REPORT OF THE DIRECTOR OF MINES

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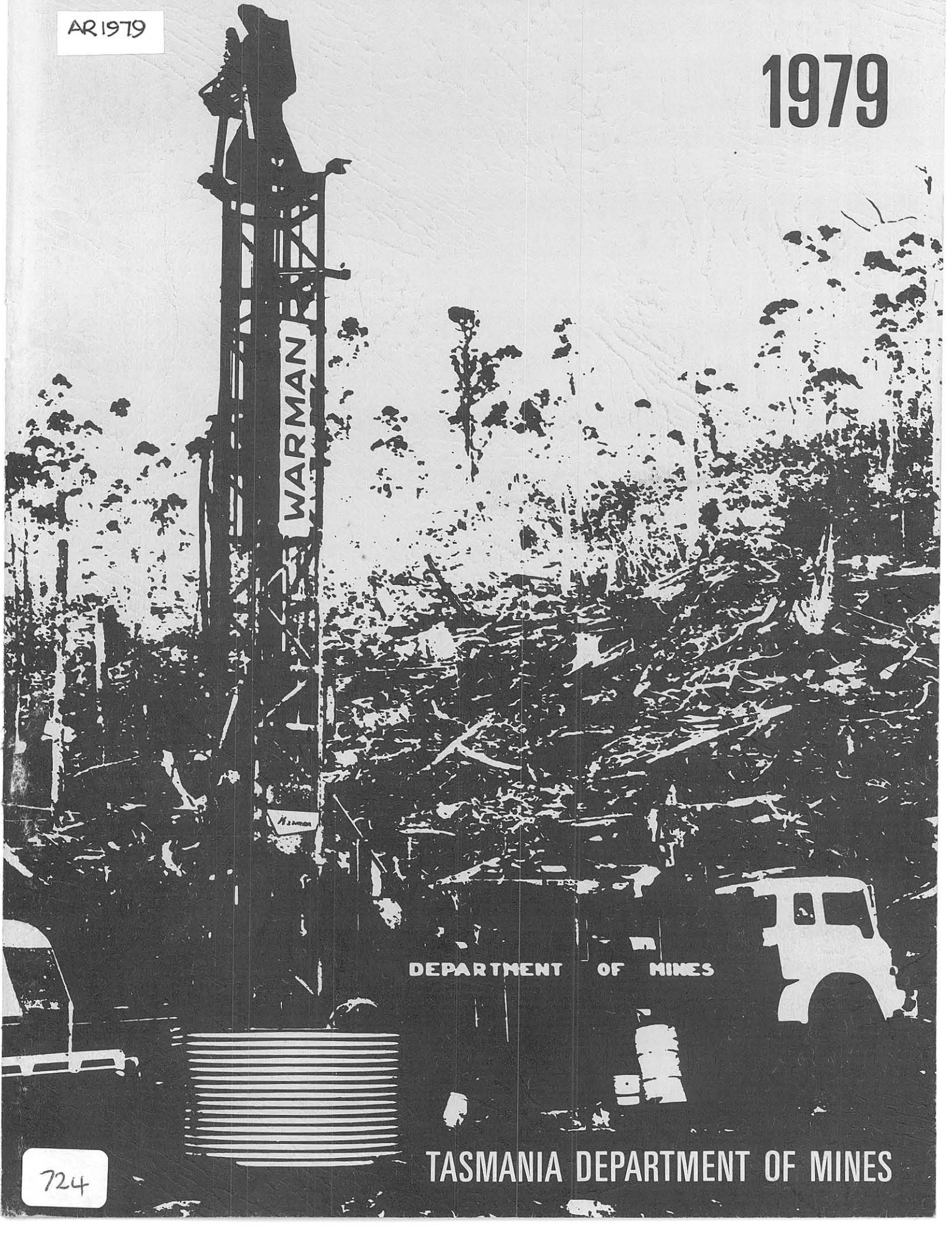

DEPARTMENT OF MINES

TASMANIA DEPARTMENT OF MINES

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1980 (No. 97)

1980

PARLIAMENT OF TASMANIA

DIRECTOR OF MINES

REPORT FOR THE YEAR ENDED 31 DECEMBER 1979

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

By Authority:
T. J. HUGHES, Government Printer, Tasmania

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Exploration for coal on Fingal Tier. Warman drill rig at diamond drill hole 45.

[frontispiece]

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REPORT OF THE DIRECTOR OF MINES

Department of Mines,
Hobart, 21 November 1980

THE MINISTER FOR MINES

SIR,

I present my report on the mining industry for the year ended 31 December 1979. This Annual Report will be the last to appear over my name. Due to normal delays in preparation and printing this annual report will appear after my retirement in 1980.

It has been my privilege to have been Director of Mines since 1954 and during this period the mining industry in Tasmania has recorded a major growth increase. Many small mines have become major mines by world standards — (Renison Limited is the largest underground tin mine in the world) and a number of major new mines such as Savage River Mines and Cleveland Tin Ltd, have commenced production. In addition a number of new mines are being prepared for production.

The great upsurge in the Tasmanian mining industry that commenced some twenty years ago followed changes in mining legislation that were designed to encourage exploration. Later substantial increases in metal prices triggered new developments and expansion of existing mines.

The mining industry is now the largest primary industry in Tasmania, but the future of the industry depends upon bold and well designed scientifically based exploration programmes. The industry is suffering from the fact that more and more land is being denied to exploration by expanding National Parks and pressure from conservation groups.

Minerals are an important part of the heritage of the people of Tasmania and any objection or campaign which plans to deny these resources to the community must be examined very critically by responsible Government.

The value of metals and minerals produced from Tasmanian ores, based on average Australian metal prices was $350 572 595. This is an increase of over 16 per cent on the 1978 figure.

In addition metallurgical production from ores and concentrates imported into the State was $283 284 804 compared with $230 923 877 for the previous year, showing an increase of more than 22 per cent. Production of most minerals was down on last year's figures but this was offset by improved metal prices resulting in an overall increase in the value of production. Two exceptions to the lower production were in the output of chromite and iron ore pellets.

Details of production and value of all mining products are shown elsewhere in this report but particulars of the principal minerals are summarised below:—

	1978		*1979*	
	Quantity	*Value $ million*	*Quantity*	*Value $ million*
Copper (tonnes)	22 067	26·7	21 026	37·8
Gold (kilograms)	1 618	8·8	1 490	13·9
Iron ore pellets (tonnes)	2 108 027	43·0	2 258 882	47·4
Lead (tonnes)	16 907	9·6	16 375	17·1
Silver (kilograms)	68 456	10·5	62 705	18·6
Tin (tonnes)	7 271	84·5	6 617	94·5
Tungsten as tungstic oxide (tonnes)	2 630	31·8	2 490	30·5
Zinc (tonnes)	61 753	35·1	59 396	43·9
Coal (tonnes)	223 957	2·5	237 380	3·2

DEVELOPMENTS

On 8 March Renison Limited announced the Company's decision to expand production capacity from 630 000 to 850 000 tonnes of ore at a cost of approximately $18 million. At the end of the year, Stage I of the Concentrator Expansion was progressing well. The rod mill foundations were 70 per cent complete and major items of equipment were on order. Detailed design for Stage II of the Concentrator Expansion was well advanced. The programme also includes increasing the mining and service facilities and the provision of additional housing. In addition to the expansion programme, improvements have been made to the administrative facilities by the construction of new mill and office blocks.

At Mount Lyell the company is establishing a major diesel trucking operation in the Main Decline. This should give significant operating economies compared to the combined diesel truck/rail ore transportation system. The new system is scheduled to become operational early in 1980. Particular attention has been given to development in the Main Decline. This will provide the principal access to the Prince Lyell mine for which an increasing proportion of the total ore production is obtained.

In August Aberfoyle Limited announced that the company intended to proceed with the development of the Que River deposit. This deposit is located 80 road kilometres south of Burnie. A ten year contract has been negotiated with the Electrolytic Zinc Company of Australasia Limited for the delivery of Que River lead/zinc ore to the Rosebery concentrator commencing in 1981. Ore will be delivered at a rate of between 150 000 and 200 000 tonnes per year. Additional underground development and equipping of the mine for production is estimated to cost $16 million.

Signing of the agreement with Aberfoyle has necessitated the Electrolytic Zinc Company lifting the capacity of its Rosebery concentrating mill from 650 000 to 850 000 tonnes a year. This expansion will include the construction of a new crushing station and increased capacity in the grinding, flotation and filtration sections of the mill. Work is expected to be completed by early 1981.

At Risdon the company is replacing the two oldest existing units of the acid plant with an 800 tonnes per day sulphuric acid plant. Cost of the acid plant and peripheral facilities will be about $20 million.

The joint venture consortium of Buka Minerals N.L., Triako Mines N.L. and the French company Serem (Aust.) Pty Ltd has encountered minor technical problems which have delayed the commencement of full scale production. These are expected to be overcome and planned production capacity of 100 tonnes a day achieved.

At Savage River Mines the company is investigating the norther lode near the existing Savage River mining operations. This could mean an additional life expectancy for the mine of a further fifteen to twenty years. However, detailed exploration, engineering and mining studies could take at least two years.

At the Cleveland mine development has included sinking of two ventilation shafts and construction of a new tailings dam. The company has also spent more than $600 000 on additional accommodation for its employees.

The only operating coal mine in the State, the Cornwall Coal Company N.L. was taken over by Goliath Cement Holdings Ltd in September. Their intention is to continue and expand the coal mining operations of their new subsidiary. It is hoped to open a new mine to meet anticipated market demand and ensure continuity of adequate coal supplies.

PRODUCTION

Copper

The major producer is the Mount Lyell Mining and Railway Company Ltd at Queenstown but significant quantities also result from the processing of zinc-lead ores by the Electrolytic Zinc Company at Rosebery and as a product of tin mining operations by Cleveland Tin N.L. at Luina.

The Mount Lyell Company treated 1·4 million tonnes of ore for the production of 67 707 tonnes of copper concentrate containing 18 255 tonnes of copper, 2 673 kilograms of silver and 428 kilograms of gold. The copper concentrates are transported by road to Melba Siding and then by rail to Burnie for shipment to Port Kembla and Japan. Pyrite concentrates (20 463) tonnes were produced for processing by North-West Acid Pty Ltd at Burnie for the manufacture of sulphuric acid. Production of pyrite concentrate ceased in May 1979, as a result of the closure of North-West Acid Pty Ltd.

Mt Lyell operated for the full year without any financial assistance from the Federal or State Governments due to improved prices for copper, gold and silver, tighter operating controls and the success of the modified mining plan. The Company has in fact repaid all assistance received from both Governments and it is anticipated that it will operate at a profit for the 1979–80 financial year. This will of course depend on the present level of prices being maintained.

The Electrolytic Zinc Company at Rosebery produced 2 318 tonnes of copper from the treatment of its zinc/lead ores and 453 tonnes were produced by Cleveland Tin N.L. at Luina as part of its tin mining operations.

Iron Ore

Pellets produced from iron ore mined at Savage River totalled 2 258 882 tonnes compared with 2 108 027 tonnes for the previous year. Twenty-eight shipments of pellets were made from Port Latta to Japan under the existing contract.

Negotiations have continued to transfer the area known as the Northern Lease to Savage River Mines.

Tin

Total production was 6 618 tonnes which was a decrease of 653 tonnes, or almost 9 per cent, compared with the total of 7 271 tonnes for the previous year. The principal producers were Renison Limited at Renison Bell, Cleveland Tin N.L. at Luina, Aberfoyle Tin Limited at Rossarden and the Pioneer Tin Mine which is operated by Kibuka Mines Pty Ltd.

Tasmania continues to be the leading State in production of this mineral, contributing about 58 per cent of the Australian total production.

Production by Renison Limited totalled 5 330 tonnes of tin from the treatment of 567 576 tonnes of ore. The overall recovery of tin metal in concentrates was 72·6 per cent compared with 68·8 per cent in the previous year.

The company has continued an active exploration programme at Renison Bell, Mt Lindsay, Trial Harbour and Wilson River. The drilling programme continued in the Blue Tier area near St Helens.

At the Cleveland mine at Luina, production consisted of 1 106 tonnes of tin and 453 tonnes of copper from the treatment of 352 977 tonnes of ore. 19 329 tonnes of HMS float material was taken from the stockpile and treated in the concentrator.

The main decline was advanced to the 24 level and bored reserves were increased by 38 600 tonnes as a result of mine development.

At the Storeys Creek and Aberfoyle Mines operated by Aberfoyle Tin Ltd 43 386 tonnes of ore were treated to produce 134 tonnes of concentrate containing 115 tonnes of tin and 126 tonnes of concentrate containing 111 tonnes of wolfram. The 1·2 metre ventilation shaft at the Aberfoyle mine was completed and this enabled the rate of development to be increased.

Amdex Mining Ltd continued to operate the Endurance mine at South Mt Cameron and the Pioneer mine at Pioneer. At Endurance 270 378 cubic metres was treated for the recovery of 47·5 tonnes of tin. A total of 200 000 cubic metres was treated for the recovery of 93 tonnes of tin from the operations at Pioneer.

The level of activity by small operators in the alluvial areas was maintained at a high level. This was a result of the continued high level of tin metal prices.

Tungsten

The principal producers are King Island Scheelite, who mine scheelite at their Bold Head and Dolphin mines on King Island, Aberfoyle Limited, who produce wolfram concentrates from the mining of wolfram-tin ores near Rossarden, and Tasminex N.L. who produce scheelite from the Kara mine at Hampshire.

The Oakleigh Creek mine, which will be operated by Central Tasmanian Tungsten Pty Ltd on behalf of a consortium of French and Australian mining companies, was developed to the stage where it is anticipated that production will commence in early 1980.

The King Island Scheelite mine treated a total of 405 029 tonnes of ore for the production of 2 329 tonnes of tungstic oxide. The figure for 1978 was 2 377 tonnes of tungstic oxide. An amount of 46 386 tonnes of ore was processed at the Aberfoyle mill for the recovery of 111 tonnes of tungstic oxide and 115 tonnes of tin.

Tasminex N.L. produced 50 tonnes of tungstic oxide from their mine at Kara. Production was less than the previous year due to problems with machinery at the mine and a reduction in the number of shifts from three to two from May.

Zinc

The Electrolytic Zinc Company at Rosebery treated 655 430 tonnes of ore for the recovery of 134 341 tonnes of zinc concentrates, 24 902 tonnes of copper concentrates and 19 932 tonnes of lead concentrates. Total production consisted of 59 396 tonnes of zinc, 16 375 tonnes of lead, 2 318 tonnes of copper, 60 032 kilograms of silver and 1 061 kilograms of gold.

The zinc concentrates from the Rosebery mine and concentrates from the Broken Hill mines are treated at the Electrolytic Zinc Company's plant at Risdon. The production of zinc from non-Tasmanian ore was 134 344 tonnes compared with 114 340 tonnes in the previous year.

METAL PRICES

The following table shows the average Australian metal prices: —

Commodity	*Unit*	*1977*	*1978*	*1979*
		$	$	$
Copper	tonne	1 188·34	1 201·67	1 788·50
Gold	kilogram	4 306·86	5 426·70	9 172·06
Lead	tonne	532·09	570·83	1 045·25
Rutile concentrates	tonne	211·58	188·25	260·00
Silver	kilogram	135·24	153·37	300·54
Tungsten oxide	unit	158·79	120·95	122·23
Tin	tonne	10 400·00	11 649·17	14 235·75
Zircon concentrates	tonne	98·75	65·00	53·75
Zinc	tonne	680·08	569·75	733·25

Copper

The price in January was $1 500 per tonne and it continued to rise until April when the price was $1 900 per tonne. From May through to July the price declined steadily to $1 620 per tonne.

The rest of the year saw a steady rise until in December the price was $2 000 per tonne.

The early rise was due to firm demand, and supply shortages caused by production and transport problems in Zaire and Zambia. Production was also disrupted by strikes in Canada and Peru. The fall in the price in mid-year was partly seasonal and partly due to fear of a recession in the United States of America.

The rise in the latter half of the year was influenced by investment and speculation buying. The precious metals market staged a sharp speculative boom and this overflowed into the copper market.

The London Metal Exchange price at the beginning of 1979 was £827 per tonne. It then followed a pattern to the Australian price with a peak of £1 013 in April, then a fall to £803 in July and a recovery to December when the average price was £1 006. London Metal Exchange stocks of copper fell throughout the year due to a shortfall in production from Zaire, Zambia and Peru. It is impossible to judge how much effect the speculative and investment buyers had on this fall in stocks but there is obviously some effect.

Tin

The opening price for the year was $12 727 per tonne. This rose steadily until June when the price had reached $14 449. In July the price dropped to $13 669 and thereafter rose steadily to the end of the year with a peak price of $15 598 per tonne in November. The December price was $15 484 per tonne.

The balance between supply and demand which emerged in late 1978 was maintained through 1979 but prices rose to new peaks during 1979. The market strengthened in the March quarter in response to buying by consumers who had deferred purchases in the hope of lower prices, if and when tin was released from the United States strategic stockpile. The United States Congress continued to refuse to take such action throughout the year.

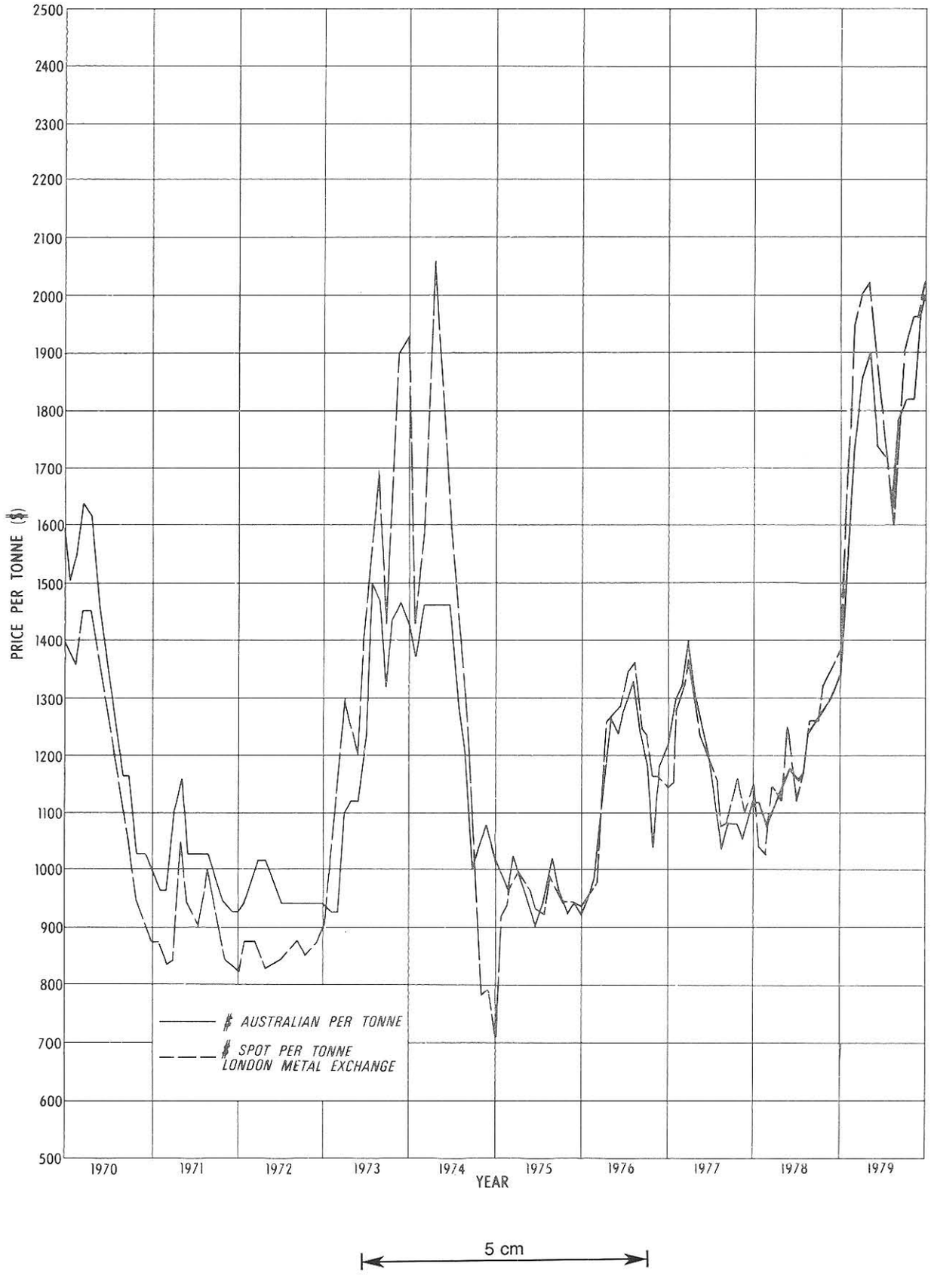
However, the tin disposal bill was signed into law by President Carter on 29 December, after being delayed for over three years. This was too late to have any effect on the market in 1979.

Tin prices rallied in late 1979 as a result of firm demand and shortages caused by disruptions to production in South-East Asia and Bolivia.

The International Tin Council raised the floor and ceiling prices in July 1979 but the market price ranged above the ceiling price for the whole year. The Council, which normally meets in London met in Sydney in October 1979. Members of the Council visited Renison's operation in this State.

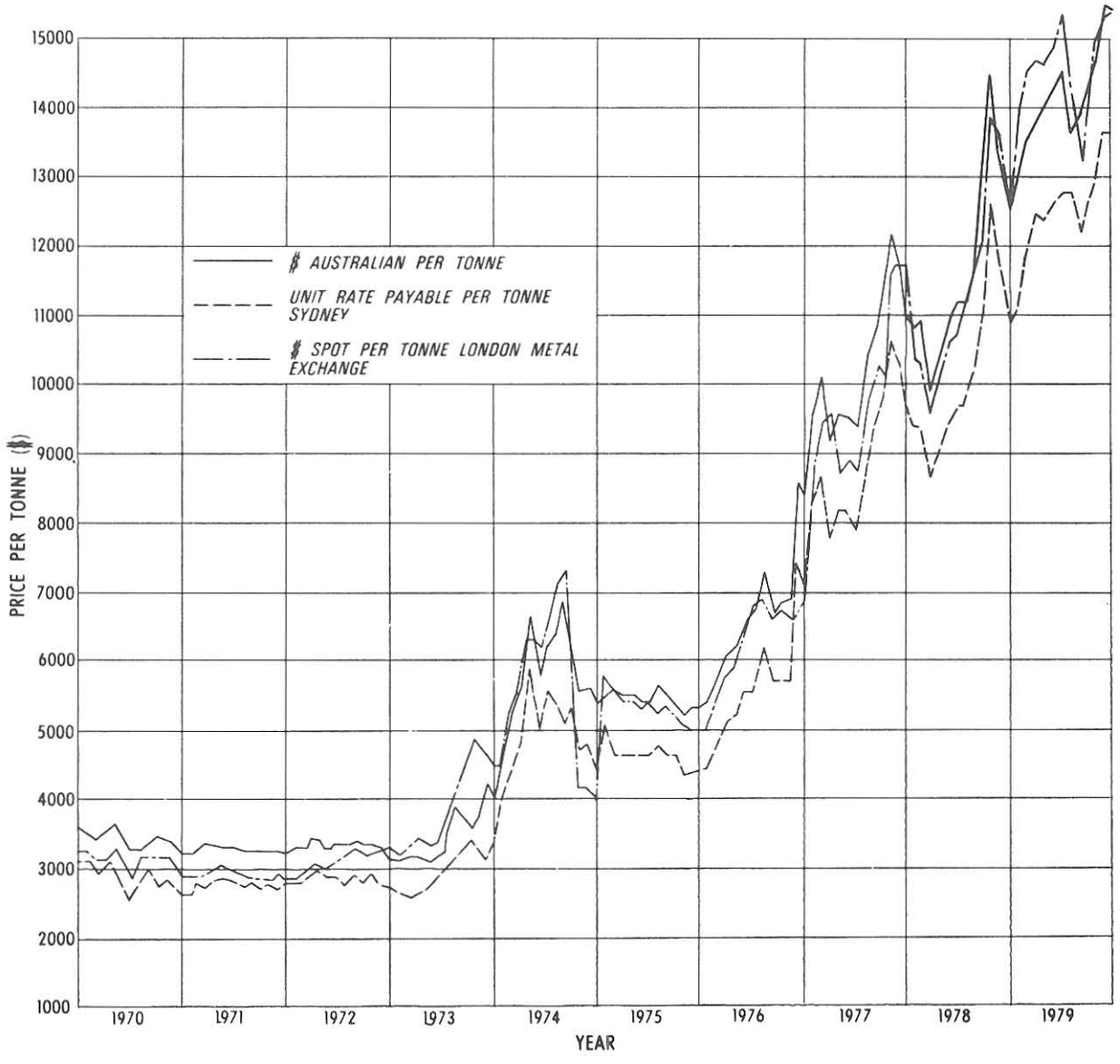
COPPER PRICES

MONTHLY AVERAGES, 1970–79



TIN PRICES

MONTHLY AVERAGE, 1970–1979



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TUNGSTEN PRICES

MONTHLY AVERAGES, 1970-1979

Tungsten

Tungsten prices declined slightly from 1978 levels, the second year of decreased prices from the record high levels of 1977. The average annual Metal Bulletin quotation was $138·83 per metric ton unit (mtu) compared with $143·79 per mtu in 1978 and $170·67 per mtu in 1977.

