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1968

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1967

PARLIAMENT OF TASMANIA

DIRECTOR OF MINES

REPORT FOR THE YEAR ENDED 31 DECEMBER 1967

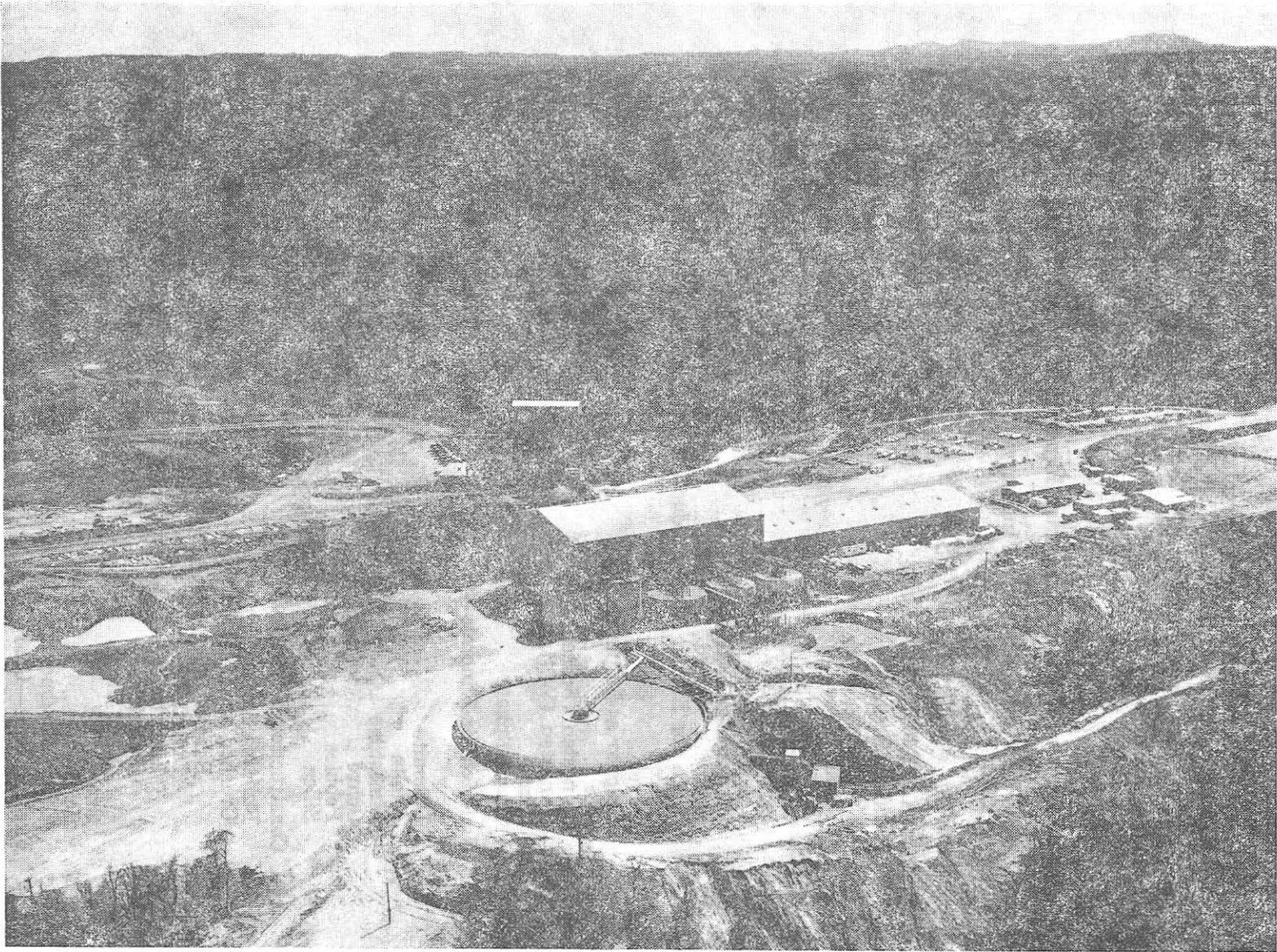
Presented to both Houses of Parliament by His Excellency's Command

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Mine and Concentrator—Savage River Mine

REPORT OF THE DIRECTOR OF MINES

Department of Mines,
Hobart, 19 April 1968.

THE HONOURABLE THE MINISTER FOR MINES.

I have the honour to present my report on the mining industry for the year ended 31 December 1967.

The value of metals and minerals produced was \$126,769,466 consisting of production from Tasmanian ores \$55,252,710 and \$71,426,756 from imported ores. This represents an overall increase of \$2,899,850 being an increase of \$4,072,017 on Tasmanian ores and a decline of \$1,262,167 in value of imported ores.

There have been increases in the production of copper, gold and tin but a small decline in the output of lead, silver and zinc. The output of copper increased by 1,137 tons due to a slight overall improvement in the average grade of ore treated.

The most significant increase in production has been in the case of tin. A total of 2,351 tons of concentrates was produced containing 1,529 tons of metallic tin as compared with 1,511 tons of concentrates containing 1,030 tons of metallic tin for 1966. The additional production reflects the increase in throughput by Renison Limited which stepped up the quantity of ore treated in 1967 to 280,670 tons as compared with 53,657 tons for 1966. Concentrates produced amounted to 1,348 tons containing 819 tons of metallic tin as compared with 593 tons of concentrates containing 385 tons of tin in 1966.

The average number of men employed was 10,538.

Tasmania shared with the rest of Australia the growth in the mining industry and the steady expansion which has been evident for several years continued to be a feature of the industry in Tasmania.

The establishment of the iron ore pellet export industry, the development of productive mining at the Cleveland Tin Mine, the installation of larger capacity plant at the Renison Tin Mine, re-establishment of underground mining at the Mt Lyell Company, the sinking of a new shaft at the Electrolytic Zinc Company's mine at Rosebery, plans for establishment of beach sand mining at King Island and active programmes of exploration covering the potential base mineral bearing areas of the State present a picture which justify optimism for the future of the mining industry.

NEW DEVELOPMENTS

During the year under review there have been significant developments in the mining industry.

Construction work on the establishment of the iron ore pellet industry based on the Savage River deposits reached the final stages and pellet production commenced during November 1967.

Iron ore developments are referred to separately in this report.

At the Cleveland Mine near Waratah the township of Luina was completed, mine buildings have been erected, underground development has proceeded and mining plant and the mill have been installed. Productive operations commenced during the last months of 1967. When in full operation it is planned to mine 250,000 tons of ore annually containing 2,200 tons of tin concentrates and 3,800 tons of copper concentrates. The market value of the tin and copper in the concentrates is expected to be worth about \$5,000,000 each year. Ore reserves are estimated at 3,000,000 tons assaying 1.02% tin and 0.43% copper.

At Renison Bell the new 1,000 tons per day plant operated throughout the year. Operational difficulties have been encountered due to equipment failures and to varying sources of ore which resulted in low recoveries. Research is in progress to improve the percentage of tin recovered from ore processed through the mill and although the problem has not been solved some progress has been made.

Further mine development and drilling has resulted in a re-assessment of ore reserves which have been fixed at 13.75 million tons averaging 0.75% tin. Exploratory work is continuing.

The Mt Lyell Mining and Railway Co. Ltd continued an active programme of exploration and development within their leases at Queenstown and extensive diamond drilling was undertaken. Development of the Crown Lyell No. 3 orebody containing 3.7 million tons of ore averaging 1.6% copper has commenced and feasibility studies on mining of an estimated 40-45 million tons of 1% copper ore lying below the present open-cut are continuing. Ore reserves from current workings have been assessed at 16.6 million tons containing 1.026% copper.

A contract has been let for the sinking of a new vertical shaft at the Rosebery mine of the Electrolytic Zinc Co. The shaft will be circular of 22 feet diameter and 2,420 feet deep and will be equipped to permit a substantial increase in production to a depth of 3,770 feet. The capital cost will be about \$4,000,000. Development work and diamond drilling has been maintained on the company's leases and ore reserves have been increased to 7.5 million tons.

Development work and diamond drilling at the Aberfoyle Tin Mine at Rossarden and the Storeys Creek Tin Mining Co. at Storys Creek resulted in the establishment of increased ore reserves which are essential to ensure a continuity of operations. At the Storeys Creek Mine reserves were assessed at about a quarter of a million tons and at the Aberfoyle Mine about 0.34 million tons which represented increases on 1966 estimates.

Exploratory diamond drilling at the King Island Scheelite Mine at King Island has successfully confirmed the existence of ore over a length of 600 feet and to a depth of 550 feet north-east of No. 3 Fault. There is estimated to be 1,000,000 tons of ore of 1% tungstic oxide content between 300 feet and 550 feet below sea level. Possible working methods are being studied. Based on this and other work, reserves have been calculated at nearly three million tons of 0.53% tungstic oxide which represents a doubling of assessed reserves in 1966.

A small party which has been interested in prospecting known alluvial tin and gold deposits at King Island over a period of many years was successful in having further exploration undertaken by Quest Pty Ltd, a Melbourne company and by Mt Costigan Mines Ltd, a Canadian company. As a result a small scale alluvial tin mining operation has been established by Quest under the name of Hawkes Alluvial Ltd and investigation of areas adjoining the mine workings is being undertaken. Mt Costigan Mines Ltd undertook a comprehensive drilling programme and have established the existence of extensive deposits of beach sand minerals containing mainly rutile and zircon with some tin. A feasibility study has established that the deposits are capable of commercial development and a company named Naracoopa Rutile Limited has been formed to exploit the deposits and to continue prospecting operations. The subscribers to the company consist of New Costigan Mines Ltd, Amad No Liability, Mid-Eastern Oil N.L. and Anglo-American Corporation (Australia) Limited.

Towards the end of the year the Dorset Tin Dredge operated by the Storeys Creek Tin Mining Co. N.L. at Gladstone encountered difficulty in continuing productive mining because of low tin values in the ground being dredged. The Department undertook a programme of exploratory drilling on an area in the Gladstone district which might be suitable for dredging and results have indicated a substantial quantity of tin-bearing gravels. The company is engaged in drilling on its leases to establish reserves capable of economic dredging. A Special Prospector's Licence has been granted in the Mussel Roe area some distance from the Dredge and the company has a drilling plant employed in testing this area. The future operation of the Dredge is dependent upon the successful outcome of present investigations, and results to date are encouraging.

Operations by small tin producers in the north-east have been seriously affected by the prolonged period of dry weather. Supplies of water to producers from the Mount Cameron Water Race, Gladstone, have reached a record low level and unless there are heavy falls of rain producers will be forced to cease operations.

Power restrictions which became effective in October have not seriously affected productive mining activities but the Electrolytic Zinc Co. at Risdon has been obliged to make a small reduction in zinc production and to drastically reduce the production of sulphate of ammonia.

METAL PRICES

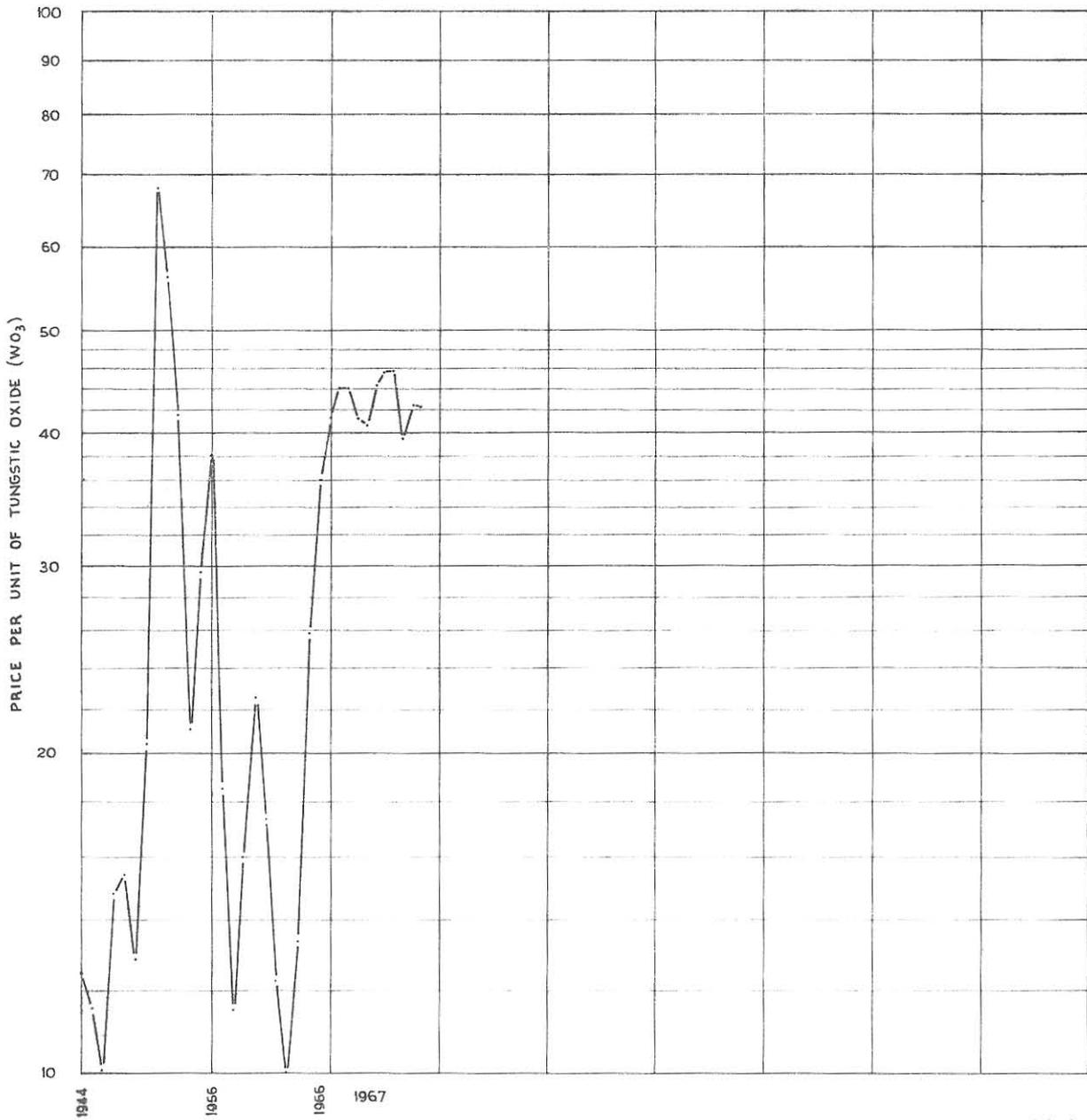
Copper.—The Australian price of copper has been based on prevailing world prices since August 1966, and has fluctuated according to supplies available from producing countries for trading on the London Metal Exchange. During the greater part of the year the price fixed by the Copper Producers' Association was \$950 per ton but in September this was increased to \$1,000 per ton, in October to \$1,150 per ton and in November to \$1,250 per ton and this was the ruling price at the end of the year. The uncertainties of the pricing policies of the main exporting countries added to a current shortage of available metal is likely to result in an upward movement in price.

Lead.—The Australian price of lead remained at \$225 per ton until May when it declined to \$210 per ton. The price remained unaltered at the end of the year.

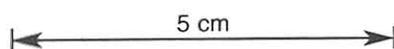
Tin.—The Australian price of tin which is based on the cost of tin imported from Malaysia was \$3,123 per ton at the beginning of the year. The price ranged between a high of \$3,153 per ton in June to a low of \$3,033 per ton in December. The increased availability of supplies both from higher mine production and from continuing sales from the United States stockpile has

TUNGSTEN PRICES

YEARLY AVERAGES 1944-1966 MONTHLY AVERAGES 1967-

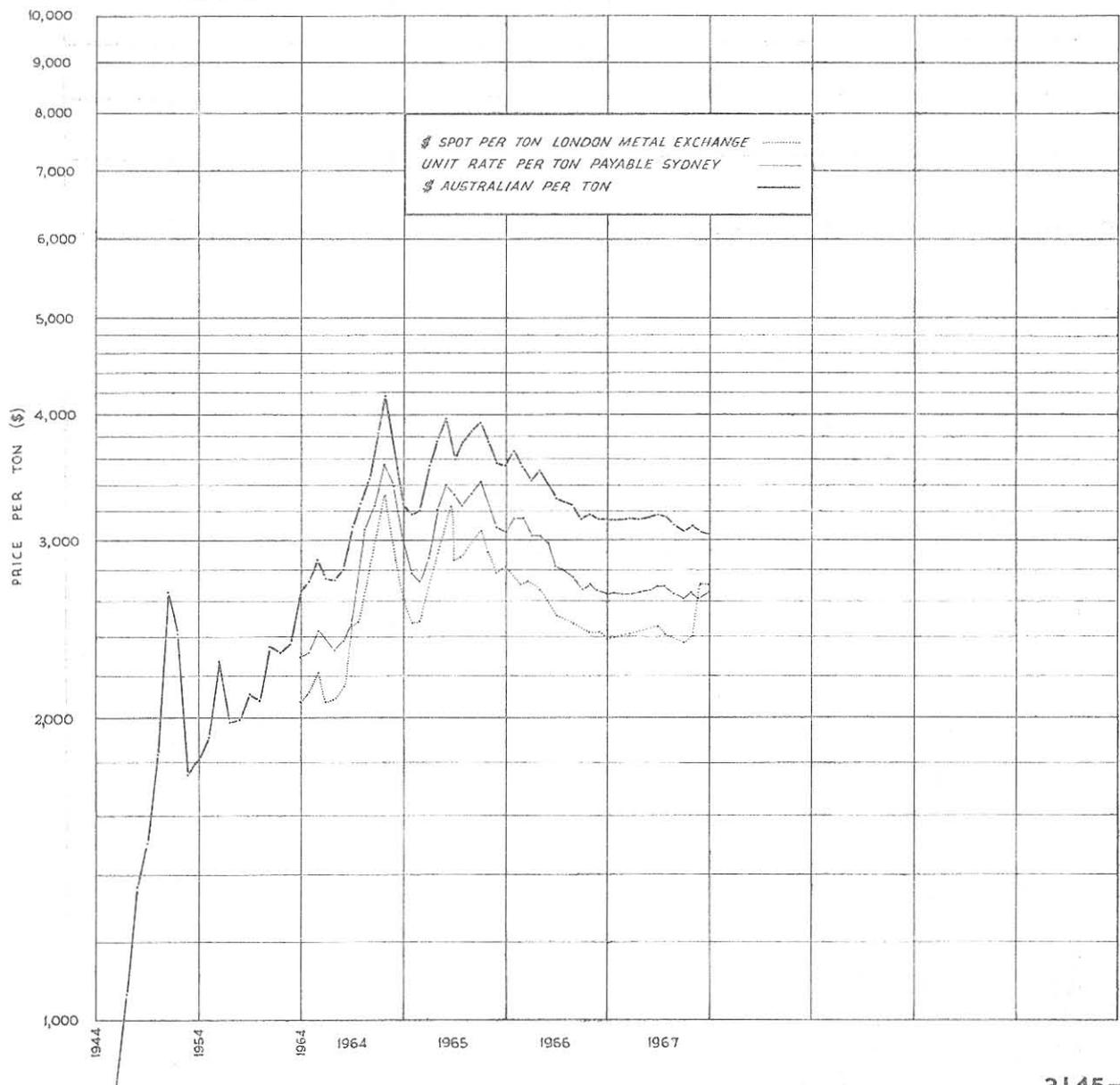


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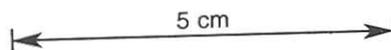


TIN PRICES

YEARLY AVERAGES 1944 - 1964 MONTHLY AVERAGES 1964 -

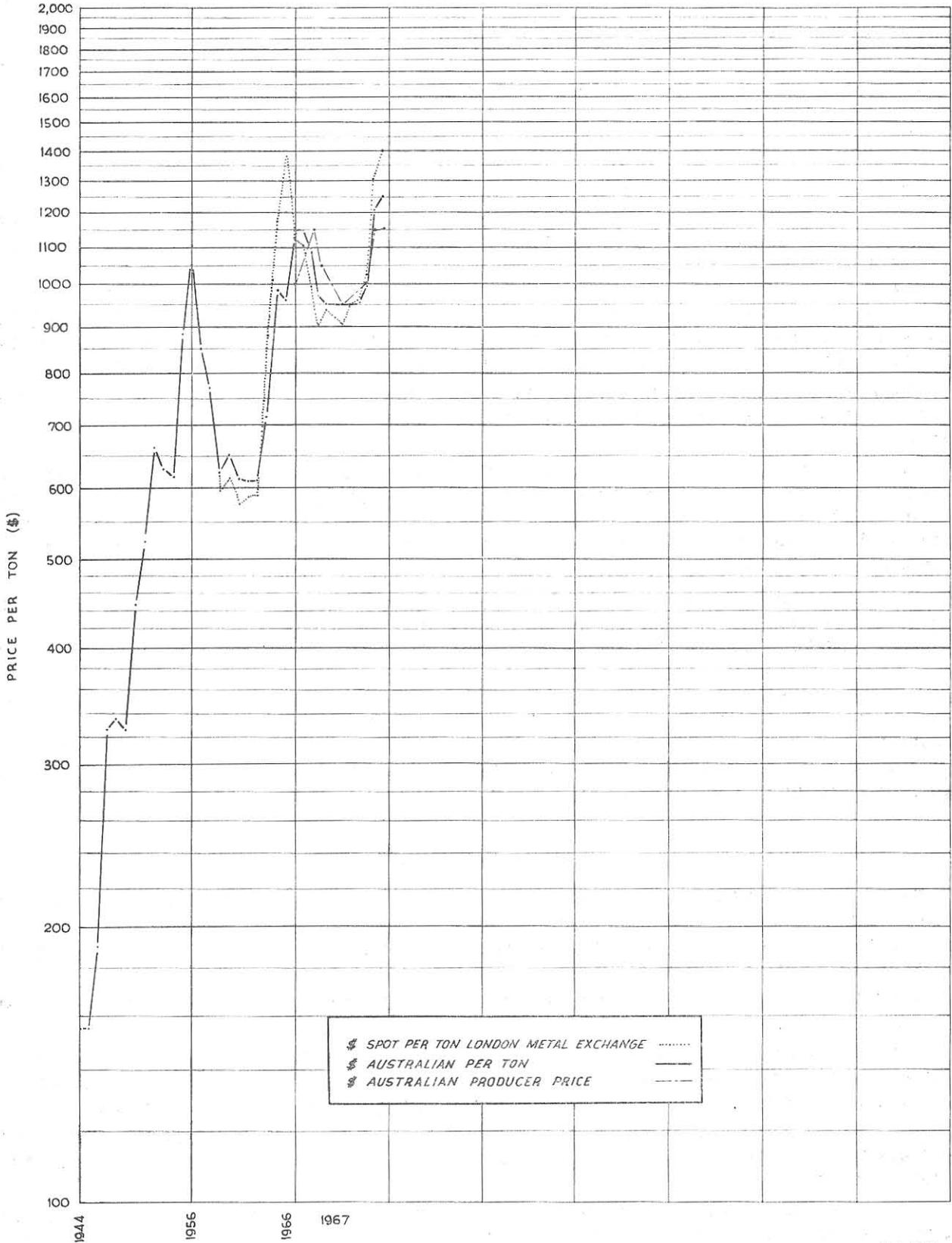


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COPPER PRICES

YEARLY AVERAGES 1944-1966 MONTHLY AVERAGES 1967-



3146-M

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resulted in a general downward trend in world prices and there are indications that the position could develop when supply will exceed demand. If this should eventuate the price control Buffer Stock set up by the International Tin Council would operate and together with controlled releases of tin from the United States stockpile would serve to maintain prices at an economic level. Following the 14.3% devaluation of the British pound in November 1967, the Buffer Stock Manager will sell tin when the London Metal Exchange price reaches £S1,633 per ton but he may decide to sell when the price is £S1,516 per ton. If the price should fall to £S1,283 he will buy tin to reduce market supplies and force prices upwards but he may buy from when the price reaches £S1,400 before the minimum operational price is reached. The price on the London Metal Exchange at the end of December was £S1,345 per ton and in accordance with the Buffer Stock market control scheme a level had been reached at which steps should be taken to buy tin to arrest the downward trend.

