AR1970

1971 (No. 28)

1971

PARLIAMENT OF TASMANIA

DIRECTOR OF MINES

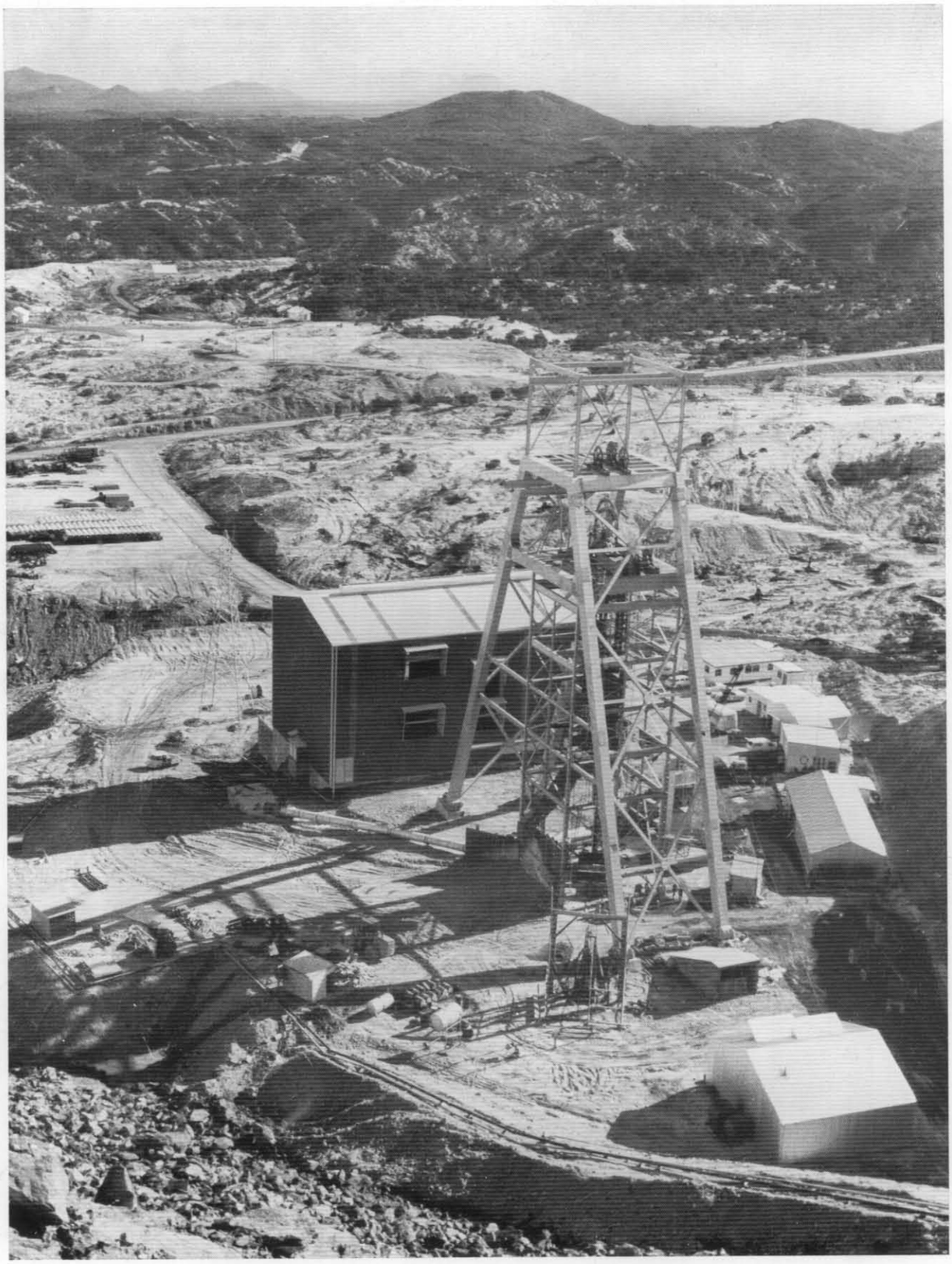
REPORT FOR THE YEAR ENDED 31 DECEMBER 1970

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

By Authority:

T. J. HUGHES, Government Printer, Tasmania

62979



The Mount Lyell Mining and Railway Company's new No. 1 Shaft at Prince Lyell will provide the main access, ore hoisting and ventilation needs for future underground operations.

[*Photo: The Advocate*]

TABLE OF CONTENTS

REPORT OF THE DIRECTOR OF MINES

Department of Mines,
Hobart, 1 July 1971

THE HONOURABLE THE MINISTER FOR MINES

I present my report on the mining industry for the year ended 31 December 1970.

The value of metals and minerals produced was $115,469,042 from Tasmanian ores which is an increase of 10.9% as compared with 1969 and $96,507,223 from metallurgical production from imported ores representing an increase of 7.2%. The total of $211,976,265 represents a new record in the value of the mining industry to the State and exceeds by $17,805,830 the record established last year. It is certain that new records both in production and value will be recorded next year and for some years to come.

Increases were recorded in the production of copper which rose from 17,299 tons in 1969 to 23,016 tons in 1970; gold from 36,705 oz to 39,386 oz; pyrites for the manufacture of sulphuric acid which totalled 75,338 tons as compared with 28,535 tons in 1969; rutile concentrates from 5,239 tons in 1969 to 7,409 tons in 1970; and tin which gained 163 tons to a record of 4,939 tons. There was a fall of 66,743 tons in iron ore pellets exported; production of lead declined by 1,172 tons to 10,558 tons; silver fell by 38,049 oz to 1,417,697 oz; tungstic oxide declined to 1,411 tons from 1,529 tons; and zinc produced was 37,723 tons as compared with 41,121 tons in 1969. The declines in production do not represent a permanent reduction in the output of the minerals indicated but are due to temporary causes. Despite the decreases in production, values did not fall significantly because of higher metal prices and in the case of tungstic oxide the value of the smaller production exceeded the 1969 value by $2.5 million.

The metals responsible for the upsurge in value were principally copper which rose by $7 million, tin by $1 million and tungsten by $2.5 million.

The mineral industry is a most important factor in the economy of the State and is responsible for approximately 35% of the net value of primary production in Tasmania. It is responsible for 12% of the value of production of the mineral industry throughout Australia although the area of the State represents 0.9% of the area of the Commonwealth and our population is only 3.2% of Australia as a whole. The mining industry as a commodity group contributed more than any other group to export earnings and indications are that the position of the industry will improve in the future. Tasmania's exports of mining products, notably zinc and aluminium, copper concentrates, iron ore pellets, lead concentrates, tungsten concentrates and tin concentrates represent a significant contribution to the amount earned from overseas processors and consumers of the mineral industry.

NEW DEVELOPMENTS

Further progress was made with major development programmes by the major operating mines and this is now being reflected in increased production.

The Mt Lyell Mining and Railway Co. Ltd mined 2,208,000 tons of ore of an average grade of 0.977% copper and produced 81,536 tons of copper concentrate containing 21,001 tons of copper, 112,998 oz of silver and 13,810 oz of gold valued at $30 million. In addition 77,493 tons of pyrite valued at $187,388 were produced for use in the manufacture of sulphuric acid at the works of North West Acid Pty Ltd at Burnie which is operated jointly with the Electrolytic Zinc Co. A total of 1,553 men were employed.

Work on the $30 million expansion programme announced in 1968 has made good progress and underground development has continued in the 12 West ore-body, the Crown Three mine, the upper level of the Cape Horn mine and the upper levels of the Prince Lyell ore-body, from the West Lyell open cut and from the main adit below. The West Lyell open cut continued to be the main source of ore and the Lyell Tharsis open cut was also worked. The work of sinking the new 25-foot diameter concrete lined circular shaft to a depth of 2,125 feet in the Prince Lyell area commenced. This will provide the main access, ore hoisting and ventilation needs for all future underground operations. Erection of the winder house for the skip winder to be commissioned in 1971 is well advanced and the fabrication of the steel head frame is progressing.

The smelting plant closed on 24 December 1969 after 74½ years operation and all copper concentrates are being transported by road to Melba Siding and thence by the Emu Bay Railway Company to Burnie from where 20,000 tons will be shipped each year to the Port Kembla works of the Electrolytic Zinc Refining

and Smelting Company and the balance sent to Mitsubishi Metal Mining Company of Japan under contract of purchase of concentrates in excess of 20,000 tons a year for a period of ten years from 1 January 1970.

It is planned to increase production to 25,000 tons of contained copper a year by 1973.

The Electrolytic Zinc Co. at Rosebery which operates the Rosebery, Hercules and Farrell mines produced 294,542 tons of ore for the recovery of 37,696 tons of zinc, 10,536 tons of lead, 1,256 tons of copper, 1,302,802 oz of silver and 26,468 oz of gold, 44,175 tons of pyrite, 38 tons of cadmium and 2,845 lb of mercury valued at $19.6 million.

The $50 million expansion programme has reached an advanced stage. The new 22-foot diameter main shaft at the Rosebery mine which is planned for a depth of 2,420 feet has been sunk to 1,760 feet and connections to three levels of the mine have been made. The shaft has been equipped for productive mining and is scheduled for commissioning in June 1971. At the Farrel mine a new steel head frame has been installed as part of a development plan to increase ore production to 25,000 tons a year. The erection of 146 new homes for employees is in progress. The work force has increased from 750 men in 1969 to 1,000 men.

Ore reserves have been assessed at 9.2 million tons at the Rosebery mine, 250,000 tons at the Hercules mine and 60,000 at the Farrell mine.

The increase in the output of tin to a record of 4,939 tons is a result of programmes of exploration and development which began in the 1960s. The principal producer is Renison Ltd at Renison Bell which lifted its production from 2,641 tons last year to 2,700 tons valued at $9.2 million for 1970. This mine is now the leading Australian tin producer. An active programme of exploration is being conducted to add to ore reserves which have been assessed at 16.5 million tons averaging 0.84% tin. Constant attention is being given to methods of ore treatment to ensure a high percentage recovery of tin in concentrates.

At the Cleveland mine at Luina tin production rose from 1,510 tons last year to 1,704 tons and copper produced increased from 569 tons to 763 tons. Exploration has been given close attention and deep drilling has established a possible tonnage of 2.8 million tons. The latest assessment fixes total ore reserves at 3.7 million tons which provides for a mine life, at the current throughput rate, of twenty years. A flotation plant has been installed to increase the percentage recovery of tin. It is pleasing to record that this company which commenced production in 1968 recently paid its first dividend to shareholders.

At the Aberfoyle mine at Rossarden, production of tin amounted to 300 tons as compared with 402 tons for 1969 but the output of wolfram concentrate increased and tungstic oxide produced was 137 tons. Ore reserves were assessed at 410,000 tons and a geological appraisal of the adjoining Lutwyche prospect indicates ore reserves of 550,000 tons of economic grades of tin and wolfram. At the Storeys Creek mine where tin production is secondary to wolfram, production amounted to 29 tons. Ore reserves were assessed at 408,000 tons. The Dorset Tin Dredge at Gladstone operated by the Storeys Creek Tin Mining Co. recovered 89 tons of tin. The volume of ground of economic grade available for dredging is becoming exhausted and the company proposes to cease productive work because of accumulated operational losses.

Production of iron ore pellets at Port Latta from ore mined at Savage River is now second only to copper in value. There were shipments to Japan totalling 1,887,479 tons valued at $23,708,579.

At the King Island scheelite mine a total of 263,952 tons of ore were milled for the recovery of 1,070 tons of scheelite concentrates containing 761 tons of tungstic oxide valued at $5.2 million. A vigorous programme of exploration has been pursued both on the company's leases and in adjoining areas held under licence. Extensive diamond drilling has outlined additional ore bodies which are being developed for productive mining. Reserves of ore are conservatively estimated at 7 million tons of an average grade of 0.75% tungstic oxide. A large capital expenditure programme is projected which will result in the replacement of the existing concentration plant and the provision of a new power station and mine facilities. The company, with financial assistance from Government, is building a new port at Grassy using mine overburden. This will overcome transport problems which were a restriction to development programmes on King Island. The relative stability in the market price for tungsten has been a factor in stimulating production of wolfram at the Storeys Creek mine where production of tungstic oxide rose from 303 tons in 1969 to 512 tons and at the neighbouring Aberfoyle Tin mine which produced 137 tons as compared with 134 tons in 1969.

The production of rutile and zircon concentrates by Naracoopa Rutile Ltd from beach sand mineral deposits on King Island which commenced last year, steadily increased and 7,409 tons of rutile concentrates valued at $1,216,274 and 3,949 tons of zircon concentrates valued at $333,052 were recorded. Ilmenite concentrates have been stockpiled for possible future treatment or sale. Operations will benefit from the construction of the new port facilities at Grassy. The company is engaged in boring operations in areas adjoining its leases to establish further reserves of sands of economic grade.

Coal production was 124,499 tons which is an increase of 8,566 tons over 1969. The Australian Newsprint Mills at Boyer was the major consumer.

NEW PROJECTS

No new mining ventures were commenced in 1970 but the sulphuric acid plant at Burnie operated by North-West Acid Pty Ltd using pyrite from the Mt Lyell Co. Ltd, Queenstown and the Electrolytic Zinc Company, Rosebery was commissioned in May 1970. Additions to processing at the Comalco works at Bell Bay, the Electrolytic Zinc Company at Risdon and the Goliath Portland Company cement works at Railton were important in the growth of metallurgical processing in this State. Increased production of copper concentrates by the Mt Lyell Mining and Railway Company Ltd, progressive increases in productive capacity by the Electrolytic Zinc Company at Rosebery, Renison Ltd at Renison Bell, Cleveland Tin N.L. at Luina and King Island Scheelite Ltd at Grassy reflect the results of progressive programmes of expansion.

A joint project for development of limestone deposits in the Mole Creek area by Associated Pulp and Paper Mills Ltd and David Mitchell Estates Ltd is in process of being established to provide supplies for the papermaking industry at Burnie and for the manufacture of lime for building and other purposes.

Associated Pulp and Paper Mills Ltd are conducting a feasibility study on kaolin deposits in the Scottsdale area and in the north-east as a local source of raw material used in papermaking. Requirements are being imported at present.

Investigations by Paringa Mining Company, a subsidiary of Aberfoyle Ltd, have indicated the existence of an ore body at the old Pyramid Mine near Scamander which may be developed for the production of tin by open-cut methods; investigations are proceeding.

B.M.I. Mining Pty Ltd a subsidiary of Blue Metal Industries of New South Wales has purchased the leases of the Endurance Tin Mining Corporation in Tasmania. Productive tin mining has commenced at the Monarch mine and preliminary work is in progress to re-commence operations at the Endurance Mine at South Mt Cameron where modern alluvial mining techniques are to be employed.

METAL PRICES

During 1970 base metal prices showed a small overall decline but not to an extent sufficient to affect the economics of productive mining or to influence programmes for expansion currently in progress.

Copper.—The Australian price of copper which is fixed by the Copper Producers Association ranged from a high of $1,635 per ton in April to a low of $995 per ton in December, and reflected a similar movement on the London Metal Exchange where the price ranged between £S730 and £S453 per ton.

Lead.—The Australian price of $290 per ton at the end of 1969 remained unchanged until August 1970 when it was fixed at $275.70 per ton. The price fell to $270 per ton in September and it remained at this level until the end of the year.

Tin.—The Australian price is based on the landed price of imported tin and varies daily with the Straits quotation. In January it was $3,600 per ton but this fell to $3.497 per ton in February. In March it rose to $3,525 per ton and, in April to $3,628 per ton but a progressive decline was then recorded to a low of $3,302.60 per ton in December. The prices reflect quotations on the London Metal Exchange.

The export quota scheme which was accepted by the Australian Government towards the end of 1968 as a move by the International Tin Council to assist in maintaining tin prices in a period of over-production was effective and as demand increased it was possible to remove restrictions. At that time Australia was a consumer member of the Council and producers were not affected. However Australia was at the same time moving from being a consumer to an exporter principally as a result of the rapid rise in production in this State by Renison Ltd and Cleveland Tin N.L. At a meeting of the Council in May, Australia became a party to the Fourth International Tin Agreement as a producer member effective as from 1 July 1971. The aim of the Agreement is to control prices by means of a buffer

stock and operates on the same basis as previous agreements but under the Fourth Agreement Australia in its new role as a producer must make a compulsory contribution to the buffer stock in cash or tin metal. The Australian delegation arranged for the Australian contribution to be based on exports rather than production and the contribution will be $1.6 million. This is being provided by the Commonwealth Government which has recently passed the appropriate legislation.

Under the Third International Tin Agreement which operates until July, the Manager of the buffer stock must buy tin when the price falls below £S1,350 per metric ton on the London Metal Exchange; he may buy in the range £S1,350-£S1,460, he takes no action when the price is between £S1,460 and £S1,540; he may sell in the range £S1,540-£S1,650 and he must sell from his buffer stock when the price exceeds the ceiling of £S1,650 per ton.

The prices on the London Metal Exchange in 1970 ranged from a high of £S1,604 per metric ton in April to a low of £S1,457 in December.

The control exercised under the Agreement has been effective in maintaining prices at an economic level and has enabled producers to maintain and expand mine output. This is of great importance to Tasmanian producers.

Tungsten.—The price of tungstic oxide governs the value of wolfram and scheelite concentrates produced in the State. During 1970 it ranged from a high of $78.27 per long ton unit at the beginning of the year to a low of $57.29 per long ton unit in October. The price had risen to $61.71 per long ton unit at the end of the year.

Zinc.—The official Australian price was $295 per ton throughout the year. The price quoted in the following table and which is used to assess the value of zinc at Risdon includes a differential of $32 per ton.

AVERAGE AUSTRALIAN PRICES, 1966-1970 ($A)

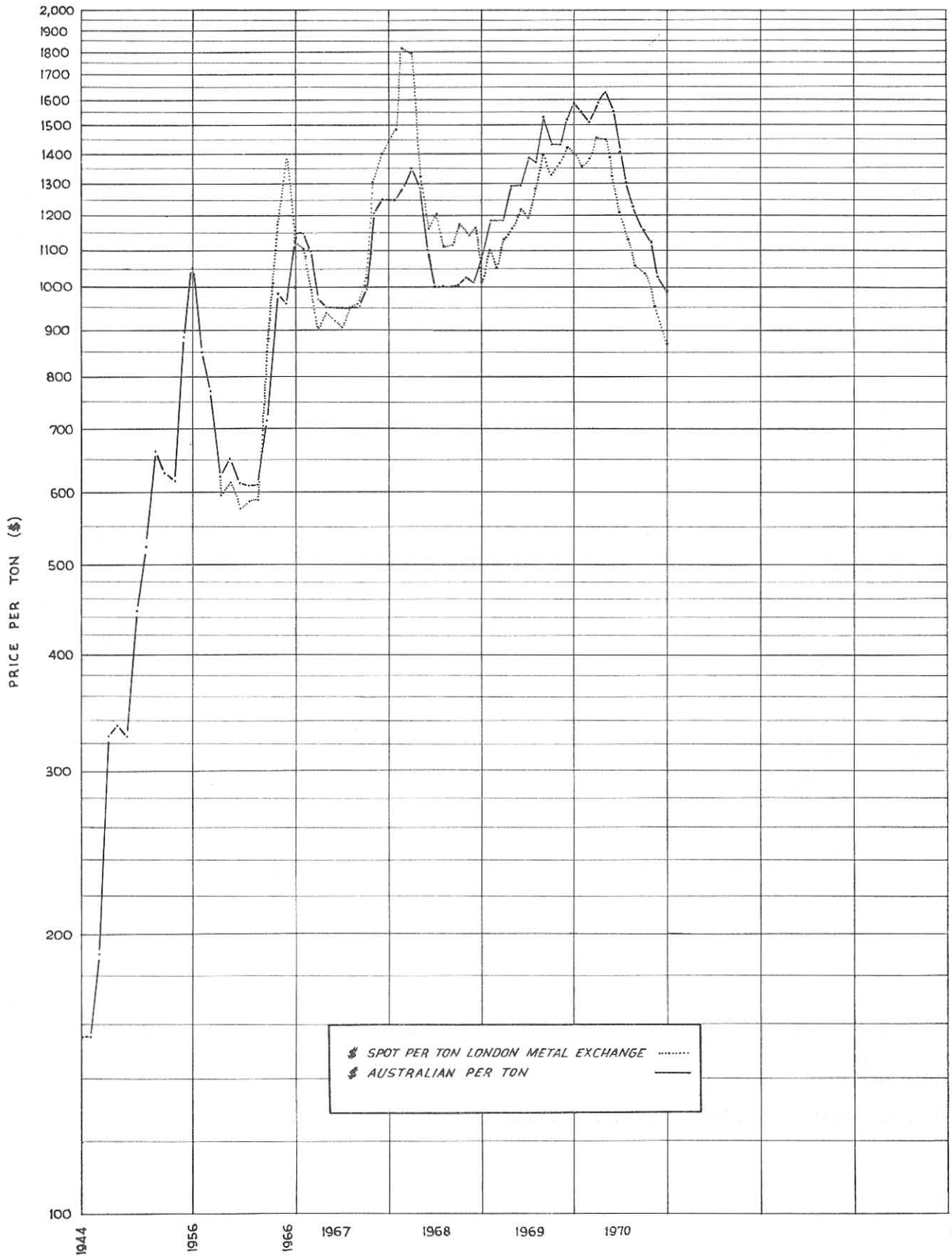
Commodity	*Unit*	1966 $	1967 $	1968 $	1969 $	1970 $
Copper	ton	961.67	1,062.49	1,098.83	1,368.31	1,314.14
Gold	fine oz	31.25	31.25	33.71	36.69	32.21
Lead	ton	247.08	216.25	218.33	262.67	281.67
Rutile	ton	....	....	....	....	164.25
Silver	fine oz	1.17	1.47	2.07	1.62	1.57
Tin	ton	3,322.83	3.100.49	2,943.83	3,292.33	3,430.17
Tungsten	unit WO_3	36.30	42.49	39.11	45.91	68.56
Zinc	ton	309.33	301.00	296.00	310.99	327.00
Zircon	ton	....	....	....	....	55.29

EXPLORATION

At the beginning of the year intense competition for exploration and special prospector's licences developed and interest was displayed in localities, including old goldfields, which had remained dormant for many years. The provisions of the Mining Act and Regulations proved adequate to meet the conflict of several applications for the same area and overlapping of areas applied for, and it was possible to determine all applications on the basis of priorities established by the legislation and according to the nature and extent of programmes of exploration proposed by the applicants. At the end of the year 114 special prospector's licences and exploration licences of a total area of 15,981 square miles was held to search for minerals. In addition eleven permits to explore for petroleum in off-shore areas were held under the Petroleum (Submerged Lands) Act which was passed jointly by the Commonwealth and all the States in 1967.

The Department continued its policy of requiring licence holders to reduce areas to those of particular interest after the licences had been in force for a sufficient period to allow larger areas to be subjected to a general investigation. This has had the dual effect of stimulating exploration activities by licence holders and has also enabled areas to be made available to other companies desirous of investigating the mineral resources of the State.

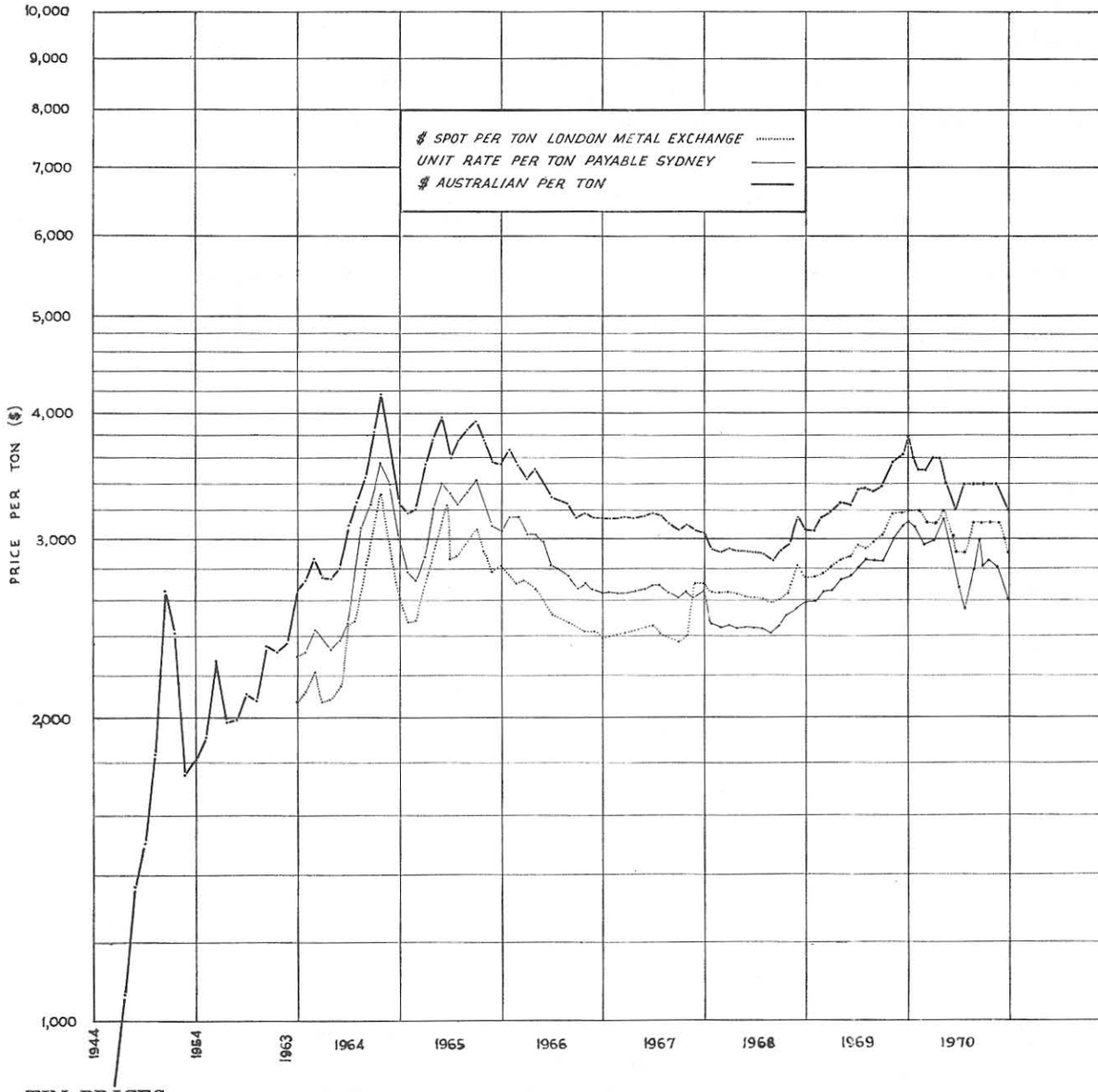
It has been estimated that more than $2 million has been expended by licence holders in exploration work during 1970. This is in addition to extensive exploration undertaken by established mines on their mine leases where expenditure has also exceeded $2 million. The number of persons employed in exploration has increased from 110 in 1965 to 213 in 1970 and expenditure has increased by one-third.