The average Australian price ranged from $105·65 per mtu in January to a high of $128·23 per mtu in August and September and had fallen back to $118·03 per mtu in December.

The price of tungsten was affected by a release of approximately 2 630 tonnes of tungstic oxide from the United States Government stockpile and a decrease in purchases by Communist block buyers.

Zinc

Production continued to exceed consumption during 1979 and the price reflected this situation. Total metal production in non-communist countries for the year was 4 731 tonnes and total consumption was 4 693 tonnes. There was therefore a net increase in stocks. Cut backs in production were announced in North America and Europe in the second half of the year.

The price on the London Metal Exchange rose to £408 per tonne in February but then declined steadily to £275 per tonne in August. There was then a modest rise and the price averaged £330–£340 in the last four months of the year.

The Australian price in January was $665 per tonne and this rose to $773 per tonne from May to August. The price had declined to $714 per tonne by the end of the year.

EXPLORATION

Interest in exploration was actively maintained throughout the year, both by local companies and by companies new to the State. Thirty-six licences were issued and forty-six existing licences were renewed.

Included in the applications received during the year were thirteen from companies looking for coal. This gives an indication of the increasing importance being given to coal exploration as a result of the energy crisis. Due to the upsurge in the search for coal it has been necessary for the Department to issue two key maps. One shows the exploration licences held for ' coal, oil and shale only ' and the other for all minerals ' excluding coal, oil and shale '. Issue of the separate maps commenced in 1 August.

Although the majority of licences are held in the west and north-west, the advent of the coal applications has given a more even distribution of licences over the other parts of the State. Another factor which stimulated exploration was the significant rise in the price of gold. This not only affected companies but caused many individuals to obtain prospectors' licences and to explore old workings.

In August 1978 the moratorium was imposed on South-West Tasmania. This is to remain until the appropriate legislation is passed by Parliament to amend the National Parks and Wildlife Services Act and the Forestry Act. However it was made clear to Cabinet that ' the Government will ensure that there is no diminution of the existing rights of persons and companies entitled to explore and harvest the natural resources of South-West Tasmania '.

During the present year there have been applications by three companies for substantial areas in the area subject to the moratorium. These have been processed by the Department to a certain stage and now await the passing of the necessary legislation before any further action can be taken.

The Department has maintained its established programme of regional geological mapping, economic geology, groundwater investigations and engineering geology. Maps and reports are issued regularly and professional staff are always available to assist and advise those engaged in the mining industry. Reports and other information lodged by former exploration licence holders are placed on ' open file ' when licences are relinquished or cancelled. These, with departmental publications and maps, form the basis upon which further work is planned by other explorers.

The Department's drilling plants continue to be engaged in testing mineral and coal deposits and in the investigation and measurement of underground water in selected areas. The work on exploration in the Fingal Valley has been accelerated in an effort to determine the State's coal resources in that area.

Expenditure on Exploration Licences and Special Prospectors' Licences during 1979 was as follows: —

Quarter ended	*$*
31 March 1979	1 544 558
30 June 1979	1 438 601
30 September 1979	1 092 192
31 December 1979	496 722
	4 572 073

COAL

The Duncan mine at Fingal operated by the Cornwall Coal Company N.L. was the only coal mine in production during the year. Output this year showed an increase of 13 423 tonnes over the 1978 figure of 223 957 tonnes, with an annual total of 237 380 tonnes. The average number of employees increased from 105 to 107.

In September the Cornwall Coal Company N.L. was taken over by Goliath Cement Holdings Ltd which obtained 98 per cent of the issued capital.

Cornwall at present provides coal for Goliath Cement, Australian Newsprint Mills Ltd at Boyer, Cadburys, the Royal Derwent Hospital and Savage River Mines. Increasing oil prices are causing other companies to seriously consider converting from oil to coal.

There has been a general upgrading of equipment at the mine and improvements have been made to the ventilation system. The construction of a separate entrance is still encountering geological problems.

A new seam was discovered in the course of exploration at Mt Nicholas.

In addition to the coal exploration being carried out by the Department, the Shell Co. is investigating at two locations. One is on their own licence E.L. 18/77 which was issued on 26 January 1978. This licence now covers a total area of 1 473 square kilometres in the vicinity of Avoca. The Shell Co. is also drilling on E.L. 5/61 held by Industrial and Mining Investigations. This licence covers an area of 775 km^2.

OIL

The following table shows details of permits issued under the Petroleum (Submerged Lands) Act 1967 which were current at 31 December 1979:—

Title	*Holder*	*Blocks*	*Expiry Date*
T/5P	Hematite Petroleum Pty Ltd	16	16.7.84
T/6P	Hematite Petroleum Pty Ltd	32	16.7.84
T/12P	Amoco Australia Petroleum Company, Tasman Oil Inc.	60	4.4.85
T/13P	Otter Exploration N.L.	224	4.4.85

In February Hematite Petroleum resumed drilling operations in the Bass Basin. Pelican-4 was drilled to evaluate the reservoir continuity of gas bearing sands indicated in the Pelican-1 and 2 wells drilled in 1970. Esso provided the semi-submersible drilling rig 'Ocean Endeavour' for the operation.

Following the surrender of T/4P by Hematite Petroleum Pty Ltd in 1978 the 42 blocks were gazetted and applications invited. The only application received within the allotted time was from Cue Minerals N.L. The company was advised on 1 November that the Designated Authority was prepared to grant a permit. This should be issued early in 1980.

An application received in June 1978 from Otter Exploration N.L. was granted in April 1979. The 224 blocks extend from north of Flinders Island to the vicinity of Eddystone Point on the north-east coast of Tasmania. Otter Exploration N.L. is the operator. Other companies with an interest in this permit include Spargos Exploration N.L., Bamboo Creek Gold Mines N.L. and Ocita Pty Ltd.

Another application received in 1978 was from Terra Marine Pacific Inc. of Dallas, Texas. This was granted on 4 April 1979. The permit is for 60 blocks on the west coast, from north of Granville Harbour to the vicinity of Point Hibbs. On the 31 December this permit was transferred to Amoco Australia Petroleum Company and Tasman Oil Inc.

On 15 August notices were published in the Tasmanian Government Gazette for the surrender of the 85 blocks of T/3P and the partial surrender of T/5P (49 blocks) and T/6P (32 blocks). Applications were invited for all of the 166 blocks with a closing date of 1 October 1979.

Applications were received from two consortiums of Australian companies — Van Diemen's Land Resources N.L. and Bass Strait Oil and Gas N.L. and one American company (Weaver Oil and Gas Corporation) of Houston, Texas.

Recommendations have been made to the Minister for Mines (Mr Polley) in his capacity as Designated Authority for allocation of the areas.

It is clear that reliance on Middle East oil supplies can pose a real danger to our economy. It is therefore essential that governments and the oil industry work together to ensure that vigorous oil exploration programmes are encouraged and continued.

LEGISLATION

The following amendments were made to Acts and Regulations administered by the Department.

Mining Act 1929

Section 2 was amended by inserting a subsection defining royalty in relation to a mining product.

Section 7 was amended to allow the provisions of the Act to apply to such gems, precious stones and helium as were specified in a proclamation. This was prompted by an increasing interest in gems and precious stones following Mt Lyell Mining and Railway Company Limited's application for an exploration licence (E.L. 26/78) for this purpose in the vicinity of Savage River.

The fees payable for a Prospector's Licence and a Miner's Right were increased by an amendment to section 22. A Prospector's Licence was increased from $1·00 to $10·00 and a Miner's Right from 50 cents to $5·00. The previous rates had remained unchanged for over 35 years.

Section 29 which specifies the annual rate payable on certain leases was also amended. The amendment rescinded the existing rate of $2·50 per hectare for mineral lease (other than alluvial leases) and substituted the new rate of $5·00 per hectare. It also rescinded the existing rate of $1·25 per hectare for alluvial leases, coal and stone leases and easements and substituted the new rate of $2·50 per hectare. Lease rents were last increased in 1960 when they were doubled. The increased rates applied from the 1 July 1979.

Regulation 48 was also amended to increase the fees payable for rent of water and easement licences.

As Miners' Rights and Prospectors' Licences operate on the calendar year the increased fees were not made effective until 1 January 1980.

Mount Read and Rosebery Mines Limited, Leases Act 1916

This Act was also amended to increase the rent payable on mining leases and licences to conform with increases on rents charged under the Mining Act 1929. The increases were made effective from 1 July 1979.

Iron Ore (Savage River) Agreement Act 1965

It was necessary to prepare a Deed of Variation under Section 6 *(b)* (ii) of the lease to increase the lease rents in conformity with other Acts.

Mines Inspection Act 1968.

An amendment was made to Schedule II of the Regulations relating to the fees payable for a mine manager's certificate of competency for written and oral examinations.

MINING AND THE ENVIRONMENT

Tasmania's continued prosperity is to a large extend bound up with the continued development of our mining industry. It is therefore important to consider the possible impact which other factors may have upon the prosperity of that industry.

Over the past several years a conflict in land use between mining and other development industries and bodies concerned with protection of the environment has emerged. It would be foolish to deny that this conflict does not still persist but it is now possible to perceive a growing maturity of thought of some of the opposing factions. This is a healthy development which is much to the benefit of the State and must be nurtured and developed with all the skill and understanding which can be brought to bear upon the subject. At present the areas of agreement are being reached by the moderate parties on both sides, whilst those who may be described as the more extreme elements in the conflict are still very far apart in their views.

Solutions must be found and although the pathway may be long and difficult it must be pursued with respect and diligence.

For its part the mining industry must continue to demonstrate its resolve to respect and protect the environment throughout the whole of its activities from exploration to mining and rehabilitation. The conservation interests should endeavour to appreciate the progress which has been made in this field and at the same time appreciate that mining developments are essential in order to protect our present standard of living.

A present attitude by some parties which would deny access by mining companies to geologically favourable exploration areas must be resisted by all concerned. We cannot afford to alienate such areas for all time and at the same time look forward to the continued prosperity of the mining industry. When the mining industry is granted rights to explore in fragile areas, it must in turn exercise restraint in its operations.

It is important for all concerned in these matters to work carefully toward solutions which will lead to substantial benefits for the State.

THE FUTURE OF MINING

The 1980's will be a time of challenge and expansion for the Tasmanian mining industry. At the present time we are in the midst of a mineral exploration boom at least as great as that which we experienced a decade ago. Developments which will flow from this boom will create further expansion of the mining industry in Tasmania.

At present we have the development of the Que River deposit and concomitant expansion of milling capacity at Rosebery. Renison is expanding its milling capacity; exploration of the old Tasmania gold mine at Beaconsfield and the tin deposits at Mt Bischoff show promise of development into working mines. In other areas of the State aggressive mineral exploration is proceeding and it will be surprising indeed if this does not lead to the development of additional mines in the State.

Tasmania has important advantages to offer at a time of increased mining and exploration activity. The State contains mineral deposits of world significance and extensive tracts of geologically favourable host rocks for mineralisation. In addition to the favourable environment the compactness of the State offers advantages in that the infrastructure for newly established mines is likely to be far less costly than would be the case in the more sparsely populated portions of Australia.

Whilst future mineral exploration in Tasmania is likely to be dominated by the search for tin and tungsten as the State has long held a leading position in the production of these commodities, the exploration programmes will also extend into a whole range of other mineral products. We have a history of small but important gold mining in the north-east of the State and these deposits will be carefully re-examined. The discovery and development of the zinc deposits at Que River indicates that there is a good possibility of discovering new massive sulphide base metal deposits. The development of chrome sand deposits near Beaconsfield has added a new commodity to the list of Tasmanian mineral products and there are good prospects of continued production of this important mineral.

The search for oil in Bass Strait and along the west coast of Tasmania has entered a new phase with the advent of several new companies to the search. This exploration requires large amounts of high-risk capital together with great skill and dedication. Tasmania can therefore look forward to a new and exciting round of oil exploration which may well bring great benefit to the State.

Coal exploration within the State has been vastly expanded and we can anticipate continued development of our coal resources for the benefit of Tasmanian industry. Finally we can look forward to significant development of our non-metallic mineral resources. At present there is active exploration for silica, dolomite, and magnesite and the prospect of the development of a significant industry based on these resources cannot be overlooked.

AUSTRALIAN MINERALS AND ENERGY COUNCIL

The Council met on 9 March in Sydney and on 26 July in Brisbane.

Important matters discussed have included:—

(1) The fuel supply and distribution situation.
(2) Energy conservation.
(3) Research and development on alternative to liquid fuels.
(4) Pricing policy for L.P.G. and L.P.G. automotive vehicle conversion.
(5) Joint offshore authorities for petroleum and all other minerals.
(6) Activities of the Australian Heritage Commission.

The activities of the Australian Heritage Commission in relation to the minerals and energy industries in Australia were discussed in detail at the Sydney meeting. The Council noted with approval that the Prime Minister had recently instituted a review of the scope and operation of the Australian Heritage Commission Act. The Council agreed that it would be appropriate for this review to be concluded expeditiously.

The Advisory Committee drawn from officials of the departments supporting the Council Ministers, held meetings in Sydney, Canberra and Brisbane. The major task undertaken by the Advisory Committee was the review of the existing Petroleum (Submerged Lands) Act of 1967.

REVENUE

REVENUE COLLECTED DURING THE YEAR ENDED 31 DECEMBER 1979

Heads of Revenue	$
Mines Department (Drilling)	94 514
Rent and Fees of Auriferous and Mineral Lands	314 973
Mineral Royalties	2 981 959
Survey Fees	2 080
Fees under the Dangerous Goods Act	28 364
	3 774 881

COMPARATIVE STATEMENT OF REVENUE FROM MINES BEING RENTS, FEES, STORAGE OF EXPLOSIVES, ETC., PAID TO THE TREASURY DURING THE YEARS 1974 TO 1979

Year	$	*Year*	$
1974	649 029	1977	2 263 163
1975	602 259	1978	2 380 590
1976	1 202 560	1979	3 774 881

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

Royalties

The royalty on sand and gravel remained unchanged at 30 cents per cubic metre. The three tier system for other minerals applied for the full twelve months.

The amount of royalty collected in 1979 was $3 334 950 consisting of $36 347 from the mining of sand and gravel and $3 298 603 from other mining operations.

Three companies elected to pay royalty on proceeds.

LEASES AND LICENCES

NUMBER AND AREA OF NEW LEASES AND LICENCES ISSUED DURING THE YEAR ENDED 31 DECEMBER 1979

Leases and Licences	*Number*	*Area (ha)*	*Sluiceheads*
Coal	9	878	....
Gold	10	539	....
Stone	6	493	....
Minerals	12	714	....
Gravel and Sand	12	297	....
Tin	31	818	....
Water	14	....	54
	94	3 739	54

TOTAL NUMBER OF LEASES AND LICENCES IN FORCE ON 31 DECEMBER 1979

Leases and Licences	*Number*	*Area (ha)*	*Sluiceheads*
Antimony	1	32	....
Bauxite	5	183	....
Clay	20	356	....
Coal	24	3 537	....
Copper	4	4 963	....
Dolomite	4	126	....
Gemstones	3	22	....
Gold	54	1 763	....
Granite	2	6	....
Iron ore	18	1 692	....
Kaolin	2	362	....
Limestone	5	615	....
Marble	2	32	....
Minerals	70	10 993	....
Osmiridium and chromite	2	184	....
Peat	2	92	....
Sand and Gravel	100	7 433	....
Silica	11	641	....
Slate	2	99	....
Stone	105	5 505	....
Silver lead and zinc	17	959	....
Tin	338	11 678	....
Uranium	1	81	....
Wolfram and tin	15	2 772	....
Water licences	114	....	1 054
Easements	87	1 440	....
Total	1 008	55 566	1 054

NUMBER AND AREA OF LEASES AND LICENCES APPLIED FOR DURING THE YEAR ENDED 31 DECEMBER 1979

Leases and Licences	*Number*	*Area (ha)*	*Sluiceheads*
Coal	6	1 773	....
Gold	12	913	....
Gravel and sand	12	1 645	....
Limestone	12	1 276	....
Minerals	6	2 382	....
Tin	35	2 085	....
Water	6	....	21
Total	89	10 074	21

TOTAL NUMBER OF ALL TYPES OF PROSPECTING RIGHTS HELD
AS AT 31 DECEMBER 1979

Mining Tenement	*Number*	*Area*
Permits to enter and search on private land, including owners' consents	10	19 126 ha
Exploration licences	80	18 278 km²
Special Prospectors' licences	4	80 km²
Miners' Rights	109	28 ha
Prospecting licences	293	7 325 ha
Authorities to prospect under the Aid to Mining Act 1927	....	....
Permits to explore for petroleum under the Petroleum (Submerged Lands) Act 1967	5	374 blocks

MINES DRAFTING SECTION

Senior Draftsman G. A. Thomas reports: —

1979 saw the production of four new series charts at a scale 1:20 000. They were: Mathinna, Mt Blackboy, Calder, and Rosebery. Proof-copy state has been reached with Yolande River, Brilliant Creek and Dublin Town. Others on programme include Waratah, Lynchford, Mt Owen and Mt Saddleback.

Working charts and transparencies now total 480 and with much greater emphasis being placed on activities relating to forestry, national parks, environment, land management, local government and the private sector, the necessity to keep these charts up-to-date on a daily basis is paramount.

There were 71 applications for mineral leases on crown land and 22 over private property. Numerous miners' rights and prospecting claims were recorded and the public information service offered increased considerably with the upsurge in mining activity, particularly in the known gold areas in Tasmania.

Special Prospecting and Exploration Licences totalled 33, with considerable movement occurring in Offshore Petroleum Licences. Renewed activity in coal, oil and shale exploration saw the necessity to introduce a new transparency specifically for these areas. To obtain a full picture of Licences held, it is now necessary to work from two charts.

Special productions included Calder Gravel Area, drawn by this office in conjunction with the Lands Department, and five areas exempted from the Mining Act.

Sixty-one diagrams subject-to-survey, 14 plans and seven diagrams for survey were drawn. Transparencies for all diagrams were drawn for Lease documentation.

Dyelines for office use and sale to the public totalled 1 800. Photostat copies for sale and office use amount to 66 000.

The latter part of 1979 saw the Section relocated on the ground floor in the area previously occupied by the Lands Department Cadastral Draftsmen. The location is spacious and comfortable and allows for necessary growth in the plan, file and photo-storage areas.

WARDENS' COURT

R. G. Williams and W. V. McDonald v. B.M.I. Mining Pty Ltd. Forfeiture of leases 85M/64 and 40M/70. Applications were withdrawn following surrender of leases.

K. Thompson v. Petro-Quest Pty Ltd. Objection to an exploration licence, Devonport area. The Warden of Mines, Devonport, dismissed the application.

P. M. Grose v. Verbaan Developments Pty Ltd. Objection to exploration licence, north-east Tasmania. The application was withdrawn by the plaintiff.

Industrial and Mining Investigations Pty Ltd v. Cornwall Coal Company N.L. Objection to exploration licence, Fingal. The application was withdrawn by the plaintiff.

MINE MANAGERS' CERTIFICATES

Metalliferous Mine Managers' Certificates were issued by the Board of Examiners under the Mines Inspection Act 1968, as follows: —

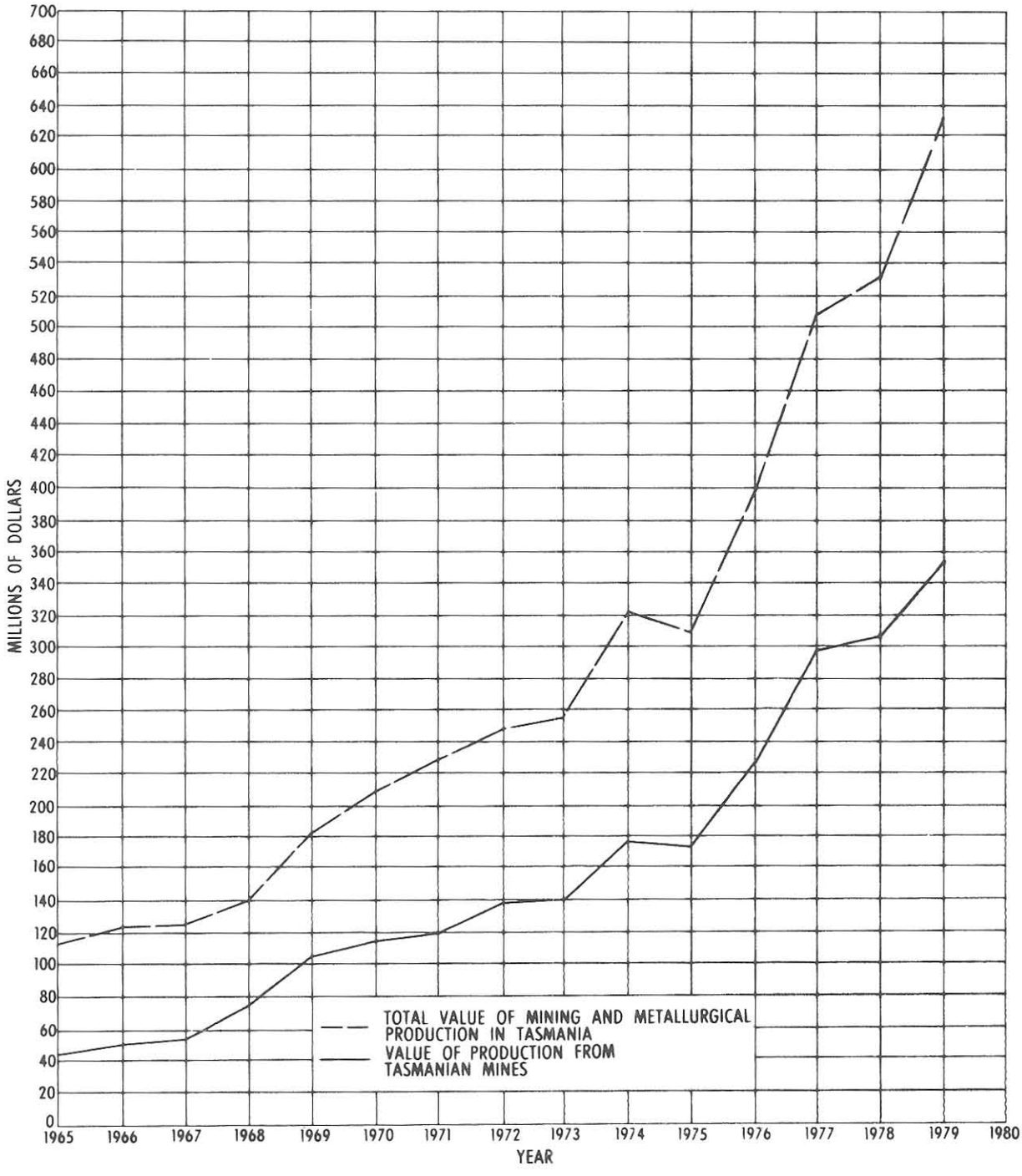
By examination viva voce —

Certificate No.	*Name*
264/79	Andrew John King
265/79	Peter Guildford North
266/79	Roger Neville Hampson
267/79	William John Crossley
268/79	John McAllister
269/79	Peter John Reynolds
270/79	Michael Andrew Eager
271/79	Terence John Stephenson
272/79	Keith John Elvish

VALUE OF TASMANIAN MINERALS IN RECENT YEARS WITH AUSTRALIAN METAL PRICES

Year	*$*	*Year*	*$*
1970	115 569 042	1975	173 317 865
1971	119 998 652	1976	228 466 800
1972	136 847 182	1977	298 006 591
1973	139 557 052	1978	300 884 758
1974	177 327 923	1979	350 572 595

VALUE OF MINING AND METALLURGICAL PRODUCTION, 1965-1979



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MINERAL PRODUCTION SINCE 1880