The amount payable to Tasmanian tin producers is quoted on the basis of a unit rate based on 70% tin concentrate with adjustments for variations in grade. The price varies daily and ranged from an average high of \$27.25 in July to a low of \$25.41 in December. This represents a decline to the level of prices which producers received during the early part of 1964 and is affecting the economic working of marginal deposits particularly by small operators. Development of deposits by some larger producers which was stimulated by high market prices towards the end of 1964 and 1965 is now resulting in greater production. The fall in price has not discouraged production but if increased quantities of tin reaching the market from producing countries results in overtaking demand, it will be difficult for market control schemes to maintain the price at an economic level and this will serve to limit expansion of productive activities.

Tungsten.—Producers of tungstic oxide are the Storeys Creek and Aberfoyle Mines which market wolfram concentrates and the King Island Scheelite mine which produces scheelite concentrates.

The price of tungsten which is quoted on the basis of a long ton unit rate fluctuated between a high of 365/- Sterling per unit and a low of 315/- Sterling per unit until devaluation of the British pound which resulted in an increase in the price to 385/- Sterling per unit. The relative stability of the price at an economic level has stimulated exploration and developmental work and producers report location of further ore reserves and proposals for increased production.

Zinc.—The Australian price of zinc has been fixed on the producer's pricing basis since mid-July 1964. It remained at \$266 per ton until June 1967 when it was reduced to \$256 per ton. Although Australian consumption has increased, exports of concentrates and of refined zinc account for more than half of the Australian production. Sales are made throughout the world in competition with production from other countries. Although there were forecasts of surplus production, prices on the London Metal Exchange and in the United States although subject to some variation, remained relatively constant. The American price has remained at 13.5 cents per pound since July 1967 and the London Metal Exchange price was £S114 per ton at the close of the year which represented the highest monthly average for the year.

EXPLORATION

Exploration activities by producing mines outside the boundaries of their mining leases and by exploration companies have been continued on a major scale, but the trend is now to concentrate on relatively smaller areas where geological, geochemical and geophysical surveys have indicated favourable conditions for the occurrence of mineral deposits.

A total of 99,624 square miles of land and sea-covered land is held as exploration or special prospectors' licences principally in the west and south-west of the State.

Activities in off-shore areas, where large areas of sea-covered land off the west, north-west, south and north-east coasts are in occupation, have continued but on a reduced level. There have been no reports of discoveries of economic significance but investigations are continuing.

Six exploration licences to search for oil in off-shore areas to the limits of the Continental Shelf are in occupation and investigational work is proceeding. These activities are referred to in detail later in this report.

Aberfoyle Tin N.L.; Cleveland Tin N.L.; Comstaff Pty Ltd; Electrolytic Zinc Company of Australasia Ltd; Industrial and Mining Investigations Pty Ltd; King Island Scheelite (1947) Ltd; Mt Costigan Mines Ltd; Mt Lyell Mining and Railway Company Ltd; Pickands Mather & Company; Planet Mining Company Pty Ltd; Quest Exploration Pty Ltd; Renison Limited; Storeys Creek Tin Mining Company N.L.; and Utah Development Company are the companies engaged in exploratory work on land whilst Ocean Mining A.G.; Planet Mining Company Pty Ltd; and the Electrolytic Zinc Company of Australasia Ltd and The Broken Hill Pty Company Ltd are con-

cerned in off-shore mineral investigations. In addition to Hematite Petroleum Pty Ltd a subsidiary of The Broken Hill Pty Company Ltd which has been searching for oil in Bass Strait since 1960, Esso Exploration Australia Inc.; Magellan Petroleum Southern Pty Ltd; and the Electrolytic Zinc Company of Australasia Ltd hold licences to search for oil in off-shore areas.

Expenditure on exploration outside existing mining leases is estimated at \$1.5 million for 1968. Since exploration became a feature of mining in this State during the past ten to fifteen years, total expenditure in the search for new mineral deposits would exceed \$12,000,000.

The Department of Mines has continued with regional investigations and with economic, hydrological and engineering geological work as part of its policy of investigation and exploration of the mineral resources of the State.

Boring at the old Tasmania gold mine was completed and three intersections of the orebody were made with encouraging results. Tenders were invited from interested companies for the right to further investigate and exploit the deposits but no tenders were received. However, the potential of the area is still being considered by some companies.

The Department is currently engaged in testing alluvial tin deposits in the north-east; gold reefs at Aliberton; underground water resources in the Longford-Cressy area, and deposits in the Fingal Valley and potential tin lodes at Waratah and on the Blue Tier.

The information obtained by the Department as a result of geological surveys and engineering and metallurgical investigations are published in the form of maps, bulletins and technical reports and these are available for use by mining and exploration companies.

Ore-dressing services and assaying facilities at the Department's laboratories at Launceston were in constant demand by operating mines and exploration companies. It is pleasing to record that the technical services provided by the Department in the fields of geology, mining engineering and metallurgy have played an important role in the decision to establish an iron ore industry on the Savage River deposits and also in the establishment of productive mining at the Cleveland Tin Mine.

IRON ORE

Construction work associated with the establishment of the iron ore pellet export industry based on the Savage River iron ore deposits has proceeded to schedule and the first concentrate was pumped through the 53-mile pipeline from Savage River to Port Latta in October. Test production of pellets at Port Latta commenced in November and the first shipment is expected to be made to Japan early in 1968.

Pickands Mather & Company, managers for the Savage River project have therefore achieved a record by being responsible for the first pellet production in Australia. When full production is reached the Port Latta plant will export about 2.25 million tons of pellets a year.

The ore which is mined by open-cut methods at Savage River is a low grade magnetite averaging about 40% iron content. It is concentrated at Savage River where it is up-graded to about 69% iron. This concentrate is then pumped in slurry form to Port Latta where the pellets are manufactured for shipment. The establishment of the industry was ratified by the Iron Ore (Savage River) Agreement Act 1965, which has been referred to in previous annual reports. The project is a joint venture of Northwest Iron Company Ltd and Dahlia Mining Company Ltd each of which will have a half interest and will take one-half of the output. The capital of Northwest Iron Company Ltd is being subscribed by Pickands Mather & Company International, and Australian interests consisting of Kathleen Investments (Aust.) Ltd, Ampol Mining Company Pty Ltd, Colonial Mutual Life Assurance Society Ltd, The Mutual Life & Citizens Assurance Company Ltd, United Insurance Company Ltd, National Mutual Life Association of A/asia Ltd and Australian Mutual Provident Society, whilst the capital of Dahlia Mining Company Ltd is being provided by the Japanese companies of Mitsubishi Shoji Kaisha Ltd and Sumitomo Shoji Kaisha Ltd. Investment in the project exceeds \$62,000,000.

A royalty of 15 cents per ton of pellets shipped is payable to the State under the Savage River (Iron Ore) Agreement Act.

The lease granted at Savage River relates to part only of the known iron ore deposits and Mr E. R. Hudson whose company holds the Exploration Licence is continuing to investigate the balance of the area of 140 square miles contained in the Exploration Licence and is having discussions with overseas interests with the object of determining the possibilities of establishment of an integrated steel industry. A feasibility study is currently being undertaken.

Discussions have also taken place as to the possible production of pyrites as a by-product of the concentrating plant at Savage River for use in the manufacture of sulphuric acid. It is probable that no decision will be made until the pellet making plant becomes fully operative,

but it represents a possibility which could be of economic value to Australia which uses imported brimstone as a source of raw material for much of the sulphuric acid manufacture required by industry. Tasmania's requirements of sulphuric acid are fully satisfied by the production of the Electrolytic Zinc Company which exports its surplus to other States.

OIL

The Broken Hill Pty Co. Ltd through a subsidiary, Hematite Petroleum Pty Ltd, has held a licence to search for oil in Bass Strait since 1960. Considerable geophysical work was undertaken and in association with Esso Explorations Australia Inc. three bores have been put down in the Bass Basin which occurs within the licence area. The first bore (Bass No. 1) located 90 miles east of King Island was completed at 7,717 feet, the second (Bass No. 2) which was sited 75 miles west of Flinders Island was sunk to 5,910 feet and the third bore (Bass No. 3) 55 miles north of Stanley was completed at 7,978 feet. All bores were unproductive. Data which has been assembled is being re-assessed and further investigations will be undertaken.

Portion of the Otway Basin extends from South Australian and Victorian waters into Tasmanian waters and is included in the licence held by Hematite Petroleum Pty Ltd. The 'Ocean Digger', the semi-submersible drilling rig constructed at the Whyalla Shipbuilding Yards of The Broken Hill Pty Co. Ltd which recently completed a bore in South Australian waters has now moved into Tasmanian waters about 50 miles north-west of King Island. A bore to 12,000 feet has been programmed.

Esso Exploration Australia Inc. holds off-shore licences on the east, west and south-west coasts to the edge of the Continental Shelf. Geophysical work has been undertaken and is to be continued. The Electrolytic Zinc Company have an area of 8,000 square miles in south-eastern Tasmania embracing land and off-shore areas where geophysical work has been carried out. Results are being assessed in order that further work may be arranged.

Magellan Petroleum Southern Pty Ltd are the holders of two licences. One to the west of Flinders Island covers the part of the Continental Shelf outside the licence area of Hematite Petroleum Pty Ltd and includes part of the Gippsland Basin (which lies outside the jurisdiction of the State of Victoria) and is within about 20 miles of where oil and gas discoveries have been made by Hematite Petroleum Pty Ltd operating on licences issued by Victoria. The second licence covers an area of 3,620 square miles west of King Island and is mostly beyond the limits of the Continental Shelf. Portion of the Otway Basin which is within Tasmanian waters occurs in the licence area. The company is undertaking geophysical surveys.

Mr C. G. Sulzberger the holder of a licence to search for oil on the north-west coast near Elizabeth Town has completed three bores without success and has abandoned the area. He has made another application for a licence in the Longford area in the north of the State and proposes to undertake drilling operations.

Uniform legislation to administer off-shore oil search and production activities has been finally passed by the Parliaments of the Commonwealth and the States. Detailed reference is made under the heading of Legislation.

LEGISLATION

Petroleum (Submerged Lands) Act 1967

At a meeting of State and Commonwealth Ministers on 8 June 1962, it was agreed that a national solution to the problems of off-shore operations in the search for petroleum was necessary. Most States had at the time issued exploration companies with licences to search for petroleum in off-shore areas, and even though some States had inserted provision in their legislation to apply the legislation to off-shore areas there was considerable doubt as to whether the ownership of the Continental Shelf was vested in the States or the Commonwealth, and whether the power to grant an effective title was vested in a State Government or the Commonwealth Government. Following a series of conferences between State Ministers for Mines and the Commonwealth Minister for National Development, discussions at conferences of the Attorneys-General of the States and the Commonwealth and between legal and Mines Department officers of the States and the Commonwealth legislation was prepared on a co-operative basis to provide a framework to govern the exploration for and exploitation of the petroleum resources of the Continental Shelves of Australia and certain of the Territories of the Commonwealth. In this co-operative effort the States and the Commonwealth have pooled not only their respective jurisdictional powers but also their administrative and technical resources. It was agreed that without abating or abandoning their constitutional

claims and without derogating from their respective constitutional powers the States and the Commonwealth would enact uniform legislation providing for a Common Mining Code to apply uniformly to the Continental Shelf and to the sea-bed and sub-soil beneath territorial waters. The joint arrangement will not apply to submerged land beneath internal waters which will remain subject to the provisions of the Mining Act 1929.

The arrangement is contained in a formal Agreement dated 16 October 1967, which states that Australia as a coastal State has sovereign rights over the Continental Shelf beyond the limits of Australian territorial waters for the purpose of exploring it and exploiting its natural resources. This right is recognised by the Convention of the Continental Shelf signed at Geneva on 29 April 1958, to which Australia is a party. The term 'Continental Shelf' is used in the Convention as referring to—

- (a) the sea-bed and sub-soil of the submarine areas adjacent to the coast but outside the area of the territorial seas to a depth of 200 metres, or beyond that limit, to where the depth of the superjacent waters admits of the exploitation of the natural resources of these areas; and
- (b) to the sea-bed and sub-soil of similar submarine areas adjacent to the coasts of islands.

The area of territorial waters and area of superjacent waters of the Continental Shelf which each State and Territory of the Commonwealth will administer under the Common Code has been defined in the Commonwealth Act and in each State Act and is illustrated by maps which accompany the Commonwealth/State Agreement. These are referred to as 'adjacent areas' and were determined between the Commonwealth and the States after individual States with common boundaries had agreed upon a dividing line between the States of that part of the Continental Shelf off their respective coasts. A formal agreement between Tasmania and Victoria was signed on 22 October 1965.

The Common Code is embodied in the Petroleum (Submerged Lands) Act 1967, which is a 'mirror' of the Commonwealth Act. The Commonwealth Act and the uniform Acts of all the States have been passed by the respective Parliaments in accordance with the Agreement referred to, and it is now possible for legally effective authorities to be issued to search for petroleum and exploit any discoveries.

The Act will be administered by the State in consultation with the Commonwealth and the Minister for Mines will be the Designated Authority under the Act who is charged with administration of the Common Code contained in the legislation in so far as the Tasmanian adjacent area is concerned.

Graticular Blocks—The normal methods of survey markings to fix boundaries and location of areas cannot be applied to submerged lands and the Act provides for the application of a system from the graticulation of the earth's surface by the meridian of Greenwich. The adjacent area to each State will be divided into blocks consisting of 5 minutes of latitude for 5 minutes of longitude. The area will vary due to the curvature of the earth's surface, but will consist of approximately 25 square miles for each block in the vicinity of Tasmania.

Forms of Tenure.—The Act provides for the issue of exploration permits, production licences and pipeline licences and makes provision for registration of dealings in permits and licences, the carrying out of all operations in accordance with good oil field practice, regulation and control of operations by direction of the Designated Authority and for payment of fees and royalty on production of petroleum.

Exploration Permit.—An Exploration Permit may be granted in respect of a maximum of 400 blocks, that is, about 10,000 square miles. A nominal minimum of sixteen blocks, about 400 square miles, has been set. If the Designated Authority is satisfied as to the technical and financial resources of the applicant and as to the proposed programme of work he may issue an Exploration Permit for a period of six years subject to such conditions as he may determine. An application fee of \$1,000 is payable and an annual rent of \$5 per block with a maximum of \$100. In addition a security of \$5,000 is required to ensure compliance with the conditions of the permit. At the end of six years, renewals for successive periods of five years may be granted provided the permit holder has satisfactorily complied with the conditions of the licence. All renewals are subject to the requirement that the permittee must surrender half of the permit area. The Designated Authority may invite tenders for the surrendered area and may issue an intending applicant with a special prospecting authority to enable a preliminary investigation of the area to determine the amount of any tender. In certain circumstances the Designated Authority may make available reports and other information furnished by the previous permit holder to prospective tenderers.

Production Licences.—Where petroleum is discovered in a permit area the holder must notify the Designated Authority and furnish full particulars of the nature of the discovery. The permit holder may or may not be required by the Designated Authority to nominate a block which will then become the centre of a location. The maximum area of a location consists of a group of nine blocks each side being three blocks in length. The nominated block, which is the centre of a location, does not have to be the 'discovery block' where petroleum was reported to be discovered. The 'discovery block' must, however, be included in the location. Application must be made for a production licence not later than two years after the location has been declared or within such further period not exceeding two years as the Designated Authority may allow. Where the location was for nine blocks the application for a production licence may relate to five blocks, if the location for eight or seven blocks, application may be made for a production licence for four blocks, if the location for six or five blocks, the application can be for three, if four or three, then two can be applied for, if two, only one can be applied for and if one, then the application may be for that block.

The location blocks not applied for as a production licence revert to the Crown. The holder of the exploration permit may apply for these blocks as a separate production licence in which case an additional royalty, known as 'over-ride royalty' shall apply to the whole of the blocks in a location. If the permit holder does not apply for the additional blocks the Designated Authority may invite applications. Provision is made for the issue of a special prospecting authority to permit an intending applicant to explore the blocks on offer to enable an evaluation to be made for purposes of a tender.

A production licence will be issued for a term of twenty-one years with right of renewal for twenty-one years at an annual rental of \$3,000 per block together with a royalty at 10% of the well-head value of petroleum produced. This will usually be for five blocks out of the nine-block location and will be known as a primary licence. If a secondary licence for the remaining four blocks from a nine-block location is granted the same term and annual rent as for a primary licence will apply, but instead of a 10% royalty, a royalty of not less than 11% and not more than 12½% will apply on production from the whole of the nine blocks, that is, the five blocks in the primary licence and the four blocks in the secondary licence. The actual rate of the 'over-ride royalty' will be decided by the Designated Authority after conferring with the applicant. All production licences will contain a covenant requiring the holder to expend \$100,000 each year for each block contained in the licence on exploration or operations for the recovery of petroleum. The amount may be expended anywhere within the licence area. The value of any petroleum produced in any year may be off-set against the expenditure obligation for the next year. Unless an exemption is obtained the licence holder may be required to pay to the Crown the difference between the expenditure obligation and the amount actually expended. Licence holders are required to commence operations within six months and to conduct all such operations in a workmanlike manner and in accordance with good oilfield practice. If the Designated Authority is satisfied there is recoverable petroleum in the licence area and none is being produced, the licence holder may be directed to commence production. A producer may also be required to increase or reduce his production to a specified level. A security of \$50,000 is required from licence holders for compliance with the provisions of the licence.

Pipeline Licences.—Provision is made for the issue of pipeline licences for conveyance of petroleum from an off-shore well to the shore. The term of such licences will be twenty-one years or can be varied to run concurrently with the production licence from which the petroleum is being produced. An application fee of \$1,000 is payable together with an annual rent of \$20 per mile. Security for compliance with the conditions of the licence has been fixed at \$20,000.

Registration of Instruments.—As previously indicated the State is 'mirror' legislation to that of the Commonwealth. For constitutional reasons the Commonwealth is unable to charge stamp duty on the consideration concerned in dealings in titles, and in the State legislation provision has been made for payment of registration fees which are equivalent to stamp duty payable on similar transactions under the normal Stamp Duty legislation. Briefly, a fee of 1½% of the consideration or value of the exploration permit, production licence or pipeline licence is payable on a transfer or an instrument by which a legal or equitable interest in a title is created. If the transfer is between related companies for administration purposes a fee of \$1,000 is payable in lieu of the 1½% ad valorem fee. Where the consideration is expenditure in approved exploratory work then the fee payable is \$100 only. Where the transfer is the result of an agreement entered into prior to this legislation a fee of \$1,000 is payable.

Release of Information.—All exploration permits and production licences require the holders to furnish complete information by way of reports, plans, drill core samples and other records

relating to exploration and production. Provision is made for the circumstances under which this information may be released for public purposes. In general, information is not released where the permit or licence holder continues in lawful occupation of the area.

Fees and Royalties.—All amounts received by way of application fees, premiums, annual rentals and registration fees remain the property of the State. The prescribed royalty of 10% of the value of petroleum at the well-head will be shared between the Commonwealth, which will receive four-tenths, and the State, which will receive six-tenths, in accordance with the Commonwealth/State Agreement of 16 October 1967. The Agreement provides the over-ride royalty of from 1% to 2½% will remain with the State.

The legislation also provides for the making of regulations and those relating to safety and operational conditions are in process of completion.

Transitional Provisions.—Exploration licences to search for oil in off-shore areas which have been issued previously under the Mining Act 1929, consist of 35,325 square miles in the name of Hematite Petroleum Pty Ltd, two areas of 8,350 square miles and 2,700 square miles respectively to Esso Exploration Australia Inc., portion of an area of 8,000 square miles held by the Electrolytic Zinc Co. of Australasia Ltd, and two areas of 998 square miles and 3,620 square miles in the name of Magellan Petroleum Southern Pty Ltd.

These licence holders may at any time apply for the issue of exploration permits in lieu of their present exploration licences.

The exploration licences will all expire during 1968, and exploration permits, under the Petroleum (Submerged Lands) Bill 1967, will then be granted. Should a discovery of petroleum be made before a new exploration permit is granted the holder may nominate a block and apply for a production licence under the new legislation.

The Mining Act 1929

No amendments were made to the Act but several regulations were prepared to improve administrative procedures and are incorporated in the Mining Regulations 1967 (S.R. 1967, No. 316). Provision has been made to enable the Director of Mines to exercise discretion as to the shape of mining tenements where the normal requirement that mining tenements must be in the form of a square is not reasonably practicable. Previously the regulations required that owners or occupiers of land exercising prospecting rights had to observe a monthly expenditure covenant. The amendment removes this provision and such persons are now required to prospect continuously in accordance with good mining practice to the satisfaction of the Director of Mines. This makes the conditions for prospecting on private land uniform for all persons entitled by the legislation to prospect on private land. New regulations have been made as to the method to be employed in permanently marking out mining tenements. The provisions relating to the issue of rights to mine for minerals on stone leases have been revised and new forms prescribed.

Under the Mining Act 1929 (section 70) provision is made for the issue of permits to enter and search on certain private land for minerals and prescribed stones. As a result of alterations to the definitions of 'minerals' and 'stone' by the Mining Act 1966, 'stones' now relate to substances normally regarded and used as building or construction stone, namely, clay, sand, gravel, serpentine, gabbro, dolerite, basalt, slate, granite, freestone and other building stones. The types of 'stone' in respect of which the amended regulation makes it possible to grant a permit to search on certain private land is limited to 'slate' only. In the case of other 'stones' the written consent of the owner and occupier is necessary.

Other amendments provide that greater quantities of mining products may be removed by prospectors for testing purposes, clarification of procedures for surrendering leases and for minor matters of an administrative nature.

FIRST AUSTRALIAN PNEUMOCONIOSIS CONFERENCE

An Australia-wide conference on dust in mines covering instrumentation, sampling techniques and methods of suppression is to be held in Sydney in February 1968. The major mining companies are financing the visit of one expert from overseas and this State has joined with the other States and the Commonwealth in sponsoring the visit of another expert who will present a paper at the conference. This Department's contribution of \$500 was authorised under the Appropriation Act 1967-68. The expert will visit Tasmania to discuss specific problems concerning dust. The problems associated with dust have increased over recent years as a result of greater mining activity, more extensive mechanisation in mines and the use of diesel equipment underground. The conference and the visit of the overseas expert should be of benefit to the mining industry generally and assist in the administration of legislation concerned with the health and safety of persons employed in mines.

NATIONAL COAL RESEARCH ADVISORY COMMITTEE

A National Coal Research Advisory Committee representing the Commonwealth, the States and private enterprise was set up in 1964 and Tasmania is represented by the Director of Mines. National Coal Research Laboratories have been established by the Committee which assists in financing the activities and also contributes to research activities being undertaken by the CSIRO, universities and other government and private bodies who are investigating new uses for coal or are aiming to improve its efficiency as a fuel.

A new programme has been undertaken this year by the Australian Coal Industry Research Laboratories aimed at lowering the cost of production by improving winning methods and increasing the efficiency of coal for various purposes by careful grading, washing and sizing before sale. Work on the production of nitrogenous fertiliser and electric furnace electrodes from coal is also under attention.

A total of \$520,000 is contributed to the Committee each year for allocation to research projects. Tasmania's annual payment is \$5,000. Actual expenditure on coal research by the Committee and all other known agencies in Australia is in the vicinity of \$2.5 million per annum.

Results from research projects and any possible application to Tasmanian coals are kept under review.