COPPER PRICES

YEARLY AVERAGES 1944-1966, MONTHLY AVERAGES FROM 1967

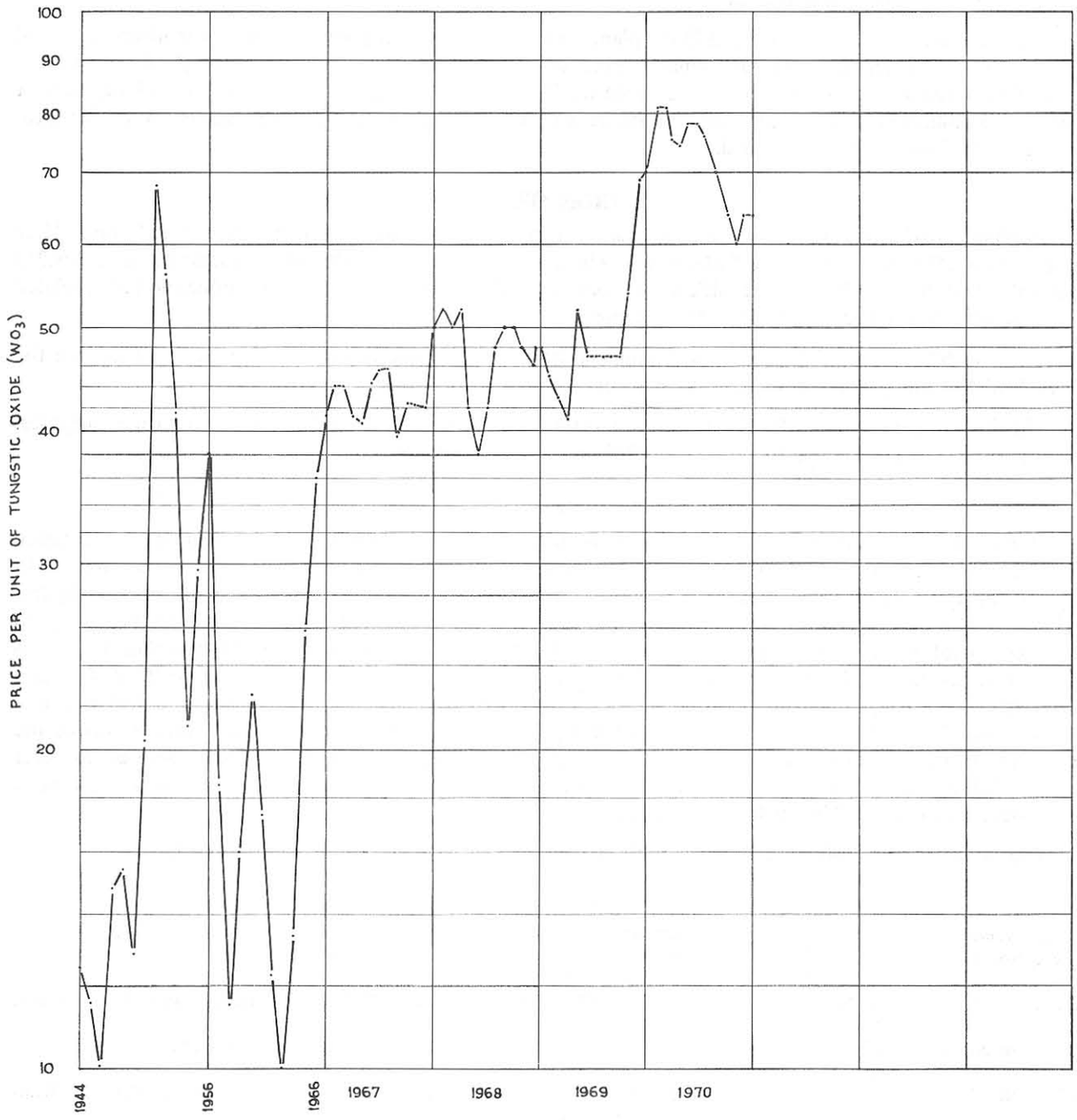
5 cm



TIN PRICES

YEARLY AVERAGES 1944-1964, MONTHLY AVERAGES FROM 1964

5 cm



TUNGSTEN PRICES

YEARLY AVERAGES 1944-1966, MONTHLY AVERAGES FROM 1967

5 cm

The Department's regional mapping activities have been restricted because of shortage of professional staff, but within the limits of available resources an active programme of regional geological investigations, and economic, hydrological and engineering geological surveys has been maintained. The publications and maps resulting from this work are in constant demand by exploration companies and by other interested persons. The staff of the Department has also been available to meet the numerous enquiries for information on the potential mineral resources of the State and in advising on prospecting and mining particularly by small parties.

The Department operates nine drilling plants which, when not engaged in boring for hirers, are used in investigating mineral deposits, particularly those which have not attracted the interest of exploration companies. The results of the boring are made available to enquirers and whenever mineral deposits of economic significance are located, mining leases will be granted to suitable applicants to enable productive operations to be established.

IRON ORE

Production of iron ore pellets at Port Latta from iron ore mined and concentrated at Savage River totalled 1,887,479 tons valued at $23,708,578 which was slightly below the 1969 production of 1,908,215 tons valued at $24,084,702. The difference does not indicate any real decline in production but is related to temporary delays because of industrial stoppages.

The feasibility of establishing a steel industry based on iron ore deposits at Savage River outside the leases held for the pellet industry remains under active investigation.

The iron ore deposits at Blythe River and Hampshire continue to be held for exploration purposes. Investigations are proceeding to determine their economic potential.

OIL

During the year four wells were put down in Bass Strait on permits held by Hematite Petroleum Pty Ltd. Whelk No. 1 in the Otway Basin, 15 miles WNW of Currie was dry. The next three wells were in the Bass Basin and Pelican No. 1 located 40 miles NE of Rocky Cape gave small shows of hydrocarbons. This represents the first record of oil and gas in Tasmanian waters. It was necessary to abandon operations at 10,428 feet because of abnormally high pressures. The rig was then moved to a site 80 miles east of King Island, a well known as Cormorant No. 1 was put down to 9,845 feet and hydrocarbons were again encountered. A SE step-out well to Pelican 1 called Pelican 2 followed and this was completed at 10,066 feet and resulted in hydrocarbon shows being obtained. The results of the three wells in Bass Basin are of signficance in the search for petroleum and the company decided to defer further drilling until all technical data from the drilling and previous geophysical work had been re-assessed. Further drilling will be undertaken during 1971.

The other permit holders continued with geophysical surveys and assessment of results.

EXPLORATION WELLS

Well Name	*Location*	*Depth*	*Result*
Whelk No. 1	Lat. 39° 53′ 58″ S; Long. 143° 33′ 21″ E—15 miles WNW of Currie, King Island	4,800 ft	Dry.
Pelican No. 1	Lat. 40° 20′ 20″ S; Long. 145° 50′ 37″ E—40 miles NE of Rocky Cape	10,428 ft	Small shows of hydrocarbons. Abandoned.
Cormorant No. 1	Lat. 39° 34′ 23″ S; Long. 145° 31′ 36″ E—80 miles east of King Island	9,845 ft	Hydrocarbon shows.
Pelican No. 2	Lat. 40° 18′ 28″ S; Long. 145° 49′ 12″ E—50 miles north of Burnie (Step-out well Pelican No. 1)	10,066 ft	Hydrocarbon shows. Abandoned.

Details of permits and licences in force covering the search for petroleum are as under:—

EXPLORATION PERMITS UNDER PETROLEUM (SUBMERGED LANDS) ACT

Title No.	*Title Holder*	*Area (blocks)*	*Expiry Date*
T/1P	Magellan Petroleum Australia Ltd	41	4.7.74
T/2P	Magellan Petroleum Australia Ltd	117	4.7.74
T/3P	Hematite Petroleum Pty Ltd	342	16.7.74
T/4P	Hematite Petroleum Pty Ltd	394	16.7.74
T/5P	Hematite Petroleum Pty Ltd	317	16.7.74
T/6P	Hematite Petroleum Pty Ltd	400	16.7.74
T/7P	Esso Exploration & Production Aust. Inc.	147	6.9.74
T/8P	Esso Exploration & Production Aust. Inc.	400	6.9.74
T/9P	Magellan Petroleum Australia Ltd	17	11.4.75
T/10P	Magellan Petroleum Australia Ltd	27	11.4.75
T/11P	Amoco Australia Exploration Co.	112	11.4.75

EXPLORATION LICENCES UNDER MINING ACT 1929

Title No.	*Title Holder*	*Area (sq miles)*	*Expiry Date*
E.L. 18/65	Esso Exploration & Production Aust. Inc.	230	17.9.71
E.L. 19/65	Esso Exploration & Production Aust. Inc.	60	17.9.71
E.L. 15/67	Nudec Petroleum Pty Ltd	349	9.4.71

LEGISLATION

Mining Act 1929

Amendments were made to the Mining Regulations by S.R. 1970, No. 89 to prescribe a uniform procedure which will apply to applications for all forms of mining tenements under the Mining Act 1929. The new procedures are not a wide departure from the previous requirements of the Regulations but have been designed to simplify methods of application and remove matters which tended to cause confusion to the mining public. Experience has proved the amended procedure to be most effective in practice.

Inflammable Liquids Act 1929

An amendment was made to this Act to empower the Governor to make Regulations to prohibit the installation of prescribed equipment or apparatus and to control the sale, supply and distribution of prescribed inflammable liquids or dangerous commodities except by persons holding a licence or certificate. The amendment is primarily concerned with 'liquefied petroleum gas' (L.P. gas). The Regulations will provide that all installations must be made by persons licensed by the Plumbers Registration Board and gas distributors will have to be licensed and will be prohibited from supplying gas to installations which have not been installed by a licensed person.

Mines Inspection Act 1968

The Regulations were amended (S.R. 1970, No. 177) to make some technical provisions relating to rope attachments, equipment of drums and winders, testing of wire ropes, construction and operation of conveyors, precautions to be used in shot-firing and the use of certain types of explosives.

CONSERVATION

Conservation of the natural environment goes hand in hand with anti-pollution measures and there is a growing consciousness of conservation in all its aspects.

It has been the attitude of the Department of Mines for many years that the days of indiscriminate destruction of the natural environment for mining has passed and that there must be a mutual respect and understanding of the interests of all concerned in order that proper standards of conservation of natural assets may operate. The mining industry is not without some blame and has been given a reputation as a despoiler of the natural environment and as a consequence proposed mining operations in certain areas have attracted considerable opposition. The solution of such problems can only be found by appropriate scientific investigations rather than by an uncompromising 'hands off' attitude so that there can be an ordered development of natural assets which play such an important role in the development of the economic progress of the State.

The known reserves of minerals of economic importance, especially of the base metals, are limited. The increasing demand for these minerals, particularly from the developing countries has made the discovery of new mineral deposits essential to the maintenance of present living standards. The mineral potential of an area should be considered in all future conservation plans. If there are mineral deposits capable of commercial exploitation provision should be made for controlled development to ensure a minimal effect on the natural environment.

The Australian Mining Industry Council which includes virtually all the mining companies of substance in Australia is very active in the field of anti-pollution, land rehabilitation and activities affecting the environment and is arranging a national seminar to be attended by representatives of mining companies, conservationists, Governments and universities to permit an exchange of views. This is a positive step towards solution of the problems and clearly demonstrates the desire of the industry to co-operate in the field of environmental quality.

The Australian Minerals Council, consisting of the Ministers for Mines of the States and the Commonwealth Minister for National Development and the Minister for Territories, is conducting a survey of legislation and administrative policies of the States on the question of environmental problems.

In my last Report I referred to legislative provisions available to the Department to control pollution and also to representation on the Industrial Hygiene Committee which includes in its activities a study of pollution and environmental protection from the operation of industries.

A Director of Environmental Control has been appointed to the Department of Labour and Industry and has at his disposal the technical resources of the Department of Mines and of the Department of Health Services in measures to study and combat practices having an undesirable effect on the environment. This Department is planning to augment its laboratory staff and to purchase additional equipment to supplement the services already being provided. The Government proposes to introduce legislation to be recommended by the Director of Environmental Control to control pollution and to fix standards within acceptable limits.

The Department of Mines laboratory at Launceston has undertaken the analyses of 270 samples taken from deposit gauges set up in some nineteen stations in six different towns in the State to monitor discharges into the atmosphere. Mining engineers of the Department have given close attention to discharge of mines wastes into rivers: prevention measures being taken at the mines concerned have proved to be effective. This aspect of operations now forms an integral part of inspections of mines and is examined at the same time as matters concerning mining practices which involves the health and safety of mine employees and persons in the vicinity of mines.

AUSTRALIAN MINERALS COUNCIL

This body consists of the Minister for National Development, the Minister for the Interior, Territories of the Commonwealth and the Minister for Mines for each State. It was formed with the object of facilitating discussion on matters of mutual interest relating to the mineral resources of Australia.

In my last Report reference was made to a major difference between the States and the Commonwealth in the matter of exploration and exploitation of off-shore minerals. The Commonwealth claimed ownership of such minerals and legislation was introduced into the Commonwealth Parliament to enable the issue of titles and to control operations which may result. This legislation has not been proceeded with and there are to be further discussions with the Commonwealth. Other subjects of significance which have been discussed include pollution and the present legislation of the States to provide means for its effective control, and a study of the provisions of the Mining Acts of the States in an endeavour to produce a basic Code. Investigations are continuing.

REVENUE

REVENUE COLLECTED DURING THE YEAR ENDED 31 DECEMBER 1970

Head of Revenue	$
Public Works and Services—Mines Department	59,094
Rent and Fees of Auriferous and Mineral Lands	109,841
Royalty on Iron Ore Pellets	310,720
Survey Fees	6,074
Fees under the Explosives and Inflammable Liquids Act	42,937
TOTAL	528,666

COMPARATIVE STATEMENT OF REVENUE FROM MINES, BEING RENTS, FEES, STORAGE OF EXPLOSIVES, ETC., PAID TO THE TREASURY DURING THE YEARS 1965 TO 1970

Year	$	*Year*	$
1965	125,606	1968	205,941
1966	135,350	1969	445,712
1967	161,892	1970	528,666

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

LEASES AND LICENCES

NUMBER AND AREA OF NEW LEASES AND LICENCES ISSUED DURING THS YEAR ENDED 31 DECEMBER 1970

Leases and Licences	*Number*	*Area (acres)*	*Sluiceheads*
Antimony	1	80	
Easements	5	117	
Gold	5	170	
Minerals	4	290	
Silica, talc and graphite	4	252	
Silver-lead	1	50	
Stone	2	87	
Tin	21	538	
Water licences	2	9	10
TOTAL	45	1,593	10

TOTAL NUMBER OF LEASES AND LICENCES IN FORCE ON 31 DECEMBER 1970

Leases and Licences	*Number*	*Area (acres)*	*Sluiceheads*
Antimony	3	240	
Bauxite	6	475	
Barytes	2	80	
Clay	12	426	
Coal	11	3,751	
Copper and gold	8	1,305	
Copper-nickel	3	120	
Dolomite	4	309	
Easements	63	2,215	
Feldspar	2	15	
Gold	27	995	
Granite	3	25	
Iron ore	9	5,680	
Kaolin	3	160	
Limestone	23	1,635	
Marble	1	20	
Mica	1	20	
Minerals	67	12,613	
Ochre	2	8	
Osmiridium and chromite	9	2,144	
Nickel	1	80	
Sand and gravel	28	1,333	
Scheelite	6	476	
Silica	10	1,403	
Silver-lead	20	2,002	
Stone	52	964	
Tin	339	17,804	
Uranium	1	50	
Wolfram	15	2,796	
Water licences	136	787	1,183
TOTAL	866	59,931	1,183

NUMBER AND AREA OF LEASES AND LICENCES APPLIED FOR DURING THE YEAR ENDED 31 DECEMBER 1970

Leases and Licences	*Number*	*Area (acres)*	*Sluiceheads*
Antimony	2	160	
Clay	1	10	
Copper	2	20	
Easements	5	117	
Gold	6	144	
Gravel	3	119	
Iron ore	1	40	
Limestone	1	20	
Marble	1	20	
Minerals	18	1,220	
Osmiridium	2	48	
Silver-lead	5	370	
Stone	6	250	
Tin	118	4,558	
Talc	1	80	
Wolfram	9	465	
Water	23	234	55
TOTAL	204	7,875	55

TOTAL NUMBER AND AREAS OF ALL TYPES OF PROSPECTING RIGHTS HELD AS AT 31 DECEMBER 1970

Mining Tenement	*Number*	*Area*
Permits to enter and search on private land, including owner's consents	22	53,264 acres
Exploration licences	84	15,718 square miles
Special Prospector's licences	30	263 square miles
Miners Rights	123	62 acres
Prospectors licences	314	15,700 acres
Authorities to prospect under the Aid to Mining Act 1927	1	9 square miles
Permits to explore for petroleum under the Petroleum (Submerged Lands) Act 1967	11	2,314 graticular blocks (58,000 square miles)

EXPLORATION LICENCES AND SPECIAL PROSPECTORS LICENCES IN FORCE AT 31 DECEMBER 1970

Licence No.	*Holder*	*Address*	*Area (sq. miles)*	*Situation*	*Expiry Date*
E.L. 4/61	Industrial & Mining Investigations Pty Ltd	Australia Square, Sydney	147	Savage River	23.8.71
E.L. 5/61	Industrial & Mining Investigations Pty Ltd	Australia Square, Sydney	450	East Coast	24.8.71
E.L. 1/62	Electrolytic Zinc Co. of A/asia Pty Ltd	Rosebery	49	Rosebery	22.7.71
E.L. 2/62	Electrolytic Zinc Co. of A/asia Pty Ltd	Rosebery	10	Dundas	12.3.71
E.L. 1/63	Cleveland Tin N.L.	233 Collins Street, Melbourne	27	Mt Cleveland	10.2.71
E.L. 2/63	Aberfoyle Tin N.L.	233 Collins Street, Melbourne	87	Mt Lindsay	1.4.71
E.L. 5/63	Comstaff Pty Ltd	60 Market Street, Melbourne	374	West Coast	30.6.71
E.L. 8/65	Mt Lyell Mining and Railway Co. Ltd	Queenstown	110	Devon	12.5.71
E.L. 12/65	Pickands Mather & Co. International	Port Latta	31	West Coast	21.6.71
E.L. 13/65	Broken Hill Pty Co. Ltd	500 Bourke Street, Melbourne	748	SW Tasmania	21.6.71
E.L. 18/65	Esso Exploration Production Aust.	Box 4249, Sydney	230 (internal waters)	W & SW Coast	17.9.71
E.L. 19/65	Esso Exploration Production Aust.	Box 4249, Sydney	60 (internal waters)	East Coast	17.9.71
E.L. 9/66	Mt Lyell Mining and Railway Co. Ltd	Queenstown	83	Mt Tyndall	11.2.71
E.L. 13/66	Naracoopa Rutile Ltd	King Island	15	Wayanna, King Island	19.4.71
E.L. 15/66	King Island Scheelite	King Island	24	King Island	24.4.71
E.L. 11/67	Storeys Creek Tin Mining Co. N.L.	Rossarden	22	Rossarden	21.7.71
E.L. 15/67	Nudec Petroleum Pty Ltd	C/o C. G. Sulzberger, Brisbane Street, Launceston	349	Longford	9.4.71
E.L. 1/68	Comstaff Pty Ltd	C/o Anglo-American Corp., Aust. Ltd	220	West Coast	30.6.71
E.L. 4/68	J. Curtain	King Island	63	King Island	11.7.71
E.L. 6/68	Texins Development Pty Ltd	C/o Geophoto Resources Consultants, 30 Herschel Street, Brisbane	295	Branxholm	23.2.71
E.L. 7/68	Texins Development Pty Ltd	C/o Geophoto Resources Consultants, 30 Herschel Street, Brisbane	124	Dundas	23.2.71
E.L. 8/68	Electrolytic Zinc Co. of A/asia Ltd	Rosebery	4	Strahan	23.2.71
E.L. 9/68	D. Pearson	Ulverstone	40	Mawbanna	16.3.71
E.L. 13/68	D. W. Hinkley	Esplanade, Brighton Beach, Vic.	2	Cuprona	7.4.71
E.L. 14/68	E. H. MacDonald	Australia Square, Sydney	1	Natone	7.4.71
E.L. 15/68	H. T. Reardon	Bothwell	28	Ringarooma	25.4.71
E.L. 16/68	A.C.I. Operations Pty Ltd	110 Gormanston Road, Moonah	297	West Coast	4.5.71
E.L. 17/68	Tasminex N.L.	93 York Street, Launceston	234	Black Range	4.5.71
E.L. 19/68	Comstaff Pty Ltd	C/o Anglo-American Corp., Aust. Ltd, 60 Market Street Melbourne	15	NW Coast	30.6.71
E.L. 1/69	Tasminex N.L.	93 York Street, Launceston	104	Natone	10.2.71
E.L. 4/69	King Island Scheelite (1947) Ltd	King Island	35	NW King Island	14.3.71
E.L. 5/69	King Island Scheelite (1947) Ltd	King Island	116	W King Island	14.3.71
E.L. 7/69	Allstate Exploration N.L.	C/o A. H. Dickens & Co., George Street, Sydney	5,300	Beaconsfield	21.4.71
E.L. 8/69	Tasminex N.L.	93 York Street, Launceston	49	Neasey Plains, Arthur River	12.5.71
E.L. 9/69	Naracoopa Rutile Ltd	291 George Street Sydney	15	Sea Elephant Bay	21.5.71
E.L. 10/69	Mt Lyell Mining and Railway Co. Ltd	Queenstown	40	Queenstown	5.6.71
E.L. 13/69	S. E. Shaw	4 Gladstone Parade, Lindfield, N.S.W.	14	Ben Lomond	8.7.71
E.L. 18/69	Milstern (Beechcroft) Pty Ltd	30 Glen Street, Milsons Point, Sydney	112	Upper Forth	2.3.71
E.L. 19/69	Associated Pulp & Paper Mills Ltd and David Mitchell Estate Ltd	Burnie	32	Mole Creek	3.3.71

PARTICULARS OF EXPLORATION LICENCES, ETC.—*continued*

Licence No.	*Holder*	*Address*	*Area (sq miles)*	*Situation*	*Expiry Date*
E.L. 23/69	King Island Scheelite (1947) Ltd	King Island	55	King Island	16.4.71
E.L. 27/69	Australian Paper Manufacturers	P.O. Box 63, Geeveston	17	New River	9.6.71
E.L. 1/70	Inland Explorations Pty Ltd	P.O. Box 1223, Launceston	15	Seymour	30.1.71
E.L. 2/70	Aberfoyle Tin N.L.	233 Collins Street, Melbourne	255	Mt Remus	30.6.71
E.L. 3/70	Inland Explorations Pty Ltd	P.O. Box 1223, Launceston	300	Weld River	28.1.71
E.L. 5/70	B. R. Forster	12 Delamere Crescent, Trevallyn	15	Bridport	30.1.71
E.L. 6/70	F. J. Lillas	C/o M. C. Forster, 556 Sandy Bay Road, Sandy Bay	10	Bicheno	3.2.71
E.L. 9/70	J. B. Piggott	128 Macquarie Street, Hobart	126	Jane River	3.2.71
E.L. 10/70	C. V. Johnson	8 Sussex Street, Glenorchy	30	King William Range	24.2.71
E.L. 11/70	McClarm Prospecting Syndicate N.L.	C/o A. McCormick, 104 Regent Street, Sandy Bay	4	Lower Beulah	4.3.71
E.L. 12/70	Crystal Valley Mining Co. Ltd	15 Ellington Road, Sandy Bay	194	Bubbs Hill	5.3.71
E.L. 14/70	Scamander Mining Corp. N.L.	81 Cameron Street, Launceston	99	Beulah	11.3.71
E.L. 17/70	R.B. Mining Pty Ltd	22 Dynon Road, S Kensington, Vic.	154	Ringarooma	24.3.71
E.L. 18/70	B.M.I. Mining Pty Ltd	P.O. Box 42, Wentworthville, N.S.W.	250	Cape Barren Island	24.3.71
E.L. 19/70	B.M.I. Mining Pty Ltd	P.O. Box 42, Wentworthville, N.S.W.	300	NE Tasmania	24.3.71
E.L. 20/70	Associated Pulp & Paper Mills Ltd	Burnie	31	Mt Stronach	2.4.71
E.L. 21/70	Associated Pulp & Paper Mills Ltd	Burnie	144	Pioneer	2.4.71
E.L. 22/70	Oceanic Exploration Co.	C/o Butler, McIntyre & Butler, 28 Murray Street, Hobart	200	Diddleum Plains	2.4.71
E.L. 23/70	T. G. Hiley	C/o Frio Mining & Exploration Pty Ltd, Box 281, Brisbane	260	Robbins Island, Hunter Island, etc.	14.4.71
E.L. 24/70	B.M.I. Mining Pty Ltd	P.O. Box 42, Wentworthville, N.S.W.	118	Warrentinna	14.4.71
E.L. 25/70	M. L. Davies	139 New Town Road, New Town	28	Golden Valley	16.4.71
E.L. 26/70	T. W. Davies	139 New Town Road, New Town	13	Beaconsfield	16.4.71
E.L. 27/70	Crystal Valley Mining Co.	C/o J. Shirley, 11 Taroona Crescent, Taroona	323	Flinders Island	16.4.71
E.L. 29/70	Pluton Exploration N.L.	116 Collins Street, Hobart	300	Picton	28.4.71
E.L. 32/70	G. J. Roberts	463 Sandy Bay Road, Sandy Bay	90	Golconda	28.4.71
E.L. 33/70	Graham Roberts Investments Pty Ltd	151 Macquarie Street, Hobart	85	Alberton	19.5.71
E.L. 34/70	W. MacFarlane	62 Wilson Road, Glen Waverley, Vic.	166	St Marys	16.6.71
E.L. 36/70	C.R.A. Exploration Pty Ltd	95 Collins Street, Melbourne	378	Deloraine	24.12.71
E.L. 37/70	Finniston Minerals N.L.	59 Cameron Street, Launceston	170	Macquarie Harbour	30.6.71
E.L. 38/70	Electrolytic Zinc Co. of A/asia Pty Ltd	Rosebery	3	Ann Bay	7.7.71
E.L. 39/70	Minefields Exploration N.L.	140 Queen Street, Melbourne	14	Herrick	9.1.71
E.L. 40/70	Mt Lyell Mining and Railway Co. Ltd	Queenstown	43	Queenstown	22.1.71
E.L. 41/70	Flavelle Mining N.L.	C/o J. Shirley, 11 Taroona Crescent, Taroona	47	Clarke Island	18.2.71
E.L. 42/70	Minor Timbers Pty Ltd	P.O. Box 20, Somerset	157	Parrawe	15.4.71
E.L. 43/70	Mineral Holdings Aust. Pty Ltd	343 Collins Street, Melbourne	23	West Takone	15.4.71
E.L. 44/70	A. R. Dodson	C/o Minops Ltd, 505 St Kilda Road, Melbourne	75	Zeehan	3.5.71
E.L. 45/70	R. B. Ling	Edith Creek	24	Edith Creek	4.5.71
E.L. 46/70	F. R. Morris	C/o Mining Systems, 14 Spring Street, Sydney	290	Smithton	10.5.71
E.L. 47/70	W. D. Roots	C/o Sydney Geological & Geophysical Services Pty Ltd, 74 Pitt Street, Sydney	293	Macquarie Harbour	18.5.71
E.L. 48/70	Renison Ltd	Renison Bell	228	Pieman River	10.6.71
E.L. 49/70	A.C.I. Operations Pty Ltd	P.O. Box 872J, Hobart	232	Sandy Cape	10.6.71

