	Tarcoola	254 15 3	253 10 19	730 15 6	57
Welcome Home (Tarcoola Blocks)	Tarcoola	1,656 3 0	1,612 17 6	3,359 1 4	40
Wickham	Birdwood	8 3 0	2 10 17	8 8 3	21
Wildildie.....	Mongolata.....	231 5 0	51 4 11	200 16 4	27
Wilgena Syndicate ..	Tarcoola	29 15 0	23 15 12	88 10 7	59
Wilgena Enterprise ..	Earea Dam....	407 10 0	360 14 23	1,418 1 9	69
Wilgena Associated ..	Tarcoola	45 0 0	98 10 10	364 3 11	161
Wilson, Plumer & Co.	Charleston	2 18 0	1 2 9	3 19 6	27
White Gum	Balhannah	13 5 0	4 15 9	17 3 11	26
White Hope.....	Tarcoola	319 0 0	462 0 0	1,740 0 3	109
Walparuta	Olary	12 5 0	5 6 7	13 0 0	21
Wheal Everley	Woodchester ..	5 15 0	0 11 0	1 13 11	5
Wheal Ellen	Strathalbyn ...	68 0 0	18 9 5	62 8 11	18
Wheal Doria	Tennant's Creek	4 13 0	67 15 3	280 2 4	1,204
Welsh Prince.....	Wadnaminga ..	10 0 0	3 10 13	12 8 0	25

SOUTH AUSTRALIAN TERTIARY LIGNITES.

The figures showing the total information obtained to date from the Government drilling operations on the various Tertiary lignite fields of South Australia are given in the following tabulation :—

Occurrence, Tonnage, Etc.

Field.	Distance from Adelaide.	Number of Holes Drilled.	Average Thickness of Main Seam.	Average Depth of Main Seam from Surface.	Area Proved by Boring to Date.	Gross Tonnage Proved by Boring to Date.
	Miles.		Ft.	Ft.	Acres.	Tons.
Hope Valley	8 (road)	15	13·0	164	200	Not Estimated
Noarlunga	25 (rail)	6	12·7	322	80	1,438,000
Clinton	55 (sea)	19	21·8	292	620	32,384,000
Inkerman-Balaklava..	58 (rail)	27	18·8	233	3,520	94,012,000
*Bower	85 (rail)	36	12·5	389	479	9,852,000
Moorlands.....	87 (rail)	192	15·3	88	1,091	24,583,000
*Anna	94 (rail) 9 (road)	39	14·3	238	3,360	63,494,000

* Field fully delimited by boring. Total gross tonnage proved to date 225,763,000.

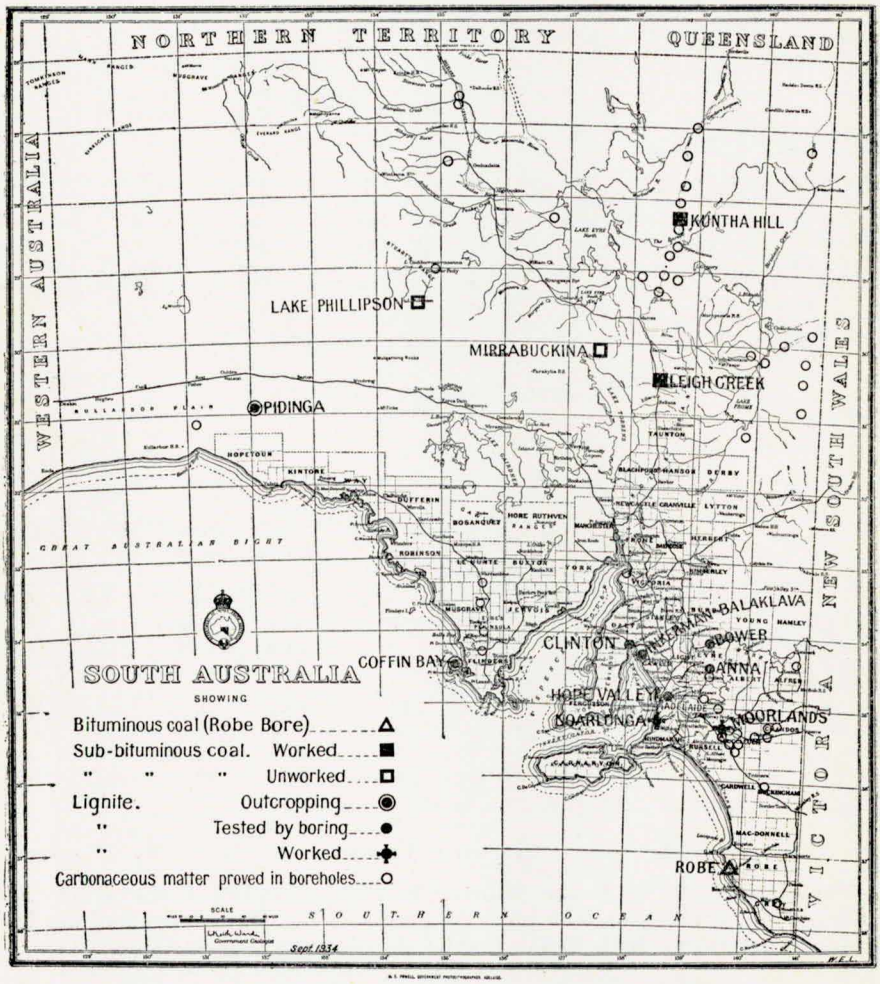
Weighted Average Composition.

Field.	Moisture at 105° C. after Air-drying.	Sulphur Content after Air-drying.	Analysis as Raised.				
			Moisture at 105° C.	Volatile Matter.	Fixed Carbon.	Ash.	Bitumen
	%	%	%	%	%	%	%
Hope Valley ...	12·7	3·3	51·0	22·1	14·0	12·9	—
Noarlunga	21·8	5·0	48·7	24·2	15·4	11·7	1·1
Clinton	16·7	3·3	51·7	24·5	15·5	8·3	1·0
Inkerman-Balaklava	16·5	3·7	55·0	21·9	16·3	6·8	0·7
Bower.....	14·2	3·8	49·3	23·7	14·9	12·1	0·7
Moorlands	14·3	3·7	51·4	21·8	13·9	12·9	—
Anna	13·2	3·3	54·1	21·5	13·7	10·7	0·9

Calorific Values.

No instrument for determining calorific values was available in the earlier stages of boring. The following table gives the results in B.T.U. per pound of air-dried lignite as determined by a Mahler Bomb Calorimeter, since available :—

Field.	B.T.U. per Lb. of Air-dried Lignite.		
	Minimum.	Maximum.	Unweighted Mean.
Inkerman-Balaklava	5780	9220	8150
Bower.....	6053	9549	7820
Moorlands	5564	9475	7548
Anna	5855	9597	8003


NORTHERN TERRITORY
QUEENSLAND
WESTERN AUSTRALIA
NEW SOUTH WALES
VICTORIA
KUNTHA HILL
LAKE PHILLIPSON
MIRRABUCKINA
LEIGH CREEK
PIDINGA
HOPETOUN
KINTORE
BUFFERIN
BOSANQUET
HOREHUTHVEN
RANGE
NEWCASTLE CRANSTLE
LYTTON
TAUNTON
BLACHFORD MANOR
DERBY
GREAT AUSTRALIAN BIGHT
ROBINSON
MUSGRAVE
JERVOIS
YORK
VICTORIA
KIMBERLEY
CHERMAN-BALAKLAVA
YOUNG
HAMLEY
CLINTON
FLOWER
COFFIN BAY
HOPE VALLEY
ADELAIDE
NOARLUNGA
MOORLANDS
CARDWELL
KARKHAM
MAC-DONNELL
ROBE
SOUTHERN OCEAN
SOUTH AUSTRALIA
SHOWING
Bituminous coal (Robe Bore)
Sub-bituminous coal. Worked
" " " Unworked
Lignite. Outcropping
" Tested by boring
" Worked
Carbonaceous matter proved in boreholes
SCALE
Sept 1934

EXPLANATION OF MAP.

The map printed on the preceding page shows the position of the principal deposits of fossil fuel in South Australia.

The coal of highest grade is that discovered in the deep (4,505ft.) borehole near Robe drilled with a percussion drill in search of petroleum. Fragments of coal were recovered from depths between 2,830ft. and 3,642ft., and analysis shows the coal to be similar to the Jurassic coal of Victoria. But the depth of occurrence and the water in the Tertiary sediments overlying the Jurassic coal measures have precluded development.

The sub-bituminous coal of Leigh Creek has been worked in an experimental way, and the main seam in the colliery is 45ft. thick. The obstacle to development has been the remote position of the field, which is 169 miles from Port Augusta.

A little work has been done also at Kuntha Hill, on the stock route between Marree and Birdsville, on narrow seams up to 2ft. 6in. in thickness, but in this case also the geographical handicap is too severe for exploitation.

The Lake Phillipson and Mirrabuckina seams are known only from deep boreholes drilled in search of water. Many other occurrences of coaly matter recorded in boreholes drilled for water within the limits of the Great Australian Artesian Basin are probably to be regarded as seams of sub-bituminous coal contained within the limits of the Upper Cretaceous or Winton series.

The Tertiary lignite outcrops only on Eyre Peninsula, at Point Sir Isaac, on Coffin Bay, and at Pidinga, to the south-south-east of Ooldea. There has been no development at either place. There has been some work done at Noarlunga and Moorlands, but the knowledge of the reserves and mode of occurrence of the lignite is due principally to systematic boring by the Department of Mines. By this means reserves amounting to 225,763,000 tons have been proved, but the limits of only the Bower and Anna fields are known. Further boring will undoubtedly increase the reserves largely on the other fields. Details regarding the occurrences will be found on page 29.

THE BROKEN HILL ASSOCIATED SMEL

Statement reflecting Works' Annual Production for the period

Date Calendar Year ended	Market Lead.	Silver.	Gold.	Antimonial Metal.
	Tons.	Fine ozs.	Fine ozs.	Tons.
December 31st, 1915	49,902·2171	2,006,408·40	950·6763	266·6260
December 31st, 1916	103,290·7086	4,503,047·16	9,018·3222	1,102·6364
December 31st, 1917	117,356·6864	5,781,060·63	9,434·2039	1,526·8354
December 31st, 1918	133,833·4628	6,740,585·77	12,248·6612	1,403·4275
December 31st, 1919	68,055·9051	4,678,528·30	4,883·7682	112·6046
December 31st, 1920	558·1104	36,683·87	—	853·2861
December 31st, 1921	26,847·7309	1,613,670·23	248·3448	—
December 31st, 1922	93,467·9868	6,457,844·28	1,651·4402	254·1577
December 31st, 1923	116,910·1619	7,323,722·88	4,016·4508	1,735·4119
December 31st, 1924	126,165·2887	7,183,620·89	3,159·3305	1,326·5472
December 31st, 1925	146,161·1657	8,180,823·86	2,034·2995	523·9828
December 31st, 1926	149,950·9833	8,407,395·33	3,360·1568	240·1134
December 31st, 1927	164,699·0528	9,057,301·45	7,858·2288	221·1071
December 31st, 1928	156,130·9812	7,943,149·78	5,462·2527	—
December 31st, 1929	172,597·8690	8,768,266·62	3,621·1522	1,292·1562
December 31st, 1930	168,671·8749	8,617,464·37	7,194·2194	—
December 31st, 1931	133,528·5334	7,020,008·81	3,702·0451	—
December 31st, 1932	135,502·9224	6,101,137·42	3,529·9002	—
December 31st, 1933	160,433·3285	2,265,302·58	1,563·3093	—
	2,224,064·9699	112,686,022·63	83,936·7621	10,858·8923

Date Calendar Year ended.	Copper Matte.	Antimonial Slag.	Drossed Bullion.	Refinery Retort Blue Powder.
	Tons.	Tons.	Tons.	Tons.
December 31st, 1915	—	—	—	—
December 31st, 1916	—	—	—	—
December 31st, 1917	—	—	—	—
December 31st, 1918	—	—	—	—
December 31st, 1919	—	—	—	—
December 31st, 1920	—	—	—	—
December 31st, 1921	1,386·2732	—	—	—
December 31st, 1922	1,405·6625	—	—	—
December 31st, 1923	3,077·9750	—	792·7577	—
December 31st, 1924	1,509·5375	—	—	—
December 31st, 1925	1,001·7125	100·4500	—	—
December 31st, 1926	2,701·8750	549·8375	—	—
December 31st, 1927	3,456·1750	2,522·1875	—	—
December 31st, 1928	4,056·5875	3,404·7750	—	—
December 31st, 1929	3,801·1875	2,812·9250	—	76·7930
December 31st, 1930	4,105·3479	3,008·8625	—	—
December 31st, 1931	1,950·7250	1,868·3250	—	—
December 31st, 1932	2,886·2750	1,138·1500	—	—
December 31st, 1933	4,748·4250	4,020·3000	—	—
	36,087·7586	19,425·8125	792·7577	76·7930

TERS PROPRIETARY, LIMITED, PORT PIRIE.

June 2nd, 1915, to December 31st, 1933 (including Sulphuric Acid).

Refined Spelter.	Unrefined Spelter.	Sulphuric Acid.	Litharge.	Blue Powder ex Zinc Distillation Plant.	Special Alloys.	Cadmium Precipitate
Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
2,005·3438	525·0656	—	5·0384	3·4500	—	—
3,560·8154	1,223·5979	—	94·3349	479·8112	—	—
1,949·1917	1,550·8666	—	154·9522	238·1924	4·6562	—
3,316·8260	1,907·9137	—	461·2612	908·1714	28·9848	—
1,665·1054	848·2925	—	326·4256	700·2428	21·6124	—
3,465·5787	355·6195	—	424·3134	586·5500	12·1345	—
178·4303	77·8482	—	232·5817	8·4000	9·5844	—
—	—	—	311·2316	220·3612	55·2856	—
—	—	—	420·0547	—	75·3246	—
—	—	4,959·0706	319·8667	—	133·7364	—
—	—	10,997·7572	335·2917	—	96·6994	—
—	—	1,0854·3344	322·7060	—	42·0887	—
—	—	15,290·4640	293·7000	—	98·3950	—
—	—	23,709·5979	51·9420	—	84·9839	3·6475
—	—	22,542·5174	—	—	19·5955	63·3480
—	—	18,613·9163	—	—	41·3633	131·2670
—	—	9,042·6537	—	—	2·2575	105·7243
—	—	23,034·0501	—	—	6·8665	97·8964
—	—	15,718·3617	0.1000	—	2·8285	58·5898
1,6141·2913	6,489·2040	154,762·7233	3,753·8001	3,145·1790	736·3972	460·4730

Shrapnel Lead.	Shipping Bullion.	Copper Bullion and Accretions.	Dore Bullion.	Zinc Oxide.	Zinc Residuum Baghouse Fume.
Tons.	Tons.	Ounces.	Ounces.	Tons.	Tons.
—	3,962·9978	—	—	—	—
650·2558	—	—	—	—	—
4,281·6650	—	—	—	—	—
1,629·4779	—	—	—	158·4183	22·8277
—	—	—	—	—	1·6071
—	—	—	—	68·9375	44·2012
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	7·4996	—	—	—
—	—	0·6723	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	3·7801	—	—	—
—	—	—	5,227,803·50*	—	—
6,561·3987	3,962·9978	11·9520	—	227·3558	68·6360

* This bullion contained 5,213,099·23 ozs. of fine silver and 4,716·0798 fine ozs. of gold.

GENERAL NOTES.

During the search for water by boring, a noteworthy thickness of lignitic material was proved to exist at the corner of Melbourne Street and Brougham Place in North Adelaide. The percussion drill penetrated lignitic matter between depths of 111ft. and 156ft. from the surface, this bed being entered below 80ft. of Miocene limestone and sands. The sample obtained from the driller is not comparable with samples obtained with a rotary drill, and it is probable that the distribution of clay in the bed was not uniform. The action of the drill would cause the mingling of any cleaner lignite with seams of clay, and thus raise the general content of ash in the sample above that of any cleaner lignite that may exist. The composition of the sample as received was:—

	Undried. Per cent.	Airdried. Per cent.
Moisture at 105° C.	49.07	13.24
Volatile matter	18.22	30.70
Fixed carbon	10.26	18.27
Ash	22.45	37.79
	100.00	100.00

Prices of Metals.—During the six-month period to the end of June, the price of electrolytic copper averaged a little under £36 per ton, but it has fallen considerably since, being now a little below £31.

Lead averaged £11 9s. 7d. for the period, and zinc £14 14s. 9d., these metals and copper showing a decline below the average price for 1933. The open market price for gold has, however, increased, the average for the period having been £6 15s. 5d. as against £6 4s. 9d. for the year 1933. Recently gold reached the record price of £7 1s. 7d. per fine ounce, the corresponding Australian mint price being £8 14s. 9d.

Copper.—The operations of the Moonta Mining Scheme were continued during the period, and concentrates were shipped to Port Kembla, but the continued fall in the price of copper has rendered operations difficult. The flotation treatment mill at the mine has been successful in producing a very good grade of concentrate. A report on operations is printed elsewhere in this *Review*.

Iron Ore.—The Broken Hill Proprietary Co.'s works at Whyalla, Iron Knob, and Middleback have been operated recently on a very much larger scale of production, and it appears likely that there will be a very big output of this high-grade iron ore for the year. At Iron Knob two shifts of men are at work breaking the ore, and two large electric shovels are engaged loading the ore from the face for conveyance to the crusher. Each of these shovels is of 4 cubic yard dipper capacity, capable of loading the broken ore at the rate of 400 tons per hour. The crusher in use can put through 1,000 tons per hour, broken to about 10in. gauge, the further reduction to shipping size being effected at the crushing plant at Whyalla. Ore is now being regularly broken and despatched from the Middleback deposit also, and the carriage of the ore from the mines to Whyalla at present requires the running of six ore trains daily. Approximately 500 men are employed at present.

Gypsum.—The production of this mineral, of which the State possesses immense deposits, has been on a larger scale during the period, and a considerable tonnage of gypsum has been mined and exported beyond the State after satisfying the local demand. The bulk of the gypsum is exported in the crude state, the rock gypsum as mined being merely crushed and washed. Special facilities for loading have been installed at Cape Spencer, where the Waratah Gypsum Pty. Co. is operating, a tunnel having been driven below the stock pile at the sea front, with a conveyor belt extending out on the jetty, and delivering the material directly into the ship's hold, giving quick loading for the boats.

GOVERNMENT DRILLING OPERATIONS.

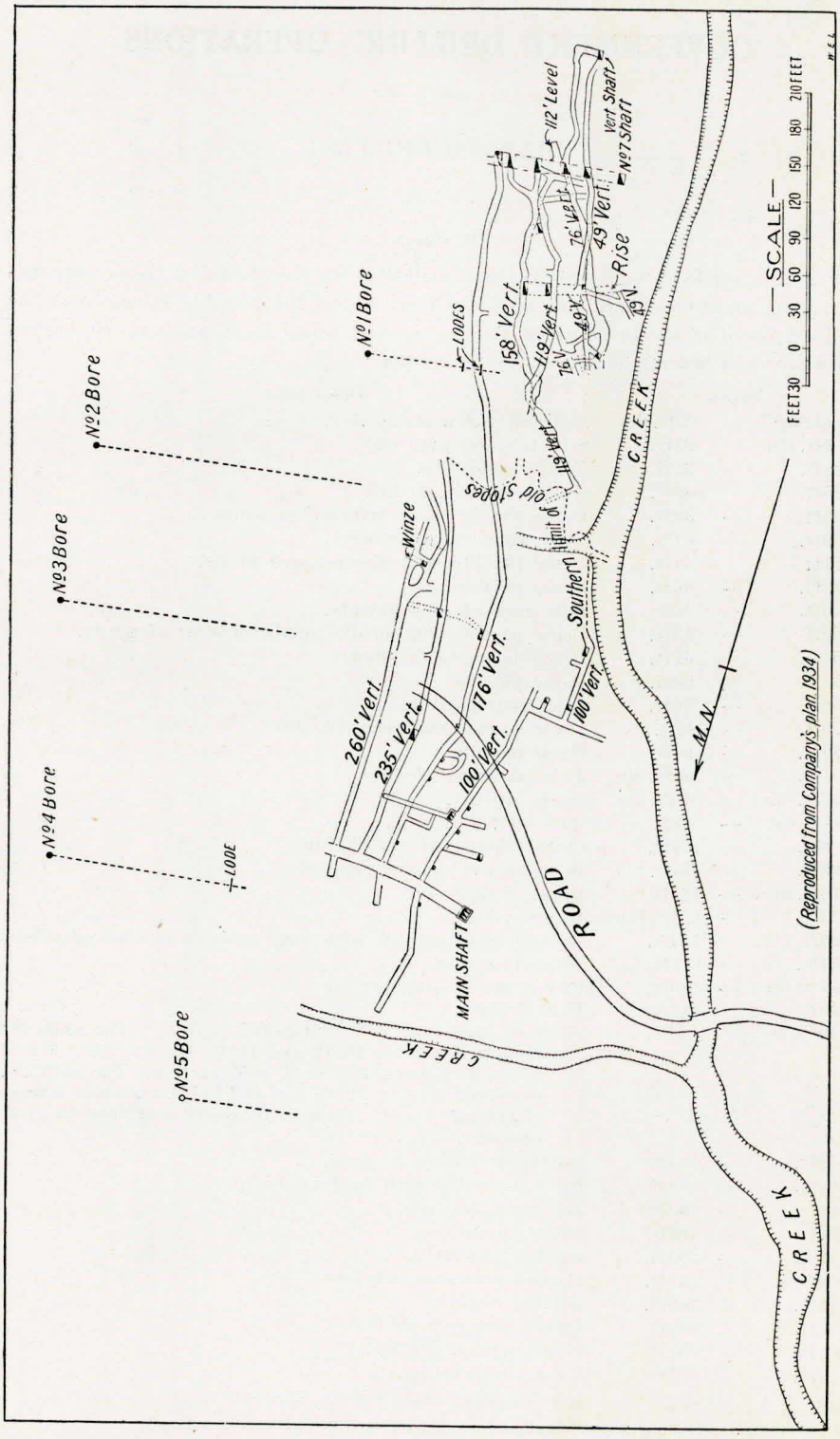
DIAMOND DRILLING.