QUANTITY AND VALUE OF PRODUCTION AS AT 31 DECEMBER 1979

Mineral	*Unit*	*Total Quantity*	*Value*
METALLIC MINERALS			$
Antimony	(tonne)	3	2 034
Bismuth	(kilogram)	110 080	503 385
Cadmium	(tonne)	3 079	11 920 716
Chromite	(tonne)	1 689	150 732
Cobalt oxide	(kilogram)	132 174	874 543
Copper (blister) to 1918 (now shown under Silver and Copper)	(tonne)	169 273	27 577 054
Copper matte	(tonne)	6 326	267 472
Copper ore to 1918 (now shown under Copper)	(tonne)	42 439	1 155 476
Copper (from 1919)	(tonne)	768 430	518 266 004
Crocoite	(specimens only)	....	46 187
Gold	(kilogram)	101 941	90 847 333
Ilmenite	(tonne)	558	2 512
Iron ore pellets	(tonne)	24 602 117	367 875 878
Iron oxide (including hematite, limonite and magnetite)	(tonne)	269 401	1 368 702
Lead (from 1919)	(tonne)	561 754	120 418 246
Manganese	(tonne)	1	6
Manganese dioxide (from 1957)	(tonne)	11 671	425 680
Mercury	(kilogram)	7 697	90 251
Monazite	(tonne)	34	1 214
Nickel	(tonne)	237	81 036
Osmiridium	(kilogram)	881	1 418 771
Pyrite (to 1971)	(tonne)	2 124 070	10 239 957
Pyrite (from 1972)	(tonne)	1 524 975	....
Rutile	(tonne)	1	36
Rutile (concentrates)	(tonne)	40 027	8 270 047
Scheelite (concentrates)	(tonne)	48 589	208 279 540
Silica for silicon alloy production	(tonne)	251 929	5 082 324
Silicon as silicon alloys	(tonne)	294 026	57 056 516
Silver-lead ore to 1918 (now shown under Silver and Lead)	(tonne)	1 101 295	12 858 582
Silver (from 1919)	(tonne)	2 149 979	85 461 813
Sulphur as sulphuric acid	(mono tonne)	4 110 677	75 500 560
Tin	(tonne)	225 560	550 726 268
Wolfram (concentrates)	(tonne)	22 057	44 485 750
Zinc	(tonne)	1 514 416	463 701 610
Zinc sulphate (from 1957)	(tonne)	3 251	324 177
Zircon (concentrates)	(tonne)	39 001	5 039 899
NON-METALLIC MINERALS			
Asbestos	(tonne)	4 044	34 284
Barite	(tonne)	2 240	16 478
Clay (from 1958) —			
Brick	($metre^3$)	1 664 502	4 497 002
Tile	($metre^3$)	71 310	182 009
Other	($metre^3$)	535 945	2 259 543
Dolomite	(tonne)	110 983	917 795
Graphite	(tonne)	41	214
Kaolin	(tonne)	166 285	5 567 937
Limestone —			
Agricultural and other	(tonne)	1 341 939	4 158 415
Carbide	(tonne)	1 038 837	5 296 109
Cement	(tonne)	10 778 964	20 122 909
Chemical and metallurgical	(tonne)	5 008 091	10 290 039
Ochre	(tonne)	2 949	23 483
Pebbles (from 1957)	(tonne)	23 932	473 828
Sand (moulding)	(tonne)	864	9 550
Silica	(tonne)	423 676	1 166 528
Talc	(tonne)	338	2 154
FUEL MINERALS			
Coal	(tonne)	11 484 856	39 066 429
Shale	(tonne)	42 239	62 462
Peat	(tonne)	9 454	370 128

MINERAL PRODUCTION SINCE 1880 — *continued*

QUANTITY AND VALUE OF PRODUCTION AS AT 31 DECEMBER 1979 — *continued*

Mineral	*Unit*	*Total Quantity*	*Value*
CONSTRUCTION MATERALS			$
Building stone —			
Freestone	(metre³)	15 245	903 158
Granite	(metre³)	6 221	325 146
Other stone	(metre³)	14 681	131 388
Crushed and broken stone (from 1958) —			
Basalt	(metre³)	4 387 608	24 732 651
Dolorite	(metre³)	10 037 209	49 267 156
Limestone	(metre³)	446 080	2 049 433
Sandstone	(metre³)	49 457	182 208
Other	(metre³)	4 271 709	21 187 458
Gravel (from 1958)	(metre³)	23 964 425	60 519 561
Sand (from 1958)	(metre³)	2 928 891	9 994 037
Other road-making material	(metre³)	3 612 034	8 493 388
			2 961 110 860

STATISTICS RELATING TO THE MINERAL INDUSTRY

Mineral	Unit	Year ended 31 December 1978 — Total Quantity	Year ended 31 December 1978 — Value	Year ended 31 December 1979 — Total Quantity	Year ended 31 December 1979 — Value
METALLIC MINERALS			$		$
Cadmium	(tonne)	145	594 500	141	760 870
Chromite	(tonne)	684	61 312	1 005	89 420
Cobalt oxide	(kilogram)	2 820	52 790	2 312	88 386
Copper	(tonne)	22 067	26 730 905	21 026	37 858 925
Crocoite	(specimens only)	....	10 496	....	1 447
Gold	(kilogram)	1 618	8 768 832	1 490	13 884 521
Iron ore pellets	(tonne)	2 108 027	42 990 928	2 258 882	47 489 940
Iron oxide	(tonne)	14 325	105 800	16 246	154 660
Lead	(tonne)	16 907	9 573 050	16 375	17 140 828
Manganese dioxide	(tonne)	520	15 436	90	2 947
Silica for silicon alloy production	(tonne)	44 722	1 118 050	74 474	1 861 850
Silicon as silicon alloys	(tonne)	25 461	8 308 568	38 568	12 017 624
Silver	(tonne)	68 456	10 475 642	62 705	18 657 637
Sulphur —					
Pyrite	(tonne)	141 250	....	41 018	....
Sulphuric acid from pyrite	(mono tonne)	242 438	6 723 816	101 932	2 962 946
Sulphuric acid from zinc concentrates	(mono tonne)	109 626	2 590 668	87 695	2 025 134
Tin	(tonne)	7 271	84 521 356	6 618	94 511 996
Tungsten as tungstic oxide	(tonne)	2 630	31 750 739	2 490	30 541 347
Zinc	(tonne)	61 753	35 078 116	59 396	43 968 329
VALUE OF METALLIC MINERALS		....	269 471 004	....	324 018 807
NON-METALLIC MINERALS					
Clay —					
Brick	(metre³)	63 401	190 671	75 921	239 467
Tile	(metre³)	7 496	30 153	....	....
Other	(metre³)	14 270	71 575	16 750	84 814
Dolomite	(tonne)	10 284	119 438	18 313	216 739
Kaolin	(tonne)	13 281	1 174 763	17 513	1 454 203
Limestone —					
Agricultural	(tonne)	67 485	412 296	52 358	352 902
Carbide	(tonne)	29 876	448 140	29 160	437 400
Cement	(tonne)	515 717	1 547 151	559 564	1 678 692
Chemical and metallurgical	(tonne)	89 575	913 400	88 371	904 078
Other	(tonne)	14 363	56 197	18 406	62 777
Pebbles	(tonne)	1 486	48 095	1 515	47 390
Silica	(tonne)	8 366	43 991	8 397	47 800
VALUE OF NON-METALLIC MINERALS		....	5 055 870	....	5 526 262
FUEL MINERALS					
Coal	(tonne)	223 957	2 527 033	237 380	3 202 108
Peat	(tonne)	3 098	65 170	410	78 775
VALUE OF FUEL MINERALS		....	2 592 203	....	3 280 883
CONSTRUCTION MATERIALS					
Building stone —					
Freestone	(metre³)	937	159 923	492	36 922
Granite	(metre³)	705	114 416	874	119 872
Other stone	(metre³)	35	1 400	1 178	12 062

STATISTICS RELATING TO THE MINERAL INDUSTRY — *continued*

Mineral	*Unit*	*Year ended 31 December 1978*		*Year ended 31 December 1979*	
		Total Quantity	*Value*	*Total Quantity*	*Value*
Crushed and broken stone —			$		$
Basalt	(metre³)	380 946	3 476 975	562 965	4 101 303
Dolerite	(metre³)	415 779	3 685 566	255 786	2 009 204
Limestone	(metre³)	41 743	292 121	34 130	240 891
Sandstone	(metre³)	3 057	21 399	10 125	72 189
Other	(metre³)	836 632	5 856 627	320 995	2 230 041
*Gravel	(metre³)	1 584 195	8 007 233	1 347 938	6 749 634
Sand	(metre³)	204 347	1 211 412	269 244	1 539 019
Other road-making material	(metre³)	187 255	938 609	123 031	635 506
VALUE OF CONSTRUCTION MATERIALS		....	223 765 681	....	17 746 643
TOTAL VALUE WITH AUSTRALIAN METAL PRICES		....	300 884 758	....	350 572 595
METALLURGICAL PRODUCTION FROM OTHER THAN TASMANIAN ORES					
Alumina					
Aluminium					
Aluminium hydrates					
Aluminium sulphate					
Cadmium		....	230 923 877	....	283 284 804
Cobalt oxide					
Ferro-manganese					
Titanium dioxide					
Zinc					
VALUE OF MINING AND METALLURGICAL PRODUCTION		....	531 808 635	....	633 857 399
AVERAGE NUMBER OF EMPLOYEES		9 425		9 273	

* Figures include late returns.

AID TO MINING

Under the provisions of the Aid to Mining Act, 1927, financial assistance may be made available to companies or single operators who hold mineral leases. Loans are secured by a registered mortgage deed and repayments are required at the rate of 7½ per cent of the proceeds of minerals produced and sold.

Repayments of royalty from assisted parties are credited to the Mining Trust Fund and are then available to other applicants. An amount of $25 000 was made available in the Appropriation Act 1979–80 and transferred to the Fund on 3 December 1979.

During 1979 assistance totalling $10 500 was made available to two tin miners operating in the north-east of the State to assist in the purchase of a loader and a bulldozer.

Mining Plant

Certain items of plant are available for hire to small parties to test mineral prospects from shafts or other forms of underground mining. During the year a jig was hired for a short period.

STAFF MOVEMENTS

Name	*Position*	*Remarks*	
Bellis, T. R.	Draftsman	Resigned	28.3.78
Briggs, W. (Miss)	Clerk	Promoted	12.4.79
Coad, A. M. (Miss)	Office Assistant	Appointed	26.7.79
Clayton, E. L. (Miss)	Clerk	Appointed	30.8.79
Crocker, B. S. (Mrs)	Office Assistant	Resigned	26.3.79
Davis, H. J. (Miss)	Clerk	Resigned	25.5.79
Everard, J.	Geologist	Commenced	2.7.79
Grieve, M. (Mrs)	Typist	Transferred	15.2.79
Hampson, R. N.	Mining Engineer	Appointed	10.5.79
Hopkins, P. N.	Clerk	Promoted	6.9.79
Moon, A. T.	Geologist	Appointed	15.1.79
Munro, R. A. A.	Field Assistant	Resigned	18.4.79
Murzecki, P. R. P.	Registrar of Mines	Appointed	21.6.79
Ruzicka, P.	Field Assistant	Appointed	31.10.79
Smith, C. P.	Registrar of Mines	Resigned	17.4.79
Stewart, N. S.	Clerk	Resigned	26.11.79
Taylor, A. E. (Mrs)	Typist	Appointed	5.7.79
Vass, A. I. (Miss)	Clerk	Appointed	28.5.79
West, A. K.	Laboratory Technician	Resigned	28.2.79
Wyton, S. (Miss)	Laboratory Technician	Appointed	19.4.79

SCHOLARSHIPS

No scholarships were awarded this year. P. B. Ketelaar and D. Polya continued their studies at the University of Tasmania for the degree for Batchelor of Science (second year).

Miss C. A. Bacon was granted an extension of her scholarship to enable her to study for an honours degree. She successfully completed her studies and was awarded upper second class honours. Her thesis was based on research into Tasmanian coal-bearing sequences and was therefore of direct relevance to the activities of the Department.

OVERSEAS VISIT

A. V. Brown, a geologist of the Regional Mapping Section of the Geological Survey Branch, attended the International Ophiolite Symposium in Cyprus during April. This symposium was organised and sponsored by the Government of Cyprus and the International Association of Volcanology and Chemistry of the Earth's Interior.

CONCLUSION

Appreciation is recorded of the services rendered by officers of the Department, Wardens of Mines and Registrars of Mines in Hobart and Launceston.

A detailed review of operations and production, 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 follow.

J. G. SYMONS, Director of Mines.

OPERATIONS AND PRODUCTION

1. METALLIC MINERALS

CADMIUM

QUANTITY AND VALUE OF PRODUCTION

Year	*Tonnes*	*$*	*Year*	*Tonnes*	*$*
1927–1974	2 371	8 495 046	1977	149	731 250
1975	155	784 240	1978	145	594 500
1976	118	554 810	1979	141	760 870
			Total	3 079	11 920 716

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

CHROMITE

QUANTITY AND VALUE OF PRODUCTION

Year	*Tonnes*	*$*	*Year*	*Tonnes*	*$*
1978	684	61 312	1979	1 006	89 420
			Total	1 690	150 732

Northern Chromite Pty Ltd, Beaconsfield

Minor modifications only were made to mining and milling methods. A two stage pumping system was installed to reclaim fine chromite bearing tailings.

A new tailings dam and a flocculant mixing and dosing system was constructed and installed for a capital expenditure of $45 000.

The average number of employees increased from 12 to 16 at the years end.

COBALT OXIDE

The source of the 2·312 tonnes of cobalt oxide of value $88 386 was the same as that of cadmium.

COPPER

SOURCE QUANTITY AND VALUE OF PRODUCTION

	From tin ores		*From lead-zinc ores*		*In blister copper*		*From copper ores*		*Total*	
Year	*Tonnes*	*$*	*Tonnes*	*$*	*Tonnes*	*$*	*Tonnes*	*$*	*Tonnes*	*$*
1919–1974	5 115	5 740 517	28 266	24 359 008	501 143	208 564 870	119 460	137 095 644	653 984	375 760 039
1975	570	545 487	2 174	2 080 831	....	....	22 954	21 980 197	25 968	24 606 515
1976	611	709 379	2 709	3 153 402	....	....	21 246	24 644 879	24 566	28 507 660
1977	433	519 836	2 966	3 509 792	....	....	17 690	20 772 332	21 089	24 801 960
1978	450	547 864	2 163	2 596 818	....	....	19 454	23 586 223	22 067	26 730 905
1979	453	820 955	2 318	4 172 383	....	....	18 255	328 865 587	21 026	37 858 925
Total	7 632	8 884 038	40 596	39 872 234	501 143	208 564 870	219 059	260 944 862	768 430	518 266 004

The Mount Lyell Mining and Railway Company Limited, Queenstown

T. E. Evans, Mining Engineer, Burnie, reports:—

Production

Production of ore dropped below the level of 1978 by approximately 150 000 tonnes. This drop was due mainly to a series of industrial stoppages over the year.

In contrast, the grade of the ore despatched to the concentrator slightly improved. This improvement however was insufficient to offset the effect of the drop in ore tonnage and so the tonnage of copper contained in the ore produced also dropped.

The improvement in the ore grade was due to the successful exercising of more stringent control over stope draw and the mining of some better grade ore blocks.

The production data for 1979 is as follows:—

Ore mined	*Tonnes*
Prince Lyell	917 526
'A' Lens	328 866
Cape Horn	205 422
	1 451 814
Grade of ore despatched to the concentrator — 1·34 per cent copper	
Tonnage of ore treated (tonnes)	1 457 313
Copper concentrate produced — (tonnes)	69 707
Containing —	
Copper (tonnes)	18 255
Silver (grams)	2 673 339
Gold (grams)	424 779
Pyrite concentrate produced — (tonnes)	20 463
Total value of production	$37 200 000

The production of pyrite concentrate ceased in May as a result of the closure of North-West Acid Proprietary Limited, who had been purchasing the concentrate.

All the ore produced came from underground sources. Open stoping was the mining method which produced the bulk of the ore. Sub-level caving, which was practised in 'A' Lens, and mine development contributed the balance.

General

Improved copper prices caused the operation to be profitable and no government assistance was required.

Another large mass-firing was undertaken in the Prince Lyell mine, this time the 24/25 pillar in the 20 series of stopes. One hundred and forty tonnes of explosives were used in the firing, which it is calculated broke 507 500 tonnes of ore.

Ore haulage by diesel trucks up the main decline direct to No. 4 Crusher on surface commenced in December, employing three Wagner MT4-25-30 trucks and two Euclid B6TD trucks. These trucks will be augmented in this duty by four DJB D550 trucks, each of 50 tonnes capacity, when they enter into service in 1980.

Rail haulage from Prince Lyell Mine and 'A' Lens has thus diminished considerably and will eventually cease altogether. Rail haulage from Cape Horn however continues to operate as before and this means of haulage is also being employed for despatching Twelve-West ore to the concentrator.

Underground at the 14-Level horizon, the installation of a Roxon mechanical-plate feeder commenced. This feeder will handle ore from a rise system which serves both the 20 Series and the 30 Series stopes at Prince Lyell. The feeder is designed to load the DJB D550 trucks.

At the concentrator, the installation of two 15 feet diameter ball mills, each with 2 500 kW motor, and the modification of plant associated with milling commenced in October. Commissioning of these ball mills is scheduled to take place in September 1980 and their operation is designed to improve copper recovery and to raise the tonnage treated to 1·8 million tonnes per annum on the basis of a five-day operating week.

At the old West Lyell workshop, dismantling is complete.

Mine Development

A summary of the mine development achieved during the year is as follows:—

Mine Area	*Driving (metres)*	*Rising (metres)*	*Diamond Drilling (metres)*
Prince Lyell —			
20 Series	544	367	911
30 Series	1 217	143	1 360
Off No. 1 Shaft	43	....	43
Main Decline	16	....	16
'A' Lens	1 497	296	1 793
Cape Horn	1 075	104	1 179
Crown Twelve West	70	....	70
Total	4 462	910	5 372

On the 92 m level, development was completed of the extraction and undercut layout for the Prince Lyell 20 Series stopes. Development was also completed of the diagonal crosscut into the footwall to the position of the extended Southern Exhaust Airway system. At end of the year preparation was underway in this diagonal crosscut for rising to be carried out later to the 197 m level by means of an Alimak raise climber.

In connection with the Prince Lyell 30 Series stopes, development was commenced of the 80 m drilling level and development of the accesses to the extraction levels was started and progressed to completion.

On the 'A' and Intermediate lenses, development of a layout for open stoping was commenced on the 180 m and 100 m levels and was progressed to near completion. Ground conditions in the 'A' Lens development on the 100 m level were generally poor and made necessary the extensive installation of ground support.

Extension of the main decline down to the 40 Series stopes commenced, as did development for the extraction of some remnant ore left in the Crown Twelve West orebody.

A Paurat E300 Road Header was given a trial in the main decline heading during October. The machine proved unsuccessful due to excessive tool wear.

Of the rises completed, six, totalling 467 metres, were developed by means of a raise borer.

ORE RESERVES AT 30 JUNE 1979

Mine	*Ore (tonnes)*	*Copper (%)*	*Silver (g/tonne)*	*Gold (g/tonne)*
PROVED ORE				
Prince Lyell	3 081 000	1·37	3·0	0·4
Cape Horn	120 000	2·71	4·3	1·2
'A' Lens	65 000	1·35	1·6	0·3
	3 266 000	1·42	3·02	0·43
PROBABLE ORE				
Prince Lyell	20 284 000	1·45	3·0	0·4
Cape Horn	874 000	1·93	3·1	0·3
'A' Lens	2 223 000	1·37	1·5	0·2
Royal Tharsis	1 878 000	1·46	1·5	0·2
Intermediate Lens	291 000	1·24	1·5	0·2
Crown Twelve West	25 000	9·50	30·6	0·2
	25 575 000	1·47	2·77	0·36
POSSIBLE ORE (NOT RESERVES)				
Cape Horn	1 128 000	1·55	3·1	0·3
'A' Lens	1 418 000	1·25	1·5	0·2
Prince Lyell	3 000 000	1·30	3·0	0·4
Crown Three	1 187 000	1·67	4·0	0·4
	6 733 000	1·40	2·88	0·34

Capital Expenditure

A total of $1 289 000 was expended on the following capital items:—

2 down-the-hole drill rigs;
1 booster compressor;
1 Wigbus;
4 concentrate trucks;
7 assorted light vehicles;
ordering of 4 DJB D550 trucks;
completion of tipping arrangement at No. 4 crusher;
commencement of new ball-mill building and foundations;
commencement of rehabilitation of Prince Lyell No. 1 shaft;
commencement of pump-station excavation at No. 1 shaft;
commencement of installation of Roxon feeder;
trial operation of a Paurat E300 road header;
development to the position of the Southern Exhaust Airway;
extension and preparation for rising; and
excavation of part of new underground diesel workshop.

Safety

Including contractors' employees, the average number of persons employed was 711.

One hundred and fifteen lost-time accidents occurred, of which one was fatal and another eleven were classified as serious.

The work injury statistics are as follows:—

Manhours exposure	1 268 185
Frequency Rate	90·7
Severity Rate	6 423·4
Mean Duration (Days)	19

Cleveland Tin N.L., Luina

This company, reviewed under Tin, produced 1 588 tonnes of copper concentrates containing 453 tonnes of copper valued at $820 955.

Electrolytic Zinc Company of Australasia Limited, Rosebery

This company, reviewed under Zinc, produced 2 318 tonnes of copper valued at $4 172 383.

GOLD

QUANTITY AND VALUE OF PRODUCTION

Year	*Kilograms*	*Value $*	*Year*	*Kilograms*	*Value $*
Prior to 1975	94 450	51 257 919	1977	1 616	6 976 251
1975	1 543	5 712 948	1978	1 618	8 768 832
1976	1 314	4 246 862	1979	1 490	13 884 521
			Total	101 941	90 847 333

The Mount Lyell Mining and Railway Company Limited, Queenstown

This company recovered 428 kilograms from sludge in the electrolytic copper refinery valued at $4 024 289.

Electrolytic Zinc Company of Australasia Limited, Rosebery

Concentrates produced by this company contained 1 061 kilograms valued at $9 851 981.

Amdex Mining Limited, South Mount Cameron

Concentrates produced by this company contained one kilogram of gold valued at $8 251.

IRON ORE (PELLETS)

Savage River Mines, Savage River and Port Latta

	Tonnes
Savage River —	
All material handled	14 092 940
Rock to waste	8 779 270
Crude ore	5 313 670
Concentrate produced	2 214 721
Concentrate pumped	2 092 654
Port Latta —	
Pellets produced	2 258 882
Pellets shipped	2 217 467
Pellets inventory	274 542
Value of production	$47 489 940

Mining

R. N. Hampson, Mining Engineer, Burnie reports:—

Mining operations in the pit were concentrated mainly on the 14th and 15th levels. In addition some mining was carried out on the upper levels of the pit. The lowering of the saddle between A and B dumps to R.L. 332 was completed early in the year.

A detailed investigation into the stability of the pit walls was completed by D. Piteau and Associates of Vancouver, Canada. Based on their recommendations a programme to determine the feasibility of dewatering the East Wall of the pit commenced towards the end of the year.

Choke blasting continues to be the main method of blasting but overbreak and wall damage are causing some concern.

Four new Caterpillar 85 tonne trucks and a Caterpillar hydraulic shovel were purchased during the year.

Milling

A system of ore blending for optimising concentrator productivity has been tested. It is proposed to install additional stockpiles and purchase mobile equipment in 1980 for routine blending applications.

At Port Latta trials were undertaken towards the end of the year substituting a small percentage of the oil with coal in the firing of one furnace. The pellet plant building was painted and re-roofed and structure replacement is scheduled for early 1980.

Pellets were shipped on 28 vessels averaging 79 195 tonnes per vessel. Three shipments of fuel oil were received and inclusive of road freighted fuel totalled 33 995 tonnes. Two shipments of bentonite were received totalling 18 485 tonnes.

Exploration and Reserves

Drilling of the northern deposit was undertaken to establish ore reserves.

Some diamond drilling was done from the lower benches to confirm ore projections and ratification of the remaining reserves with the original estimates is being continually monitored.

Capital Expenditure

The main areas of capital expenditure for the year have been:—

(1) Purchase of four new 85 tonne haulage trucks, one new hydraulic shovel and one low loader.

(2) Pit wall design investigation and groundwater investigation.

(3) Construction of twenty apartments at Savage River.

(4) Purchase of new electronic bentonite feeder and audiometric testing equipment.

(5) Purchase of a diesel generator and purchase installation of main air blower filters.

Safety

The work injury statistics for the year were:—

	Savage River		*Port Latta*	
	1979	*1978*	*1979*	*1978*
Man hours exposure	921 259	800 890	521 857	504 747
Frequency rate	100·95	114·9	34·49	33·7
Severity rate	1 206·61	1 674·8	590·20	1 098·4
Incidence rate	22·0%	22·0%	7·5%	6·7%
Mean duration	8·5	10·9	12·2	23·3
Average number of employees	428	418	240	254

Of the 111 lost time accidents (109 in 1978) reported seven were classed as serious, five at Savage River and two at Port Latta. The remaining lost time accidents were classified as minor.