PARTICULARS OF EXPLORATION LICENCES, ETC.—*continued*

Licence No.	*Holder*	*Address*	*Area (sq miles)*	*Situation*	*Expiry Date*
E.L. 50/70	Turkeith Pty Ltd	P.O. Box 1981R, Melbourne	12	SW King Island	8.6.71
E.L. 51/70	B. E. Arnold	Lilydale	3	Bellingham	8.6.71
E.L. 52/70	W. H. Jones	C/o Sydney Geological & Geophysical Services Pty Ltd, 74 Pitt Street, Sydney	280	Strahan	8.6.71
E.L. 53/70	John L. Irving	C/o Valley Exploration, 65 William Street, Melbourne	40	Stanley River	10.6.71
E.L. 54/70	Turkeith Pty Ltd	P.O. Box 1981R, Melbourne	18	Yellow Rock	10.6.71
E.L. 55/70	T. E. Beams	53 Forster Street, Launceston	3	Turquoise Bluff	10.6.71
E.L. 56/70	G. T. Dolbey	Lebrina	3	Turquoise Bluff	16.6.71
S.P.L. 3	Electrolytic Zinc Co. of A/asia Ltd	Rosebery	10	Tullah	6.7.71
S.P.L. 20	Renison Ltd	Renison Bell	3	Ringville	16.2.71
S.P.L. 22	Electrolytic Zinc Co. of A/asia Ltd	Rosebery	23	Trial Harbour	9.6.71
S.P.L. 24	Ludbrooks Ltd	Box 4505, Melbourne	21	Cox Bight	19.1.71
S.P.L. 27	Renison Ltd	Renison Bell	5	South Dundas	19.1.71
S.P.L. 37	Heazlewood Nickel Prospecting Syn. N.L.	C/o A. McCormick, 104 Regent Street, Sandy Bay	6	Heazlewood	7.5.71
S.P.L. 46	McIntyre Mines (Aust.) Pty Ltd	8-12 Bridge Street, Sydney	19	Dundas	30.4.71
S.P.L. 48	R. L. Rainbow	Winnaleah	3	N Scottsdale	4.6.71
S.P.L. 54	R. W. Carter	43 Fairthorne Road, Launceston	6	Mt Remus	16.2.71
S.P.L. 55	T. G. Rainbow	Winnaleah	1	N Scottsdale	10.2.71
S.P.L. 56	B. A. Farquhar	Scottsdale	25	Takone	10.2.71
S.P.L. 61	Eastern Tin Pty Ltd	114 Collins Street, Hobart	4	Coles Bay	24.3.71
S.P.L. 62	A. R. Smith	Longford	25	Professor Range	2.4.71
S.P.L. 67	Industrial Sands Pty Ltd	C/o O. E. Harvey, P.O. Box 502, Devonport	2	Port Sorell	24.6.71
S.P.L. 68	Louisa Mining Corp. N.L.	C/o M. C. Forster, 7 Crelin Street, Battery Point	5	Louisa Bay	15.7.71
S.P.L. 70	D. M. Lewis	Swansea	11	Mt Maud	14.4.71
S.P.L. 72	Scamander Mining Corp. N.L.	81 Cameron Street, Launceston	5	Scamander	13.5.71
S.P.L. 74	F. C. Bardenhagen	Lilydale	4	Mt Stronach	19.7.71
S.P.L. 77	R. C. Lawry	Gladstone	3	Gladstone	25.2.71
S.P.L. 79	B. G. R. Groves	Gladstone	2	vcty Dorset Dredge	5.3.71
S.P.L. 80	B. Padgett	Nunamara	1	vcty Dorset Dredge	5.3.71
S.P.L. 81	Rockford Pty Ltd	Bothwell	17	NE Tasmania	5.3.71
S.P.L. 82	J. S. Cox	Ringarooma	4	Mt Maurice	11.3.71
S.P.L. 86	E. K. King	Private Bag, Derby	5	Gladstone	2.4.71
S.P.L. 89	Texins Development Pty Ltd	30 Herschel Street, Brisbane	11	Zeehan	15.7.71
S.P.L. 90	P. J. Cronly	7 Meredith Street, Lenah Valley	16	Loddon Range	5.2.71
S.P.L. 91	Louisa Mining Corp. N.L.	A.M.P. Building, 86 Collins Street, Hobart	8	Hastings	18.2.71
S.P.L. 92	M. L. Watt	Gladstone	6	Gladstone	29.3.71
S.P.L. 93	H. J. Stackpole	Scottsdale	3	Mt Cameron	29.3.71
S.P.L. 94	Mt Lyell Mining and Railway Co. Ltd	Queenstown	9	Strahan	13.4.71

Exemptions

The following exemptions to the labour covenant of leases were granted in circumstances beyond the control of the lessees:—

Cornwall Coal Company: Leases 27M/65, 37M/65 and 24M/66, Royal George, from 1 January to 31 October 1970.

R. Brinckman and D. Dicker: Leases 48M/64 and 90M/64, Mt Rex, from 1 January to 30 June 1970.

Estate late A. G. Floyd: Lease 25M/67, Gladstone, from 1 May to 30 November 1970.

B. F. Groves, F. A. Rubens and D. C. Dunkley: Lease 54M/68, Zeehan, from 1 July to 31 October 1970.

D. C. Dunkley: Lease 36M/62, Zeehan, from 1 July to 31 October 1970.

WARDENS' COURT

A.C.I. Operations Pty Ltd v. *Mineral Holdings Australia Pty Ltd.* The application for the forfeiture of lease 101M/67 was heard by the Warden of Mines (J. Temple-Smith) who found that the labour covenant does not run with the land but is collateral thereto and therefore does not find an assignee in respect of breaches committed prior to the transfer to him. The application for forfeiture was ruled to be premature and unable to proceed.

S. A. Clark v. *B. F. Groves, F. A. Rubens and D. C. Dunkley.* The application for the forfeiture of lease 53M/68 was held by the Warden of Mines (J. Temple-Smith) who declared the lease to be forfeited.

N. James v. *S. Roy.* The application for the forfeiture of lease 97M/66 was held by the Warden of Mines (J. Temple-Smith) who declared the lease to be forfeited.

R. M. Colgan, J. W. Mahone and J. P. O'Rourke v. *F. J. Lillas.* The objection to the granting of lease 146M/70 was heard by the Warden of Mines (J. Temple-Smith). The objectors claimed an interest in the land on the grounds that they previously held the land applied for as a lease but that the lease had been forfeited for non-payment of rent because demands for the rent due had not been received. The Warden ruled that as a result of the forfeiture the objectors no longer had a legal interest in the land and the case was dismissed.

The objectors petitioned the Governor to restore the forfeited lease. The petition was granted and the objectors were reinstated as the lessees.

Objection by land owners to the granting of an Exploration Licence applied for by Investment Trust Ltd. The Warden of Mines (D. T. Oldham) did not proceed with the hearing of the objections to the second application by Investment Trust Ltd pending the outcome of the appeal to the Supreme Court on his ruling that the first application by the company was invalid because of non-compliance with the provisions of the Mining Regulations in the matter of marking-out of the land.

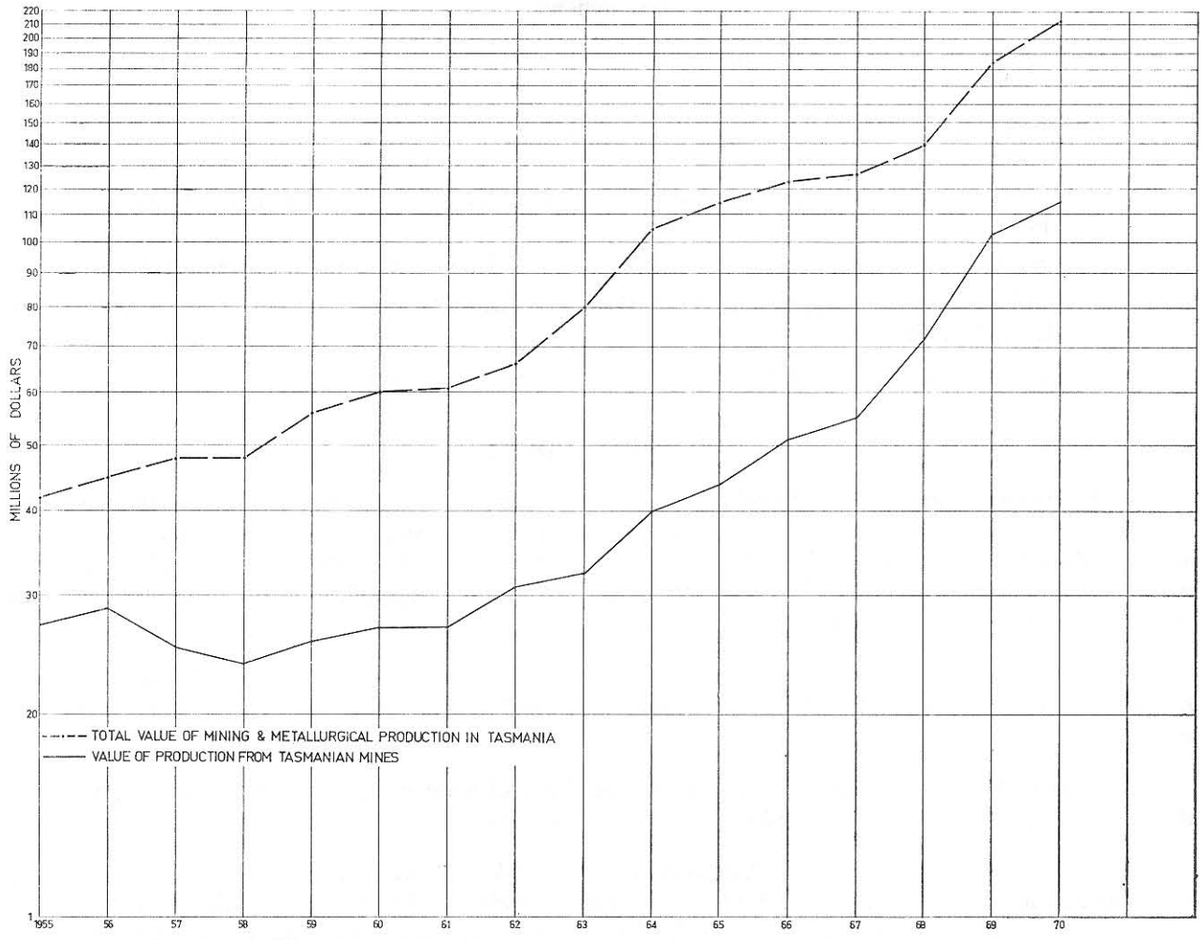
The company has failed to proceed with the appeal and as a result the land concerned in the application has remained 'tied up'. This position has been a matter of great concern to the Department but there is no legal process whereby the hearing of the appeal can be required.

MINE MANAGERS' CERTIFICATES

Metalliferous Mine Managers' Certificates were issued by the Board of Examiners under the Mines Inspection Act 1968, to Leslie Thorncliffe Nicholls, George Geoffrey Daniels, Veikku Kaleri Jumpanen, Ernest Newrick Charlton, John Lewis Collins, John Gregory Sparks, Ralph David Byles, Michael Baker and Murray William Uhlmann.

VALUE OF TASMANIAN MINERALS IN RECENT YEARS WITH AUSTRALIAN METAL PRICES

Year	$	*Year*	$
1961	26,758,954	1966	51,180,693
1962	30,874,136	1967	55,252,710
1963	32,206,272	1968	71,919,344
1964	40,013,378	1969	104,150,500
1965	43,755,904	1970	115,469,042



VALUE OF MINING AND METALLURGICAL PRODUCTION, 1955-70

MINERAL PRODUCTION SINCE 1880

QUANTITY AND VALUE OF MINERAL PRODUCTION AS AT 31 DECEMBER 1970

Mineral		*Total Quantity*	*Value* $
METALLIC MINERALS			
Antimony	(tons)	3	2,034
Bismuth	(tons)	84	59,288
Cadmium	(tons)	1,825	5,777,693
Cobalt oxide	(tons)	23.55	53,802
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)	538,566	256,716,312
Crocoite	(specimens only)		3,902
Gold	(fine oz)	2,839,078	38,344,645
Ilmenite	(tons)	550	2,512
Iron ore pellets	(tons)	4,555,777	57,443,916
Iron oxide (including hematite, limonite and magnetite)	(tons)	155,508	495,655
Lead (from 1919)	(tons)	422,461	60,223,470
Manganese	(tons)	1	6
Manganese dioxide (from 1957)	(tons)	3,531	115,473
Mercury	(lb)	12,822	78,924
Monazite	(tons)	33	1,214
Nickel	(tons)	233	81,036
Osmiridium	(oz)	31,100	1,418,771
Pyrite	(tons)	1,910,988	8,691,653
Rutile	(tons)	1	36
Rutile (concentrates)	(tons)	12,648	1,991,360
Scheelite	(tons)	27,256	60,962,668
Silica for silicon alloy production	(tons)	44,820	408,774
Silicon as silicon alloys	(tons)	71,649	7,840,817
Silver-lead ore to 1918 (now shown under Silver and Lead)	(tons)	1,083,898	12,858,582
Silver (from 1919)	(fine oz)	53,116,111	37,068,544

Mineral		Total Quantity	Value $
Sulphur as sulphuric acid (from 1957)	(mono tons)	744,621	9,463,351
Tin	(tons)	165,418	128,922,199
Wolfram	(tons)	18,349	29,616,447
Zinc	(tons)	995,588	178,230,493
Zinc sulphate (from 1957)	(tons)	3,200	324,177
Zircon (concentrates)	(tons)	12,171	673,587
NON-METALLIC MINERALS			
Asbestos	(tons)	3,980	34,284
Baryte	(tons)	2,205	16,478
Clay (from 1958)—			
Brick	(cubic yards)	1,345,842	2,589,518
Tile	(cubic yards)	43,260	60,421
Other	(cubic yards)	337,075	867,598
Dolomite	(tons)	38,979	228,889
Graphite	(tons)	40	214
Kaolin	(tons)	111,086	883,018
Limestone—			
Agricultural and other	(tons)	780,885	1,856,161
Carbide	(tons)	809,700	2,522,487
Cement	(tons)	6,438,650	9,726,883
Chemical and metallurgical	(tons)	4,325,958	5,416,193
Ochre	(tons)	2,687	20,149
Pebbles (from 1957)	(tons)	11,506	187,389
Sand (Moulding)	(tons)	850	9,550
Silica	(tons)	254,103	562,120
Talc	(tons)	333	2,154
FUEL MINERALS			
Coal	(tons)	9,817,361	26,123,843
Shale	(tons)	41,572	62,462
Peat	(tons)	418	23,876
CONSTRUCTION MATERIALS			
Building stone—			
Freestone	(cubic yards)	8,273	113,118
Granite	(cubic yards)	5,978	85,153
Other	(cubic yards)	9,469	27,466
Crushed and broken stone (from 1958)—			
Basalt	(cubic yards)	1,974,431	4,782,554
Dolerite	(cubic yards)	7,695,266	26,136,350
Limestone	(cubic yards)	306,681	800,361
Sandstone	(cubic yards)	45,395	80,581
Other	(cubic yards)	1,916,950	4,528,108
Gravel (from 1958)	(cubic yards)	15,674,129	17,058,555
Sand (from 1958)	(cubic yards)	1,640,401	2,266,028
Other road materials	(cubic yards)	2,886,774	3,267,007
			$1,034,210,581

STATISTICS RELATING TO THE MINERAL INDUSTRY

Mineral		Year ended 31 December 1969		Year ended 31 December 1970	
		Total Quantity	Value $A	Total Quantity	Value $A
METALLIC MINERALS—					
Cadmium	(tons)	39	255,267	38	275,140
Cobalt oxide	(tons)	1.03	4,594	1.51	5,902
Copper	(tons)	17,299	23,671,713	23,016	30,185,785
Crocoite		Specimens only	320	Specimens only	....
Gold	(fine oz)	36,705	1,338,817	39,386	1,266,882
Iron ore pellets	(tons)	1,908,215	24,084,702	1,887,479	23,708,579
Iron oxide	(tons)	11,117	71,791	9,457	60,667
Lead	(tons)	11,730	3,081,475	10,558	2,981,018
Manganese dioxide	(tons)	213	6,714	194	6,982
Mercury	(lb)	3,626	23,707	2,845	16,166
Pyrites	(tons)	28,535	171,210	75,338	205,151
Rutile (concentrates)	(tons)	5,239	775,086	7,409	1,216,274
Silica for silicon alloy production	(tons)	5,857	58,570	14,535	145,350

STATISTICS RELATING TO THE MINERAL INDUSTRY—*continued*

Mineral	*Year ended 31 December 1969*		*Year ended 31 December 1970*	
	Total Quantity	*Value $A*	*Total Quantity*	*Value $A*
Silicon as silicon alloys (tons)	16,036	1,763,960	27,021	2,777,913
Silver (fine oz)	1,455,746	2,346,948	1,417,697	2,237,470
Sulphur as sulphuric acid (mono tons)	53,756	1,158,662	145,827	2,304,745
Tin (tons)	4,776	15,817,361	4,939	16,927,602
Tungsten as tungstic oxide (tons)	1,529	7,119,644	1,410	9,682,704
Zinc (tons)	41,121	12,795,905	37,723	12,335,394
Zinc sulphate (tons)	107	11,565	92	9,780
Zircon (concentrates) (tons)	6,096	340,535	6,075	333,052
Value of Metallic Minerals	....	94,898,546		106,682,555
NON-METALLIC MINERALS—				
Clay—				
Brick (cubic yards)	110,086	220,296	83,920	183,459
Tile (cubic yards)	3,213	5,611	2,256	4,512
Other (cubic yards)	44,822	140,630	50,611	162,524
Dolomite (tons)	1,515	9,104	3,341	20,045
Limestone—				
Agricultural (tons)	37,560	84,825	26,626	58,714
Carbide (tons)	22,683	163,282	28,660	232,029
Cement (tons)	448,638	883,816	413,957	815,496
Chemical and metallurgical (tons)	37,489	136,500	36,089	134,035
Other (tons)	3,704	3,979	3,861	4,711
Ochre (tons)	79	1,191	41	595
Pebbles (tons)	1,023	19,036	1,642	31,943
Silica (tons)	22,003	93,181	35,066	157,306
Value of Non-Metallic Minerals	....	1,761,451	....	1,805,369
FUEL MINERALS—				
Coal (tons)	115,933	519,373	124,499	617,565
Peat (tons)	151	8,456	139	8,000
Value of Fuel Minerals	....	527,829		625,565
CONSTRUCTION MATERIALS—				
Crushed and broken stone—				
Basalt (cubic yards)	259,212	777,636	213,119	639,357
Dolerite (cubic yards)	636,496	2,021,072	745,612	2,250,451
Limestone (cubic yards)	24,153	74,610	31,201	93,603
Sandstone (cubic yards)	2,000	6,000	30	250
Other (cubic yards)	93,854	299,011	317,124	978,232
Building stone—				
Freestone (cubic yards)	1,073	15,219	1,444	24,911
Granite (cubic yards)	50	150	....	....
Other (cubic yards)	2,329	6,987	640	1,920
Gravel (cubic yards)	1,428,938	1,705,556	1,327,471	1,584,145
Sand (cubic yards)	237,807	341,553	234,463	336,262
Other road material (cubic yards)	1,618,294	1,714,880	388,216	446,422
Value of Construction Materials	....	6,962,674		6,355,553
Total Value with Australian Metal Prices	....	104,150,500		115,469,042
METALLURGICAL PRODUCTION FROM OTHER THAN TASMANIAN ORES—				
Alumina Aluminium Aluminium hydrates Aluminium sulphate Cadmium Cobalt oxide Ferro-manganese Titanium dioxide Zinc	....	90,019,935	....	96,507,223
Value of Mining and Metallurgical Production	....	194,170,435		211,976,265
Average Number of Men Employed	10,407		10,773	

AID TO MINING

During the year three operators of alluvial tin mines in the north-east were granted loans to enable purchase of equipment to assist in the establishment of productive mining operations.

Loans are repayable by royalty, usually 7½%, of the gross proceeds of minerals produced and a low rate of interest is charged according to the nature of assistance required. Advances for the purchase of equipment are secured by the prescribed Mortgage Deed.

Repayments received were credited to the Mining Trust Fund and are available to finance other projects which upon investigation by a mining engineer or a geologist of the Department are considered to have reasonable prospects of economic development. The amount received in repayments was greater than usual and this was due principally to repayments made by parties who were assisted last year.

Mt Bischoff Mine: The reserve at the old Mt Bischoff mine made under the Aid to Mining Act 1927, was reduced from 28 square miles to 9 square miles. Two mining leases were granted to one of the tribute parties whose scale of operations had developed beyond the tribute system of working. The leases have now been transferred to a company which proposes to invest capital for large scale operations. The Department continued to grant tributes to small scale operators who pay a 2½% royalty on gross proceeds of the tin produced. Exploration activities under an Authority to Prospect were maintained by Anglo-American Corporation on behalf of Comstaff Pty Ltd.

Mining Plant: Equipment was hired for part of the year to a lessee engaged in investigating gold reefs at Lefroy.

STATEMENT OF RECEIPTS AND PAYMENTS OF THE MINING TRUST FUND FOR THE YEAR ENDED 31 DECEMBER 1970

Receipts	$	*Payments*	$
Balance as at 1 January 1970	9,907.06	Assistance	1,981.87
Repayment of loans	11,487.52	Maintenance—	
Interest on loans	951.37	Tribute area, Mt Bischoff	34.47
Tribute royalty	1,071.26	Mining plant	48.78
Hire of mining plant	625.50	Balance to next Account	21,977.29
	$24,042.71		$24,042.71

STAFF

The following were the staff movements during the year:—

Name	*Position*	*Remarks*	
Abtmeier, B. F.	Geologist	Appointed	2.12.70
Baillie, P. W.	Geologist	Appointed	9.4.70
Connolly, Miss G. L.	Typist	Appointed	19.11.70
Donnelly, P. J.	Draughtsman	Appointed	10.12.70
Ellerton, Miss L.	Typist	Appointed	2.2.70
		Transferred	6.4.70
Elmer, S. R.	Geologist	Appointed	21.10.70
Farmer, N.	Geologist	Appointed	1.2.70
Gee, R. D.	Geologist	Resigned	30.1.70
Hosken, K. J.	Laboratory Assistant	Appointed	27.7.70
		Resigned	16.10.70
James, B. N.	Storeman	Appointed	17.12.70
Jones, Miss C. A.	Typist	Resigned	21.1.70
Jordan, M. J. S.	Technical Assistant	Appointed	10.6.70
		Resigned	16.12.70
Lawrie, Miss M.	Typist	Retired	9.2.70
Littlejohn, A. B.	Field Assistant	Appointed	20.4.70
Morris, L. W.	Senior Mining Engineer	Retired	1.10.70
Mulder, H.	Librarian	Resigned	31.12.70
Murchie, H.	Senior Mining Engineer	Appointed	2.10.70
Murzecki, P. R. P.	Clerk	Appointed	27.1.70
Nankivell, P. B.	Senior Draughtsman	Resigned	6.5.70
Peters, T. G.	Field Assistant	Appointed	12.10.70
Phillips, Miss L. M.	Typist	Appointed	20.2.70
Stephens, S. H.	Field Assistant	Resigned	18.3.70
Walsh, T. J.	Senior Draughtsman	Appointed	6.8.70
Warren, J. P.	Laboratory Technician	Appointed	30.11.70
Watling, L. Y.	Typist	Appointed	6.4.70
		Resigned	7.10.70

SCHOLARSHIPS

Geology Scholarships were awarded to P. Lennox, P. L. F. Collins and D. A. Bowling.

S. Forsyth and P. Williams were granted extensions of their scholarships to enable them to undertake Honours Degrees. A Mining Engineering Scholarship has been awarded to W. J. Anderson.

I regret to record the death of R. A. Frazer, the previous holder of the Mining Engineering Scholarship.

OVERSEAS VISIT

Approval has been obtained for the Deputy State Mining Engineer (P. M. Johnstone) to visit South Africa, Zambia and Sweden to study new mining techniques, some of which are being applied in underground mining development taking place in this State.

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

CADMIUM: QUANTITY AND VALUE OF PRODUCTION

Year	Tons	$	Year	Tons	$
1924–65	1,525	4,132,402	1968	74	390,642
1966	75	341,111	1969	39	255,267
1967	74	383,131	1970	38	275,140
			Total	1,825	5,777,693

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 1.51 tons of cobalt oxide of value $5,902 was the same as that of cadmium above.