WIRE ROPE COMMITTEE OF THE AUSTRALIAN MINERAL RESEARCH ASSOCIATION LIMITED

A Wire Rope Committee was set up by the Australian Mineral Industries Research Association Limited in December 1961, and has the support of the Commonwealth and State Governments and of industry who make financial contributions towards the cost of wire rope research. At present there are eighteen sponsors. A full-time Project Scientist is employed who is engaged in research into hoisting dynamics and rope behaviour, durability and testing. The aim of the project is to develop a reliable technique and the necessary equipment for the non-destructive testing of wire-ropes and to present evidence of its reliability so that it will be accepted throughout the mining industry in place of the existing wasteful destructive testing procedure. Three testing instruments are now available and tests have already been carried out on different types of rope. Periodic testing will be continued and data will be accumulated which will form the basis of the assessment of the safe working life of wire ropes by a non-destructive process. Ropes in use in Tasmanian mines were tested by this process towards the end of the year. The work of the Wire Rope Committee is extremely important and will have far-reaching effects on mine safety, mining legislation and operating economics. The proposed financial contribution by this State is \$2,000 spread over a period of three years. The Director of Mines is a member of the Committee.

REVENUE

Return Showing the Revenue Collected During the Year Ended 31 December 1967

Head of Revenue	Amount
	\$
Public Works and Services—Mines Department	31,619
Rent and Fees of Auriferous and Mineral Lands	91,566
Survey Fees	5,361
Fees under the Explosives and Inflammable Liquids Act	33,346
Total	\$161,892

Comparative Statement of Revenue from Mines, Being Rents, Fees, Storage of Explosives, etc., Paid to the Treasury During the Years 1960 to 1967

Year	Amount
	\$
1959	64,576
1960	83,452
1961	95,196
1962	88,242
1963	114,072
1964	119,398
1965	125,606
1966	135,350
1967	161,892

The above statement does not include Stamp Duties upon Transfer of Leases.

LEASES AND LICENCES

Return Showing Number and Area of New Leases and Licences Issued During the Year Ended 31 December 1967

Leases and Licences	Number	Area (acres)	Sluiceheads
Clay and Sand	3	30	
Copper	2	108	
Easements	3	11	
Gravel	2	2,085	
Gold	3	38	
Osmiridium	14	600	
Peat	1	10	
Silica	2	1,453	
Stone	5	610	
Tin	40	1,462	
Water Licences	15	56	57
Total	90	6,463	57

Return Showing the Total Number of Leases and Licences in Force on 31 December 1967

Leases and Licences	Number	Area (acres)	Sluiceheads
Beach Sands	5	400	
Bauxite	5	454	
Barytes	1	40	
Clay	12	442	
Coal	14	3,751	
Copper	2	6,291	
Copper-Nickel	3	120	
Dolomite	4	309	
Easements	67	999	
Feldspar	2	15	
Gold	20	656	
Granite	3	25	
Iron Ore	6	5,060	
Limestone	22	1,616	
Mica	1	20	
Minerals	34	11,257	
Ochre	2	8	
Nickel	1	80	
Osmiridium and Chromite	28	3,534	
Rutile-Tin	2	19	
Sand and Gravel	23	877	
Scheelite	5	2,007	
Silica	7	59	
Silver-Lead	10	389	
Stone	50	5,228	
Tin	238	10,446	
Tin-Wolfram	16	5,181	
Uranium	1	50	
Water Licences	117	901	784
Total	696	59,603	784

Return Showing Number and Area of Leases and Licences Applied for During the Year Ended 31 December 1967

Leases and Licences	Number	Area (acres)	Sluiceheads
Copper	1	80	
Easements	6	57	
Gold	2	20	
Gravel	2	20	
Minerals	4	5,013	
Osmiridium	15	554	
Scheelite	2	1,158	
Silica	1	10	
Silver-Lead	1	2	
Stone and Sand	5	467	
Tin	48	1,109	
Water	20	80	57
Total	106	8,513	57

*Return Showing Total Number and Areas of All Types of Authorities to Prospect Held
as at 31 December 1967*

Type and Authority	Number	Area
Permits to enter and search on private land including owner's permissions	13	18,550 acres
Exploration Licences	45	99,492 sq miles
Special Prospector's Licences	17	132 sq miles
Prospector's Licences	116	5,800 acres
Miner's Rights	125	62 acres
Authorities to prospect under Aid to Mining Act 1927	1	28 sq miles

*Table Showing Particulars of Exploration Licences and Special Prospector's Licences in Force
at 31 December 1967*

Licence No.	Holder	Address	Area (sq miles)	Situation	Expiry Date	Mineral
E.L. 1/60	Hematite Exploration Pty Ltd	500 Bourke St, Melbourne	35,325	Bass Strait	11.10.68	Petroleum oil and gas
E.L. 4/61	Industrial & Mining Investigations Pty Ltd	2 Castlereagh St, Sydney	147	Savage River	23.8.68	Minerals
E.L. 5/61	Industrial & Mining Investigations Pty Ltd	2 Castlereagh St, Sydney	450	East Coast	24.8.68	Coal and limestone
E.L. 1/62	Electrolytic Zinc Co. of A/asia Pty Ltd	Rosebery	49	Rosebery	22.7.68	Minerals
E.L. 2/62	Electrolytic Zinc Co. of A/asia Pty Ltd	Rosebery	8	Dundas	12.3.68	Minerals
E.L. 1/63	Aberfoyle Tin N.L.	505 St Kilda Rd, Melbourne	15	Mt Cleveland	12.2.68	Tin
E.L. 2/63	Aberfoyle Tin N.L.	505 St Kilda Rd, Melbourne	87	Mt Lindsay	1.4.68	Minerals
E.L. 4/63	Storeys Creek Tin Mining Co. N. L.	505 St Kilda Rd, Melbourne	144	Moorina	18.6.68	Kaolin
E.L. 5/63	Comstaff Pty Ltd	120 William St, Melbourne	925	West Coast	30.6.68	Minerals
E.L. 2/65	Utah Development Co.	Box 1320 L, G.P.O., Melbourne	1,575	Furieux Group Islands	18.8.68	Topaz, tin, gold
E.L. 5/65	Broken Hill Pty Co. Ltd	500 Bourke St, Melbourne	80	Dorset	4.5.68	Minerals
E.L. 6/65	Ocean Mining A.G.	38 Canning St, Launceston	900	Dorset	18.5.68	Minerals
E.L. 7/65	Ocean Mining A.G.	38 Canning St, Launceston	600	King Island	18.5.68	Minerals
E.L. 8/65	Mt Lyell Mining and Railway Co. Ltd.	Queenstown	110	Devon	12.5.68	Minerals
E.L. 10/65	Mt Costigan Mines Ltd	c/- W. D. Bartlett, Naracoopa, King Is.	2	King Island	14.5.68	Minerals and stone
E.L. 12/65	Pickands Mather & Co. International	Port Latta, Tas.	4,074	West Coast	21.6.68	Minerals except coal and oil
E.L. 13/65	Broken Hill Pty Co. Ltd	500 Bourke St, Melbourne	6,000	South-West	21.6.68	Minerals except coal and oil
E.L. 15/65	Broken Hill Pty Co. Ltd	500 Bourke St, Melbourne	1,700	Sheffield	2.1.68	Minerals except coal and oil
E.L. 17/65	Electrolytic Zinc Co. of A/asia Ltd	Risdon	8,000	SE Tasmania	19.8.68	Petroleum, oil and gas
E.L. 18/65	Esso Exploration Aust. Inc.	Box 4249, G.P.O., Sydney	8,350	W & SW Coast	17.9.68	Petroleum, oil and gas
E.L. 19/65	Esso Exploration Aust. Inc.	Box 4249, G.P.O., Sydney	2,700	Off-shore, East Coast	17.9.68	Petroleum, oil and gas
E.L. 2/66	T. D. Hughes	2 Castlereagh St, Sydney	480	Flinders Island	18.4.68	Tin and associated minerals
E.L. 3/66	Planet Mining Co. Pty Ltd	2 O'Connell St, Sydney	3,900	North-West	4.5.68	Minerals
E.L. 4/66	Electrolytic Zinc Co. of A/asia Ltd	Rosebery	960	Hunter Group	22.6.68	Minerals, stone excluding phosphate rock
E.L. 9/66	Mt Lyell Mining and Railway Co. Ltd	Queenstown	83	Mt Tindall	5.2.68	Metallic minerals
E.L. 10/66	Ocean Mining A.G.	38 Canning St, Launceston	3,900	S & SE Tasmania	17.4.68	Non-metallic minerals
E.L. 11/66	Ocean Mining A.G.	38 Canning St, Launceston	9,136	West Coast	17.4.68	Non-metallic minerals
E.L. 13/66	Mt Costigan Mines Ltd	King Island	27	Wayanna, King Island	19.4.68	Tin and associated minerals

Particulars of Exploration Licences, etc.—continued

Licence No.	Holder	Address	Area (sq miles)	Situation	Expiry Date	Mineral
E.L. 14/66	Mt Costigan Mines Ltd	King Island	18	Bingaree, King Island	19.4.68	Tin and associated minerals
E.L. 15/66	King Island Scheelite	King Island	4	King Island	24.4.68	Metallic minerals
E.L. 1/67	M. M. Roberts	c/- W. C. Burrows, Napoleon St, Battery Pt	28	King Island	19.7.68	Tin
E.L. 2/67	Utah Development Co.	505 St Kilda Rd, Melbourne	3,027	Dorset	24.7.68	Non-metallic minerals
E.L. 3/67	Quest Exploration Pty Ltd	100 Collins St, Melbourne	50	King Island	8.3.68	Tin, titanium, etc.
E.L. 4/67	Magellan Petroleum Southern Pty Ltd	c/- Simmons Wolfhagen, Hobart	998	Off-shore, NE Tasmania	5.4.68	Oil
E.L. 5/67	Magellan Petroleum Southern Pty Ltd	c/- Simmons Wolfhagen, Hobart	3,620	Off-shore, NW Tasmania	5.4.68	Oil
E.L. 6/67	Pickands Mather & Co. International	189 St Georges Terrace, Perth, W.A.	150	Mackintosh R.	17.5.68	Metallic minerals
E.L. 7/67	King Island Scheelite	Grassy, King Island	31	Beaconsfield	17.5.68	Metallic minerals
E.L. 9/67	W. C. Burrows	11 Napoleon St, Battery Pt	35	NW King Island	12.8.68	Tin, titanium, etc.
E.L. 10/67	Quest Exploration Pty Ltd	100 Collins St, Melbourne	11	NW King Island	12.2.68	Tin, titanium, etc.
E.L. 11/67	Storeys Creek Tin Mining Co. N.L.	Rossarden	20	Rossarden	21.7.68	Metallic minerals
E.L. 12/67	Electrolytic Zinc Co. of A/asia Ltd	Rosebery	20	Branch Creek	26.7.68	Minerals
E.L. 13/67	Planet Mining Co. Pty Ltd	280 George St, Sydney	264	Weymouth	25.2.68	Gold, rutile, etc.
E.L. 14/67	W. L. Young	Box 3362, G.P.O., Sydney	140	West King Island	30.6.68	Metallic minerals
E.L. 15/67	NUDEL Petroleum Pty Ltd	c/- C. G. Sulzberger, Deloraine	349	Longford	10.4.68	Oil
E.L. 16/67	Pickands Mather & Co. International	Sydney	1,000	NW & W Tasmania	9.5.68	Gold, rutile, etc.
S.P.L. 399	V. Wood	Pioneer	15	Mt Cameron	28.4.68	Tin
S.P.L. 403	L. Price	Ifraville, West Tamar	2	Scamander	20.4.68	Tin
S.P.L. 404	C. Loftus-Hills	26 Stirling St, Kew, Vic.	2	Zeehan	22.4.68	Minerals
S.P.L. 2	M. Gatenby	King Island	1	Naracoopa	27.4.68	Minerals
S.P.L. 3	Electrolytic Zinc Co. of A/asia Ltd	Rosebery	10	Tullah	6.7.68	Minerals
S.P.L. 7	J. C. Curtain	King Island	1	Naracoopa	9.3.68	Minerals
S.P.L. 9	Mt Costigan Mines Ltd	c/- W. Bartlett, Naracoopa, King Island	1	Cowper Point	1.4.68	Tin
S.P.L. 17	G. C. Kingston	c/- F. A. Hudson, Smithton	25	Balfour	1.3.68	Minerals only
S.P.L. 20	Renison Ltd	Renison Bell	3	Ringville	16.2.68	Metallic minerals
S.P.L. 22	Electrolytic Zinc Co. of A/asia Ltd	Rosebery	15	Trial Harbour	9.6.68	Minerals
S.P.L. 24	Alstergren Pty Ltd	Box 4505, G.P.O., Melbourne	2	Cox Bight	19.7.68	Tin
S.P.L. 25	Mt Lyell Mining and Railway Co. Ltd	Queenstown	9	Professor Range	19.1.68	Metallic minerals
S.P.L. 26	Mt Lyell Mining and Railway Co. Ltd	Queenstown	2	Loila Tier	19.1.68	Metallic minerals
S.P.L. 27	Renison Ltd	Renison Bell	5	South Dundas	19.7.68	Metallic minerals
S.P.L. 31	B. A. Farquhar	Scottsdale	25	West Tamar	12.4.68	Metallic minerals
S.P.L. 33	Consolidated Gold-fields (Aust.) Ltd	Sydney	2	St Helens	12.3.68	Metallic minerals
S.P.L. 34	Storeys Creek Tin Mining Co. N.L.	Box 96, Gladstone	12	Gladstone	10.4.68	Metallic minerals

WARDEN'S COURT

W. C. Archer v. K. R. Fudala—Application for forfeiture of lease 29M/53 and 9W/53.

This application which was forwarded to the Warden of Mines, Hobart for hearing was adjourned *sine die*.

Cornwall Coal Company v. T. W. Davies.

A. R. Gee v. T. W. Davies—Objections to application 698P/M at Royal George.

This application was to be heard by the Warden of Mines, Launceston but did not come to hearing as a result of the withdrawal of the application by the applicant.

EXEMPTIONS

The following exemptions were granted:—

- J. Bibby and G. M. Hall. Leases 26M/60, etc., at Adamsfield, 20 September 1966 to 20 January 1967.
- N. R. and D. Fenton. Lease 82M/39 at Avoca from 17 October 1966 to 17 April 1967.
- H. K. Turner. Leases 62M/63 and 63M/63 at Mt Lindsay from 15 December 1966 to 28 February 1967.
- Aberfoyle Tin N.L. Exemption Exploration Licence 1/65 at Rossarden until 6 January 1967.
- K. E. Fudala. Leases 29M/63, 16M/64 and 17M/64 at Cox Bight from 12 April 1967 to 15 October 1967.
- The Cornwall Coal Co. N.L. Lease 6756/M at Cornwall from 1 January 1967 to 31 December 1967.

MINE MANAGER'S CERTIFICATES

During the year the Board of Examiners granted Metalliferous Mine Manager's Certificates of Competency:—

Norman Farrow Morwood Donald Frank Virant Brian Marshall Phillips

Certificates were also issued to:—

Kevin John Carter Archibald James Murphy,

upon presentation of a certificate issued by a recognised authority in another State.

RETURN SHOWING VALUE OF TASMANIAN MINERALS IN RECENT YEARS WITH AUSTRALIAN METAL PRICES

Year	Value \$
1958	23,676,108
1959	25,532,522
1960	26,774,520
1961	26,758,954
1962	30,874,136
1963	32,206,272
1964	40,013,378
1965	43,755,904
1966	51,180,693
1967	55,252,710

MINERAL PRODUCTION SINCE 1880

Quantity and Value of Mineral Production as at 31 December 1967

<i>Mineral</i>	<i>Total Quantity</i>	<i>Value</i>
METALLIC MINERALS—		
Antimony	(tons) 3	\$ 2,034
Bismuth	(tons) 84	59,288
Cadmium	(tons) 1,674	4,856,644
Cobalt Oxide	(tons) 20	38,623
Copper (Blister) to 1918 (now shown under Silver and Copper)	(tons) 166,600	27,577,054
Copper Matte	(tons) 6,227	267,472
Copper Ore to 1918 (now shown under Copper)	(tons) 41,769	1,155,746
Copper (from 1919)	(tons) 482,309	185,337,421
Crocoite	(specimens only) —	1,066
Gold	(fine oz) 2,729,461	34,603,838
Ilmenite	(tons) 550	2,512
Iron Oxide (including Hematite, Limonite and Magnetite)	(tons) 122,154	284,167
Lead (from 1919)	(tons) 388,419	51,591,995
Manganese	(tons) 1	6
Manganese Dioxide (from 1957)	(tons) 2,859	93,562
Mercury	(lb) 4,204	24,645
Monazite	(tons) 33	1,214
Nickel	(tons) 233	81,036
Osmiridium	(oz) 31,088	1,417,062
Pyrite	(tons) 1,764,611	8,060,268
Rutile	(tons) 1	36
Scheelite	(tons) 23,505	46,496,350
Silica for Silicon Alloy Production	(tons) 20,068	161,254
Silicon as Silicon Alloys	(tons) 13,722	1,643,972
Silver Lead Ore to 1918 (now shown under Silver and Lead)	(tons) 1,083,898	12,858,582
Silver (from 1919)	(fine oz) 48,768,207	29,422,122
Sulphur as Sulphuric Acid (from 1957)	(mono tons) 479,881	4,664,226
Tin	(tons) 152,577	86,935,156
Wolfram	(tons) 16,367	21,794,760
Zinc	(tons) 876,683	141,241,233
Zinc Sulphate (from 1957)	(tons) 2,914	293,176
NON-METALLIC MINERALS—		
Asbestos	(tons) 3,980	34,284
Barite	(tons) 2,205	16,478
Clay (from 1958)—		
Brick	(cubic yards) 1,045,100	1,958,121
Tile	(cubic yards) 34,291	42,598
Other	(cubic yards) 203,076	441,279
Dolomite	(tons) 31,589	184,670
Graphite	(tons) 40	214
Kaolin	(tons) 111,086	883,018
Limestone—		
Agricultural and other	(tons) 678,890	1,632,018
Carbide	(tons) 734,671	2,021,666
Cement	(tons) 5,166,413	7,220,576
Chemical and Metallurgical	(tons) 4,220,141	5,047,248
Ochre	(tons) 2,556	18,199
Pebbles (from 1957)	(tons) 7,627	116,723
Silica	(tons) 188,156	281,507
Talc	(tons) 333	2,154
FUEL MINERALS—		
Coal	(tons) 9,485,999	24,575,263
Shale	(tons) 41,572	62,462
CONSTRUCTION MATERIALS—		
Building Stone—		
Freestone	(cubic yards) 5,393	68,086
Granite	(cubic yards) 5,918	84,973
Other	(cubic yards) 2,316	6,122
Crushed and Broken Stone (from 1958)—		
Basalt	(cubic yards) 1,224,841	2,542,754
Dolerite	(cubic yards) 5,707,478	16,771,922
Limestone	(cubic yards) 233,599	578,964
Sandstone	(cubic yards) 39,925	66,861
Other	(cubic yards) 1,355,972	2,800,300
Gravel (from 1958)	(cubic yards) 11,469,603	12,031,062
Sand (from 1958)	(cubic yards) 956,212	1,300,635
Other Road Materials	(cubic yards) 731,767	915,018
		<u>\$742,671,695</u>

STATISTICS RELATING TO THE MINERAL INDUSTRY

Mineral	Year ended 31 December 1966		Year ended 31 December 1967	
	Total Quantity	Value \$A	Total Quantity	Value \$A
<i>Metallic Minerals—</i>				
Cadmium	(tons) 75	341,111	74	383,131
Cobalt Oxide	(tons) 1	3,193	1.14	3,860
Copper	(tons) 15,158	14,688,857	16,301	17,326,612
Gold	(fine oz) 32,655	1,020,453	34,677	1,083,667
Iron Oxide	(tons) 2,797	7,903	7,866	35,130
Lead	(tons) 12,162	2,994,513	11,930	2,578,032
Manganese Dioxide	(tons) 401	15,238	424	15,540
Mercury	(lb) .....	.....	4,204	24,645
Pyrites	(tons) 68,077	408,462	59,714	358,284
Scheelite	(tons) 1,311	3,776,862	* .....	.....
Silica for Silicon Alloy Product tion	(tons) 403	4,030	4,459	44,590
Silicon as Silicon Alloys	(tons) .....	.....	11,857	1,375,412
Silver	(fine oz) 1,507,421	1,764,113	1,503,354	2,225,257
Sulphur as Sulphuric Acid (mono tons)	65,013	650,130	72,347	723,470
Tin	(tons) 1,031	3,419,153	1,529	4,735,799
Tungsten as Tungstic Oxide	(tons) .....	.....	1,182	5,032,488
Wolfram	(tons) 510	1,367,704	*	.....
Zinc	(tons) 40,904	12,648,558	40,231	12,106,835
Zinc Sulphate	(tons) 301	32,809	301	34,307
<i>Value of Metallic Minerals</i> .....	.....	43,143,089	.....	48,087,059
<i>Non-Metallic Minerals—</i>				
<i>Clay—</i>				
Brick	(cubic yards) 106,599	216,853	102,383	208,306
Tile	(cubic yards) 3,765	8,282	2,800	6,450
Other	(cubic yards) 48,584	100,353	25,339	72,902
Dolomite	(tons) 2,606	15,097	2,143	12,361
<i>Limestone—</i>				
Agricultural	(tons) 34,364	77,407	41,220	98,421
Carbide	(tons) 29,218	114,056	16,234	62,290
Cement	(tons) 252,393	494,437	253,611	496,749
Chemical and Metallurgical	(tons) 28,489	88,983	33,670	103,155
Other	(tons) 270	5,670	3,714	6,258
Ochre	(tons) 65	1,008	97	1,459
Pebbles	(tons) 895	15,183	1,237	20,404
Silica	(tons) 5,014	10,261	8,557	23,360
<i>Value of Non-Metallic Minerals</i> .....	.....	1,147,590	.....	1,112,115
<i>Fuel Minerals—Coal</i>	(tons) 82,664	353,238	76,541	324,553
<i>Construction Materials—</i>				
<i>Crushed and Broken Stone—</i>				
Basalt	(cubic yards) 294,351	537,429	241,712	724,811
Dolerite	(cubic yards) 1,018,180	2,977,616	628,356	2,128,932
Limestone	(cubic yards) 14,451	35,421	13,389	40,167
Sandstone	(cubic yards) 4,627	6,727	4,490	13,470
Other	(cubic yards) 269,578	651,713	162,456	487,725
<i>Building Stone—</i>				
Freestone	(cubic yards) 757	8,650	519	7,374
Granite (red)	(cubic yards) .....	.....	291	2,501
Other	(cubic yards) 140	300	836	2,508
Gravel	(cubic yards) 1,681,381	1,842,479	1,582,625	1,892,159
Sand	(cubic yards) 228,559	261,837	189,530	294,102
Other Road Material	(cubic yards) 203,154	214,604	116,922	135,234
<i>Value of Construction Materials</i> .....	.....	6,536,776	.....	5,728,983
<i>Total Value with Australian Metal Prices</i> .....	.....	51,180,693	.....	55,252,710
<i>Metallurgical Production from other than Tasmanian Ores—</i>				
Alumina .....	.....	72,688,923	.....	71,426,756
Aluminium .....	.....	.....	.....	.....
Aluminium Hydrates .....	.....	.....	.....	.....
Aluminium Sulphate .....	.....	.....	.....	.....
Cadmium .....	.....	.....	.....	.....
Cobalt Oxide .....	.....	.....	.....	.....
Ferro-Manganese .....	.....	.....	.....	.....
Titanium Dioxide .....	.....	.....	.....	.....
Zinc .....	.....	.....	.....	.....
<i>Value of Mining and Metallurgical Production</i> .....	.....	\$123,869,616	.....	\$126,679,466
Average Number of Men Employed .....	.....	10,122	.....	10,538

* Now under Tungsten as Tungstic Oxide.