IRON OXIDE

QUANTITY AND VALUE OF PRODUCTION

Year	*Tonnes*	*Value $*	*Year*	*Tonnes*	*Value $*
Prior to 1975	210 809	778 723	1977	12 793	102 200
1975	10 699	92 769	1978	14 325	105 800
1976	13 529	134 550	1979	16 246	154 660
			Total	269 401	1 368 702

A. Pearson continued to mine hematite at the Iron Cliffs mine, and supplied a cement works with 16 246 tonnes of hematite valued at $154 660. The average number of persons employed was six.

LEAD

QUANTITY AND VALUE OF PRODUCTION

Year	*Tonnes*	*Value $*	*Year*	*Tonnes*	*Value $*
Prior to 1975	488 995	77 240 559	1977	16 027	8 523 445
1975	11 380	3 524 700	1978	16 907	9 573 050
1976	12 070	4 415 664	1979	16 375	17 140 828
			Total	561 754	120 418 246

Electrolytic Zinc Company of Australasia Limited, Rosebery

This company, reviewed under Zinc, produced 19 932 tonnes of lead concentrates and the total content of lead in the lead, zinc and copper concentrates was 16 375 tonnes valued at $17 140 828.

Specimens of Lead Minerals

Adelaide Mine, Dundas

Production of mineral samples realised $9 622. Extensions to the stoping of the intermediate level driven last year, were stopped when the vein terminated. An intermediate drive from the rise to the open cut has continued. Two men worked the lease during the year.

Red Lead Area

Production of specimen crocoite was valued at $12 000 with all specimens being sold overseas. Overburden stripped and stockpiled for back filling amounted to 15 000 m^3. Work on No. 2 lode has exposed two good veins of crocoite with an associated cross vein. One man worked on the lease with a backhoe-front end loader.

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 90 tonnes was valued at $2 947.

MERCURY

No production of mercury was reported for 1979.

MOLYBDENUM

The King Island Scheelite mine recorded its first production of a Molybdenum concentrate as a by-product of the artificial Scheelite plant. A total of 38 526 kilograms of Molybdenum was produced.

OSMIRIDIUM

Total production to date is 881 kilograms valued at $1 418 771.

PYRITE

QUANTITY AND VALUE OF PRODUCTION

Year	*Tonnes*	*Value $*	*Year*	*Tonnes*	*Value $*
Prior to 1975	2 814 714	....	1977	225 270	....
1975	224 423	....	1978	141 250	....
1976	202 370	....	1979	41 018	....
			Total	3 649 045	

Pyrite concentrates produced by the Mt Lyell Mining and Railway Company Limited, Queenstown and the Electrolytic Zinc Company of Australasia were sent to the North-West Acid Pty Limited plant at Wivenhoe for the manufacture of sulphuric acid.

No value is reported for pyrites as this is included in the value reported for sulphur as sulphuric acid.

SILICA FOR SILICON ALLOY PRODUCTION

The Broken Hill Pty Company Limited, Beaconsfield

This company mined and supplied to the Tasmanian Electro-Metallurgical Company 74 474 tonnes of silica valued at $1 861 850. A local contracting firm carried out the operation of quarrying and crushing.

SILICON

Tasmanian Electro-Metallurgical Company Pty Limited, Bell Bay

In the production of silicon as silico-manganese this company smelted 33 442 tonnes of local Beaconsfield quartzite combined with slag from ferro-manganese production for a yield of 38 568 tonnes of silico-manganese valued at $12 017 624. The average number of persons employed is shown under Ferro-Manganese.

SILVER

Silver is produced solely as a by-product from the treatment of copper, lead, zinc and tin ores. A total of 62 705 kilograms of silver was produced for a value of $18 657 637 at the West Coast mines of the Mt Lyell Mining and Railway Co. Ltd, Queenstown, Electrolytic Zinc Company of Australasia Ltd, Rosebery and Cleveland Tin at Luina.

QUANTITY AND VALUE OF PRODUCTION

Year	*Kilograms*	*Value $*	*Year*	*Kilograms*	*Value $*
Prior to 1975	1 905 419	53 630 528	1977	65 830	8 904 050
1975	55 853	6 110 155	1978	68 456	10 475 642
1976	54 421	6 341 438	1979	62 705	18 657 637
			Total	2 212 684	104 119 450

SULPHUR

Sulphuric Acid is produced in the roasting of the zinc concentrates from the West Coast mines of the Electrolytic Zinc Company of Australasia Limited at their Risdon plant and also from pyrite concentrates produced at the West Coast mines of the Electrolytic Zinc Company and the Mount Lyell Mining and Railway Company Limited.

North-West Acid Pty Ltd, Wivenhoe

On 21 February 1979, North-West Acid Proprietary Limited announced the imminent closure of its plant as a result of continued heavy financial losses.

In accordance with this announcement, the plant permanently ceased making acid on 31 August 1979. All wage-earning employees were retrenched one week later and the staff were subsequently depleted by natural wastage down to the number sufficient only to cope with security needs. The bulk of the plant was sold at public auction during October 1979.

Production for the year to 31 August amounted to 101 932 tonnes of sulphuric acid.

The manpower and accidents statistics relating to the year up to 31 August are as follows:—

Average number of employees	103
Man hours exposure	140 300
Number of accidents	7
Frequency rate	49·9
Severity rate	541·7
Mean duration (days)	10·9

SULPHUR AS SULPHURIC ACID: SOURCE, QUANTITY AND VALUE OF PRODUCTION

	From zinc concentrates		*From pyrite concentrates*			*Total*	
			Pyrite	*Acid*			
Year	*Mono tonnes*	*$*	*Tonnes*	*Mono tonnes*	*$*	*Mono tonnes*	*$*
1957–1974	956 740	12 022 774	978 619	1 432 895	22 515 849	2 389 635	34 538 623
1975	63 362	1 240 198	222 626	332 753	6 924 011	396 115	8 164 209
1976	91 182	1 937 278	226 639	299 293	7 220 562	390 475	9 157 840
1977	70 051	1 582 435	233 146	322 710	7 754 761	392 761	9 337 224
1978	109 626	2 590 668	201 419	242 438	6 723 816	352 064	9 314 484
1979	87 695	2 025 134	41 018	101 932	2 962 946	189 627	4 988 080
Totals	1 378 656	21 398 487	1 903 467	2 732 021	54 101 973	4 110 677	75 500 460

TIN

QUANTITY AND VALUE OF PRODUCTION

Year	*Tonnes*	*Value $*	*Year*	*Tonnes*	*Value $*
1873–1974	192 691	225 659 759	1977	6 634	69 105 352
1975	5 494	30 093 128	1978	7 271	84 521 356
1976	6 853	46 834 677	1979	6 617	94 511 996
			Total	225 560	550 726 268

Aberfoyle Ltd, Rossarden

PRODUCTION

	Ore milled	*Cassiterite concentrates*	*Tin in concentrates*	*Value*	*Wolfram concentrates*	*WO_3 in concentrates*	*Value*
	(Tonnes)	(Tonnes)	(Tonnes)	($)	(Tonnes)	(Tonnes)	($)
Aberfoyle	30 447	133·68	114·52	1 642 677			
Storeys Creek	12 939						
Aberfoyle Mill	43 386	133·68	114·52	1 642 677	125·80	110·91	1 359 974

Mining

R. C. Thomas, Senior Mining Engineer, Hobart, reports that operations at the Storeys Creek Mine continued throughout the year at a reduced level with production being obtained from remnants and pillar recovery. The Storeys Creek mine winder was refurbished during the year. Total mine development for the year amounted to 31 metres of rising, driving and cross-cutting.

At the Aberfoyle Mine the 1·2 metre raise bore hole from surface to 13 level in the Lutwyche section was completed for the purpose of ventilation in the Lutwyche setion, as a result it was possible to increase the rate of development in this section. Total development amounted to 623 metres of driving, rising and cross-cutting. Work commenced at the end of the year on straightening, re-grading and improving the rail tracks on 13 level in the anticipation of using heavier rolling stock.

Work continues on upgrading the underground power supply and improving the pumping facilities.

Studies have been commenced on ways and means of servicing the Lutwyche project by a new vertical shaft. A new hydraulic/compressed air diamond drill has been purchased for exploration underground.

Milling

The ore milled from both mines increased from 36 761 tonnes to 43 386 tonnes.

A bulk sample of the jig tailings stockpile was tested during December for the recovery of heavy metal in the fines.

The rod mill continued milling for sand fill and a total of 11 275 tonnes was placed underground at the Rossarden mine.

Expenditure

Major expenditure was as follows:—

	$
Mining —	
New double deck mine cage for Spiers shaft	2 200
Emergency power supply improvements	17 500
Increased pumping capacity	21 800
Increased power supply for pumping	15 000
Rockdrill/air leg replacement	8 700
Atlas Copco Diamec 250 diamond drill	32 800
Milling —	
General mill plant replacement	4 600
General —	
Safety department vehicle	5 800
Mobile crane	34 600
Fence around Brandon and Lutwyche shafts	4 500

Exploration

A total of 622 metres of diamond drilling was completed during the year at the Aberfoyle mine mainly in the Lutwyche Section.

The geological section continued mapping the underground developments as well as the mapping in the adjoining exploration licence area.

Employment

The average number of persons employed increased by 12 to 191 of which 96 were employed underground. There were 51 injuries during the year resulting in a loss of 472 working shifts.

Amdex Mining Limited, Pioneer

J. Dempster, Mining Engineer, Launceston reports that operations continued at both properties of the company.

Endurance Mine, South Mt Cameron

A slight increase in production was recorded for the year. The mine treated 270 378 cubic metres of gravel for a recovery of 47·5 tonnes of SnO_2 valued at $506 843.

A monitor and sluicing operation was commenced to recover tin from mineral lease 23M/75 on the left bank of the Ringarooma River adjacent ot the old area mined by the Dorset dredge. The number of men employed on this property fell from 23 at the beginning of the year to 12 men at the end of the year.

Pioneer Mine, Pioneer

The removal of barren wash cover by bulldozer and scraper units was halted in April 1979 because of the cost of the operation. It is planned to employ hydraulic methods to remove the overburden when sufficient funds are available.

The treatment plant was modified by the addition of a 26 inch cyclone and conveyor belt system to produce sand for mine backfill purposes. Two spiral units were introduced into the swill circuit to reconcentrate the fines portion of the concentrates.

The work force increased from 26 to 39 employees during the year, most of the increase came from the men redundant at the Endurance operation.

A total of 200 000 cubic metres of gravel was treated for a recovery of 93·25 tonnes of SnO_2 valued at $975 493.

Cleveland Tin N.L., Luina

During 1979, 341 537 tonnes of ore were hauled from the mine and 352 977 tonnes of ore were treated at the concentrator. From the ore treated, concentrates were produced containing 110 594 metric tonne units of tin in the form of cassiterite and 453 tonnes of copper.

H.M.S. float material amounting to 19 329 tonnes was taken from stockpile and treated in the concentrator.

The ore hauled from the mine was obtained from the following sources:—

	tonnes
Hall's lenses	120 698
Henry's lenses	77 330
'B'-South lens	76 656
Khaki lenses	66 853

Stoping yielded 86 per cent of the total ore hauled and mine development produced 14 per cent.

The ore treated graded 0·52 per cent tin in the form of cassiterite and 0·24 per cent copper.

Stoping

Ore broken in stopes amounted to 225 600 tonnes. Bored reserves increased from 318 600 tonnes at the beginning of the year to 357 200 tonnes at the end as a result of boring 73 725 metres of blast-holes during the year.

Vertical Crater Retreat stoping was undertaken in the B-South lens between 11 and 13 levels. A total of 2 650 metres of holes of 165 mm diameter was bored in association with this stoping, the results of which were encouraging.

Elsewhere in the mine the stoping method employed continued to be strike retreat sub-level open stoping.

Fill was introduced to the mine for the first time. This fill took the form of dry waste rock and H.M.S. float material and was poured into some old stopes on both the Hall's and Khaki lenses.

Development

Progress in mine development was as follows:—

Development Type	*Metres Advanced*
Decline	432
Drives and crosscuts	2 381
Bored rises	656
Slot rises	200
Other rises	33
Total	3 702

The bored rises comprised an intake airway and an exhaust airway, both of which were bored from surface, and an escapeway, which was bored between the 12 and 22 levels.

Advance of the decline was again given high priority and this heading had reached the elevation of 24 Level at year end.

Diamond Drilling

Diamond drilling accomplished was as follows:—

Purpose	*Metres Drilled*
Production assistance	3 877
Ore reserves determination	2 185
Underground exploration	1 471
Total	7 533

Production assistance drilling concentrated on defining the structural complexities present below 16 Level, whilst underground exploration drilling concentrated on outlining Hall's ore below and to the north of existing workings. No exploration drilling was carried out from surface.

Ore Reserves

Mineable ore reserves increased by nearly 950 000 tonnes last year to 2 258 000 tonnes, grading 0·66 per cent tin in the form of cassiterite and 0·26 per cent copper.

Metallurgical Performance and Development

Recovery in the concentrator averaged 59·8 per cent for tin (as cassiterite) and 49·2 per cent for copper. Tin recovery was maintained at last year's level despite the treatment of a large batch of refractory ore from B-South Lens on a trial basis at mid year. Copper recovery fell as a result of employing modified assay procedures that are believed to produce more reliable results.

Five new weightometers were installed on mill-feed conveyors and a digital read-out weighscale was installed for concentrate weighing. These replacement installations improved metallurgical accounting.

On-stream analysis equipment utilising Amdel submersible probes was installed in the cassiterite flotation section. This installation improved circuit control.

A secondary silicate regrind circuit was installed to scavenge previously discarded gravity tailings. The product from this circuit is being sent to tin flotation for further treatment.

Capital Expenditure

Expenditure on capital items amounted to $3 213 000, as follows:—

Items	$	$
Replacements (net of disposals) —		
Multi-boom development rigs	321 000	
Haulage trucks	589 000	
Loaders	169 000	
Sundry items	85 000	
		1 164 000
Increase/Maintain Production —		
On-stream analysis equipment	161 000	
Mill instrumentation/control equipment	131 000	
Mine ventilation equipment	466 000	
Air compressors	89 000	
Scavenging regrind circuit	94 000	
Sundry items	246 000	
		1 187 000
Welfare/Environment/Safety —		
Housing	187 000	
Singlemen's quarters	334 000	
Tailings dam extensions	181 000	
Sundry items	160 000	
		862 000
Total		3 213 000

Manpower and Safety

The number of persons employed by Cleveland Tin Limited averaged 280.

Man hours exposure	612 523
Number of accidents	79
Frequency rate	129·0
Severity rate	2 319·9
Mean duration rate	18·0

Of the 79 accidents that occurred, 3 were classified as serious.

Incident

On 19 July collapse of the hanging wall occurred in the Khaki stope on the south side of the 3 Level to 10 Level rib pillar, causing irrepairable damage to two drilling jumbos. These jumbos were standing in the drives on the 10 Level and the 11 Level respectively and were struck by large rocks which rolled out of the stope into the drives by way of the stope face and the drawpoints.

Nobody was hurt by the occurrence.

Renison Limited, Renison Bell

Mr R. N. Hampson, Mining Engineer, Burnie reports that:—

Ore hauled to the surface stockpile, or delivered direct to the crusher, totalled 579 119 tonnes. The sources of this production were: —

	Tonnes
North Stebbins	64 848
South Stebbins	31 819
Murchison	125 719
Dreadnought	45 179
Colebrook	117 610
Penzance	106 950
Howard	12 131
Sligo	8 481
Melba (2·5 horizon)	39 034
Ring	8 569
Federal	17 400
Lucks Open Cut (No. 3 Horizon outcrop)	1 379
Total	579 119

CONCENTRATOR PLANT

Tonnes treated	567 576 tonnes
Ore grade	1·29 % Sn
Tonnes (concentrate)	11 181 net dry tonnes
Tin metal in concentrate	5 330 tonnes
Overall metal recovery	72·60 %

MINING

Development

There was no advance in the Renison decline during the year. No. 5 Adit was restarted to provide a return airway for the Ring orebody and intersected good grades in the Sligo ore zone, which has upgraded the ore potential considerably.

Further development of the main access decline to the lower South Stebbins took place. No further driving was done in the North Bassett exploration drive following a reappraisal of production priorities. It is planned to continue work in this area in 1980.

The majority of ore development was concerned with blocking out the Melba and Ring orebodies and to maintain existing stope blocks. Developments of the new No. 4 ventilation exhaust system was started and one section was complete by the end of the year.

Driving and cross-cutting	*Ore (m)*	*Waste (m)*	*Total (m)*
Renison mine	....	63·2	63·2
North Bassett	....	75·9	75·9
Services	5·4	228·3	233·7
Sligo	16·9	11·6	28·5
North Stebbins	52·5	138·5	191·0
Colebrook	125·9	43·4	169·3
Penzance	134·3	38·8	173·1
Howard	68·3	182·1	250·4
South Stebbins	....	482·0	482·0
Murchison	68·8	114·0	182·8
Dreadnought	159·3	18·0	177·3
Melba (2·5 Horizon)	252·1	403·2	655·3
Ring	220·9	314·8	535·7
	1 104·4	2 113·8	3 218·2
Rising	42·2	266·9	309·1
Total development	1 146·6	2 380·7	3 527·3

Stoping

Some mining of the Federal orebody took place to meet production requirements. Ore was produced from the new Ring orebody as stope development and exploration proceeded.

The majority of ore was from the No. 2 and No. 3 horizons. Heavy media rejects and development waste rock met all the stope fill requirements. Ground conditions remained good in most stoping areas.

During the year two new production trucks were introduced and some older equipment was modified for waste trucking operations.

The 1 700 level pump station was commissioned during the year; the highway overpass was completed and a new surface refuelling installation was brought into operation.

MILLING

A total of 567 576 tonnes of ore at an average grade of 1·29 per cent Sn was treated at an average rate of 75 tonnes per hour. Overall concentrator recovery improved by 2·52 per cent to 72·6 per cent. Total declared tin metal in concentrates was 5 336·53 following reconciliation with figures declared as received at the smelters. Mill availability at 86·7 per cent was below the target of 94 per cent largely as a result of industrial disputes. Crushing plant operations were satisfactory.

Heavy media separation operations were satisfactory and efficiency was improved following modifications to the Dynawhirlpool units. Plant trials with atomised ferro-silicon showed it to be superior as regards consumption, stability and rheology than milled material and, although more expensive per unit, an overall cost benefit was demonstrated. It is highly likely that this will become a permanent agent in H.M.S. operations. The grinding circuits operated satisfactorily; major change made was the open circuiting of the table tailing regrind mill. This was done to allow the cyclone-screen rig to be removed for the installation of other equipment as part of an overall concentrator expansion. No deleterious effect was observed following the change.

Sulphide flotation circuits and reagent regimes were not altered.

The collector for cassiterite flotation was changed from para-tolyl arsonic acid to styrene phosphonic acid. Following some inital deterioration in results, while conditions were optimised, the reagent performance has been excellent.

Leach performance continued to be good. However, it has been necessary to install a wet scrubber to control noxious fumes which are generated sporadically. The origin and mechanism of this emission has not yet been determined.

Metallurgical performace was highly satisfactory for the year and will improve as aids such as O.S.A., P.W. 1600, scanning electron microscope are increasingly employed, and auto-control is developed. Pyrometallurgical processes have the greatest potential for improving the grade and the yield and providing a route to treatment of tailings dam material.

Following investigations into various levels of expansion, a recommendation to expand to 850 000 tonnes per annum was presented to the Board in January 1979. This report also recommended that an indicative feasibility study into the application of low grade concentrate fuming be carried out by March 1979.

The recommendations were accepted by the Board and final approval to proceed was given in March 1979. The Technical Services section has been at a high level of activity throughout the year to develop the flowsheet and carry out equipment testing in the areas of screening, magnetic separation, hydraulic classification, thickening, etc. as well as continuing with other process development, off-lease prospect evaluation, and routine testing.

Concentrator extensions commenced in March 1979. All sections except the crusher will be expanded and the same type of process equipment will be used, except in grinding, where a rod mill will replace the rolls crusher.

Associated metallurgical changes will be:—

(1) Finer grinding to reduce tin loss to sulphide concentrate.

(2) Separate treatment of sulphide recycle streams.

(3) Separate treatment of reground gravity plant tailings.

(4) Introduction of more automatic control, particularly in the flotation sections.

Various circuit changes and process additions have made much equipment redundant and removal of this commenced to clear the decks for the expansion. The vanners, spray dryer, screen and cyclone rigs, batch flotation cells, and obsolete piping had all been removed at year's end.

The indicative study into fuming showed positive economic benefit and the investigation will continue to confirm preliminary findings. A plant trial with 100 tonnes of low grade concentrate has been arranged in East Germany in March 1980.

Mill tailings continued to be discharged into A and B dams, but their capacity is now almost exhausted. Discharge into the new C dam is expected to commence in February or March 1980.

Extensions to the Assay Laboratory were almost complete at year's end. Designs for expanding Research Laboratory facilities were drawn up and it is anticipated this work will be carried out in the first half of 1980.

EXPLORATION AND RESERVES

During 1979, Renison Limited expended $1·6 million on exploration for tin deposits in Tasmania. Work was concentrated in four districts namely: Renison Bell area, Heemskirk Granite, Meredith Granite and the Blue Tier Granite areas.

In the Renison mine area intensive diamond drilling succeeded in defining substanital extensions of known orebodies. As of June 1979 geological reserves had increased during the financial year by 1·2 million tonnes of 1·4 per cent Sn. This style of exploration effort will be continued in the Renison Bell area during 1980.

In the Heemskirk Granite area Renison Limited has interest in two exploration licences and three mining leases. Exploration was directed towards the search for both diseminated tin deposits in the granite and replacement tin-tungsten deposits in the sedimentary sequences adjacent to the granite. Drilling at St Dizier broadly outlined a moderate tonnage of medium grade mineralogically complex tin mineralisation whilst drilling on the Federation Plateau intersected several encouraging stanniferous zones. Geophysical and geochemical surveys over sediments east of the granite defined targets worthy of further exploration.

In the Meredith Granite area north of Zeehan, Renison Limited holds an interest in three exploration licences covering sections of the granite itself as well as the adjacent sedimentary aureole. A further drilling programme at Mt Lindsay again produced disappointing results and no further drilling on these large skarns is planned for the near future. One hole was completed in a carbonate sequence east of the Stanley River workings with disappointing results. A photogeological study over the Meredith Granite and its surrounds was completed and reconnaissance follow-up ground work is justified in several areas.

On the East Coast exploration for large low grade disseminated cassiterite deposits in the Blue Tier Batholith in the vicinity of the Anchor mine continued largely by way of diamond drilling. To date a moderate tonnage of such material has been broadly defined and further work is planned.

Ore reserves were estimated on 30 June 1979 as 14 949 000 tonnes of ore at a grade of 1·14 per cent Sn. This tonnage was made up of 6 152 000 tonnes of 1·20 per cent Sn classified as proven ore and 8 797 000 tonnes of 1·11 per cent Sn classified as probable ore. In addition to the above tonnages a further 11 300 000 tonnes of 1·05 per cent Sn were classified as possible ore but not as reserves.

	Proved		*Probable*		*Total*	
Ore Zone	*Tonnes 000's*	*Grade % Sn*	*Tonnes 000's*	*Grade % Sn*	*Tonnes 000's*	*Grade % Sn*
Bassett Federal	2 390	0·87	2 850	1·02	5 240	0·95
No. 1 Horizon	....	....	100	1·07	100	1·07
No. 2 Horizon	1 435	1·27	3 021	1·05	4 456	1·12
Melba Zone	650	1·32	73	0·91	723	1·28
No. 3 Horizon	1 677	1·58	2 753	1·28	4 430	1·39
Total	6 152	1·10	8 797	1·11	14 949	1·14

Capital expenditure for the year was as follows:—

The major items of capital expenditure, totalling $7 754 930, for 1979 were: —

(a) Community projects — fencing of houses in Zeehan and town workshops.
(b) Expansion programme — extensions to the concentrator, additional housing, new production haul trucks, a new front-end loader, workshop extensions and mine office modifications.
(c) Completion of the sewerage plant.
(d) New surface refuelling installation — additional fuel storage facilities.
(e) Mine development — capital development and rising, completion of the highway overpass.
(f) Underground equipment — purchase of fans, pump lines, compressor, completion of pump station on 1 700 level.
(g) Mill plant and equipment — on-stream analysis of sulphide and cassiterite flotation circuits, automatic sampling installations on concentrate and tailings lines, cone classifier.
(h) Mobile equipment — purchase of two Cat. 769 C haul trucks; one 2 boom jumbo; one grader and one front-end loader.
(i) Instruments, laboratory and workshop equipment — portable X.R.F.; lathe and general instrumentation.
(j) Office equipment — installation of a new P.A.B.X. telephone system.

SAFETY

At December 1979 the labour complement was:—

Mining	95
Milling	136
Engineering	155
Administration	37
Geology	12
Industrial and Personnel	23
Total	458

Labour turnover was 24·4 per cent which follows a trend of steady improvement over recent years. Stability in the underground award workforce was notable with only six separations. Award separations in the Engineering and Milling sections were 45 and 27 respectively, which was comparable to previous years.