COPPER

COPPER: SOURCE, QUANTITY AND VALUE OF PRODUCTION

Year	From tin ores		From lead-zinc ores		In blister copper		From copper ores		Total	
	Tons	$	Tons	$	Tons	$	Tons	$	Tons	$
1919-1965	339	248,582	13,174	7,447,974	436,933	145,604,234	404	21,162	450,850	153,321,952
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
1968	169	173,213	1,303	1,433,063	14,470	15,915,117	....	....	15,942	17,521,393
1969	569	787,851	1,337	1,837,597	12,799	19,499,587	2,594	3,546,678	17,299	23,671,713
1970	763	1,011,242	1,256	1,680,941	....	....	20,997	27,493,602	23,016	30,185,785
Total	1,840	2,220,888	19,504	14,869,112	493,227	208,564,870	23,995	31,061,442	538,566	256,716,312

The Mount Lyell Mining and Railway Company Limited, Queenstown

	Tons	
Mining—		
Overburden removed from West Lyell Mine		583,683
Ore mined—		
Prince Lyell		40,042
West Lyell		1,642,698
Crown Lyell		293,694
Cape Horn		107,273
Lyell Tharsis		124,660
Precipitate smelted		24
		2,208,391
Limestone delivered to works		5,987
Copper concentrate produced		81,536
Containing—		
Copper (tons)	211,001	
Silver (fine oz)	112,998	
Gold (fine oz)	13,810	
Pyrite concentrate shipped		69,403
Total value of production		$30,375,465
Average number of men employed—		
Mining—		
Open cut		120
Underground		295
Other		1,164
Total		1,579

Production from the inception to 31 December 1970—

Copper (tons)	676,836
Gold (fine oz)	663,965
Silver (fine oz)	16,546,401

E. C. Leyland, Mining Engineer, Burnie, reports—

Production

Approximately 20% of the ore mined during the year was provided from the underground mines. Underground development and production methods have changed with the introduction of heavier, more sophisticated drilling and mucking equipment. Ground conditions at Cape Horn have not assisted the progressive development of the chosen mining method but with depth the situation is expected to improve.

Milling

During the year the concentrate handling facilities at Queenstown and Melba Flats were commissioned; the concentrate is conveyed between Melba Flats and Burnie by the Emu Bay Railway Company. The installation of sixty 4-inch cyclones and three pumps in the second stage desluicing section of the mill, has improved the recovery rate of fine copper sulphides and pyrite.

Development

No. 1 Shaft, Prince Lyell. Site preparation, collar and headframe foundations and the pre-sink section of the shaft (to 92 feet) were completed. Contractors commenced to erect the headframe and instal the ore hoist, which is to be used by the sinking contractors, Messrs Roberts-Holland, during the sinking operation. The shaft is to be 25 feet in diameter, cement-lined, 2,125 feet deep and will provide the main access, ore hoisting and ventilation needs for all future underground operations.

Prince Lyell Decline. This adit access to the upper Prince Lyell workings was advanced to the main tunnel horizon. Lateral and vertical development of the ore and access for large equipment can thus proceed at the same time as shaft sinking is being accomplished.

Cape Horn Haulage. A haulage drive was commenced from the North Lyell tunnel to connect with the decline being advanced from the present Cape Horn adits.

Engineering

The following items of capital expenditure have been completed or purchased during the year:—

Buildings—

New changehouse and offices at the Reduction Works.
New workshop at the 710 level.
No. 1 Shaft winder house.

Power Supply—

Replacement of Lake Margaret penstocks also the Lake Margaret to Queenstown 11 kV transmission lines.

Underground Equipment—

Two Eimco 916 T20 dump trucks.
Three I-R MJM3 Drill jumbos.
Eleven Eimco 915 L.H.D. machines.

Transport—

Ten DCF 400 International trucks with trailers.

Services—

Replacement of the West Queen water main.
One 2 HHE 5,000 c.f.m. I-R compressor for Prince Lyell.

Safety

A decrease in both the accident frequency and severity rate was achieved for 1970. This improvement was particularly noticeable in the underground figures.

RESERVES

Ore reserves, as published 30 June 1970, were:—

	Tons
West Lyell Open Cut	3,685,000
Prince Lyell	26,586,000
Lyell Tharsis	450,000
Crown 3	3,493,000
12 West Orebody	36,000
Cape Horn	3,999,000
Total	38,249,000

Assays indicate 1.42% copper, 0.06 oz silver per ton, and 0.0085 dwt gold per ton.

Cleveland Tin N.L., Luina

This company, reviewed under Tin, produced 3,763 tons of copper concentrates containing 763 tons of copper valued at $1,011,242.

Electrolytic Zinc Company of Australasia Limited, Rosebery

This company, reviewed under Zinc, produced 11,722 tons of copper concentrate containing 1,256 tons of copper valued at $1,680,941.

GOLD

GOLD: QUANTITY AND VALUE OF PRODUCTION

Year	*Fine oz*	*Value* $	*Year*	*Fine oz*	*Value* $
Prior to 1966	2,662,129	32,499,718	1968	33,526	1,135,108
1966	32,655	1,020,453	1969	36,705	1,338,817
1967	34,677	1,083,667	1970	39,386	1,266,882
			Total	2,839,078	38,344,645

The Mount Lyell Mining and Railway Company, Limited, Queenstown

This company recovered 12,810 fine oz, valued at $412,925, from sludge in the electrolytic copper refinery.

Electrolytic Zinc Company of Australasia Limited, Rosebery

Concentrates produced by this company contained 26,468 fine oz, valued at $850,486.

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

From the tin concentrate of this dredge, reviewed under Tin, 108 fine oz of gold, valued at $3,471, was recovered.

IRON ORE (PELLETS)

Savage River Mines, Savage River and Port Latta

H. M. Murchie, Senior Mining Engineer, and P. Allan, Mining Engineer, Burnie, report as follows:—

	Tons
Savage River—	
Overburden removed	5,399,181
Ore mined	4,146,223
Concentrate to Port Latta (dry)	1,917,975
Port Latta—	
Pellets produced (dry)	1,887,479
Value of production	$23,708,578
Average number of persons employed—	
Mining	98
Other	537
Total	635

At Port Latta the pellet plant produced 1,887,479 tons of pellets and 42,881 tons of chips, while 1,910,678 tons of pellets, 41,438 tons of chips and 12,002 tons of off-grade product were shipped during the year.

Thirty-one shipments averaging 63,359 tons per vessel were made from Port Latta; eight oil tankers discharged 37,297 tons of fuel oil.

The total number of employees was 607; 339 at Savage River and 268 at Port Latta.

At Savage River the open cut was developed down to the eighth lift at the north end, allowing considerable improvement in drainage. The establishment of a settling pond for pit drainage has virtually eliminated discoloration of the river from pit run-off. Conditions in the pit are fairly satisfactory although difficulty in maintaining outlines was experienced for some time due to variation in nickel content requiring selective mining.

The P. & H. electric shovel force has now been augmented with a 71 RB to allow more manoeuverability and flexibility in the system.

Two tractors, three utilities and a road grader were replaced and a small mobile crane has been added to the mill maintenance equipment.

Construction work consisted of a pit-equipment service building, an instrument shop and work was started on a permanent pit lighting system. In the mill, semi-automatic grind control equipment, an AM inching device, a steam cleaning unit, two rougher magnetic separators, and a potable water treatment facility have been installed.

In the town site the improvement programme including landscaping, drainage, fencing, etc., has continued and work has been started to the erection of a further twenty-four houses.

At Port Latta, a chip regrind circuit has been rebuilt and the heat exchangers for the chunkbreaker system replaced. A general service shop has been constructed and the installation of a large agitated slurry storage tank has greatly increased the slurry storage capacity.

Storage buildings for dangerous commodities have been constructed at Savage River and Port Latta.

No new methods were initiated during the year which has been spent in consolidating existing procedures.

A sharp rise in the number of accidents for the year is causing some concern, the total having almost doubled to seventy with forty-six at Savage River and twenty-four at Port Latta.

Serious accidents occurred at Savage River when a dump spotter was struck by a tree which had been loaded along with waste on a Euclid; when a mobile crane jib fell on to a fitter after he knocked out the jib coupling pins; and to the passenger in a utility when the vehicle was literally run over by a bulldozer.

At Port Latta a serious accident occurred when a fitter received a severe electric shock from a portable welding unit. The unit, mounted on rubber wheels, proved not to have continuous earthing and damage to the supply cable caused the body to go live. Modifications to the existing units have eliminated the possibility.

IRON OXIDE

IRON OXIDE: QUANTITY AND VALUE OF PRODUCTION

Year	*Tons*	*Value* $	*Year*	*Tons*	*Value* $
Prior to 1966	111,491	241,134	1968	12,780	79,030
1966	2,797	7,903	1969	11,117	71,791
1967	7,886	35,130	1970	9,457	60,667
			Total	155,508	495,655

Iron Cliffs Mine, Penguin

A. Pearson continued to work the secondary ore at the Iron Cliffs Mine and supplied a cement works with 9,457 tons of hematite valued at $60,667. Employment averaged four men.

LEAD

LEAD: QUANTITY AND VALUE OF PRODUCTION

Year	Tons	Value $	Year	Tons	Value $
1919-1965	364,327	46,019,450	1968	11,754	2,568,982
1966	12,162	2,994,513	1969	11,730	3,081,475
1967	11,930	2,578,032	1970	10,558	2,981,018
			Total	422,461	60,223,470

Electrolytic Zinc Company of Australasia Limited, Rosebery

This company, reviewed under Zinc, produced 12,459 tons of lead concentrate and the total content of lead in the lead, zinc and copper concentrates was 10,536 tons valued at $2,975,170.

South Comet Mine

This mine is under option to Texins Development Pty Ltd. However, J. A. Smyth, the leaseholder, after carrying out considerable preparatory work, entered into partnership with three other men and commenced mining from the old No. 1 adit. From a short leading stope about 300 tons were broken, carted and stacked at Comet Maestries Siding. The transport of the ore from the mine to the siding is the most difficult and costly part of the operation. The Electrolytic Zinc Company, Rosebery, had previously agreed to treat the ore, if, and when, bin capacity was available. The parcel was loaded at the siding and transported to Rosebery *via* the old Dundas formation and the Murchison Highway. By the end of the year 297 tons had been treated for a producer value of $2,500.

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 194 tons was valued at $6,982.

MERCURY

MERCURY: QUANTITY AND VALUE OF PRODUCTION

Year	Pounds	Value $	Year	Pounds	Value $
1967	4,204	24,645	1969	3,626	23,707
1968	2,147	14,406	1970	2,845	16,166
			Total	12,822	78,924

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. Production for the year was 2,845 lb, valued at $16,166.

OSMIRIDIUM

Total production to date is 31,100 oz, valued at $1,418,771.

PYRITE

PYRITE: QUANTITY AND VALUE OF PRODUCTION

Year	Tons	Value $	Year	Tons	Value $
1915-65	1,636,820	7,293,522	1968	42,504	255,024
1966	68,077	408,462	1969	28,535	171,210
1967	59,714	358,284	1970	75,338	205,151
			Total	1,910,988	8,691,653

This is produced by the Mount Lyell Mining and Railway Company Limited, Queenstown and the Electrolytic Zinc Company, Rosebery and used for sulphuric acid manufacture.

SILICA FOR SILICON ALLOY PRODUCTION

The Broken Hill Proprietary Company Limited, Beaconsfield

This company mined and exported to its works at Newcastle a total of 14,535 tons, valued at $145,350. A local contracting firm carried out the work, employing an average of eight men.

SILICON

Tasmanian Electro-Metallurgical Company Proprietary Limited, Bell Bay

In the production of silicon as silico-manganese this company smelted 8,745 tons of local Beaconsfield quartzite combined with slag from ferro-manganese production for a yield of 27,021 tons of silico-manganese valued at $2,777,913. The average number of men employed was 141.

SILVER

Silver is nowhere mined for itself but is a valuable by-product from copper, lead and zinc ores.

SILVER: PRODUCERS, SOURCE QUANTITY AND VALUE OF PRODUCTION, 1970

Producer	*Source*	*Fine oz*	$
E.Z. Co. of A/asia Ltd	Copper, lead and zinc concentrates	1,379,716	2,223,832
Mt Lyell M. & R. Co. Ltd	Refinery sludge	76,030	123,116

SILVER: SOURCE, 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*	$
1919-65	121,787	101,764	17,690,600	5,749,634	3,747,346	1,491,148	24,197,699	18,090,206	45,757,432	25,432,752
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
1968	....	....	....	....	87,580	179,712	1,386,881	2,882,292	1,474,461	3,062,004
1969	....	....	....	....	76,030	123,116	1,379,716	2,223,832	1,455,746	2,346,948
1970	....	....	....	....	113,198	177,458	1,304,449	2,060,012	1,417,697	2,237,470
Totals	121,787	101,764	17,690,600	5,749,634	4,159,416	2,153,203	31,144,308	29,063,943	53,116,111	37,068,544

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, and from pyrite concentrates from the Electrolytic Zinc Company, Rosebery and the Mount Lyell Mining and Railway Company, Queenstown by North-West Acid Pty Ltd, Wivenhoe, near Burnie.

SULPHURIC ACID: QUANTITY AND VALUE OF PRODUCTION

Year	*Mono tons*	*Value* $	*Year*	*Mono tons*	*Value* $
1957-65	342,521	3,290,626	1968	65,157	1,335,718
1966	65,013	650,130	1969	53,756	1,158,662
1967	72,347	723,470	1970	145,827	2,304,745
			Total	744,621	9,463,351

North-West Acid Proprietary Limited, Wivenhoe

P. Allan, Mining Engineer, Burnie, reports:—

Construction of the plant at Wivenhoe was completed in the early part of the year and pyrite was first fired on 1 May.

Pyrite (64,713 tons) supplied jointly by the Mount Lyell Mining and Railway Company of Queenstown and the Electrolytic Zinc Company of Rosebery was used to produce 87,376 mono tons of sulphuric acid.

Initial production has been plagued with difficulties experienced from design, construction and commissioning which have seriously taxed all concerned and this has resulted in major modifications at a very early stage.

Grate failures have required the complete replacement of the No. 2 roaster grate, a low pressure drop grate, by a high pressure drop refractory grate with replaceable nozzles, and the bed cooling coil configuration has been generally lowered to control the lower bed temperatures. A similar modification will be carried out to the No. 1 roaster in the ensuing year.

Other difficulties have resulted in alterations to the installation and materials used in the hot cyclone down legs and in boiler cleaning equipment.

Anti-corrosion modifications have been required in the oil and motor cooling system for the main blower. The acid towers have required inlet and outlet repairs and improvements have been carried out on the acid coolers as a result of tube failures. Modifications have also been required to the lime slurrying for liquor treatment and to the scrubber anti-blocking system.

One complete and one partial burn-down of electrical control units resulted in the Department requesting a complete re-assessment of the electrical installation and the introduction of a more adequate system of isolation. It is also planned that the main control and switch rooms will be pressurised to prevent the infiltration of highly conductive dust.

A leak in the acid export line due to a fault at a scour valve gasket caused some damage to the PMG trunk telephone cables. A continual check of the line and all manholes now operates to minimise the possible effects from any recurrence.

Some fallout is inevitable when putting the plant on stream but should only happen once a year for a very short number of hours. The unfortunate stop-start sequence has aggravated the situation but no serious damage to flora, fauna or property has resulted.

The noise problem is under constant review by the Department, the Commonwealth Acoustics Laboratory and private consultants engaged by the company. Considerable reduction has already been achieved but much work still remains to be done.

Two accidents occurred to Simon Carves employees during construction; one employee broke a leg; the other broke an arm. There were five minor accidents to company employees during the year, a total of seven accidents during the entire construction and commissioning period. No accidents occurred from July to December and the company is to be congratulated on the successful implementation of their safety programme.

TIN

TIN: QUANTITY AND VALUE OF PRODUCTION

Year	*Tons*	*Value* $	*Year*	*Tons*	*Value* $
1873-1965	150,017	78,780,204	1968	3,126	9,242,080
1966	1,031	3,419,153	1969	4,776	15,817,361
1967	1,529	4,735,799	1970	4,939	16,927,602
			Total	165,418	128,922,199

Aberfoyle Tin, N.L., Rossarden

H. Murchie, Senior Mining Engineer, Burnie, reports the average number of persons employed:—

Underground	115
Surface and mill	96
Other staff	21
Total	232

This was a decrease of thirty-eight compared with 1969.

Production from the ore treated consisted of 599 tons of tin concentrate containing 402 tons of tin valued at $1,323,309 and 185 tons of wolfram concentrate containing 134 tons of tungstic oxide valued at $611,886.

	Tons
Tonnage of ore milled	72,455
Tailings retreated	26,235
Sand fill placed in stopes	42,465

Underground development—	*Feet*
Driving	328
Cross-cutting	63
Rising	647

The Lutwyche Project remained suspended throughout the year with the ventilation fans and pumps being maintained on a care and maintenance basis to allow for a resumption of development at immediate notice. The estimated tonnage of economic ore is 52,200.

Underground diamond drilling totalled twenty-five holes for a footage of 3,930 feet.

The following expenditure was incurred on capital works:—

	$
Mill modifications	24,453
Single men's quarters	54,325
Housing improvements	13,575
Vehicles	10,617
Total	102,970

A new tailings dam was built, and lime added to the settling pond to effect efficient settling of the solids. Procedures were laid down to ensure the control of all points in the mill circuit where leaks could develop and thus prevent them. The bulk of the work has now been carried out but more remains to be done before conditions can be regarded as satisfactory. New single men's barracks have been built to improve the accommodation provided for single men. The mess hall has been extended and refurnished.

Ore reserves as published at 30 June 1970 were as follows:—

	Tons
Indicated	357,000
Inferred	52,000

Blue Metal Industries Mining Pty Ltd, South Mount Cameron

This company took over the operations of the Endurance Mining Corporation in December 1970.

Western Endurance: Work on preparing for the re-opening of mining operations on the western end of the Clifton Lead was prosecuted vigorously throughout the year. Some of the more important works executed were:—

A new pumping station shed was erected.

A new 12-inch x 14-inch Thompson pressure pump was installed along with auxiliary equipment.

The laying of 300 feet of 26-inch m.s. pipeline increasing to 28-inch for a further 1,200 feet to nozzle and gravel pump site, was completed.

The power line to the pumping station and a branch line to the gravel pump site was completed.

A 22,000 V-6,000 V was procured and installed.

A new 16-inch gravel pump was procured but not installed at the end of year.

Monarch Dam: A serious collapse of the earthwork embankment in the winter months due mainly to use of some porous materials, failure to key the downstream bank and ineffective compacation of clay materials, necessitated the near-emptying of the dam pending the onset of dry weather. A decision was made to completely demolish the existing embankment and a firm of consulting engineers was engaged to design a completely new wall, etc. Demolition of the structure was in progress at the end of the year.

Monarch Mine: On the Monarch flats cassiterite was recovered from discontinuous and often overlapping lenses of wash occurring at varying levels. Not all of these lenses are of economic value. The avoidance of pollution of the Boobyalla River was also a problem. Sluicing was continued throughout the year; 32,000 cubic yards being treated for the recovery of 5.239 tons of cassiterite containing 3.770 tons of tin. An average of six men were employed. The treatment plant consists of a 12-inch gravel pump and jigs. Tailings are stacked and part of the water re-circulated.

Cleveland Tin N.L., Luina

P. Allan, Mining Engineer, Burnie, reports:—

There has been a slight increase in the tonnage treated to 278,844 tons containing 0.858% Sn and 0.396% Cu, with recoveries as follows:—

	Tons
Tin concentrate	2,487.96
Tin content	1,831.98
Copper concentrate	3,453.776
Copper content	934.272
Tin content	180.045

The production of 43,172 cubic yards of road metal again provided an additional source of income.

Total capital expenditure for the year approximated $731,500 and included the purchase of an additional three-boom drill jumbo, two Wagner S.T.5A loading vehicles, two Wagner M.T.F. ore carriers, a wheeled bulldozer and a 2,200 c.f.m. compressor.

Work has been completed on the clearing of the new tailings disposal area and a start has been made to the construction of the dam wall.

Most underground work is now at 7 Level and below. A new mine office, bit shop and repair shop have been built within easy reach of 7 Level, the lowest surface adit. A new and very satisfactory magazine has been built and a large covered working area has been provided near the main workshop to combat inclement weather.

In the township of Luina ten houses previously started were completed and another ten houses and a fire station built. All the roads in the township and the mill road have been sealed.

Underground development shows a slight decrease from the previous year at 6,078 feet. The reduction is principally in main and decline driving where the pressure for footage has been relieved with the full development of the upper stoping levels and the main decline now being developed below 9 Level.

In the mill, a three-cell M.8 end flow 'Yuba-Richards' jig was installed in the primary classification circuit to produce a rougher concentrate prior to tabling. At the moment, the jig concentrate is still being re-tabled but the results are sufficiently encouraging to justify the installation of two additional jigs in the near future.

There was a tendency for the excessive volume of water when re-tabling tailings to sluice fine cassiterite in the tin treatment section. This has been overcome by the introduction of de-watering cyclones into the circuit prior to re-tabling.

In the crushing and grinding area, alteration to final product screening has reduced the proportion of ¼-inch material in the heavy media feed allowing an increase in the quantity of ore treated along with an increase in the rejection of float material without any increase in float grade.

An attempt to alter the separation cone media to reduce media viscosity ran into operational problems and the 65 mesh media was retained.

Skega rubber liners have been fitted to two ball mills with promising results and a third was fitted with Firestone shell liners which have still to be assessed. A reduction in ball size in the primary and an increase in ball size in the silicate regrind mills while only giving a minor improvement in the grind has been successful in eliminating the previously experienced corrugated scouring effect on the liners.

Only two serious accidents were reported for the year. One man received a fractured arm while fitting pipes and another received a rock fragment in the eye while spalling on the crusher bin and lost the sight of the eye.

The published ore reserves at 30 June 1970 were:—

	Tons
Indicated	945,500
Inferred	1,918,000

L. J. Groves and Palmer, Eastern Lead Mine, South Mount Cameron

Employing contractors with heavy earth moving equipment this party dozed up 33,300 cubic yards of shallow tin-bearing surfacings which they sluiced and treated for a recovery of 17.662 tons of concentrates containing 13.341 tons of tin valued at $45,430. The two partners employed one man.

Hawkes Alluvial Tin Limited, King Island

This company mined 87,398 cubic yards of alluvial tin-bearing ground to produce 31 tons of tin concentrates containing 22 tons of metallic tin valued at $76,221. Four men were employed.

W. J. Hodge, Razorback Mine, Dundas

Mr Hodge and his partner continued to treat ore obtained from the old open cut and surface workings on the northern section of the lode. A production of 524 tons yielded 7.066 tons of concentrate valued at $13,636. This property was under option towards the end of the year to Gippsland Minerals N.L. who required access to Placer No. 2 adit. The leaseholders were attempting to negotiate the caved section of this adit at the end of the year.

G. Machen, Waratah

Mr Machen carried on sluicing operations in North Valley, producing 19 tons of concentrates containing 12 tons of tin valued at $42,317. An average of three men were employed.

Mount Cameron Tin Syndicate, South Mount Cameron

This syndicate, under the management of R. C. Lawry, continued to operate its South Mt Cameron leases, dozing up 64,285 cubic yards which yielded 20.718 tons of concentrates containing 15.602 tons of tin valued at $53,558. Employment averaged three men.

R. L. Rainbow and Sons, Banca Mine, Winnaleah

Operations were continued on the newly-developed face some 400 yards east of homestead on the Boobyalla Road for the first half of the year, the yield being 0.532 tons of concentrates containing 0.399 tons of tin valued at $1,398. During the second half of the year operations were switched to the surface slopes west of the road. A total of 13,900 cubic yards of shallow surfacings were dozed up and treated for a recovery of 8 tons of concentrates containing 6 tons of tin valued at $19,467. The party of three men were employed continuously throughout the year.

Renison Limited, Renison Bell

P. Allan, Mining Engineer, reports as follows:—

The company mined a total of 379,510 tons of ore producing 4,337 tons of high grade (60% Sn) and 1,478 tons of low grade (20% Sn) containing in all 2,700 tons of tin valued at $9,248,051.

The Renison decline was advanced 1,511 feet to reach 8,173 feet from and 860 feet below the portal while 10,237 feet of additional driving and cross-cutting and 808 feet of rising was completed.

Diamond drilling again increased to 32,164 feet with 15,281 feet in underground exploration and proving, 9,942 feet in surface drilling, 4,741 feet in prospect exploration on Renison leases and 2,200 feet on the joint venture with Mount Lyell and C.G.F.A.

In the mill the selective cassiterite flotation plant was commissioned with a designed capacity of 10,000 tons per annum of minus 6, plus 2 micron material previously rejected to waste. A Niro spray drier to dry the fine flotation concentrate was also commissioned. In the primary grinding section two ball mills now operate in parallel increasing the throughput from 45 to 55 tons per hour.

The new Argent River dam was completed and work continues on enlarging the main tailings area. A special 'anti-pollution' dam was constructed below the mill to cope with mill wash water and spillage and has proved highly satisfactory.

A new 20,000 lb explosives magazine, AN-FO storage and mixing unit and a new bulk diesel refuelling unit were approved and installed.

The company employed an average of 98 persons underground and 252 on the surface.

A total of forty-seven accidents occurred during the year, one of which was serious: an employee of Skilled Personnel walked behind a reversing ore carried on surface and had a heel crushed by one of its rear wheels.

On 7 December Terence Cairns was killed instantly while sitting on a parked tractor at the entrance to the 3S 609 cross-cut when a large slap fell from the roof directly over his head. The cause of the fall was attributed to weathering since there was no shotfiring in the mine during the previous weekend. This was the first fatality in the Renison Bell area for about eighty years.

Star Hill Syndicate, Gladstone

This syndicate, under the direction of R. C. Lawry, continued to operate the old Star Hill face until the end of the second quarter. Six thousand cubic yards were treated yielding 2.376 tons of concentrates containing 1.733 tons of tin valued at $6,035. Three men were employed for the period. By permission of the lessee. A. D. Green cleaned up some old races for a yield of 0.058 ton of cassiterite containing 0.038 ton tin valued at $129.

A. J. Stevenson and Mullins Bros, Red Hills Mine, Weldborough

Operations were confined to the first quarter of the year and production of 0.604 ton of concentrates containing 0.401 ton of tin valued at $1,405. The second quarter was devoted to setting up the plant on the newly-acquired Weld River lease at Moorina.

A. J. Stevenson and Mullins Bros, Weld River Mine, Moorina

This party operated for six months and treated 12,000 cubic yards for a recovery of 2.844 tons of concentrates containing 1.782 tons tin valued at $6,003. The ground, consisting of a heavy cover of old tailings, yielded 0.53 lb SnO_2/cubic yard.

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

A summary of operations by this company shows increased activity compared with 1969—

Acres dredged	23.676
Yardage treated	1,674,100
Average depth (feet)	44.25
Tons of concentrates	120.150
Tons of tin	89.515
Value of tin	$308,139
Gold recovered (fine oz.)	108.24
Average employment (men)	37

There was a dramatic decline in grade in the ground treated during the final quarter of the year, 15 tons of cassiterite containing 11 tons of tin were obtained from 425,000 cubic yards treated compared with 36 tons of concentrates containing 27 tons of tin from 477,500 cubic yards in the September quarter. Deteriorating values in the line of bores ahead point to the possibility of closure in 1971.

V. Wood, Mussel Roe Mine

This producer continued operating the newly-developed face on the eastern side of the river and treated 58,900 cubic yards of gravel for the recovery of 14 tons of concentrates containing 10 tons of tin valued at $35,268. Employment averaged two men.