AID TO MINING

A number of small parties engaged in alluvial tin mining operations experienced difficulty in maintaining production because of a shortage of water supplies and loans were made available under the Aid to Mining Act 1927, to assist in purchase of pumping equipment, pipes and fluming and for dam construction. A total of eight parties received assistance involving an expenditure of \$7,394.

The Endurance Tin Mining Company N.L. which was assisted in 1964 for the purchase and installation of jigs and cyclones made full use of this equipment during the year and a substantial amount of royalty repayments were received. The proprietors of the Stanhope Coal Mine who had been assisted to purchase a belt conveyor, made regular repayments from coal produced and at the end of the year had almost repaid in full the amount advanced. An application for a further loan to extend the conveyor system was approved.

The reserve under the Aid to Mining Act which covers all land within a radius of three miles of Waratah, has been in continuous occupation by Comstaff Pty Ltd under an Authority to Prospect and eleven small tribute parties have been authorised to engage in productive operations under the prescribed form of Tribute Agreement. During 1966 three Authorities to Prospect were held but two of these ceased active operations and the remaining holder was granted an Authority to enable field exploration and drilling and metallurgical studies to be related to the greater part of the reserved area. The Department has retained a small area upon which it is proposed to undertake diamond drilling to test the economic possibilities of a known occurrence of tin.

Mining Plant

The mining plant purchased by the Department for hire to small parties to test mineral discoveries was used for a short period on a tin-wolfram prospect and a compressor was on hire to a tribute party at Waratah. Very little interest has been displayed in actively investigating small prospects of minerals involving underground operations and in such circumstances the amount of equipment available for hire has been held at a minimum. Additional units will be purchased if a reasonable demand by *bona fide* operators should develop.

STATEMENT OF RECEIPTS AND PAYMENTS OF THE MINING TRUST FUND FOR THE YEAR ENDED 31 DECEMBER 1967

Receipts	\$	Payments	\$
Balance at 1 January 1967	12,454.75	Assistance	7,394.37
Repayment of loans	17,484.14	Maintenance, tribute area, Mt Bischoff	79.52
Interest on loans	1,097.66	Maintenance, mining plant	41.38
Tribute royalty	339.60	Miscellaneous	38.28
Hire of mining plant	42.46		
Authorities to prospect	64.62		7,553.55
Sale of abandoned equipment	20.00	Balance to next Account	23,999.68
	\$31,553.23		\$31,553.23

STAFF

The following were the staff movements during the year:—

Name	Position	Remarks
Mackinnon, H. M. G.	Draughtsman	Commenced 3.1.67
Bellis, T. R.	Draughtsman	Commenced 3.1.67
Clarke, M. J.	Palaeontologist	Commenced 16.1.67
McNamara, J. (Miss)	Typist	Commenced 19.1.67
Blackman, H. C. J.	Drilling Superintendent	Commenced 1.2.67
Foster, M. K. (Miss)	Typist	Resigned 15.2.67
Piontek, L. (Miss)	Assistant	Commenced 16.2.67
Pitcher, J. G.	Technical Assistant	Commenced 7.3.67
Eaves, B. D.	Field Assistant	Resigned 31.3.67
Williams, K. G.	Field Assistant	Commenced 8.6.67
Leyland, E. C.	Mining Engineer and Inspector of Mines and Explosives	Commenced 13.6.67
Shorthouse, P. K. (Miss)	Typist	Resigned 21.7.67
Urquhart, G.	Geologist	Resigned 21.7.67
Dobromilski, B. S. (Miss)	Typist	Commenced 23.8.67
Smith, S.	Caretaker, Magazine and Inspector of Explosives	Commenced 25.9.67
Rhodes, L. J.	Senior Metallurgist	Commenced 2.10.67
Pike, G. P.	Geologist	Commenced 4.12.67
Houlgrave, P. (Miss)	Typist	Commenced 7.12.67
Blizzard, K. M. (Miss)	Typist	Resigned 8.12.67

Scholarship

Mr W. C. Cromer was granted a Geology Scholarship.

Retirement

Mr G. J. Levett, Caretaker of the Magazine at Launceston, retired on 13 August 1967 after sixteen years' service.

Death

Miss E. M. Smith, Geologist, died on 29 August 1967.

CONCLUSION

Appreciation is recorded of the services rendered by officers of the Department, including officers of the Mines Draughting Section, Wardens of Mines and Registrars of Mines in the several mining districts.

A detailed review of operations and production follows, and the reports of the Geological Survey Branch, the Chemical and Metallurgical Branch, the Mines and Explosives Branch, the Mount Cameron Water Race Board and the Ringarooma and Cascade Water Board are attached.

J. G. SYMONS, Director of Mines.

OPERATIONS AND PRODUCTION

1.—Metallic Minerals

CADMIUM

Quantity produced:—

	Tons	Value \$
1924-63	1,379	3,264,284
1964	76	511,002
1965	70	357,116
1966	75	341,111
1967	74	383,131
Total	1,674	\$4,856,644

This is a by-product obtained by the Electrolytic Zinc Company of Australasia Limited at its Risdon Works from zinc concentrates produced from the Rosebery and Williamsford Mines.

COBALT OXIDE

The source of the 1.14 tons of cobalt oxide of value \$3,860 was the same as that of cadmium above.

COPPER

Quantity and value of production:—

Year	From Tin Ores		From Lead-Zinc Ores		In Blister Copper		In Copper Ores		Total	
	Tons	\$	Tons	\$	Tons	\$	Tons	\$	Tons	\$
1919-1963	339	248,582	11,021	5,933,566	409,296	126,188,392	404	21,162	421,060	132,391,702
1964 .....	....	....	1,075	712,046	14,142	9,361,332	....	....	15,217	10,073,378
1965 .....	....	....	1,078	802,362	13,495	10,054,510	....	....	14,573	10,856,872
1966 .....	....	....	1,214	1,168,996	13,944	13,519,861	....	....	15,158	14,688,857
1967 .....	....	....	1,220	1,300,541	15,081	16,026,071	....	....	16,301	17,326,612
Total	339	\$248,582	15,608	\$9,917,511	465,958	\$165,150,166	404	\$21,162	482,309	\$185,337,421

The Mount Lyell Mining and Railway Company Limited, Queenstown

Mining—	Tons
Overburden removed	1,993,543
Ore mined—	
West Lyell	2,110,042
Crown Lyell	41,127
Razorback	29,564
Limestone delivered to works	10,948
Silica delivered to works	3,368
Reduction—	
Concentrates smelted	55,642
Crown Lyell ore smelted	8,422
Precipitate smelted (North Lyell and Comstock)	90
Blister copper produced	15,242
Containing—	
Copper (tons)	15,081
Gold (fine oz)	9,397
Silver (fine oz)	75,384
Pyrite concentrate shipped	59,714
Total value of production	\$16,077,506

Average number of men employed—

Mining—	
Open cut	233
Underground	78
Other	1,199
Total	1,510

Production from the inception to 31 December 1967—

Copper (tons)	624,551
Gold (fine oz)	629,464
Silver (fine oz)	16,265,921

Mr L. W. Morris, Senior Mining Engineer, and Mr J. L. Black, Mining Engineer, Burnie, report that development work in the underground mines was as follows:—

Mine	Driving feet	Rising feet	Total feet
Crown Lyell	2,872	653	3,525
Royal Tharsis		minor stripping only	
Razorback	29	50	79
Totals	2,901	703	3,604

Ore reserves at 30 June 1967, totalled 16.6 million tons assaying 1.026% copper, 0.119 oz silver per ton and 0.009 dwt gold per ton. Of this total the West Lyell open cut accounted for 9.58 million tons averaging 0.78% copper.

Diamond drilling continued on Prince Lyell—Royal Tharsis and in the Crown Lyell 'corridor' area. Up to ten diamond drilling rigs were active in this work. A total of 55,066 feet of diamond drilling in 129 holes was completed.

Underground development commenced on the Crown Lyell No. 3 orebody estimated to contain 2.8 million tons of ore. The small high grade underground orebody mentioned in last year's report is being mined by cut-and-fill methods.

New plant and works of a capital nature purchased or undertaken during the year included:—

Installation of twenty 60-inch Agitair cells in the flotation section of the concentrator.

Replacement of a 5 feet 6 inch standard cone crusher by a 7 feet short-head crusher in the concentrator crushing section. (These two additions lifted milling capacity to 7,000 tons per day.)

Installation of four 830 kVA diesel generators was commenced to alleviate the effect of power rationing. Three of the units were commissioned early in the current year.

A new hydraulic fill installation was commissioned to pump mill tailings to underground workings.

A pumping plant was installed to stockpile smelter slag.

A new bulk loading installation for copper concentrates was completed at Regatta Point, Strahan.

The following major plant units were purchased:—Two 30-ton Euclid trucks, one Schramm Kota drill, four Caterpillar tracked bulldozers, ten Albion trucks for Strahan road transport, three underground rocker shovels, one 'Simba' long-hole drill for underground rising, one exhaust fan for Crown Lyell mine, three diamond drills for exploration, three transformers to increase Lake Margaret transmission voltage from 6.6 kV to 11.0 kV, one new convertor blower and seven staff houses.

Electrolytic Zinc Company of Australasia Limited, Rosebery

This company, reviewed under Zinc, produced 12,227 tons of copper concentrate containing 1,220 tons of copper valued at \$1,300,541.

GOLD

Quantity produced—	Fine oz	Value \$
Prior to 1964	2,600,494	30,573,632
1964	31,551	985,960
1965	30,084	940,126
1966	32,655	1,020,453
1967	34,677	1,083,667
Total	2,729,461	\$34,603,838

The Mount Lyell Mining and Railway Company Limited, Queenstown

This company recovered 9,397 fine oz, valued at \$293,656, from sludge in the electrolytic copper refinery.

Electrolytic Zinc Company of Australasia Limited, Rosebery

Concentrates produced by this company contained 25,130 fine oz, valued at \$785,316.

Storeys Creek Tin Mining Co. N.L. (Dorset Tin Division), South Mount Cameron

From the tin concentrate of this dredge, reviewed under tin, 112 fine oz of gold, valued at \$3,510, was recovered.

IRON ORE (PELLETS)**Savage River Mines, Savage River and Port Latta**

Mr L. W. Morris, Senior Mining Engineer, and Mr E. C. Leyland, Mining Engineer, Burnie, report as follows:—

CONSTRUCTION—SAVAGE RIVER

All construction work at Savage River was completed during the year and all facilities were tested.

Townsite.—All construction work under the control of Savage River Mines was completed in October, with the exception of some landscaping in the townsite and commercial areas. The excavations for the hospital being carried out by the Public Works Department have been completed, whilst the second phase of the development of the school has been substantially completed.

Concentrator Facilities.—This was completed in November and both lines have been operated intermittently. Minor modifications to the plant were still being carried out at the end of December.

Pipeline.—The pipeline construction was completed in October and the pipeline has been tested. Concentrate pulp was first pumped to Port Latta on 26 October.

CONSTRUCTION—PORT LATTA

Pellet Plant.—The construction work on the pellet plant was completed in November. Plant modifications are still in progress.

Off-shore Loader.—At the end of December, this facility was 88% completed. The main work yet uncompleted is the dolphin and anchorage system.

PRODUCTION

	Tons
All materials mined	4,037,018
Rock and waste material	3,721,609
Ore mined	315,409
Ore milled (dry)	160,866
Concentrate produced (dry)	60,518
Concentrate pulp pumped to Port Latta	43,647

IRON OXIDE

Quantity produced—	Tons	Value \$
Prior to 1964	101,159	211,936
1964	6,808	19,362
1965	3,524	9,836
1966	2,797	7,903
1967	7,866	35,130
Total	122,154	\$284,167

Iron Cliffs Mine, Penguin

Mr A. Pearson continued to work the secondary ore at the Iron Cliffs Mine and supplied a cement works with 7,804 tons of haematite valued at \$34,322 and 62 tons of limonite valued at \$808. Employment averaged four men.

LEAD

Quantity produced—	Tons	Value \$
1919-63	341,378	40,036,244
1964	11,823	2,879,606
1965	11,126	3,103,600
1966	12,162	2,994,513
1967	11,930	2,578,032
Total	<u>388,419</u>	<u>\$51,591,995</u>

Electrolytic Zinc Company of Australasia Limited, Rosebery

This company, reviewed under Zinc, produced 13,766 tons of lead concentrate and the total content of lead in the lead, zinc and copper concentrates was 11,930 tons valued at \$2,578,032.

MANGANESE DIOXIDE

This is recovered as a sludge in the electrolysis of zinc sulphate at the Risdon Works of the Electrolytic Zinc Company of Australasia Limited, the original source being the ore in its West Coast mines. The production of 424 tons was valued at \$15,540.

MERCURY

This is recovered at the Risdon Works of the Electrolytic Zinc Company of Australasia Limited from the roaster gases in the calcining of zinc concentrates. The ore containing the mercury is mined at the company's mines on the West Coast. Recovery was first made early in 1967 and production for the year was 4,202 lb valued at \$24,645.

OSMIRIDIUM

There was considerable activity in the Adamsfield area and a number of leases was granted, but no production has been recorded this year. Total production since 1910 is 31,088 oz, valued at \$1,417,062.

Messrs W. D. Clark and G. M. Hall have strengthened their dam, cleaned out the water race, set up a monitor and sluice boxes, which should enable them to commence mining the first pad-dock early in the new year.

Messrs J. Bibby and J. Bennetto have pushed a road into their leases from the new Gordon Road which will provide better access for their equipment.

PYRITE

Quantity produced—	Tons	Value \$
1915-63	1,511,571	6,542,028
1964	66,381	398,286
1965	58,868	353,208
1966	68,077	408,462
1967	59,714	358,284
Total	<u>1,764,611</u>	<u>\$8,060,268</u>

This is produced and exported by the Mount Lyell Mining and Railway Company Limited for sulphuric acid manufacture.

SILICA FOR SILICON ALLOY PRODUCTION**The Broken Hill Proprietary Company Limited, Beaconsfield**

This company mined 4,459 tons of silica, valued at \$44,590, for export to Newcastle for the manufacture of silicon alloys.

SILICON**Tasmanian Electro-Metallurgical Company Proprietary Limited, Bell Bay**

This company smelted slag from ferro-manganese production with 3,211 tons of silica from Beaconsfield to produce silicon as silicon-manganese. The quantity of alloy produced was 11,857 tons valued at \$1,375,412. The average number of employees was 149.

SILVER

Silver is nowhere mined for itself but is a valuable by-product from copper, lead and zinc ores. The current producers are shown below:—

Producer	Source	Quantity Fine oz	Value
E.Z. Co. of A/asia Ltd	Copper, Lead & Zinc Concentrates	1,427,970	\$ 2,113,558
Mt Lyell M. & R. Co. Ltd	Refinery Sludge	75,384	111,699

Quantity and value of production:—

Year	From Tin and Other Ores		From Silver-Lead Ore		From Copper Ore		From Lead-Zinc Ore		Total	
	Fine oz	\$	Fine oz	\$	Fine oz	\$	Fine oz	\$	Fine oz	\$
1919-63	121,787	101,764	17,648,937	5,700,934	3,635,311	1,360,362	21,490,122	14,929,910	42,896,157	22,092,970
1964 ....	....	....	41,663	48,700	59,807	69,922	1,375,946	1,608,444	1,477,416	1,727,066
1965 ....	....	....	....	....	52,228	60,864	1,331,631	1,551,852	1,383,859	1,612,716
1966 ....	....	....	....	....	59,878	70,070	1,447,543	1,694,043	1,507,421	1,764,113
1967 ....	....	....	....	....	75,384	111,699	1,427,970	2,113,558	1,503,354	2,225,257
Totals	121,787	\$101,764	17,690,600	\$5,749,634	3,882,608	\$1,672,917	27,073,212	\$21,897,807	48,768,207	\$29,422,122

SULPHUR AS SULPHURIC ACID

Sulphuric acid is produced in the roasting at Risdon of the zinc concentrates from the Rosebery and Hercules mines of the Electrolytic Zinc Company of Australasia Limited.

Quantity and value of production:—	Mono Tons	Value \$
1957-63	220,423	2,069,646
1964	57,926	579,260
1965	64,172	641,720
1966	65,013	650,130
1967	72,347	723,470
Total	479,881	\$4,664,226

TIN

Quantity produced:—	Tons	Value \$
1873-1963	148,000	71,781,160
1964	990	3,237,286
1965	1,027	3,761,758
1966	1,031	3,419,153
1967	1,529	4,735,799
Total	152,577	\$86,935,156

Aberfoyle Tin N.L., Rossarden

Mr H. Murchie, Mining Engineer, Hobart, reports the average number of persons employed—

Underground	140
Surface	79
Staff	40
Total	259

Tonnage of ore milled was 86,662 tons, a decrease of 2,750 tons over the preceding year. In addition 59,870 tons of accumulated tailings were re-treated.

Production from the ore treated consisted of 623 tons of tin concentrate containing 430 tons of tin valued at \$1,335,169 and 123 tons of wolfram concentrate containing 90 tons of tungstic oxide valued at \$383,052.

Underground development comprised:—

	Feet
Driving	1,450
Cross cutting	91
Rising	1,020
Main orepass rising	619
Driving Lutwyche Prospect	1,225
Total	<u>4,405</u>

Underground diamond drilling consisted of twenty-three holes completed with a footage of 2,870 feet. Of this drilling 800 feet was carried out to test for water bearing ground in the Lutwyche Prospect. Water was intersected and grouting operations are in hand to contain the water.

Renison Limited, Renison Bell

This company treated 280,670 tons of ore for the production of 1,348 tons of concentrates containing 819 tons of tin valued at \$2,535,375.

The new concentrating plant has achieved its designed throughput of 1,000 tons per day. A close watch must be kept on finely crushed ore to prevent setting and even spontaneous combustion in the crushed ore bin. Metallurgical performance of the plant has not been up to expectation and correction has been delayed due to unsatisfactory performance of various items of equipment. These problems are gradually being rectified.

The Federal lode was silled out on the 1,380 feet level to a height of 25 feet. The first lift of fill (surface waste rock) was placed early in the current year and drilling of the first stoping lift was commenced. The Dreadnought lode is being examined by exploratory and access development from the Federal decline. Operations at the Battery mine were confined to stoping only.

Open cut operations at the Black Face produced 37,216 tons of ore during the first half of the year, a small tonnage only remaining. At Dalcoath 5,547 tons were mined by open cutting. Overburden stripping could expose additional ore but no further work is contemplated at present. The Montana South open cut produced 45,614 tons during the first half of the year and only a small tonnage remains.

The following development footages were advanced in the Federal mine:—

	Feet
Driving (including 2,300 feet of sill drive and cross-cuts)	3,747
Rising (chiefly ventilation and fill rises)	1,456
Declining	1,482
Total	<u>6,685</u>

The diamond drilling programme was continued and the following footages were drilled:—

	Feet
Exploratory drilling from surface sites	5,514
Exploratory drilling from underground sites ..	3,022
Operational drilling from underground sites ..	11,294
Total	<u>20,830</u>

The average labour force was 227 of which fifty-one men were employed underground.

Total ore reserves at 30 June 1967, were 12,860,000 tons averaging 0.80% Sn.

The following major items of equipment were purchased and placed in operation:—

- Two 150,000 c.f.m. ventilating fans.
- Two 10-stage Pomona pumps and 600 kVA transformer.
- Two diesel-engined Landrover utilities for mine services.
- One mobile scaling platform comprising a Hiab crane unit fitted to a Fordson diesel tractor.
- One Philips Auto Assay Unit (X-ray fluorescent) installed in the assay office.

The following construction work was carried out:—

An extension of 50 feet was made to the administration block.

The engineering workshop has been extended an additional two bays.

Additional storage space for general stores and plant spares has been provided by the erection of an 80 feet x 40 feet shed.

Eleven additional houses, making a total of sixty-seven houses have been built in Zeehan and the single men's quarters enlarged by constructing another wing containing twenty-two single bedrooms together with amenities rooms.

Cleveland Tin N.L., Luina

Mining.—The main haulage road to the No. 7 adit and the access roads to No. 2 and No. 3 level adits were constructed and metalled. Underground cross-cutting and driving commenced in April 1967, and the following development was achieved during the year:—

Item	Footage	Waste Tons	Ore Stockpiled Tons
Driving	1,140	....	10,275
Rising	409	2,018	524
Cross-cutting	1,843	23,880	....
Silling .....	....	....	20,580
Total	<u>3,392</u>	<u>25,898</u>	<u>31,379</u>

The following mining equipment was received during the year and placed in operation as required:—

Drilling equipment—

- (a) One diesel-powered two-boom drilling rig.
- (b) One diesel-powered three-boom drilling rig.

Loading equipment—

- (a) Two 5-yard front-end loaders.
- (b) Two 20-ton ore carriers.

Other equipment—

- (a) Two compressors (each 1,300 c.f.m. capacity).
- (b) Two diesel vehicles for personnel and miscellaneous duties.

Milling.—The crushing and treatment plant, although still under construction, has progressed to approximately 85% of completion.

Engineering.—The service buildings, carpenters' shop, warehouse and all ancillary buildings have been completed and equipped.

Townsite.—A canteen, shopping centre, quarters for single staff and men and a total of sixty-one houses have been erected. The sewerage and reticulation scheme for the township and mine has been completed.

Geological.—On the mine lease surface geological mapping was carried out on all new mine access roads and in all excavations. Underground mapping was kept abreast of the underground development and all diamond drill core was logged, and sampled wherever necessary. Twenty-one holes were drilled for a total footage of 2,955 feet. Geochemical soil sampling was carried out along the SW strike extension of the Cleveland orebodies over a length of 1,400 feet.

Capital Expenditure.—Total capital expenditure for the year amounted to \$6,423,098.

Endurance Tin Mining Co. N.L., South Mount Cameron

This company treated 271,000 cubic yards from the Clifton Workings for the production of 54 tons of concentrate, containing 41 tons of tin, valued at \$126,135.

The average number of men employed was 18 in the open cut and 21 other, making a total of 39.

Operations were mainly confined to the Clifton Lead for the first three months, but subsequently production resulted from the treatment of shallow alluvials on areas adjacent to the lead. The Linatex jigs in the new treatment plant continued to operate satisfactorily.

Mussel Roe Mine, Pioneer

Improved production was achieved by Mr V. Wood at his two working faces near the Mussel Roe River with a production of 20 tons of tin concentrate containing 14 tons of tin valued at \$44,944 from a total of 52,500 cubic yards. Average number of men employed was four.

Normal sluicing was continued through the year, water being supplied by the Mount Cameron water race. No. 1 face was opened up at the beginning of the year and worked continuously throughout. No. 2 face was worked for five months only due to shortage of water. Throughput on both faces would average 25 cubic yards per hour.

Star Hill Syndicate, Gladstone

Concentrate produced from the 101,000 cubic yards sluiced totalled 11 tons with a tin content of 8 tons valued at \$25,121, an average of two men being employed.

Operations on this mine followed the same pattern as in previous years. Grade was maintained at $\frac{1}{4}$ lb tin concentrate recovered per cubic yard. The face is 35 feet high and a 7 x 8-inch Thomson pump direct coupled to a 100 h.p. electric motor supplies pressure at 70 lb per square inch from a high level dam supplied from a dam on the Mount Cameron race. An electric motor of 125 h.p. supplies power to a 7 x 8-inch pump to lift the water 140 feet. Overall, three months' time was lost through shortage of water.

Storeys Creek Tin Mining Co. N.L. (Dorset Tin Division), Gladstone

The manager reports a successful year, 1,574,700 cubic yards being treated for the recovery of 128 tons of concentrate containing 96 tons of tin valued at \$296,304. Difficulty was experienced in defining the course of the dredge due to uneven distribution of values. An average of forty-one men were employed.