Recruitment of skilled tradesmen, metallurgists and project engineers presented the only real problems during the year. Interstate recruiting was necessary for tradesmen and overseas recruiting was required to fill the professional positions.

Work injury statistics were:—

Man hours exposure	837 469
Frequency rate	106·27
Severity rate	1 563·04
Incidence rate	1·71%
Mean duration rate	10·51

Of the 89 lost time accidents reported (including re-occurrences) two were classified as serious and the remaining 87 were classified as minor.

SMALL PRODUCERS

The alluvial tinfields sustained a high level of activity during 1979 due to continuing steady high tin metal prices.

The production of sundry small producers is summarised as follows:—

BRANXHOLM - DERBY AREA

Name of Producer	*Tin Concentrates Tonnes*	*Contained Tin Metal Tonnes*	*Value $*
Barnett and Jones	8·056	5·561	80 162
Banks, K.	0·168	0·101	1 406
Barnett, L. M.	1·590	1·140	16 427
Hayes, R.	5·079	3·424	49 450
Hyde, R. G.	0·725	0·518	7 308
Johnson, J.	0·398	0·224	3 093
Johnson, N.	2·373	1·364	20 464
Johnson, N. C. and V. A.	5·733	3·552	50 538
Jones, E.	2·233	1·909	27 092
Kerrison, K.	2·698	1·726	24 533
Rainbow, W.	1·872	1·358	19 470
Yaxley, T.	0·397	0·275	3 919

PIONEER - SOUTH MT CAMERON - GLADSTONE AREA

Name of Producer	*Tin Concentrates Tonnes*	*Contained Tin Metal Tonnes*	*Value $*
Blackberry, D. M.	0·815	0·412	6 151
Groves, L. J.	7·384	5·531	77 389
Hodgetts, J.	0·560	0·384	4 337
Lawry, R. C. and L. A.	12·563	9·126	139 380
Moore, N. B.	2·158	1·580	23 013
Moore, R. J.	1·405	0·963	13 655
M.S.H. Mining	5·680	4·079	55 899
Mott, J. G.	0·045	0·034	483
Reynolds, M.	2·623	1·857	25 896
Richardson, K. and S.	0·398	0·279	3 755
Standage, H.	0·404	0·293	4 002
Summers, I.	0·051	0·037	526
Wines, K.	1·982	1·255	18 047
Wilcox, T.	0·042	0·028	398
Wood, C. V.	3·750	2·700	41 237
Wood-Galbraith	4·866	3·122	45 097

EAST COAST

Name of Producer	*Tin Concentrates Tonnes*	*Contained Tin Metal Tonnes*	*Value $*
Lewis, D.	1·651	1·105	15 335
Dwyer, D. B.	0·158	0·110	1 564
Gillies, B.	0·045	0·030	458
Gillies, F.	0·049	0·032	455
Pitchford, B. and S.	0·117	0·077	1 128
Reynolds, J.	0·119	0·103	1 473

WEST COAST (BALFOUR - WARATAH - PORT DAVEY)

Name of Producer	*Tin Concentrates Tonnes*	*Contained Tin Metal Tonnes*	*Value $*
Bester, H.	0·018	0·012	170
Gozier, M.	0·230	0·139	1 937
Heathcote, M	0·051	0·036	503
Holloway, J.	0·075	0·054	755
Kenworthy, D.	0·411	0·244	3 511
Laan, M. and Langsford, N.	0·900	0·640	8 945
Laan,	4·603	3·277	44 570
Laan, P.	2·400	1·539	21 582
Laffier,	8·287	5·160	73 695
Machen, G.	0·301	0·215	2 894
Northern Developments	3·643	1·763	24 985
Ralph and Guy	14·317	10·410	149 152
Smith, A. R.	0·879	0·600	8 660
Norton-Smith, H.	0·618	0·319	4 489
Wilson, P. P. R.	4·305	3·206	45 679
Colgan, R.	0·649	0·442	6 208
Bulless, C.	0·574	0·442	6 348

TITANIUM

No production of Titanium dioxide was reported for 1979.

TUNGSTEN (SCHEELITE)

TUNGSTIC OXIDE: QUANTITY AND VALUE OF PRODUCTION

Year	*Tonnes (Concentrates)*	*Tonnes (WO_3)*	*Value $*
1917 to 1974	34 725	5 684	80 751 459
1975	2 082	1 519	10 367 449
1976	2 698	2 019	19 044 373
1977	3 276	2 397	38 878 558
1978	3 429	2 490	30 058 958
1979	3 231	2 379	29 178 743
Total	48 589	16 488	208 279 540

King Island Scheelite Limited, Grassy

Mr R. Billingham, Mining Engineer, Hobart reports that:—

PRODUCTION STATISTICS

Ore mined — (tonnes)	
Dolphin Mine	249 489
Bold Head Mine	151 684
Total	401 173
Mill throughput (tonnes)	405 029
Derived Mill Head (%WO_3)	0·73
Concentrates produced (tonnes)	3 152·5
Concentrate grade (%WO_3)	73·89%
M.T.Us produced	232 949·15
Molybdenum produced (kilograms)	38 526
Average number of persons employed —	
Underground	118
Surface	363
Total	481

Dolphin Mine

Development advances made were:—

	(m)
Main Decline	104
Level Drives	721
Ramps	723
Raise boring	175
Hand rising	87
Total	1 810

The main decline was temporarily stopped at 270 m below sea level because development showed that the lower section of the Wedge orebody has steepened significantly along the decline fault. This necessitated a re-assessment of the stoping method to be used in this section of the orebody. Level drives and ramps were mainly advanced to open up the Pit and Wedge orebodies. Hand rising was for the secondary egress system and raise boring for ventilation. Ore was obtained from the Wedge, Pit and Central orebodies, which produced 223 717 tonnes and stope development which produced 25 772 tonnes.

The rock mechanics programme continued with the assistance of CSIRO and a consultant, Dr J. R. Barrett. Rod extensometers continued to indicate pillar compression and relaxation concurrent with mining with the maximum pillar compression being 4·0 mm per metre. Rods installed in the Wedge stope indicated a maximum extension in the backs of 1·6 mm per metre, and those over the Pit stope showed movement of approximately 7 mm. Subsidence monitoring by levelling in the −75 m level showed no extraordinary movement when the final lift of the Wedge stope was being mined. The Potts stressmeters in C Central showed an apparent levelling off when the pillars became too tall to take any more stress.

Pillar stitching using 2·8 m fully grouted steel bolts continued to be the main method of strengthening pillars but successful tests were carried out with resin injection. Long hole placement of fully grouted wire rope was successfully carried out for back support, using standard steel bolts between the cables.

Water inflow rates and the sodium content of water samples continued unchanged.

Bold Head Mine

Development advances made were:—

	(m)
Main Decline	102
Waste Development	434
Stope Development	552
Raise Boring	46
Hand Rising	137
Total	1 271

The Main Decline advanced slowly because of the need to develop the C Lens orebodies at depth. The main waste development was to open the C1, C2 and D Lens orebodies and the C West orebody through the Western Fault. The second egress system was extended to the 059 level at some 100 m below sea level. Ore production was from several sources using different stoping methods including cut and fill stopes using cavos, F.E.Ls, jumbos and hand mining, and slot stoping using Scraper winches. The main sources were the C Lens stopes and the B Lens Fault Block.

Milling

The mill operated for 363 days with a throughput of 405 029 tonnes at a head grade of 0·76 per cent WO_3. The upgrading work completed in the concentrating plant in 1978 operated successfully and no major alterations were undertaken during 1979.

The artificial scheelite plant operated during the year and was able to upgrade all flotation concentrates to a more saleable product and to produce molybdenum for sale. A new drum filter, carbonate liquor tank and spillage recovery system were being installed at the end of the year with anticipated completion by February 1980.

Capital Expenditure

Capital expenditure was as follows: —

	$
Mining	519 277
Concentrator	298 800
Engineering	326 935
Administration	148 896
Agricultural	23 765
Total	1 317 673

Mining capital expenditure was for the purchase of a front end loader and two jumbo drilling rigs. In the concentrator the artificial scheelite plant was completed and a new XRF machine was purchased. Engineering capital was mainly for vehicle replacement.

Tasminex N.L., Kara Mine

Mr E. C. Leyland Senior Mining Engineer, Burnie reports that:—

Production

	Tonnes
Ore treated	49 875
Concentrate	79
Magnetite (stockpiled)	23 382

During 1979 production from the main Kara No. 1 orebody was 30 175 tonnes with 19 700 tonnes being mined from a subsidiary pit on the ' Bob's Bonanza ' orebody. This latter orebody is steeply dipping averages about two metres in width, contains pockets of high-grade ore and is situated some 250 m east of the main pit. No reserves were previously calculated for this orebody. All ore was treated in the concentrating plant by crushing, grinding in a ball mill, magnetic drum separation and concentrating on Wifley tables. The scheelite concentrate averaged 63 per cent WO_3 and the magnetite 60 per cent + Fe. The scheelite was sold and shipped to Europe with the magnetite being stockpiled for possible future sales.

Exploration

Under the agreement with McIntyre Mines (Australia) Pty Ltd all exploration on E.L. 17/68 and the mining lease 105M/77 was carried out by that Company. During 1979 McIntyre Mines negotiated an extension of the original agreement to permit further diamond drilling and metallurgical testing of the ore. Fifty new diamond drill holes were drilled, averaging 200–300 m in depth, with the majority of these holes testing the Kara North and Eastern Ridge areas. In December McIntyre completed a feasibility study from which the following ore interpretations were made:—

(a) Geological Reserves, which are defined as the tonnage and grade of rock within the constructed blocks at a cut off grade of 0·25 per cent WO_3.

	Measured		*Indicated*	
Classification Zone	*Tonnes*	*% WO_3*	*Tonnes*	*% WO_3*
Kara No. 1	292 000	0·65	554 000	0·75
Kara No. 1 — Southern Extension	....	....	118 000	0·61
Kara North	....	....	168 000	1·34
Western Limb	....	....	46 000	0·39

(b) Mining Reserves, which are comprised of the tonnage and grade of ore amenable to open pit extraction within the geological reserves, with the addition of 15 per cent of that tonnage at a grade of 0·1 per cent WO_3.

Zone	*Tonnes*	*% WO_3*
Kara No. 1	971 000	0·63
Kara North	170 000	1·28
Total	1 141 000	0·73

Capital Expenditure

The total capital expenditure for 1979 was $300 000. Major items purchased were:—

1 primary crusher.
1 apron feeder.
1 ball mill (second hand).
1 magnetic separator.
1 gyratory crusher (small).
1 TD 25 bulldozer.
3 concentrating tables.
2 four wheel drive personnel vehicles.

Milling

Replacement of the original rolls crushers by the installation of a ball mill was completed on 17 January and a new primary 36 in. × 30 in. Baxter jaw crusher was included in the circuit during February. These modifications resulted in the loss of five weeks production at the beginning of the year. As a result of the finer grinding the jigs were no longer operating satisfactorily and it was decided to remove the jigs and replace them with tables. The heavy reliance on diesel motors of various sizes and species, coupled with the increased cost of fuel, encouraged the Company to move to electrification of the plant. Accordingly a share issue was made late in the year to raise sufficient new capital to bring the H.E.C. power to the mine site, and to convert the existing concentrating plant to electric power.

Safety

The concentrator operated on three shifts per day, five days per week, until 30 May and thereafter on two shifts, each of eight hours, on a five day week.

The labour force comprised:—

Open Pit (day shift only)	4 men
Plant	5 men/shift
Clean up, day shift	2 men
Fitting	1 man

There were three lost time accidents for 1979 all classified as minor. The severity rate was affected by the carry over of 185 days from an accident which occurred in 1978.

Work injury statistics were:—

Man Hours Exposure	40 378
Frequency Rate	74·3
Severity Rate	6 216·2
Duration Rate	83·7
Incidence Rate	14·3 %
Average Number of Employees	21

TUNGSTEN (WOLFRAM)

TUNGSTIC OXIDE: QUANTITY AND VALUE OF PRODUCTION

Year	*Tonnes (Concentrates)*	*Tonnes (WO_3)*	*Value $*
1899–1974	20 818	2 039	35 949 065
1975	303	225	1 543 378
1976	248	186	1 724 433
1977	185	136	2 214 489
1978	196	140	1 691 781
1979	126	111	1 362 604
Total	21 876	2 837	44 485 750

Aberfoyle Ltd, Rossarden

This company, reviewed under Tin, produced 125 tonnes of Wolfram concentrates valued at $1 359 974 at their Rossarden and Storeys Creek mines.

All Nations Mine and Pochin's Adit (Leases 24M/60 and 66M/78).

E. C. Leyland, Senior Mining Engineer, Burnie reports that:—

Surface costeans were excavated and sampled by the three man party over the area between the workings of the All Nations Mine and Pochin's Adit. No new exposures were cut, accordingly, it was decided to extend the face of Pochin's Adit. Sixty metres of driving on two small stringers were completed for the year. The ore and waste from this development (600 tonnes) was stockpiled on the surface, the combined grade assaying 0·28 per cent WO_3. An approach was made to this Department for a small drilling programe to be carried out under the aid to mining scheme. At the end of the year it was decided to drill two holes beneath the fault on the All Nations block, early in 1980. Labour conditions were fulfilled by the employment of the three men and machinery.

Oakleigh Creek Mine — Central Tasmanian Tungsten Pty Ltd

E. C. Leyland, Senior Mining Engineer, Burnie reports that:—

Development

Serem (Australia) Pty Ltd, as operators of leases 60M/69, 60M/71 and 59M/71, continued exploration until mid-year when the decision was made to change the prospect into an operating mine. The 240 m and 280 m levels were extended to the faulted zone, and a rise advanced from the 240 m level, through the 280 m level, to the surface, at the limit of the payable ore. Stope development was commenced and at the year's end one block was ready for stoping and two further blocks were in preparation. Two short diamond drill holes were bored, one East and one West, at the end of the 240 m level to test for parallel veins. No intersections of economic value were made.

	(m)
Total Driving	573
Total Rising	344

All development was in ore, yielding a tonnage of 5 193 tonnes with the grade being estimated to be 0·6 per cent WO_3. This development ore was dumped on the surface stockpile. In the first stoping block 344 tonnes at 1·0 per cent WO_3 were broken by the end of the year. The stoping method is to be conventional shrink stoping.

The concentrator building, crusher house, and surface bin were completed and equipment was being installed as it arrived. Power is supplied from three diesel alternators, each of 250 kW output, established in a new power station.

Exploration

Geological mapping of the surface in the immediate vicinity of the mine and environs was completed. Stream sediment geochemistry, together with detailed mapping of areas of interest on the mineral leases, was continued. Three diamond drill holes, total length 325 m, were drilled underground but did not locate any veins in proximity to the workings of the main vein.

Reserves have been assessed as:—

Category	*Tonnes*	*% WO_3*
Proven	40 000	1·26
Probable	54 650	1·22
Possible	57 200	1·33
Total	151 850	1·27

Capital

Expenditure for the year was $1 217 000. Major items included in this total were the: concentrator building; power station; workshop; upgrading of the access road.

Safety

The average employment figure for the year was eight employees however, at the end of the year, there were 19 permanent employees and 11 contractors on site. There were no lost time accidents on the leases.

ZINC

QUANTITY AND VALUE OF PRODUCTION

Year	*Tonnes*	*Value $*	*Year*	*Tonnes*	*Value $*
1919–74	1 226 174	271 353 572	1977	63 070	42 745 279
1975	54 326	35 873 182	1978	61 753	35 078 116
1976	49 697	34 683 132	1979	59 396	43 968 329
			Total	1 514 416	463 701 610

Electrolytic Zinc Company of Australasia Limited

EXTRACTION FROM CONCENTRATES: RISDON

	Tonnes
From other than Tasmanian ore: —	
Zinc	134 344
Cadmium	402
Cobalt oxide	27·48
Superphosphate	92 335
From Tasmanian ore: —	
Zinc	58 156
Cadmium	135
Cobalt oxide	2·310
Manufactured products: —	
Aluminium sulphate	4 334
Ammonium sulphate	1 233

The average number of persons employed was 1 981.

WEST COAST DIVISION

	Tonnes	Kilograms
Concentrate produced: —		
Zinc concentrate	134 341	
Lead concentrate	19 932	
Copper concentrate	24 902	
Pyrite concentrate	17 476	
Recoverable quantity in ore mined: —		
Zinc	59 396	
Lead	16 907	
Copper	2 318	
Cadmium	141	
Silver	....	60 032
Gold	....	1 061
Cobalt oxide	2·31	
Manganese dioxide	90	

Total value of production — $93 800 030

R. N. Hampson, Mining Engineer, Burnie reports that:—

Mining

DEVELOPMENT

Rosebery: A total of 5 063 metres of driving and cross-cutting and 2 038 metres of raising was advanced during the year. Of this 86 per cent was advanced on the 15, 16 and 17 levels in main level development and bulk stoping blocks. The diesel workshop on 17 level was nearing completion and the decline was advanced 419 m (6 per cent). A ventilation raise for mining of the northern orebody between 15 and 12 levels was commenced. A total of 10 269 metres of diamond drilling was completed underground at the Rosebery mine.

Hercules: A total of 464 metres of driving and cross-cutting and 15 metres of raising was advanced during the year. Development on 7 level continued during the year. There was no diamond drilling underground during the year at the Hercules mine.

Production

Ore from all sources, including a trial shipment of 7 752 tonnes from Que River, totalled 673 190 tonnes; an increase of 16 332 tonnes (2·5 per cent) for the year.

At Rosebery the open-cut produced 76 256 tonnes and the underground mine produced 518 968 tonnes. The Hercules mine produced 70 214 tonnes while the Farrell mine remained on a care and maintenance basis.

The Rosebery underground mine production was approximately evenly divided between conventional cut and fill stoping and bulk stoping. Extraction of pillars in the 15 level bulk stopes was successfully continued.

Ore Reserves

Ore reserves as at 12 December 1979 were as follows: Rosebery mine 7 546 989 tonnes; Hercules mine 420 380 tonnes; Farrell mine 70 998 tonnes for a total of all mines of 8 038 367 tonnes at a grade of 5·1 per cent Pb, 16·0 per cent Zn, 0·80 per cent Cu, 136 g/t Ag, 3·0 g/t Au and 14·2 per cent Fe.

Milling

A total of 698 395 dry tonnes was milled during the year to produce 24 902 tonnes of copper concentrate, 19 932 tonnes of lead concentrate, 134 341 tonnes of zinc concentrate and 35 892 tonnes of pyrite concentrate.

Employment

Mining	609
Engineering	297
Treatment	90
Other	144
Total	1 140

Safety

The number of lost time accidents including re-occurrences totalled 897.

The work injury statistics for the year were:—

Man-hours exposure	2 019 114
Frequency rate	435·34
Severity rate	5 838·90
Incidence	5·46%
Mean duration	9·58
Average number of employees	1 149

Of the 879 lost time accidents (including re-occurrences) reported 12 were classed as serious and the remaining 867 lost time accidents were classed as minor.

Capital Expenditure

Major capital expenditure during 1979 included the commencement, continuation or completion of the following projects: —

1. Purchase of mining equipment —

   2 Horwood Bagshaw diesel loaders
   1 3 boom development jumbo
   1 Horwood Bagshaw electric loader
   36 Granby trucks
   1 10 tonne loco with associated equipment and charging shed
   6 gable trucks
   1 Halco 82·6 mm down-the-hole drill and associated equipment
   12 rail trolleys and 1 mancar
   1 shotcrete machine
   2 diamond drills
   7 Ingersoll-Rand winches
   8 fans, various sizes
   1 dewatering pump.

2. Purchase of construction of surface and mill equipment and plant: —

   Beaver dump truck
   Facsimile transmission system
   Surface mullock disposal
   Rosebery mill expansion
   2 1 200 c.f.m. air compressors
   Underground power supply 15 level north end
   2 Atomic absorption spectrophotometers
   High pressure cleaner
   Pulveriser
   Light vehicle replacements
   Onstream analysis
   Crusher station spillage recovery.

Major operating projects with a substantial capital content which continued during the year were the decline below 17 level and 7 level development at Hercules.

RISDON WORKS

P. Allan, Mining Engineer, Hobart reports that major developments include:—

Construction of building and plant for the mechanical stripping of cathode zinc.

Installation of a copper residue drum filter.

Extension of the ship-loading facilities for sulphuric acid.

Investigation, design and construction of the peripheral equipment necessary for the construction of an 800 tonne per day sulphuric acid plant planned for 1980.

Investigation, design and preliminary construction of a contaminated water treatment facility to collect, treat and recycle superphosphate plant effluents.

On 7 May a 60 year-old cell room operator died on site as a result of sustaining an incised wound to the femoral artery from a high pressure water jet. The equipment in question was a Rucksuck pipe cleaning device in which water at 305 kg/cm^2 is ejected from a nozzle arrangement introduced into a pipe line for cleaning and scouring purposes. The operator accidentally withdrew the jet and clutched it to his body causing the jet to pierce his clothing and the inside of his leg as far as the femoral artery. As he was wearing fully protective clothing the seriousness of the accident was not immediately recognised and the immediate treatment given was for cardiac arrest. Tests subsequently carried out on the equipment proved that the risk area extended to approximately 250 mm from the nozzle and that the pressure drop beyond this distance caused the jet to break into a fine spray. To prevent any possible re-occurrence a second operator with an in-line shut off valve is now placed in close proximity to the operator when the machine is used in similar circumstances.

Mackintosh Joint Venture — Que River Project

T. Evans, Mining Engineer, Burnie reports that:—

General

Following the completion of the planned exploratory development on the RL 610 m and the RL 550 m levels late in 1978, a programme of diamond drilling was undertaken for the purpose of geological interpretation and to provide information for aiding mine planning. A further feasibility study was then carried out using the latest information available.

In consequence of the favourable results obtained from the feasibility study, shaft sinking was resumed early in November and a start was made before the end of the year on preparing a site for a compressor station. Furthermore, application was made to the statutory authorities for permission to build a new road from the shaft area to the Murchison Highway.

Late in the year, the Hydro-Electric Commission completed constructing the 220 kV power transmission line between Tullah and Sheffield, which crosses the mining lease area and will serve the Que River operation in due course of time.

Mine Development

The shaft, which has dimensions of 5·0 m × 18·5 metres — from RL 533·5 to 515·0 m — to a total depth of 182 metres. One metre deep reinforced concrete bands were cast at 5 metre intervals down the shaft as before.

A 10 metre long plat was excavated from the shaft at the RL 520 m horizon and a drive was developed for a distance of 7 metres towards the proposed position of a development-ventilation rise.

Production

All of the 1979 mine development was carried out in waste rock, so there was no ore produced during the year.

Ore produced from development carried out during 1978 was placed on a stockpile situated near the shaft. During 1979, 7 752 dry tonnes of that ore were taken from the stockpile and despatched to the Electrolytic Zinc Company of Australasia Limited, Rosebery, for treatment. The grade of the ore despatched was 0·38 per cent Cu, 7·0 per cent Pb, 13·77 per cent Zn, 170·8 g/t Ag and 3·01 g/t Au.

Diamond Drilling

A total of 1 724·3 metres of diamond drilling was completed during the course of one underground and two surface programmes. The principal objectives of these programmes were as follows:—

(a) to define more accurately the lower margin of economic mineralisation in the P-Q Lens system between 7 450 N and 7 500 N; and

(b) to obtain more knowledge of the geology within the P-Q Lens.

A breakdown of the drilling by level is as follows:—

Level	*Metres*
RL 550 m	549·1
RL 610 m	120·0
Surface	1 055·2
Total	1 724·3

Ore Reserves

A re-assessment of the level of ore reserves was carried out in March 1979. The new figures arrived at are as follows:—

	Tonnes	*Cu %*	*Pb %*	*Zn %*	*Ag g/t*	*Au g/t*
P-Q Lens	3 557 210	0·35	6·97	12·51	171·0	3·36
S Lens	870 711	1·05	1·89	3·86	41·7	....
Total	4 427 921	0·49	5·97	10·81	145·6	2·70

In addition, less well defined mineralisation has been placed in an inferred-ore category (but not in ore reserves), as follows: 1 803 283 tonnes at 0·21 per cent Cu, 3·46 per cent Pb, 6·54 per cent Zn, 55·7 g/t Ag and 0·99 g/t Au.

All these figures take dilution by mining into consideration.

Manpower and Safety

Employee strength was 50 at year end but averaged only 20 for the year. Most of the 50 were contractors' personnel; The Cementation Company (Australia) Limited, who are undertaking the shaft sinking and equipping, being the chief contributor to the strength.

Only four accidents occurred and none of these was serious. The accident statistics are as follows:—

Man-hours	38 075
Frequency rate	105·1
Severity rate	845·7
Mean duration (days)	8·1

ZIRCON

There was no production of Zircon during 1979.