Deloraine.

No. 5 borehole of the series has been drilled at the site shown on the accompanying plan, on the northern side of No. 4 hole, to test the possible extension of the lode explored in the principal workings. It was drilled at an angle of 70 degrees in a direction bearing 95 degrees west of north.

Depth.			Description.
Surface	—	5ft. 6in.	Soil and yellow sandy clay.
5ft. 6in.	—	21ft.	Stiff parti-coloured clay.
21ft.	—	25ft.	Friable sandstone.
25ft.	—	26ft.	Broken banded phyllite.
26ft.	—	39ft.	Dense phyllite, with well-marked joints.
39ft.	—	41ft.	Dense calcareous phyllite.
41ft.	—	43ft.	Dense phyllite with disseminated pyrite.
43ft.	—	46ft.	Dense phyllite.
46ft.	—	50ft.	Pale greenish-grey phyllite.
50ft.	—	53ft.	Dense phyllite with small sporadic crystals of pyrite.
53ft.	—	57ft.	Dense dolomitic limestone.
57ft.	—	69ft.	Dense phyllite.
69ft.	—	70ft.	Calcareous phyllite.
70ft.	—	80ft.	Dense banded calcareous phyllite.
80ft.	—	94ft.	Dense phyllite.
94ft.	—	96ft. 6in.	Pale calcareous phyllite.
96ft. 6in.	—	97ft. 6in.	Dense phyllite.
97ft. 6in.	—	98ft.	Pale jointed phyllite.
98ft.	—	109ft.	Crumpled and jointed phyllite.
109ft.	—	116ft. 6in.	Brecciated calcareous phyllite.
116ft. 6in.	—	125ft.	Dense phyllite.
125ft.	—	126ft. 6in.	Pale phyllite.
126ft. 6in.	—	134ft.	Dense banded phyllite with small sporadic crystals of pyrite.
134ft.	—	137ft. 6in.	Jointed phyllite.
137ft. 6in.	—	140ft.	Pale greenish grey phyllite.
140ft.	—	142ft.	Pale phyllite.
142ft.	—	145ft.	Siliceous lode stuff with undigested phyllite. The sediment recovered between 142ft. and 144ft. 4in. was assayed and found to contain 2dwts. of gold per ton. The sediment recovered between 144ft. 4in. and 145ft. contained a trace of gold, on assay. The core recovered contained no gold, on assay.
145ft.	—	185ft.	Quartzite, friable in parts.
185ft.	—	188ft.	Jointed phyllite with disseminated pyrite.
188ft.	—	190ft.	Brecciated phyllite.
190ft.	—	199ft.	Dense phyllite.
199ft.	—	205ft.	Jointed phyllite.
205ft.	—	208ft.	Banded calcareous phyllite.
208ft.	—	230ft.	Jointed phyllite.
230ft.	—	249ft.	Dense dark-grey phyllite.
249ft.	—	254ft.	Dense jointed phyllite.
254ft.	—	279ft.	Calcareous phyllite.
279ft.	—	280ft.	Dense phyllite with veinlets of calcite.

Boring was abandoned at 280ft.



New Deloraine Gold Mine and Bore Sites.

Bird-in-Hand Mine, Woodside.

The No. 2 borehole, details regarding which were printed in Mining Review No. 59, was continued to a total depth of 844ft., the rock traversed below 751ft. 6in. being mica schist.

Borehole No. 3 of this series was then started at the site shown on the plan printed herewith to test the extension of the Extended lode in depth. The hole was drilled vertically, and was put down with a percussion drill to a depth of 137ft. The fragmental samples recovered showed that the rocks penetrated were quartz-mica schists, portions of which were so siliceous as to be practically quartzites. From a depth of 137ft. diamond drilling was resumed, with the results following:—

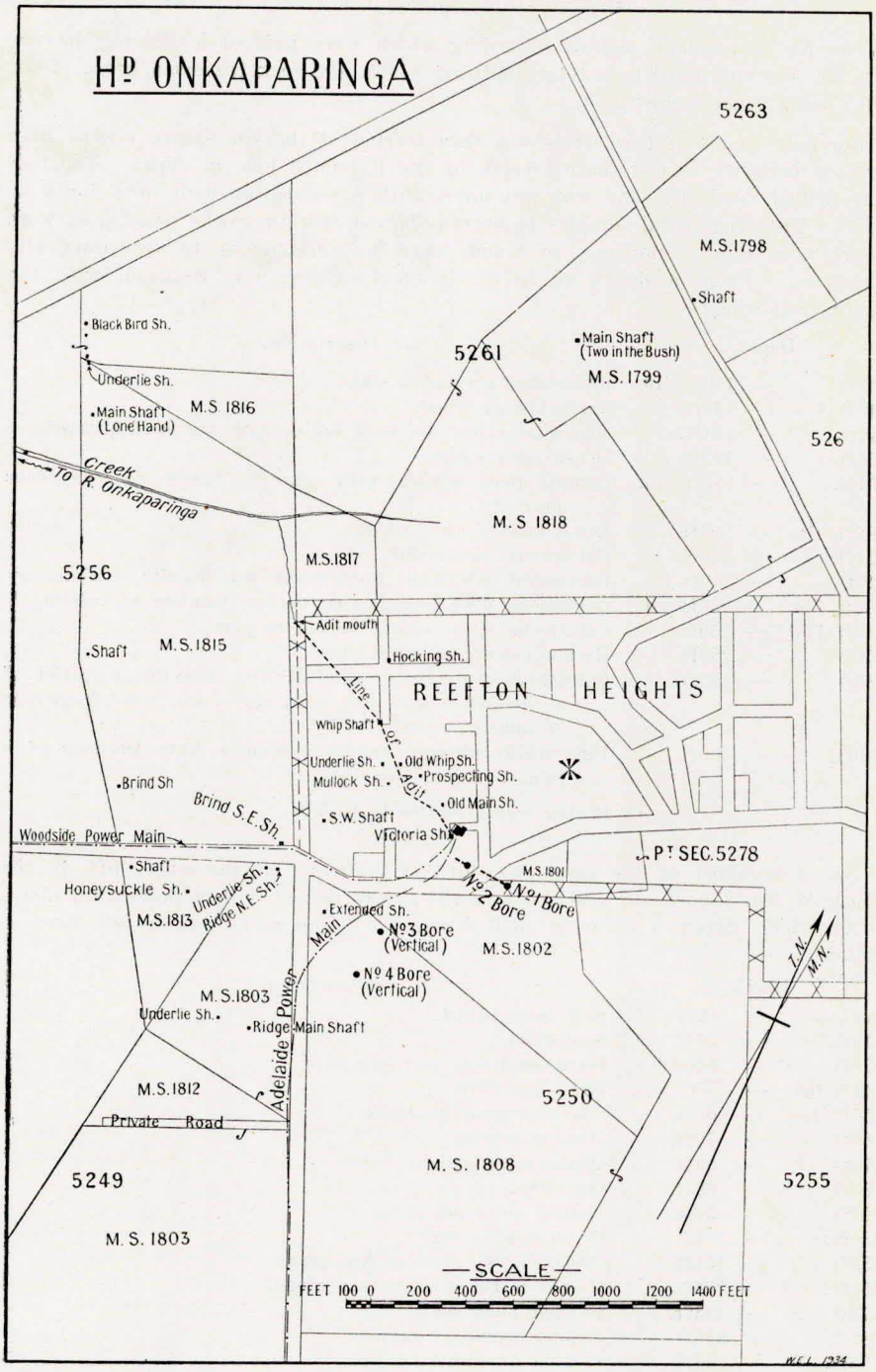
Depth.			Description.
137ft.	—	140ft. 4in.	Dense dark-grey mica schist.
140ft. 4in.	—	142ft.	Banded mica schist.
142ft.	—	164ft.	Somewhat calcareous mica schist, with bands of quartzite.
164ft.	—	174ft.	Dense mica schist.
174ft.	—	182ft. 4in.	Banded mica schist, with narrow bands of calcareous quartzite.
182ft. 4in.	—	194ft.	Dense banded mica schist.
194ft.	—	220ft.	Calcareous mica schist.
220ft.	—	220ft. 7in.	Brecciated calcareous mica schist with calcite veinlets.
220ft. 7in.	—	230ft. 7in.	Calcareous mica schist with narrow veinlets of calcite.
230ft. 7in.	—	250ft.	Calcareous mica schist, banded in part.
250ft.	—	280ft.	Broken calcareous mica schist.
280ft.	—	390ft.	Calcareous and siliceous sand derived from disintegration of a calcareous and micaceous sandstone, with fragments of quartz veinlets.
390ft.	—	459ft.	Fine white siliceous sand, apparently from leaching of a calcareous sandstone.

Boring was abandoned at 459ft.

No. 4 borehole of the series was drilled vertically at the site 200ft. to the south of No. 3 borehole, and the first 70ft. were drilled with a percussion plant, after which depth a diamond drill was used. The rocks penetrated were as follows:—

Depth.			Description.
Surface	—	12ft.	Soft mica schist.
12ft.	—	36ft.	Sandstone.
36ft.	—	43ft. 6in.	Hard sandstone and quartzite.
43ft. 6in.	—	57ft. 4in.	Hard quartzite.
57ft. 4in.	—	60ft.	Coarse-grained quartzite.
60ft.	—	70ft.	Hard quartzite.
70ft.	—	89ft.	Quartz-mica schist.
89ft.	—	92ft.	Quartzite.
92ft.	—	130ft.	Banded mica schist.
130ft.	—	133ft.	Greenish-grey clay.
133ft.	—	153ft.	Greenish-grey sand of fine grain.
153ft.	—	174ft.	Porous textured coarse sandstone.
174ft.	—	183ft.	Banded mica schist.
183ft.	—	235ft.	Impure banded limestone.
235ft.	—	244ft.	Friable limestone.
244ft.	—	254ft.	Impure limestone, friable in part.
254ft.	—	298ft.	Friable impure limestone.
298ft.	—	391ft.	Grey siliceous sand.

Boring was abandoned at 391ft.



Bird-in-Hand Gold Mine and Bore Sites.

Other Drilling.

In addition to the drilling before-mentioned, three drills (two percussion and one rotary) were employed on the work of boring holes for grouting at the site of the Baroota reservoir weir. There were 81 boreholes drilled, the total amount of drilling being 8,138ft. 8in.

MOTOR-DRIVEN ROTARY DRILL.

There are many parts of South Australia in which there is difficulty or abnormally high expenditure in obtaining fuel (firewood) and boiler water for the standard steam-driven rotary drill used in testing mineral deposits. The necessity for a prospecting drill operated by an internal combustion engine for use in such localities has been met by the design and construction of a light portable drill by the Chief Engineer for Boring. The whole of the construction has been effected in the departmental depot. Photographs of the drill are printed herewith. (See also Frontispiece.)

The machine is a self-contained unit mounted on a rigid double channel iron frame, and strong steel road wheels are attached to the bottom channel in such a manner as to allow ample clearance for ordinary tracks.

The motor is a 23 h.p. heavy duty "Buda" engine of the four cylinder type. Power is transmitted to the drill rods through a twin-disc clutch and three-speed gear box to an epicyclic gear capable of adjustment to eliminate the danger of twisting off the couplings if the rods are subjected to abnormal strain. The hoist consists of a cast steel drum driven from the main shaft by a set of 2 to 1 gears.

A hydraulic feed is provided to control the drilling speed, the water pressure being supplied by a 5in. x 2in. double-acting force pump driven from the counter shaft by a chain. A release valve is fitted to the delivery, so that a constant pressure may be maintained in the hydraulic cylinder.

The derrick, constructed of 4in. tubular steel, is attached to the bottom channel so that when the machine slides back for the withdrawal of the drill rods the crown wheel remains in a central position over the borehole.

The machine can be driven at variable speeds, so that bits armed with special alloys, such as haystellite, can be used where the nature of the rock to be drilled allows them to be substituted for carbons.

Another feature of the drill is its adaptability to churn drilling when necessary. For this purpose a quick-drop percussion device has been fitted, and with its use a dry hole may be started and continued through friable country to the depth at which it is desired to land the standpipe. The adoption of this method prevents the disturbance of the soft country near the surface by the return water required in rotary drilling, and permits the use of a full-length core barrel when coring is started.

The capacity of this drill, with "A" size rods, is about 500ft. In cases where a number of holes in close proximity is required, the whole drill, including the derrick, can be moved without dismantling.

REPORTS

BY

The Chief Inspector of Mines (L. J. Winton, B.E.).

MOUNT GRAINGER AND MEDORA GOLD MINES.

These mines are about seven miles north of Oodla Wirra Railway Station on the Broken Hill line, and with some other holdings have recently been taken up by the Golden Morn Gold Mining Company for fresh development. The Mount Grainger mine was discovered about 1894, and has been fully described by R. L. Jack in Report No. 2, G.S.S.A., information from which is briefly condensed as follows:—

The lode channel is a sericitised zone 20ft. to 30ft. wide, with masses of country rock included in places. The strike is about N. 25° E. and the dip is to the W.N.W. at angles ranging from 45° to 55°, the country rocks being glacial till, sandstone, slate, and quartzite, dipping steeply to the west-north-west and striking approximately with the lode, which lies partly in the tillite, and partly in the underlying slate.

It is stated that the lode channel is not uniformly auriferous, but has been enriched by gold-bearing leaders crossing its width, which branch from a persistent hanging wall vein, ranging up to 12in. in thickness. This vein is stated always to contain gold, and to be rich in places. The leaders from it cross the lode channel at right angles, and form the means of enrichment for the latter, giving rise to payable shoots where sufficiently numerous.

A three-compartment shaft has been sunk to 336ft. depth, from which the lode channel was cut on the 120ft., the 220ft., and the 330ft. levels.

The bottom level was not accessible at the time of Dr. Jack's visit, but it was stated that the lode formation was 30ft. wide, and that assay values of 9dwts. to 13dwts. were obtained.

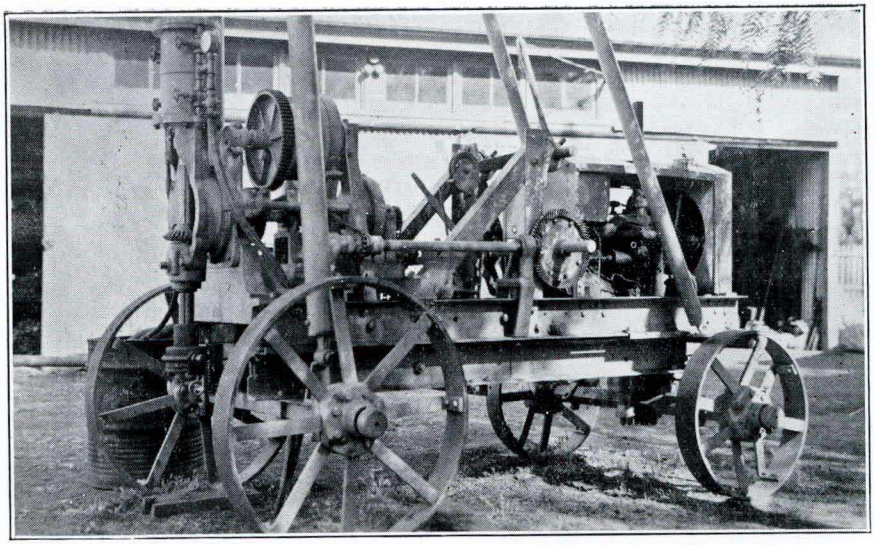
A winze was sunk off the shaft at 230ft. vertical depth, and followed the lode down for about 126ft. on the underlie. It was stated that payable values came in at 70ft. down the winze, and continued to the bottom. The stope length at the 120ft. level was 61ft. or more, and a width of 20ft. was seen, and there is a considerable amount of lode material available between the 330ft. level and the surface.

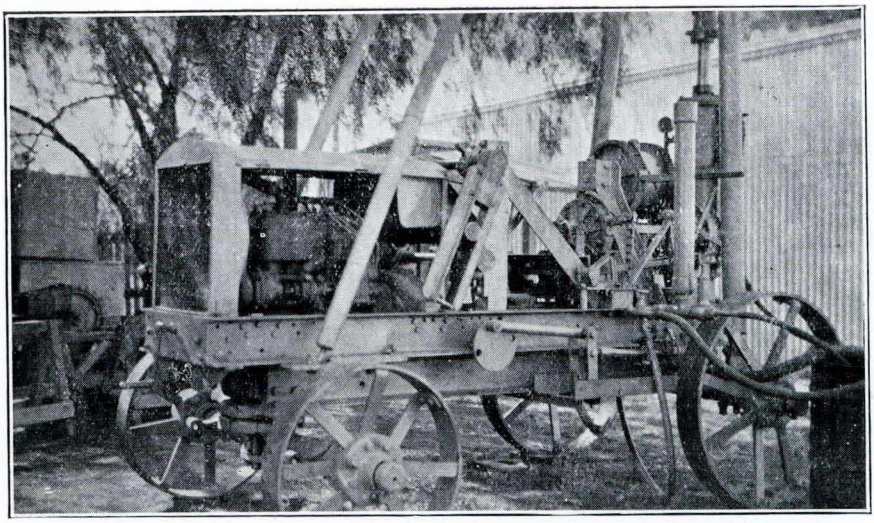
The mine was formerly equipped with 15 head of light stampers and cyanide plant, water for boiler and treatment processes being obtained from the main shaft, which yielded about 8,000galls. per 24 hours.

Records of past production are not complete, but as far as can be ascertained, about 3,127 tons of ore were treated for 1,365ozs. of bullion, valued at £5,143, out of which the Medora workings contribution consisted of 200 tons for 182ozs. of gold bullion, valued at £694.

Part of the total tonnage mentioned above was treated on the mine, and part at the Peterborough Government Battery, the figures for the ore sent to the latter being 730 tons for 760ozs. of bullion, valued at £2,998, normal gold value.

The tonnage mentioned as produced at the Medora workings was also treated at the Government Battery.





Government Rotary-Percussive Drill.

To face page 40.]

TARCOOLA GOLD FIELD.

Mining and prospecting work is being continued here as usual, the enhanced price of gold enabling hitherto unpayable lode matter to be worked at a profit, about 35 or 40 men being engaged altogether.

The new mine, the *White Hope,* is yielding good returns. The workings have now been extended to a depth of about 100ft., and the gold-bearing vein has been opened for a length of about 60ft., striking N.N.E. and dipping west through the granite country. The vein of gold-bearing quartz ranges to 8in. in width, and gold is also found in about 3ft. width of formation containing the vein, enabling that width of ground to be stoped.

To the end of June, 319 tons have been treated for a yield of 462ozs. bullion, valued at £1,740 at the normal value of gold. Four men are engaged in production and development, and the mine, which is now owned by S. H. Trewartha, is being put into proper shape for systematic development.

At the *Perseverance* Mine the old main shaft is being deepened to about 250ft., to afford more convenient access to the deeper portion of the lode. It is being sunk on the underlie, but has passed out of the lode, which appears to be on the western or hanging wall side of the shaft.

A short crosscut will therefore be required to find it, and a level can then be driven on it to the south to open up the shoot of ore, which pitches to the south. At the present high price of gold, the stoping limits of the lode will probably be much increased. A compressor and rock drill and a friction winch are used in carrying on the work. Below water level this lode carries a considerable amount of pyrite, and a gold-bearing concentrate is obtained at the Government Battery, by means of a Wilfley table, the remainder of the ore being amalgamated and cyanided as usual. This mine has now produced 3,948 tons of ore yielding 5,160ozs. of bullion valued at £18,919 at the normal price of gold.

At the *Curdnatta* Mine a good vein of ore about 5in. wide, and having an easterly strike, is being worked off the crosscut at the bottom of the main shaft. The total production of this mine has been 1,526 tons for 1,429ozs. valued at £5,179 at normal gold price.