Work was confined to the Aberfoyle Lead and much development work in the form of drilling, land clearing for accession, river diversion and lagoon drainage was accomplished.

Pioneer Mine, Pioneer

Mr V. Wood's operations were mainly confined to sluicing the upper 40 feet of alluvium. Average grade was 0.25 lb tin per cubic yard. A small area was taken down to the bottom with an indication of higher values. The following major works were carried out during the year:—

- (1) Acquisition and installation of a 10-inch gravel pump powered by a 180 h.p. electric motor.
- (2) Removal of power lines to a new position, necessitated by sluicing operations.
- (3) Acquisition of two traction engines for use with a scraper to remove tailings. After a trial period these were found to be uneconomic and a 48 h.p. log hauler unit was acquired for use in lieu thereof. This has proved to be satisfactory for the time being but a higher powered unit has now become necessary.

Shortage of water caused a cessation of operations for two months early in the year. Throughput averaged 72 cubic yards per hour and an average of five men were employed. Concentrates containing 12 tons of tin valued at \$36,906 were produced from the 86,700 cubic yards sluiced.

Cornwall Coal Co. N.L., Royal George

Diamond drilling was continued with one hole started in 1966 and four other holes completed, with a footage of 1,951 feet, and one uncompleted hole having a depth of 450 feet, making a total footage for the year of 2,401 feet.

Mount Cameron Tin Syndicate, South Mount Cameron

Values for the first half of the year were maintained at a reasonably high level. Ground was difficult to break up and the flat nature of the bottom made for difficult working. To cope with this a small bulldozer with a 10-foot blade and two tyne-ripper was acquired and proved highly satisfactory. Being able to attack this rich but otherwise unworkable ground, it was thus possible to pay off the purchase price of the dozer (\$10,000) in five months. When this area of ground was depleted of values a move was made to a 95-acre section one mile further south.

To work this section, known as the Eastern Lead, an 8 x 10-inch pressure pump, powered by a 300 h.p. diesel was acquired and put into service. The delivery line was 15 inches and the monitor was operated with a 3-inch tip. Diesel consumption was at the rate of seven gallons per hour. Production on this mine has been on a satisfactory level, grade being maintained at approximately 1.5 lb per cubic yard.

Concentrates produced by this syndicate yielded 10 tons of tin valued at \$31,381. Employment averaged three men. The yardage of gravel sluiced was 20,000.

Storeys Creek Tin Mining Co. N.L., Storys Creek

This company, reviewed under Tungsten, produced 89 tons of concentrate containing 65 tons of tin, valued at \$202,781.

Mr G. Machen, Waratah

Mr Machen carried on two sluicing operations in North Valley and prepared to establish a further operation. Production was 4 tons of concentrates containing 3 tons of tin valued at \$8,754. An average of three men were employed.

Messrs Robert and Groves, South Mount Cameron

This party consisting of four men treated rich tin-bearing material bulldozed from the former clay lease adjoining. Grade averaged 1.5 lb per cubic yard and approximately 7 tons of tin concentrates were produced. Equipment on hand consisted of—

- one only diesel, 175 h.p.,
- one only 8-inch pressure pump,
- one only tractor, 60 h.p.,
- one only 6-inch pressure pump.

Using a return water system, work was uninterrupted during the year. The concentrates contained 4.991 tons of tin valued at \$15,377.

Production by Small Workers

Many miners and prospectors throughout the State produced small quantities of concentrate by reason of either small-scale or part-time workings. Their work is described under the heading of various districts.

EAST COAST

Mr W. D. Clark, Coles Bay: Sluicing continued in the area of Saltwater Creek with a party of three recovering concentrates with a tin content of 0.663 ton valued at \$2,074.

The leases were sold to Freycinet Tin Pty Ltd during the year and they have continued operations in the area, recovering concentrates with a tin content of 0.344 ton valued at \$1,048.

Mr D. Lewis, Coles Bay: Lack of water has hampered operations on Middleton Creek and to overcome this a large dam has been constructed near the headwaters. This dam was filled towards the end of the year enabling the operator to sluice a large volume of overburden which has been bulldozed into the creek. Concentrates produced contained 0.099 ton of tin valued at \$302.

Mr L. McRae, Coles Bay: A sample quantity of material has been sluiced yielding concentrates containing 0.159 ton of tin valued at \$484.

Miscellaneous—St Helens: Drought conditions precluded productive operations by J. P. Reynolds, Saxelby Creek, B. Goodluck and A. Counsel of Golden Fleece area. Mr P. R. Wheeler produced 0.021 ton of tin in concentrates valued at \$66.

AVOCA

Messrs Brinckman and Dicker, Mount Rex, satisfactorily commissioned their mill at Buffalo Creek and de-watered the mine to No. 1 level. Concentrates produced contained 0.628 ton of tin valued at \$1,921.

RINGAROOMA-BRANXHOLM-DERBY

Mr T. Merritt, Ringarooma River Beaches, treated 3,065 cubic yards to produce concentrates containing 0.799 ton of tin valued at \$2,472.

Mr R. Kerrison, Ringarooma River Beaches produced concentrates containing 1.256 tons of tin valued at \$3,905.

Mr W. G. Stevens, Guiding Star Mine, Ruby Flat: Concentrate produced contained 0.105 ton of tin valued at \$325. Ground here is stony and face depth is 18 feet. Grades average 1 lb per cubic yard. Lack of water caused a cessation of operations early in the year.

G. Rayner and Party, Derby: This party of two carried out a final clean-up at the mine in the Cascade River. Concentrates produced contained 0.388 ton of tin valued at \$1,207.

Mr K. C. Phillips, The Valley, Derby, ceased operations after a short period during which he produced concentrates containing 0.032 ton of tin valued at \$99.

Miscellaneous: Messrs W. F. Marshall, J. Maumill, J. Melville, T. Mundy, A. Quinn, M. Salter, L. R. Wheeler and G. Willis produced individually, small quantities of concentrates containing a total of 1.488 tons of tin valued at \$4,636.

GLADSTONE

Mr E. King, Fly by Night Mine, worked as water permitted, the protracted dry spell causing an early shut down in the year. Mr King's mechanical equipment consisted of:—

- two only 70 h.p. diesels,
- one only 100 h.p. diesel,
- one only 70 h.p. bulldozer,
- one only 5 x 6-inch pressure pump,
- one only 6-inch gravel pump,
- one only 6-inch pressure pump.

Concentrates produced contained 1.090 tons of tin valued at \$3,381.

Mr H. Standage, Amber Creek: Working a 16-foot face adjacent to the Amber Creek culvert, this operator took twenty-two bags of tin concentrates from an estimated 1,000 cubic yards. A band of wash on the bottom averaged 2 feet in width. Subsequently Mr Standage was joined by Mr D. Dawe but shortage of water caused an early cessation of operations. The concentrates contained 1.725 tons of tin valued at \$5,334.

Mr R. C. Lawry, Amber Hill: Operations in the first quarter of the year were confined to sluicing shallow ground averaging about 1 lb per cubic yard. Shortage of water then caused a cessation of operations and a new dam was constructed. The catchment area covers twelve acres with an average depth of 8 feet. With the anticipated linking up of the Mount Cameron water race (Amber Creek Branch) all-the-year-round operations should be possible, contingent on normal rainfall. Concentrates produced contained 0.741 ton of tin valued at \$2,277.

Mr R. C. Lawry, Deep Creek Mine: Situated $\frac{1}{2}$ mile off the Boobyalla Road, north of Mount Cameron, this mine has a face depth of 50 feet. Desultory operations dependent on the availability of water yielded 8 cwt of tin concentrates. A further area of 100 feet x 100 feet has been stripped down to values and is ready for cleaning up when water becomes available. Outlook for future work on this mine is encouraging owing to the exposure of a 10 feet deep lead occupying a gutter in the granite. However, operations are dependent on storm water and the construction of a new dam is required to make the mine workable.

Messrs K. D. and F. R. Richardson, Dry Gut Mine: This party worked shallow surfacings for nine months. They then acquired a 40 h.p. bulldozer and a pumping outfit consisting of a 40 h.p. kerosene engine directly coupled to a 4 x 5-inch pressure pump. The equipment was moved at the end of the year to a new site on the outskirts of Gladstone on the fall into the Ringarooma River. Here again 10 inches of tin-bearing gravel was dozed into heaps and sluiced in the conventional manner. Concentrates produced contained 1.500 tons of tin valued at \$4,636.

Mr Nigel Moore: Situated in a gully on the northern foothills of Mount Cameron, this mine is reached by a road which turns to the right of the main Gladstone-Herrick road at a point 2 miles from Gladstone. Very little work has been done owing to lack of water. Equipment consists of—

- one only 40 h.p. kerosene engine,
- one only 5-inch pressure pump,
- one only 35 h.p. tractor,
- one only 5-inch gravel pump.

The lessee, Mr N. Moore, worked the mine at weekends and on holidays. Concentrates produced contained 0.080 ton of tin valued at \$245.

Miscellaneous: Messrs B. Dawe, H. A. Fenton and A. G. Floyd produced individually, concentrates containing a total of 0.423 ton of tin valued at \$1,306.

MOUNT CAMERON-PIONEER

Messrs R. L. Rainbow and Son, Banca Mine, continued to operate the old Banca leases for six and a half months of the year, shortage of water curtailing operations for the balance of the period. To offset the water shortage a 72 h.p. diesel engine and 5-inch pressure pump were acquired and installed.

Two new dams constructed during the year did much to offset the effects of the abnormally dry season. In addition, approximately $\frac{3}{4}$ mile of flood races were constructed. Ground values throughout averaged 0.75 lb per cubic yard. The quantity of gravel sluiced was 14,450 cubic yards for a production of 3.591 tons of tin in concentrates of value \$11,063.

Mr G. Cox, White Rock: Working a 15 feet high face, this operator derived his pressure from a high level race, giving him approximately 75 feet head pressure. His production was 0.507 ton of tin in concentrates of value \$1,549.

Messrs J. and M. J. Kerrison, Garibaldi, produced concentrates containing 1.985 tons of tin valued at \$6,189.

Mr H. Summers, Sapphire Creek, sold 0.057 ton of tin in concentrates of value \$177.

MOORINA-WELDBOROUGH

Mr T. Yaxley, Weldborough, continued sluicing in Niagra Creek. He was hampered by lack of a suitable access road and was forced to manhandle his supplies from the road to his workings $1\frac{1}{2}$ miles through hilly bush country. Mr Yaxley constructed fluming and restored an old race from Knights Creek, but this new source of supply failed under the severity of the drought. His production was 0.310 ton of tin in concentrates of value \$956.

Messrs A. J. Stevenson and Mullins Bros, Weldborough: This party reopened and restored 3 miles of race from a point above the Laffer Dam to their new set-up at Red Hills on the outskirts of Weldborough. The work was long and arduous, but rewarding inasmuch as it opened up high grade ground hitherto unworkable. At the Laffer Dam a 4-inch pump driven by a tractor was installed to raise the water from the dam to the high level race. Total production amounted to 1.559 tons of tin in concentrates valued at \$4,789. Employment averaged two men.

Mr H. Moses, Blue Tier: This operator continued sluicing remnants in old workings in Seven Mile Creek. Much time was lost through water shortage, but with the advent of rain in July Mr Moses was able to maintain sluicing operations by recirculating the water, until the end of the year. His production was 1.167 tons of tin in concentrates of value \$3,604.

Mr W. L. Boon, Moorina: A lower production of concentrates compared with the previous year yielded 0.024 ton of tin, valued at \$75 as against a production of 0.670 ton of tin in 1966.

Messrs M. and J. Lambert, Weldborough, again worked the Race Course Flat lease for a return of concentrates containing 0.171 ton of tin, valued at \$532.

Messrs K. Banks and F. Coombes produced concentrates containing 0.120 ton of tin, valued at \$372.

Mr D. C. Lambert produced 0.029 ton of tin in concentrates of value \$88.

Mr H. W. Terry produced 0.073 ton of tin in concentrates of value \$224.

G. Rayner and Party, Wyniford River: At the Wyniford River mine a 6 x 7-inch pressure pump powered by a 65 h.p. diesel engine was installed. This mine was originally operated by the Rajah Tin Mining Co. The ground varies in depth between 12 and 15 feet and is very stony. The party installed a grizzly to cope with the stones but were later forced to close down.

Total return from the Wyniford River mine was 0.237 ton of concentrates containing 0.164 ton of metallic tin, valued at \$424. The party consisted of three men.

WARATAH

Mr L. W. Wills produced concentrates containing 0.016 ton of tin, valued at \$49 from a small underground vein by working part-time.

Mr M. G. Glozier from his underground working on Thompson's Lode, produced concentrates containing 0.196 ton of tin, valued at \$615 by part-time work.

Mr J. Housego produced concentrates from tailings in the Waratah River containing 0.770 ton of tin, valued at \$2,387, working full-time.

Mr W. Housego, working part-time, produced concentrates containing 0.047 ton of tin, valued at \$145.

Mr D. Kenworthy working on Pig Flat produced 0.011 ton of tin in concentrates of value \$35.

Messrs Mahoney and Colgan commenced operations at Wombat Creek and produced concentrates containing 0.081 ton of tin, valued at \$253.

Mr S. R. Richardson, Thompson's Lode, produced concentrates containing 0.260 ton of tin, valued at \$792.

Mr E. Kelly produced concentrates containing 0.027 ton of tin, valued at \$85.

WEST COAST

R. E. Clarke, Grand Prize: The mine and plant has been partially rehabilitated in preparation for part-time operation.

J. Hodge, Razorback Mine, Dundas: Early in the final quarter of the year the plant had been rehabilitated and treatment at the rate of four tons per day, commenced. Two men, employed full-time, produced concentrates containing 0.963 ton of tin, valued at \$2,941.

R. Laffer, St Dizier, North Heemskirk: This operator worked part-time on equipping the St Dizier open cut for productive operations.

A. R. Smith, Tasman River, North Heemskirk: Production totalled 0.302 ton of tin, valued at \$938 from part-time operation. The leaseholder spent a portion of his time on prospecting operations on his Queensberry mine lease, now under option to the Mt Lyell Mining and Railway Co. Ltd.

Mr C. D. King, Port Davey, produced from the Melaleuca Mine concentrates containing 1.175 tons of tin, valued at \$3,640.

Mr E. J. Bayley, Balfour, produced 0.042 ton of tin in concentrates of value \$128.

Mr A. A. Walker, Balfour, produced 0.059 ton of tin in concentrates of value \$180.

MISCELLANEOUS

Mr L. Stackhouse, Launceston, sold 0.009 ton of tin in concentrates of value \$28.

TUNGSTEN (SCHEELITE)

Quantity produced:—	Tons (Concentrates)	Value \$
1917-63	18,746	35,846,506
1964	1,063	1,109,282
1965	1,185	2,090,600
1966	1,311	3,776,862
1967	1,200	3,673,100
Total	<u>23,505</u>	<u>\$46,496,350</u>

King Island Scheelite (1947) Ltd, Grassy

Production statistics:—

Mining:	
Overburden removed	699,821 tons
Ore mined	224,153 tons
Treatment:	
Ore milled	222,977 tons
Concentrate recovered	1,200 tons
WO ₃ content	863 tons
Value	\$3,673,100
Average number of employees	178

A re-calculation of ore reserves to a depth of 300 feet below sea level datum indicated 2,000,000 tons averaging 0.50% and 970,000 tons averaging 0.60% tungstic oxide as at 1 November 1967. Following some diamond drilling north-east of No. 3 Fault, the existence of ore over a strike length of 600 feet to a depth of 550 feet has been confirmed. From these drilling results it has been estimated that 1,000,000 tons of ore averaging 1% tungstic oxide occurs between a depth of 300 to 550 feet below sea level. Studies on the mining method to extract this ore have been made and a decision in favour of the extension of the open cut appears likely.

Diamond Drilling.—A total of twenty-six holes for a footage of 11,747 feet were drilled.

Capital.—The following items were purchased and installed:—

Town—

- (1) Ten houses and a ten-roomed barracks for single men.
- (2) A fire-fighting truck and auxiliary equipment.

Mill—A rotary louvre dryer for the gravity concentrate.

Mine—A down-the-hole percussion blast-hole drill.

TUNGSTEN (WOLFRAM)

Quantity produced:—	Tons (Concentrates)	Value \$
1899-1963	14,566	17,773,494
1964	364	391,134
1965	492	903,040
1966	510	1,367,704
1967	435	1,359,388
Total	16,367	\$21,794,760

Aberfoyle Tin N.L., Rossarden

Wolfram concentrate produced contained 90 tons of tungstic oxide (WO_3) valued at \$383,052. This company is reviewed under Tin.

Storeys Creek Tin Mining Co. N.L., Storeys Creek

Average number of persons employed:—

Underground	67
Surface	25
Staff	6
Total	98

Tonnage of ore milled was 37,016 tons, an increase of 561 tons over the previous year.

Production from the ore treated consisted of 313 tons of wolfram concentrate containing 229 tons of tungstic oxide (WO_3) valued at \$976,336 and 89 tons of tin concentrate containing 65 tons of tin valued at \$202,781.

Underground development comprised:—

Driving	2,282
Cross-cutting	385
Rising	414
Total	3,081

Diamond Drilling.—Two surface holes of total footage 1,450 feet intersected narrow veins. Thirty-five underground holes with total footage of 2,217 feet were drilled. The total diamond drill footage for the year amounted to 3,667 feet.

Capital Works.—

- (1) Recreation hall built at singlemen's quarters.
- (2) Lead-acid Oldham cap lamps and charging unit installed providing 102 cap lamps.

ZINC

Quantity produced:—	Tons	Value \$
1919-63	717,380	91,809,972
1964	40,072	12,256,426
1965	38,096	12,419,442
1966	40,904	12,648,558
1967	40,231	12,106,835
Total	876,683	\$141,241,233

Electrolytic Zinc Company of Australasia Limited**EXTRACTION FROM CONCENTRATES: RISDON**

From other than Tasmanian Ore—	Tons
Zinc	99,575
Cadmium	231
Cobalt Oxide	22
Superphosphate	105,965
From Tasmanian Ore—	
Zinc	42,728
Cadmium	73
Cobalt Oxide	1.14
Manufactured products—	
Aluminium Sulphate	2,236
Ammonium Sulphate	21,277

The average number of men employed was 2,823.

WEST COAST DIVISION

Ore mined—							
Mine	Pb %	Zn %	Fe %	Cu %	Ag oz./ton	Au dwt/ton	Tons
Hercules	6.4	18.6	12.00	0.43	6.35	1.8	22,176
Rosebery	5.55	16.5	14.4	0.69	6.0	1.98	270,892
Farrell	15.9	6.9	9.8	0.26	16.9	Nil	6,616
							299,689

Concentrate produced—

	Tons
Zinc Concentrate	81,751
Lead Concentrate	13,766
Copper Concentrate	12,227
Total	107,744

Recoverable quantity in ore mined—

Zinc	40,231	tons
Lead	11,930	tons
Copper	1,221	tons
Cadmium	74	tons
Silver	1,427,970	oz (fine)
Gold	25,130	oz (fine)
Cobalt Oxide	1.14	tons
Manganese Dioxide	424	tons
Zinc Sulphate	301	tons
Sulphur as Sulphuric Acid	72,347	mono tons
Mercury	4,204	lbs

Total value of production—\$18,445,007.

Average number of persons employed—

	Surface	Underground	Total
Hercules Mine	8	25	33
Rosebery Mine	362	331	693
Farrell Mine	8	12	20
Total	378	368	746

ROSEBERY, HERCULES AND FARRELL MINES

Development—

Rosebery—

Main level development (driving and cross-cutting)	1,888 feet
Rising	1,821 feet

In addition 1,759 feet of driving was done on No. 14 level to provide access to diamond drill sites.

Hercules—

Driving and cross-cutting	693 feet
Rising	81 feet

Farrell—

Driving and cross-cutting	307 feet
Rising	132 feet

In addition 557 feet of driving and cross-cutting was done on No. 9 level to provide access to diamond drilling sites.

Diamond Drilling

Rosebery.—A total of 25,940 feet which includes 1,653 feet of pilot and ventilation drilling.

Hercules.—A total of 1,455 feet which includes 297 feet of pilot and ventilation drilling.

Farrell.—A total of 2,042 feet which includes 54 feet of surface drilling.

Prospects.—Two holes drilled at Melba Flat totalled 1,067 feet.

General

Ore reserves, on 28 June 1967, of the Rosebery and Hercules mines were estimated at 7,500,000 tons, an increase of 500,000 tons over the figure for the previous year.

The use of trackless ore loaders (T2G autoloader) in the Rosebery mine increased and at the end of the year, four were operating. A fifth was put into operation early in the current year.

Major improvements are being made in the Rosebery mine ventilation system. A new 30,000 c.f.m. fan has been installed on No. 6 level in the north end of the mine and the 50,000 c.f.m fan from No. 4 level is in process of being installed at the foot of the service rise on No. 8 level. Work is about to start on a new upcast system in the south end.

At the close of the year work commenced by outside contractors on the Rosebery No. 2 main shaft project, a start being made on the 15 feet x 15 feet sinking brace cross-cut on R.L.775 feet.

The installation of a complete new zinc flotation section consisting of thirty-eight cells, which will replace the old cells, is nearing completion.

The two additional oil-fired steam generators, each capable of producing 5,000 lb per hour of steam, were placed in operation.

The fifteen new houses mentioned last year were completed and mostly occupied.

A decision has been made to install an auxiliary diesel-driven power plant.

RISDON WORKS

Mr J. B. Braithwaite, Senior Mining Engineer and Mr H. Murchie, Mining Engineer, Hobart, report that the average number of employees was 2,823.

The following new plant and equipment was installed during the year:—

A retort for production of six micron zinc dust.

Two additional Cottrells for treating exhaust gases from the zinc plant.

A Doyle scrubber for exhaust gases from superphosphate mixer.

A 2,000-ton concentrated sulphuric acid storage tank together with pipeline to the wharf providing acid loading facilities.

Several new projects were commenced, the most important of these being the installation of silicon rectifiers which will effect some saving on electric power.

ZINC SULPHATE

This is a by-product from the treatment of zinc concentrate by the Electrolytic Zinc Company of Australasia Limited. The quantity produced was 301 tons of value \$34,307.

2.—Non-Metallic Minerals

CLAY

Quantity produced:—	Cubic yards	Value \$
1958-63	708,945	1,273,078
1964	136,256	272,770
1965	147,796	283,004
1966	158,948	325,488
1967	130,522	287,658
Total	1,282,467	\$2,441,998

Company	Clay Cu. yd	Value \$	No. of Men	Product
Agripipe Pottery Pty Ltd, Relbia	408	408	2	Pipes
Campbell, John Pty Ltd, Launceston	2,020	1,761	13	Pipes
*Fenton, E. V., Kingston	4,559	11,397	1	Bricks
Goliath Portland Cement Co. Ltd, Rail- ton	15,169	51,575	2	Cement
*Hazell Bros, Margate	13,886	34,714	1	Bricks
Hobart Brick Co., New Town and Gran- ton	11,018	27,544	42	Bricks
Huttons Bricks Pty Ltd, Prospect	14,000	28,000	12	Bricks
Luck Brick and Pipe Pty Ltd, Dulverton	5,612	8,417	19	Bricks
Machens Brick Pty Ltd, Kings Meadows	15,712	31,424	20	Bricks
McHugh Bros Bricks, Pty Ltd, Granton	14,100	35,250	12	Bricks
McHugh Bros Pty Ltd, Granton	4,049	12,545	14	Pipes
McHugh Bros Pty Ltd, Launceston	2,433	5,353	18	Pipes
McHugh Bros Pty Ltd, Prospect Vale ..	11,438	5,719	12	Bricks
*Wells, D. S., Blackmans Bay	3,452	8,629	1	Bricks
Wise, G. R. & Son, Relbia	1,260	1,260	...	Bricks
Wynyard Brick, Wynyard	8,606	17,212	9	Bricks
Wunderlich Pty Ltd, Loira and Laun- ceston	2,800	6,450	28	Tiles

* Supplies to Hobart Brick Company

Hobart Brick Company, New Town

Average number of persons employed was forty-two.