2. NON-METALLIC MINERALS

CLAY

QUANTITY AND VALUE OF PRODUCTION

Year	m^3	*Value $*	*Year*	m^3	*Value $*
1958–74	1 792 775	5 129 904	1977	87 931	284 910
1975	112 287	572 230	1978	85 167	292 399
1976	100 926	334 830	1979	92 671	324 281
			Total	2 271 757	6 938 554

DETAILS OF PRODUCTION

Company	*Clay m^3*	*Value $*	*No of men*	*Product*
Agripipe Pottery Pty Ltd	....	....	4	Pipes and Pots
Clifton Brick (Tas) Pty Ltd, Longford	32 976	107 986	28	Bricks
Goliath Portland Cement Co, Railton	16 391	81 955	*	Cement
Grierson, M. A., Dodges Ferry†	11 133	33 399	1	Bricks
Hazell Bros, Kingston†	8 594	25 782	2	Bricks
Hobart Brick Co. Granton	9 855	29 565	25	Bricks
Hobart Brick Co. Kingston	2 103	9 009	1	Bricks
Humes Ltd, Hamilton	359	2 859	5	Pipes
Zolati and Sons, Dulverton	11 242	33 726	20	Bricks

* Reported under Limestone (Cement).
† Suppliers to Hobart Brick Company.

The brick-making industry continues to be affected by rising fuel costs and is looking at the use of other forms of fuel. One brick making company is actively considering the use of ground and dried wood waste in its tunnel kiln.

DOLOMITE

QUANTITY AND VALUE OF PRODUCTION

Year	*Tonnes*	*Value $*	*Year*	*Tonnes*	*Value $*
Prior to 1974	58 392	347 194	1977	8 617	97 489
1975	5 042	40 543	1978	10 284	119 438
1976	10 335	96 392	1979	18 313	216 739
			Total	110 983	917 795

Circular Head Dolomite and Trading Co. Pty Ltd, Smithton

This company, the sole producer, employed an average of ten men and produced 18 313 tonnes of crushed and milled dolomite primarily as a top-dressing in agriculture.

KAOLIN

QUANTITY AND VALUE OF PRODUCTION

Year	*Tonnes*	*Value $*	*Year*	*Tonnes*	*Value $*
Prior to 1975	112 869	883 018	1977	11 039	1 028 645
1975	2 056	170 138	1978	13 281	1 174 763
1976	9 527	857 170	1979	17 513	1 454 203
			Total	166 285	5 567 937

A.P.P.M. Ltd, Tonganah

The company continued to mine decomposed granite to produce kaolin filler clay for their paper mills at Burnie.

Only minor alterations were made to the treatment plant during the year.

The No. 1 pit was mined out and is now being progressively filled with tailings. Some clearing was carried out on the No. 3 pit site at North Tonganah and a haul road to same was partially constructed.

All plant feed is now obtained from No. 2 pit which has a life expectancy of two years.

Some further mined out areas were rehabilitated by levelling and grassing.

LIMESTONE

QUANTITY, VALUE OF PRODUCTION AND USAGE

	Manufacture of cement		*Manufacture of carbide*		*Chemical and metallurgical*		*Agricultural and other*		*Totals*	
Year	*Tonnes*	$	*Tonnes*	$	*Tonnes*	$	*Tonnes*	$	*Tonnes*	$
1919–74	8 307 113	13 150 028	919 932	3 525 805	4 618 312	6 615 330	1 016 833	2 482 826	14 862 190	25 773 989
1975	417 615	810 173	18 865	269 704	54 548	340 424	54 452	185 769	545 480	1 606 070
1976	488 441	1 465 323	20 696	310 440	75 154	704 308	52 490	257 116	636 781	2 737 187
1977	490 514	1 471 542	20 308	304 620	82 131	812 499	65 552	348 532	658 505	2 937 193
1978	515 717	1 547 151	29 876	448 140	89 575	913 400	81 848	468 493	717 493	3 377 184
1979	559 564	1 678 692	29 160	437 400	88 371	904 078	70 764	415 679	847 859	3 435 849
Totals	10 778 964	20 122 909	1 038 837	5 296 109	5 008 091	10 290 039	1 341 939	4 158 415	18 167 831	39 867 472

Benders Spreading Services, Ida Bay

P. Allan, Mining Engineer, Hobart reports:—

This company which is a minor shareholder in Electrona Carbide Industries is now the sole owner of the Lune River limestone quarry which is currently the only source of limestone for local carbide production and was previously owned by the Commonwealth Carbide Co.

The introduction of new equipment for materials handling, the transport of product by road in place of, as previously, by water, improvements to internal roads and the upgrading of the crushing and screening facilities has removed many of the bottlenecks and re-established the operation on a firm basis.

Further assistance is envisaged towards redevelopment of the quarry itself with perhaps the introduction of selective mining and grade control.

Production for the year was 29 160 tonnes of limestone to an estimated value of $437 400 for carbide production, 4 466 tonnes of limestone to an estimated value of $45 330 for agricultural purposes and 35 403 tonnes of limestone to an estimated value of $531 045 for metallurgical purposes with a workforce that averaged ten men.

A. R. Beams, Flowery Gully

From his quarry, crushing plant and lime kiln, Mr Beams produced 3 413 tonnes of crushed limestone for agricultural purposes and 3 442 tonnes of limestone and lime for chemical and metallurgical purposes. Total value of production was $81 048 and an average of six persons was employed.

Electrona Carbide Industries, Electrona

P. Allan, Mining Engineer, Hobart reports:—

This year proved difficult for the company which had numerous problems associated with the commissioning of the new furnace complex while undergoing a change in ownership and control.

With White Industries assuming production responsibilities and injecting some specialised expertise most of the commissioning problems were overcome but at the expense of meeting current markets. Financial assistance had to be supplied by the State Government to maintain the continuing viability of the operation which now looks to be in a settled condition.

Despite the problems the company produced 11 129 tonnes of carbide and 543 tonnes of acetylene black with an average employment figure of 181 which was increasing towards the close of the year. The limestone used in manufacture was quarried at Lune River and amounted to 29 160 tonnes.

Goliath Portland Cement Co. Ltd, Railton

J. Dempster, Mining Engineer, Launceston reports that:—

A total of 581 034 tonnes of limestone at an estimated value of $1 743 042 was quarried and used mainly in the manufacture of cement. An average of seventeen people was employed in the quarry.

A new branch was opened at the north end of the quarry as a pump sump.

The plant produced 423 788 tonnes of Portland cement at a value of $7 509 523. An average of 290 persons was employed in the plant during the year.

A major reconstruction of the plant was commissioned. The first stage due for completion at 30 June 1980 was a $10 million contract that was let to Humboldt Wedag for the construction of a Pyroclon Precalcination pre-heater system and ancillaries ahead of the rotary kiln. With the completion of Stage 1 the plant output of fine cement is planned to increase from 1 500 to 2 200 tonnes per day. It is planned to increase the output to 3 000 tonnes per day at a later date when additional milling capacity is installed.

The dispatch section of the works was upgraded for a capital expenditure of $1 million. The expenditure covered the installation of a six spout bag rotary packing machine, a conveyor system, shrink wrap tunnel and building extensions.

A large portable vacuum clean-up system was also purchased for $40 000 for general plant housekeeping.

Mole Creek Limestone Ltd, Mole Creek

The quarry produced 49 326 tonnes of limestone for chemical and metallurgical purposes and 15 857 tonnes of limestone for agricultural and other purposes at a total value of $395 286.

The average number of persons employed in the quarry and kilns at the end of the year was seventeen.

Capital expenditure for the year totalled over $100 000 and included a two deck vibrating screen, stacking conveyor, portable drill rig and additions to the oil storage area.

Railton Lime Pty Ltd, Railton

3 574 tonnes of limestone received from Goliath Portland Cement Co. Pty Ltd was crushed for agricultural use and for roads.

PEBBLES

QUANTITY AND VALUE OF PRODUCTION

Year	*Tonnes*	*Value $*	*Year*	*Tonnes*	*Value $*
1957-1974	17 167	298 956	1977	1 189	30 399
1975	859	15 622	1978	1 486	48 095
1976	1 716	33 366	1979	1 515	47 390
			Total	23 932	473 828

Mineral Supplies, Ulverstone

The collection of pebbles for grinding was continued on the beaches in the Ulverstone area. The output was 867 tonnes, valued at $44 150. An average of seven persons was employed.

SILICA

QUANTITY AND VALUE OF PRODUCTION

Year	*Tonnes*	*Value $*	*Year*	*Tonnes*	*Value $*
1936-1974	345 408	830 920	1977	13 453	81 930
1975	27 573	95 257	1978	8 366	43 991
1976	20 479	66 630	1979	8 397	47 809
			Total	423 676	1 166 537

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

A total of 8 096 tonnes of silica sand, valued at $40 480 was produced for the manufacture of glass.

Mineral Supplies, Ulverstone

This firm produced 141 tonnes of silica valued at $5 400.

3. CONSTRUCTION MATERIALS

BUILDING STONE

Freestone

Four hundred and ninety-two cubic metres of freestone were quarried at a value of $36 922. There was a decline in production of 445 cubic metres from the previous year and this was mainly due to the decline in the building industry during 1979.

Red Granite

A total of 874 tonnes of red granite was quarried at a value of $119 872.

Coles Bay Granite Pty Ltd

This company quarried 650 tonnes of red granite at a value of $110 120.

Difficulties have been experienced in the quarrying and transporting of the granite to its Italian market. Five men were employed at the quarry during the year.

Building Stone (Other)

A total of 1 178 tonnes was produced at a value of $12 062.

CRUSHED AND BROKEN STONE

Basalt

A total of 562 965 cubic metres of Basalt was quarried, the value of production was $4 101 303.

Talisker Blue Metals, Launceston

The quarry at Relbia was closed at the year end, the plant and operations switched to the new quarry site at Breadalbane.

A 60 in × 48 in Traylor Primary Crusher was installed together with its ancillary equipment. Garage, workshops and office block constructed. A storage dam and settling pond were completed.

Dolerite

A total of 255 786 cubic metres of dolerite valued at $2 009 204 was quarried during the year.

Launceston Quarries

The plant at the quarry, off Remount Road, was extended by the addition of a triple rolls roller mill and a triple deck screen, a portable washing screen was installed and a new air conditioned vibration free control room was constructed for a total capital expenditure of $155 000.

Limestone

A total of 34 130 cubic metres valued at $240 891 was produced.

Sandstone

A total of 10 125 cubic metres valued at $72 189 was produced.

Other Stone

A total of 320 995 cubic metres valued at $2 230 041 was produced. The majority of the production was in connection with Hydro-Electric Commission Pieman Scheme.

An average of 155 persons was employed by all producers of crushed and broken stone.

GRAVEL

Production of gravel amounted to 1 347 938 cubic metres valued at $6 749 634, the majority of which was used on public roads in all parts of the State.

SAND

Production of sand rose from 204 347 cubic metres to 269 244 cubic metres at a value of $1 539 019.

OTHER ROAD MATERIAL

Production declined from 187 255 cubic metres to 123 031 metres valued at $635 506. Most of this production is used by mining companies on their internal roads and tends to be produced to satisfy an immediate demand.

The construction materials industry employed an average of 485 persons during 1979 which was a decrease of 12 persons on the 1978 employment levels.

4. FUEL MINERALS

COAL

QUANTITY AND VALUE OF PRODUCTION

Year	*Tonnes*	*Value $*	*Year*	*Tonnes*	*Value $*
Prior to 1975	10 473 142	28 422 548	1977	198 966	2 152 381
1975	161 922	972 491	1978	223 957	2 527 033
1976	189 489	1 689 878	1979	237 380	3 202 108
			Total	11 484 856	38 966 439

Cornwall Coal Company N.L., Duncan Colliery, Fingal

Mr P. Allan, Mining Engineer, Hobart reports that:

Total production of coal for the year was 237 380 tonnes mainly from continuing heading and pillar development while employment remained stable at 107 men.

Additions to the underground equipment included a Minesmobile four-wheel drive front-end loader, two 200 kVA underground substations and associated extensions to high tension distribution boards and cables, the installation of an underground fire-main and telephone line, five pumps, hydraulic jacks and props, a belt lacer, a conveyor overpass, extensions to underground conveyors and the upgrading of existing conveyors.

On the surface, a new freshwater line was installed from the mine to the washery, the main circuit breaker has been upgraded, the general lighting throughout the surface facilities has been improved, a two-way radio and bases have been installed to assist with the availability of vehicles and staff and various items of equipment installed in the screening plant, accounts office, laboratory and conveying office to improve productivity.

Towards the end of the year the company began work at Mt Nicholas in the vicinity of Cornwall in investigating the possibility of opening new workings in the Blue Seam which it is hoped will augment the current production from Duncan and allow the company to meet the demands of a potentially expanding market. This new optimistic approach was supported mainly by a change in ownership which came about by the purchase of the company by the Goliath Portland Cement Co., of Railton who have a long association with the Fingal Valley coal industry and were the first company in Tasmania to convert back to coal as a result of rising oil costs.

Previous attempts by the company to re-establish a colliery in a lower seam at Mt Nicholas proved impractical and work started towards the close of the year in developing into the Blue Seam at an elevated horizon. While preliminary results are encouraging it would be premature to forecast the success or otherwise of the current venture.

On 1 March in the D heading of No. 1 section of the Duncan Mine a thirty-three-year-old roof-bolter was killed by a roof collapse which occurred while he was inserting the bolt in the second hole.

PEAT

QUANTITY AND VALUE OF PRODUCTION

Year	*Tonnes*	*Value $*	*Year*	*Tonnes*	*Value $*
Prior to 1975	1 462	91 548	1977	330	45 788
1975	375	29 873	1978	3 098	65 170
1976	3 779	58 974	1979	410	78 775
			Total	9 454	370 128

Collins Development Pty Ltd

This company produced and processed 410 tonnes of peat valued at $78 775.

5. FOREIGN ORES

The total value of the metallurgical products of four large works treating foreign ores imported into Tasmania was $283 284 804 an increase of $52 360 927 over the value recorded in 1978.

ALUMINIUM

Comalco Aluminium (Bell Bay) Ltd, Bell Bay

Two hundred and twenty-four thousand six hundred and fifty-four tonnes of alumina were imported during the year producing 113 769 tonnes of aluminium. Average employment was 1 270 persons which was an increase of 16 persons on the previous year.

Capital expenditure totalled over $2 095 000 for the year and was incurred for the following: two new 415 V sub-stations: three circuit breakers; rectifier cooling system modifications; new telephone exchange; new one tonne electric induction furnace for scrap; completion of No. 12 furnace casting station; new 50 tonne reverberating casting-shop furnace, a casting-shop degrassing unit; fume tower modifications; modifications to the cryolite recovery plant and construction of a plant to detoxify the potline leachate.

FERRO-MANGANESE, FERRO-SILICON AND SILICO-MANGANESE

Tasmanian Electro-Metallurgical Co. Pty Ltd, Bell Bay

During the year a total of 62 317 tonnes of manganese ore was imported from Groote Eylandt. One hundred and twenty-five thousand one hundred and eight tonnes of manganese alloys for the steel industry was produced.

The alloys were 86 540 tonnes of high carbon ferro-manganese and 38 568 tonnes of silico-manganese which has been reported under Silicon.

Capital expenditure for the year totalled $310 000 and included an extension to the main office block, a new front-end loader and a finished product shed at No. 5 Furnace.

The average number of persons employed increased by 17 to 425 persons.

TITANIUM DIOXIDE

Tioxide Australia Pty Ltd, Heybridge

Western Australian ilmenite was treated at the Heybridge plant for the production of titanium dioxide. The improved market demand was offset by rising fuel costs which severely reduced the profit potential of the increased sales.

Capital expenditure totalled $1 187 000 for the year and covered the following items:—

(1) Projects for improved operation and cost reduction;

(2) Energy saving exercises;

(3) Dust elimination projects;

(4) Upgrading electrical installations;

(5) Automation of some process operations; and

(6) Safety improvements.

The number of persons employed was 401 a decrease of six on the average figure for 1978.

ZINC, CADMIUM, COBALT OXIDE AND SUPERPHOSPHATE

Electrolytic Zinc Company of Australasia Limited, Risdon

This company, reviewed under Zinc, produced zinc from concentrates imported from Broken Hill 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.

The past year has been a challenging one for the Branch. The zero growth policy on staff members combined with an increased demand for geological services from industry, the Government and the public have placed considerable pressure upon the officers of all sections of the Branch. It is anticipated that these pressures are likely to be maintained or even increased during the year ahead and it is even possible that the Survey will be forced to reduce services in some fields.

Whilst the main increase in work load has come from the expanded coal exploration programme there has also been a rise in enquiries from mineral and oil exploration companies together with increased public enquiries for engineering geology and hydrogeological services.

The expanded coal exploration programme is proceeding satisfactorily. Drilling capacity has expanded and geophysical surveys pushed toward completion. This has brought with it a concomitant increase in core logging, sampling, geological mapping and computation of geophysical results. The latter aspect has been delayed due to the breakdown of the Departmental in-house computer and a new machine has been ordered. Tenders have been called for an aeromagnetic survey of the Fingal coalfield and this should be carried out early in the new year. This survey will be a valuable adjunct to the gravity surveys already carried out. Private companies have also shown considerable interest in Tasmanian coal deposits and a number of Exploration Licences have been issued. However, at the time of writing only two private companies were active in the field.

There has been a general upsurge in mineral exploration in the State and all areas which show any promise of mineral potential are held under some form of mining tenement. Having regard to the mineral potential of the State this is a healthy sign for the future of the mineral industry of Tasmania.

Regional geological mapping of seven sheets was continued whilst five sheets have been completed to the drafting stage and work has commenced on three new sheets. The standard of mapping has continued at a very high level and progress in this field is very satisfactory.

The number of enquiries for advice on groundwater has increased and reports provided as required. A major project carried out in this field has been the discovery and development of an underground water supply for Swansea. The Branch has carried out numerous studies of damage to urban properties due to landslips as well as preparing reports on the geological aspects of various engineering projects. Of concern is the increasing detection of damage to housing due to expanding clays and the Survey would like to be in a position to assist more with this problem given adequate staff.

Detailed reports of the activities of the Branch are given by the various section heads and specialists.

REGIONAL GEOLOGY

Supervising Geologist E. Williams reports —

1:50 000 Map Series —

Boobyalla Sheet has been published.

Kingborough, Huntley, Maria, Smithton and Sorell Sheets are beng drafted for publication.

Snow Hill Sheet: Senior Geologist N. Farmer continued mapping.

Interlaken Sheet: Geologist S. Forsyth continued mapping.

Blue Tier Sheet: Geologists M. P. McClenaghan and P. R. Williams continued mapping.

Pedder Sheet: Geologists M. P. McClenaghan, N. J. Turner and C. Calver continued mapping.

Eddystone Sheet: Geologists P. W. Baillie and P. R. Williams continued mapping.

St Marys Sheet: Geologists N. J. Turner, C. Calver and P. W. Baillie continued mapping.

Corinna Sheet: Geologist A. V. Brown continued mapping.

St Valentines Sheet: Mapping was completed by P. R. Williams, P. W. Baillie and P. Lennox.

Ben Lomond Sheet: Geologist P. Lennox commenced mapping.

Bathurst Sheet: Geologists P. R. Williams and P. Lennox commenced mapping.

Notes for the 1-mile Sheffield and Mackintosh Sheets and for the 1:50 000 Ringarooma — Boobyalla Sheets are being edited.

Reports for the 1-mile Frankford Sheet, and 1:50 000 Strahan, Oatlands and Kingborough Sheets are being prepared.

ECONOMIC GEOLOGY

Supervising Geologist A. J. Noldart reports —

The staff of the section comprised a supervising geologist, two senior geologists and five geologists.

The following activities were carried out:—

(1) Continuation of investigation of detrital tin in the north-east generally including —
   (a) Commencement of exploratory drilling on the Musselroe River flats — Cybele Creek, Garfield Elizabeth area.
(2) Examination of mineral prospects and small mines throughout the State and examination of mineral potential of areas under application to purchase from the Crown.
(3) Advice to prospectors in general.

Fuel Minerals

(1) Continuation of exploratory diamond drilling in the north-east coal fields.
(2) Continuation of mapping and studies of the Duncan coal mine, Fingal.
(3) Continuation of compilation of an interim report on the coal resources of the Fingal area.
(4) Continuation of detailed field mapping of the north-east coal fields in association with the Regional Mapping Section.
(5) Close liaison was maintained with private interests investigating fuel deposits throughout the State.

Non-Metallic Minerals

Construction Materials

(1) Continuation of construction materials survey and register from government, local government and private industry records.
(2) Continuation of quarry sampling data tabulation for construction materials report.
(3) Compilation of above data to assist various planning authorities and municipal bodies.
(4) Appraisals of potential or proposed quarry sites in various localities.
(5) Advice to governmental and semi-governmental bodies, and private industries.

Industrial Minerals

(1) Field investigation and completion of preliminary drilling programme in the Barnes Hill, Beaconsfield area. Two further potentially economic occurrences were located.

General

(1) Continuation of studies of the Cambrian succession of the Mt Darwin-Rosebery-Pieman River mineralised belt and mineral relationships.
(2) Continuation of mineral appraisal of the regional geology of the Cleveland mine area and southwards, and the St Valentines map sheet in association with the Regional Mapping Section.
(3) Presentation of lectures at the Fluid Inclusion Workshop, Latrobe University, representation at the Australian I.M.A. symposium on ore reserves and at the Fourth Australian Geological Convention, Hobart.
(4) Preparation of Ore Minerals Catalogue.
(5) Commencement of Mackintosh map sheet economic appendix.
(6) Liaison was maintained with mineral exploration companies throughout Tasmania and works in progress in association with industry staff.

ENGINEERING GEOLOGY

Supervising Geologist P. C. Stevenson reports —

The Section consisted of a Supervising Geologist, two Senior Geologists and four Geologists.

Geologist A. T. Moon joined the section in January and brought it to full strength.

The years work has been remarkable not only for its volume but for the range of activities. As usual the greatest volume of work has been in the groundwater and slope stability fields.

The regional groundwater survey covering Scottsdale and the North-East is being compiled and has given rise to a great deal of contract drilling which has necessitated additional field work. More extensive investigations in this area have been required at Cape Portland and at Winnaleah for a town supply. In other parts of the State major investigations have been necessary at Swansea for a town supply, at Binalong Bay, King Island, South Arm and Tomahawk. Other investigations have been carried out at Primrose Sands, Tasman Peninsula, Forcett and Mowbray Park Smithton as well as many individual bore sites.

Regional water surveys have begun at Sheffield and in the Oatlands area, but the diversion of drilling and geophysical services onto coal work has prevented much progress. The Carlton regional investigation has been in abeyance for the same reasons. The Devonport regional investigation is being compiled.

The Section and Department has been represented at the Technical Committee on Underground Water at Perth, a geologist attended the Groundwater Pollution Conference in Perth and there has been a meeting of the local group of the Technical Committee on Water Quality, and a paper for publication has been prepared on the Pump Testing of a Spear-Bore Array.

Slope stability work has been extensive both in soft and hard rocks. A flow of house block and subdivision work has continued (from the Tamar, the North-West, from the Lilydale area and from Sorell, Hobart, the Huon, and Tasman Peninsula) and in spite of the existence of landslide zone maps, this work has restricted the amount of fundamental investigation. Nevertheless, detailed geological, geophysical and soil mechanics work has been possible at Norwood, at Grooms Slip and Penguin and at St Anthonys School, Riverside. As a result of this detailed work the nature of the landslide phenomenon in Tasmania is becoming better understood, and the land use decisions derived therefrom are of higher quality.

Consulting engineers in the State are now becoming more involved in slope stability assessments and this is a welcome development. Some review of this work is still required the section however, particularly in the fields of new subdivisions and in the design of tailings dams.

The section has been closely concerned with the design of forestry roads at Bicheno and Fingal where these cross unstable hill slopes.

The proposed landslip zones at St Helens have been in the hands of the Portland Council for some time but the poor base-map coverage of the area has necessitated considerable survey work to bring the maps to a standard suitable for proclamation. The section has been closely involved in discussions with objectors in the proposed area.

There has been some basic study of the mineralogy of clays. This has found applications not only to the landslide problem but to the growing problem of house damage caused by expansive clays.

The stability of hard rock slopes has been of concern at The Nut at Stanley, where loose rocks were threatening installations and buildings, and the section has been involved in detailed assessments of the stability of faces in the open pit at Savage River. Some work has also been done on the slopes above the Pinnacle Road on Mt Wellington.

Work on water supply dams has been significant. The site for the Dunns Creek dam at Kingston has been mapped and a detailed drilling programme designed. Sites on the Carlton River near Sorell and on the Guide River near Burnie have been similarly prepared, and the site of a small ornamental dam at Bradys Lookout has been assessed by drilling.