A little surface prospecting is being done at the *Royal George* Mine, which has produced 1,481 tons of ore yielding 676ozs. bullion, valued at £2,409 at the normal price of gold, during its existence.

The *Welcome Home* Mine continues to produce payable ore, which at present is being won by driving north on the lode, below the underlie shaft, about 35ft. from the surface. The owners intend to resume work below water level shortly.

This lode has now produced 1,656 tons yielding 1,613ozs. of bullion worth £3,359 at normal gold value.

The owners of the *Morning Star* Mine have continued work with satisfying results, a small tonnage of good quality having been produced. To the present time 564 tons, yielding 762ozs. of gold bullion, valued at £2,595 normal price, have been obtained from this mine.

The *Imperial* lode, one of the numerous gold-bearing formations of the Tarcoola Blocks Mine is being worked as usual. The owners followed a rich shoot pitching to the south for some distance, obtaining very rich ore, 286 tons treated having produced 979ozs. of gold bullion valued at £2,800 normal price, in addition to earlier production as part of the Tarcoola Blocks Mine

A number of other parties are engaged prospecting on various parts of the field, obtaining parcels for treatment from a number of the old mines.

Messrs. C. & W. Manning are opening up a new find on the eastern end of the field south of the Victory Well. As far as can be seen at present the formation is of good size, and is stated to show gold throughout.

LAKE LABYRINTH.

In this locality some small parcels of ore are being obtained and sent to Tarcoola for treatment.

Gold occurs here in a number of veins, but these are mainly small, and the values are patchy. The total production from this place is 90 tons yielding 83ozs. of bullion valued at £302 normal price.

EAREA DAM.

Work has been continued at the *Wilgena Enterprise* Mine, and a vertical shaft 88ft. in depth was sunk to connect with the underlie shaft at a greater depth than the existing vertical shaft.

The connection was made about 20ft. above the bottom of the underlie, and the water was pumped out of the latter. The bottom could not be inspected at the time of visiting, but it was stated that the lode or vein was only 4in. in width at that point. Driving on the lode was commenced at 20ft. from the bottom, and the north face was in 35ft., and the south face 4ft. when seen. The vein ranges from a few inches up to 2ft. in width, towards the north end, and is being stoped out for treatment. The total production so far has been 382 tons for 348ozs. of bullion valued at £1,372 at the normal price of gold.

GLENLOTH.

Fabian's No. 3 Mine is being worked by three parties.

Willis's party at the north end have continued underhand stoping and driving north on the rich portion of the vein in their block. The vein is about 8in. thick, and is very rich in places.

Webb's party holding the central block, have been engaged in stoping ore from the shoot developed in the winze below the 127ft. level. This winze is down about 48ft., and has developed a shoot about 80ft. in length, in which the vein averages 8in. to 10in. in width, and has yielded good values. This party has also done some work at the southern end of the 127ft. level, where a rich portion of the vein had been previously worked.

On the southern end of the mine Messrs. Ray and Pratt have reconditioned the old shaft, which is 90ft. vertical and 39ft underlie depth. The bottom of the shaft was under water, but it was stated that the vein was about 12in. wide, with traces of gold. Portions of the vein have been stoped up north and south from the bottom for a distance of about 24ft. south and 15ft. north, the vein ranging from 6in. to 24in. wide, but patchy as regards gold content.

This mine has now produced a total of 1,152 tons from which 1,732 ozs. of gold bullion were obtained valued at £5,785 normal price. The *Royal Tiger* is being worked by Messrs. Stewart and Williams, who are sinking on the underlie of some small veins.

A new prospect known as the *Monarch* has been opened up about 15 chains south of the old *Nil Desperandum* Mine. Shoad stones containing gold were found on the surface, and led to the discovery of the broken upper portions of some gold-bearing veins which made no outcrop.

The veins occur in granitic rock, and consist of quartz with some iron oxide, and free gold is visible in a good deal of the quartz. Two veins were exposed in the deeper workings, the upper one being up to 16in. in width, the lower one about 10in. They are separated by about 3ft. of country, but appear to be approaching each other to the south. The dip as far as can be seen, appears to be 15° east of south, but the exposure of the veins is not sufficient yet to define its course. The first crushing obtained, treated at Tarcoola, was a parcel of 48 tons which yielded 63ozs. 11dwts. of gold bullion valued at £243 15s. 4d. exclusive of premium. (22/10/1934.)

THE SOUTH AUSTRALIAN FELSPAR SYNDICATE.

This syndicate is engaged in mining felspar on private property, section 6113, of the hundred of Talunga, about 1¼ miles east of Gumeracha, and a little north of the road from that place to Birdwood.

A number of pegmatite dykes traverse the schist country, some of which are of large size, the general strike being 165°, approximating north-south. One of these dykes has been opened up on a low rise, and felspar and chinastone are being mined. The quarry excavation shows a good exposure of material, traversed by some small quartz veins, and mostly of a good white colour; a little iron-stained material occurs in places, but can be discarded in working. White mica is developed in parts of the deposit, and some crystals of beryl were noted in one place, these being the only accessory minerals in evidence.

The material is considerably weathered, and consequently easily worked, and appears capable of yielding a large tonnage, which can be readily won by open-cut workings. A general sample was taken from the quarry faces, which on analysis showed the following composition:—

	Per Cent.
Silica	70.36
Alumina	17.56
Ferric oxide	0.12
Magnesia	0.22
Lime	0.40
Soda	4.39
Potash	5.04
Loss on ignition	1.82

(27/9/34.)

RUTILE DEPOSIT, SECTION 17, PARA WIRRA.

This section, which is private land, contains some old workings from which rutile has been obtained in the past, no record, however, being available of the quantity. These workings lie a little south of part of the Warren Reservoir, and are about four miles south-east of Williamstown, and half a mile south-west from the main road between Williamstown and Birdwood, access to which is gained by a passable road.

The country rock here consists of mica-schist, quartz-mica schist, and laminated quartz, with pegmatite dykes which have been the mineralising agents. The strike of the foliation planes of the schist is about 160°, and the dip is to the eastward, the formation being evidently the southerly continuation of the rutile-bearing formation which has been worked on section 959, hundred of Barossa, about 2½ miles to the north. Rutile occurs finely disseminated and also in rich veins through the schist, and in the quartz. A little ilmenite is also present in places, and some tourmaline occurs in the pegmatite.

The rutile has been obtained from a large open cut, about 200ft. long by 30ft. wide, and about 15ft. deep on the western side, over the full extent of which the mineral is distributed in varying amounts.

On the southern end, just beyond the cut, a long costeen was dug across the strike of the country, but as it has fallen in considerably, nothing was seen in it. About 90ft. farther south another long trench has also been dug across the strike, and exposures of rutile-bearing schist were seen in it, the rutile being finely disseminated in the schist, no special concentration being noted. The sample taken from here contained rather more ilmenite than is desirable.

The examination of the occurrence showed that rutile is present in rich veins and patches, in seams through the laminated quartz, and in fine particles disseminated through the schist. There is no doubt but that a considerable amount of high-grade ore can be obtained by selectively mining the rich occurrences, but in order to find whether it was possible to work on a larger scale by mining the

rutile-bearing schist, samples were taken of this material as well as the higher grade material. The samples were also taken of sufficient size to allow of experimental work being done on them to determine whether the ore could be concentrated to marketable grade, for which not less than 94 per cent. titanium dioxide is required.

The samples were obtained as follows:—

No. 1.—Sample taken across a 7ft. face of schist, at the north-east end of the cut.

No. 2.—Sample taken across a 12ft. face of schist, a continuation of No. 1 sample going south along the side of the cut.

No. 4.—Sample taken from the exposure of laminated quartz at the south-east end of the cut 3ft. wide.

No. 5.—Sample taken from a rich 5in. vein exposed near the middle of the cutting on the west side.

Nos. 6 and 7.—General samples of ore from various parts of the cutting.

No. 3.—Sample taken from 7ft. of schist exposed in the costeen about 90ft. south of the open cut.

The assay values are as under:—

	Per Cent. Titanium Dioxide.
No. 1 contained	3.0
No. 2 contained	1.1
No. 3 contained	2.7
No. 4 contained	3.6
No. 5 contained	14.3
No. 6 contained	20.6
No. 7 contained	6.1

These results show that the whole of the material contains rutile, and that by selective mining and sorting ore of 20 per cent. or better grade can be got.

The accompanying report of laboratory tests by Mr. Gartrell (see page 47) is very satisfactory in showing that the material, including some of the samples which were taken without any sorting or picking, can be concentrated by simple methods to market requirements. The sample which was not treated because of its higher ilmenite content is No. 3, which did not come from the open cut, but from a costeen about 90ft. south, and which would not therefore affect the working of the cut.

This rutile deposit therefore appears to have good possibilities of commercial utilisation. It is of considerable extent, and contains rich veins and segregations of ore which can be readily mined and treated, and it shows in addition a considerable amount of lower grade ore which can also be concentrated to the required grade. As regards depth, rutile being a mineral of deep-seated origin, there is no reason why deeper workings should not extend the ore reserves. There is some ilmenite present in places, but not generally in sufficient quantity to be objectionable (where there is much of this mineral magnetic separation must be employed to remove it).

The gangue is mostly soft and friable, and mining and crushing costs should be very reasonable.

It is quite likely that further prospecting may be successful in opening up more ore, and such prospecting should be pursued in the vicinity of the pegmatite dyke rock, which can be seen outcropping in places south of the cutting, as these dykes have been the agency by which the mineral was introduced.

Throughout the world, known deposits of rutile of workable size are limited in number. The principal producing localities are Kragero, in Norway; Roseland, in Virginia; and Florida, in America; Baie St. Paul, Quebec, in Canada; and South Australia, Madagascar, and Queensland also have deposits, and have had some production The Norwegian deposit is stated to contain ore averaging

10 to 15 per cent. of rutile; the Virginian formation, which is of very large extent, is stated to yield ore ranging from 10 to 30 per cent. of rutile; and the Quebec occurrence is said to range up to 20 per cent.

In 1929 Norway produced 43 tons of 90-93 per cent. rutile concentrate, and in 1930 46 tons of similar material; the American production has been over 500 tons in past years, but present figures are not obtainable. For present markets 94-96 per cent. rutile (titanium dioxide) content is required, for which 10 to 12 cents per lb. are offered; the Australian price for the same grade is understood to be £40-£50 per ton. (27/9/34.)

New Deloraine Gold Mines.

Development work, stoping and treatment of ore has been proceeded with at this mine. The southern section of the mine has continued to produce ore, which has been treated partly at the mine, with the company's own four-head battery, and partly at Mount Torrens Government Battery.

In order to unwater and obtain access to the main workings of the old mine at the northern end, the work of straightening up the old underlie main shaft was commenced, and good progress has been made. The shaft was sunk on the lode, and some good ore has been obtained during this work, and payable lode formation appears to extend north from the shaft beyond the limits of the old workings.

An electrically driven multi-stage centrifugal pump mounted on a carriage for lowering or raising in the shaft has been installed to complete the unwatering. When this is done the old workings will be available for inspection.

Bird-in-Hand Gold Mine.

The work of pumping out the water and reclaiming the two main shafts has been completed. The Pomona turbine pump, which was installed in the Victoria Shaft, has been successful in lowering the water, the heaviest inflow, when pumping reached the No. 5 level, being estimated at 1½ million gallons per 24 hours.

As the water was lowered, the re-conditioning of the shaft was proceeded with, and the old pump-columns and pit work removed, and the shaft repaired and equipped for hauling. This work has now been completed, and the shaft is in use to the bottom level, No. 5, being equipped with an electric winding engine.

The old main shaft, which is about 60ft. deeper than the Victoria shaft, was found to have collapsed above the 112ft. level. A single compartment was carried down through this portion, connecting with the lower part of the shaft, which was found to be in good order, and a duplicate pump was installed to assist in unwatering and for emergencies.

A small electric winch has been established here to service this shaft. The old workings are now available for inspection, and the work of cleaning up and retimbering where necessary has been begun. When the levels are in order the various exposures of the lode will be sampled. Prospecting operations are also being carried on at a number of places on the surface.

Kitticoola Gold Mines, N.L.

The first company to work this mine was formed in 1845, and mining commenced a year or two later.

The mine is about 2 miles south of Palmer, and about 43 miles from Adelaide, and contains a number of gold and copper-bearing lodes, of good size, traversing granitic country. The mine was examined by the former Deputy Government Geologist, Dr. Jack, whose report was reprinted in Mining Review No. 53.

In the old workings stopes of from 5ft. to 40ft. wide have been worked, showing that the ore formations were of good size, and work had been carried down to the 420ft. level. Former Government officials inspecting and sampling

the mine recorded good values in gold and copper from the various levels, and Dr. Jack's conclusion was that "with efficient management and suitable plant, and a proper appreciation of the occurrence of the ore, there appears to be no reason why the mine should not become an important and remunerative property."

Since that report was written gold has, of course, more than doubled in price, thus adding very considerably to the value of the mine in respect of that metal. The present company has been formed to re-open and work the mine, and is now engaged in putting up two treatment plants, one on each side of the creek that traverses the property. The No. 1 plant situated near the main workings comprises a 125 h.p. suction gas plant, using charcoal fuel, two rock breakers, 26in. x 10in. and 14in. x 8in., Cornish rolls, two tube mills, and four Wilfley tables, a Berdan pan, and the necessary classifying and elevating plant.

For the other plant an 80 h.p. suction gas engine has been provided, 10 head of stamps, which it is intended to increase to 15 head, amalgamating plates, 2 Wilfley tables, and a Berdan pan.

It is expected that the larger mill will put through 2,000 tons per month, and the smaller about 1,000 tons per month.

These plants will treat the oxidised ores, but when the mine is unwatered flotation will probably be necessary for the treatment of the primary sulphide ore.

REPORT

BY

Mr. H. W. Gartrell, Bonython Laboratory.

FURTHER NOTE ON MOUNT CRAWFORD RUTILE, SECTION 17, PARA WIRRA.

Seven samples received from Mr. Winton, September 4th, 1934:—

1. Representing 7ft. right across the strike.
2. Representing 12ft. right across the strike.
3. Representing 7ft. of schistose material exposed in a trench south of the open cut.
4. Representing 3ft. of a quartz formation in the south-eastern end of the cutting.
5. Representing a 5in. vein of good ore exposed on the western side of the cut.

6 and 7 forming a general sample.

	Lbs.	Per Cent. TiO_2.
Sample 1	40	3.0
Sample 2	35	1.1
Sample 3	37	2.7
Sample 4	28	3.6
Sample 5	42	14.3
Sample 6	35	20.6
Sample 7	58	6.1
Samples 6 and 7	93	11.6

Of these samples, 1 and 2 contained much kaolin and 7 a good deal.

Panning Tests.—A portion of each sample was crushed and panned to obtain some idea of the rutile content, and also in search of ilmenite.

Samples 1 and 5 contained very few black grains; samples 2 and 4 contained more, while 3 appeared to contain about 5 per cent. ilmenite.

Samples 6 and 7 were reasonably clean.

A small portion of each sample was put over the magnetic separator; Nos. 1, 2, 4, 5, 6, 7 gave only a trace of magnetic material, but 8 per cent. of No. 3 was magnetic.

Concentration Tests.—Half of samples 6 and 7 were united, crushed minus ⅛in., and jigged; the coarse concentrates were not only chiefly composites, but small in quantity.

Half of samples 1, 2, 4, and 5 (omitting sample 3 which contained much more ilmenite than any of the others) was then united with the whole of samples 6 and 7 and crushed minus 12 mesh, and jigged. The resultant coarse concentrates were still too few to bring to grade so work was continued on the hutch product; this was ground wet till only 5 per cent. remained on 28 mesh, and screened on 60 mesh. The plus 60 mesh material was then classified, and the concentrates assayed 96 per cent. TiO_2.

This test is satisfactory in showing that so long as the patch represented by sample 3 is avoided it is practicable to make a high-grade concentrate by gravity methods; it is unsatisfactory in giving no idea of what extraction is practicable.

Reason for Stage Concentration.—The greater part of the gangue can be eliminated by crushing minus ⅛in. and concentrating. The rougher concentrates consist largely of composite particles, and must be recrushed, but it is a great advantage to avoid fine crushing a lot of gangue.

Reason for Fine Jigging.—It is now altogether unusual to jig material finer than 10 mesh, tabling being preferred, but tables are designed to make a large proportion of tailings and not to remove only a few per cent. of gangue.

In jigging, so long as the bed can be kept alive, it is relatively unimportant what are the proportions of concentrate and tailing.

With a double jigging a part of the coarse primary concentrates can be used to cover the ragging in the secondary jig, and to form a layer through which gangue finds it hard to pass. This must not be interpretated as meaning that tabling cannot be used for concentrating rutile; in fact on another rutile ore we made concentrates assaying over 94 per cent. TiO_2, using a table instead of a jig. On this particular ore the limited amount of work done seems to indicate that jigging is preferable to tabling.

In the laboratory, crushing minus ¼inch, jigging, wet grinding the concentrates to 5 per cent. plus 28 mesh, rejigging and classifying the concentrates gave a satisfactory grade of concentrate.

If information is required about the extraction to be expected it would be necessary to treat a considerable amount of representative ore. It should be possible to produce concentrates assaying 94 per cent. TiO_2 but 96 per cent. appears highly optimistic unless the extraction be very low.

A few very carefully picked grains assayed 97.5 per cent. TiO_2.

The concentrates which assayed 96 per cent. TiO_2 contained a number of grains with small pieces of quartz adhering; a very gentle grinding followed by classifying would have slightly raised the grade. It may be necessary to give such a treatment to the mill concentrates which are not likely to be quite as high grade as the laboratory concentrates. (26/9/34.)

REPORTS

BY

The Inspector of Mines (J. L. Pearson).

PALMER.—GOLD CLAIMS NOS. 14567/14570 ON PART SECTIONS 28 AND 29, HUNDRED OF TUNGKILLO.

The above claims are situated close to the township of Palmer, 42¾ miles by road from Adelaide, the southern boundary of the pegged area facing the Adelaide-Palmer Road at its entrance to the latter town. The eight claims secure the mining rights over 40 acres, embracing an area 80 chains long and 5 chains wide, along the eastern slope of a steep hill, broken at intervals by deep cuttings (dry creeks). The southern group of claims (on part section 29) and northern group (on part section 28) are divided by a running creek.

In the following description the claims are numbered 1 to 8, commencing from the southern claim nearest to the township, and following in sequence the claims to the north.

The country rock where outcropping is generally granite, but in the north-eastern corner of No. 4 claim, at the base of the hill, a quarry cutting shows kaolinized rock ending against a face of gneiss.

On the southern group of claims (Nos. 1-4) the surface indications suggest that in this area there are a number of quartz reefs and leaders, striking approximately north and south, and probably with an underlie to the west. The following reef exposures and workings were noted:—

(1) On the No. 1 claim on the south-eastern slope of the hill and near the claim boundary a reef outcrops 30in. wide. A sample across the exposure, consisting of ferruginous quartz and shale, yielded on assay a trace of gold (less than 1dwt. per ton).

(2) At the north boundary of the No. 1 claim, and on the upper part of the slope, floaters of mineralised quartz outcropping through the soil over a width of 30ft. A representative sample broken from these croppings assayed 10dwts. of gold per ton.

(3) At approximately the centre of No. 2 claim a reef outcrops 30in. in width, from which a sample broken across the face contained 1dwt. of gold per ton.

(4) Adjacent to the boundary of Nos. 3 and 4 claims there are old workings, comprising a shallow tunnel driven in a southerly direction, a crosscut off this tunnel west, and winze below the crosscut. The back of the tunnel shows a narrow quartz leader, the remainder of the workings requiring to be secured before they can be examined. The spoil heap near these workings contains mineralized quartz, and a selected sample from it, consisting of quartz, ironstone, malachite, azurite, and pyrite yielded equal to 6dwts. of gold per ton.

(5) In the north-east portion of No. 4 claim a recently sunk pit 6ft. deep shows a leader of mineralized quartz ranging from 2in. to 6in. in width. A representative sample from the broken vein material assayed 7dwts. of gold per ton.

(6) At approximately 100ft. distant on a bearing of 317° (N 43° W) the vein exposed in pit No. 5 has been opened up in a shallow cutting to a depth of about 3ft. A sample taken over a width of 4in., consisting of siliceous ironstone, contained equivalent to 6ozs. 6dwts. of gold per ton.

(7) To the west of the last-mentioned workings a parallel leader has been exposed by a side cutting to a maximum depth of 6ft. A sample from the vein in the bottom of this cutting, consisting of siliceous ironstone and limestone, assayed 1oz. of gold per ton.

(8) On the eastern side of the workings (described in paragraphs 6 and 7), and at a lower (creek) level, a side cutting at the foot of the slope showed a copper-stained formation consisting of quartz, siliceous ironstone, and kaolinized rock.