V. Wood, Pioneer Tin Mine

The main features of the year's work were the progress of the working face into deeper ground approaching the old Pioneer workings, the draining of the lake formed by these old workings using a 16-inch pump, the development of an intermediate bench, the formation of a new pump site at the bottom level and the transfer to it of the 10-inch gravel pump. The bottom bench was broken by a monitor with a 2½-inch tip but the long suction pull compelled Mr Wood to combine a 9-inch hydraulic elevator in tandem with his 10-inch gravel pump. All this overburden was treated but no rich ground was touched during the year. Much more overburden remains to be removed before a start can be made in taking up the rich band of wash which lies beneath. The tin dressing jigs continued to operate satisfactorily. On the upper bench Mr Wood employed a giant nozzle equipped with a 5-inch tip and allowed the broken spoil to run direct down a riffled tailrace to the old Pioneer lake. Any tin contained in this

overburden will be thereby trapped and can be recovered as the bottom face advances. Mr Wood employed an average of seven men in the sluicing of 229,000 cubic yards low grade overburden for the recovery of 8.5 tons of concentrates containing 6 tons of tin valued at $21,311.

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

L. D. McRae, Coles Bay, produced concentrates containing 0.063 ton of tin valued at $221 from his workings in Saltwater Creek.

Miscellaneous.—T. H. Fitzallan, W. Richards and M. Robson produced, individually, concentrates containing 0.270 ton of tin valued at $918.

AVOCA

N. R. and D. Fenton produced concentrates containing 0.192 ton of tin valued at $673.

SCOTTSDALE–RINGAROOMA–BRANXHOLM–DERBY

K. Banks, Ringarooma River Beaches, Mutual Area, Derby. Of a total production of 1.208 tons of concentrates containing 0.774 ton of tin valued at $2,668, a total of 0.887 ton of concentrates with a tin content of 0.552 ton was recovered from the treatment of 1,434 cubic yards, an average of 1.8 lb of SnO_2/cubic yard treated.

K. Kerrison, Scottsdale. Working his Ringarooma River leases about a mile above the bridge at the Mutual he recovered 3.523 tons of concentrates containing 2.442 tons of tin valued at $8,383 from 2,294 cubic yards of river gravels representing a grade of 3.4 lb SnO_2/cubic yard.

J. Maumill, Ringarooma River Beaches, Derby. Working river leases adjoining K. Kerrison's holdings this operator produced 2.274 tons of concentrates containing 1.369 tons of tin valued at $4,664. Values averaged 3 lb SnO_2/cubic yard.

T. Merritt, Ringarooma River Beaches, Mutual Area, Derby, continued to work the river beaches and treated 1,185 cubic yards for a recovery of 0.657 ton of concentrates containing 0.428 ton of tin valued at $1,471. On these figures the ground averaged 1.24 lb SnO_2/cubic yard.

D. L. and W. J. Mullins, Ruby Flats, Branxholm. This party treated 1,050 cubic yards of dozed up material near Branxholm Creek and recovered 0.415 ton of concentrates containing 0.309 ton of tin valued at $1,035. They work part time and clean up once a year.

M. Rayner, Ringarooma River Beaches, Derby. This operator treated ground averaging 3.2 lb SnO_2/ cubic yard to recover 0.904 ton of concentrates containing 0.629 ton of tin valued at $2,162.

Messrs Targett and Bonner, Black Creek, Branxholm. The partnership was reconstituted in the latter part of the year and a Gardiner diesel engine of 83 h.p. was brought on to the job and a 6-inch x 6-inch Kelly & Lewis single stage pressure pump installed. There was no productive mining.

Miscellaneous.—L. M. Barnett, M. Hodgetts, R. Holloway, C. Hyde, S. T. Kerrison, A. McDougall, J. Melville, S. Morley, A. A. Quinn and G. Rayner produced, individually concentrates containing 1.313 tons of tin valued at $4,467.

PIONEER–MOUNT CAMERON–GLADSTONE

G. Green, Lark Creek. This operator re-opened a face on the old Lark mine and treated 2,000 cubic yards for the recovery of 0.444 ton of concentrates containing 0.331 ton of tin valued at $1,108.

B. G. R. Groves and R. C. Lawry. This party dozed and treated 1,200 cubic yards of surface material for a recovery of 0.287 ton of concentrates containing 0.217 ton of tin valued at $736. The show was worked for only one quarter until boggy conditions immobilised their earth moving equipment temporarily and they were forced to close.

E. King, Mount Cameron Creek, produced concentrates containing 0.200 ton of tin in concentrates valued at $678.

R. C. Lawry, Amber Hill, produced concentrates containing 8.096 tons of tin valued at $27,370.

N. B. Moore. Treating dozed-up ground north of Mt Cameron, this operator worked part time to recover 0.495 ton of concentrates containing 0.364 ton of tin valued at $1,232. The ground averaged 2.2 lb SnO_2/cubic yard.

F. D. Richardson and Party, Deep Creek Mine, Drydens Creek, Gladstone. This party treated 2,480 cubic yards using headwater and a breaking-up nozzle for the recovery of 1.1 tons of concentrates containing 0.610 ton of tin valued at $2,061. Two men were employed. Falling values brought about a closure at the end of the third quarter.

H. Standage, Amber Creek Mines, Gladstone. This operator treated ground averaging 1.25 lb SnO_2/cubic yard and recovered 0.581 ton of concentrates containing 0.607 ton of tin valued at $2,077.

Miscellaneous.—T. M. Bishop, D. Dawe, M. Fenton, H. Green, P. J. Groves, E. Kerrison, R. and H. Y. Moore, M. Robson and J. M. Groves, and E. Wilcox produced, individually, concentrates containing 1.449 tons of tin valued at $4,992.

MOORINA–WELDBOROUGH–ST HELENS

W. L. Boon, Moorina. The course of the Frome River was diverted and a small paddock in the former water course was worked. Values were not up to expectations and no sales were recorded.

W. Grose and P. Kidd, Weldborough. These operators dozed and sluiced surface leader ground on the Cambria for the dual purpose of winning tin and at the same time exposing the leaders for sampling and evaluation. Their operations were spasmodic during the year but yielded 0.829 ton of concentrates containing 0.596 ton of tin valued at $1,995.

R. G. Hyde, Moorina, working part time, 0.323 ton of concentrates were obtained containing 0.223 ton of tin valued at $779 from beaches in the Weld River.

J. Lambert, Weldborough. A tin lead in Laffer Creek was followed and 0.208 ton of concentrates was obtained, containing 0.138 ton of tin valued at $462.

H. Moses, Blue Tier Mine. The upper reaches of the Wyniford River were worked only for a short time during the first quarter and 0.096 ton of concentrates was obtained, containing 0.069 ton of tin valued at $242.

A. J. Stevenson and Mullins Bros, Weldborough, produced concentrates containing 2.183 tons of tin valued at $7,408.

T. Yaxley, Weldborough. Operations on his Nigra Creek leases were resumed and 1.018 tons of concentrates were recovered containing 0.735 ton of tin valued at $2,520. The grade was 0.8 lb SnO_2/cubic yard.

Miscellaneous.—R. Holloway, D. Kerrison and D. Richards produced, individually, concentrates containing 0.253 ton of tin valued at $866.

WARATAH

R. Barker produced concentrates containing 0.080 ton of tin valued at $268.

M. G. Glozier produced concentrates containing 0.271 ton of tin valued at $938 from his underground workings on Thompson's Lode.

T. R. Glozier produced concentrates containing 0.012 ton of tin valued at $42.

C. Housego produced concentrates containing 0.365 ton of tin valued at $1,254.

J. Housego recovered 0.632 ton of tin in concentrates valued at $2,075 from tailings in the Waratah River.

E. Kelly recovered 0.609 ton of tin concentrates valued at $2,064.

D. Kenworthy from a part-time operation at Pig Flat, produced 0.054 ton of tin in concentrates valued at $186.

L. W. Wills, working underground part time, returned 0.018 ton of tin in concentrates valued at $63.

WEST COAST

C. D. King, Port Davey, produced from the Melaleuca mine, concentrates containing 3.359 tons of tin valued at $11,411.

Miscellaneous.—Messrs Colgan and Whyman, V. J. Davis, P. T. Griffiths and S. A. Tatlow produced, individually, concentrates containing 0.348 ton of tin of value $1,165.

TITANIUM

Naracoopa Rutile Limited, Naracoopa

An average of thirty-three persons was employed.

PRODUCTION OF MINERALS FROM 97,048 TONS OF SANDS

Mineral	*Concentrate (tons)*	*Titanium dioxide content (tons)*	*Value ($)*	*Mineral*	*Concentrate (tons)*	*Zircon content (tons)*	*Value ($)*
Ilmenite ..	25,202	NA	NA	Zircon	6,075	3,949	333,052
Rutile	7,409	7,023	1,216,274				

Major items of capital equipment commissioned during 1970 included:—

Two Reading & Gill wet magnets, to remove ilmenite in the wet tailing plant.

One 36-inch Rotex screen in the dry mill to screen the rutile products. A vacuum filter was purchased for the dewatering of the drier feed.

One vacuum 48-inch Rotex screen in the dry mill to screen the zircon product.

One Reading high tension plate machine purchased for the zircon circuit.

One new Toyota land cruiser for the drilling and exploration crew, and a reconditioned Gemco rig to replace the hand drilling.

One new Caterpillar 922 B front-end loader was purchased.

Two houses at Naracoopa were bought to house staff.

A large pump and suction line were installed on the 7.5 million-gallon freshwater dam to supply additional water to the plant.

Larger motors were installed on pumps in the wet plant to increase capacity.

A cassiterite recovery circuit was installed and low grade cassiterite concentrates are being produced. The first shipment of material for the new $240,000 preconcentrating plant arrived and the assembly crew began erecting it. A $30,000 barracks building to house twelve men, including cooking and dining facilities, was ordered, a site bought and a power supply from the plant alternators arranged. This should be ready for occupation by the end of February 1971.

Pending the start of mining operations on the lower grade Lanherne area, mineral is still being obtained from the lower Milford beaches and at the mouth of the Frazer River.

TUNGSTEN (SCHEELITE)

TUNGSTEN (SCHEELITE): QUANTITY AND VALUE OF PRODUCTION

Year	*Tons (Concentrates)*	*Tons (WO_3)*	*Value $*
1917-65	20,994	....	39,046,388
1966	1,311	945	3,776,862
1967	1,200	862	3,673,100
1968	1,460	1,054	4,127,564
1969	1,530	1,092	5,084,758
1970	1,070	761	5,253,996
Total	27,565		60,962,668

King Island Scheelite (1947) Limited, Grassy

Production statistics—

Treatment—	
Ore milled	263,952
Concentrate recovered (tons)	1,070
WO_3 content (tons)	761
Value	$5,253,996
Average number of persons employed—	
Open cut	39
Other	216
Total	255

A total of $750,000 was spent on capital equipment for the open cut. This included:—

One Caterpillar 988 front-end loader.

One Caterpillar 992 front-end loader.

Four Caterpillar 769—35-ton dump trucks.

One I-R Crawlmaster drill.

One G.D. 1,200 c.f.m. compressor.

One G.D. airtrack drill.

One Caterpillar D8 bulldozer.

One grid roller.

The equipment was purchased to increase production of overburden from the open cut. Total open cut production has increased from 170,000 to 410,000 tons per four-week period. The ratio of overburden to ore has increased from 6 to 1 to 17 to 1. The above equipment has been concentrated on removing overburden from the footwall side of the open cut. To remove sand overburden on the hanging wall section of the open cut, a contract was let to Roche Bros who have been using three self-loading scrapers. Much of the mullock produced has been used in the formation of a breakwater to form a port at Grassy.

The condition of the open cut was found to be most unsatisfactory when a massive slip plane developed on the footwall removing all safety berms. Working conditions in the floor of the pit were hazardous. Instructions were given that safety berms were to be established on the footwall of the cut and additional safety precautions taken when working on the pit floor. This work has not yet been completed but the company is to be commended for the speed with which the situation is improving and the co-operation that they have given the Department.

Capital expenditure of $400,000 on the mill resulted in the following changes in equipment and circuiting:—

The original primary crusher, a 42-inch x 48-inch Hadfield jaw crusher was taken out of service and replaced by a 48-inch x 60-inch Vickers Ruwolt jaw crusher. The new jaw crushing plant includes considerably improved facilities, a 48-inch Jacques apron feeder, a Micropulsaire dust collector and a Demag 20-ton overhead travelling electric crane.

The conveyor system returning plus ⅜-inch ore to the Symons short head crusher was simplified. No. 3 conveyor was extended, eliminating one dusty transfer point and one short conveyor, No. 3A.

The conveyor system drawing ball mill feed from the fine ore bins was also simplified. No. 6 conveyor belt was extended such that ball mill feed dropped from this belt into a splitter chute and then down covered chutes directly to the No. 1 and No. 2. ball mills. This direct route eliminated three short belt conveyors, Nos. 7A, 8 and 9. A Morgensen sizer was installed to screen No. 2 ball mill discharge. This multi-deck shaking screen replaced two DSM screens which were giving a poor screening performance.

A 15-inch dewatering cyclone was installed in the grinding section spillage circuit to decrease the water load on the bowl-rake classifier.

One new Fieldhouse vanner was installed to take advantage of the improved design of drive and feed distribution recently incorporated by the designers.

Magnetic separation equipment had been improved in both the wet and dry treatment plants. A Gill four-pole wet magnetic separator has replaced the Jones separator (of English origin) in the flotation circuit. A Reading high intensity cross belt separator has been installed to handle the final cleaning of gravity concentrate just prior to bagging. This machine replaces an early model of Rapid disc magnetic separator which has become obsolete.

Tailings were first impounded in a dam in July 1970. Previously tailings were sent to sea. Although there have been difficulties with consolidating the walls of the tailing dam, water was reclaimed from the dam for re-use in the mill. Previously water from flotation tailings had never been re-used in the mill. The use of this water has not posed any metallurgical problems so far.

Dust continued to be a problem associated with the crushing section of the mill and in spite of improvements the problems has not been eliminated. The company has agreed to give this work priority.

TUNGSTEN (WOLFRAM)

TUNGSTEN (WOLFRAM): QUANTITY AND VALUE OF PRODUCTION

Year	*Tons (Concentrates)*	*Tons (WO_3)*	*Value* $
1899-1965	15,422	....	19,067,668
1966	510	377	1,367,704
1967	435	320	1,359,388
1968	484	347	1,358,093
1969	602	437	2,034,886
1970	896	649	4,428,708
Total	18,349		29,616,447

Aberfoyle Tin N.L., Rossarden

Wolfram concentrate produced contained 137 tons of tungstic oxide (WO_3) valued at $926,018. This company is reviewed under Tin.

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

Average number of persons employed—

Underground	107
Surface	77
Total	184

Tonnage of ore milled was 86,058 tons, an increase of 35,185 tons over the previous year.

Production from the ore treated consisted of 707 tons of wolfram concentrate containing 512 tons of tungstic oxide (WO_3) valued at $3,502,690, and 43 tons of tin concentrate containing 29 tons of tin valued at $98,696.

Underground development comprised—

	Feet
Driving	1,629
Cross-cutting	516
Rising	1,654
Sump excavation	117
Total	3,916

Underground diamond drilling comprised fifty-one holes giving a total footage of 7,846.

The new slimes dam is now operating and it is planned to build an additional slimes dam behind the township which would be remote from Storeys Creek rivulet.

The addition of lime to the discharged mine water together with provision for settling action of this treated water in the old slimes dam has improved the quality of the water which discharges into the creek. Anti-pollution controls have been introduced but the system is not yet completely effective.

During the year the office accommodation was extended and increased. The miners' change house was extended and improved and a new officials change house was built.

The safety devices on the mine winder were found to be inadequate and the recommendations of the Department of Mines' Mechanical Engineer have been carried out satisfactorily. Shaft operating procedures, especially with regard to explosives transport and the use of cage gates, did not meet our requirements and these are now being enforced.

G. Gerke and L. Davis, Mt Horror Wolfram Mine

The proprietors of this show erected a small ore dressing plant consisting of crushing plant screens and jigs. The plant is capable of handling 5-6 tons per hour. No production was recorded.

ZINC

ZINC: QUANTITY AND VALUE OF PRODUCTION

Year	Tons	Value $	Year	Tons	Value $
1919-65	795,548	116,485,840	1968	40,061	11,857,961
1966	40,904	12,648,558	1969	41,121	12,795,905
1967	40,231	12,106,835	1970	37,723	12,335,394
			Total	995,588	178,230,493

Electrolytic Zinc Company of Australasia Limited

EXTRACTION FROM CONCENTRATES: RISDON

	Tons
From other than Tasmanian ore—	
Zinc	126,193
Cadmium	290
Cobalt oxide	26
Superphosphate	96,568
From Tasmanian ore—	
Zinc	39,583
Cadmium	77
Cobalt oxide	1.51
Manufactured products—	
Aluminium sulphate	2,884
Ammonium sulphate	29,661

The average number of men employed was 2,737.

WEST COAST DIVISION

Ore mined—

Mine	Pb %	Zn %	Fe %	Cu %	S %	Ag oz/ton	Au dwt/ton	Tons
Hercules	4.80	13.90	11.69	0.31	18.20	4.60	1.90	19,832
Rosebery	5.17	16.73	13.54	0.68	22.77	5.64	2.53	273,358
Farrell	14.11	6.91	9.30	0.23	8.57	14.28	Nil	1,352
								294,542

Concentrate produced—

	Tons
Zinc concentrate	77,348
Lead concentrate	12,459
Copper concentrate	11,722
Total	101,529

Recoverable quantity in ore mined—

Zinc	37,696 tons
Lead	10,536 tons
Copper	1,256 tons
Cadmium	38 tons
Silver	1,302,802 fine oz
Gold	26,468 fine oz
Cobalt oxide	1 ton
Manganese dioxide	194 tons
Zinc sulphate	92 tons
Sulphur as sulphuric acid	58,451 mono tons
Mercury	2,845 lb

Total value of production—$19,655,346.

Average number of persons employed—	*Surface*	*Underground*	*Total*
Hercules Mine	7	22	29
Rosebery Mine	384	386	770
Farrell Mine	6	13	19
Total	397	421	818

Development

Item	*Rosebery (ft)*	*Hercules (ft)*	*Farrell (ft)*	*Prospects (ft)*
Shaft sinking	629	....	108	....
Driving and cross-cutting	4,777	22	148	....
Rising	1,154	275	....	....
Diamond drilling	16,093	630	1,326	965

No. 2 Main Shaft Project. Shaft sinking continued during the year in good ground conditions and the face was advanced from a depth of 1,129 feet to completion at 1,758 feet. This depth was 482 feet short of the planned target but, due to the scheduling of the winder installation by a different contractor and the inability of the sinking party to achieve the planned footage advance, the decision to stop just below 19 Level was taken. The loading station below 17 Level and 16, 17, 18 and 19 Level plats were excavated.

Following the last shaft blast on 13 May 1970, the contractor, Dillingham-Shaft Sinkers Pty Ltd completed all necessary in-shaft equipping, namely: shaft bunton sets, ladderway, guides, pipes for air, water, and pumping, and also screening. Between 13 May and 20 November 1970, Dillingham-Shaft Sinkers also excavated and concreted the floor and wall ducts in the winder chamber, and the ore and waste bins at the Main Haulage Level.

The electrical and mechanical contractors, G.E.C.-A.E.I. commenced on 20 November to prepare for and install, the loading and unloading station steel and the shaft and plat cables. It is expected that the winders will be installed and the shaft ready for trials, preparatory to commissioning early in June 1971.

Mine Ventilation. With the completion of the stripping of the rise from 8 Level to the surface, the installation of three 36-inch A. F. Richardson fans (delivering a total of 75,000 c.f.m.) the Southern Exhaust Airway was completed in late November. This system has improved the quality and quantity of air being circulated through the workings in the southern section of the mine.

The connection of the 15 and 17 Level main haulage cross-cuts to No. 2 Shaft improved conditions considerably in this lower development area. No. 2 Shaft now commenced to assume one of its main roles as a source of intake air. Some progress was made with the Northern Exhaust Airway and this system should be completed by the end of 1971.

Farrell Mine. Shaft sinking in the new North Farrell shaft continued during the year and progressed to 96 feet below 10 Level. A plat was cut at 10 Level, 150 feet below 9 Level. Towards the end of the year mining operations were suspended to enable a new headframe and ore and waste bins to be erected over the shaft collar; construction was completed on 17 November 1970.

General

The removal of the pyrite from the hydraulic fill for the cut and fill stopes has not engendered any great problems in operation. Considerable planning has been carried out into the possible methods of mining 'F' lens below the 14 Level, final details should be concluded shortly and the method instituted in this coming year. The previous success of the trackless autoloader fleet on the mine has confirmed that this vehicle will be the ore transport medium in the new stopes.

Ore reserves for the Rosebery and Hercules ore bodies were 9,049,303 tons at the end of the year.

Ore Treatment. The pyrite plant was commissioned early in the year under review. It is treating, on a ratio of about 1 : 1 zinc tailings from the concentrating mill and tailings recovered from the residue dam area. Also commissioned was the filtration and concentrate loading plant, situated some 3,000 feet from the main plant, and which, incorporates many new operating devices. A new metallurgical office block was constructed and occupied during the year. Modifications and additions to the main plant were commenced to permit the doubling of throughput in 1971.

Engineering. Work on the new residue dam was commenced in October 1969 and it received residue for the first time on 12 June 1970. Construction was suspended in June and resumed in November. Completion is planned for May 1971 and the dam should have a life of five years.

During the latter half of 1970 the following were commenced:—

(*a*) A new change house for miners and staff, incorporating offices for the mining and geological departments, and situated at the portal of 7 Level (the access to No. 2 Shaft).

(*b*) Quarters for 140 single men and a new laundry.

(*c*) A new housing estate with 146 houses.

Safety. A serious attempt to improve industrial safety was made during the year with the appointment at Rosebery of an experienced safety officer. Results indicate initial success in this sphere with a considerable drop in the accident severity rate and some decrease in the frequency rate. This improvement in results is a creditable achievement in view of the large number and varied quality of contractors' employee's at present working on the company's expansion programme.

RISDON WORKS

Production of zinc was 37,696 tons, a decrease of 3,425 tons compared with 1969.

Capital expenditure for the year amounted to $12 million; the major development work included:—

(1) The completion of the new melting, casting and zinc products plant.

(2) A new bulk acid loading plant and facilities.

(3) Dredging of the wharf frontage.

(4) The rehabilitation and strengthening of the wharf and adjacent storage areas.

(5) The installation of an additional rectifier and uprating of others.

(6) The installation of an additional cooling tower in the Electrolytic Division.

(7) The enlargement of the leaching and purification sections.

The construction of the new residue treatment plant is proceeding and it is expected to be operating in 1971.

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 92 tons of value $9,780.

ZIRCONIUM

Naracoopa Rutile Limited, reviewed under Titanium, produced 6,075 tons of concentrates containing 3,949 tons of zirconium valued at $333,052.

2.—Non-Metallic Minerals

CLAY

CLAY: QUANTITY AND VALUE OF PRODUCTION

Year	*Cubic yards*	*Value* $	*Year*	*Cubic yards*	*Value* $
1958-65	992,997	1,828,852	1968	148,802	358,507
1966	158,948	325,488	1969	158,121	366,537
1967	130,522	287,658	1970	136,787	350,495
			Total	1,726,177	3,517,537

CLAY: DETAILS OF PRODUCTION

Company	*Clay (cu. yd)*	*Value ($)*	*No. of Men*	*Product*
Bones, I. M., Kingston*	1,077	2,693	....	Bricks
Campbell, John, Pty Ltd, Launceston	1,550	1,550	13	Pipes
Fenton, E. V., Kingston*	5,180	12,822	1	Bricks
Goliath Portland Cement Co. Ltd, Railton	42,186	143,433	1	Cement
Hazell Bros, Margate*	22,211	55,274	1	Bricks
Hobart Brick Co., New Town and Granton	8,562	21,011	44	Bricks

Company	Clay (cu. yd)	Value ($)	No. of Men	Product
Humes Ltd, Austins Ferry	2,270	7,239	15	Pipes
Humes Ltd, Hamilton	900	3,195	4	Pipes
Humes Ltd, Prospect Vale	2,835	6,237	24	Pipes
Huttons Bricks Pty Ltd, Launceston	13,190	26,380	13	Bricks
Luck Brick and Pipe Pty Ltd, Dulverton	5,848	8,772	13	Bricks
Machens Brick Pty Ltd, Kings Meadows	16,624	33,248	25	Bricks
Noonan, J. E., Copping*	2,218	5,154	1	Bricks
Wells, D. S., Blackmans Bay*	170	425	....	Bricks
Wise, G. R., Youngtown	870	870	1	Pipes
Wunderlich Ltd, Launceston	2,256	4,512	26	Tiles
Wynyard Brick Co., Wynyard	7,530	15,060	6	Bricks
Zolati and Son, Dulverton	1,310	2,620	5	Bricks
Total	136,787	350,495	193	

* Suppliers to Hobart Brick Company

DOLOMITE

DOLOMITE: QUANTITY AND VALUE OF PRODUCTION

Year	Tons	Value $	Year	Tons	Value $
Prior to 1966	26,840	157,212	1968	2,534	15,070
1966	2,606	15,097	1969	1,515	9,104
1967	2,143	12,361	1970	3,341	20,045
			Total	38,979	228,889

Circular Head Dolomite and Trading Co. Pty Ltd, Smithton

This company, the sole producer, employed an average of one man and produced 3,341 tons, an increase of 1,826 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

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	$
1919-65	4,660,409	6,229,390	689,219	1,845,320	4,157,982	4,855,110	599,322	1,444,262	10,106,932	14,374,082
1966	252,393	494,437	29,218	114,056	28,489	88,983	34,634	83,077	344,734	780,553
1967	523,611	496,749	16,234	62,290	33,670	103,155	44,934	104,679	348,449	766,873
1968	409,642	806,995	23,686	105,510	32,239	98,410	30,244	71,914	495,811	1,082,829
1969	448,638	883,816	22,683	163,282	37,489	136,500	41,264	88,804	550,074	1,272,402
1970	413,957	815,496	28,660	232,029	36,089	134,035	30,487	63,425	509,193	1,244,985
Totals	6,438,650	9,726,883	809,700	2,522,487	4,325,958	5,416,193	780,885	1,856,161	12,355,193	19,521,724

Addison and Coates, Cooee

This firm produced 800 tons of limestone valued at $1,600.

Australian Commonwealth Carbide Company Ltd, Ida Bay and Electrona

This company quarried 28,600 tons of limestone at a cost of $232,329 at Ida Bay and used it for the production of calcium carbide at Electrona. Calcium carbide production was 14,044 tons valued at $1,989,724 and acetylene black production was 219 tons valued at $73,012. The average number of persons employed was 201 of whom eighteen were at the quarry. A road was constructed connecting the Ida Bay Quarry with the forestry road which joins the Lune River Road near the workshops.