Foundation studies have been made for a reservoir at Rocherlea and a water treatment plant near Ulverstone. The diversion of the ANR line near Latrobe has necessitated extensive geological and seismic work so that a location for a cutting can be chosen. The construction of the Base-line Air Pollution Station at Cape Grim and the George Town Golf Club extensions, required assessments of the foundation integrity. An urban geology map of Riverside is being prepared, and it is the intention to produce such a map for major cities and to revise the existing map of Hobart.

A magnetometer survey on the Launceston Southern Outlet was required to resolve the nature of the rock series through which a cutting had been designed, and advice was given to Telecom on the electrical nature of the soils in the Scottsdale area prior to the installation of cables.

Detailed logging of the Boobyalla borehole and an associated reflection seismic traverse were carried out, considerably extending knowledge of this anomalous and critical area.

New core and excavation logging forms based on those recommended by the Geological Society of London Working Group have been drawn up and put into use.

Visitors have included Professor W. R. Dearman of the University of Newcastle on Tyne who spoke to the section on the engineering significance of rock weathering, Mr Karl Shaw of A.N.U. who is working on the radio-isotope dating of beach deposits and was able to assist us with information of Seven and Nine Mile Beaches, Greens Beach and Anthonys Beach. A visit was made to the Big Thompson dam of the Melbourne and Metropolitan Board of Works.

All section members have now attended the St John Ambulance First Aid Course. A course of field lectures and exercises was provided for the final year civil engineers of the University of Tasmania.

Addresses and discussions on geological subjects are often requested by Local Authorities and this year these have been provided by section members to the Councils of the Portland, Glamorgan and Ringarooma Municipalities.

GEOPHYSICS

Geophysicist D. E. Leaman reports —

Regional Projects

Interpretation of the gravity map of Tasmania was continued as funds and time permitted. Some preliminary results were incorporated in a structural section across Northern Tasmania compiled by the Regional Section. Use of reflection seismic methods was also tested along a line St Helens–Savage River. Lesser assessments were provided as mapping aids on Maria Island and at Apsley for control of drilling.

Engineering Geology and Archaeology

Most geophysical surveys related to foundation engineering or ground-water projects continue to be undertaken by the Engineering Geology Section and only specialist projects are referred. In particular assistance was provided for harbour surveys at Stanley and design of water level recorders.

Initial test surveys at Bowen Park were followed up and new surveys were undertaken at Garden Point, Port Arthur. The combination of metal detector and magnetometer was shown to be very powerful.

Ore Deposits

No surveys were undertaken during the year but construction of an induced polarisation transmitter was continued. In addition, the application and use of metal detectors was evaluated.

Other Deposits

Coal resources surveys in central east Tasmania dominated all activities during 1979. The regional gravity survey completed in 1978 was used as a drilling guide during 1979 with excellent results. A detailed survey of the prime target area was nearing completion at the end of the year. Quantitative interpretation procedures have been developed in order to extract the most from these surveys. Specifications and preparations for a two tier aeromagnetic survey were also completed. More expensive line methods have also been tested. Resistivity methods have not proved useful but the seismic reflection method has been considerably developed. Early optimism about this method has proved to be justified and although the processing sequence remains to be fully refined the results of test traverses have revealed much about the form, continuity and structures within coal measures and other sedimentary sections. Final feasibility tests on Fingal Tier, possibly leading to a production survey, should be completed early in 1980

A minor quarry assessment survey was also undertaken at Cradoc.

Computing

Computing facilities provided the weak link in geophysical activities in 1979. With the breakdown and loss of internal equipment early in the year and funding, programming and capacity problems in relation to Public Service or external facilities, many projects were curtailed or restricted. Only the coal project continued normally due to priority and the fact that all processing was to be handled externally at the University of Tasmania. A replacement processor had not arrived by the end of the year.

Programming for a system for the Tasmanian rock catalogue and certain accounts procedures were completed. In addition several programmes prepared for the replaced processor were revised and updated so as to avoid delays when the replacement arrives.

CARTOGRAPHIC DRAUGHTING

Senior Draughtsman D. M. Hardy reports —

The following progress was made on colour map productions:—

1:250 000 Series

The final sheet in this series King and Flinders Island was printed in fifteen colours.

1:50 000 Series

Boobyalla (sheet 24): printed in 13 colours.

Maria Island (sheet 77): fair drawing proceeding.

Kingborough (sheet 88): fair drawing proceeding.

The structural map of Tasmania at 1:500 000 was reprinted in 5 colours.

A special area map, Geology of the Longford Basin, at 1:100 000 was printed in 10 colours.

During the year a display for National Map Week was arranged.

This year saw an increase in the amount of black and white diagrams required. In all, approximately 180 geophysical, geological, palaeontological and engineering plans and diagrams for Reports, Geological Survey Bulletins and normal field services were produced.

SURVEYING

Surveyor G. Benn reports —

The following surveys were carried out during the year: —

(1) Continuation of surveying and levelling of diamond drill holes and associated tracks at Fingal.
(2) Continuation of levelling in the Duncan Coal Mine, Fingal and a check survey along the belt road only.
(3) Continuation of the survey of boreholes at Garfield Creek, Gladstone.
(4) Landslips at Groom's Slip, Penguin; Brooke Street, East Devonport; Norwood, Launceston.
(5) Further survey work at Northern Chromite, Beaconsfield.
(6) Two proposed reservoir sites at Carlton and Kingston, Hobart.
(7) A survey along St Helens Point Road, St Helens, for landslip zoning.
(8) A survey at Nine Mile Beach, Swansea, for a water supply for Swansea Council.
(9) A survey of Shield's quarry, Howrah, Hobart.

Plans were produced of all surveys.

GEOCHEMISTRY

Geochemist, W. E. Baker reports —

The major activity during 1979 was the development of a method of analysis of gold in plant materials which could be applied on a routine basis. Completely satisfactory operation was not possible because of the limitations imposed by the existing laboratory conditions. Some 300 samples of radiata, fern, wattle, eucalypt and reeds were analysed yielding values of 20 to 3 000 ppb gold on an ash basis, with further work it may prove possible to use the method to establish the presence of gold-bearing drift under soil cover.

Minor studies continued with humic acids and were mainly concerned with anion interaction which may be involved in the transport of such elements as molybdenum.

Faults are becoming more frequent with the now ageing atomic absorption plant and service is difficult. Lack of continuity of staff is also a problem as it takes some six months training to develop semi-professional skills.

MINERALOGY AND PETROLOGY

Mineralogist and Petrologist, D. C. Green reports —

The year has seen further progress in the application of modern techniques to problems encountered in the mining, metallurgical and geological fields. For example, extensive investigations of chromite bearing sands and clays from Barnes Hill near Beaconsfield have been made to assist the Economic Section outline further resources.

Some 200 rock and mineral specimens, ores and concentrates were examined for prospectors, mineral collectors and officers of the Department. In these and major investigations I have been assisted in a part-time capacity by a new appointee, geologist J. Everard and technical assistant R. Woolley.

The Departmental collection of registered minerals and rocks is being transferred to mobile shelving and recatalogued. Some specimens are over one hundred years old and represent an important contribution to the State's early mining history no longer accessible through mine development or closure.

The extensive alluvial tin programme outlined in the previous report was completed in July and the results collated.

Other specific mineralogical investigations concerned the occurrence of tin in garnet, the nature of garnets thought to be indicative of kimberlite pipes, and zeolite determination. Considerable use was made of the electron probe micro-analyser installed at the Central Science Laboratory, University of Tasmania.

The stable isotope laboratory established in 1979 at the University continues to provide basic data for palaeoclimate, ore formation and hydrological investigations. A joint application to the Australian Research Grants Commission for $18 600 was successful and will permit the installation of modern hydrogen isotope equipment in early 1980. Two papers on stable isotope topics were prepared for the Fourth Australian Geological Convention.

PALAEONTOLOGY

Palaeontologist, M. J. Clarke reports —

Progress is again recorded in several areas, more particularly the detailed biostratigraphy of Tasmanian Late Palaeozoic cold-water faunas. Most of the first half of the year was spent completing the detailed regional mapping of Maria Island. Large collections of extremely well preserved fossils are now being processed. Important new discoveries include the presence of *Notospirifer*, a new genus and several new species of spiriferid brachiopods in Late Tamarian rocks. Refinement of the Late Bernacchian stratotype indicates that the *Taeniothaerus* Zone may be subdivided into a lower part with *Tomiopsis ovata*, and an upper part with *Tomiopsis plana* and *Tomiopsis ingelarensis*. Both on Maria Island and in the St Marys Quadrangle the specialised linoproductid *Anidanthus* is proving to be a common component of the Late Bernacchian *Taeniothaerus* fauna. Elsewhere in Tasmania *Anidanthus* is extremely rare. Preliminary determinations of oxygen isotope palaeotemperatures on specimens of *Eurydesma* and *Trigonotreta* from Maria Island are disappointing and are greatly at variance with the more qualitative methods based on taxonomic diversities. Late Bernacchian faunas have been proved for the first time at Pawleena, Sorell Quadrangle.

Eldon Group faunas in the Huskisson River area, Corinna Quadrangle, discovered last year by Geologist A. V. Brown have been collected to greater detail. These faunas with *Rostricellula* and other rhynchonellids, *Atrypa, Nucleospira, Leptostrophia, Cornulites, Tentaculites, Encrinurus* and *Trimerus* are essentially Wenlockian (Middle Silurian) in age and provide an important intermediate link between the Llandoverian (Early Silurian) faunas of the Tiger Range area, south-western Tasmania, and the Late Silurian — Early Devonian faunas of western Tasmania.

Dr Carlos Gonzalez (Argentina) visited Tasmania in January. He was shown a representative selection of developments of Late Palaeozoic rocks in south-eastern Tasmania and collections of pectinoid lamellibranchs, especially *Deltopecten, Etheripecten* and *Streblopteria.*

Well preserved specimens showing the unusual hinge-ligamental structure of Tasmanian *Deltopecten* have been provided for Dr N. D. Newell, American Museum of Natural History, New York. Dr Newell, who is one of the world's leading authorities on Late Palaeozoic bivalved molluscs, is currently conducting a revision of Late Palaeozoic pectinoids.

Dr E. M. Truswell (Bureau of Mineral Resources, Canberra) and Dr J. B. Jago (South Australia) are again thanked for their continuing assistance in the areas of Late Palaeozoic palynology and Cambrian trilobites respectively.

Indentifications of fossil material for schools and other members of the general public have again been provided.

PUBLICATIONS

Publications Officer E. L. Martin reports —

The following publications were printed during the year:—

Geological Survey Bulletin 57. Groundwater from coastal sands at Greens Beach, Northern Tasmania, by W. C. Cromer.

Geological Survey Bulletin 58. Stratigraphy, correlation and evolution of the Mt Read Volcanics in the Queenstown, Jukes-Darwin and Mt Sedgwick areas, by K. D. Corbett.

Geological Survey Explanatory Report 1-Mile Series. Sheet 30. Beaconsfield, 2nd ed., by R. D. Gee, P. J. Legge and others.

Geological Survey Explanatory Report 1-Mile Series. Sheet 37. Sheffield, by I. B. Jennings and others.

Geological Survey Explanatory Report 1:250 000 Series. Sheet SK-55/6. Oatlands, by S. M. Forsyth and A. B. Gulline.

Geological Survey Explanatory Report 1:250 000 Series. Sheet SK-55/8. Hobart, by N. Farmer.

Geological Survey Paper 3. Whitewater Creek dam sites, Kingston and the Tertiary channels of the Kingston-Margate area, by W. R. Moore.

Tasman Fold Belt System in Tasmania (revd ed.) by E. Williams.

The following publications were in preparation at the end of the year:—

Geological Survey Explanatory Report 1-Mile Series. Sheet 44. Mackintosh.

Geological Survey Explanatory Report 1:50 000 Series. Sheet 24 and 32. Boobyalla and Ringarooma.

Tasmania: Mineral Resources and Mining Industry (revd ed.).

The section also undertook the editing of the abstracts volume for the Fourth Australian Geological Convention.

About 500 colour slides were added to the department's collection. Subjects included road-cuttings, dolerite structures and weathering, general views and rock exposures in the Mackintosh Sheet area, and aerial views of the spear bore array at Nine Mile Beach.

Following the demise of the ageing Wang computer, our grid conversion programme was rewritten in FORTRAN for use on the CSB PDP-11. Lists of Unpublished Reports for the last few years are now on computer file and can be accessed using file editing and search programmes.

Unpublished Reports for the years 1920–1925 were microfilmed by the Central Microfilm Bureau.

The Publications Officer attended the second meeting of the AESIS Advisory Committee in Sydney on 28 November.

List of Unpublished Reports, 1979

No.	*Title*	*Author*	*Date*
1979/1	Geology of the area around a proposed dam site near Legana	W. L. Matthews	9.1.79
1979/2	Stability assessment of some low density residential areas in the Huon Valley	P. C. Stevenson	17.1.79
1979/3	Groundwater and land stability in the Tasman Peninsula	W. C. Cromer R. C. Donaldson P. C. Stevenson	19.1.79
1979/4	Geology around a proposed dam site on the Guide River	W. L. Matthews	19.1.79
1979/5	Magnetic survey at Shoal Bay, Maria Island	D. E. Leaman	31.1.79
1979/6	Sand resources at ' Native Point ', Perth	V. M. Threader	20.2.79
1979/7	Prospecting for gravel in the Eddystone and Musselroe Roads area	V. M. Threader	7.3.79
1979/8	Pulbeena travertine limestone	T. G. Summons	14.3.79
1979/10	Site investigations for a proposed water main and reservoir at Rocherlea	W. R. Moore	20.3.79
1979/11	Recommendations for the construction of an access road and associated land drain in the heel area of the Parklands slip mass, Burnie	P. C. Stevenson W. L. Matthews	28.3.79
1979/12	The probable Middle Cambrian sequence on the Gordon River Road, south-western Tasmania	N. J. Turner	9.4.79
1979/13	Seismic evaluation of proposed quarry site for H. Duggan and Sons, Cradoc	D. E. Leaman	27.4.79
1979/14	A computer programme for the production of sand and gravel resources plots	E. L. Martin	9.4.79
1979/15	East Coast Coal Project gravity survey. Prelimary report. Part 2. First progress report, December 1978 — June 1979	D. E. Leaman	30.5.79
1979/16	Results of drilling for water in the Devonport — Port Sorell — Sassafras area, 1976–1979, and selection of future bore sites	W. C. Cromer	12.7.79
1979/17	Seismic survey at Fishermens Dock, Stanley	R. G. Richardson	1.6.79
1979/18	Rock instability on The Nut, Stanley	A. T. Moon R. C. Donaldson	2.5.79
1979/19	Department of Mines diamond drill hole assay logs, Great Pyramid tin prospects	D. J. Jennings	5.7.79
1979/20	Seismic survey at a proposed dam site at the Guide River, Hampshire	W. L. Mattews	5.7.79
1979/21	Gravel workings at Royal George, Municipality of Fingal	V. M. Threader	9.7.79
1979/22	A diamond drill hole at Deep Bay, Cygnet	N. Farmer	10.7.79
1979/23	A diamond drill hole at Silver Hill, Cygnet	N. Farmer	12.7.79
1979/24	A diamond drill hole a Margate	N. Farmer	12.7.79
1979/25	A diamond drill hole at Harts Hill, near Margate	N. Farmer	20.7.79
1979/26	A diamond drill hole at Snug	N. Farmer	20.7.79
1979/27	A diamond drill hole at Palmers Road, Oyster Cove	N. Farmer	20.7.79
1979/28	A diamond drill hole at Snug Tiers, Oyster Cove	N. Farmer	20.7.79
1979/29	A diamond drill hole at Mt Cygnet	N. Farmer	23.7.79
1979/30	A pre-feasibility geological site investigation, Metropolitan Water Board Dunns Creek Project	A. T. Moon	24.7.79
1979/31	Use of the DHR 1632 seismic system for deep crustal studies	D. E. Leaman	6.8.79
1979/32	Structural assessment, Cooks Marsh area	D. E. Leaman	6.8.79
1979/33	Bowen's Landing Historic Site, Risdon: further geophysical work and appraisal of results	D. E. Leaman	7.8.79
1979/34	The stability of slopes above Eaglehawk Neck look-out	P. C. Stevenson	7.8.79
1979/35	Geological investigation of concrete reservoir sites, Bridgenorth Road, Legana	A. T. Moon	8.8.79
1979/36	Drilling at a proposed dam site on R.Vos' property, Legana	W. L. Matthews	14.8.79
1979/37	Garden Point Caravan Park, Port Arthur, Archaeological assessment — geophysics	D. E. Leaman	14.8.79
1979/38	House drainage problems on Pilchers Hill, Lindisfarne	D. E. Leaman	24.8.79
1979/39	Final report on a seismic survey of Fishermens Dock, Stanley	R. G. Richardson	27.8.79
1979/40	Geological map of the Cygnet area	N. Farmer	7.9.79
1979/41	Site investigation for the proposed Cam River water treatment plant, Somerset	R. C. Donaldson	29.8.79
1979/42	Reference listing of photographs and colour slides showing engineering, structural and general demonstrations related to Jurassic dolerite	D. E. Leaman M. J. Dix	11.9.79
1979/43	Slope stability at Cape Grim	P. C. Stevenson	10.9.79
1979/44	Foundation conditions at George Town Golf Club	P. C. Stevenson	24.9.79
1979/45	Foundation conditions at St Anthony's School, Riverside	D. J. Sloane	6.11.79
1979/46	A structural profile across Tasmania. Implications of geophysical surveys	D. E. Leaman	12.11.79
1979/47	A landslide at Deviot	W. L. Matthews	9.11.79
1979/48	Offshore oil wells in Tasmanian waters	J. D. Berry	15.10.79
1979/49	Test pitting for road-making materials along Eddystone and Musselroe Roads, Portland Municipality	V. M. Threader	23.11.79
1979/50	Pre-feasibility geological site investigation: Carlton River Project	A. T. Moon	23.11.79
1979/51	Foundation conditions at Norwood House, Norwood	D. J. Sloane	6.12.79
1979/52	Groundwater prospects at Mowbray Park, Smithton	P. C. Stevenson	10.12.79
1979/53	Notes on the Aerodrome Hill landslip area	D. J. Sloane	10.12.79
1979/54	East Coast Coal Project gravity survey. Preliminary report. Part 3. Second progress report, July 1979 — January 1980	D. E. Leaman	18.12.79
1979/55	Preliminary investigation of proposed Latrobe bypass, Australian National Railways Western Line	R. C. Donaldson A. T. Moon	19.12.79

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.

The number of samples registered was about a third less than last year and the number of determinations was down by about a fifth. The number of determinations per sample registered increased to 3·2. Complete rock analyses done totalled 87.

Chromium determinations (793) were three times the previous highest for this element and this, coupled with the twenty-fold increase in magnetic separations, reflected the greatly increased activity in chromite. Tin determinations were at only one third of last year's level.

Rubidium and strontium were both determined at record levels during the year. Both elements are determined as traces in complete rock analyses.

TYPE AND NUMBER OF TESTS

Type of Test	*Number*		*Type of Test*	*Number*	
I. QUANTITATIVE—			B. Miscellaneous		
A. Elements—			Ash	418	
Aluminium	130		Combined Water	88	
Antimony	4		Cyanide	6	
Arsenic	22		Ignition loss	65	
Barium	79		Insoluble	60	
Bismuth	14		Moisture	473	
Cadmium	9		Protective alkali	6	
Calcium	162		Soluble salts	13	
Carbon (including CO_2)	236		Specific energy	25	
Cerium	8		Volatiles	144	
Chlorine	8			1 298	
Chromium	793		C. Waters, etc.—		
Cobalt	93		Complete analysis	228	
Copper	107		Partial analysis	332	
Fluorine	47		Deposit gauges	48	
Gold	75			608	7 041
Iron (ferric)	309		II. QUALITATIVE		35
Iron (ferrous)	98		III. CLAY AND CERAMIC		
Lanthanum	8		Brickmaking tests	2	
Lead	93		Clay contents	2	
Lithium	22		Fusion points (incl. coal ash)	22	
Magnesium	160		Clay properties, liquid and plastic limits, shrinkage	56	
Manganese	139		Special tests on bricks	20	
Mercury	3			102	102
Molybdenum	31		IV. METALLURGICAL		
Nickel	96		Ball milling	5	
Niobium	89		Crushing and grinding	16	
Phosphorus	123		Density	37	
Potassium	108		Examination of minerals	12	
Rubidium	107		Flotation	1	
Scandium	72		Heavy liquid separation	27	
Silicon	113		Magnetic separation	328	
Silver	55		Pan concentration	5	
Sodium	108		Tabling	9	
Strontium	107		Sizing (including cyclosizing)	468	
Sulphur	202				908
Tantalum	9				
Tellurium	3				
Tin	593				
Titanium	129				
Tungsten	226				
Uranium	5				
Vanadium	106				
Yttrium	87				
Zinc	60				
Zirconium	87				
	5 135		Total		8 086

RESEARCH INVESTIGATIONS

Tin	2	Coal	1
Tungsten	3	Ceramics	1
Gold	1	Water	2
Lead	1	Pollution	1
		Total	12

SUMMARY OF INVESTIGATIONS

Tin

R590 — Cassiterite occurrence in Ringarooma Bay

Residues from samples obtained in 1966 and 1967 by Ocean Mining AG were composited; barren clay samples were omitted from this composite.

Most of the tin was found to be in composite grains.

About half the tin is contained in a third of the mass between 300 um and C/S2. This fraction assays 0·05 per cent Sn.

Heavy liquid separation between 4·7 mm and 38 um yielded 10 per cent of the tin in a product assaying 1·3 per cent Sn and containing 0·3 per cent of the original mass.

R775 — D. M. and M. E. Blackberry, Wyniford River

Concentrates being produced were of low (25 per cent Sn) grade and not marketable.

Test work showed that tin was being lost in endeavours to upgrade the concentrate even to this low grade.

It was recommended that in cleaning up the concentrate it be screened on 300 um and 600 um and the fractions concentrated. Finally the concentrate should be magnetically separated to yield a 75 per cent Sn product.

A valuable by-product was also made, namely a 26 per cent Sn/27 per cent WO_3 product.

Tungsten

R758 — Commonwealth Aluminium Pty Ltd, Moina wrigglite

This is a further extension of the investigation on this material previously done in R731 and R745. The head sample which weighed a tonne assayed 8·6 per cent F, 0·27 per cent Sn and 0·19 per cent WO_3.

Stage gravity concentration was done at 300 um, 170 um, 105 um, 75 um and on hydraulic cyclone products. Concentration at each stage employed tabling, flotation of sulphides and magnetic separation. A vanner was used to concentrate the finest products.

The vanner tailing contained 85 per cent of the fluorine.

A gravity concentrate contained 0·11 per cent of the original mass, assayed 25 per cent WO_3, 31 per cent Sn and contained 17 per cent of the tungsten and 12 per cent of the tin. The sulphide product assayed 14 per cent Zn, 1·7 per cent Bi and 0·3 per cent Cu.

Products made in this project will be used in further investigations.

R771 — Tasminex N.L., Kara mine

A sample of 'hematitic' ore assaying 1·2 per cent WO_3 and containing 88 per cent of magnetics was submitted for recovery tests by the Company which proposed to treat this ore in its present Kara mill.

Using a test method that would follow Kara mill practice 15 per cent of the tungsten was recovered in a concentrate assaying 36 per cent WO_3.

Using efficient magnetic separation and sizing of the gravity feed a third of the tungsten was recovered in a 60 per cent WO_3 concentrate.

It was found that almost half the tungsten was irrecoverable because a third of it was intimately associated with the magnetite (probably not as the mineral scheelite) and a further 10 per cent, although scheelite, is so fine as to preclude recovery by gravity methods.

R779 — Tasminex N.L., Kara mine

A sample of low grade concentrate made in the Kara mill from treating 'hematitic' ore was submitted for examination. It was claimed by the Company that the heat applied to dry this concentrate made it magnetic. The sample assayed 51 per cent WO_3.

The main impurity was magnetite which was removed by dry high intensity magnetic separation to yield a 69 per cent WO_3 concentrate containing 89 per cent of the tungsten. Only 10 per cent of the iron was retained in this concentrate.

As the dry magnetic separation was more intense than the wet magnetic separation this would account for the claim that the concentrate became magnetic on drying.

Gold

R785 — Department of Mines, Lisle tailings from lease 35M/71

A sample containing 100 kg of sluice box tailings was submitted for examination.

After sizing the fractions were either jigged or tabled to recover the gold which gave a head assay of 1·9 g Au/m^3 which indicates a serious loss of gold from the sluice box.

The gold recovered assayed 860 fine

Lead

R780 — Turmine and Carter, Fury Plains mine

The sample submitted assayed 22 per cent Pb and 45 g Ag/t from which a market concentrate was required.

Jigging at −5 mm recovered half the lead in a concentrate assaying 49 per cent Pb and 86 g Ag/t. Closer sizing of ore crushed to pass 2·4 mm did not improve the recovery but raised the concentrate grade to 62 per cent Pb and 106 g/t Ag.