(9) On No. 5 claim, where a hill rises abruptly from the creek at the boundary of No. 4 and No. 5 claims, at about two-thirds of the distance from the creek to the top of the hill, there is a bold outcrop of quartz.

In the vicinity of the cuttings on No. 4 claim, described in paragraphs 5, 6, and 7, there are a number of collapsed or filled-in openings, including two or three old shafts, which were evidently sunk to exploit the gold-bearing formations exposed in the accessible shallower workings. From these earlier workings parcels of ore are reputed to have been sent to the Government Battery, Mount Torrens, for treatment, but the returns cannot be traced owing to no information being available as to the names under which the parcels were forwarded.

Nos. 6, 7, and 8 claims were also carefully examined, and although the hill slopes showed shed quartz at various places, there was no definite outcrop visible, while the quartz seen was generally unmineralized apart from being slightly stained with iron oxide on the joints.

SUMMARY.

The assay results from the croppings on No. 1 claim (see paragraph 2) from the outcrop on No. 2 claim (see paragraph 3) and from the narrow veins on No. 4 claim (see paragraphs 5, 6, and 7) warrant sufficient work being done at the places named to ascertain whether the gold values are persistent, and high enough to warrant further systematic exploitation.

The formations on Nos. 4 and 5 claims (see paragraphs 8 and 9) require to be opened sufficiently to expose the true width so that accurate samples can be obtained to ascertain if they carry gold values of importance.

The results from the writer's samples already detailed indicate that generally the gold values occur in mineralized quartz, and that the unmineralized quartz is barren. In view of this fact, any mineralized vein exposed should be carefully tested by panning and checked by the assay of properly taken samples.

The veins at all places named occur on hill slopes, and can be economically further opened by surface trenching, and the expenditure of, say, £50 to £60 on this class of exploratory work will afford information as to what further development is warranted. (31/7/34.)

MOONTA MINING SCHEME.

The following statement shows the results of the productive operations from the commencement of regular milling up to the 27th August, 1934:—

EXPENDITURE AND RETURNS FOR PERIOD 25/9/33 TO 25/8/34.

Expenditure.	£ s. d.	Percentage of Total Expenditure.
Wages advances to scheme employees	4,201 15 10	50.90
Cartage of concentrate, stores, &c.	80 17 9	0.98
Fuel, mining stores, and timber	1,650 1 3	20.00
Shipping freights on concentrates (Wallaroo to Port Kembla)	1,453 13 4	17.61
S.A. Railways—Freight on concentrates and stores	556 8 10	6.74
S.A. Harbors Board—Wharfage	78 18 8	0.96
S.A. Government—Rents, rates, &c.	77 3 6	0.93
Insurance—Workmen's compensation, fire	130 13 2	1.58
Agency charges, Port Kembla	24 11 4	0.30
	£8,254 3 8	100.00

		£ s. d.	
Concentrates sold (net weight)	944.87 tons		
Metal contents—			
Copper	261.37 tons		
Gold	109.81 ozs.		
Gross value (as per Electrolytic Refining and Smelting Co.'s ore purchase notes)		11,141 6 6	
Less smelting and realisation charges		4,185 1 1	
		6,956 5 5	
Loss on period 25/9/33 to 15/8/34		£1,297 18 3	

It will be noted from the foregoing results that of the gross value (£11,141) over 37 per cent. (£4,185) was absorbed by smelting and realisation charges.

The division of the local outlay is shown under the heading "Expenditure," from which it will be seen that slightly over 50 per cent. was distributed as wages in the Moonta district, 20 per cent. was required for mining supplies, 17.6 per cent. paid as freight on concentrates, and over 9 per cent. (approximately £770) to the South Australian Government for various services.

The number of men directly employed averaged 50, while casual employment was provided for a number of other men in obtaining timber, firewood, &c.

When production was commenced electrolytic copper average £36 per ton (£A 45), and the working estimates were based on this figure. During the production of the last parcel finished 25/8/34, however, the price dropped, and the returns were so much lower that a heavy loss was incurred, and productive operations had to be temporarily suspended 1/9/34.

Under the present conditions it is doubtful if it is practicable to resume production until the price of electrolytic copper recovers to £33 to £34 per ton, as below that figure the returns are insufficient to meet other charges and provide a reasonable wages advance for the employees under the scheme.

During the fourth period the ore mined and hauled totalled 2,273 tons, of which 2,213 tons (dry weight) were milled, producing 234 tons (net weight) of concentrates assaying 28.535 per cent. of copper, .115ozs. of gold, the total metal contents being copper 66.75 tons, gold 26.9ozs.

The working costs including all charges amounted to 20s. 3d. per ton of ore milled.

This figure is higher than was originally estimated, the increase being due chiefly to the low rate of output from underground, which approximated 1 ton per man per day. As the output estimates were based on the returns obtained over a period of several years, from a mine only a few miles distant, the result was a disappointment.

The milling figure included in the above-mentioned total was satisfactory, as including maintenance, ore bags for the concentrates, and bagging the concentrates the total charges were 6s. 2d. per ton milled.

The concentrating plant and practice were described in Mining Review No. 58, page 42, *et seq.*, but at the time it was not possible to give the exact quantity of reagents used, as regular conditions had not then been established.

During the last milling period, 2,213 tons (dry) treated, the consumption of reagents was:—

Lime	1.67 lbs. per ton treated
Sodium aerofloat	0.095lbs. per ton treated
Eucalyptus oil	0.074lbs. per ton treated

As already stated, the concentrate made averaged 28.535 per cent. of copper.

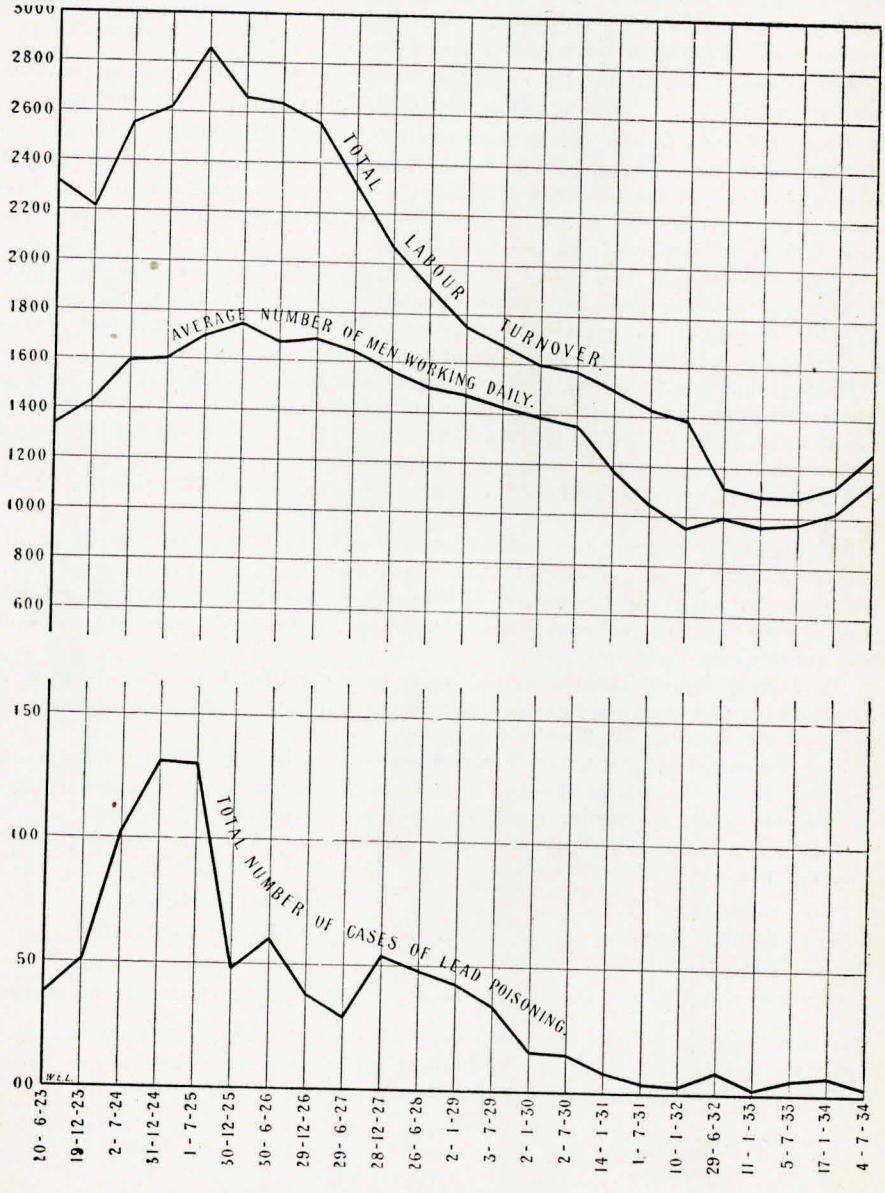
A mineragraphic examination of a typical sample of the concentrate was made under the direction of Dr. F. L. Stillwell of the Council for Scientific and Industrial Research, who reported the following proportions of minerals:—

	Per Cent.
Chalcopyrite	88.5
Covellite	3.5
Pyrite	8.0

In addition to the above minerals, analysis shows 12.44 per cent. of gangue minerals, including quartz, felspar, actinolite, tourmaline, biotite, and hematite.

Investigations are being made as to whether it is practicable by using extra reagents to increase the grade of the concentrate, and so reduce the freight charges.

In view of the above-quoted composition it is, however, a matter of doubt if any appreciable improvement can be made.



Plumbism at the Port Pirie Smelters.

BROKEN HILL ASSOCIATED SMELTERS, PORT PIRIE.

During the half-year ended July 4th, 1934, production was continued on normal lines.

The principal alterations and additions made during the period were connected with the reconstruction of the refinery, following the alterations in the plant and processes due to the development of the improved continuous refining methods. The most notable feature was the completion of the new retorting and electrolytic parting plant for dealing with the gold-silver-zinc crusts recovered in the de-silverizing section.

The position regarding employment and industrial disease is clearly shown by the graph printed with this report. During the period three (3) cases of lead poisoning were reported amongst employees with long periods of service in the lead treatment plants. The above number is equivalent to 0.262 per cent. of the total employees—this figure confirming the opinion expressed in an earlier report that as the result of the improvements made in recent years the working conditions at the smelters are now probably superior to those in any smelting plant in other countries handling equal quantities of leady material.

The position respecting accidents has been satisfactorily maintained, and the figures for the period 17/1/34 to 4/7/34 are as follows:—

Lost time accidents per 1,000 man days = 0.50
Days lost time per 1,000 man days = 11.76

A tabulation printed alsewhere in this Review gives detailed particulars of the company's annual production since the smelters were taken over in 1915.

MINING IN THE DISTRICTS ADJACENT TO MANNAHILL.—WADNAMINGA GOLDFIELD.

New Milo Mine.—At this property tribute operations were continued until the end of May, the tributors during the period January-May, 1934, forwarding to the Government Battery at Peterborough parcels of ore for treatment aggregating 28.7 tons, which yielded 45.9ozs. of gold bullion.

In June the New Milo and the adjoining Virginia Mine were transferred to the Wadnaminga Consolidated Company, which was formed in Adelaide to further develop the properties named, and to install a treatment plant.

Company operations were commenced in July, and at the date of the last inspection (30/8/34) 12 men were engaged on the following work:—

(*a*) Preparing a battery site.
(*b*) Completing the erection of buildings to serve as a store and blacksmith's shop.
(*c*) Erecting the framing for a headgear and ore bin over the main underlie (Nutman) shaft.
(*d*) Equipping Nutman shaft with a rail track suitable for use with a power hoist.
(*e*) Removing the waste left by the working parties at the 370ft. levels east and west of Nutman shaft in preparation for extending the drives at that depth.

The battery and cyanide plant will be erected on sloping ground on the Virginia lease, which adjoins the New Milo on the west side, and near the Virginia shaft, from which it is intended to obtain the water supply for milling purposes.

A detailed description of the New Milo Mine was published in No. 54 Mining Review, page 125, *et. seq.*

The workings on the Virginia Mine are at present filled with water, and it is understood that it is not proposed to commence pumping the accumulated water until a supply is required for use at the treatment plant.

Thunder Queen Mine.—Following an arrangement between a private syndicate and the leaseholder, active development of this property was resumed in June last. During the June-September period the surface plant was overhauled, the underground working cleared, and the following development completed:—

No. 3 shaft deepened 86ft. (from 154ft. to 240ft).

236ft. level—East drive advanced to 20ft.
West drive advanced to 6ft.

154ft. level—West drive advanced to 83ft.

The most notable change disclosed by the extensions is that the reef which, from surface to 238ft., dips to the south at an average underlie of about 30° from the horizontal at the latter depth, becomes nearly vertical. Water is making from the bottom of the shaft at the rate of 600 gallons per day (24 hours).

The extensions completed have followed the lode channel, and the following values are reported to have been disclosed:—

Where Sample Taken.	Width of Reef.	Assay Value. Ozs.	Dwts.
No. 3 shaft, 219ft. from surface	22	1	2¾
No. 3 shaft, 224ft. from surface	12	0	15½
No. 3 shaft, 231ft. from surface	14	0	7¾
No. 3 shaft, west drive at 154ft., rise 83ft. from shaft, 8ft. above level	14	0	12

The mine is being further developed with the object of placing it on a productive basis, and the mine owners are reported to have made arrangements for the treatment of the ore with the Wadnaminga Consolidated Company who, as already stated, are installing a battery and cyanide plant on the New Milo and Virginia group.

North and South Mine.—This property, which is situated about three-quarters of a mile distant in a southerly direction from the New Milo group, has recently been registered as a mineral claim. The workings were described by the late Government Geologist (H. Y. L. Brown) in 1898, and as far as can be ascertained since that time practically no additional development has been carried out. Mr. Brown's report was a follows:—

"This quartz lode extends N. 13° W. for 300ft. It dips westerly 25°, and varies in thickness along the outcrop from a few inches up to 2ft. The main shaft is 166ft. on the inclination of the lode, and from it the lode has been stoped out for a length of about 30ft., and for a height of 90ft. above the 120ft. level.

"No. 2 shaft (situated 90ft. north from No. 1 shaft) is an incline 64ft. deep, and the lode is 15in. thick in the bottom.

"No. 3 shaft (situated 80ft. north from No. 2 shaft) is 103ft. on an inclination of 28°, and has a quartz vein from 3in. to 9in. thick in the bottom. This is a small and intermittent lode, making in some places and thinning out in others.

"No. 4 shaft has been sunk 20ft. at an angle of 58° southerly on an east and west quartz vein about 9in. in thickness. The footwall is well defined.

"The lode was discovered in 1891. About 200 tons of ore were treated at the Virginia Battery, but no returns are available. Twenty tons treated at the Milo Battery average 1oz. of gold per ton."

When examined on 30/8/34, the only workings accessible were those from the No. 1 shaft, which are in a fairly good condition. From the available information the lode is irregular in size and value.

In view of the present high price for gold, and that treatment facilities will be available within a mile of the property at an early date, further investigation to ascertain the extent of the gold-bearing shoots is warranted.

Countess of Jersey, &c.—On this and parallel lines of reef at the south-western part of the field, a few men have been engaged in prospecting in an endeavour to locate fresh secondary veins locally known as "indicators," as in many cases where they intersect the main lodes, rich pockets of gold have been found to occur. No discovery of importance has been reported. (17/10/34.)

MINES IN THE TALTABOOKA DISTRICT.

The mining claims forming the above group are situated about six miles east from Wadnaminga, and approximately 26 miles from Mannahill, 234 miles distant from Adelaide on the railway to Broken Hill.

Old records show that most of the gold-bearing veins in the vicinity were originally prospected in 1894-6 when mining was active and treatment facilities available on the Wadnaminga field. The increased interest in gold mining due to the high price of gold and lack of employment in other industries has led to a renewal of interest in this and adjacent areas.

The mines and claims registered under the provisions of the Mining Act were examined on August 29th-30th, 1934. The particulars available are as follows:—

Esmonde Mine.—The mining rights over the above-named mine were acquired by the present holders (a working party) about two years ago, and the area is now held as a gold mining lease from the Crown (registered as No. 1782.) The lode strikes east and west, and dips to the south at a flat angle. Where exposed it consists of ferruginous quartz carrying in addition to gold a small percentage of lead and copper minerals, and averages about 10in. in width. The country rock is of a schistose character, and comparatively soft. The principal work carried out by the present holders has been the forming of the west shaft, equipping it with a rail track and clearing and securing the earlier workings, which were practically blocked with waste rock. The west shaft is an underlie following the lode to a depth of 123ft., while 81ft. east there is an old underlie open from the surface to the first level, where the two shafts are connected. At the first (78ft.) level, there are drives extending from the west shaft 193ft. east and 70ft. west, a total length of 263ft., while from the bottom of the same shaft (123ft.) there is a drive 19ft. in an easterly direction.

At the 78ft. horizon the eastern drive shows lode for the full length and in the face, while it has been proved by stoping for a distance of 41ft. west from the shaft. Small sections have been stoped in both the back and bottom of the 78ft. drives, evidently to obtain parcels sent to the Government Cyanide Works, Peterborough.

The western drive from the 41ft. mark to the end, a length of about 30ft., is filled nearly to the roof with waste material, and over this distance the reef is pinched and probably valueless.

At a distance of approximately 420ft. in a westerly direction from the main workings there is an old underlie shaft 125ft. deep with drives from the bottom 10ft. east and 8ft. west. In these workings the lode averages 14in. in thickness, and consists of slightly mineralised quartz. About 30 tons of the lode material are lying at the surface, and a representative sample from this heap assayed 3dwts. of gold per ton, while a selected sample broken from the reef in the 125ft. drives assayed 8dwts. of gold per ton.

Production.—The records show that a number of parcels won from the main workings have been treated, and yielded as follows:—

Prior to 1898	36 tons, average return 93s. per ton
Since 1898	68 tons, average return 66s. per ton
Total	104 tons, average return 75s. 4d. per ton

The values per ton quoted are based on gold at normal value.

Faugh-A-Ballagh.—This claims adjoins the Esmonde Mine on the west. There are a number of old workings, some collapsed and others blocked with waste to such an extent that no systematic examination was possible. These openings include an underlie shaft 90ft. deep, where some stoping has been done on the west side between the depths of 33ft. and 57ft. from the surface, and a vertical shaft reputed to be 60ft. deep 120ft. distant from the underlie in a southerly direction, but not connected with the latter workings. A report made in 1895 gives the width of the lode as 18in., and states that samples of the ore had assayed up to 1oz. 13dwts. of gold per ton. A trial parcel of ore treated at the Peterborough Government Cyanide Works, however, only yielded gold equivalent to 15s. per ton, calculated on normal value.

Marna.—This prospect is situated about a mile distant in an easterly direction from the Esmond Mine, and covers the eastern slope of a bare hill with a quartz lode outcropping on the surface. The lode consists of quartz and brown ironstone. It has an east and west strike, and dips to the south. The country rock is blue slate.

The only workings are two shallow cuttings 60ft. apart situated near the bottom of the slope.

A representative sample from the bottom of these cuttings across a width of 2ft. has been assayed by the departmental analyst, and it contained equivalent to 5dwts. of gold per ton. The creeks at the base of the hill are reputed to have been worked for alluvial gold.

Triumph.—This mine is situated about one mile distant in a southerly direction from the Esmonde Mine, and was originally prospected about 1895. The departmental records show that the early holders forwarded to the Government Battery, Peterborough, 17.9 tons of ore, which yielded 8.55ozs. of gold bullion, equal to 35s. per ton of ore treated.

The lode bears approximately east and west, and dips in a northerly direction. The country rock is clay slate.

The principal opening is an underlie shaft reputed to be 90ft. deep, but only accessible to 44ft. below the surface, the lower part being filled with debris washed down by successive rain storms. At 44ft. from the surface there is a drive east measuring 20ft. from the shaft.

The lode exposed in these workings averages 2ft. in width, and consists of quartz with iron minerals and traces of carbonate of lead.

Representative samples from the shaft and drive have been assayed by the departmental analyst. The positions where the samples were taken, width of lode, and assay value are shown in the following tabulation:—

Underlie Shaft, Triumph Mine.

Position Where Sample Taken.	Width of Reef. Ft.	Ins.	Assay Value Per Ton. Dwts.
East end of shaft 26ft. from surface	2	0	5½
West end of shaft 26ft. from surface	1	10	6
West end of shaft 44ft. from surface	1	8	10
East drive at 44ft., sample from face 20ft. from shaft	2	2	5

It is probable that the parcel already referred to as yielding 35s. per ton was ore recovered in excavating the underlie workings where the foregoing samples were obtained.

Copperlinka Mine.—This property which is held by the same interests as the Taltabooka group is approximately 10 miles north-west from Taltabooka and 14 miles east from Mannahill.

At the date of inspection (29/8/34) none of the workings was accessible, and it was only possible to examine the lode outcrop and note that it was persistent over a comparatively long distance. The lode strikes north and south, and where outcropping it consists of quartz and ironstone. The country rock is clay slate.