Australian Newsprint Mills Limited, Maydena

This company quarried 8,901 tons of limestone at a cost of $65,913. 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—

	Tons	$
Agricultural Limestone	3,955	9,492
Limestone for chemical and metallurgical purposes	22,616	54,278
Burnt lime for various purposes	30	990
Total	62,601	64,760

Eighteen men were employed.

Goliath Portland Cement Co. Ltd, Railton

A total of 413,957 tons of limestone with a cost value of $815,496 was quarried and used in the manufacture of cement. An average of twenty-two men were employed in the quarry, for this production.

In addition to the above 3,031 tons of limestone (listed as 'other') and valued at $2,121 was produced for road construction within the confines of the quarry.

Production amounted to 306,277 tons fine cement valued at $5,512,086. An average of 309 men were employed.

Quarry. An intensive overburden removal programme was undertaken during the year, a local contracting firm being engaged to strip the overburden back to the railway line in the north-west corner. The company also carried out its own stripping on the south side, both operations developing substantial reserves.

Works. The new grinding mill was commissioned in March and has continued to function satisfactorily since.

A.C. Plant. An innovation was the installation of the modern automatic Dankaert machine which stone cuts the edges of the cement sheets square or chamfered as required.

R. K. Sulzberger, Flowery Gully, Launceston

Using a mobile crushing plant Mr Sulzberger crushed a total of 128 tons valued at $926, including 78 tons of agricultural lime valued at $726.

The Mount Lyell Mining and Railway Company Limited, Halls Creek

This company quarried 4,478 tons of limestone, valued at $13,434 for delivery to the works at Queenstown from the quarry at Halls Creek. 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 14,194 tons of limestone, valued at $22,160, supplied by the Goliath Company.

Wright Stephenson Pty Ltd, Pulbeena

This company produced 8,434 tons of lime sand, valued at $26,546, compared with 8,781 tons in the previous year. Average employment was two men.

OCHRE

OCHRE: QUANTITY AND VALUE OF PRODUCTION

Year	*Tons*	*Value* $	*Year*	*Tons*	*Value* $
1918-65	2,394	15,732	1968	11	164
1966	65	1,008	1969	79	1,191
1967	97	1,459	1970	41	595
			Total	2,687	20,149

A. Pearson, Spalford and Deep Creek

Production of red and yellow ochre from these pits was 41 tons, valued at $595.

PEBBLES

PEBBLES: QUANTITY AND VALUE OF PRODUCTION

Year	Tons	Value $	Year	Tons	Value $
1957-65	5,495	81,136	1968	1,214	19,687
1966	895	15,183	1969	1,023	19,036
1967	1,237	20,404	1970	1,642	31,943
			Total	11,506	187,389

A. Pearson, Ulverstone

The collection of pebbles for grinding was continued on the beaches around Ulverstone. The output was 1,642 tons, valued at $31,943. An average of three men were employed.

SILICA

SILICA: QUANTITY AND VALUE OF PRODUCTION

Year	Tons	Value $	Year	Tons	Value $
1936-65	174,585	247,886	1968	8,878	30,126
1966	5,014	10,261	1969	22,003	93,181
1967	8,557	23,360	1970	35,006	157,306
			Total	254,103	562,120

F. R. and C. M. Lazenby, South Arm

A total of 6,232 tons of silica sand, valued at $12,464, was produced for the manufacture of glass.

Industrial Sands Pty Ltd, Eagle Point

This company continued to refine silica sands for various industrial purposes, producing 28,783 tons of sands in various grades and sizings valued at $143,915. An average of eleven men were employed.

An additional bay 19 feet wide was built onto the side of the original building in order to provide additional dry storage space for treated sands. Additional elevating and screening plant was installed and the sand barges modified for river or pit use.

Mineral Supplies, Ulverstone

This firm supplied 51 tons of silica, valued at $927.

The Mount Lyell Mining and Railway Company Limited, Queenstown

This company, reviewed under Copper, quarried 1,314 tons of silica, valued at $4,599, for use as a flux.

3.—Construction Materials

BUILDING STONE

BUILDING STONE: QUANTITY AND VALUE OF PRODUCTION

Stone	Cubic yards	Value $
Freestone	1,444	24,911
Other	640	1,920
Total	2,084	26,831

Etna Stone Pty Ltd, Pontville

Two hundred and forty cubic yards of freestone were produced.

CRUSHED AND BROKEN STONE

Basalt

BASALT: PRODUCERS, QUANTITY AND VALUE OF PRODUCTION

Quarry	*Men*	*Cubic yards*	*Value* $
A.F.H., Surrey Hills	2	11,223	33,669
A.N.M., Maydena	4	25,020	75,060
Bonney Bros, Mooreville	7	60,400	181,200
Hobart Quarries, Bridgewater	7	94,657	283,971
R. Jones, Round Hill	2	5,575	16,725
G. J. Weily, Bridgewater	3	6,320	18,950
Others	2	9,924	29,772
Total	27	213,119	639,357

Dolerite

DOLERITE: PRODUCERS, QUANTITY AND VALUE OF PRODUCTION

Quarry	*Men*	*Cubic yards*	*Value* $
C. Bain & Son (Stantons), Dynnyrne	2	40,000	120,000
Devon Metal Supplies, Devonport	15	35,796	107,388
Electrolytic Zinc Co., Risdon	1	12,458	37,374
Forestry Commission	NR*	9,852	29,556
Glenorchy Quarries, Glenorchy	4	29,585	88,755
Hobart Quarries, New Town	34	271,896	815,688
Hydro-Electric Commission, Mersey-Forth	4	60,000	180,000
Launceston Blue Metals, St Leonards	2	2,028	6,084
Launceston Quarries, Mowbray	14	80,081	240,243
Pioneer Quarries, Flagstaff Gully	9	75,182	225,546
Public Works Department	NR*	89,000	267,000
Talisker Blue Metals, Relbia	2	23,058	69,174
Others	7	16,676	33,643
Total	94	745,612	2,250,451

* See Gravel

Hobart Quarries Pty Ltd, Flagstaff Gully

A total of 94,657 cubic yards, valued at $283,971, was produced.

Limestone

LIMESTONE: PRODUCERS, QUANTITY AND VALUE OF PRODUCTION

Quarry	*Men*	*Cubic yards*	*Value* $
Weily, G. J., Glenorchy	7	31,201	93,603

Sandstone

SANDSTONE: PRODUCERS, QUANTITY AND VALUE OF PRODUCTION

Quarry	*Men*	*Cubic yards*	*Value* $
Etna Stone Pty Ltd, Pontville	....*	30	250

* See Freestone

Other Stone

OTHER STONE: PRODUCERS, QUANTITY AND VALUE OF PRODUCTION

Quarry	*Men*	*Cubic yards*	*Value* $
Bain & Son (Stantons), Dynnyrne*	NR†	60,000	180,000
Cleveland Tin N.L., Luina	NR‡	38,089	114,267
Hobden, L., Pty Ltd, Rokeby	2	13,492	40,476
Hydro-Electric Commission, Tarraleah	5	14,763	55,327
Hydro-Electric Commission, Strathgordon	13	56,372	184,938
King Island Scheelite	NR§	30,135	90,405
Renison Ltd, Zeehan	NR‡	67,000	201,000
Transport Commission, Launceston	3	10,352	31,056
Others	1	26,921	80,763
Total	24	317,124	978,232

* New producer
† See Dolerite
‡ See Tin
§ See Tungsten (Scheelite)

GRAVEL

GRAVEL: PRODUCERS, QUANTITY AND VALUE OF PRODUCTION

Pit	*Men*	*Cubic yards*	*Value* $
Associated Forest Holdings	6	87,099	87,099
Beaconsfield Council	2	21,172	21,172
Bonney Bros, Mooreville	3	19,550	39,100
Broken Hill Pty Co. Ltd	4	36,783	73,566
Brighton Council	4	13,534	13,534
Circular Head Council	2	19,513	19,513
Deloraine Council	2	19,905	19,905
Devonport Council	2	62,066	62,066
Esperance Council	1	16,707	16,707
Evandale Council	1	13,915	45,765
Fielding, Flowerdale	11	48,964	69,208
Fingal Council	2	20,642	20,642
Flinders Island Council	2	30,577	30,577
Forestry Commission	17	83,939	83,939
George Town Council	2	18,134	18,134
Green Ponds Council	NR	12,245	12,245
Hamilton Council	3	15,539	15,539
Hobart Quarries	NR*	14,823	15,742
Huon Council	2	30,495	30,495
Johnstone, Cambridge	2	38,117	38,117
King Pty Ltd, Devonport	8	12,089	25,464
Lilydale Council	2	15,256	26,697
New Norfolk Council	1	12,914	12,914
Oatlands Council	2	25,515	25,515
Pioneer Quarries, Mersey Lea	4	84,962	128,976
Portland Council	6	19,168	19,168
Public Works Department	140	200,000	200,000
Richmond Council	NR	25,733	25,733
Ringarooma Council	2	15,300	15,300
Scottsdale Council	2	12,000	17,000
Ulverstone Council	2	23,633	23,633
Westbury Council	1	18,329	18,239
Woodfield & French	30	73,611	115,073
Others	44	165,242	197,278
Total	312	1,327,471	1,584,145

* See Crushed and Broken Stone (Dolerite)

SAND

SAND: PRODUCERS, QUANTITY AND VALUE OF PRODUCTION

Pit	*Men*	*Cubic yards*	*Value* $
Bonney Bros, Calder	3	25,400	50,800
Devonport Marine Board	1	60,000	60,000
Fielding, Calder	2	6,810	8,785
Grubb, Sandford	1	7,897	7,897
Harrison, South Arm*	2	12,050	12,050
Hydro-Electric Commission, Strathgordon	NR	6,105	13,257
Kenney, Kelso	1	9,506	14,168
Long, South Arm	5	56,871	85,305
Lutwyche, Prospect Vale	NR	2,500	6,800
Males, South Arm	2	11,726	27,146
Pioneer, Mersey Lea	††	10,800	10,800
Turmine, Perth	NR	3,429	3,868
Woodfield & French	1	4,849	9,440
Others	5	16,520	25,946
Total	23	234,463	336,262

* New producer
† See Gravel

OTHER ROAD MAKING MATERIAL

OTHER ROAD MAKING MATERIAL: PRODUCERS, QUANTITY AND VALUE OF PRODUCTION

Pit	*Men*	*Cubic yards*	*Value* $
Cleveland Tin, Luina	***	5,083	5,083
Fielding, Ulverstone	1	3,674	4,419
Hydro-Electric Commission, Forth	12	218,433	218,433
Hydro-Electric Commission, Tarraleah	NR	4,085	11,158
Jones, Round Hill	NR	10,010	10,010
King, Devonport	1	57,373	59,003
Mt Lyell Co., Queenstown	1	23,012	51,908
Queenstown Council	1	3,000	4,500
Renison Ltd, Zeehan	***	8,000	8,000
Savage River Mines	††	12,792	25,584
Woodfield & French	‡‡	24,986	28,260
Zeehan Council	3	8,440	8,440
Others	2	9,328	11,624
Total	21	388,216	446,422

* See Tin
† See Iron Ore
‡ See Gravel

4.—Fuel Minerals

COAL

COAL: QUANTITY AND VALUE OF PRODUCTION

Year	*Tons*	*Value* $	*Year*	*Tons*	*Value* $
Prior to 1966	9,326,794	23,897,472	1968	90,903	411,642
1966	82,664	353,238	1969	115,933	519,373
1967	76,541	324,553	1970	124,499	617,565
			Total	9,817,361	26,123,843

W. R. Tindal, Mining Engineer, Hobart, reports that there has been an increase in production of 8,566 tons. The number of employees decreased from fifty-nine to fifty-eight, of whom thirty-two were employed underground. The production per man year increased from 3,410 to 3,891 tons for underground employees and from 1,965 to 2,147 overall.

Duncan Coal Mine, Fingal

Production for the whole of the year was obtained from an adjoining abandoned coal mine (Fingal Coal Mine). The main adit has been rehabilitated for almost its full length. Whilst this was in progress production was obtained from an area of the Duncan Coal Mine called the Burma Section which consisted of pillar previously isolated by a creek. All of the pillars were recovered and whilst this was being done the Main adit of the old Fingal Coal Mine was retimbered, a conveyor belt laid to 35 bord and a cross cut through pillars on the right-hand side to virgin coal. A conveyor was laid along the slant to enable production to start immediately in this area when the extraction of pillars in the Burma Section of the Duncan Coal Mine was completed.

Development of coal from the slant has indicated a substantial area of thick coal in an area in which the coal was supposed to be thinning out.

The continuous miner has continued to function satisfactorily and physical conditions under this method seem to be better than in previous areas.

Production from the Duncan and Fingal mines was 111,806 tons, an increase of 11,249 tons with a complement of forty-nine employees giving an increased overall production per man year, from 2,011 to 2,282 tons.

New Stanhope Coal Mine, Avoca

As previously reported the area is very complex and production in virgin coal was finally stopped due to faulting and disturbances on all sides.

A slant was driven in an attempt to locate the faulted member but without success and diamond drilling failed to intersect the coal seam.

Extraction of pillars has begun on the left-hand side of No. 2 tunnel and was still in progress at the end of the year.

Production was 11,389 tons, a decrease of 2,188 tons, with an overall production per man year of 1,627 tons, a decrease of 312. The average number of employees was seven.

Sandfly Coal Mine, Kaoota

Coal from this mine is semi-anthracitic and is used for household purposes and in lime production. Extraction of pillars continued till the end of September when a fall in the main tunnel caused complete and final cessation of work in the mine.

A new tunnel was driven further and encountered a large downthrow fault and resulted in this tunnel being abandoned.

Another tunnel was started after a lot of shallow bore holes were sunk on what appears to be the downthrow side of the fault which caused the abandonment of the previous new tunnel.

Production for the nine months was 1,304 tons as against 1,292 for the nine months of the previous year but a drop of 495 tons for the full year.

Two men are employed at the mine.

5.—Foreign Ores

The total value of the metallurgical products of four large works treating foreign ores imported into Tasmania was approximately $96,507,223.

ALUMINIUM

Comalco Aluminium (Bell Bay) Ltd, Bell Bay

Operations by this company showed an increase of 2,061 tons of aluminium over the previous year.

Other products were: aluminium hydrates, 6,347 tons; and alumina, 3,876 tons.

In all 73,368 tons of aluminium were extracted from 146,107 tons of bauxite from Weipa and 84,295 tons of imported alumina. Average employment was 1,202.

Work on the installation of the second half of the No. 3 Pot line was well ahead of schedule and was ready for a trial run at the close of operations on 31 December.

FERRO-MANGANESE

Tasmanian Electro-Metallurgical Co. Pty Ltd, Bell Bay

During the year 109,692 tons of manganese ore from Groote Eylandt was smelted to produce 62,190 tons of manganese alloys for the steel industry.

The alloys were 35,169 tons of high carbon ferro-manganese and 27,021 tons of silicon-manganese reported under Silicon.

TITANIUM DIOXIDE

Australian Titan Products Pty Ltd, Heybridge

This company continued with the production of titanium dioxide pigment, from ilmenite imported from Western Australia.

The company increased its capital expenditure to $304,552 for the year, the amount being spent mainly on building extensions for change rooms and storage and the replacement of tanks and other equipment.

The sludge retaining dam, completed during the year, has helped to further reduce the discolouration of the sea in the vicinity of the plant which was principally due to the release of iron-bearing liquors down the old 18-inch inshore pipeline. The sludge dam removes the insolubles from the effluent which is now controlled to 5 ppm iron content by continuous monitoring.

While work continues on improving the internal drainage system, considerable study is being carried out on sea currents, surveys of the sea bed and sampling of the sea and adjacent rivers.

Pollution problems both within and without the plant have been given considerable attention. Dust extraction equipment is now in operation throughout the plant, although the pigment milling and product packing sections still require some work. Emissions from the three calciner kilns are passed to wash towers and then to three electrostatic precipitators. These latter previously had oil seals which were found to constitute a fire hazard; these have been replaced by air seals. Intermittent fall-out from the digester reactions remains a problem and this is now being studied with a view to gas scrubbing while continuous sampling of fall-out at fourteen locations around the plant enables the determination of the nature and extent of the total atmospheric fall-out from the company's operations.

The company continues to have a good accident record. There were only minor accidents and five accident-free months in the year. One shift has spoiled its long-standing record by having its first lost-time injury in eleven years. An audiometer screening of all employees was completed during the year.

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.M.Aust.I.M.M.

Throughout most of the year the Branch continued to encounter considerable difficulty in coping with the normal flow of work due to the shortage of professional staff. Additional demands upon the Branch due to the continuing mineral and exploration activities by private companies together with the necessity of initiating geological studies on landslip problems throughout the State compounded an already difficult situation. However, during the latter portion of the year two geologists were recruited for duties with the Groundwater and Engineering Geology Section and this eased the situation in those fields somewhat. A serious shortage of geologists for Regional Mapping and Economic Geology still persisted at the end of the year and it does not appear likely that the staff position can be fully restored in the immediate future.

The accommodation for the Geological Survey Branch is still unsatisfactory, particularly as the Branch is split between two buildings, neither of which offers accommodation of a suitable standard. Plans have been made for the whole Branch to be accommodated in the main Mines Department building during the coming year but no solution is in sight for upgrading the accommodation to an acceptable standard.

The Regional Mapping Section suffered most from the stortage of geologists during the year, another geologist resigned to take up a position in industry but one experienced and one junior geologist were recruited. Thus although the Section achieved a net gain of one geologist, a serious shortage of suitably qualified staff for this Section still remained at the end of the year. Under the difficult circumstances which prevailed the Section continued with the systematic geological mapping of the State, although naturally at a lower rate than is desirable.

The Engineering Geology and Groundwater Section was able to maintain its programme of systematic assessment of the groundwater resources of the State and provided geological advice on various engineering projects. Towards the end of the year it was possible to commence a systematic study of landslides in the Tamar Valley. This is a very important project and one which it had been hoped to initiate some years ago. The study of landslides, particularly their effect in and around urban areas, seems likely to become a continuing and important aspect of the work of the Branch for many years to come.

The Economic Geology Section has again been over-extended due to the demands for information and data by exploration companies and shortage of staff. Nevertheless the Section has continued to supply data, record and assess incoming company reports and carry out basic programmes of research into the problems of the genesis of Tasmanian ore deposits. In this connection an important programme of study of the granitic rocks of the NE Tasmania was commenced and the regional phase of this study was almost completed by the end of the year. A full understanding of the chemistry, structure and distribution of these rocks will enable the exploration for further tin deposits to be conducted on a proper scientific basis.

Geologist D. Leaman received his Doctor of Philosophy degree during the year and resumed full-time duties with the Branch. His doctoral thesis on the determination of the shape of dolerite intrusions in the Hobart area by means of geological and gravity surveys is a very important contribution to the understanding of this complex matter.

Once again it has been a difficult year for the Geological Survey Branch. Shortages of staff, accommodation problems and the continuation of the mineral exploration boom have all provided strains on staff members. It is to the credit of the officers of this Branch that despite these pressures, worthwhile progress has been made in all fields of geological study and additional basic research has been carried out so that the understanding of the geology of the State has advanced considerably.

REGIONAL GEOLOGY

Supervising Geologist E. Williams reports—

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

The explanatory report for the Pipers River 1-mile Sheet was published. The report for Table Cape is in press. The report for Quamby has been compiled and those for Burnie, Mackintosh, Beaconsfield and Hobart 1-mile sheets are being prepared.

Quamby 1-mile Sheet has been published.

Beaconsfield 1-mile Sheet is in press.

Hobart 1-mile Sheet is in press.

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

Brighton 1-mile Sheet: Geologist D. Leaman continued mapping in this area.

Scottsdale 1-mile Sheet: Senior Geologist W. R. Moore continued a groundwater survey.

Kingborough 1-mile Sheet: Geologist N. Farmer commenced mapping in this area.

Mapping was suspended in the Strahan 1-mile Sheet due to staff shortages.

ECONOMIC GEOLOGY

Supervising Geologist A. J. Noldart reports—

The following studies were carried out during the year:—

METALLIC DEPOSITS

(*a*) Investigations continued on detrital tin deposits in the north-eastern districts generally.

(*b*) Further examinations of detrital tin deposits in the Mt Stronach east area with advice to prospecting parties.

(*c*) Continuation of the investigation of granitic rocks and associated mineralisation in the eastern and north-eastern districts and completion of oxidation studies in the Orieco Mine. Preparation of reports in association with personnel of the University of Tasmania.

(*d*) Further examination of detrital chromite deposits, Montagu Swamp area on behalf of Quest Exploration Pty Ltd.

(*e*) Examination of antimony deposits, Bathurst Harbour and detrital tin deposits Melaleuca Inlet and Cox Bight.

(*f*) Commencement of a detailed examination of the detrital mineral potential of the Cape Naturaliste-Eddystone Point-Mt William area.

(*g*) General advice to prospectors and examination of the mineral potential of areas under application for purchase from the Crown.

(*h*) Continuation of exploratory diamond drilling at Fooks Lode, Waratah, and St Pauls tin prospect, Royal George.

(*i*) Completion of first phase of drilling in the Alberton goldfield and of a two-hole programme for lateritic nickel profiles beneath Permian cover at Andersons Creek.

(*j*) Commencement of a drilling programme on the Salisbury Goldfield, Beaconsfield.

(*k*) Examination of black sand deposits at Dodges Ferry.

FUEL MINERALS

(*a*) Continuation of exploratory diamond drilling for coal in the Fingal Valley.

(*b*) Continuing mapping and studies of the New Stanhope and Duncan coal mines and completion of roof structure studies in the 'Cat' and 'Kitten' coal mines, Fingal.

(*c*) Exploratory diamond drilling at the Sandfly mine, Kaoota and examinations of new mine opening.

NON-METALLIC MINERALS

(*a*) Continuation of studies of clay resources of the Longford, Launceston and Hobart areas.

(*b*) Continuation of exploration for kaolin resources in north-eastern Tasmania.

(*c*) Commencement of a regional study of construction materials in the Launceston and Hobart zones.

(*d*) Investigation of construction materials for the Kingborough and Sorell municipalities, stone leases at Forcett, proposed dolerite quarry at Chigwell.

(*e*) General advice as requested to extractive industries throughout Tasmania.

SURVEYING

(*a*) Surveying and levelling of diamond drill holes at Andersons Creek, Beaconsfield, in the Mt Nicholas and Valley mine areas, Fingal, and at the Sandfly coal mine, Kaoota.

(*b*) Continuation of mine level surveying in the Duncan and New Stanhope coal mines.

(*c*) Surveying and levelling at the Sandfly coal mine, Kaoota.

(*d*) Diamond drill hole orientation surveys Oonah mine, Zeehan, on behalf of Minops Pty Ltd, and for Departmental drilling generally.

(*e*) Levelling and correlation of coal outcrop Mt Nicholas-Cornwall area.

(*f*) Siting and levelling of seismic traverses in the following localities: Kingston-North West Bay dam sites, Castle Forbes Bay and Kermandie River dam sites, Rokeby by-pass road, Southern outlet road and Matriculation College, Launceston.

GENERAL

(*a*) Completion of percussion drilling programme Lower Boobyalla River area commenced during 1969.

(*b*) Sampling of granites on Flinders Island, Maria Island and South West Cape for age determination and correlation with other granite masses.

(*c*) Investigation of the structure of the granitic rocks of the Little Mt Horror area.

(*d*) Investigation of the geology of the coastline between the Boobyalla and Tomahawk Rivers.

(*e*) Close liaison continued with active mineral exploration companies throughout Tasmania and examinations made of any significant mineralogical or geological developments.

(*f*) The Chief Geologist, I. B. Jennings and Supervising Geologist, A. J. Noldart attended a Symposium on Archean Geology held in Perth, Western Australia and later examined nickel occurrences and nickeliferous rock suites in the Kalgoorlie-Norseman area.

ENGINEERING GEOLOGY AND GROUNDWATER

Supervising Geologist P. C. Stevenson reports—

At the beginning of the year the staff of the Section consisted of a Supervising Geologist, a Senior Geologist and a Geologist, but in March Dr D. E. Leaman returned to the Section from the University of Tasmania. S. Elmer joined the Section in October and B. Abtmeier in December. During the year M. J. Jordan acted as a Junior Geologist.

ENGINEERING GEOLOGY

Dam site investigations at various stages have provided about 35% of the work of the Section Preliminary mapping has been completed at eight sites and geophysical surveys (mostly seismic) at eleven sites. Drilling has been supervised at Pipers River No. 10, Kempton, Craigbourne, Deep Creek, Nunamara and Kingston dam sites and reports have been written at each stage for each site.

Foundation studies for two schools at Rosny and Newnham have required geophysical surveys, drill supervision and reporting.

Landslips are claiming more attention. Slips have been examined at George Town, Garden Grove, Launceston, Comalco, Devonport, Burnie, Beauty Point and Upper Plenty and a geologist is now working full time on the landslip problems of the Tamar Valley.

Apart from specific engineering investigations, geophysical work of a more general nature has been done on buried Tertiary channels at Scottsdale, Hopes Beach, Kingston and Moriarty, electric bore logging at Fingal and Longford and on gravity surveys covering large areas in the Kingborough quadrangle, the north-east and the Tamar areas. Interpretation methods have been improved, but additional computing facilities are required for further advances. These methods have necessitated a mathematics revision course which has been conducted within the section.

In the field of general engineering geology, a quarry site on the Southern Outlet Road has been examined and reported on, and cemetery sites have been investigated for the Southern Metropolitan Master Planning Authority, A new and significant venture has been the compilation of an Engineering Geology Map for the Hobart area, which it is hoped to publish in limited edition in the near future. A report has been prepared on the results of mapping and seismic survey on the Bellerive by-pass.

GROUNDWATER

The major groundwater exploration projects in the Longford Basin and in the Scottsdale-Bridport area have continued during the year. Longford has occupied twenty-four geologist-weeks including eight weeks office work. This work is expected to be completed during 1971. The Scottsdale work has occupied fourteen field weeks and seven office weeks, and has consisted largely of geophysical surveys aimed at delineating the basement features of the basin. Fourteen boreholes have been sunk, but due to development difficulties new boreholes have been deferred until plant and techniques in present use at Longford can be employed. Meanwhile pump testing is being continued with the existing holes but has shown only moderate yields so far.

The coastal sand aquifer programme which was in abeyance due to lack of staff has been continued on a limited scale, two field weeks being completed in the past year involving spear-bore trials.

The geological mapping which form the basis of groundwater work has continued in the Brighton area and has begun in the Oatlands area. The Coal River Basin Underground Water Supply Paper has been edited for publication and a borehole commenced at Glenorchy has provided data on the structure, rock types and hydrology of the area: this bore is still in progress.