The plant was extended to produce 70,000-80,000 press bricks per week involving the installation of a dry grinding pan, elevator, storage bin and a stiff plastic brick making machine. The extrusion plant building was extended, the new roof structure covering an area of 12,000 square feet. A new air receiver was installed.

DOLOMITE

Quantity produced:—	Tons	Value \$
Prior to 1964	24,772	145,148
1964	923	5,280
1965	1,145	6,784
1966	2,606	15,097
1967	2,143	12,361
Total	31,589	\$184,670

Circular Head Dolomite and Trading Co. Pty Ltd, Smithton

This company, the sole producer, employed an average of one man and produced 2,143 tons, a decrease of 463 tons. The stone is milled for top-dressing in agriculture.

KAOLIN

There has been no production since 1962. The total quantity produced since 1940 is 111,086 tons, valued at \$883,018.

LIMESTONE

Quantity and value of production and usage—

Year	Manufacture of Cement		Manufacture of Carbide		Chemical and Metallurgical		Agricultural and Other		Totals	
	Tons	\$	Tons	\$	Tons	\$	Tons	\$	Tons	\$
1919-63	4,150,272	5,230,436	631,685	1,620,490	4,095,911	4,663,863	539,132	1,294,240	9,417,000	12,809,034
1964	261,030	511,136	27,219	106,398	32,996	100,368	30,273	75,540	351,518	793,442
1965	249,107	487,818	30,315	118,432	29,075	90,874	29,917	74,482	338,414	771,606
1966	252,393	494,437	29,218	114,056	28,489	88,983	34,634	83,077	344,734	780,553
1967	253,611	496,749	16,234	62,290	33,670	103,155	44,934	104,679	348,449	766,873
Totals	5,166,413	\$7,220,576	734,671	\$2,021,666	4,220,141	\$5,047,248	678,890	\$1,632,018	10,800,115	\$15,921,508

Addison and Coates, Currie

This firm produced 5,000 tons of limestone valued at \$7,500. An average of one man was employed.

Australian Commonwealth Carbide Company, Ltd, Ida Bay and Electrona

This company quarried 16,234 tons of limestone at a cost of \$62,290 at Ida Bay and used it for the production of calcium carbide at Electrona. Calcium carbide production was 7,158 tons valued at \$861,378 and acetylene black production was 188 tons valued at \$89,886. The average number of persons employed was 197, of whom 22 were at the quarry.

The carbide works was damaged in the bush fire of 7 February, causing total stoppage of production until 23 May. Reconstruction work carried out during the shut-down included:—

A Hardinge ball mill for grinding calcined anthracite to 85%—120 mesh. The mill has a vacuum operated closed circuit with rated capacity 500 lb/hour.

A new lime mixing building containing an Alliss Chalmers radial jaw crusher 24 x 10 inches.

New lime skip, 8 feet diameter lime bin.

A 18-foot diameter anthracite bin.
 A 14-foot diameter coke bin.
 New conveyor structure to feed the anthracite and coke bins.
 A vibrator feeding the lime skip with a dust extractor below the vibrator.
 A new tipping ramp and elevated roadway with a reinforced cement pad for spalling.
 Rail mounted trucks have been replaced by wheelbarrows.
 No. 3 lime kiln has been repaired and relined.
 No. 2R furnace transformer, rating 4,500 kVA, reconditioned.
 A new pump for supplying cooling water to the furnaces.
 A new laboratory and four houses to replace losses.

Lune River Quarry, Ida Bay

Progress continues with the establishment of the top bench and conditions are considered to be much improved.

Australian Newsprint Mills Limited, Maydena

This company quarried 5,358 tons of limestone at a cost of \$28,637. The limestone was burnt at their Boyer Mill and used in newsprint production. Six men were employed in the quarry throughout the year.

A. R. Beams, Flowery Gully

From his quarry, crushing plant and lime kiln, Mr Beams produced:—		\$
2,281 tons	Agricultural limestone, valued at	8,275
17,364 tons	Limestone for chemical and metallurgical purposes, valued at	41,674
70 tons	Burnt lime for various purposes, valued at	1,470
<hr/> 19,715 tons	Total value	<hr/> \$51,419

Twelve men were employed.

New equipment installed included the following items:—

- (1) Hopper and chute.
- (2) Hatfield crusher, 24 x 14-inch.
- (3) Conveyor belt, 14 feet x 18 inches.
- (4) Jacques impacter crusher.
- (5) Conveyor belt, 60 feet x 18 inches.
- (6) Vibratory screens.

Modern safety features have been incorporated in the design of the plant.

Goliath Portland Cement Co. Ltd, Railton

Limestone quarried and used in the manufacture of cement totalled 253,611 tons, at a cost of \$496,749. Employment in this quarry, for limestone for cement manufacture only, averaged 19 men.

Cement production totalled 201,550 tons valued overall at \$3,627,900. This production was all fine cement. Average employment was 326 men.

To cope with power rationing the company has installed two 830 kW and two 720 kW diesel electric generating sets. A water reclamation system is also being installed to recover all water at present running to waste.

R. K. Sulzberger, Flowery Gully and Launceston

This operator quarried 737 tons of limestone at his Flowery Gully quarry. The stone was carried to his Launceston crushing plant and sold for agricultural purposes. The value being \$4,800. This represents production for the first nine months. In the final quarter of the year a start was made on dismantling the crusher for removal to Fingerpost Hill, Lilydale Road. This move was necessitated by the rapid development of the Council Flood Protection Scheme, the space being required for the early construction of flood retaining walls at this point.

Melrose Agricultural Lime Quarries, Eugenana

Production of ground limestone fell to 1,639 tons, valued at \$9,833, an average of three men being employed in the quarry.

Mineral Supplies, Ulverstone

Sales of stocks on hand by this firm amounted to two tons, valued at \$22.

The Mount Lyell Mining and Railway Company Limited, Halls Creek

This company quarried 10,948 tons of limestone, valued at \$32,844, for delivery to the works at Queenstown from the quarry at Halls Creek. Quarrying operations were on a contract basis and the limestone was used as flux in the blast furnace or burnt to produce lime for use in the flotation plant.

Railton Lime Works, Railton

Two men were employed at this works to crush and mill 24,496 tons of limestone, valued at \$47,995, supplied by the Goliath Company. New equipment for the storing, conveying, screening and reduction of oversize by hammer mill of the crushed material supplied by the Goliath Company is being installed.

Wright Stephenson Pty Ltd, Pulbeena

This company produced 7,065 tons of limesand, valued at \$19,996, compared with 6,067 tons in the previous year. Average employment was two men.

OCHRE

Quantity produced:—	Tons	Value \$
1918-63	2,285	14,264
1964	69	924
1965	40	544
1966	65	1,008
1967	97	1,459
Total	2,556	\$18,199

A. Pearson, Spalford and Deep Creek

Production of red and yellow ochre from these pits was 97 tons, valued at \$1,459.

PEBBLES

Quantity produced:—	Tons	Value \$
1957-63	3,848	57,014
1964	727	10,120
1965	920	14,002
1966	895	15,183
1967	1,237	20,404
Total	7,627	\$116,723

A. Pearson, Ulverstone

The collection of pebbles for grinding was continued on the beaches around Ulverstone. The output was 1,237 tons, valued at \$20,404.

SILICA

Quantity produced:—	Tons	Value \$
1936-63	165,792	228,972
1964	4,231	8,386
1965	4,562	10,528
1966	5,014	10,261
1967	8,557	23,360
Total	188,156	\$281,507

Australian Glass Manufacturers Ltd, South Arm

This company obtained 4,900 tons of silica sand, valued at \$9,030, for the manufacture of glass.

Mineral Supplies, Ulverstone

This firm supplied 289 tons of silica, valued at \$2,542.

The Mount Lyell Mining and Railway Company Limited, Queenstown

This company, reviewed under Copper, quarried 3,368 tons of silica, valued at \$11,788, for use as a flux.

3.—Construction Materials**BUILDING STONE**

Quantity produced—	Cubic yards	Value \$
Granite (Red)	291	2,501
Freestone	519	7,374
Other	836	2,508
Total	1,646	\$12,383

CRUSHED AND BROKEN STONE**Basalt**

Quarry	Men	Cubic yards	Value \$
A.F.H., Surrey Hills	1	11,507	34,521
A.N.M., Maydena	5	45,987	137,961
Bonney Bros, Mooreville	12	92,745	278,235
Holloway, Round Hill	5	10,358	31,074
Savage River Mines	*	59,600	178,800
Wely, Bridgewater	6	11,303	33,909
Others	5	10,212	30,311
Total	34	241,712	\$724,811

* See Iron Ore.

Dolerite

Quarry	Men	Cubic yards	Value \$
Brighton Council	1	10,175	30,525
Clothier, St Leonards	4	6,048	18,146
Davis Contractors	4	39,500	118,500
Electrolytic Zinc Co., Risdon	1	7,539	22,617
Gordon, Glenorchy	6	10,500	31,500
Hobart Quarries, New Town	34	241,061	723,183
H.E.C., Repulse	13	88,391	268,379
Launceston Quarries, Mowbray	11	52,402	157,206
Public Works Department	91	87,182	483,860
Pioneer Quarries, Flagstaff Gully	7	31,791	95,373
Roche Bros, Selfs Point and Queens Domain	5	27,000	81,000
Rouse, G., St Leonards	3	9,670	29,006
Others	14	17,097	69,637
Total	194	628,356	\$2,128,932

Hobart Quarries Pty Ltd, New Town

A new bench has been opened south-west of the existing benches, giving four effective benches. This will permit the re-orientation of the benches away from the surrounding built-up area.

Two new WABCO 20-ton dump trucks with TELMA electric brake retarders have been put into use.

A Gardner-Denver PR 123J deep hole drill with independent rotation has been purchased, together with a Holman 600 c.f.m. compressor. Several complaints of dust nuisance were investigated and found to be unfounded. A garden is being established at the approach to the quarry to prevent the settling of dust and experiments with dust suppression sprays are being investigated.

Glenorchy Quarries, Glenorchy

During the year this quarry, formerly Gordon's, was purchased by Geo. Quon Contractors Pty Ltd who have built a ready-mixed plant at the quarry.

Limestone			
Quarry	Men	Cubic yards	Value \$
Weily, Glenorchy	9	13,389	40,167

Sandstone			
Quarry	Men	Cubic yards	Value \$
Hilder, Loyatea	1	2,000	6,000
Queenstown Council	2	2,490	7,470
Total	3	<u>4,490</u>	<u>\$13,470</u>

Other Stone			
Quarry	Men	Cubic yards	Value \$
Devon Metal Supplies, Devonport .....	....	25,077	75,231
Hay, Currie	1	2,155	6,512
Holloway, Round Hill .....	....	10,410	31,230
King Island Council	1	11,220	33,660
King Island Scheelite, Grassy	1	4,875	14,625
Mt Lyell Co., Queenstown	4	80,616	241,848
S. & B. Contracting, Smithton .....	....	2,090	6,270
Sorell Council	3	2,129	6,387
Transport Commission, Leith	5	18,934	56,802
Others	2	4,950	15,160
Total	17	<u>162,456</u>	<u>\$487,725</u>

GRAVEL			
Pit	Men	Cubic yards	Value \$
Associated Forest Holdings	4	98,797	98,797
Bonney Bros, Mooreville	7	20,671	37,182
Bothwell Council	3	30,656	30,656
Circular Head Council	2	47,945	47,945
Devonport Council	4	31,584	31,584
Evandale Council	1	26,870	62,377
Fielding, Flowerdale	5	39,518	43,057
Flinders Island Council	2	30,572	30,572
Hamilton Council	2	27,070	27,070
Huon Council	2	32,851	32,851
Kentish Council	2	21,549	21,549
Murrumbidgee Gravel Co., Mersey- lea	7	55,999	96,133
New Norfolk Council	2	29,805	29,805
Oatlands Council	2	24,255	24,255
Pioneer Sand and Gravel Co., Merseylea	2	30,038	30,038
Portland Council	6	25,695	25,695
Scottsdale Council	2	30,485	71,485
Westbury Council	2	35,811	35,811
Woodfield and French, Launceston ..	19	46,660	46,660
Government Departments	142	497,715	575,855
Others	83	398,079	492,782
Total	301	<u>1,582,625</u>	<u>\$1,892,159</u>

Pioneer Quarries (Tas.) Pty Ltd, Merseylea

This property was formerly owned by the Murrumbidgee Sand & Gravel Co.

Additional plant installed was as follows:—

One only 8 x 4-foot single deck screen.

One only 30 cubic yard hopper.

Operator's room.

A new dual screen trommel (internal diameter 48 inches, outside diameter 56 inches, length 13 feet 6 inches).

SAND			
Pit	Men	Cubic yards	Value \$
Atkinson, Sandford	1	6,579	6,579
Bonney Bros, Mooreville .....	.....	23,078	41,460
H.E.C., Repulse .....	.....	18,527	69,841
Kenny, Kelso	1	9,131	13,697
Long, South Arm	4	49,624	49,624
Males, South Arm	1	6,076	6,076
Murrumbidgee Gravel & Sand Co., Merseylea .....	.....	7,017	11,929
Pearce, Ulverstone	2	11,000	22,000
Others	7	58,498	72,896
Total	16	189,530	\$294,102

OTHER ROADMAKING MATERIALS

Pit	Men	Cubic yards	Value \$
Devonport Council .....	.....	14,529	14,529
Haines, Lorinna .....	.....	2,900	2,900
Holloway, Round Hill .....	.....	24,027	24,027
Kauri Timber Co., Devonport	1	4,050	6,075
King Island Scheelite .....	.....	4,054	4,054
Ulverstone Council	2	18,502	18,502
Woodfield & French, Launceston .....	.....	23,539	23,539
Zeehan Council .....	.....	4,540	4,540
Others	4	20,781	37,068
Total	7	116,922	\$135,234

4.—Fuel Materials

COAL		
Quantity produced:—	Tons	Value \$
Prior to 1964	9,073,176	22,854,496
1964	151,161	622,630
1965	102,457	420,346
1966	82,664	353,238
1967	76,541	324,553
Total	9,485,999	\$24,575,263

Mr W. R. Tindal, Mining Engineer, reports that there has been a drop in production of 6,123 tons of coal, equivalent to 7%. The number of employees decreased from 66 to 58 of whom 33 were employed underground. The production per man year increased from 2,296 to 2,319 tons for underground employees and from 1,252 to 1,320 overall. The fall in production is due to the effect of the increased use of fuel oil.

Duncan Coal Mine, Fingal

Production continued in the seam in which mining has been carried out in previous years. Operations have again been concentrated in the right-hand panel on which first workings have been completed and pillar extraction in the retreat has commenced. The left-hand panel was worked intermittently in the early part of the year, but towards the close of the year was in constant production, with improvements in the height of seam and quality of the coal.

There has not been any change in methods of working the seam and the whole of the output was cleaned in the washery. Preparations are being made both on surface and underground to cope with the unit train to be introduced in 1968 to carry coal to Australian Newsprint Mills at Boyer.

Production from this mine was 61,748 tons gross, a decrease of 3,880 tons with a complement of forty-seven employees giving an increase in overall production per man year from 1,215 to 1,314 tons. Production during the year has been on the basis of a four-day week with the fifth day being on maintenance.

Prospecting for a lower seam was carried out in the Fingal Coal Mine by diamond drilling to a depth of 133 feet at a point 370 yards inbye from the portal.

New Stanhope Coal Mine, Avoca

As in the previous year the whole of the production was obtained from the No. 2 adit. Workings were still in disturbed and faulted ground, mainly by down faults not large enough to create difficult mining conditions. A zone of dirty coal was encountered in the tunnel about the middle of the year which had previously limited the workings on the right-hand side, but by the end of the year the No. 2 adit had passed through the zone. The coal on both sides had shown considerable improvement in addition to that in the face of the tunnel.

No change has been made in the method of working except that the coal from the cut-throughs between levels is being loaded out by a scraper loader. The coal is brought out of the mine by scraper chains and rubber conveyor belts to the surface bins.

The small coal is cleaned by a Diester table and the large coal is still unwashed but hand-picked.

Production was 13,230 tons gross, a decrease of 1,398 tons with an overall production per man year of 1,654 tons, a decrease of 174 tons. The average number of employees remained at eight.

Sandfly Coal Mine, Kaoota

Coal from this mine is semi-anthracitic and is used in hop kilns, for household purposes and for the burning of lime at the Australian Newsprint Mills at Boyer. The extraction of pillars continued for the whole of the year with no change in the method of working. A new adit has been started and advanced 20 feet.

Production was 1,563 tons, a decrease of 770 tons for the year with three employees, giving an overall production per man year of 521 tons, a decrease of 62 tons.

5.—Foreign Ores

The total value of the metallurgical products of four large works treating foreign ores imported into Tasmania was approximately \$71,426,756.

ALUMINIUM

Comalco Aluminium (Bell Bay) Ltd, Bell Bay

Operations by this company showed a decrease of 433 tons of aluminium over the previous year.

Other products were—aluminium hydrates, 5,814 tons; and alumina, 4,430 tons.

In all, 51,769 tons of aluminium were extracted from 136,206 tons of bauxite from Weipa and 51,104 tons of imported alumina. Average employment rose by 33 to 1,047.

During 1967 the company completed an expansion project involving construction of a half pot line and some extensions to the casting shop at an estimated cost of \$9,000,000. Production capacity of the new unit is 18,000 long tons per annum. Owing to power restrictions production from the new equipment was not commenced.

Approximately \$600,000 was spent on modifications to the green carbon plant to prevent loss of carbon dust previously discharged to atmosphere, and to improve quality.

FERRO-MANGANESE

Tasmanian Electro-Metallurgical Co. Pty Ltd, Bell Bay

This company, reviewed under Silicon, smelted 148,543 tons of manganese ore to produce 54,917 tons of ferro-manganese for steel making. The ore used was mainly obtained from Groote Eylandt in the Northern Territory.

Australian Titan Products Pty Ltd, Heybridge

This works imported 46,836 tons of West Australian ilmenite from which was produced 22,488 tons of titanium dioxide pigment.

Capital Expenditure.—During the year the following capital items were acquired and installed:—

	\$
(1) Three diesel generators and ancillary equipment	141,549
(2) Forced flow pigment packers	63,850
(3) Miscellaneous small items	93,448
Total	<u>\$298,847</u>

The average number of employees during the year was 468.

ZINC, CADMIUM, COBALT OXIDE AND SUPERPHOSPHATE**Electrolytic Zinc Company of Australasia Limited, Risdon**

This company, described under Zinc, produced zinc from Broken Hill concentrates together with small quantities of cadmium and cobalt oxide as by-products. The sulphuric acid derived from roasting the concentrates was used in making superphosphate fertilisers from phosphate rock imported from Nauru, Ocean and Christmas Islands.

GEOLOGICAL SURVEY BRANCH

Report of Chief Geologist, I. B. Jennings, B.Sc. (Hons), A.MAust. I.M.M.

Mineral explorations by private companies continued at a high level throughout the year and the Economic Geology Section continued to provide technical assistance and advice as required. In addition to this, the data yielded from current mineral exploration has been assessed and recorded for future use. Geological studies of the alluvial tin deposits in NE Tasmania continued, together with investigations into the non-metallic mineral deposits and the fossil fuel resources of the State. Advice was provided to prospectors and operators of various small mines.

The Regional Geological Mapping Section continued the programme of systematic mapping of the State. Whilst progress in this field was hampered by staff shortages satisfactory progress was made and the production of high quality 1 mile to 1 inch geological sheets was maintained.

Research into the groundwater resources of the State continued and by the end of the year the basic geological and geophysical data necessary for an assessment of the Longford Tertiary Basin had been assembled. Interpretation and compilation of this data is proceeding. A systematic study of the groundwater resources of the Colebrook-Campania district was made and a draft report prepared. This section also continued to provide geological advice on various engineering proposals. Most of the engineering geology done during the year concerned a number of proposed dam sites along the Jordan River and a continuing study of geological conditions for a proposed major dam at Whitewater Creek, near Kingston.

Overall progress throughout the year in all geological fields was very good. The appointment of Mr M. J. Clarke as palaeontologist early in the year has considerably strengthened the specialist services available to the branch. Staff shortages have restricted some activities but it is anticipated that programmes of post-graduate training which are now coming to fruition together with additional staff recruitment will considerably ease this problem during the coming year.

Miss Edith Smith, Publications Officer, died on 29 August 1967. Miss Smith was an outstanding officer who made very great contributions to the work of the branch particularly in her specialised field of technical editing. It has been largely due to Miss Smith's efforts that the standard of departmental publications has risen to a high level during a period of rapid expansion. Miss Smith's services will be sadly missed by the Department and by all members of the geological profession.

REGIONAL GEOLOGY

Senior Geologist E. Williams Reports:—

Progress during the year in regional geological mapping of 1-mile sheets:—

Explanatory Notes of the Pipers River 1-mile Sheet have been completed and are being prepared for printing. Notes of the Table Cape, Burnie, Noland Bay and Mackintosh 1-mile Sheets are being compiled.

Noland Bay 1-mile Sheet has been published.

Burnie 1-mile Sheet is in the process of being published.

Pieman Heads 1-mile Sheet was completed by A. B. Gulline, R. D. Gee, A. P. Bravo and P. J. Legg and the sheet is in the process of being published.

Frankford 1-mile Sheet—Geologist A. B. Gulline continued mapping in this area.

Beaconsfield 1-mile Sheet—Geologist R. D. Gee continued mapping in this area.

Rossarden-Mathinna Region, NE Tasmania—Geologists A. P. Bravo and P. J. Legge have spent the year studying the geology of this region.

Gordon River Project—At the request of the Hydro-Electric Commission a study of the geology of the Lower Gordon River was commenced by R. D. Gee and G. P. Pike.

PUBLICATIONS

WILLIAMS, E., 1967.—Joint Patterns at Dalrymple Hill, North-East Tasmania. *Geol. Mag.*, Cambridge. Vol. 104, No. 3, pp. 240-252.

————— 1967.—Notes on the Determination of Shortening by Flexure Folding Modified by Flattening. *Pap. Roy. Soc. Tasm.* Vol. 101, pp. 37-41.

————— and GROVES, D. I., 1967.—Examples of Intrusive Acid Dykes in Eastern Tasmania. *Pap. Roy. Soc. Tasm.* Vol. 101, pp. 13-15.

GULLINE, A. B., 1967.—The First Proved Occurrence of Carboniferous in Tasmania. *Aust. J. Sci.*, Sydney. Vol. 29, pp. 332-333.

ECONOMIC GEOLOGY

Senior Geologist A. J. Noldart Reports:—

The following studies were made during the year:—

1. METALLIC DEPOSITS

Work, as follows, was carried out—

- (a) Investigation of the NE tin deposits. Detailed plane-table mapping project on Hasties workings.
- (b) Drilling for alluvial tin for the Dorset dredge.
- (c) Examination and advice for H. Moses on tin workings in the Blue Tier area.
- (d) Testing by Proline drilling and by mapping of possible alluvial tin areas in the Coles Bay district.
- (e) Logging of the drill core from the Royal George Mine and from the Roy Hill Mine. (Assessment of the Royal George Mine by the Cornwall Coal Co. continued.)
- (f) Examination of tin prospects at Great Republic, Mt Rex, Pyramid, Loila Tier, Anchor Mine and Briseis Mine.
- (g) Completion of drilling—Beaconsfield gold mine. Also preparation of a report and plans.
- (h) Continuation of geological studies at Alberton. Siting of drill holes and logging of cores.
- (i) Examination of gold workings at Lisle, Back Creek, Panama, Golconda, Denison and Lefroy.