From reports published in Mining Reviews 13, 14, and 15 the mine was opened about 1910, and developed from two shafts—an underlie (No. 1) 30ft. deep, and a vertical (No. 2) 18ft. deep situated 45ft. distant from No. 1 in a southerly direction and holed to the underlie workings.

The lode above the drive at the 30ft. level is stated to have consisted of gold-bearing ferruginous quartz 3ft. and over in width. Below this drive at a point 43ft. south from the No. 1 shaft a winze was reported (18/2/11) to have been sunk to 17ft., disclosing gold-bearing material 12in. to 18in. wide, showing a vein in the bottom which assayed 5dwts. of gold per ton.

The extent of the workings is not known, but during the period the mine was worked (1910-11) a total of 165 tons 3cwts. of ore was forwarded to Peterborough Government Battery, where it yielded 111ozs. 3dwts. of gold bullion, equal to a return of 50s. per ton.

Conclusions.—The returns obtained from the parcels of ore treated from the Esmonde and Copperlinka Mines, showing average values of 75s. 4d. and 50s. per ton respectively at the normal price for gold warrant further exploratory work with the object of proving the extent of the gold-bearing formations. In view of the current high price for gold, and with treatment facilities (battery and cyanide plant) available within a few miles at Wadnaminga, if the ore deposits are systematically developed both mines afford prospects of being remunerative propositions under present conditions.

To assess the probable value further information is required about the extension of the ore bodies, and the following work is recommended as urgent:—

(1) At the Esmonde Mine to continue the west shaft to 180ft., and to drive at that depth on the ore shoot for at least 200ft. The foregoing sinking and driving with necessary equipment will, it is estimated, cost approximately £1,200. The whole of the work outlined will, if the vein continues, provide milling ore, and develop a tonnage for stoping.

(2) At the Copperlinka Mine:—

(*a*) To re-open the underground workings so as to ascertain the length of ore worked, and whether the gold-bearing shoots extend beyond the limits of the old openings.

(*b*) To systematically trench the continuation of the outcrop with a view to possibly locating other gold-bearing shoots.

Owing to lack of data, the probable cost of the redemption of the old workings cannot be estimated, but an expenditure of £500 should afford sufficient information to determine what further development is warranted.

At the Triumph Mine the lode material so far exposed is comparatively low grade. To definitely assess the possibilities, the workings require to be cleared and secured to permit of a close examination and systematic sampling of the reef exposures in the underlie shaft. The cost of the necessary work is estimated to approximate £250.

The Marna claim is practically undeveloped, and the only information is that the lode traversing it carries gold (5dwts. to the ton) at one point. To ascertain the probable value the old cuttings should be cleared, and the continuation of the lode trenched at regular intervals. This work which it is estimated will cost approximately £50, should afford information as to whether the lode carries enough gold to justify further development.

MANNAHILL DISTRICT.

Homeward Bound Mine.—At this property work is confined to the shallow workings near the western boundary of the lease, where a tribute party are engaged in raising ore which will be sent for treatment at the Government Battery, Peterborough.

No further work has been done at the prospecting shaft, which some time ago was sunk on the eastern continuation of the reef to a depth of 30ft., disclosing an ore vein 15in. wide, estimated (by panning tests) to contain values equal to 5dwts. of gold per ton.

Euro Mine.—This property is situated in hilly country about 3½ miles south-west of the Homeward Bound group. The gold-bearing veins occur in a bedded formation of slate and sandstone, containing veins of quartz and ironstone. A parcel of ore taken from material at the surface was recently treated at the Government Battery, Peterborough. The return from the battery was equal to 3dwts. 11 grains per ton, while the tailings contained 2dwts. 7 grains, making the total contents 5dwts. 18 grains per ton.

Westward Ho Mine.—The syndicate controlling this property have secured the old vertical shaft about 320ft. south from the main underlie shaft, and approximately 100ft. farther south than the lowest workings from the underlie.

The vertical shaft has been equipped with a Richard's pump, operated by a 6 h.p. Hormsby engine, and with this equipment both the vertical and the underlie workings have been unwatered, the water from the latter draining through the intervening ground into the vertical shaft.

At the date of the last inspection (31/8/34) the water had been lowered to 71ft. in the vertical, and only slow progress could be made, as the shaft below that point was filled with debris, which had to cleaned out as the water was lowered.

The shaft is now reported to be clear to the bottom (98ft.), and the lower workings from the underlie to be accessible.

Fuller particulars respecting this mine were published in Mining Review No. 55, page 87, *et seq.*

Elsie May Reef.—Mineral claims have recently been taken up along the outcrop of this reef, which is situated about three-quarters of a mile in an easterly direction from the Westward Ho Mine. Where exposed at the surface the reef consists of quartz, ferruginous shale, and limestone interstratified with clay slates and sandstone. The reef strikes east and west and dips to the south at a flat angle.

The locality was originally prospected about 1887, but abandoned after a trial crushing which yielded a little over 1dwt. of gold per ton.

The only recent working is a cutting about 8ft. long, exposing the reef to a depth of 6ft. Samples taken by the writer (31/8/34) from the reef in the floor of the cutting carried less than 1dwt. of gold per ton.

In view of the above stated results, the only work possibly warranted is the systematic prospecting of the outcrop, to determine whether the full length of the reef is low grade, or if it contains enriched portions with further development.

Royal Charlie Mine.—The mining rights over this property have recently been acquired by Adelaide interests, but when last inspected active work had not been commenced. Particulars respecting the earlier workings and ore occurrence at this mine are printed in No. 55 Mining Review, pages 90-92.

Teetulpa Field.—Apart from a few men fossicking on the alluvial workings, prospecting is confined to two leases:—

The Great Ironclad held under gold mining lease 1530, is situated at the junction of the Ironclad and Brady Gullies. The leaseholders are following with an underlie going down on a southerly bearing a north and south reef averaging about 9ins. wide, carrying gold in patches and usually associated with bismuth minerals. In

bulk, however, it is low grade, a trial parcel sent to the Government Battery, Peterborough, yielding by battery treatment 1dwt. 22 grs. of gold per ton, while the tailings assayed 1dwt. 3grs. per ton.

The Londonderry Gold Mining Lease 1784 is situated between Goslin and Strawbridge Gullies on the east side of the field. The workings consist of an underlie following the strike of a quartz reef about 9in. wide. The excavation is approximately 50ft. long and 25ft. deep at the face. Panning tests show that the quartz is barren, and the gold occurs in the ironstone casing of the reef, which ranges in thickness from a streak to several inches.

Sixteen tons recently crushed from this lease returned by amalgamation 2dwts. 4grs. per ton, while the tailings contained 3 dwts. 13grs. per ton, equal to a total of 5dwts. 17grs. per ton.

New Luxemberg.—In this locality approximately 14 miles east from Olary the Lux Mine has been taken up as a gold mining lease and adjoining it a gold claim. The reefs in the locality carry gold and copper, and some years ago were extensively developed. A parcel of 3.2 tons from the Lux Mine treated at the Peterborough Government Battery yielded 2oz. 5dwts. of gold, equal to 14dwts. per ton, while the tailings contained 2dwts. 19grs.

Fluorspar near Plumbago Station.—Operations on this deposit have been suspended for several months, but it is reported work has now been resumed with the object of further proving the deposit. Particulars of the occurrence are printed in Mining Review No. 57, page 80, and the workings described in Mining Review No. 58, page 41. (17/10/34.)

Wadnaminga Consolidated.

On December 6th an inspection was made of the above-named Company's properties at Wadnaminga. Since active operations were commenced in July last the Nutman Shaft has been repaired and equipped with a substantial rail track, and rails laid in the drives from that shaft at the 210, 270, 370, and 495ft. levels. At the surface the headgear and ore bin have been completed, a friction winch installed and a small Holman air compressor and receiver installed. Adjacent to the shaft suitable buildings have been erected to serve as store, fitting and blacksmith's shops; also magazines for the storage of explosives. The pipes requisite for the underground air and water mains had been delivered at the mine, but were not in position.

At the Battery site a water storage system comprising seven tanks of 30,000 gallons capacity have been erected; the mill engine (63 h.p. Ruston-Hornsby oil driven) installed; the 5 head battery from the Great Eastern transferred to the new site, and a set of settling pits (4) excavated and concreted.

In addition to the work detailed, foundations have been excavated for an additional ten-head of stamps, which are understood to be on order from a local engineering firm.

The Company's plans are understood to provide for the installation of a jaw-crusher, which has been delivered at the site and for a battery bin, for which a large quantity of sawn timber had on the 7th December, 1934, just been landed by rail at Mannahill, and was being transported to the mine.

The work so far completed has been carried out in a substantial manner, and considering the adverse conditions respecting transport and difficulty in obtaining skilled labour, reasonable progress made.

It will be noted from the foregoing summary that none of the actual development for which a footage subsidy was granted by the Employment Promotion Council has been commenced. The New Milo Mine was examined by the writer

in 1931, and the results are embodied in a report printed in No. 54 Mining Review.

The recommendations then made were:—

That the value of the unworked blocks should be tested, as well as further development undertaken on the lode extensions, and if the results were satisfactory, a treatment plant provided to treat 3,500 to 4,000 tons per year.

The present Company has so far concentrated on mine equipment, and the erection of a treatment plant, and undertaken more capital expenditure than was warranted until the development programme for which a subsidy was given is completed. The equipment has two notable defects:—

(1) That the air compressor is of such limited capacity that it will only be possible to work one, or perhaps two, air drills at the same time.

(2) That the shaft hoist is planned for a motor drive with power from a generator operated by the Battery engine, whereas for flexibility and efficiency these should have been independent units.

In the opinion of the writer:—

(1) It is a matter for urgency that the development programme and preparation of blocks of ground for stoping should be undertaken without further delay.

(2) The 5 head of stamps already in position with a corresponding section of the cyanide plant should be completed and put into operation before any further work is carried out on the remainder of the projected treatment plant.

It may be added that to secure a satisfactory rate of progress with the development, and at the same time provide air drills for stoping, an additional air compressor of 5 or 6 drill capacity will have to be provided. (17/12/34.)

WALLAROO MINES.

Work has been continued at the western end of the main lode series of veins at the points described in Mining Review No. 59, page 71.

At the Trollope shaft, section 1, the claim holders (Barratt and Harvey) are now prospecting at the 40ft. level by driving on the northerly continuation of the vein from which they have been winning high-grade ore for shipment.

At the date of the last inspection the face at 56ft. distant from the prospecting shaft showed mineralised formation containing little ore of commercial value. The formation strikes approximately north and south, and the extension is penetrating an area hitherto unprospected. The earlier driving disclosed good ore going underfoot, but the drives are practically at water level, and development below the present workings cannot be undertaken unless power appliances are installed to take out the accumulated water from the old workings at Trollope Shaft and to keep them unwatered.

Adjacent to the North Hughes shaft, Millbank and Warren have continued work on the new vein discovered by the party some months ago. The ore is being followed by driving and stoping in a north-westerly direction.

During the period May to September the parties shipped the following ore to Port Kembla, New South Wales, for smelting and realisation:—

Barratt and Harvey: 6.25 tons, assaying 26.4 per cent. copper, .01ozs. of gold per ton.

Millbank and Warren: 6.03 tons, assaying 25.03 per cent. copper.

REPORTS

BY

The Inspector of Mines and Quarries (H. S. Cornelius).

Plympton and Seaton Park Sand Pits.

Plympton.—On section 153, hundred of Adelaide, a series of scattered dunes occurs, ranging from 12ft. to 20ft. high, and appearing as drift dunes which are at present covered with a grass mat. The sand ranges from a reddish to a pale yellow colour, and is very fine grained.

On part section 154, hundred of Adelaide, an extensive deposit covering some 20 acres is being worked by C. H. Norris, of Unley Park. About 10 acres of the sand have already been removed. The remaining portion will average 12ft. thick. The bed of sand is cream-coloured near the surface, changing into a yellow and red at the bottom of the pit.

On the same section L. G. L. Deacon, of Plympton, is operating pits averaging about 9ft. deep of similar colour to that at Norris's pits. The sand is directly loaded into lorries or waggons by shovel, and is used for building sand and top-dressing for lawns. The deposit is not confined to the areas mentioned above, but extends into other holdings which have not yet been worked, from which thousands of tons of sand could be mined if required.

Seaton Park.—Torrita Sand Pits, situated close to the Grange Road on section 423, hundred of Yatala. A considerable amount of sand has been removed from these workings. The top section, for a depth of about 10ft., is a fine-grained yellowish red sand, then a bed of sandy clay 6ft. to 8ft. thick is found; below this clay is a bed of water-washed sand and gravel ranging from 2ft. to 5ft. thick. Most of the top layer has been removed, and the clay broken down and distributed over the worked-out area. This enables the washed sand and gravel to be mined.

Krieger's Sand Pits.—On section 430, hundred of Yatala, a deposit is being operated on to a depth of 10ft. or 12ft., producing a reddish-coloured sand.

E. G. Surman's Gravel Pit, Findon Road, Findon, is a water-washed sand and gravel bed, overlain with about 8ft. or 9ft. of stiff marl and clay. The bed ranges from 4ft. to 10ft. in thickness, and is mined by first removing the overburden and breaking down the gravel. This is put through a screen and the sand separated.

A. P. Starr's Gravel Pits, Findon Road, Findon. The working face is similar to that described in Surman's pits, but the overburden is only about 3ft. thick. The same method of separating sand from gravel is applied here. Samples have been taken from these pits, with a view of obtaining a complete analysis of the material. (27/8/34.)

Para Wirra Syndicate, Stockyard Gully.

Owing to a dispute between the above company and the vendors in connection with the terms of the option, the company ceased operations some months ago. The block or claim on which most of the work was done by the company was awarded to the company by the Warden for non-compliance with certain regulations. No. 1 shaft, however, which gives access to the workings, is just south of the boundary between the claims, and could not be used by the company.

In No. 3 shaft some 150ft. north the lode formation was not well-defined, but as this shaft is sunk to below the depth in which the development is done north of No. 1, it was decided to put out a drive from the 75ft. level to connect to the northern level from No. 1. This drive was started from a short easterly

crosscut and extended 26ft. south-east. On making a prismatic compass survey it was found that the new drive, although nearly on the correct bearing, was approximately 20ft. too far east. (5/6/34.)

Mather and Hill's Claim, Stockyard Gully.

This claim was previously mined by the Hansel Mundy Company, whose time option with the vendors expired in December of last year. The owners have since let the mine on tribute on a 10 per cent. basis. The tributors sent three parcels, amounting to 31½ tons, to the Mount Torrens battery for treatment, for a total extraction of 9dwts. 18grs. per ton. Approximately 15 tons of the material were collected from the dumps at the surface, the remainder being mined underground from the northern end of the shaft at 50ft. and 30ft. below the surface. Apparently the best portion of the lode is being mined by the tributors. This method of working, stoping the ends of the shaft, if carried beyond a certain length, can only result in the shaft becoming unsafe to use as a thoroughfare. At the surface a small four-head light battery is in the course of erection. This will be driven by a 6½ h.p. Hornsby kerosene engine. The same power will also be used to work a deep-well pump, fixed in the shaft to provide water for the battery. (5/6/34.)

Prospecting at Woodside District.—Eureka Mine.

At a point about 4 chains south of the old workings a shaft has been sunk 30ft. deep. At 10ft. vertical depth a mullocky formation was exposed, and followed down on an underlie of 45° to 30ft. deep. The formation, averaging 2ft. wide, is encased between two well-defined walls of quartz mica-schist, and strikes on a bearing of 320° (which is about 20° west of the normal bearing of the main lode at the old workings).

As the formation is almost in a direct line with the main lode at the surface, it may be the extension of it, but as considerable faulting has taken place, and the channel is filled with crushed rock meal and broken quartz, it appears to be either the continuation of a fault plane or a strike fault.

A sample taken at 30ft. deep, on assay did not show a trace of gold. If, as suspected, this is a fault, the main lode could reasonably be expected to be picked up east of the present workings.

About 20 chains north of the old workings the Great Northern Eureka Syndicate has two shafts 40ft. and 25ft. deep. In No. 2 shaft (25ft. deep) the lode will average 4in. wide.

In No. 1 shaft the lode is 6in. wide; 10ft. of driving north has been also done. This mine was previously worked by a prospector named Delaney, who sent a small parcel of 7½ tons to the Government battery for a return of 6dwts. 9grs. per ton. (30/5/34.)

Iron Ore Deposit at Mount Charles.

The deposit is situated on the north-eastern slope of Mount Charles, and consists of dark-brown and yellow siliceous limonite, with an occasional patch of haematite embedded in the matrix.

It was opened and worked as a quarry for road metal, the deepest exposure being about 18ft., and covers an area of about 2 acres. At the surface a few gibbers are seen, but the top section to a depth of 3ft. is debris, composed of clay, sandy schist, and sandstone impregnated with irregular nodules of limonite and haematite. Below this are bands of irregular masses of sandy clay and schist, intermixed with iron ore. It has no definite limits, as far as can be seen in the exposure, but appears to be a superficial deposit of lateritic habit, rather than a massive ore reef formation.

A sample taken was assayed at the School of Mines and returned 40.5 per cent. of metallic iron. (10/7/34.)

Mount Charles Gold Prospecting.

On June 25th an inspection was made of the gold prospecting operations being conducted at Mount Charles. The Mount Charles Gold Prospecting Syndicate have abandoned the old workings, but have sunk a vertical shaft just east of Boag's working to a depth of 100ft. to try and locate the eastern extension of his (Boag's) lode. In sinking three veins were cut, all dipping south, the most important being cut in the shaft at about 75ft. deep; a crosscut north at the 50ft. level cut the same vein about 15ft. distant from the shaft. Here it shows a width of about 6in., and is composed of ferruginous quartz and schist. This vein does not appear to be Boag's lode, and a crosscut is being put out north at the 100ft. level to try and locate the latter.

Boag's Prospect.—Since last seen the eastern workings have been abandoned and filled in. Two shafts 30ft. apart have been put down to a depth of about 40ft. The lode at each shaft will average about 10in. wide. From the eastern shaft a drive was put out west for a length of 20ft., and stoping has been carried out to a height of 12ft. above the back. From the western shaft a level 25ft. long has been driven west. Some stoping has also been done above this level. A parcel of ore from these workings amounting to 48½ tons was recently treated at the Mount Torrens battery for a return of 18dwts. 13grs. per ton over the plates, while the treatment of the tailings returned 8dwts. 20grs. per ton, or a total of 1oz. 7dwts. 9grs. per ton. Since this mine has been in operation 144 tons 16cwts. of ore have been treated at the Mount Torrens battery for a return of 201ozs. 14dwts. 19grs. of bullion, or an average of approximately 1oz. 8dwts. per ton. All this ore has been won from above the 50ft. level.

Mrs. K. Simpson has four men prospecting on the western end of Boag's workings. A deep trench disclosed a small vein striking on a bearing of 75° dipping south at a flat angle of 35°. This does not coincide with Boag's strike, which is east and west. It appears to be a branch on the footwall side. A sample taken from the vein showed only a trace of gold.

Considerable deep trenching has also been carried out farther west. As the bedrock is overlain by about 9ft. or 10ft. of debris it was suggested that it would be probably more profitable to systematically loam the hillside first before continuing with the trenching. (9/7/34.)

Shell Grit Workings at St. Kilda and Gawler Beaches.

An inspection of the above workings was made on October 17th, 1933.

St. Kilda.—On section 323, hundred of Port Adelaide, shell grit is being removed from the northern side of the embankment. Mr. Rivett, the lessee, has a man employed there constantly. The pits range from 2ft. to 4ft. deep, and are now being worked in a systematic manner by mining and carrying a continuous face, not as previously, by sinking pits indiscriminately. Most of the grit is graded into fines and roughs by a hand-driven trommel and the whole product is bagged. The workings are safe and most of the banks are battered down. The completed sections are levelled off and the banks battered to a low angle.

Fine grit is also being mined from section 320, hundred of Port Adelaide. Here the workings are only about 2ft. deep and were found in very good condition.

Gawler Beach.—Most of the grit is being mined along the beach about a chain inland from high water mark. The pits extend for about a mile in length, and are worked in sections. They are not carried forward continuously as those at St. Kilda, but are a series of holes from 10ft. to 30ft. long by about 10ft. wide and 2ft. to 3ft. deep. The greater number of these holes have sloping banks and are worked in a safe manner. A number of the old workings along this beach are filled with drift seaweed, which gives the shore an appearance of a series of small hummocks and irregular hollows. These, however, are partially levelled when a high tide occurs. (20/10/33.)

Sturt Meadows Prospecting Syndicate.

The above syndicate's claims on section 4268, hundred of Onkaparinga, were inspected on July 2nd, 1934. The syndicate let the mine on tribute for a period in which the tributors (two parties), R. E. Jennings and H. Jones, worked on the best portions of the lode formation.