Smaller projects on groundwater have included a water survey at Gellibrand Point, siting a bore at Alonnah School on Bruny Island, an unsucessful investigation for water at Dunalley School and advice on too abundant groundwater at a new housing estate at Prospect Vale. Bores were also sited for farm properties including three high-yielding bores at Sorell, Campbell Town and in the Huon, drilled by a private contractor using down-hole-hammer equipment.

Two geologists attended a successful Groundwater School at Adelaide and work has continued on the Groundwater Map of Australia under the aegis of the Water Resources Council. Compilation is also proceeding on the Groundwater Map of Tasmania which is intended as a guide to the groundwater potential of the State.

MAPPING AND ENGINEERING DRAUGHTING SECTION

Senior Draughtsman T. J. Walsh reports—

Despite the shortage of staff during the latter half of the year, owing to resignations, good progress was achieved in all fields of draughting.

Geological Atlas—1-mile Series:—

Quamby Sheet No. 46: Printed in twelve colours.

Beaconsfield Sheet No. 30: Fair drawn, proof checked and expected to be printed early in 1971.

Hobart Sheet No. 82: Fair drawing proceeding.

Two multi-colour maps 'Geology of the Coal River Basin' and 'Hydrology of the Coal River Basin' were completed, proof checked, and will be printed early in 1971.

Two multi-colour maps 'Gravity Survey—Tertiary Basins—Northern Tasmania' showing Residual Bouguer Anomaly contours have had the base information amended, and fair drawing is proceeding on these two maps.

A multi-colour map at the scale of 2 miles to 1 inch 'Geology of the Blue Tier Batholith' showing seventeen types of Devonian granite rocks was commenced.

Twelve figures were drawn for Geological Survey Bulletin 53.

Three graphs and three diagrams were drawn for the Director of Mines Report (1969).

Thirty monocolour maps were prepared for Technical Reports No. 14.

Fifty-four monocolour maps were prepared for Technical Reports No. 15.

Five graphs and seven diagrams were prepared for the Chemical and Metallurgical Branch.

The balance of time was used in drawing seventy-four geophysical, geological, palaentological and engineering plans and diagrams related to normal field services.

A conference of Chief Draughtsmen of State Geological Surveys and of the Bureau of Mineral Resources was attended by former Senior Draughtsman P. B. Nankivell, in Sydney. The conference dealt with techniques, technical data, and problems related to geological cartography.

MINERALOGY AND PETROLOGY

Mineralogist and Petrologist G. Everard reports—

Petrological descriptions were made of extensive suites of rocks collected by Field Geologists at Boobyalla and Cressy, and of bore core from D.D.H. No. 6 Fingal. Various other rocks collected at Mt Arrowsmith, Bicheno, Port Davey, Bell Hill mine, Forest River, Longford district and Beaconsfield were also examined in thin section.

Microscopic examinations were made of detrital material collected at The Gardens, and of various clays from East Devonport and Nunamara. Stone from Pioneer quarries and carborundum wheel cuttings from the Etna Stone Company was examined in thin section. Core from Bore No. 2, Texin Company, South Mount Cameron was examined for mineral content.

Renewed interest in prospecting resulted in a continuing increase in the number of specimens received from the general public, and over 100 written reports were made of a variety of materials including rock and mineral specimens, sands, gravels, clays and soils.

The Departmental rock and mineral collection was increased by the addition of about 270 specimens during the year.

PALAEONTOLOGY

Palaeontologist M. J. Clarke reports—

Good progress has been maintained in the field of Permian biostratigraphy. The principal areas of investigation during the year have been Maria Island, the Beaconsfield-Port Sorell area, Western Bluff and Mersey Great Bend, Latrobe. In addition, collections have been made from certain critical horizons at Arcadian Siding, Maydena and Mt Nassau, Granton. A formal zonal scheme is in the preliminary stages of compilation. This scheme promises a more precise faunal subdivision of the Tasmanian (and hence the entire eastern Australian) Permian sequence than those schemes currently established in Queensland and New South Wales.

The discovery of diagnostic brachiopod faunas very high in the Permian sequence on Maria Island and at Flowerpot Point, Blackmans Bay is of the utmost importance in so far that it clarifies what are currently strongly debated correlations between eastern Australia and New Zealand.

Exceptionally well-preserved material from the Port Sorell area provides the first conclusive proof of the neospiriferid growth position, and also new evidence of the mechanism responsible for the very frequent post-mortem asymmetrical distortion of Tasmanian Permian fossils.

The stratigraphy and systematic description of Permian fossils from the Friendly Beaches area, Coles Bay is in the final stages of preparation for publication.

At the request of the Hydro-Electric Commission, visits to the Gordon above the Olga dam site were made in March and April of this year. Palaeontological advice based on surface collections was provided, and has continued throughout the year on faunal material obtained from a number of diamond drill hole cores and other surface material.

Fossil material for practical classes in Higher School Certificate (Geology) has been provided where possible.

GEOCHEMISTRY

Geochemist W. E. Baker reports—

Approximately 3,000 element analyses were completed during the year covering such metals as copper, lead, zinc, nickel, cobalt, iron, manganese and barium in soil, vegetation and mineral samples.

Geophysical follow-up of the geochemical anomaly at Oliver Hill gave positive results but drilling has not yet been undertaken.

Geochemical survey work in the vicinity of the old Barrington copper mine was completed. The results, which will be detailed in Technical Reports No. 16, gave no indication of lode material throughout the area studied.

A soil sampling programme in the vicinity of the barite workings near Beulah was commenced in December.

About 200 samples of wolframite from various localities were analysed for iron and manganese in conjunction with D. I. Groves. The iron : manganese ratios do not appear to be strictly temperature-dependent and details of this study will be published later.

A project to investigate the effect of humic acids on metal migration was commenced. The results obtained to date indicate that the activity of these acids in the degradation of economic minerals is substantial in many cases.

Laboratory facilities remain very restricted and the situation regards the use of organic solvents remains the same as in 1969. Plans are being drawn up by the Department of Public Works to ease this problem until a complete relocation of geological services can be undertaken. It is hoped that these modifications will be installed during 1971.

LIBRARY

Librarian H. Mulder resigned at the close of the year and no new appointment has yet been made to this position.

Prior to Mr Mulder's appointment in February 1969 the library had been cared for on a part-time basis by unqualified staff for a number of years, and was therefore in a run-down condition. During his term of office Mr Mulder commenced a reorganisation of the library systems and a systematic indexing of all Departmental literature. Due to severe limitations imposed by space and a general uncertainty regarding the ultimate position of the library, a good deal of reorganisation still remains to be done. This position appears likely to remain for the next few years until more definite plans for the general accommodation of the Department are formulated.

The indexing work has progressed well and at the end of the year some 35,000 cards had been prepared and a backlog of indexing awaiting the typing of cards remains. A number of new books were added to the Departmental collection together with a large volume of material received on exchange for Departmental publications. In addition to the above the library provided service for Departmental officers and was very much occupied in providing material to students and personnel from exploration companies engaged or intending to engage, in mineral exploration in the State.

PUBLICATIONS

Publications Officer E. L. Martin reports—

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

Geological Survey Record No. 9. Catalogue of the minerals of Tasmania.

Geological Survey Record No. 10. Tasmanian Strophalosiidae.

Geological Survey Report No. 11. The metamorphic and structural sequences in the Precambrian of the Cradle Mountain area.

The following publications were prepared for printing and lodged with the Government Printer:—

Geological Survey Explanatory Report. Table Cape.

Technical Reports No. 14, 1969.

Bulletin 51. Gravity survey of the Tertiary basins in northern Tasmania.

NON-DEPARTMENTAL PUBLICATIONS

The following articles by members of the Geological Survey Staff* were published during the year:—

CLARKE, M. J.* 1970. A new Permian strophalosiid brachiopod genus from eastern Australia. *J. Paleont.* 44: 986-987.

FORD, R. J., GROVES, D. I.*, KLOMÍNSKÝ, J. 1970. Oxidation at the Orieco copper mine, eastern Tasmania. *Proc. australas. Inst. Min. Metall.* 235: 87-92.

GROVES, D. I.*, SOLOMON, M., RAFTER, T. A. 1970. Sulfur isotope fractionation and fluid inclusion studies at the Rex Hill mine, Tasmania. *Econ. Geol.* 65: 459-469.

KLOMÍNSKÝ, J., GROVES, D. I.* 1970. The contrast in granitic rock types associated with tin and gold mineralization. *Proc. australas. Inst. Min. Metall.* 234: 71-77.

WILLIAMS, E.* 1970. Kink-bands developed during the folding of sandstone layers at Stony Head, north Tasmania. *Tectonophysics* 10: 437-457.

CHEMICAL AND METALLURGICAL BRANCH

Report of the Chief Chemist and Metallurgist, H. K. Wellington, B.E., F.S.A.S.M., A.M.Aust.I.M.M.

TYPE AND NUMBER OF TESTS

Type of Test	*Number*		*Type of Test*	*Number*	
I. QUANTITATIVE—			Zirconium	55	
Elements—					4,743
Aluminium	37		Miscellaneous—		
Antimony	42		Ash (coals)	47	
Arsenic	70		Calorific value	10	
Barium	19		Coal (moisture, ash, volatiles)	174	
Beryllium	1		Deposit Gauge Tests	219	
Bismuth	33		Ignition loss	103	
Cadmium	9		Insoluble (acid)	74	
Calcium	158				
Carbon (including 10 for CO_2)	31		Moisture	6	
Chlorine	2		Radicals and Complexes	19	
Chromium	7		Water (complete analysis)	66	
Cobalt	39		Water (limited examination)	50	
Copper	361				768
Fluorine	1				5,511
Gold	196		II. QUALITATIVE		98
Iron (including 213 acid soluble)	405		III. CERAMIC—		
Lead	279		Fusion Points	221	
Magnesium	96		Miscellaneous	552	
Manganese	31				773
Molybdenum	72		IV. METALLURGICAL—		
Nickel	55		Crushing and grinding	6	
Niobium	5		Density	3	
Phosphorus	78		Flotation	60	
Platinum	4		Hardness (Mohr)	1	
Potassium	1		Heating	2	
Silicon (including silica)	52		Heavy Liquid Separation	322	
Silver	209		Magnetic Separation	191	
Sodium	8		pH	11	
Sulphur (including sulphuric acid and sulphate)	81		Sizing (including sedimentation)	561	
Tantalum	5		Tabling	46	
Tin (including 77 soluble tin)	1,526		Weathering	2	
Titanium	134				1,205
Tungsten	274				
Vanadium	54		Total		7,587
Zinc	313				

NOTE: Since 1967 there has been a marked change in the supply of samples to this laboratory. Before 1967 State Government sources, excluding this laboratory, supplied about 10%; since then 30% of the samples for testing. Prior to 1967 there were a few companies who supplied a steady stream of samples for quite long periods of say a year or more but since then there have been many suppliers, generally with most samples coming in over a short period of say three months.

RESEARCH INVESTIGATIONS

Tin	5	Non-metallics	1
Tungsten	4	Ceramics	3
Copper, lead, zinc	1	Pollution	2
Antimony	1		
		Total	17

SUMMARY OF INVESTIGATIONS

Tin

R.602—Ardlethan Tin N.L. (Ardlethan, N.S.W.)

Samples from the present mill feed, the White crystal ore body and the newly-discovered Western Mineralisation area were submitted for comparative tests to determine any differences between these ores and current mill feed in concentration, and grindability. All samples behaved similarly.

R.606—Cleveland Tin N.L., Luina

A sample of rougher vanner tailing was submitted from the company's mill to see if the Jones High Intensity Magnetic Separator would remove siderite from this material. The siderite, which behaves similarly to cassiterite in tin flotation, would have to be removed from the product to allow successful tin concentration by flotation. Tests showed about half the siderite could be removed.

R.608—Tyree Holdings, Razorback Mine, Dundas

Two samples, one current mill tailings, the other oxidised ore were submitted for examination. About half the tin in the tailings was shown to be recoverable by carefully sizing the table feed. With the oxidised ore fine grinding and careful sizing were necessary to liberate and concentrate the tin.

R.610—I. W. Andrews, Branxholm

A tin middling sample was submitted for examination of the diluent minerals which were found to be spinel, zircon and quartz. By screening alone a 50% Sn concentrate containing 72% of the tin was made.

R.615—S. J. Kerrison, Penny Farthing Mine, Mt Stronach

A sample of heavy mineral middling was submitted for examination. The only economic mineral was cassiterite (11% Sn head), the rest being mostly ilmenite.

Tungsten

R.595—King Island Scheelite (1947) Ltd, Grassy

A literature survey on the removal of molybdenum from scheelite concentrates was made.

Some autoclaving tests were made along the lines that appeared most suitable from the literature.

R.607—King Island Scheelite (1947) Ltd, Grassy

The flotation of sulphides from a sample of vanner tailings was shown to be possible using Vantoc CL and sulphuric acid as reagents.

However, a better approach was considered to be the flotation of such sulphides before the scheelite flotation in the mill.

R.613—Scamander Mining Corporation N.L., Scamander Tier Prospect

The wolframite could be readily concentrated from this sample in a product containing 86% of the tungsten and assaying 45% WO_3.

R.616—Scamander Mining Corporation N.L., Mt Pelion Wolfram Mine

Crushing to minus ¼ inch was found sufficient to liberate the wolfram from the quartz gangue. However the concentration of the small tin content may require fine grinding and a more complicated flowsheet.

Copper, Lead and Zinc

R.604—Minops Pty Ltd, Queensbury Mines, Zeehan

A small sample was cut from a 4-ton sample for preliminary metallurgical tests which showed that satisfactory recoveries of copper, lead and zinc could be obtained from this ore.

Antimony

R.619—C. Clayton, Port Davey

Tests showed that gravity concentration gave a low recovery (53%) and unacceptable concentrate grade (47% Sb). Flotation tests gave a 70% recovery at an acceptable grade (52% Sb).

Non-Metallics

R.614—L. H. McNeair, St Valentine's Peak

Flotation tests recovered 90% of the barytes in a 98% concentrate. Gravity concentration yielded 93% in a concentrate assaying 92% barytes.

Pollution

R.609—North-West Acid Pty Ltd, Burnie

Australian Titan Products Pty Ltd, Heybridge

Preliminary tests were made using laboratory-produced calcine and calcium arsenite to assess the effect of this material on sea water and sea water plus Titan effluent.

The change in pH when Titan effluent and sea water are mixed was also studied.

R.620—Aberfoyle Ltd, Aberfoyle and Storeys Creek Mine

Analysis and concentration tests were done on marmatite specimens from both mines to ascertain the Zn/Cd ratio for these metals. The ratios were:—

Aberfoyle mine	32 : 1
Storeys Creek mine	25 : 1

Ceramics

R.605—Survey of Brick Production in State

R.611—Humes Ltd, Vitrified Clay Division, Granton

The shrinkage of clay pipes was studied in relation to water content of the feed, firing temperature and the shale content of the feed.

R.617—Hobart Brick Co., New Town

The compressive strength given by testing single bricks, and stacks of two and three bricks were compared. The larger the stack tested the lower the compressive strength but also a lower coefficient of variation is obtained.

MINES AND EXPLOSIVES BRANCH

Report of the Deputy State Mining Engineer and Deputy Chief Inspector of Mines and Explosives, 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 was 10,773, an increase of 366. Of this increase, 167 occurred in underground employment reflecting the transition from open cut to underground mining at Mount Lyell and the expansion at Rosebery. The increase in underground employees was 14%.

ACCIDENTS

The number of registered accidents was 200 in which 196 men were injured and four killed. In calculation of the rates per thousand, 131 employee in the total of 10,773 were disregarded because their employers do not submit accident reports.

LOCATION OF ACCIDENTS

Section of the Industry	UNDERGROUND Number of Persons				SURFACE Number of Persons				TOTAL Number of Persons			
	Employed	Killed	Injured	% Injured	Employed	Killed	Injured	% Injured	Employed	Killed	Injured	% Injured
Coal	31	....	2	6.4	27	....	....	....	58	....	2	3.4
Copper	295	1	27	9.5	1,284	....	22	1.7	1,579	1	49	3.2
Iron	....	....	....	....	639	....	12	1.9	639	....	12	1.9
Silver-lead-zinc	487	....	22	4.5	516	....	2	0.4	1,003	....	24	2.4
Tin and tungsten	367	1	15	4.4	985	....	12	1.2	1,352	1	27	2.1
Quarries, works, prospection, etc	4	....	....	....	6,007	2	82	1.4	6,011	2	82	1.4
Total	1,184	2	66	5.7	9,458	2	130	1.4	10,642	4	195	1.9
Not reported	....	....	....	....	131	....	....	....	131			
	1,184				9,589				10,773			

DESCRIPTION OF FATAL AND SERIOUS ACCIDENTS

Fatal

W. J. Pearce, Mount Lyell Co.: Struck by falling rock.

J. Cairns, Renison Limited: Struck by falling stone.

B. G. Walker, Machens Brick Works: Dragged through brickmaking machine.

K. Johnstone, Weilys Quarry: Struck on head as a result of an explosion.

Serious

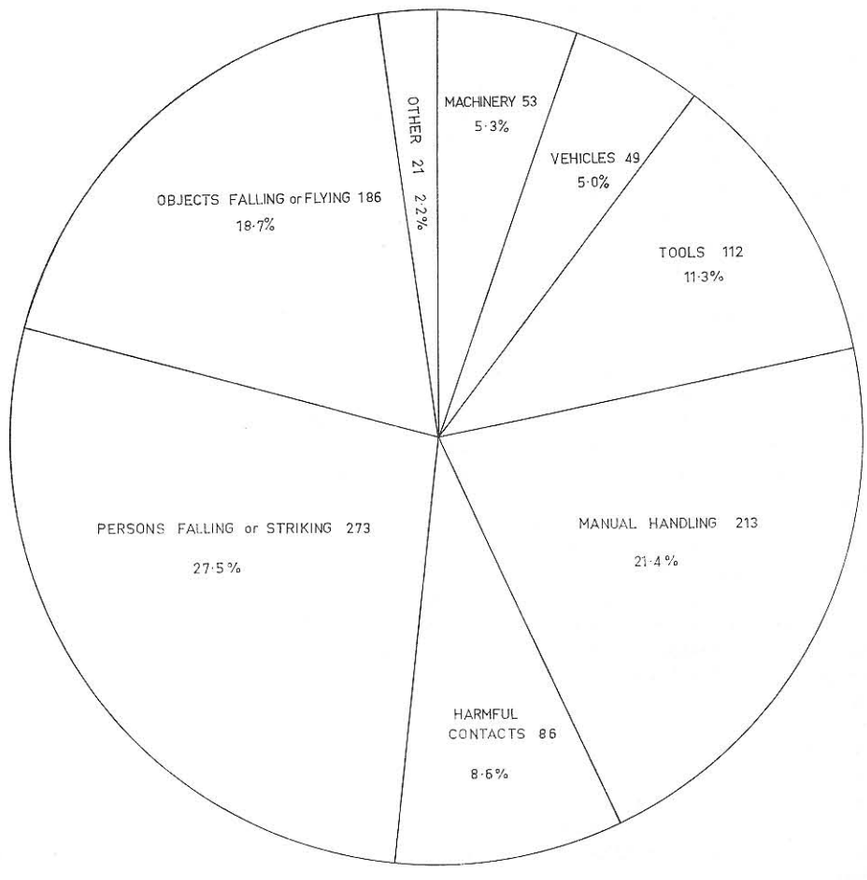
S. J. Henley, Mount Lyell Co.: Struck by fall of wall; broken leg.
A. Petty, Mount Lyell Co.: Slipped off roof; broken wrist.
G. J. Luke, Mount Lyell Co.: Struck by stone off wall; broken bone in hand.
M. R. Bell, Mount Lyell Co.: Slipped on rail and bogger ran over foot; broken bone in foot.
D. F. Wilson, Mount Lyell Co.: Struck by ventilation door; fractured shoulder.
K. D. Giles, Mount Lyell Co.: Hand caught between bogger and truck; cracked bone in hand.
G. B. Smith, Mount Lyell Co.: Slipped when stepping down from shovel; fractured foot.
V. Laduzko, Mount Lyell Co.: Struck by stones from a blast; loss of sight both eyes.
W. J. Lumsden, Mount Lyell Co.: Caught between truck and garage wall; fractured pelvis.
T. McDermott, Mount Lyell Co.: Slipped and caught foot in motor; fractured foot.
R. H. Jacobsen, Mount Lyell Co.: Dropped bar on foot; fractured toe.
W. J. Pryor, Mount Lyell Co.: Tripped by flailing air hose; fractured ankle.
C. A. Phillips, Mount Lyell Co.: Concussion from blast closed door onto hand; amputated middle finger.
G. Ball, Mount Lyell Co.: Crushed between trucks; amputated finger.
E. McConnell, Mount Lyell Co.: Foot caught under bogger; fractured foot.
M. C. Keygan, Mount Lyell Co.: Tripped over rope; fractured patella.
C. F. Legge, Mount Lyell Co.: Slipped off rock whilst boring; fractured ankle.
C. R. J. Perry, Mount Lyell Co.: Struck on hand by falling stone; fractured finger.
J. Vasi, Mount Lyell Co.: Hand jammed between drill and face; fractured thumb.
F. O. Tapmer, Electrolytic Zinc Co.: Fell from roof; fractured clavicles.
J. Hutt, Electrolytic Zinc Co.: Hit finger on mould; fractured finger.
R. Reckman, Electrolytic Zinc Co.: Thrown off scaffold; broken ribs.
D. A. Maple, Electrolytic Zinc Co.: Bar fell on finger; fractured finger.
P. Melnick, Electrolytic Zinc Co.: Finger jammed by drill; fractured finger.
J. McBride, Electrolytic Zinc Co.: Slipped and struck chest; fractured ribs.
J. McBride, Electrolytic Zinc Co.: Fell off scaffolding; fractured skull.
R. F. Taylor, Electrolytic Zinc Co.: Stubbed toe; fractured toe.
P. G. Raynor, Electrolytic Zinc Co.: Spindle fell on foot; fractured toe.
M. Smith, Electrolytic Zinc Co.: Ladder slipped; fractured wrist.
R. Hancock, Electrolytic Zinc Co.: Piece of timber jammed hand; fractured finger.
K. C. Brady, Electrolytic Zinc Co.: Zinc slab fell on foot; fractured toe.
J. Mansen, Electrolytic Zince Co.: Pushing truck jammed in points; fractured vertebrae.
G. T. Lockwood, Electrolytic Zinc Co.: Slab crushed finger; fractured finger.
A. F. Heaney, Electrolytic Zinc Co.: Stepped on asbestos sheet, covering crucible containing molten zinc, and sheet broke; burnt foot.
J. Rutledge, Electrolytic Zinc Co.: Fingers jammed in chute; fractured finger.
W. Jedral, Electrolytic Zinc Co.: Fellow employee fell on him; fractured leg.
M. Dennison, Electrolytic Zinc Co.: Jammed finger; fractured finger.
P. McDougall, Electrolytic Zinc Co.: Foot rolled on nail; broke bone in foot.
D. B. Chaffey, Electrolytic Zinc Co.: Fell from plank; broken arm.
P. G. Sheehan, Renison Ltd: Caught finger in wire mesh; amputated finger.
I. Pikunic, Renison Ltd: Caught finger in fan; thumb and finger amputated.
F. Cvek, Renison Ltd: Collided with truck; fractured heel.
W. R. Johns, Storeys Creek: Ladder fell on hand; fractured finger.
R. F. Mills, Storeys Creek: Fell off wall; fractured skull.
N. J. Chapman, Aberfoyle Ltd: Slipped and fell; fractured leg.
F. Davis, Aberfoyle Ltd: Bored into unexploded charge: lost eye.
W. P. Butt, Storeys Creek: Lost footing; fractured ankle.
T. Reid, Goliath Cement: Injured foot whilst coupling drill rods; amputated toe.
J. Bajgan, Dillingham Construction: Struck on head by truck; fractured skull.
C. Petridis, Dillingham Construction: Rock fell on foot; fractured foot.
L. A. Cole, Goliath Cement: Cleaning chain in motor; fractured finger.
B. E. Eversham, Comalco: Jumped off furnace; fractured heel.
T. Pertsinidis, Dillingham Construction: Rock fell on helmet; fractured skull.
J. Leon, NW Acid: Struck by falling steel bar; fractured leg.
T. Wilson, Comalco: Caught finger between sling and crane hook; amputated finger.
J. Daun, Dillingham Construction: Fell from stage; fractured head and arms.
E. Asenjo, Dillingham Construction: Struck side of kibble; fractured ribs.
R. Spadima, Dillingham Construction: Jammed finger; broken finger.
I. Golob, Savage River Mines: Slipped on oily surface; fractured thumb.
R. Carr, Pioneer Quarry: Caught arm in conveyor; fractured arm.
A. Duvnjak, Dillingham Construction: Jammed hand; fractured hand.
D. Atkin, Australian Titan Products: Caught hand between truck and vane; fractured thumb.
N. W. Hill, Hobart Quarries: Steel broke whilst drilling; broken toe.
R. Hodgetts, Wunderlich: Feet caught under lift tynes of forklift; crushed feet.
J. Sartori, King Island Scheelite: Structure on which employee was working moved and he jumped off; fractured arm.
G. Chandler, King Island Scheelite: Tyre and rim fell on him; fractured ankle.
J. E. Palmer, Australian Commonwealth Carbide: Hand caught in rope; fractured finger.
A. T. Wilkinson, BHP/Esso Ocean Digger: While unscrewing pipes shackle swung round; fractured leg.
R. C. Beadle, Australian Commonwealth Carbide: Structure fell onto crane; broken bone in neck.
R. Canning, Savage River Mines: Drilling machine jammed and hit him on the head; fractured skull.
C. J. Bluett, Hobart Quarries: Drill steel broke; broken toe.
F. Zivcic, Dillingham Construction: Struck by falling object; fractured arm.

J. F. Lukas, Mount Lyell Co.: Rail fell on foot; broken foot.
A. Woodcock, Cleveland Tin: Hose struck arm; fractured arm.
W. Long, Australian Titan Products: Twisted foot; fractured ankle.
J. Sitkei, Comalco: Fingers caught in fan blade: amputated finger.
L. J. Fletcher, Australian Commonwealth Carbide: Stepped into manhole; fractured ribs.
P. Pestrucci, Comalco: Finger jammed by frame; fractured thumb.
A. Dinsdale, Savage River Mines: Fell off roof; fractured foot.
I. Murray, Dillingham Construction: Drill steel broke; fractured foot.
J. Leslie, Comalco: Struck by steel chuck from lathe; fractured cheekbone.
C. Auty, Savage River Mines: Tractor backed over panel van; fractured pelvis and jaw.