2. FUEL MINERALS

The following work was carried out—

- (a) Continuation of the investigation of the coal resources of the Fingal Valley by means of geological mapping and drilling. A geological map has been prepared and boring is continuing.
- (b) Advice was provided on geological problems encountered in the New Stanhope Coal Mine.

3. NON-METALLIC MINERALS

The following non-metallic deposits were examined—

- (a) Clay and shale deposits at Launceston, Latrobe, Hamilton, Ten Mile Hill and in north-eastern areas.
- (b) Clays from the Kingston district in conjunction with an Australia-wide study on the 'Characterisation of Clays'.
- (c) Kaolin deposits at Gladstone, Scottsdale, Ringarooma and 'The Gardens'.
- (d) Limestone occurrences at Mt Paul, Coles Bay.
- (e) Drill cores from holes put in to investigate the Flowery Gully limestone.
- (f) Possible deposits of foundry sands.

4. GEOPHYSICS

Magnetometer surveys were made of the Savage River north deposits, iron ore deposits at Iron Cliffs, Penguin and pyrite deposits at Branchs Creek. Seismic traverses were made across possible tin leads on the Great Northern Plains.

5. SURVEYING

Work was carried out at the following localities—

- (a) Whitewater Creek dam site, Kingston: levelling and setting out of geophysical grids.
- (b) North-east tin fields: extension of the level grid.
- (c) Great Northern Plains: setting out and levelling of seismic traverses and drill lines.
- (d) Alberton: surveying and levelling of drilling sections.

6. GENERAL

A mapping project to determine the economic potential of the Coles Bay-Bicheno district was commenced and substantially completed by the end of the year.

ENGINEERING GEOLOGY AND GROUNDWATER

Senior Geologist P. C. Stevenson Reports:—

The volume of both engineering and groundwater work has continued to increase, both because of demand, and because of increased staff. Additional geophysical equipment has enabled more detailed information to be obtained.

ENGINEERING GEOLOGY

Dam Sites

Geologist W. R. Moore has carried the survey of the Kingston dam site into the feasibility phase with a drilling programme supplemented by water pressure permeability tests, and has co-ordinated gravity, magnetometer and resistivity surveys of the site. The work has been reported on, but further feasibility studies are being postponed.

Geologists W. R. Moore and D. E. Leaman have prepared preliminary reports on the six dam sites on the Jordan River and also on those at Nicholls Rivulet, Cygnet, and near Ringarooma.

Road Routes

Geologist W. R. Moore prepared reports on the proposed road realignments at Dysart Hill on the Midland Highway. D. E. Leaman reported on the proposed Bell Bay-Bridport Road at Lefroy.

Various geologists have reported on potential landslips at Don Heads, Rosevears, Burnie, Boat Harbour and on foundations at Launceston and for the State Library, Hobart.

GROUNDWATER INVESTIGATIONS

Longford Tertiary Basin

Geologist W. L. Matthews has completed the mapping of the Longford Tertiary Basin.

Geologists M. J. Longman and D. E. Leaman have completed and compiled a gravity survey of the Longford Basin and detailed interpretation is in hand.

Geologists M. J. Longman and W. L. Matthews supervised the drilling of four further deep investigation holes in the basin and have logged the holes geologically and geophysically.

Coal River Basin

Geologist D. E. Leaman has completed the mapping of the Coal River Basin and some adjacent areas, and he has observed and compiled a gravity survey of the basin. In addition, M. J. Longman has observed and interpreted three seismic profiles and used these to site seven deep investigation bore holes in the basin.

King Island

Geologist W. L. Matthews carried out and reported on investigations for groundwater on King Island.

Scottsdale

Geologist W. R. Moore has mapped areas to the north and east of Scottsdale in order to determine its groundwater potential and has carried out extensive resistivity work to supplement this mapping. Further work in the Scottsdale-Bridport area will lead to the publication of a Water Supply Paper on the area.

Other Areas

Geologist M. J. Longman carried out further water survey in the Cuprona-Riana area.

Various geologists have selected water bore sites in the Huon Valley, Coal River, South Midlands, Launceston, Westbury, north, north-west, north-east and eastern areas.

GEOPHYSICAL WORK

Apart from the geophysical work explicitly employed in groundwater and engineering studies, Geologists M. J. Longman and D. E. Leaman have carried out experimental magnetometer surveys at Savage River and Cuprona and bore hole logging at Port Sorell.

GENERAL

Two geologists attended the 1967 Groundwater School organised by the Australian Water Resources Council at Adelaide.

A landform map to aid in the selection of representative catchments for Tasmania was prepared.

Field Assistant J. G. Pitcher has compiled a punched card index of known bores in Tasmania.

The section has recorded information on new bores emanating from the workings of the Underground Water Act 1966.

PUBLICATIONS

Geologist D. E. Leaman compiled and prepared for publication a Water Supply Paper on the Coal River Basin.

MAPPING AND ENGINEERING DRAUGHTING SECTION

Senior Draughtsman K. T. Kendall Reports:—

The filling of staff vacancies and the acquisition of extra storage facilities has alleviated pressures brought about by the expanded mapping and investigational programme of the Geological Survey. Consequently this year's cartographic productions and activities have exceeded previous highs.

Geological Atlas 1-mile Series

Noland Bay Sheet No. 23: Fair Drawn and printed in eleven colours. This sheet features detailed structural profiles of Siluro-Devonian coastal exposures.

Burnie Sheet No. 28: Fair drawn, proof checked, will be printed early in 1968.

Pieman Heads Sheet No. 42: Compilation proceeding.

Beaconsfield Sheet No. 30, Frankford Sheet No. 28 and Quamby Sheet No. 46: Further base map material was supplied to the Regional Mapping Section.

Australia 1:250,000 Series: Compilation reductions and base materials were supplied to the Regional Geology Section.

Other Material Prepared for Publication

One 4-colour plate, two 8-colour mineral resources maps (A—Lode and Alluvial Deposits; B—Stratified and Residual Deposits, Granite and Serpentinite) and one monocolour map for Geological Survey Bulletin No. 50—'Geology and Mineral Resources of Tasmania'.

Fifty monocolour maps, sections and diagrams for Technical Report No. 11 (1966).

Eight monocolour maps, etc., for Geological Survey Report No. 9 'The Rex Hill Mine'.

One 2-colour map and six monocolour maps, etc., for Geological Survey Report No. 10 'Permian Stratigraphy and Sedimentation in the Barn Bluff Area, Central Tasmania'.

Nineteen maps, diagrams and photographs for Geological Survey Record No. 6 'Glacial Map of Northwest-Central Tasmania'.

Six maps, etc., for Geological Survey Record No. 7 'Re-appraisal of the Lower Permian Type Section, Golden Valley, Tasmania'.

Two flowsheets for the Director of Mines' Annual Report (1966). Various printing and duplication services were maintained for use by the department and mining exploration interests.

General

Material was also prepared for ministerial use in the television coverage of Bass Strait oil exploration and the Tasmania Gold Mine, Beaconsfield project. Other items relating to oil exploration were produced for legislative purposes.

An increase was noted in the amount of material received for draughting from the Chemical and Metallurgical Branch.

The balance of time was used in preparing geological, geophysical and engineering plans related to normal field services.

MINERALOGY AND PETROLOGY

Mineralogist and Petrologist G. Everard Reports:—

On 23 January a three-day conference on petrological nomenclature, for petrologists of the State Surveys and the Bureau of Mineral Resources was attended in Canberra.

Petrological reports were made on:—A suite of rocks from Lake River district, diamond drill core from Roy Hill D.D.H's. Nos. 1 and 2 and individual specimens and groups of specimens from Frankford Quadrangle, Whitewater Creek D.D.H., Campania, Single Hill, Lauderdale, Waterhouse Point, Kingston and Oatlands.

Mineragraphic examinations were made of D.D.H. core from the Royal George Mine and of metallurgical concentrates from the Launceston Laboratory.

Among miscellaneous examinations may be included:—Bore hole samples from Great Northern Plains development, samples of soil from South Esk river flats, sands to be used as moulding sands and nodules dredged from the sea bed for phosphate content.

Rock, minerals, soils, sand, clays and concentrates to the number of about fifty individual specimens were examined for members of the general public.

Additional specimens to the number of 243 were added to the rock and mineral collection for the year.

A beginning was made on the revision of Petterd's Catalogue of the Minerals of Tasmania.

PALAEONTOLOGY SECTION

Palaeontologist M. J. Clarke Reports:—

Early this year a long-term study was undertaken of the nature, sequence and distribution of Permian faunas throughout the State. Initially this has involved a re-investigation of the Golden Valley Type Section, a problem finally solved by diamond drilling. The results of this work are now in press. A detailed descriptive and taxonomic palaeontology of the fossils obtained during this work, principally stropholosiids and neospiriferids, is under preparation. It is hoped to extend the scope of this work to embrace the complete Permian outcrop of the Western Tiers and thence the entire State.

Faunal assemblages from a number of localities in the Permian of the Kingston area have been identified and commented on. This work is in conjunction with that of the Engineering Section and relates to proposed Metropolitan Water Board dam sites.

Through the courtesy of B.H.P. a number of Cambrian and Ordovician trilobite and brachiopod faunas from the area south of Macquarie Harbour have been studied and identified.

A systematic departmental fossil collection has been initiated and currently totals over 500 specimens, principally Cambrian trilobites from south of Macquarie Harbour and Permian brachiopods from the Golden Valley area.

A number of palaeontological enquiries from schools, naturalist clubs and other members of the general public have been dealt with.

Publication

Cyrtospirifer, Schellwienella and Schuchertella in 'Faunas of D'Etroeungt'. Aspect from Southern Ireland with notes and comments on the Devonian-Carboniferous boundary. Palaeontological Appendix (with W. S. Bisat and W. H. C. Ramsbottom) in 'The Upper Devonian and Carboniferous Stratigraphy of the Culni Facies in Southern Ireland'. Naylor, D. and Jones P. C. *Scientific Proc. Roy. Dublin Soc.*, A.3, No. 1, 1967.

PUBLICATIONS

The following publications were received from the Government Printer and issued during the year:—

Underground Water Supply Paper No. 6—'The Groundwater Resources of the Cygnet District' by D. E. Leaman, B.Sc. (Hons).

Geological Survey Report No. 9—'The Rex Hill Mine' by G. Urquhart, M.Sc.

Technical Report No. 10 (1965).

Annual Report of Director of Mines.

Tin and Copper

Aberfoyle Tin Development Partnership, Mt Cleveland Mine

R.527—Rougher concentrates from the pilot plant were upgraded using plant equipment. Some miscellaneous tests on products were made to assist with mill design. Attention was given to copper recovery which had until now been done by private companies for the Partnership.

R.549—Difficulties encountered in R.527 with copper concentration were investigated with pilot plant and cyclic batch tests. These tests showed that the anticipated grade and recovery of copper would not easily be obtained.

Copper, Lead and Zinc

Brinkman and Dicker, Mt Rex Mine

R.557—As a consequence of table flotation, which had been investigated in R.525, having been introduced into the Mt Rex flowsheet a sulphide product containing copper, lead and zinc is being produced.

This present investigation showed that after destroying the surface activity induced for table flotation the copper, lead and zinc could be satisfactorily concentrated by froth flotation.

Iron

Industrial and Mining Investigations Pty Ltd, Savage River

R.532—A study was made of the liberation of titanium and nickel from magnetite at various degrees of grinding.

Gold

Mr W. Manson, Kanowna, Western Australia

R.558—A sample of auriferous clayey material was investigated for gold extraction. The work showed that disintegration of the clay to release the gold is the problem to be overcome if this material were to be worked.

Pyrite

Department of Agriculture—Mt Lyell Pyrite Concentrate

R.540—The Mt Pleasant Laboratories asked for samples of pyrite concentrate to be ground to various finenesses so they could study the rate of liberation of sulphur in sulphur deficient soils.

Sea Shells

O. Harvey, Rubicon Estuary

R.544—Shells recovered from the estuary were cleaned by washing, followed either by classification or screening to yield a product assaying over 90% CaCO₃.

Mineral Sands

Kenneth McMahon and Partners, Planet Exploration Areas, Bass Strait

R.546—Samples obtained from under the sea by an air lift type sampling drill were investigated for gold and heavy mineral concentration. Screening, followed by tabling was used to concentrate the heavy mineral which was found to be mostly ilmenite. The heavy mineral concentrate was panned to detect gold.

Beach Sands

Pickands Mather and Co. International, West Coast Beach Sands

R.553—Samples representing the types of sands found on the beaches were investigated for heavy minerals. The methods used were tabling followed by magnetic separation of the table concentrate. Heavy liquid separation was also used on some samples.

R.554—To assist the company in the identification of minerals in beach sands sample concentrates of rutile, zircon, ilmenite and chromite were prepared from Tasmanian beach sands.

Ceramics

Hobart Brick Co., New Town

R.534—Samples submitted by the company were subjected to extrusion brickmaking tests.

Machen's Brick Works, Kings Meadows

R.535—A sample of current plant material was submitted for tests which aimed at improving the appearance of the pressed bricks at present being made. No improvement could be effected, but the material extruded satisfactorily, hence the extrusion process was recommended.

Lucks' Brick & Pipe Pty Ltd, Dulverton

R.533—Brickmaking tests were made on samples obtained by departmental officers from Lucks' sources of raw material. Works Pit materials were found unsatisfactory, but Bush Pit material was found well suited to the extrusion process.

R.539—Samples of white clay from Sheffield and Railton were shown to be suitable for extrusion into bricks.

R.555—The elimination of vanadium staining by the addition of calcium fluoride was investigated. It was found that where sulphates were present in the clay, the addition of calcium fluoride produced a white scum, otherwise the fluoride did reduce the vanadium staining.

McHugh's Brickworks, Prospect

R.541—Tests were made using manganese dioxide to colour current raw materials, with a view to producing a black brick. Tests showed 20% of manganese dioxide was necessary to produce a black brick.

Wynyard Brick Co., Wynyard

R.550—Tests using current raw materials plus Mawbanna white clay were run with the object of making a white brick. However, these tests showed the objective was not attainable.

MINES AND EXPLOSIVES BRANCH

Report of the Deputy State Mining Engineer and Deputy Chief Inspector of Mines and Explosives, Mr P. M. Johnstone, B.E., M.Aust.I.M.M.

The Mines and Works Regulation Act 1915

EMPLOYMENT

The average number of persons employed in the mining, metallurgical and quarrying industry during the year was 10,538, an increase of 416. There was a decrease of 177 men engaged in governmental quarrying and an increase of 593 in metallurgical works and works under construction.

ACCIDENTS

The number of registered accidents was 146 in which 141 men were injured and six killed. In calculation of the rates per thousand, 254 employees in the total of 10,538 were disregarded because their employers do not submit accident reports.

The accident rate was adversely affected by the influence of construction work, and by the record of a large works where more than one-quarter of all accidents occurred.

LOCATION OF ACCIDENTS

Section of the Industry	UNDERGROUND Number of Persons				SURFACE Number of persons				TOTAL Number of Persons			
	Employed	Killed	Injured	Per Cent Injured	Employed	Killed	Injured	Per Cent Injured	Employed	Killed	Injured	Per Cent Injured
Coal	32	....	3	9.4	25	....	....	....	57	....	3	5.3
Copper	79	....	....	....	1,432	1	4	0.3	1,511	1	4	0.3
Silver-lead-zinc	367	1	19	5.4	374	....	9	2.4	741	1	28	3.9
Tin and Tungsten	279	1	11	4.3	684	....	12	1.8	963	1	23	2.5
Quarries, Works, Prospecting, etc. ....	....	....	....	....	7,012	3	83	1.2	7,012	3	83	1.2
Total	757	2	33	4.6	9,527	4	108	1.2	10,284	6	141	1.4
Not reported .....	....	....	....	....	254	....	....	....	254	....	....	....
					9,781				10,538			

DESCRIPTION OF FATAL AND SERIOUS ACCIDENTS

Fatal—

W. F. Grossman, Electrolytic Zinc Co., Rosebery: Struck by fall of ground.

J. F. Shipton, Savage River Mines, Savage River: Reversing a front-end loader which overturned; crushed.

H. T. Hickisey, Savage River Mines, Savage River: Guiding pipe on travelling crane when gib struck live overhead cable; electrocuted.

G. J. McCarthy, Aberfoyle Tin: Fell down shaft.

T. Clements, Comalco: Whilst cleaning isolated electrical equipment, contacted live equipment; electrocuted.

R. H. Rees, Mt Lyell Co.: Fell from walkway over crusher to concrete floor.

Serious—

- L. J. Devlin, Goliath Co.: Released crane cradle after loading mill before crane took weight and fell to floor; broken head.
- J. MacKean, Comalco: Struck by pipe fall from lorry; broken leg.
- D. W. Roach, Risdon Brook Dam: Crushed between truck and floor plate of bulldozer; broken sacrum.
- H. McCauley, Electrolytic Zinc Co., Risdon: Crushed between forklift trucks; broken pelvis.
- D. G. Watt, Storeys Creek Co., Gladstone: Took hold of dredge mooring line, hand drawn into fairlead; lost hand, arm crushed.
- H. Wright, Weilly and Sons, Glenorchy: Hit in eye by seat when spalling without protective equipment; lost eye.
- G. Morley, Electrolytic Zinc Co., Risdon: After blocking furnace, molten zinc pot spilled into water, causing splash of hot zinc; burnt face, arms and ankle.
- C. A. Croft, Electrolytic Zinc Co., Risdon: Foot slipped between steps; broken leg.
- J. Francis, Cleveland Tin: Lost control of portable power saw through receiving an electric shock; lacerated thigh.
- B. de Groot, Electrolytic Zinc Co., Risdon: Spilt pot of molten metal into glove; burnt hand.
- A. G. Muir, Goliath Co.: Electrical test prods slipped from phase to earth, causing flash; burnt face and hands.
- I. Walker, Savage River Mines, Port Latta: Guiding crane broke, glove became caught between rope and guard; lost four fingers.
- M. Badrov, Electrolytic Zinc Co., Rosebery: Lifting heavy timber; broken back.
- H. Thomas, Savage River Mines, Port Latta: Fell from roof of boiler house when removing a tube which suddenly freed; Broken head.
- H. G. Cornish, Electrolytic Zinc Co., Risdon: Swung hammer at peg, struck leg; broken.
- M. Gilbert, Comalco: Anode fell into metal bath splashing flux into boot; severely burnt foot.
- K. S. Kreutzer, Electrolytic Zinc Co., Rosebery: Lifting heavy machinery; spinal lesion.
- B. J. Ware, Electrolytic Zinc Co., Risdon: While skimming dross off zinc blocks, metal exploded; burnt hand.
- K. B. Thompson, Electrolytic Zinc Co., Rosebery: Levering truck with length of rail which slipped onto leg; broken.
- G. T. Russell, Titan Products: Fell while carrying a ladder on a loose duckboard; broken leg.
- D. Kaniaros, Electrolytic Zinc Co., Risdon: While tapping furnace, molten zinc spilt into shoe from swinging launder; burnt foot.
- K. E. Lucas, Mt Lyell Co.: While lighting fuses, the lighter ignited four others carried in pocket; burnt hand, buttock, knee and ankle.
- J. G. Pugh, Aberfoyle Tin: Struck by fall of ground; broken leg, lacerated neck.

TABLE SHOWING RATES PER THOUSAND KILLED OR INJURED

Period	No. of Persons Employed	No. of Accidents	Number of Persons			Number Per Thousand		
			Killed	Injured	Total	Killed	Injured	Total
1892-1930*								
1931-1940†								
1941-1950‡								
1951-1960§								
1961	8,493	108	1	107	108	0.119	12.720	12.839
1962	8,708	68	2	66	68	0.234	7.726	7.961
1963	8,836	86	4	83	87	0.461	9.575	10.037
1964	8,815	68	5	63	68	0.581	7.316	7.897
1965	9,038	93	4	89	93	0.465	10.342	10.808
1966	10,122	82	8	74	82	0.825	7.636	8.461
1967	10,538	146	6	141	147	0.583	13.711	14.294

* See Report of Director of Mines—1954
 † See Report of Director of Mines—1956

‡ See Report of Director of Mines—1960
 § See Report of Director of Mines—1964

INCIDENCE OF ACCIDENTS

Place and Cause of Accident	Number of Persons Killed	Number of Persons Injured (Incapacitated for over 14 days)
<i>Section A.—Metalliferous Mines—</i>		
1. Below Ground		
(a) Explosions		
(b) Falls of Ground	1	6
(c) Falling down Shafts, etc.	1	2
(d) Other Causes		22
2. Above Ground:		
(a) Machinery in Motion	2	10
(b) Other Causes	1	25
3. Accidents in Batteries, Ore-dressing, Smelting and other Metallurgical Works, etc.	1	73
Total Metalliferous Mines (A)	6	138

Section B.—Coal Mines—

4. Below Ground:		
(a) Mine Explosions (fire damp, etc.) .. .. .	.....	.....
(b) Explosives (dynamite, etc.) .. .. .	.....	.....
(c) Falls of Earth .. .. .	.....	.....
(d) Other Causes .. .. .	.....	3
5. Above Ground:		
(a) Machinery in Motion .. .. .	.....	.....
(b) Other Causes .. .. .	.....	.....
	—	—
Total Coal Mines (B) .. .. .	.....	3
	—	—
Total All Mines (A and B)	6	141
	—	—

INSPECTION

Mr E. C. Leyland was appointed to the position of Mining Engineer and Inspector of Mines and Explosives at Burnie in June, taking over part of the north-western division.

Extensive testing of diesel engines has been carried out for the purpose of approval for use underground. The production of toxic gases is determined by sampling and analysis of the exhaust gas at various engine speeds and loads. From this the ventilation requirement of fresh air is determined. In some instances engines have been tested by other authorities, and their approvals are generally accepted. However in the course of usage check tests are made.

DANGEROUS GOODS

The Explosives and Inflammable Liquids Acts

EXPLOSIVES

The following quantities of explosives were imported during the year through the ports shown:—

	Burnie	Hobart	Launceston	Naracoopa	Strahan	Stanley	Total
Nitro-compounds (lb)	5,266,135	45,500	1,139,500	861,500	7,312,635
Detonators	610,200	2,000	198,500	219,000	1,029,700
Explosives Shipments (No.)	12	1	10	8	31
Ammonium nitrate (imported for use as an explosive) (lb)	1,120,000	268,800	896,000	.....	.....	1,120,000	3,404,800
Ammonium nitrate mixtures (lb)	294,950	105,500	400,450

NOTE.—Nitro-compounds exported from Launceston = 1,684,000 lb in three shipments.

The number of licences and permits issued were: Magazine licences, 120; other licences, 496; and shot firer's permits, 99; total, 715.

PROSECUTIONS

Prosecutions were successful for breaches of the Explosives Act in the following cases:—One in relation to unauthorised conveyance of explosives, one in relation to keeping of explosives, and one in relation to usage.

THEFTS AND OUTRAGES

One hundred detonators and a quantity of safety fuses were stolen from the Glenorchy City Council quarry.

Four mysterious explosions in Ulverstone during July had their sequel in October when a twenty-year-old youth was found guilty at the Burnie court.

A man who broke into premises to steal gelignite and detonators, and used them during four safe-blowing episodes, was apprehended.

EXPLOSIVES AUTHORISED DURING THE YEAR

1. Imperial No. 2 Shot Shell Primers.
2. Anzomex Boosters.

FIREWORKS BANNED

The following types of fireworks were banned during the year:—Night Pearls, Coloured Pearls, Sparkling Pearls, Double Voice and Rising Moons.

INSPECTION

Action has been taken to progressively introduce electric shotfiring within the metropolitan area and matters given particular attention have been the use of Cordtex, and the provision of warning sirens. Nitro-compounds imported were inspected and found to be in good order. Imports of fireworks both interstate and overseas were inspected and tested and, with five exceptions were approved for sale within the State. Magazines have been regularly inspected, and departmental officers have supervised blasting operations carried out by municipal councils and construction firms.