The tributes of both parties expired on the 1st May, 1934, since which four men have been working the mine on day work for the syndicate. Since the report of the Chief Inspector was written on the 5th March, 1934, a new shaft (Symonds's) has been sunk to a depth of 50ft. This was put down to about 30ft. by the tributors, an additional 20ft. being done by the syndicate. Jones's shaft is now 35ft. deep. These shafts are only 20ft. apart, and have been connected by a drive at the 30ft. level.

At the bottom of Symond Shaft (50ft.) a westerly drive is being put out, and is now 7ft. from the shaft. The lode still maintains its southerly dip, but appears to be much steeper. At the north-eastern end of the shaft it is only a few inches wide, and is composed mostly of schist filling. At a point 4ft. from the shaft the lode in the back of the level is 23in. wide, 7in. on the footwall side being ferruginous quartz and schist, while 16in. of the hanging-wall side is quartz. Two samples were taken from it. The footwall branch 7in. wide assayed 2ozs. 11dwts. per ton, while the 16in. of quartz returned 3½dwts. In the face of the drive the lode is split by intrusive pegmatite, reducing the veins to 3in. and 1½in. wide. A combined sample was taken of these veins in the face, which returned 1oz. 18dwts. per ton.

At Jones Shaft the vein flattened to an angle of about 40°, and pinched down to 3in. wide. Although the lode formation dips north-west at the point where the crosscut from the main shaft intersected it, the south-western workings where most of the work has recently been done indicate a south-easterly dip, it may therefore be a better prospecting venture to continue sinking Symonds Shaft on the course, rather than sink the main shaft, and crosscut for the lode. (11/7/34.)

Mittopitta Deep Lead, Section J, Hundred of Terowie.

Since previously reported on only about 10 tons of material have been put through the plant on the mine, and from this about 15ozs. of amalgam have been collected, approximately 2½ozs. of gold, the ore thus averaging 4½dwts. per ton. The material treated was raised from two sections of workings, about 7 tons coming from the western side of the deposit about 15ft. or 18ft. below the surface, 1 ton of which is said to have produced 3ozs. of amalgam. Mr. McCallum, the prospector, considers this section to range from 2dwts. to 8dwts. per ton in value. The remaining 3 tons of ore were raised from the 50ft. level towards the eastern boundary of the bed, and it is estimated by the prospectors that certain parts of this wash will produce 5dwts. or 6dwts. per ton. The whole wash appears to be erratic as far as values are concerned, and it is quite possible that the places mentioned are producing the values stated. Mr. McCallum is making some alterations to his plant, and considers that with additional amalgamation plate area enough to increase the output to 2 tons per day, he will be able to show a profit on the transaction.

Altimeter Gold Mine, Pitcairn Range, Hundred of Hardy.

P. Cain and party are working on similar lines as when last reported. Two other veins known to exist lower down the hill have been opened; both of these range from 1in. to 2in. wide, and are dipping into the hill at a very flat angle. At a point 10ft. or 12ft. lower is a reef averaging 8ins. wide that dips in the opposite direction also at a flat angle. This reef carries gold, but is not so rich as the series of thinner veins. Rising up the hill, it comes into contact with the upper series, but cuts through them, the small veins traversing with the larger one

for a short distance, and then resuming their natural course and dip. It therefore appears as if the larger vein was of a later date, and in cutting through displaced or faulted the small series.

To the end of December, 1933, 101 tons 16cwts. of ore have been treated at the Peterborough battery for a return of 163ozs. 10dwts., valued at £651 3s. 7d. (normal price). Since then about 10 tons have been treated at the same battery for a return of 19dwts. per ton.

The gold-bearing veins are so small and dip so flatly into the steep hillside that only a very small tonnage of ore can be won, the overburden increasing rapidly in height, as they are worked forward. Attention is now being given to the selection of the most suitable place to tunnel into the hill, so as to save the extra work in removing the overburden.

Twigham Lead and Ulooloo Prospectors.

At Twigham Lead a small puddling plant has been erected. It consists of a fixed wooden tub in which a rake or separator revolves, the finer material overflowing to a riffled long tom. The latter is connected by a rod and cam to the power shaft which gives to the long tom a side-shaking movement. The power is obtained from a 2 h.p. petrol engine, which also operates a deep well pump fixed in the water shaft close by. The water is pumped to a 1,000 gallon tank fixed on a stand high enough to feed the plant by gravity. The material treated is obtained from open-cut workings some 40 or 50 yards up hill from the plant. It consists of quartz, decomposed slate and mica schist, and appears in the nature of a siliceous bed or formation, which apparently does not extend more than 7ft. or 8ft. below the surface. The bed is slightly folded along its strike, and practically all the values obtained are won from troughs, while the crests are barren.

The material is first passed over a ⅜in. shaker screen operated by hand, that which passes through being wheeled to the washing plant and fed into the tub by shovel. The revolving rake breaks up any clay balls that occur, and practically all the gold settles at the bottom of the tub, a very small percentage of it getting into the long tom. About 4 tons of stuff per week are thus broken and treated, the values estimated by the miners being from 2dwts. to 3dwts. per ton. The prospectors were of the opinion that if a crusher were erected to reduce the rejects from the first screening process, the treatment might be made profitable. A sample of these rejects was taken and assayed, and returned 1½dwts. of gold per ton. Considering this low return, it would not pay to erect and maintain any class of crushing plant. Although gold has been dollied from the stone, it is apparent that most of it is free, and only needs separation, and to double the output it is only necessary to duplicate the tub system. Sufficient water can be obtained from the water shaft near by for the increased output.

Ulooloo.—Some 10 or 12 men are engaged in prospecting the old alluvial field, and an occasional small piece of gold is picked up, but at present there is very little ground left which has not previously been worked. Mr. Fletcher some time ago fixed a pump in the old vertical shaft on his claim and forked out the water. Very little work below water level was done before the pump was removed, and when visited the shaft could not be examined or sampled below water level.

Wm. Nichols & Son's Quarry and Treatment Works, Longwood.

The works are situated on section 327, hundred of Noarlunga, and were previously known as Kaolin Limited. Since last reported additional plant has been added, and there is now a crushing and grinding machine capable of reducing material to a fine flour-like consistency.

Amongst the minerals ground at this plant are felspar from Olary and Charleston; fluorspar from Olary; talc from Gumeracha and Charleston; epidote, andalusite, barytes, silica, and kaolin.

The silica and kaolin are won from a fairly extensive quarry situated close to the works. The material is elevated from the quarry on an inclined tramway by friction winch; it then gravitates to a Chilian mill, and the crushed material is now fed to a box classifier. A portion of the kaolin is carried away by the overflow. The residue enters a drag classifier from which the silica is elevated and distributed to the stock piles, the kaolin being carried over to the settling pits. The siliceous sand thus produced is not finely divided, but contains about 96 per cent. silica. A considerable amount of this material is marketed in this state, but when required in a finer state it is reground in a Hardinge pebble mill. The Hardinge mill is also used for the final grinding of felspar, fluorspar, and other finely ground minerals which must be free from iron.

Talc, clay, and other softer materials are finally reduced in the Van Gelder hammer mill. In addition to the fine grinding, fire brick and special shapes are manufactured, and a small quantity of kalsomine made, but as most of the manufacturers of this product are supplied with the raw material from this factory the proprietors have not made it a practice of competing with the finished article.

A small experimental oil-fired furnace has been erected to manufacture sodium silicate (water glass).

A certain proportion of the products produced by this firm are used by local potteries for glazing, etc., but the greatest percentage is shipped to interstate factories, where it is used amongst other processes as filling for leather, paper, and rubber goods. (24/8/34.)

New Era Consolidated Gold Mines, N.L.

A summary of the available reports and information appears on page 74 of Mining Review No. 57. As all the old workings have collapsed or been filled in, no fresh information could be gathered. An attempt has been made to locate the mouth of the adit (112ft. level), but without success. The old main vertical shaft was opened, but when broken through the air was so foul as to stop further progress. As far as can be seen, this is a small shaft 6ft. x 3ft. or thereabouts, and the old timbers are in a bad state of repair. It was first thought that an examination of the workings might have been made from this opening, but there is some doubt as to the water level. Persons who from time to time have tried to work this mine state the water level to be from 70ft. to 80ft. below the surface. If this is so an examination could not be carried out without first installing a blower to create a draught and clear the workings of foul air, then to repair and secure the shaft and install a pumping plant.

As this shaft would be too small for a working proposition, and as it apparently strikes the lode formation at about 180ft. below the surface, and as according to old reports the payable portion of the lode has been worked out above the 112ft. level, it does not appear that any useful information could be gained by opening this old shaft. The mine manager therefore pegged out a site to sink a new vertical shaft 156ft. east of the outcrop and 112ft. south-east from the old shaft.

Taking into consideration the small advantage to be gained by repairing the old shaft, the new shaft proposition appears to be the best under the circumstances.

Since plotting the position of the new shaft in relation to the dip of the lode, as shown by the diamond drill holes bored on the property, it appears as if the new shaft is too far east, as by calculation the new shaft would have to be sunk approximately 280ft. before cutting the lode. Although this appears a great

depth to sink to cut the lode, it has been proved by diamond drilling to a greater depth than this. It must also be remembered that it is expected to cut a fairly large body of water. No. 2 diamond drill hole cut a stream which overflowed at the surface at the rate of 6,480 gallons per hour, from a depth of 200ft. Again the lode appears to be flattening, and if the new shaft is sunk through the lode, and continued vertically, long crosscuts will need to be driven to pick up the formation where cut by No. 2 hole. Taking everything into consideration, the site for the new shaft is probably placed in as good a position as it could be.

To open and explore the old levels, I would suggest that crosscuts be put out from the new shaft at the 112ft. and 180ft. levels.

Another advantage that may be gained in placing the new shaft at its present position is that being outside the lode, the heaviest flow of water should not be cut until about from 180ft. to 200ft. of sinking is done. On August 20th the shaft had been sunk to a depth of 66ft. (17/7/34.)

GOLD PROSPECTING NEAR WOODSIDE.

Situated on part section 5299, hundred of Onkaparinga, about 1½ miles almost due south of the Bird-in-Hand Mine. A reef formation was opened over 30 years ago; the work carried out then consisted of a shaft sunk to approximately 70ft. depth, of which 35ft. is vertical, and about the same distance continued on an underlie of about 50° east, the strike of the formation being north 20° west. At the 35ft. level drives were put out north and south. It is, however, not known if any of the material was treated.

In June of this year Mr. E. A. Sleader loamed the country near by and obtained some fair gold prospects up to and above the present shaft site. He also panned material from the dump and found gold prospects. Sleader secured the collar of the shaft and bailed out the water to 40ft. depth, and examined the drives mentioned above. The lode was found to be a quartz and iron formation ranging from 6in. to 18in. wide, but in both drives at a distance of 30ft. from the shaft the lode appeared to pinch out. The northern drive, on panning, was very poor, and the level is now filled with mullock. In the south level better prospects were obtained. A mixed sample submitted by the prospector returned 10½dwts. of gold per ton. At a point 25ft. from the shaft a winze has been sunk to 30ft., following the formation and exposed lode ranging from 6in. to 18in. wide, to a depth of 22ft. below; it appears now to have pinched to about 3in. in width.

A short drive north from the winze at 22ft. shows the lode to be 22in. wide; 12in. of this, however, on the footwall consist mostly of crushed schist and shale. Three samples were taken—two in the end 8ft. from the winze and one from the end of the winze. These were assayed at the School of Mines with the following results:—

No. 1. Hanging-wall side of lode in end 10in. wide—Nil.

No. 2. Footwall side of lode in end, 12in. wide—1dwt.

No. 3. End of winze, 18in. wide—4½dwts.

The development done on this formation proves it to be patchy, and that it is lenticular. No driving has been done beyond the points either north or south, where the lode pinched, and before abandoning the workings it would be wise to extend these levels in the hope of it again making and showing better values.

As before mentioned, loaming disclosed the presence of gold higher up the hillside than the point where the present workings have been carried out. A small ferruginous quartz leader farther west has been opened at one place with fair prospects. I would therefore recommend that the continuation of this leader be prospected in a southerly direction. (25/9/34.)

Gold Reef at Jacob Creek.

On the 16th November, 1934, in company with the Director of Mines, Dr. L. K. Ward, an inspection was made of the prospecting operations carried out by Messrs. C. Carroll and J. L. Morant, near Jacob Creek. The workings are situated on Section 353, Hundred of Moorooroo, and about 2 miles distant from Pewsey Vale Homestead.

The excavations consist of a pit 8ft. deep, and a few shallow trenches to the south of it. The country rocks are the early Pre-Cambrian schists of the Barossa series. They are essentially mica schists, with some bands that are only slightly altered sandstones showing a little mica. In the pit mentioned above the rock strikes north 40 degrees west; at the south end of the excavation a series of quartz veins dip north-east at an angle of 45 degrees, while at the north end of the pit a pug seam 3in. wide dips north-east at an angle of 70 degrees, the latter angle appearing to be the average dip of the country. Lying on this pug seam is a vein 13in. wide of mixed schist, quartz, and sandstone, with bands of similar material showing along the bottom of the pit. Four samples were taken:—

No. 1, from the series of quartz veins at the south end of pit, 6in. wide.
No. 2, from the pug seam of north end of pit, 3in. wide.
No. 3, from mixed vein, east side of pug seam, 13in. wide.
No. 4, from decomposed material east side of pit.

The assay results from the above samples are as follows:—

No. 1, nil; No. 2, 1dwt.; No. 3, a trace; No. 4, 4dwts.

The material sent to the School of Mines by the prospectors for assay, from which a return of 6ozs. 15dwts. was obtained, was evidently selected from isolated nodules or patches of ironstone found in sinking. About 1cwt. of this material is stacked at the surface, but none of the material is visible in place in the pit. It is evident from the results of the samples taken at the time of the inspection (as compared with that obtained by the prospectors) that the gold is to be looked for in the ironstone rather than in the quartz leaders. The spot selected for sinking was made because of quartz and ironstone debris scattered there. Some prospecting was done in the creek below, and colours found up to a point almost opposite the present workings.

Practically no loaming had been done on the hillsides, and as the locality is ideal for loaming, with a supply of water close by, I would recommend the prospectors, before any more work is done in the hard rock, to systematically loam the locality. This work, if properly carried out, should enable the miners to continue with deeper prospecting at the most likely place, or places, as indicated by the result of loaming. There is undoubtedly a tendency for veins in this kind of country to take the form of lenses rather than for them to be long continuous bodies. The recent rich find at Mount Crawford is an example of such occurrences. Prospecting is made more difficult under these circumstances, but, if it is carried out systematically in the manner suggested, there will be a great economy of time, effort and expenditure. (24/11/34.)

Golden Key Gold Mining Syndicate.

The above property is situated at Paracombe, on Sections 5497 and 5498, Hundred of Yatala. It is on private property, the owner being Mr. W. Pitt. An inspection was made in March, 1931. A vertical shaft was then 40ft. deep. This was started on the outcrop across the lode; in consequence it could not follow the underlie, and passed out of the lode at 14ft. deep; 30ft. of driving was carried at this depth, 27ft. north-west and 3ft. south-east. From this work a parcel of 6 tons was treated at the Mount Torrens Battery for a return of 6dwts. per ton.

At 25ft. deep a crosscut exposed the lode at 8ft. from the shaft, and drives 24ft. south-east and 12ft. north-west were put out; 7½ tons of ore from these drives was treated at the Government Battery for a return of 14dwts. 9grs. per ton, by amalgamation, while the tailings assayed 3dwts. 20grs. At the bottom of the shaft, 40ft. deep, a crosscut intersected the lode 15ft. distant, and about 8ft. of driving was done.

The lode formation strikes north-west-south-east, and dips at 60 degrees north-east. It is composed of ironstone and quartz, and ranges from 4in. to 20in. wide. The country rock is a decomposed schist or clay slate. The work carried out since the previous report in 1931 consists of an underlie shaft sunk (about 15ft. south-east of the old vertical mentioned) to a depth of 80ft. Connections were made to the old shaft at the 25ft. and 40ft. levels, and drives put out at the 65ft. horizon. A tunnel has also been driven into the hill from a south-eastern direction; at 30ft. the lode was cut, and the tunnel continued on the course, and is now holed to the underlie shaft 104ft. distant from the portal. A winze connects the 40ft. and 65ft. levels.

A shaft north of the tunnel, and at about the same horizontal level, is sunk to 16ft. deep. This shaft has also cut the lode, which here shows about 12in. wide. Some 200 yards farther south-east on Section 5498 what appears to be the extension of the same lode has been exposed by trenches at three places. The formation has been traced for a distance of approximately a mile. Since mining operations were started on this property 38 tons 4cwts. of ore have been treated at the Mount Torrens Battery for a return of 16ozs. 15dwts. 6grs. of gold, equal to a yield of 34s. per ton, normal gold value.

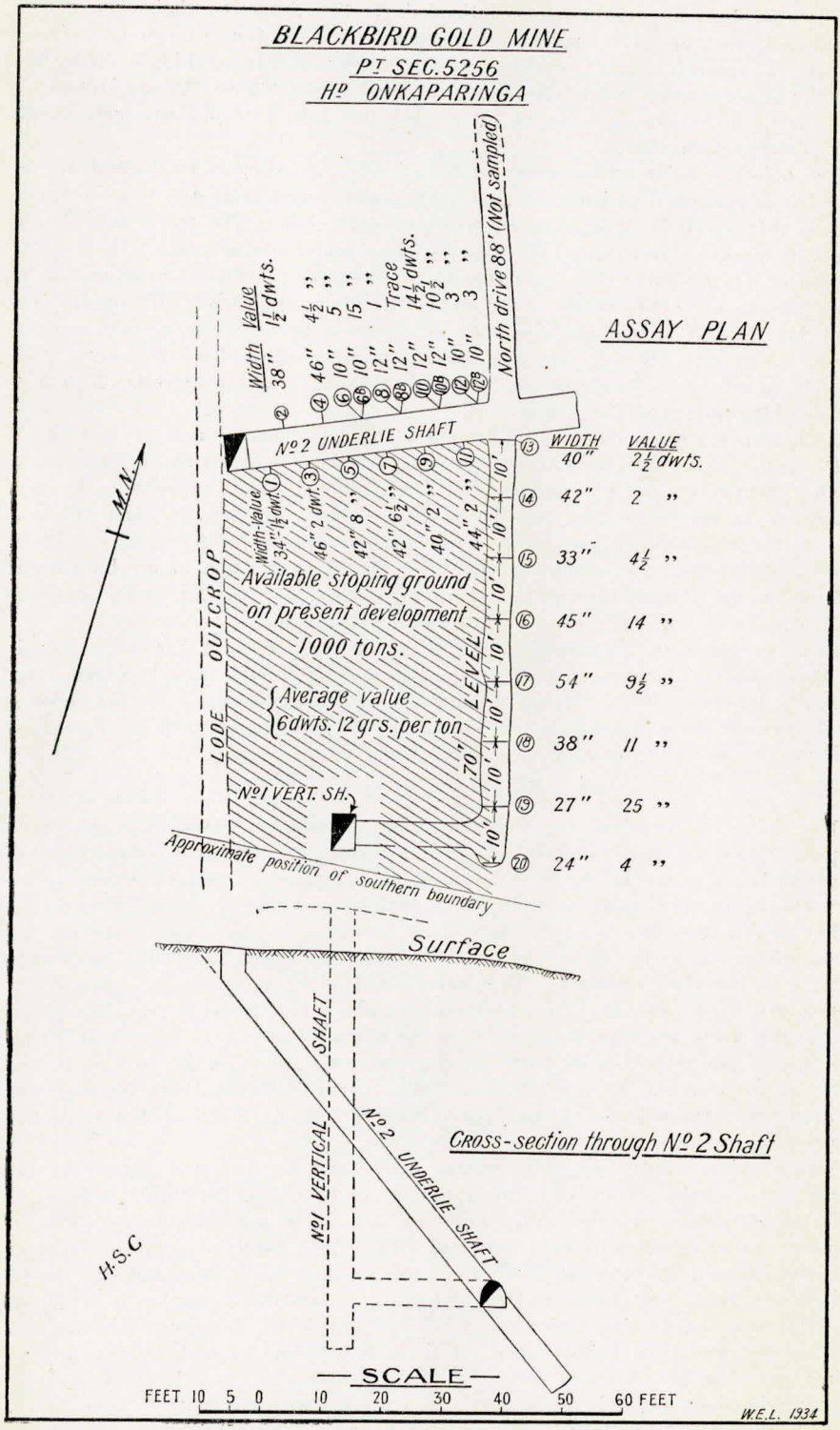
Although the lode is narrow, averaging about 10in. wide, it has been opened by drives over a distance of 400ft. in length, and has been exposed in trenching over an additional 500ft. It has the appearance of extending to greater depths. In its present stage it could not be considered as a company proposition, but is well worthy of further testing by a small party of men. (5/12/34.)

The Blackbird Gold Mine.

The mine is situated on Section 5256, Hundred of Onkaparinga, and approximately 2½ miles by road from Woodside. It is private property, the minerals being vested in the South Australian Company. The area pegged comprises some 40 acres, with approximately 40 chains in length along the strike.