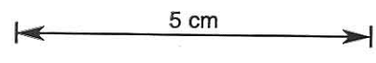
RATES PER THOUSAND KILLED OR INJURED

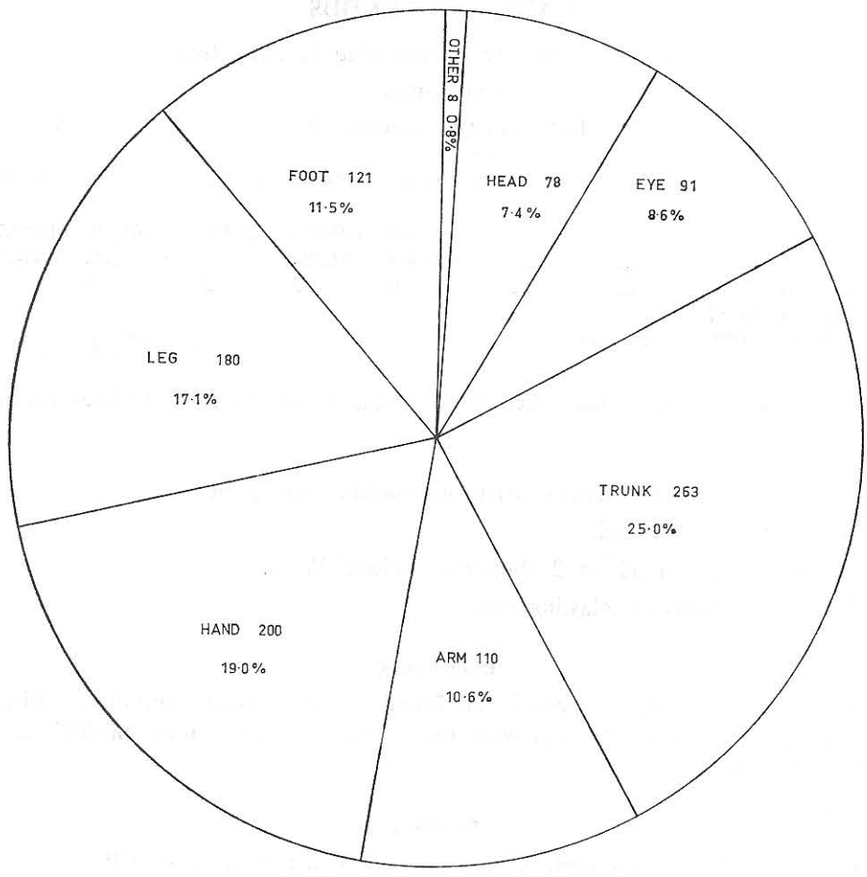
Period	No. of Persons employed	No. of accidents	Number of persons			Number per thousand		
			Killed	Injured	Total	Killed	Injured	Total
1892-1930*								
1931-1940†								
1941-1950‡								
1951-1960§								
1961	8,493	108	1	107	108	0.119	12.720	12.839
1962	8,708	68	2	66	68	0.234	7.726	7.961
1963	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
1968	10,040	126	6	120	126	0.608	12.151	12.759
1969	10,407	162	7	155	162	0.683	15.117	15.800
1970	10,773	200	4	196	200	0.371	18.194	19.516

* 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



Accident Factor





Accidents: Location of Injury

Accidents: Nature of Injury

5 cm

DANGEROUS GOODS

The Explosives and Inflammable Liquids Acts

EXPLOSIVES

IMPORTS OF EXPLOSIVES

	Burnie	Devonport	Hobart	Launceston	Naracoopa	Stanley	Strahan	Total
Nitro-compounds (lb)	....	....	498,100	605,413	72,500	463,350	1,684,700	3,324,063
Detonators	—	—	530,000	584,300	....	1,090,000	474,550	2,678,850
Explosives shipments (No.)	—	—	6	7	2	8	8	31
Ammonium nitrate imported for use as an explosive (lb)	1,514,000	....	....	....	....	690,000	....	2,204,000

The number of licences and permits issued were: Magazine Licences, 121; Other Licences, 488; Shot Firer's Permits, 94.

EXPLOSIVES AUTHORISED DURING THE YEAR

1. Class 2 Nitrate mixture—Iregel
2. Class 3 Nitro-compound Division 2—Superseis (Model W-1).
3. Class 6 Division 3—Superseis blasting cap.

INSPECTION

Imported nitro-compounds were inspected and found to be in good condition. Fireworks imports decreased during the year, all consignments were tested and two types were prohibited: Coloured star rockets and Apollo rockets.

STORAGE

The new public magazines at Howden were brought into use in March 1970.

BLASTING COMPLAINTS

Investigations were made into complaints and where necessary remedial action was instituted.

UNSERVICEABLE EXPLOSIVES

Forty pounds of nitro-compounds and 1,260 detonators were destroyed by inspectors during the year.

ACCIDENTS

An Eastern Shore youth found a quantity of electric detonators, took them home and connected one to a torch battery. He received injuries to his legs, face and hands, fortunately these were not serious.

INFLAMMABLE LIQUIDS

	Bell Bay	Burnie	Devonport	Hobart	Naracoopa	Total
Inflammable liquids imported in bulk (tons)—						
Aviation gasoline	1,736	....	....	1,500	....	3,236
Kerosene—						
Aviation	1,376	....	....	8,581	....	9,957
Lighting	407	....	1,446	1,771	....	3,624
Power	....	....	539	480	....	1,019
Motor spirit—						
Premium	47,627	22,880	29,552	71,237	1,680	172,976
Regular	13,827	5,359	9,208	26,370	....	54,764
L.P. gas	466	....	....	....	....	466
Total	65,439	28,239	40,745	109,939	1,680	246,042
Tankships (No.)	15	9	9	23	3	59

Licences to keep, 2,152; Plans approved, 342; Exemptions granted, 22; Permits to import, 24.

The Shell Co. of Australia Ltd reclaimed an area of land at Selfs Point for their new terminal. Three 2,500-ton tanks, an oil store, tank waggon filling bays, service tanks and office buildings were built.

Three 3-ton storage tanks for liquefied petroleum gas were brought into use at the Electrolytic Zinc Co. works at Risdon.

Tank Waggon Accidents

An empty semi-trailer ran off the Bass Highway near Penguin and overturned on the railway line. The driver was taken to hospital in Burnie but subsequently died.

At Wivenhoe a semi-trailer collided with a passenger train. The engine of the train was de-railed and rolled down the embankment near the bridge over the Emu River; a 10-inch furnace oil pipeline was fractured and approximately 150-200 gallons of oil flowed into the Emu River. Detergent was applied to the oil and greatly reduced the pollution of the river and foreshore. No persons were seriously injured.

INSPECTION

MECHANICAL ENGINEERING

There was considerable activity during the year, including:—

Electrolytic Zinc Co., Risdon

The commissioning of the new zinc casting division represents a big step towards full automation of this process.

Electrolytic Zinc Co., Rosebery

The 22-foot diameter No. 2 shaft is approaching completion to the first stage, and preparations are now in hand for installing the hoisting machinery and shaft conveyances. Expected hoisting capacity is 4,500 tons/day.

Mount Lyell Mining and Railway Co., Queenstown

The Prince Lyell winder house is under construction and the skip winder is being installed. Expected ore hoisting capacity is 10,000 tons/day.

Miscellaneous

New cranes were installed at Comalco, Bell Bay; Renison Ltd, Rosebery; Mount Lyell, Queenstown; Electrolytic Zinc Co., Risdon; and Goliath Portland Cement Co., Railton.

A programme of testing and inspection of lifting appliances was initiated in all mines, and in some mills where dangerous materials are handled.

Certificates of competency to drive machinery were issued to forty-four persons.

ELECTRICAL

Inspection of electrical installations and equipment and supervision of new installations was carried out throughout the year and where conditions warranted alterations or modifications orders were issued for them to conform with the Mines Inspection Regulations 1969.

EXPLOSIVES

The velocity seismograph was used initially in the investigation of complaints of vibration due to blasting but this year there have been many requests for assistance from instrumentalities, government departments and contractors to ensure that their blasting will not cause any damage. A notable case where this help was given was during work on the straightening of the channel in the Tamar River and in particular in the partial removal of Garden Island.

Four Shot-Firer's Permits were cancelled during the year and the holder of one of these was convicted under section 63 of the Explosives Regulations and fined $50.

DRILLING

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

	Number of holes	*Total footage*	*Object*
Diamond			
	1	401	Mineral investigation, Royal George
	1	674	Mineral investigation, Alberton
	1	152	Limestone investigation, Mole Creek
	2	458	Limestone investigation, Mole Creek
	3	143	Dam site, Kempton
	1	79	Dolerite testing, Southern Outlet Road
	1	1,632	Geological investigation, Glenorchy
	2	369	Coal investigation, Kaoota

Number of holes	*Total footage*	*Object*
1	30	Franki pile test, Risdon
3	758	Coal investigation, Fingal
1	290	Water investigation, Cressy
3	1,109	Mineral investigation Beaconsfield
1	153	Mineral investigation, Waratah
21	6,248	
Diamond/Auger		
5	276	Foundations, Hobart
3	97	Foundations, Wynyard
7	302	Foundations, Hobart
1	108	Slip investigation, George Town
7	415	Dam investigation, Pipers River
10	177	Road site, Hobart
5	158	Foundations, Hobart
6	256	Bridge foundations, Launceston
4	94	Dam site, Kempton
4	256	Dam site, Kingston
8	228	Foundations, Launceston
20	680	Geological investigations, Exeter
80	3,047	
Churn		
2	1,102	Geological investigation, Boobyalla
6	740	Tin investigation, South Mt Cameron
2	294	Water investigation, Scottsdale
3	448	Water investigation, Scottsdale
3	90	Road foundations, Hobart
1	70	Water boring, Gretna
4	283	Dam foundations, Smithton
2	10	Water boring, Smithton
8	447	Foundations, Launceston
9	1,420	Water investigation, Scottsdale
40	4,904	
Rotary		
17	5,284	Water investigation, Longford-Cressy
Auger		
19	350	Clay investigation Launceston
68	813	Channel investigation, Cressy
87	1,163	

DRILLING EXPENDITURE

Type of drilling	*Number of drills*	*Feet drilled*	*Total cost*	*Cost per foot*	*Cost per shift*
			$	$	$
Diamond	4	6,248	59,504	9.52	67
Diamond/Auger ..	1	3,047	17,977	5.90	75
Churn	3	4,904	44,024	9.18	65
Rotary	1	5,284	15,980	3.00	66
Auger	1	1,163	683	0.59	106

DIAMOND DRILLING

Four plants operated continuously throughout the year except for a period when one foreman was sick.

Coal

The investigation of the resources of the Fingal Valley continued but progress was slow as all sites were covered by over 100 feet of dolerite scree. As before all holes were continued to the Permian contact for stratigraphic information.

Two holes were put down in the Kaoota area when the workings ran into a fault.

Mineral Investigation

The present programme at Alberton has now been completed without finding any significant mineralisation. This country proved impossible to drill with standard wireline equipment owing to excessive deviation. The BXM and AXM holes flattened at a steady 5° to 6° per 100 feet, but with BQWL the curvature increased until rod jamming occurred. One hole which was started on a dip of 60° in NX was reduced to BQWL at 100 feet when the dip was 59°. This flattened to 37° at 400 feet and 13° at 580 feet when the hole had to be abandoned. It was wedged off at 100 feet and continued with BXM to the target depth of 1,030 feet where the dip was 20°. Drilling at Waratah continues during the summer when a plant is available.

Two holes were drilled to over 500 feet at Beaconsfield, but soft sandstone, which not only runs but becomes very tight round the casing, is causing difficulties during the drilling of a third hole.

Three holes were drilled in the limestone at Mole Creek for a company interested in developing the deposit.

Foundation Testing

Building, road and dam sites were drilled for various State and local government authorities and one Franki pile was drilled to test the quality of the concrete.

Geological Investigations

The hole drilled for stratigraphic information in the Cressy-Longford area was continued to a depth of 462 feet but core recoveries in the unconsolidated aquifers were not good.

A hole drilled for stratigraphic information at Glenorchy successfully drilled through a dolerite sill from 600 to 1,600 feet but the failure of wireline rods has made further drilling difficult. The hole is being continued.

COMBINATION AUGER/DIAMOND DRILLING

This drill has proved extremely useful in foundation drilling and geological investigations using the auger in overburden and a split inner tube NQ-3 wireline barrel to follow. Core recoveries have been excellent in all types of ground from clay to dolerite and costs have been very low except in basalt and dolerite.

ROTARY DRILLING

Water investigation continued in the Longford-Cressy area and the campaign is being brought to a close with pump tests in gravel packed holes.

CHURN DRILLING

Three churn drills operated throughout the year on tin prospecting for a company, water investigations, geological investigations and road and building foundation work. Many of the holes were deep involving two lines of casing and as the water bores involved development and pump testing average cost per foot drilled was high. The deepest hole was 455 feet.

AUGER DRILLING

The Proline auger drill was only used for two small jobs involving testing a clay deposit for a brick company and testing the ground along the route of a proposed channel for the Rivers and Water Supply Commission.

SOUTHERN DISTRICT

J. B. Braithwaite, B.C.E., B.M.E., M.Aust.I.M.M., M.I.E.Aust.

EMPLOYMENT

No general comparison can be made with previous figures owing to the transfer of the mines at Rossarden to the control of the North-Western Inspectorate.

QUARRYING

An old quarry on the saddle below Mt Nelson was re-opened to provide fill for the Wrest Point car park and 100,000 cubic yards of dolerite and sandstone had been removed by the end of the year.

EXPLORATION

The Broken Hill Pty Co. Ltd. E.L. 13/65

This has been reduced to an area of 748 square miles and geophysical and geological work was intensified on this smaller area.

Ludbrooks Ltd. S.P.L. 24 & 97

Work consisted of the evaluation of the known deposits, and of further exploration.

NORTH-EASTERN DISTRICT

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

EMPLOYMENT

The average number of men engaged in mining, metallurgical and quarrying operations was 2,082. Of this number aluminium production absorbed an average of 1,202 men, cement manufacture 314, electro-metallurgical works 141 and the remainder were employed in quarrying and mining operations.

EXPLORATION

A total of six Exploration Licences, nine Special Prospectors' Licences and three Oil Exploration Permits were current during the year.

Texins Development Pty Ltd. E.L. 6/68

Systematic prospecting enabled the original area of 650 square miles to be reduced to 295 square miles. Employment averaged nine men.

Rockford Pty Ltd. S.P.L. 65 & 81

Prospecting operations on a 17-square mile strip of coast in the vicinity of Eddystone Point (S.P.L. 65) were continued during the first three quarters of the year when the licence was allowed to lapse and the area was again applied for and re-issued as S.P.L. 81. A vigorous programme of prospecting and sampling was pursued, employment ranging between two and ten men with an average of five.

H. T. Reardon. E.L. 15/68

The area of this 62 square mile Exploration Licence was reduced to 28 square miles and prospecting was concentrated on the tin-bearing leaders on Bells Hill.

All States Exploration N.L. E.L. 14/69 & 7/69

E.L. 14/69 (45 square miles) was relinquished early in the year and drilling operations were concentrated on E.L. 7/69.

International Mining Corporation N.L. E.L. 12/69

This company made a sketchy examination of S.P.L. 48 and 55, held by R. L. and T. G. Rainbow, over which they held options, but these were not exercised.

R. L. & T. G. Rainbow. S.P.L. 48 & 55

Scout boring on these areas (2,000 acres and 640 acres respectively) was continued as climatic conditions permitted by this father and son partnership. The areas concerned are on the Stronach flats and boring was more concerned with establishing the course of the old river bed than with actual sampling.

D. H. Bessell. S.P.L. 29

Prospecting of this 300-acre clay lease was completed by the end of the third quarter of the year and portion was converted to a 10-acre silica clay lease. Employment averaged two men.

Scamander Mining Corporation. S.P.L. 72

This licence, comprising 5 square miles at Upper Scamander embraced the former S.P.L. 38 covering the Orieco copper mine and wolfram-bearing areas on the Scamander Tier. Sampling of the Orieco copper prospect and the Lutwyche wolfram leases was continued

Portland Holdings. S.P.L. 53

Prospecting continued on 1,310 acres on the Scotia Lead. Only one many was employed and much more investigation will be necessary to assess its value.

F. C. Bardenhagen. S.P.L. 74

A strip of 1,300 acres across Mt Stronach was investigated in the search for mineable quantities of molybdenite. Average employment was two men; the licence was relinquished during the last quarter.

Industrial Sands Pty Ltd. E.L. 24/69

An average of three men were employed in prospecting operations on this 20 square mile area for asbestos, nickel, sulphur, etc. The area was reviewed at the end of the year and reduced to 16 square miles; a new licence (E.L. 13/71) was issued.

Industrial Sands Pty Ltd. S.P.L. 67

This licence (1,600 acres) covers Port Sorell from Eagle Point to Branches Creek. Systematic sampling of the lime sands was continued. A second, larger sampling barge was constructed for the purpose. Barge construction and sampling provided employment for an average of three men.

EASTERN DISTRICT

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

The coal industry employed fifty-eight men, a decrease of one. Thirty-two men were employed underground and twenty-six on the surface. The quarrying industry employed fifty-one men.

NORTH-WESTERN DISTRICT

H. Murchie, B.Sc., D.R.T.C., M.Aust.I.M.M.

E. C. Leyland, A.W.A.S.M., A.M.Aust.I.M.M.

P. Allan, B.Sc., A.H.-W.C., A.M.I.M.M., Burnie

EXPLOSIVES AND INFLAMMABLE LIQUIDS

Only two accidents involving vehicles carrying inflammable liquids were reported; there was one fatality. A semi-trailer unit jack-knifed on a wet road and the driver later died of injuries received in the accident. No other vehicle was involved.

Only one case of theft of explosives occurred: from the Hydro-Electric Commission at Gowrie Park. The person involved had a blasting accident in using the gelignite but fortunately this was not fatal.

EXPLORATION

Mount Lyell Mining and Railway Co. Ltd. E.L. 8/65, 9/66, 40/70, S.P.L. 20, 94

E. L. 9/66, Mt Tyndall area. Exploration work was concentrated on the country between Lake Dora and Lake Selina at the head of the Anthony River Gorge and on the Red Hills area.

Approximately 32 miles of grid lines were cut and pegged in these areas and subsequently covered by geochemical soil sampling, geological mapping and geophysical surveys. Several miles of new roads were constructed to provide access into the Lake Selina area and to the north of the Red Hills along the HEC transmission line. Bulldozers were also used for the costeaning of pyritic zones in the Lake Selina area and to test geophysical anomalies in the Red Hills area, as well as preparing twenty-nine sites for a percussion drilling programme at the Red Hills. All accessible underground openings in the Red Hills area were systematically sampled.

In the Lake Selina area, diamond drilling commenced in April and two holes were completed and another was in progress at the end of the year with a total footage of 1,890 feet. These holes were aimed at testing the extensive induced polarisation anomaly and partly coincident magnetic anomaly developed along the Cambrian volcanics/Owen conglomerate contact. No significant mineralisation was encountered.

E.L. 8/65, Moina area. Extensive flooding during August 1970 severely restricted exploration activities in the latter part of the year and necessitated the construction of approximately 2½ miles of road, including two short bridges. Work was largely restricted to the following areas: Shepherd and Murphy mine—Fletchers Adit zone, Olivers Hill and Dolcoath Hill, over which areas a total of 149,000 feet of traverse lines were cut and pegged.

These areas were covered by detailed geological mapping, geochemical sampling and ground magnetometer and scintillometer surveys.

On a regional basis geological mapping was conducted over Cambrian porphyritic volcanics, tuffs and sediments to the north of the Dove River. The regional aeromagnetic results were re-interpreted by Compagnie Général de Géophysique who also conducted induced polarisation (I.P.) surveys over the Olivers Hill and Shepherd and Murphy-Fletchers Adit areas.

Shepherd and Murphy mine area. Only weak I.P. response was obtained over the mine zone but a small discrete I.P. anomaly, resistivity low and magnetic anomaly was detected immediately to the east of Bismuth Creek. A total of 940 feet of diamond drilling was completed to test the lateral and depth extensions of the known lode system. D.D.H. No. 1 was completed at 872 feet and passed through skarn and Moina Sandstone to finish in granite. No significant mineralisation was encountered. D.D.H. No. 2 was in progress at 68 feet in highly magnetiferous skarn at the end of the year.

Olivers Hill area. A number of I.P. anomalies were detected from the gradient array survey in the geochemically anomalous zone. Two drill holes have been proposed to test these anomalies.

Fletchers Adit area. No well defined I.P. anomalies were located, however the whole area appears to be somewhat anomalous with no apparent correlation between magnetic, resistivity, I.P. or geochemical results.

Iris River-Ti Tree Creek area. Detailed surface exploration was in progress in this area at the end of the year to follow up seven polarisable bodies located by the I.P. survey and the areas of anomalous copper and bismuth soil anomalies.

E.L. 40/70, Dora-Huxley area. The main work conducted in this area during the year has been the construction of 5 miles of access roads from Queenstown into the area south of Mt Owen and approximately 3 miles of road from Lake Dora south of Lake Spicer. Regional geological mapping was in progress.

Miscellaneous. No major work was conducted in the North Dundas area (S.P.L. 20) which has recently been relinquished and preparations were made for the systematic sampling of the King River delta in S.P.L. 94.

Minops Pty Ltd-Tenneco Aust. Inc. E.L. 44/70

Spray mine. During the year, after investigating all accessible adits and workings on this old lease, an attempt was made to de-water the No. 2 adit shaft. Power was brought into the area by the HEC from Zeehan, and a sub-station established at the portal. When pumping capacity is capable of controlling the flow it is intended to map and sample the workings and, if considered necessary, to diamond drill from the available cross-cuts to seek any extension of the lode system at depth.

Oonah mine. An exploration winze was sunk on this old lease to about 50 feet, and an attempt was made to gain access from an adit to the old main shaft (the top section of which has caved). Operations were abandoned due to water problems and difficult ground conditions. Diamond drilling in the area gave some favourable intersections.

Saint Dizier mine. Geological work coupled with some diamond drilling was carried out on this prospect.

Report of the Mount Cameron Water Race Board for the year ended 31 December 1970

THE HONOURABLE THE MINISTER FOR MINES

We submit the Report of the Mount Cameron Water Race Board for the year ended 31 December 1970.

Production of tin concentrates was 13.42 tons compared with 22.59 tons for 1969 and there was a decline in the number of sluiceheads of water supplied from 1,539 to 845. The revenue received from the fixed or cash scale charge was $2,724.30 which represents a fall of $980.30 on the amount received in 1969. However, more water was supplied on the royalty scale charge which is based on the gross proceeds of tin sold and revenue from this source increased from $31.74 in 1969 to $440.90. Total revenue was $3,348.20 as compared with $3,991.34 for 1969. Expenditure totalled $8,642.56 which was $488.14 less than the 1969 figure. The 1969 expenditure includes a long service leave payment of $1,682.99 so that in effect operational expenditure in 1970 was considerably greater than in 1969. This was due to normal wage increases and to necessary race maintenance expenditure on the Amber Creek syphon. The overall operational loss amounted to $5,294.36 which was $155 in excess of the 1969 deficit.

The Board has relied principally on two producers for the major part of its revenue for some years. In April one of these producers ceased production which resulted in a reduction of revenue of $37 per week and since the end of the year the other major producer has closed down.

The water system has been maintained in good order but the Mussel Roe syphon requires further maintenance. The Chum Creek dam which was completed last year sustained damage by floods before the earthworks had been properly consolidated. A further expenditure of $4,500 from loan funds by the Department of Mines was necessary in repairs to ensure the safety of the dam.

The Board views with concern the deterioration of the revenue from sale of water but developments are in progress on existing leases and on areas held for exploration purposes which are expected to result in water being required for re-establishment of mining on leases held by a previous major user and for productive mining on new areas.

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

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

MOUNT CAMERON WATER RACE SUSPENSE ACCOUNT

STATEMENT OF RECEIPTS AND PAYMENTS FOR THE YEAR ENDED 31 DECEMBER 1970

Receipts	$	*Payments*	$
Sale of water—		Salaries and wages, including pay-roll tax	7,310.79
Fixed on cash sale	2,724.30	Insurance	256.08
Royalty scale	440.90	Car allowance, Manager	103.84
Domestic use	183.00	Maintenance	728.97
Balance (loss)	5,294.36	Miscellaneous	222.28
	$8,642.56		$8,642.56

MOUNT CAMERON WATER RACE

STATISTICS FOR THE YEAR ENDED 31 DECEMBER 1970

Registered Rainfall

Great Mussel Roe	56 inches 83 points
Little Mussel Roe	56 inches 0 points

Water Services

Average number of claims supplied per week	2
Average number of claims supplied in any one week	2
Sluiceheads supplied—	
Fixed scale	675
Royalty scale	170
	845

Production

Tin oxide produced—

	Tons	cwt	qr	lb
Royalty scale	1	0	0	0
Fixed scale	12	8	1	25
	13	8	1	25

Employment average per week—	
Royalty scale	1
Fixed scale	4
	5

Report of the Ringarooma and Cascade Water Board for the year ended 31 December 1970

THE HONOURABLE THE MINISTER FOR MINES

We submit the report of the Ringarooma and Cascade Water Board for the year ended 31 December 1970.

The Paris and Cascade dams continued to be maintained in case these water storages are needed for mining and/or irrigation purposes in the district. A proposal to enlarge the Cascade dam to provide water for irrigation purposes in the Winnaleah district has been under examination by the Rivers and Water Supply Commission but the Board has not been advised as to any progress made.

The Board has received applications for the supply of water from the dams from a company interested in mining in the vicinity of the old Mt Paris tin mine and by Briseis Tin N.L. who have undertaken considerable investigational and preparatory work towards re-establishing productive operations at the former Briseis mine at Derby.

The proposals have not reached the stage when the quantity of water required can be assessed, but it is expected that the Briseis mine will require approximately fifty sluiceheads.

The loss for the year was $941.10 consisting of payment for caretaking of the dams and interest on the capital cost of the system. The loss is met from Consolidated Revenue in accordance with the provisions of the Ringarooma and Cascade (Water) Agreement Act 1947.

J. G. SYMONS, Chairman
H. K. TURNER, Member
N. P. EDWARDS, Member

RINGAROOMA AND CASCADE (WATER) SUSPENSE ACCOUNT

STATEMENT OF RECEIPTS AND PAYMENTS FOR THE YEAR ENDED 31 DECEMBER 1970

Receipts	$	*Payments*	$
Balance (loss)	1,091.10	Ringarooma Race: Wages	150.00
		Interest on capital cost of Ringarooma and Cascade water system	941.10
	$1,091.10		$1,091.10

T. J. HUGHES, Government Printer, Tasmania.