MANUFACTURE

While several mines have constructed small A.N.F.O. mixing plants of a high standard, Imperial Chemical Industries of Australia and New Zealand Limited have established a sophisticated mixing plant at Savage River for various A.N. mixtures and slurry explosives.

INFLAMMABLE LIQUIDS

The following quantities in tons of inflammable liquids were imported in bulk during the year through the ports shown:—

	Bell Bay	Burnie	Devonport	Hobart	Naracoopa	Total
Aviation Gasoline	1,340	....	....	963	....	2,303
Benzol .. .. .	....	....	....	....	....	....
Kerosene, Aviation .. ..	....	....	....	6,301	....	6,301
Kerosene, Lighting .. ..	....	....	710	697	....	1,407
Kerosene, Power .. .. .	....	....	1,280	650	....	1,930
Motor Spirit, Premium	35,017	15,714	27,292	52,761	....	130,784
Motor Spirit, Regular	16,682	5,112	11,865	28,519	450	62,628
L.P. Gas	240	....	....	....	....	240
Total	<u>53,279</u>	<u>20,826</u>	<u>41,147</u>	<u>89,891</u>	<u>450</u>	<u>205,593</u>
Tankships (No.)	<u>15</u>	<u>8</u>	<u>9</u>	<u>24</u>	<u>1</u>	<u>57</u>

Licences to Keep, 2,126; Plans Approved, 290; Exemptions Granted, 53; Permits to Import, 26.

OIL POLLUTION

The Hobart Rivulet was polluted due to a leaking oil tank installed within a city building. The leak was caused by corrosion; oil had apparently seeped into French drains beneath the building.

A spillage of bilge water occurred in the harbour whilst a mixture of oil and water was being transferred to a ship's slop tank. An air pocket apparently caused a quantity of bilge water to escape on deck and subsequently over the ship's side.

ACCIDENTS

Man Burned in Tank Explosion.—A man removing fittings from an old ten-gallon petrol tank with an oxy-acetylene torch suffered injuries to his face and head when an explosion occurred. It appeared that the tank had not been purged or steam cleaned.

Road Tanker Accident.—A semi-trailer unit conveying 7,000 gallons of inflammable liquid left the road and rolled 30 feet into a gully. Fortunately the driver was only slightly injured. The accident caused the rupture of two compartments of the tanker and approximately 2,200 gallons of inflammable liquid were lost. Fortunately only a slight hazard was caused, by reason of the isolated location of the accident and very heavy rain at the time.

INSPECTIONS

Inflammable liquid installations were regularly inspected during the year. Largely as a result of the bush fire disaster in February, many inspections were made due to numerous complaints expressing concern over the storage of inflammable liquids. In each case where remedial action was required this was successfully obtained. However, in all the fires in southern Tasmania during February, only one package storage area for inflammable liquids caught fire and this did not add to any other conflagration. In addition seven service stations were burnt out, but in none of these cases was the inflammable liquids storage involved.

DRILLING

Details of the drilling carried out during the year are as follows:—

Number of Holes	Total Footage	Object
<i>Diamond—</i>		
1	666	Geological Investigation—Golden Valley
5	203	Site Investigation—Nunamara
5	235	Foundation Testing—Hobart
3	86	Foundation Testing—Hobart
1+	1,485	Mineral Exploration—Alberton
9	750	Mineral Exploration—Flowery Gully
1—	414	Mineral Exploration—Beaconsfield
1—	1,196	Coal Exploration—Fingal
<u>31</u>	<u>6,095</u>	
<i>Churn—</i>		
70	4,128	Mineral Exploration—Gladstone
5	112	Foundation Testing—Hobart
19	830	Site Investigation—Penguin
3	115	Site Investigation—Stanley
3	55	Site Investigation—Devonport
10	425	Water Boring—Channel
<u>110</u>	<u>5,665</u>	
<i>Rotary—</i>		
5	2,029	Water Investigation—Longford
7	3,597	Water Investigation—Richmond
3	226	Water Boring—Channel
<u>15</u>	<u>5,852</u>	
<i>Auger—</i>		
44	574	Mineral Exploration—St Helens
36	311	Mineral Exploration—Coles Bay
46	1,900	Dam Grouting—Mersey-Forth
4	120	Dam Testing—Bellerive
72	1,690	Geological Investigation—Central Northern
<u>156</u>	<u>4,595</u>	

DIAMOND DRILLING

Four plants operated continuously throughout the year on various types of investigations.

One plant resumed work at Fingal on the investigation of coal reserves. Although the hole has passed through the known coal seams it is being continued to establish the position of the contact between the Triassic and Permian formations to assist the geologists in their interpretation of the field.

At Alberton the programme consists of a series of inclined holes to search for steeply dipping fault zones with which gold mineralisation may be associated.

At Beaconsfield drilling ceased at a depth of 1,747 feet 7 inches after a third intersection of the 'Tasmania' lode had been logged. The section from 1,723 feet 6 inches to 1,735 feet 7 inches assayed 26.8 dwt Au., 11.0 dwt Ag. and 1.1% Cu. At the conclusion of the drilling programme tenders were called for the future development of the mine.

The other two plants operated on site investigations for buildings and dams, limestone assessment and a geological investigation.

CHURN DRILLING

The churn drill on alluvial tin investigations was replaced by a combination churn-rotary drill during the year, but it has been used solely as a churn drill to date. It is intended to use the rotary action to test the clay bottom for possible deeper alluvials next year. A promising area has been scout bored on a 500-600-foot grid.

The second churn drill crew spent most of the year on site investigation for roads, bridges and buildings. Some time was spent in water boring in the north-west, but not very successfully as the type of country encountered, very fine sand and hard dolomite, is difficult for a churn drill.

ROTARY DRILLING

The rotary drill operated for most of the year on water investigation holes for the Geological Survey Branch in the Longford and Richmond areas and in spite of the lost time due to pumping tests and other investigations, achieved some very good results.

Shallow water boring was carried out at two sites in the Channel area, but no water was found.

AUGER DRILLING

The auger drill was in operation for about half the year after having been mounted on a light tractor instead of the 4 x 4 utility truck. Performance was greatly improved and the drill was used on water investigation, holes in a clay dam core and scout boring for alluvial tin.

SOUTHERN DISTRICT

Mr J. B. Braithwaite, B.C.E., B.M.E., M.Aust.I.M.M., A.M.I.E.Aust.,
Mr H. Murchie, B.Sc., D.R.T.C., M.Aust.I.M.M., Hobart—

EMPLOYMENT

The average number of men employed was 3,553, an increase of 311 on last year. The increase was due to the inclusion of the Aberfoyle and Storeys Creek mines in the district. The Electrolytic Zinc Company of Australasia had a slight decrease in the number of men employed.

ACCIDENTS

Reportable accidents for the year were fifty-seven, comprising one fatal, twenty-four serious and thirty-two minor.

Of the above accidents, 72% occurred at the Electrolytic Zinc Co., Risdon. It may be that as 80% of the men employed in the district work at the Electrolytic Zinc Co., the accident rate is below the average, but it is felt that many of the accidents were avoidable and that there is room for much improvement. My observations indicate that supervisors are not paying sufficient attention to safe practice, and it is hoped to improve accident prevention by concentrating their attention on this aspect.

NORTH-WESTERN DISTRICT

Mr L. W. Morris, A.W.A.S.M., M.Aust.I.M.M.,
Mr J. L. Black, B.E., A.M.Aust.I.M.M.,
Mr E. C. Leyland, A.W.S.M., A.M.Aust.I.M.M., Burnie—

EMPLOYMENT

Construction of housing and mine equipment at Savage River for Savage River Mines was completed during the year and the open cut was in production. The concentrate pipeline from Savage River to Port Latta was completed as was the pelletising plant at Port Latta. All units had had trial runs by the close of the year. Production on a commercial basis was scheduled to start early in 1968.

At Luina contractors for Cleveland Tin N.L. had completed the housing settlement, concentrating plant and accessories. The mill was undergoing trials at the close of the year. Mine preparation was well advanced and stockpiling of ore commenced. Commercial production was scheduled for early in 1968.

Active exploration continued over most of the western area of the State and King Island.

Total employment was 4,713, of which 518 were employed underground and 104 on exploration.

ACCIDENTS

A total of seventy-eight accidents were reported during the year and of this total four were fatal. Of the fatal accidents one occurred when a front-end loader skidded and overturned on the Savage River-Port Latta pipeline construction. A man was electrocuted at Savage River when a pipe, slung from a crane, became electrically alive when the boom of the crane touched overhead high tension wires. At Mt Lyell a foreman was struck on the head by an object falling from an overhead walkway and subsequently succumbed. Another man was killed by a fall of rock while barring down a back which appeared reasonably safe.

EXPLORATION AND PROSPECTING

There were thirty-three exploration licences and thirteen special prospecting licences current in this region of the State and King Island.

Naracoopa Rutile—King Island.—During the year Naracoopa Rutile was formed as a company to work beaches and dunes comprised in S.P.L's. 2, 7 and 9 and E.L's. 10/65, 13/66, 14/66, 1/67, 9/67 and 14/67.

Quest Exploration—King Island.—E.L's. 9/65, 3/67 and 10/67. These licences have been under the control of Quest Exploration, a Melbourne syndicate.

A small amount of exploration was done early in the year.

E.L. 8/67 was held by Hawkes Alluvial who late in the year assembled plant to commence a small alluvial sluicing operation. Shortage of water prevented any production during the year.

E.L. 1/63—*Cleveland Tin N.L.*—A comprehensive field investigation of the area was carried out, including line cutting, surveying, geological mapping, geochemistry and geophysics.

E.L's. 12/65, 6/67, 16/67.—These licences are controlled by Pickands Mather and Co. International (now Northwest Exploration) who have concentrated most of their work for the year on the western and beach areas of the licences.

E.L. 2/67 was held by Utah Development.

E.L's. 13/65 and 15/65 are held by Broken Hill Pty Co. Ltd with local headquarters in Hobart.

E. L. 5/63, 7AP/AM and 6AP/AM.—These areas are held by Comstaff Pty Ltd who had three diamond drills workings in the Mt Bischoff area during most of the year.

E.L. 3/66.—This area was held by Planet Mining Ltd, now relinquished.

E.L. 11/66.—This area was held by Ocean Mining A.G.

E.L. 2/63—*Mt. Lindsay Area.*—The Aberfoyle Group carried out an active exploration effort during the fine weather before and after the winter season. Principal object was a geological re-interpretation of the area.

S.P.L. 31—*B. A. Farquhar.*—No work has been reported on this area for the year.

S.P.L. 17—*G. C. Kingston, Balfour Area.*—No exploration work has been done during the year.

E.L's. 15/66 and 7/67—*King Island Scheelite (1947) Ltd.*—An active campaign of surveying, geological mapping and geochemical prospecting has been carried out. Late in the year the company purchased a Gemco auger drill for prospecting and geochemical sampling.

E.L. 4/61—*Industrial & Mining Investigations Pty Ltd.*—Diamond drilling continued for most of the year.

S.P.L. 20—*Renison Ltd, North Dundas.*—The old north-east Dundas tramway formation was cleared and widened as far as Montezuma Falls and a camp constructed. Approximately 92,000 feet of line cutting was completed, followed by geological, geophysical and geochemical examinations.

S.P.L. 27—*Renison Ltd, South Dundas.*—Work has been confined to geological mapping with a minor amount of geochemical work. Progress has been slow as there have been discrepancies between current company work and that of previous geologists who had mapped the area.

S.P.L's. 28 and 29—*Renison Ltd, Zeehan.*—Work was carried out in conjunction with an option held on S.P.L. 404. A literature study was made and drill core obtained from Placer Development was re-examined. The two licences were relinquished late in 1967.

E.L. 8/65—*Mt Lyell Mining and Railway Company Ltd.*—Field work, concluding late in April 1967, involved regional stream sediment sampling, local soil sampling programmes and geological mapping. Compilation and interpretation of results continued during the winter months. A re-interpretation of geochemical and aeromagnetic data has been carried out by independent consultants.

S.P.L. 25—*Mt Lyell Mining and Railway Company Ltd, Henty River.*—An option has been taken over the Queensberry Mine leases and a track prepared from the Strahan-Zeehan rail formation to the mine. About 23,800 feet of traverse line has been cut, geologically mapped and geochemically sampled. Anomalous lead and zinc values have been located.

- E.L. 9/66—*Mt Lyell Mining and Railway Company Ltd, Mt Tyndall*.—Some nine miles of access road were constructed and fifty-five miles of traverse lines cut. A geophysical team from a specialist firm carried out an induced polarisation survey over the area east of the Henty River. During the field season much of the area was geochemically sampled and geologically mapped.
- E.L. 2/62—*Electrolytic Zinc Company of Australasia Ltd, Melba Flat*.—Two drill holes, totalling 1,076 feet were completed to test a magnetic anomaly. A magnetic survey covering 75,600 feet of survey line was carried out.
- E.L. 4/66—*Electrolytic Zinc Company of Australasia Ltd, Hunter Group*.—An auger drilling programme, totalling 1,800 feet, was carried out on Three Hummock Island.
- E.L. 12/67—*Electrolytic Zinc Company of Australasia Ltd, Branch Creek*.—Geological mapping has been carried out. The slate sequence has been sampled and a bulk sample of pyritic slate taken for metallurgical testing.
- E.L. 1/62—*Electrolytic Zinc Company of Australasia Ltd, Mount Black*.—Detailed geological mapping has been carried out.
- S.P.L. 3—*Electrolytic Zinc Company of Australasia Ltd, Tullah*.—Drill hole 3F was completed at a depth of 2,052 feet. In the northern part of the area geophysical anomalies have been re-investigated. Bulldozing has been carried out to expose the rocks at the anomaly centres.
- S.P.L. 22—*Electrolytic Zinc Company of Australasia Ltd, Trial Harbour*.—Cutting of a grid, preparatory to a geochemical and geophysical survey, was commenced.

NORTH-EASTERN DISTRICT

Mr L. F. Egan, A.M.Aust.I.M.M., Launceston—

EMPLOYMENT

The number of persons employed in the district was 1,933, all on the surface, of whom 12.2 were engaged in tin mining and 28 on exploration. The remainder were in quarries and metallurgical and other works.

EXPLORATION LICENCES

Aberfoyle Tin N.L.—E.L. 3/63, Blue Tier area, 35 square miles. Operations were on a caretaker basis. The licence was cancelled in the last quarter of the year.

Electrolytic Zinc Co. of Australasia Ltd.—E.L. 12/67, Branches Creek area, 20 square miles. Geological and geophysical investigations by three men in the task of evaluating nickel prospects. The company employed two geophysicists and one field assistant.

King Island Scheelite, E.L. 7/67, prospected this exploration licence in the vicinity of Beaconsfield, putting down seventeen diamond drill holes totalling 1,022 feet, mainly through laterite and altered serpentine carrying low nickel values.

Kathleen Investments Pty Ltd. E.L. 2/66, in the name of Mr T. D. Hughes, geologist, undertook the investigation of 480 square miles on Flinders Island. Two men were engaged part-time in mapping and sampling.

Mt Lyell Mining and Railway Co. S.P.L. 26, 20 square miles, employed one geologist and two field assistants part-time on this licence in the Loila Tier area. Work consisted in surface mapping and evaluation of data previously assembled.

New Consolidated Goldfields of A/asia Ltd. S.P.L. 33, 2 square miles, beach sand deposits, St Helens Point to Falmouth. Nineteen sampling lines were accomplished over the 14-mile stretch of beach and sand dunes, two field assistants under the direction of one geologist being engaged therein. Sixty-seven hand drill holes were completed for a total of 793 feet. In addition, some special samples of sand were taken. In all 161 samples were collected.

Field work indicated that narrow seams of heavy minerals exist in the southern 3-mile section of the S.P.L. and extend southwards to Falmouth. The heavy mineral seams located appear to have a very limited width, possibly 50 feet, and vary in thickness from less than 1 inch up to 7 feet.

Ocean Mining A.G. E.L. 6/65 covering 900 square miles of offshore area touching on the north-east corner of Tasmania from Andersons Bay on the north to Ansons Bay on the east coast; kept an average of six men on field work.

Planet Mining Co. Pty Ltd. E.L. 13/67, 264 square miles, covering the coast line from Weymouth to Port Sorell and extending inland as far south as Flowery Gully; this is a new licence and came into force late in the year.

Lloyd Price. S.P.L. 403, 2 square miles, Forestry Road, Loila Tier. Mr Price, in collaboration with two other prospectors, carried out some interesting prospecting work on this S.P.L. Costeaning in one instance revealed a wolfram lode while in another instance an occurrence of chalcopyrite was disclosed. Insufficient work had been done on these prospects at the end of the year to gauge whether or not they were of economic importance.

Storeys Creek Tin Mining Co. N.L. E.L. 4/63. Kaolin only. Area 144 square miles in the vicinity of South Mt Cameron. This licence is current until 18 June 1968.

Utah Development Co. E.L's. 2/67 and 2/65. This company employed three geologists part-time on each of these licences, much of their work being concerned with appraisalment of drilling results. NOTE.—E.L. 2/65 covers 1,575 square miles of the southern part of Flinders Island and embraces all Cape Barren Island, while E.L. 2/67 covers an extensive area of north-east Tasmania.

V. Wood. S.P.L. 399, Monarch area, 14.5 square miles. This area was under option to Kathleen Investments who made an examination of the area. Work consisted of sample drilling and costeaning using a trench digger. Results had not been fully assessed at the close of the year.

Magellan Petroleum Southern Pty Ltd. E.L. 4/67, 998 square miles off-shore north-eastern Tasmania. This company carried out an aerial magnetometer survey towards the end of the year. Staff consisted of three flying personnel, one draftsman and two geologists engaged in interpretation.

C. G. Sulzberger. E.L. 6/66, 400 square miles, Ulverstone, Port Sorell area. Mr Sulzberger acquired an E5000 Mindrill rig and drilled four holes aggregating 4,634 feet. Dolerite was encountered in all four holes. In Hole No. 1, Parkers Ford, the dolerite was contacted at 600 feet. Total depth was 1,004 feet.

Hole No. 2, Squeaking Point. The 1,250 feet hole encountered dolerite at 1,150 feet.

Hole No. 3 was situated alongside the roadway between Parkers Ford and Squeaking Point. Drilled to 1,100 feet, dolerite encountered at 900 feet.

Hole No. 4, located at Harford was drilled to 1,250 feet, encountering dolerite at 1,200 feet. This hole tapped water and held it at 35 feet from the collar.

EASTERN DISTRICT

Mr W. R. Tindal, A.W.A.S.M., M.Aust.I.M.M., Hobart—

EMPLOYMENT

Employment in the coal industry was fifty-seven, a decrease of nine men, being made up of thirty-two employees underground and twenty-five on the surface.

The quarrying industry employed fifty-five men and three men were employed in tin mining.

ACCIDENTS

Three minor accidents occurred underground, one being an alkali burn due to a leaking battery, one a thumb cut with an axe and the other burns to the forearm from an electrical flash. The only surface accident was a serious one, in which a workman suffered a fractured sacrum whilst sitting on the track of a bulldozer which moved.

ELECTRICAL INSPECTION

The condition of electrical installations and equipment, of mines and works, has been constantly under review and where considered unsatisfactory, orders have been issued to have those conditions comply with the Mines and Works Regulation Act 1915. In general however, the state of electrical installations is improving.

REPORT OF THE MOUNT CAMERON WATER RACE BOARD FOR THE YEAR ENDED 31 DECEMBER 1967

The Honourable the Minister for Mines

SIR,

We have the honour to submit the report of the Mount Cameron Water Race Board for the year ended 31 December 1967.

Production of tin concentrates was 30.845 tons as compared with 30.48 tons for 1966 and water supplied consisted of 2,491 sluiceheads all of which was on the Fixed or Cash Scale rate of charges according to the sluiceheads of water delivered. No water was supplied on the Royalty Scale under which the payment received by the Board is a royalty on the proceeds of tin concentrates produced.

The dams and races have been maintained in good order and during the year a section of the race near the intake on the Mussel Roe River was cleared of ferns, weeds and other growth which was limiting the flow of water. It was also agreed that the section of the race near the point of supply of water to the Mussel Roe Mine could be widened by a user at no expense to the board to ensure a better flow of water during periods when the level of water in the race was low. The replacement of the Chum Creek syphon was authorised and it is planned to commence the work immediately should drought conditions force the closure of the mines.

The average rainfall as recorded at the intake of the race system shows a significant decline from normal and towards the end of the year difficulty was being experienced in maintaining sufficient supplies to users of water to enable production to be continued.

Expenditure exceeded that of 1966 by \$1,460 which resulted from the payment of an allowance in lieu of long service leave to an employee who resigned, the cost of cleaning of the race near the intake on the Mussel Roe River and increases in accordance with wage determinations.

Revenue declined by \$700. This was due to delays in receipt of payments for domestic water used in 1967, and for supplies to the mines for part of December 1967. These payments will be included in revenue for 1968.

The loss for 1967 based on actual revenue and expenditure was \$1,489.22.

Since the close of the year drought conditions have continued and it has not been possible to meet contracts for the supply of water. As a result the production of tin concentrates will be less for 1968 and there will be a fall in revenue. An operational loss must be expected.

Appreciation is recorded of the services of the Manager and the Channel Keepers.

We have the honour to be, Sir,

Your obedient servants,

J. G. SYMONS, Chairman
H. K. TURNER, Member
V. WOOD, Member

MOUNT CAMERON WATER RACE
STATISTICS FOR THE YEAR ENDED 31 DECEMBER 1967

Table with 4 columns: Category, Registered Rainfall, Production (Tin Oxide produced), and Employment (Average per week). Rows include Great Mussel Roe, Little Mussel Roe, Water Services, Sluiceheads supplied, and Royalty Scale.

MOUNT CAMERON WATER RACE SUSPENSE ACCOUNT

STATEMENT OF RECEIPTS AND PAYMENTS FOR THE YEAR ENDED 31 DECEMBER 1967

<i>Receipts</i>	\$	<i>Payments</i>	\$
Sale of water—		Salaries and wages including pay-roll tax	6,725.86
Fixed or Cash Scale	5,957.70	Long service leave	471.94
Royalty Scale	0.00	Car allowance—Manager	132.40
Domestic use	0.00	Insurance	179.97
Hire of pipes	120.00	Maintenance	35.52
Balance (Loss)	1,489.22	Miscellaneous	21.23
	\$7,566.92		\$7,566.92

**REPORT OF THE RINGAROOMA AND CASCADE WATER BOARD
FOR THE YEAR ENDED 31 DECEMBER 1967**

The Honourable the Minister for Mines

SIR,

We have the honour to submit the report of the Ringarooma and Cascade Water Board for the year ended 31 December 1967.

Since the closure of the race system in 1962 the Board has continued to exist under the provisions of the Ringarooma and Cascade Water Agreement Act 1947. Its only function has been to maintain the Cascade and Paris dams so that they will be preserved for use should future developments in the district require water storage facilities.

Expenditure consisted of caretaking of the dams and interest on the capital cost of the system. There was no revenue. In accordance with the provisions of the Ringarooma and Cascade Water Agreement Act 1947, the deficit of \$1,011.04 was met from Consolidated Revenue.

We have the honour to be, Sir,

Your obedient servants,

J. G. SYMONS, Chairman
H. K. TURNER, Member
V. WOOD, Member

RINGAROOMA AND CASCADE (WATER) SUSPENSE ACCOUNT

STATEMENT OF RECEIPTS AND PAYMENTS FOR THE YEAR ENDED 31 DECEMBER 1967

	<i>Receipts</i>	\$		<i>Payments</i>	\$
Balance (Loss)		1,011.04	Ringarooma Race—Wages		112.50
			Interest on capital cost of Ringarooma and Cascade Water System		898.54
		\$1,011.04			\$1,011.04