The lode, a ferruginous quartz formation, outcrops on the slope of the hill at the southern end of the lease, and can be traced some 200ft. north, beyond which point it is covered by debris. At a point 350ft. north it is exposed again in a trench 3ft. deep, and near the northern boundary two trenches, ranging from 4ft. to 6ft. deep, cut what appears to be the continuation of the formation. The lode has a general strike of north 20 degrees west, and dips to the east at an angle of 50 degrees. At a point about 200ft. north of the southern boundary it is apparently faulted, but it has again been picked up north of the fault by trenches.

The workings consist of two vertical shafts and an underlie shaft. No. 1 vertical was started about 10ft. north of the southern boundary line, and about 25ft. east from the outcrop. At a depth of 31ft. it cut the lode, passed through it, and continued vertically to a depth of 72ft. At a depth of 66ft. an easterly crosscut exposed the lode at 25ft. from the shaft. No. 2, the underlie shaft, 63ft. north from No. 1, was started and continued on the formation to a depth of 92ft. measured on the underlie. No. 3 vertical, 186ft. farther north, and on the hanging wall side, is 16ft. deep. It is in tough country rock (slate), and is being sunk with the object of cutting the lode at about 70ft. A drive south from the underlie shaft (at a depth of 70ft.) is connected with the crosscut from No. 1 vertical, giving the workings good ventilation. At the same depth a level has been opened for 88ft. north of the underlie. The lode is well defined, and of fairly


BLACKBIRD GOLD MINE
PT SEC. 5256
Hd ONKAPARINGA
ASSAY PLAN
North drive 88' (Not sampled)
Width
Value
38" 1½ dwts.
46" 4½ "
10" 5 "
10" 15 "
12" 1 "
12" Trace
12" 14½ dwts.
12" 10½ "
10" 3 "
10" 3 "
No 2 UNDERLIE SHAFT
M.N.
OUTCROP
LODE
Width-Value
34" ½ dwt.
46" 2 dwt.
42" 8 "
42" 6½ "
40" 2 "
44" 2 "
Available stoping ground
on present development
1000 tons.
Average value
6 dwts. 12 grs. per ton
70' LEVEL
10'
No 1 VERT. SH.
Approximate position of southern boundary
WIDTH
VALUE
13 40" 2½ dwts.
14 42" 2 "
15 33" 4½ "
16 45" 14 "
17 54" 9½ "
18 38" 11 "
19 27" 25 "
20 24" 4 "
Surface
SHAFT
No 1 VERTICAL
No 2 UNDERLIE SHAFT
Cross-section through No 2 Shaft
H.S.C
SCALE
FEET 10 5 0 10 20 30 40 50 60 FEET
W.E.L. 1934

uniform width throughout. In the shaft from the surface to the 70ft. level it averages 3ft. 5in. wide, while along the south level for a length of 70ft. it is 3ft. 2in. wide. At the northern end of the shaft, however, below 25ft. the lode is split into two branches, being divided by a horse of slate which continues to the bottom, and also extends along the north level for the full distance of 88ft. The lode channel maintains its average width, but the veins, which are in contact with both hanging wall and footwall sides, are in the nature of overlapping lenses, which range in width from a mere thread to 18in. Although some very good values have been panned from these veins, the owners consider that this section will not pay to mine on account of the excess mullock (probably 60 per cent.) that would be broken for a small return of ore, and for these reasons the block was not sampled nor taken into consideration when computing tonnage or values. The block of ground standing between the underlie and No. 1 vertical shaft was sampled, the samples being taken at 10ft. intervals (the results of these may be seen by referring to the assay plan attached). The whole of this block could be removed by stoping, provided that strong rearings or filled pigsties are erected at the end of the shaft.

From the development already carried out three parcels of ore have been treated at the Mount Torrens Government Battery. The first parcel of 5 tons 15cwts. obtained from the sinking of the underlie shaft from the surface to a depth of 20ft. returned 15dwts. 2grs. per ton. The second parcel taken from the same shaft, between the depths of 20ft. and 65ft., of 28 tons returned 11dwts. 19grs. per ton; while the third parcel of 23 tons broken in the drive for a length of 30ft. north from No. 1 vertical shaft returned 24dwts. per ton. The total ore treated amounted to 57 tons for a return of 44oz. 1dwt. 11grs. of gold bullion, or an average of 16dwts. 19grs. per ton. The bullion from the above crushings was stated by the manager to have realised £3 10s. per ounce, normal gold value.

Values.—The results of the samples are given in the following tabulation, and their respective positions may be seen on the assay plan attached. Those taken from the south end of the underlie shaft, together with level samples, show an average value of 6dwts. 12grs. per ton. The total value of the block of 1,000 tons at the normal price (£4 4s. 11½d.) for fine gold amounts to £1,380. This sum does not include the premiums on the price of gold, which at the time of writing amount to 107.9 per cent.

Table Showing Assay Results.

Location.	No. of Sample.	Width in Inches.	Gold Contents. Dwts. per Ton.
Underlie shaft south end 5ft. deep	(1)	34	1½
" " " 15 "	(3)	46	2
" " " 25 "	(5)	42	8
" " " 35 "	(7)	42	6½
" " " 45 "	(9)	40	2
" " " 55 "	(11)	44	2
" " " 65 "	(13)	40	2½
Underlie shaft north end 10ft. deep	(2)	38	1½
" " " 20 "	(4)	46	4½
" " " 30 "	(6)	10	5
" " " 30 "	(6B)	10	15
" " " 40 "	8	12	1
" " " 40 "	8B	12	Trace
" " " 50 "	10	12	14½
" " " 50 "	10B	12	10½
" " " 60 "	12	10	3
" " " 60 "	12B	10	3
70ft. level 10ft. south from underlie shaft	14	42	2
" 20 " " " "	15	33	4½
" 30 " " " "	16	45	14
" 40 " " " "	17	54	9½
" 50 " " " "	18	38	11
" 60 " " " "	19	27	25
" 70 " " " "	20	24	4

Tonnage.—The available tonnage from the block of ground between the shafts at the back of the 70ft. level, taking as a basis of computation, length 68ft., height 64ft., average width 3ft. 3in., after allowing for a pillar of ore to be left around the vertical shaft, is approximately 1,000 tons.

Summary.—At present the development carried out has opened a block of ore ground 70ft. long, containing approximately 1,000 tons. No farther extension can be made southward, as the ore has been opened to the southern boundary of the lease. The downward extension of this section, however, could be exploited by continuing the underlie shaft and opening another level 100ft. below. The 88ft. of driving north shows the lode to be split into two irregular veins of ore, separated by a horse of slate, and it is doubtful if it would pay for mining. At the northern end of the lease, what appears to be the continuation of the lode formation has been exposed by shallow trenches at three or four places, but further development has yet to be done at this end to prove values and tonnage.

Conclusions.—The mine has not yet reached permanent water level, and to provide water for a treatment plant one of three schemes would have to be put into effect:—

First—To sink No. 1 vertical shaft to below water level and install pumping machinery.

Second—To negotiate with the Bird-in-Hand Company to supply water from that mine. The water pumped from the Bird-in-Hand now flows to waste within 10 chains of the Blackbird lease. To make this water available, a small dam across the creek and a pumping plant would need to be installed.

Third—To pump water from a creek passing through the Blackbird lease some 30 chains north from the present workings.

The latter scheme would probably be subject to the approval of the landowner. With the difficulty of obtaining sufficient water and the comparatively small tonnage of reserves opened, I would not advise either the erection of a treatment plant or the installation of a pumping unit at the present stage. I would recommend that the underlie shaft be sunk an additional 80ft., making it 170ft. from the surface, and that a drive on the lode course be carried at this depth southwards to the boundary, and, if results warrant it, that No. 1 vertical shaft be continued and a crosscut put in to cut the lode. The northern drive should also be put out for 50ft. or 60ft. to test the formation at that depth. It would be well also to continue No. 3 vertical shaft to cut the lode and drive on its course to prove that section beyond the fault.

While this programme of development is being carried out some stoping may be done in the back of the 70ft. level, and the material treated at the Mount Torrens Battery, the returns from which, together with any ore broken by development, should cover the cost of the latter work. (30/10/34.)

TABLE

STATEMENT SHOWING, SO FAR AS CAN BE ASCERTAINED, THE MINERAL PRODUCTION OF SOUTH AUSTRALIA FOR THE YEARS 1841 TO 1933 (INCLUSIVE).

Gold and Silver in ounces fine; ton = 2,240 lbs.

Gold: Gold production to 1871, amounting to £550,000, has been distributed over the years 1852-1871.

Year.	Gold. Ozs.	Gold. £	Silver. Ozs.	Silver. £	Silver-Lead Ore and Metal. Tons.	Silver-Lead Ore and Metal. £	Copper Ore and Metal. Tons.	Copper Ore and Metal. £	Ironstone. Tons.	Ironstone. £
1841			—	—	30	390	—	—	—	—
1842			—	—	4	131	2	103	—	—
1843			—	—	19	105	6	81	—	—
1844			—	—	167	2,459	276	4,010	—	—
1845			—	—	178	1,937	981	17,179	—	—
1846			—	—	147	1,459	6,461	140,794	—	—
1847			—	—	154	2,307	9,152	171,883	—	—
1848			—	—	688	10,556	16,327	310,387	—	—
1849			—	—	262	2,956	10,323	216,819	—	—
1850			—	—	370	3,399	11,239	362,130	117	1,250
1851			—	—	131	1,592	7,717	309,400	—	—
1852		100,000	—	—	—	—	13,673	374,778	—	—
1853		80,000	—	—	24	397	4,982	176,347	—	—
1854		20,000	—	—	22	425	3,685	94,496	—	—
1855		15,000	—	—	145	3,730	4,718	152,007	—	—
1856		12,000	—	—	35	377	11,791	399,877	—	—
1857		11,000	—	—	1,422	23,855	10,959	434,984	—	—
1858		10,000	—	—	853	14,200	9,240	359,082	—	—
1859		9,000	—	—	325	13,778	10,285	397,240	—	—
1860		9,000	—	—	159	10,755	10,706	435,782	5	50
1861		8,000	—	—	78	4,726	11,259	447,446	—	—
1862		6,000	—	—	118	3,247	10,927	544,372	9	25
1863		5,000	—	—	464	9,532	10,184	532,861	—	—
1864		4,000	—	—	570	13,228	11,286	677,096	—	—
1865		4,000	—	—	90	1,640	21,185	618,472	20	100
1866		4,000	—	—	715	14,309	23,287	810,192	—	—
1867		3,000	—	—	382	8,827	19,298	741,353	—	—
1868		55,000	1,140	285	229	6,915	25,946	608,423	—	—
1869		107,000	3,000	600	171	4,767	31,474	621,825	—	—
1870		63,000	—	—	135	4,180	26,357	568,780	—	—
1871		25,000	—	—	169	5,497	26,522	637,983	—	—
1872	1,498	6,363	—	—	61	2,324	34,416	802,734	—	—
1873	69	293	—	—	1	20	34,469	768,522	—	—
1874	983	4,175	—	—	24	332	29,483	693,836	6	20
1875	1,656	7,034	—	—	132	66	33,277	753,166	—	—
1876	2,328	9,888	—	—	18	229	28,145	592,000	—	—
1877	—	—	—	—	25	415	23,675	563,010	—	—
1878	288	1,225	—	—	—	—	20,601	407,587	—	—
1879	21	90	—	—	3	90	17,083	351,388	293	812
1880	—	—	—	—	—	—	17,877	346,147	2	8
1881	207	880	—	—	90	1,182	25,462	418,296	—	—
1882	1,091	4,634	—	—	82	2,111	29,545	455,570	—	—
1883	2,480	10,534	—	—	907	13,757	22,085	375,325	—	—
1884	3,642	15,469	—	—	386	5,898	28,540	469,230	—	—
1885	4,307	18,295	—	—	45	1,633	22,156	322,983	—	—
1886	7,659	32,535	—	—	36	620	18,417	230,868	—	—
1887	16,951	72,003	—	—	134	1,923	16,570	240,333	—	—
1888	8,053	34,205	1,929	372	330	5,523	16,188	326,202	—	—
1889	8,782	37,305	2,700	490	664	8,174	21,924	296,902	4,397	1,882
1890	4,899	20,808	—	—	523	8,452	19,501	247,979	3,967	1,108
1891	6,446	27,380	—	—	128	1,787	16,627	235,817	6,799	4,551
1892	6,144	26,097	—	—	103	855	13,160	175,525	4,184	4,183
1893	2,957	12,561	—	—	54	605	5,578	214,775	3,050	3,321
1894	7,882	33,479	1,012	132	4	34	5,339	213,523	1,564	1,592
1895	6,143	26,094	—	—	6	50	5,379	228,101	1,611	1,613
1896	3,381	14,360	—	—	97	901	4,951	222,202	109	109
1897	9,206	39,103	—	—	439	2,668	5,251	242,917	404	336
1898	2,524	10,721	—	—	499	4,756	5,307	248,857	—	—
1899	3,668	15,582	—	—	404	4,182	8,389	430,890	—	—
1900	3,426	14,554	—	—	2,218	21,908	7,253	394,446	—	—
1901	3,911	16,613	—	—	472	3,196	8,605	491,617	—	—
1902	5,857	24,878	—	—	4,855	42,043	9,426	430,712	—	—
1903	6,748	28,665	7,086	804	930	10,066	13,560	472,038	84,932	46,712
1904	17,898	76,025	—	—	—	—	9,329	406,953	46,687	27,091
1905	10,795	45,853	—	—	52	369	9,111	454,945	84,483	48,577
1906	6,356	27,000	801	104	50	550	8,208	718,609	75,226	33,852
1907	4,836	20,540	5,845	780	1,000	11,000	7,931	690,000	84,600	38,100
1908	2,896	12,300	—	—	900	9,000	5,628	338,000	88,000	39,600
1909	7,111	30,206	1,660	167	77	506	5,759	338,587	16,120	8,296
1910	6,592	28,000	6,250	625	45	282	5,102	306,120	46,200	21,945
1911	3,531	15,000	1,400	140	—	—	5,922	332,500	42,300	26,400
1912	6,592	28,000	2,700	326	—	—	6,295	461,500	42,200	26,375
1913	6,545	27,800	2,660	300	153	1,100	7,161	488,986	60,658	37,911
1914	6,258	26,581	3,006	314	18	215	6,881	417,487	42,622	37,137
1915	6,081	25,830	2,462	277	59	625	7,725	561,247	237,375	264,612
1916	7,769	33,000	3,427	514	243	4,659	7,279	822,527	188,329	200,382
1917	7,141	30,334	1,825	333	622	12,018	7,213	902,495	328,386	357,804
1918	6,180	26,252	1,608	331	503	10,161	7,169	828,556	257,029	277,279
1919	3,224	13,696	561	180	—	—	2,517	228,930	268,530	307,402
1920	1,697	7,209	1,005	226	82	2,420	4,339	423,601	413,038	478,436
1921	2,628	11,163	1,449	240	—	—	1,532	106,370	506,993	587,267
1922	1,000	4,248	2,512	377	—	—	1,185	73,646	51,423	58,177
1923	950	4,031	43	6	2	54	3,523	232,172	384,434	445,303
1924	880	3,739	1,017	154	6½	219	405	26,046	580,308	667,354
1925	832	3,535	1.458	200	37	1,455	570	35,878	586,652	674,649
1926	758	3,219	353	46	28	819	231½	14,681	583,745	671,307
1927	418	1,776	179	20	5	123	201½	12,452	722,425	830,789
1928	532	2,258	—	—	—	—	192	13,321	618,316	711,063
1929	1,009	4,289	1,206	131	5½	127	276½	22,982	847,813	974,985
1930	1,311	5,569	1,058	84	0·3	6	99·3	6,966	928,392	1,067,651
1931	2,782	11,817	68	5	—	—	22	934	289,179	332,556
1932	3,014	21,246	—	—	—	—	—	—	537,928	618,617
1933	6,361	49,277	—	—	—	—	72	2,928	721,185	829,363
Totals 1841 to 1933	396,665	1,715,616	61,420	8,563	25,814·3	373,184	1,050,365·8	33,099,099	9,792,045	10,767,952

Year.	Manganese Ore. Tons.	Manganese Ore. £	Bismuth Ore. Tons.	Bismuth Ore. £	Molybdenite. Cwts.	Molybdenite. £	Wolfram Ore. Cwts.	Wolfram Ore. £	Zinc. Tons.	Zinc. £	Radium and Radio-active Ores.	Radium and Radio-active Ores. £	Asbestos. Cwts.	Asbestos. £	Alunite. Tons.	Alunite. £
1841	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1842	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1843	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1844	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1845	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1846	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1847	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1848	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1849	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1850	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1851	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1852	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1853	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1854	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1855	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1856	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1857	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1858	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1859	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1860	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1861	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1862	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1863	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1864	—	—	13	1,300	—	—	—	—	—	—	—	—	—	—	—	—
1865	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1866	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1867	—	—	20	2,061	—	—	—	—	—	—	—	—	—	—	—	—
1868	—	—	25	1,045	—	—	—	—	—	—	—	—	—	—	—	—
1869	—	—	42	560	—	—	—	—	—	—	—	—	—	—	—	—
1870	—	—	73	1,130	—	—	—	—	14	381	—	—	—	—	—	—
1871	—	—	223	4,720	—	—	—	—	12	369	—	—	—	—	—	—
1872	—	—	27	1,168	—	—	—	—	8	138	—	—	—	—	—	—
1873	—	—	9	1,775	—	—	—	—	—	—	—	—	—	—	—	—
1874	—	—	2	1,960	—	—	—	—	—	—	—	—	—	—	—	—
1875	—	—	6	2,120	—	—	—	—	—	—	—	—	—	—	—	—
1876	—	—	1	200	—	—	—	—	—	—	—	—	—	—	—	—
1877	—	—	—	—	—	—	—	—	60	1,553	—	—	—	—	—	—
1878	—	—	—	—	—	—	—	—	40	937	—	—	—	—	—	—
1879	—	—	—	—	—	—	—	—	44	1,401	—	—	—	—	—	—
1880	—	—	—	—	—	—	—	—	35	1,091	—	—	—	—	—	—
1881	—	—	—	—	—	—	—	—	10	200	—	—	—	—	—	—
1882	135	653	—	—	—	—	—	—	31	845	—	—	—	—	—	—
1883	333	2,079	—	—	—	—	—	—	35	517	—	—	—	—	—	—
1884	59	236	—	—	—	—	—	—	31	1,117	—	—	—	—	—	—
1885	130	893	—	—	—	—	—	—	31	547	—	—	—	—	—	—
1886	1,550	10,985	—	—	—	—	—	—	18	248	—	—	—	—	—	—
1887	1,452	5,144	—	—	—	—	—	—	37	535	—	—	—	—	—	—
1888	1,021	3,507	—	—	—	—	—	—	19	410	—	—	—	—	—	—
1889	1,596	5,107	—	—	—	—	—	—	63	825	—	—	—	—	—	—
1890	2,764	7,023	—	—	—	—	—	—	17	261	—	—	—	—	—	—
1891	848	1,725	—	—	—	—	—	—	24	357	—	—	—	—	—	—
1892	704	1,526	—	—	—	—	—	—	52	796	—	—	—	—	—	—
1893	2,428	6,359	—	—	—	—	—	—	73	926	—	—	—	—	—	—
1894	174	517	—	—	—	—	—	—	45	579	—	—	—	—	—	—
1895	48	146	—	—	—	—	—	—	26	322	—	—	—	—	—	—
1896	—	—	—	—	—	—	—	—	35	404	—	—	—	—	—	—
1897	—	—	—	—	—	—	—	—	11	118	—	—	—	—	—	—
1898	—	—	—	—	—	—	—	—	18	218	—	—	—	—	—	—
1899	100	118	—	—	—	—	—	—	19	352	—	—	—	—	—	—
1900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1901	132	330	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1902	18	62	—	—	—	—	—	—	19	286	—	—	—	—	—	—
1903	—	—	—	—	—	—	—	—	22	260	—	—	—	—	—	—
1904	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1905	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1906	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1907	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1908	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1909	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1910	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1911	—	—	—	—	—	—	40	154	—	—	—	—	—	—	—	—
1912	—	—	—	—	—	—	5	20	—	—	—	—	—	—	—	—
1913	—	—	—	—	—	—	2½	10	—	—	—	3,620	—	—	—	—
1914	—	—	—	—	—	—	6	24	—	—	—	5,215	—	—	20	40
1915	250	563	—	—	—	—	5	35	—	—	—	—	7	5	—	—
1916	544	2,700	—	—	—	—	4	28	—	—	—	—	420	210	134	670
1917	264	1,597	—	—	18½	359	4	30	—	—	—	—	—	—	29	145
1918	1,080	17,876	—	—	4½	98	—	—	—	—	—	686	—	—	—	—
1919	298	1,490	—	—	3¼	70	—	—	—	—	—	—	—	—	60	246
1920	514	4,626	—	—	—	—	—	—	—	—	—	—	100	90	20	150
1921	1,596	9,774	—	—	—	—	—	—	—	—	—	—	40	71	15	60
1922	639	4,585	—	—	—	—	—	—	—	—	—	—	—	—	95	210
1923	168	1,581	—	—	—	—	—	—	—	—	—	—	147	161	—	—
1924	316	1,128	—	—	—	—	—	—	—	—	—	—	80	80	—	—
1925	—	—	—	—	—	—	—	—	—	—	—	172	—	—	—	—
1926	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1927	—	—	—	—	—	—	—	—	—	—	—	1,088	—	—	—	—
1928	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1929	—	—	—	—	—	—	—	—	—	—	—	—	1	40	—	—
1930	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1931	13	78	·21	103	—	—	—	—	—	—	—	—	6	100	—	—
1932	—	—	·21	109	—	—	—	—	—	—	—	1,050	20	130	—	—
1933	20	53	·33	150	—	—	—	—	—	—	—	—	13	113	—	—
Totals 1841 to 1933	19,194	92,461	441·75	18,401	26¼	527	66½	301	849	15,993	—	11,831	834	1,000	373	1,521

Year.	Barytes. Tons.	Barytes. £	Bluestone. Tons.	Bluestone. £	Felspar and Chinastone. Tons.	Felspar and Chinastone. £	Silica. Tons.	Silica. £	Kaolin, Fireclay, and Pottery Clay. Tons.	Kaolin, Fireclay, and Pottery Clay. £	Gypsum. Tons.	Gypsum. £
1841	—	—	—	—	—	—	—	—	—	—	—	—
1842	—	—	—	—	—	—	—	—	—	—	—	—
1843	—	—	—	—	—	—	—	—	—	—	—	—
1844	—	—	—	—	—	—	—	—	—	—	—	—
1845	—	—	—	—	—	—	—	—	—	—	—	—
1846	—	—	—	—	—	—	—	—	—	—	—	—
1847	—	—	—	—	—	—	—	—	—	—	—	—
1848	—	—	—	—	—	—	—	—	—	—	—	—
1849	—	—	—	—	—	—	—	—	—	—	—	—
1850	—	—	—	—	—	—	—	—	—	—	—	—
1851	—	—	—	—	—	—	—	—	—	—	—	—
1852	—	—	—	—	—	—	—	—	—	—	—	—
1853	—	—	—	—	—	—	—	—	—	—	—	—
1854	—	—	—	—	—	—	—	—	—	—	—	—
1855	—	—	—	—	—	—	—	—	—	—	—	—
1856	—	—	—	—	—	—	—	—	—	—	—	—
1857	—	—	—	—	—	—	—	—	—	—	—	—
1858	—	—	—	—	—	—	—	—	—	—	—	—
1859	—	—	—	—	—	—	—	—	—	—	—	—
1860	—	—	—	—	—	—	—	—	—	—	—	—
1861	—	—	—	—	—	—	—	—	—	—	—	—
1862	—	—	—	—	—	—	—	—	—	—	—	—
1863	—	—	—	—	—	—	—	—	—	—	—	—
1864	—	—	—	—	—	—	—	—	—	—	—	—
1865	—	—	—	—	—	—	—	—	—	—	—	—
1866	—	—	—	—	—	—	—	—	—	—	—	—
1867	—	—	—	—	—	—	—	—	—	—	—	—
1868	—	—	—	—	—	—	—	—	—	—	—	—
1869	—	—	—	—	—	—	—	—	—	—	—	—
1870	—	—	—	—	—	—	—	—	—	—	—	—
1871	—	—	—	—	—	—	—	—	—	—	—	—
1872	—	—	—	—	—	—	—	—	—	—	—	—
1873	—	—	—	—	—	—	—	—	—	—	—	—
1874	—	—	—	—	—	—	—	—	—	—	—	—
1875	—	—	—	—	—	—	—	—	—	—	—	—
1876	—	—	—	—	—	—	—	—	—	—	—	—
1877	—	—	—	—	—	—	—	—	—	—	—	—
1878	—	—	—	—	—	—	—	—	—	—	—	—
1879	—	—	—	—	—	—	—	—	—	—	—	—
1880	—	—	—	—	—	—	—	—	—	—	—	—
1881	—	—	—	—	—	—	—	—	—	—	—	—
1882	—	—	—	—	—	—	—	—	—	—	—	—
1883	—	—	—	—	—	—	—	—	—	—	—	—
1884	—	—	—	—	—	—	—	—	—	—	—	—
1885	—	—	—	—	—	—	—	—	—	—	—	—
1886	—	—	—	—	—	—	—	—	—	—	—	—
1887	—	—	—	—	—	—	—	—	—	—	—	—
1888	—	—	—	—	—	—	—	—	—	—	—	—
1889	—	—	—	—	—	—	—	—	—	—	—	—
1890	—	—	—	—	—	—	—	—	—	—	—	—
1891	—	—	—	—	—	—	—	—	—	—	—	—
1892	—	—	—	—	—	—	—	—	—	—	—	—
1893	—	—	—	—	—	—	—	—	—	—	—	—
1894	—	—	—	—	—	—	—	—	—	—	—	—
1895	—	—	—	—	—	—	—	—	—	—	—	—
1896	—	—	—	—	—	—	—	—	—	—	—	—
1897	—	—	—	—	—	—	—	—	—	—	—	—
1898	—	—	—	—	—	—	—	—	—	—	—	—
1899	—	—	211	4,225	—	—	—	—	—	—	—	—
1900	—	—	270	5,401	—	—	—	—	—	—	—	—
1901	—	—	223	4,454	—	—	—	—	—	—	—	—
1902	—	—	196	3,922	—	—	—	—	—	—	—	—
1903	—	—	159	3,445	—	—	—	—	—	—	—	—
1904	—	—	148	3,135	—	—	—	—	—	—	—	—
1905	—	—	162	4,082	—	—	—	—	—	—	—	—
1906	—	—	95	2,454	—	—	—	—	—	—	2,924	1,953
1907	—	—	106	3,282	—	—	—	—	—	—	—	—
1908	—	—	117	3,442	—	—	—	—	—	—	—	—
1909	—	—	58	1,436	—	—	—	—	376	112	2,154	190
1910	60	180	299	5,980	—	—	—	—	922	188	15,800	9,000
1911	—	—	181	4,163	—	—	—	—	1,463	169	9,700	7,275
1912	—	—	102	2,550	—	—	—	—	200	150	12,000	9,000
1913	103	320	13	325	—	—	—	—	320	240	7,150	5,362
1914	560	1,680	—	—	—	—	—	—	11,462	17,299	16,276	12,207
1915	290	1,320	3	69	—	—	—	—	8,374	7,308	19,900	17,413
1916	456	2,052	—	—	—	—	—	—	3,240	3,820	20,371	17,825
1917	790	2,370	—	—	—	—	—	—	3,841	4,847	12,776	11,179
1918	1,352	4,059	—	—	—	—	—	—	4,014	5,598	32,013	28,012
1919	1,753	5,264	—	—	—	—	—	—	4,182	2,543	25,216	18,725
1920	2,542	7,362	—	—	4	8	—	—	735	1,295	40,192	31,604
1921	1,269	4,465	—	—	—	—	—	—	173	202	34,383	29,427
1922	1,878	6,103	—	—	—	—	—	—	1,482	1,086	45,241	37,650
1923	1,761	5,265	—	—	20	80	—	—	—	—	53,405	46,729
1924	1,898	5,694	—	—	—	—	—	—	436	436	65,690	57,479
1925	2,008	6,024	—	—	9½	38	20	80	17,988	9,964	72,276	63,242
1926	1,742	5,226	—	—	103	309	60	240	26,331	14,945	65,613	57,411
1927	1,886	5,658	—	—	92	230	450	1,800	26,526	14,852	93,850	82,119
1928	2,366	7,098	—	—	113	254	80	240	24,786	13,876	91,535	80.093
1929	1,969	5,907	—	—	—	—	50	150	21,758	12,180	95,613	83,661
1930	1,535	4,605	—	—	—	—	23	69	13,469	8,238	40,827	35,724
1931	1,445	4,335	—	—	—	—	34	133	4,920	4,101	24,207	21,181
1932	1,701	5,104	—	—	64	122	124	372	10,075	5,964	44,962	39,342
1933	1,772	4,746	—	—	110	218	130	390	14,391	8,917	50,561	37,921
Totals 1841 to 1933	31,136	94,837	2,343	52.365	515½	1,259	971	3,474	201,464	138,330	994,635	841,724

Year.	Limestone, (Cement, Flux, Agriculture.) Tons.	Limestone. £	Magnesite. Tons.	Magnesite. £	Mica. Tons.	Mica. £	Ochre (Crude). Tons.	Ochre (Crude). £	Opal.	Opal. £	Flint Pebbles. Tons.	Flint Pebbles. £	Phosphate Rock. Tons.	Phosphate Rock. £
1841	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1842	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1843	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1844	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1845	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1846	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1847	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1848	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1849	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1850	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1851	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1852	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1853	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1854	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1855	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1856	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1857	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1858	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1859	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1860	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1861	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1862	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1863	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1864	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1865	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1866	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1867	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1868	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1869	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1870	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1871	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1872	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1873	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1874	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1875	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1876	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1877	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1878	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1879	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1880	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1881	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1882	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1883	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1884	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1885	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1886	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1887	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1888	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1889	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1890	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1891	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1892	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1893	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1894	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1895	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1896	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1897	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1898	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1899	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1900	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1901	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1902	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1903	—	—	—	—	—	—	—	—	—	—	—	—	1,000	1,000
1904	43,440	6,516	—	—	—	—	—	—	—	—	—	—	3,000	3,000
1905	44,498	6,675	—	—	—	—	—	—	—	—	—	—	5,000	5,000
1906	31,940	4,791	—	—	—	—	6	48	—	—	—	—	5,850	5,850
1907	31,100	5,800	—	—	—	—	—	—	—	—	—	—	8,000	8,000
1908	29,500	6,000	—	—	—	—	—	—	—	—	—	—	11,000	11,000
1909	13,765	2,464	—	—	—	—	—	—	—	—	—	—	3,772	3,697
1910	18,600	3,720	—	—	—	—	180	746	—	—	—	—	5,200	5,200
1911	28,700	7,175	—	—	—	—	105	105	—	—	458	856	5,800	5,800
1912	50,000	12,500	—	—	—	—	300	300	—	—	120	420	6,100	6,100
1913	44,300	11,075	—	—	—	—	250	250	—	—	514	1,799	5,950	6,545
1914	54,054	16,892	—	—	—	—	84	84	—	—	270	829	6,083	6,691
1915	71,723	22,413	80	160	—	—	28	28	—	—	385	1,023	4,614	5,536
1916	74,641	23,325	166	332	—	—	40	80	—	750	158	474	5,013	5,839
1917	68,464	21,395	150	300	37½	337	78	156	—	500	1,217	3,956	5,101	6,064
1918	72,209	34,813	440	666	—	—	30	60	—	7,175	2,816	11,849	8,074	10,773
1919	45,398	15,994	273	508	—	—	146	939	—	20,000	1,243	4,708	5,950	8,982
1920	30,508	9,538	185	347	—	—	260	1,131	—	24,000	423	1,604	8,753	12,309
1921	44,277	15,546	172	373	—	—	197	1,328	—	7,000	426	1,583	5,079	6,203
1922	70,243	27,080	576	951	—	—	76	450	—	5,500	741	2,632	2,715	3,678
1923	94,020	38,579	165	323	—	—	52	155	—	3,500	470	1,617	446	592
1924	109,298	38,254	129	323	—	—	710	4,260	—	4,000	390	1,365	84	117
1925	114,870	43,076	351	878	—	—	87	887	—	9,070	101	354	742	1,142
1926	119,714	44,893	226	565	—	—	36	297	—	10,330	116	406	882	864
1927	121,272	45,477	330	825	—	—	21	288	—	9,157	79	385	749	1,124
1928	80,968	30,363	45	90	2	12	55	705	—	11,540	3	19	—	—
1929	81,053	30,395	135	270	—	—	58	450	—	11,056	13	71	—	—
1930	64,187	24,070	36	72	—	—	17	93	—	1,142	15	76	—	—
1931	40,882	15,331	—	—	2	10	21	115	—	3,127	158	523	515	2 060
1932	40,671	15,252	115	173	—	—	50	325	—	3,060	154	374	644	1,912
1933	68,512	25,692	202	280	—	—	—	—	—	3,256	233	538	26	26
Totals 1841 to 1933	1,802,807	605,094	3,776	7,436	41½	359	2,887	13,280	—	134,163	10,503	37,461	116,142	135,104

Year.	Pyrites. Fluorspar. Tons.	Pyrites. Fluorspar. £	Salt (Crude). Tons.	Salt (Crude). £	Sulphuric Acid. Tons.	Sulphuric Acid. £	Soapstone. Tons.	Soapstone. £	Talc. Tons.	Talc. £	Arsenic Ore. Tons.	Arsenic Ore. £	Natural Whiting. Tons.	Natural Whiting. £	Other Metals and Minerals. Tons.	Other Metals and Minerals. £	Total. £
1841	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	390
1842	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	234
1843	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	186
1844	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6,469
1845	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	19,116
1846	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	142,253
1847	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	174,190
1848	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	320,943
1849	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	219,775
1850	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	366,779
1851	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	310,992
1852	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	474,778
1853	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	256,744
1854	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	114,921
1855	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	170,737
1856	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	412,254
1857	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	469,839
1858	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	383,282
1859	—	—	17	8	—	—	—	—	—	—	—	—	—	—	—	—	420,026
1860	—	—	21	10	—	—	—	—	—	—	—	—	—	—	—	—	455,597
1861	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	460,172
1862	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	553,644
1863	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	547,393
1864	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	695,624
1865	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	624,212
1866	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Graphite 10	150	828,651
1867	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	755,241
1868	—	—	151	75	—	—	—	—	—	—	—	—	—	—	—	—	671,743
1869	—	—	480	240	—	—	—	—	—	—	—	—	—	—	—	—	734,992
1870	—	—	214	107	—	—	—	—	—	—	—	—	—	—	—	—	637,578
1871	—	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—	673,570
1872	—	—	199	100	—	—	—	—	—	—	—	—	—	—	—	—	812,827
1873	—	—	34	17	—	—	—	—	—	—	—	—	—	—	—	—	770,627
1874	—	—	62	31	—	—	—	—	—	—	—	—	—	—	—	—	700,354
1875	—	—	65	32	—	—	—	—	—	—	—	—	—	—	—	—	762,418
1876	—	—	20	10	—	—	—	—	—	—	—	—	—	—	—	—	602,327
1877	—	—	71	35	—	—	—	—	—	—	—	—	—	—	—	—	565,013
1878	—	—	37	18	—	—	—	—	—	—	—	—	—	—	—	—	409,767
1879	—	—	45	22	—	—	—	—	—	—	—	—	—	—	—	—	353,803
1880	—	—	621	311	—	—	—	—	—	—	—	—	—	—	—	—	347,557
1881	—	—	973	487	—	—	—	—	—	—	—	—	—	—	—	—	421,045
1882	—	—	491	246	—	—	—	—	—	—	—	—	—	—	—	—	464,059
1883	—	—	673	337	—	—	—	—	—	—	—	—	—	—	—	—	402,549
1884	—	—	855	428	—	—	—	—	—	—	—	—	—	—	—	—	492,378
1885	—	—	1,890	945	—	—	—	—	—	—	—	—	—	—	—	—	345,296
1886	—	—	3,659	1,830	—	—	—	—	—	—	—	—	—	—	—	—	277,086
1887	—	—	1,589	795	—	—	—	—	—	—	—	—	—	—	—	—	320,733
1888	—	—	2,691	1,346	—	—	—	—	—	—	—	—	—	—	—	—	371,565
1889	—	—	3,285	1,643	5	157	—	—	—	—	—	—	—	—	—	—	352,485
1890	—	—	5,598	2,799	12	393	—	—	—	—	—	—	—	—	—	—	288,823
1891	—	—	7,507	3,754	7	180	—	—	—	—	—	—	—	—	—	—	275,551
1892	—	—	6,373	3,187	7	188	—	—	—	—	—	—	—	—	—	—	212,357
1893	—	—	7,115	3,558	18	306	—	—	—	—	—	—	—	—	—	—	242,411
1894	—	—	7,624	3,812	13	230	—	—	—	—	—	—	—	—	—	—	253,898
1895	—	—	17,686	8,843	17	269	—	—	—	—	—	—	—	—	—	—	265,438
1896	—	—	18,824	9,412	42	754	—	—	—	—	—	—	—	—	—	—	248,142
1897	—	—	29,800	14,900	18	364	—	—	—	—	—	—	—	—	—	—	300,406
1898	—	—	31,950	15,975	11	204	—	—	—	—	—	—	—	—	—	—	280,731
1899	—	—	36,000	18,000	23	393	—	—	—	—	—	—	—	—	—	—	473,742
1900	—	—	34,000	17,000	13	261	—	—	—	—	—	—	—	—	—	—	453,570
1901	—	—	42,000	21,000	11	228	—	—	—	—	300	2,250	—	—	—	—	539,688
1902	—	—	38,500	19,250	8	167	—	—	—	—	—	—	—	—	—	—	521,320
1903	—	—	40,000	20,000	17	401	—	—	—	—	—	—	—	—	—	—	583,391
1904	—	—	40,000	20,000	183	2,215	—	—	—	—	—	—	—	—	—	—	544,935
1905	—	—	42,500	21,250	600	5,927	—	—	—	—	—	—	—	—	—	—	592,678
1906	—	—	55,000	27,500	326	3,329	—	—	—	—	—	—	—	—	Rutile 9	203	826,243
1907	—	—	75,000	37,500	140	1,143	—	—	—	—	4	44	—	—	—	—	816,189
1908	—	—	75,000	37,500	231	1,219	—	—	—	—	—	—	—	—	—	—	458,061
1909	—	—	51,407	25,594	833	5,486	—	—	—	—	—	—	—	—	—	—	416,741
1910	Pyrites 2,920	3,270	54,000	27,000	4,758	3,370	90	116	40	100	—	—	—	—	—	—	415,842
1911	2,496	2,560	65,000	40,600	4,626	6,940	—	—	100	200	—	—	—	—	—	—	450,037
1912	—	—	64,300	40,187	5,095	7,642	—	—	120	600	—	—	—	—	—	—	595,670
1913	—	—	65,000	48,750	5,602	7,983	—	—	50	250	—	—	—	—	—	—	642,626
1914	—	—	65,000	48,750	5,980	8,910	—	—	—	—	—	—	—	—	—	—	600,355
1915	—	—	64,000	80,000	5,965	13,421	—	—	—	—	—	—	—	—	—	—	1,001,885
1916	—	—	66,400	83,000	6,919	10,378	—	—	103	309	—	—	—	—	—	—	1,212,874
1917	—	—	46,858	93,716	6,190	8,820	—	—	—	—	—	—	—	—	—	—	1,458,755
1918	—	—	88,519	177,038	6,746	9,613	75	150	235	453	—	—	—	—	—	—	1,451,498
1919	—	—	69,174	138,348	2,179	3,105	40	80	224	785	—	—	—	—	—	—	771,995
1920	—	—	70,871	141,742	4,372	6,230	100	100	98	714	—	—	—	—	—	—	1,154,742
1921	—	—	56,492	127,107	463	660	150	150	108	560	—	—	—	—	—	—	909,549
1922	—	—	48,657	109,478	65	93	150	225	118	845	—	—	—	—	—	—	337,014
1923	—	—	50,286	113,143	2,446	4,892	300	300	118	119	—	—	—	—	—	—	898,602
1924	—	—	62,687	141,046	—	—	200	250	125	750	68	544	—	—	—	—	953,238
1925	—	—	78,251	176,065	—	—	200	250	152	912	100	600	—	—	—	—	1,028,471
1926	—	—	91,101	204,977	—	—	300	375	251	1,443	—	—	—	—	—	—	1,032,353
1927	—	—	79,286	178,394	—	—	300	450	319	1,515	—	—	—	—	—	—	1,188,522
1928	—	—	71,428	160,713	—	—	500	750	131	557	—	—	—	—	—	—	1,032,952
1929	—	—	76,457	172,028	—	—	400	600	364	1,186	—	—	99	297	—	—	1,320,805
1930	—	—	58,766	132,224	—	—	406	609	392	884	—	—	52	156	—	—	1,288,238
1931	—	—	68,666	154,499	—	—	207	311	597	2,089	—	—	50	150	—	—	553,558
1932	Fluorspar 40	133	60,063	135,142	—	—	418	856	636	1,248	—	—	—	—	Graphite 70	1,367	851,898
1933	198	669	58,587	131,821	—	—	836	2,482	541	1,479	—	—	—	—	—	—	1,100,319
Totals 1841 to 1933	Pyrites 5,416; Fluorspar 238	5,830; 802	2,259,877½	3,195,676	63,941	115,871	4,672	8,054	4,822	16,998	472	3,438	201	603	Graphite 80; Rutile, 9	1,517; 203	£51,520,327