Flotation on a product ground to pass 300 um recovered 91 per cent of the lead in a concentrate assaying 79 per cent Pb and 170 g/t Ag.

Coal

R777 — Department of Mines, boron in Fingal coal

In order to answer questions about the occurrence of boron in Fingal coal samples of washed coal, burnt and unburnt mine waste dumps and effluents from waste dumps and the washery were sampled.

The conclusions reached were:—

(1) The coal contains less than 100 g/t B probably about 20 g/t B.
(2) When burnt the boron remains in the ash which assays 70 g/t B. About a tenth of this boron can be leached with water immediately.
(3) Boron can be leached from raw coal.

Ceramics

R776 — Department of Mines, survey of brickmaking

The annual survey of bricks being produced was made in December 1978.

Water

R716 — Department of Mines, Midlands underground water

Two Midlands bores one on ' Stuartvale ' about 8 km west of Powranna and the other on ' Woorak ' about 4 km south of Powranna were regularly sampled between February 1976 and August 1978.

Little variation in the composition of the waters was found during the sampling period. However, it was observed that results from this sampling campaign differed from those obtained from single water samples when the bores were first drilled.

R769 — Department of Mines, Port Sorell underground water

Two bores about a kilometre apart were sampled over about two years namely ' Badcocks ' and ' Town ' bores.

Little variation was found to occur in the composition of the waters but there were differences between the sampling in this campaign and the initial sampling when the bores were first drilled.

Pollution

R680 — Department of Mines, oxidation of mine wastes

Results after five years of testing have been circulated to participating companies.

Department of Mines, mine environments

In addition to this work testing continued on the effect of mining on the South Esk River, the upper Forth River, and on West Coast streams.

A survey was made around the Que River mine area. The effect of raising the pH on some Que River waters was studied.

MINES AND EXPLOSIVES BRANCH

Report of the Deputy State Mining Engineer and Deputy Chief Inspector of Mines and Explosives, H. Murchie, B.Sc., D.R.T.C. M.Aust.I.M.M.

The Mines Inspection Act 1968

Employment

The average number of persons employed in the mining, metallurgical and quarrying industry during the year was 9 273, decrease of 152 persons from the average number employed in 1978.

Accidents

Accidents are again reported and recorded in accordance with Australian Standard AS 1885 ' Recording and Measuring Work Injury Experience ' however, there are some areas of employment which do not report and these are mainly small alluvial mines that are owner operated and persons employed in exploration areas.

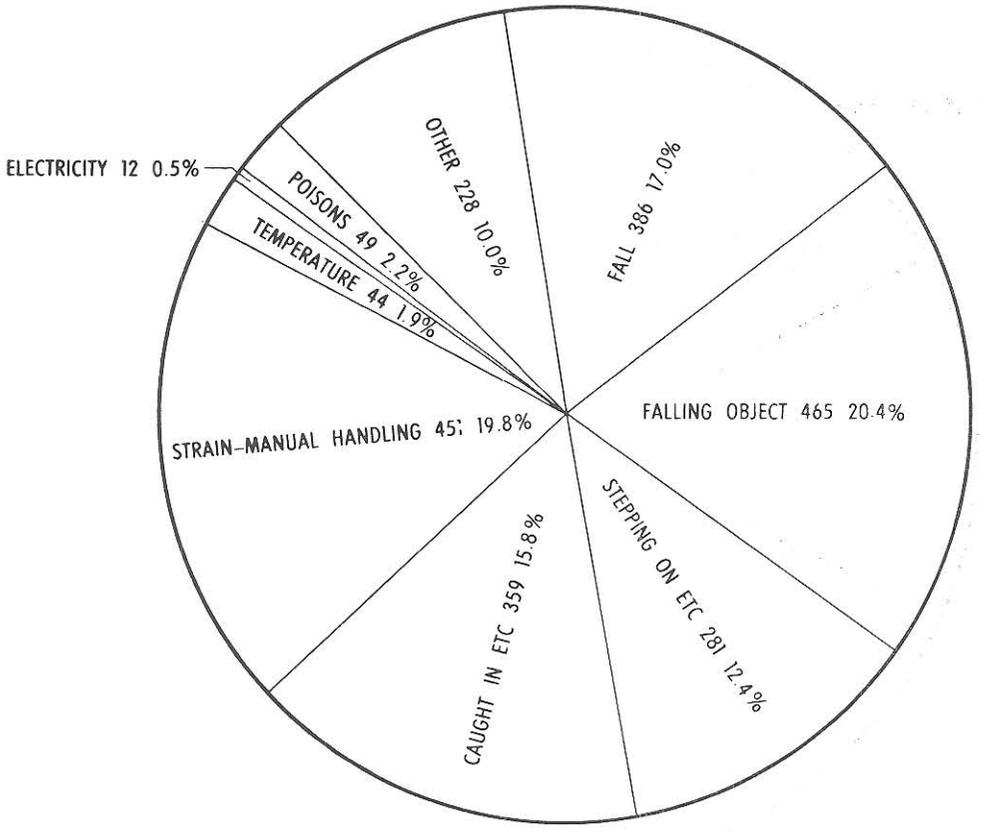
There was an increase in lost-time accidents from 1 877 to 2 275, an increase of nearly 22 per cent.

Three fatal accidents occured during the year which was the same as that recorded in 1978

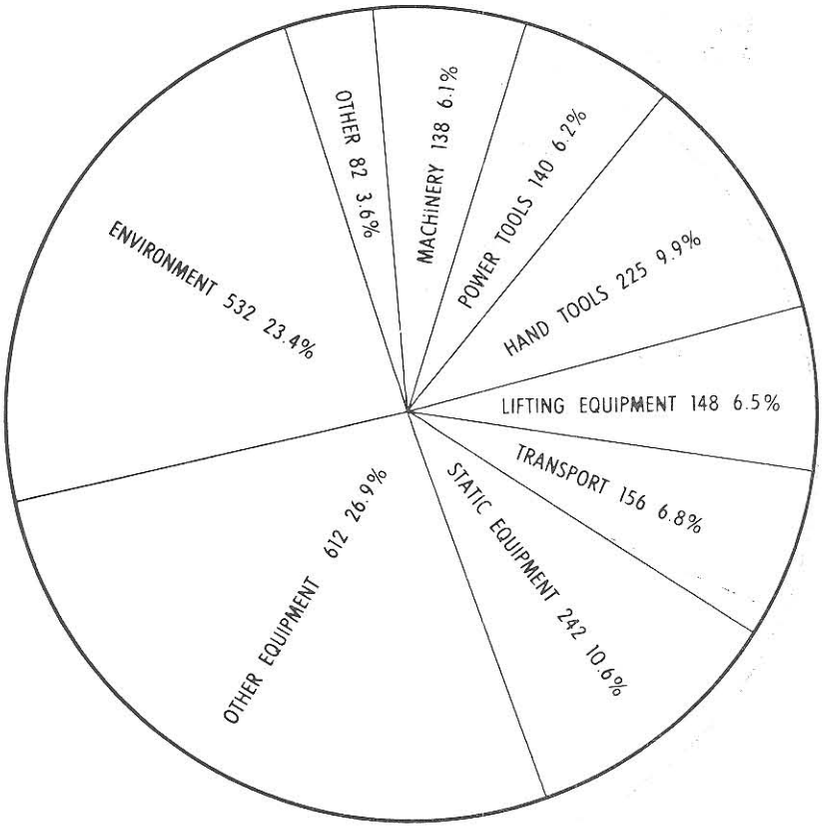
It is becoming apparent that the Inspectors of Mines are now receiving more demands on their time from the legal representatives of injured persons, this coupled with the nature of the increased incidence of lost-time injuries may require the Department to investigate in greater detail some aspects of lost time injury reporting.

ACCIDENT STATISTICS (AS 1885)

Employer	*Man hours exposure*	*No. of injuries*	*Frequency rate*	*Days lost*	*Incidence Rate (%)*	*Mean Duration Rate (days)*	*No. of Employees*
Aberfoyle	356 928	51	142·93	472	27	9	191
Amdex Endurance	38 296	....	....	....	....	....	18
Central Tasmanian Tungsten	16 880	....	....	....	....	....	8
Cleveland Tin	612 523	79	129·0	1 015	26	13	308
E.Z., Rosebery	2 019 114	879	435·3	8 451	77	10	1 149
King Island Scheelite	856 245	137	160·0	1 082	29	8	480
Mt Lyell	1 268 185	115	90·7	2 146	16	19	711
Northern Chromite	32 681	8	244·8	128	53	16	15
Pioneer	66 731	10	149·9	66	27	7	37
Que River	38 075	4	105·1	23	20	6	20
Renison	837 469	89	106·3	935	20	11	435
Savage River	921 259	93	100·9	794	22	9	428
Tasminex	40 378	3	74·3	199	14	66	21
All mines	7 104 764	1 468	206·6	15 281	38	10	3 821
A.P.P.M.	33 666	1	29·7	4	5	4	19
Comalco	2 731 533	128	46·9	2 208	10	17	1 298
Electrona	302 109	140	463·4	1 349	77	10	181
E.Z., Risdon	3 676 953	391	106·3	4 115	20	11	1 994
Goliath Cement	553 447	23	41·6	95	9	4	266
Mole Creek	29 952	....	....	....	....	....	17
N.W. Acid	140 300	7	49·9	72	7	10	103
Port Latta	521 857	18	34·5	220	8	12	240
Temco	857 717	18	21·0	528	4	29	423
Tioxide Aust.	739 804	9	12·2	103	2	11	404
Ceramic	164 133	20	121·9	146	24	7	85
All works	9 751 471	755	77·4	8 840	15	12	5 030
Colleries	184 825	37	200·2	525	35	14	107
Quarries	162 131	15	93·0	308	19	21	81
Totals	17 203 191	2 275	132·2	24 954	25	11	9 039

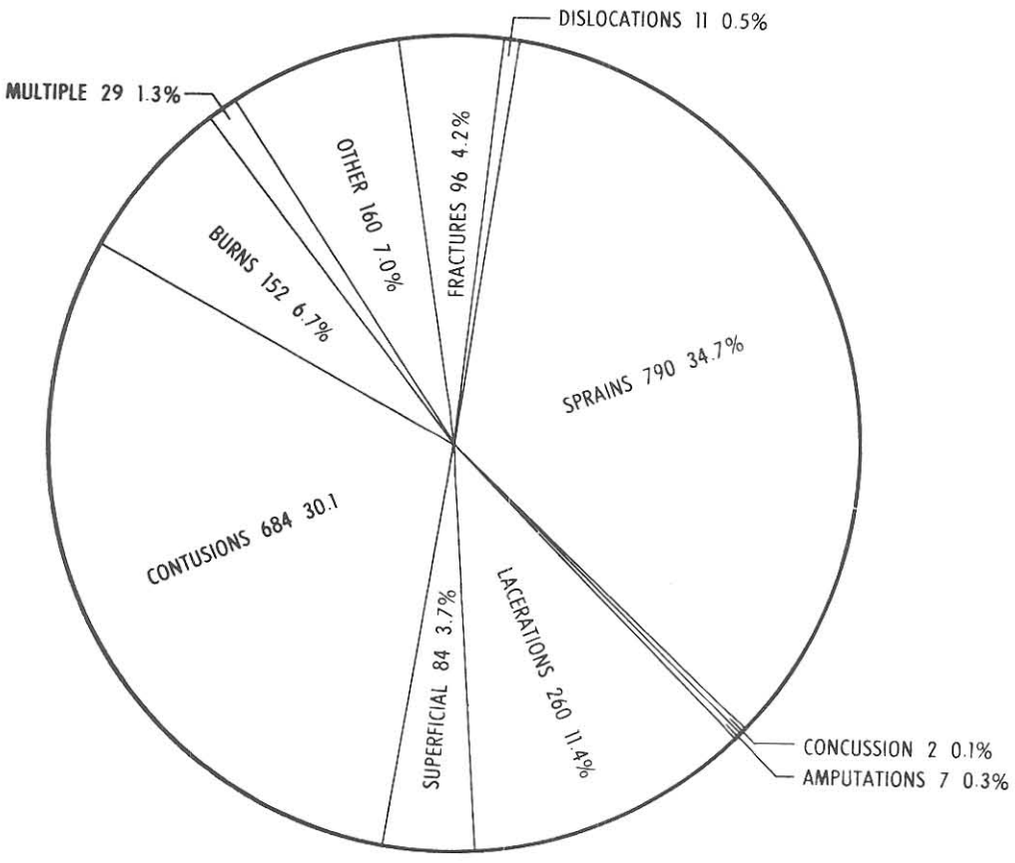


Accidents : Type of incident

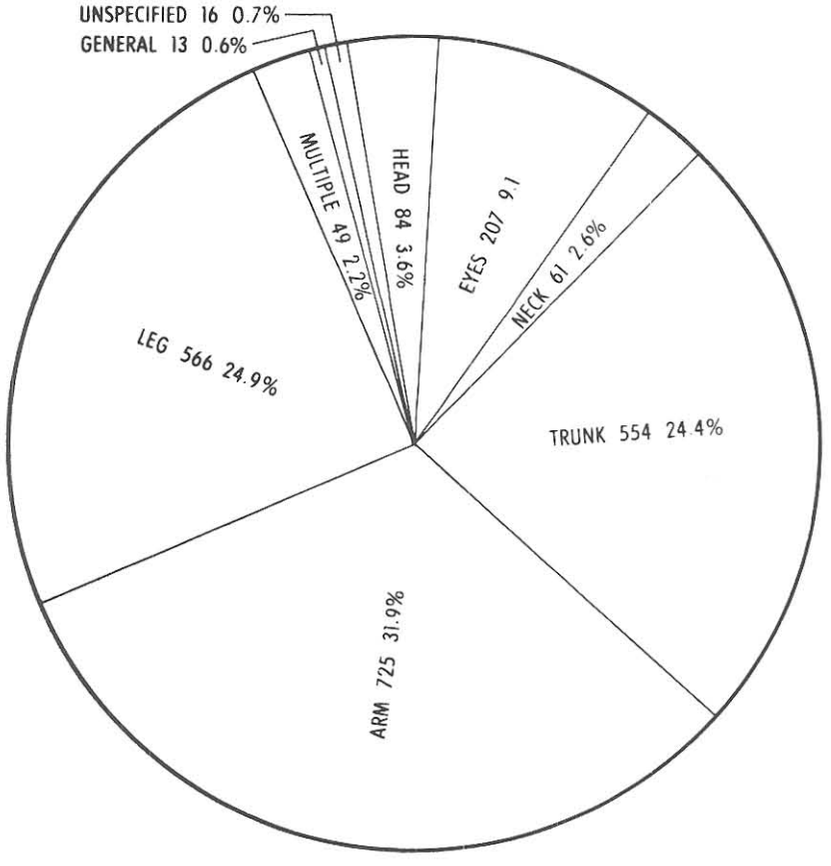


Accidents : Agency of injury

5 cm



Accidents : Nature of injury



Accidents : Location of injury

5 cm

DESCRIPTION OF SERIOUS AND FATAL ACCIDENTS

Fatal

F. B. Somers, Mount Lyell: Struck by the bucket of a travelling LHD.
S. Neolich, E.Z. Co. Risdon: Femoral artery severed by high pressure water jet.
J. A. Maney, Duncan Colliery: Crushed by roof fall.

Serious

G. Marshall, Savage River: Slipped off truck step, injuries to middle and lower back.
N. McKenzie, Savage River: Tripped over box in workshop, fractured arm.
P. Clayton, Savage River: Tracing earth fault, electrical burns to face and hands.
J. Rossiter, Savage River: Arm caught in changehouse door, fractured arm.
W. Woolley, Savage River: Slipped on pellets, fracturing collar bone.
J. T. Gilleece, E.Z. Co. Rosebery: Placed fingers in pump motor two fingers amputated.
M. J. Turner, E.Z. Co., Rosebery: Fell down manway, multiple injuries.
K. Flint, E.Z. Co., Rosebery: Knocked down manway by kibble, multiple injuries.
D. Bond, E.Z. Co., Rosebery: Hanging fell while barring down, trunk injuries.
T. Bailey, E.Z. Co., Rosebery: Hand caught between granby and sidewall, three fingers amputated.
Alexander, E.Z. Co., Risdon: Anode dropped from lifting rack, fractured finger.
Sayer, E.Z. Co., Risdon: Slipped on wet floor, fractured wrist.
W. Hawkes, E.Z. Co., Risdon: Hand caught in closing door, finger amputated.
Ferreol, E.Z. Co., Risdon: Hand caught stacking slabs, fractured finger.
A. Page, E.Z. Co., Risdon: Jammed by fork lift, fractured ankle.
Ogden, E.Z. Co., Risdon: Finger jammed between traxcavator and chute, fractured finger.
Parico, E.Z. Co., Risdon: Pushing cathode truck, fracture finger.
C. Taylor, E.Z. Co., Risdon: Fell off tube mill foundation, fractured back.
C. Croft E.Z. Co., Risdon: Releasing chain of conveyor belt, amputated finger.
Gray, E.Z. Co., Risdon: Vise slipped out of wire strop, fractured foot.
Blake, E.Z. Co., Risdon: Jig fell on foot, fractured toe.
Bull, E.Z. Co., Risdon: Vise fell on foot, fractured foot.
Barber, E.Z. Co., Risdon: Jammed between pipes, fractured thumb.
G. Ball, Mt Lyell: Drill rod fell from up hole after rockdrill removed.
R. M. Snell, Mt Lyell: Service column fell during erection, fractured hand.
D. I. Claridge, Mt Lyell: Fell from ladder, back and hip injuries.
L. Edwards, Mt Lyell: Fell while standing on LHD to effect repairs, fractured elbow.
T. L. Stubbs, Mt Lyell: Rock fall from rise face, fractured leg.
B. Woolan, Mt Lyell: Operating disc cutter when disc broke, lacerated thigh.
L. A. Marshall, Mt Lyell: Hand caught between break-out spanner and slider of down-the-hole hammer drill rig when pulling rods, amputated finger.
G. Holmes, Cleveland Tin: Rock fall, leg and shoulder injuries.
Woodward, Cleveland Tin: Leg jammed while climbing over rocks, dislocated knee.
Blake, Cleveland Tin: Rock dislodged from ladder above, fractured toe.
T. R. Smith, N.W. Acid: Preparing road acid-tanker for loading acid burns to face and eyes.
Garth, Renison Ltd: Let fall drain cover he was removing, fractured instep.
I. Denby, Renison Ltd: Flung from his vehicle on impact with sidewall, fractured collarbone.
Hayes, Duncan Colliery: Dropped timber on thumb, broken thumb.
A. G. Smith, Electrona Carbide: Fell from top of 966FEL, dislocated shoulder.
G. Voss, Electrona Carbide: Approached block while emptying carbide when carbide block split, burns to hands and legs.
D. Dorlogg, Electrona Carbide: Spark from furnace tapping through hole in boot, burns to foot.
G. McCullough, Etna Stone: Magazine explosion, burns to body.
G. Freeman, Readymix, Bridgewater: Caught in conveyor roller, multiple injuries.
R. Baker, King Island Scheelite: Struck by air hose, fractured leg.
D. Atkinson, King Island Scheelite: Rock fall, fractured leg.
K. Kennedy, King Island Scheelite: Caught in pulley, crushed hand.
N. Craig, King Island Scheelite: Fell from loader, fractured arm.
M. Benson, Comalco: Trapped between falling bail and rim of crucible, multiple chest injuries.
B. Van Koolwyk, Comalco: Fell from ladder, fractured femur.
Simmons, Comalco: Run over by his own tow motor when he left the engine running, fractured foot.
C. Lacey, Comalco: Setting anode block in furnace, trousers caught fire, burns to leg.
Schneider, Comalco: Tripped by broken air hose, fractured elbow.
D. Wickham, Comalco: Leg jammed against clamp trolley, fractured leg.
P. Fawdrey, Temco: Foot slipped into molten metal launder while barring slag, severe burns to foot.
C. Aalbright, Temco: Foot slipped into hot metal while making up tapping well, severe burns to foot.
Coker, Temco: Mud gun moved while climbing over, fractured foot.

DANGEROUS GOODS

The Dangerous Goods Act 1976

Mr M. E. Curtain: Assistant Chief Inspector of Explosives

Mr G. Jobson: Senior Inspector of Explosives

Southern District: —

Mr R. A. Pickett: Inspector of Explosives

Mr G. Goodrick: Magazine Keeper

Northern District: —

Mr D. Bonham: Inspector of Explosives

Mr S. Smith: Magazine Keeper.

North-West District: —

Mr H. E. T. Medwin: Inspector of Explosives

Mr M. E. Curtain reports that the work load has continued to increase at a rate that the present staff, although working most creditably, cannot cope effectively with all the activities and responsibilities of the Section

This is a problem of particular concern for it affects certain operations, especially routine inspections which are a year behind schedule. Only priority areas receive immediate attention.

The approval to appoint three new inspectors, sometime in 1980 (two in Hobart, one in Burnie) should ease the situation, except for the Launceston inspectorate which will still be understaffed.

Liquid Petroleum Gas

Maintained its high level of use and was one of the main priority areas regulated by the section.

The gas was widely used throughout the State for domestic, educational, commercial and industrial purposes. A noteable diversification was its use as an alternative fuel powering motor vehicles and for firing pottery kilns. A. number of problems during the year curtailed the development of autogas.

L.P. Gas Storage

A proposal forwarded by the L.P. Gas Safety Committee in 1978 for a 'Start Work Notice' was implemented in March. The system applied to all installations, licensed and non-licensed, and required a 'Certificate of Test' from the gasfitter and a 'Gas Supplier's Endorsement' to indicate that the installation had been installed according to the requirements of the Dangerous Goods Act.

In addition inspectors conducted random inspections of non-licensed installations (below 91 kg).

The initial 10 months of operation revealed some deficiencies in a number of non-licensed installations and the appropriate action was taken.

The introduction of the 'Start Work Notices' and the inspection of non-licensed installations increased the work load considerably.

	Number
Start Work Notices Received	1 966
Non-licensed installations (N.L.I.)	1 139
N.L.I. Inspected	259
Sub-standard N.L.I. found	52

Autogas

Following a recommendation from the L.P. Gas Safety Committee the Department, with the co-operation of the Transport Commission, drafted requirements and conditions for the conversion of motor vehicles to operate on L.P. Gas.

The main conditions were:—

(a) all installers must have the approval of the Chief Inspector of Explosives;
(b) all conversions must be carried out in accordance with the Australian Standard Code AS1425; and
(c) all gas cylinders must comply with the requirements of the Department of Labour and Industry.

A number of seminars were informed of the Department's requirements and the Hobart Technical College was given assistance in introducing a comprehensive L.P. Gas conversion course.

Several incidents in other States with leaking gas cylinders brought all conversion work to a standstill. Other factors affecting the industry were a number of associations, insurance companies and car manufacturers expressing concern about the standard codes and the lack of safety precautions, the high price of L.P. Gas and the limited number of outlets in the State.

	Number
Approved installers	11
Provisional approval	1
Vehicles converted since the system was implemented in July	40
Dispensing outlets	5

Transport of L.P. Gas

Comprehensive inspections of the three gas suppliers' eight L.P. gas road tankers indicated a number of defects which are being rectified.

L.P. Gas Committee

The Committee continued to meet during the year advising the Department of its recommendations.

The following were implemented:—

(a) The 'Start Work Notice' system;
(b) Gas-fitter's Information Circular issued;
(c) Random inspections of non-licensed installations; and
(d) Conditions for L.P. Gas conversions of vehicles.

Other Classes of Dangerous Goods

The Dangerous Goods act was more extensively administered during 1979.

In previous years the inspectors concentrated mainly with the importing, keeping and sale of flammable liquids, explosives and certain aspects of L.P. Gas.

The last two years and particularly throughout 1979 the Department was required to advise and regulate on all matters concerning all classes of dangerous goods.

Storage of Dangerous Goods

(a) One very important facet of the section's work, and also time consuming, was the approval of plans and sites for construction. Although the approvals were slightly down on last year they are now more rigorously examined to ensure that they complied with the existing codes and requirements;
(b) The number of licences to keep was slightly less than last year. The closing down of several service stations accounted for part of this; and
(c) A numer of industries and government instrumentalities sought advice concerning the keeping of dangerous goods.

Investigations revealed that potentially hazardous conditions exist through incorrect packaging, storage, stacking and handling of substances in Government establishments as well as private industry. In many cases it was found that a number of premises will be required to be licensed. This applied in particular to the storage of chlorine and ammonia. Assistance was also given in the disposal of Dangerous Goods.

Manufacturer of Dangerous Goods

Examination disclosed that a northern company was manufacturing dangerous substances without a manufacturing licence and without due precautions being taken.

Appropriate action was taken to remedy the situation and efforts will be made to ensure no like situation exists.

Packaging of Dangerous Goods

Inquiries revealed incorrect labelling, leaking and burst containers presenting potential hazardous conditions to employees, the public and fire fighters.

Transport of Dangerous Goods

Discussions continued with the Transport Commission concerning the control of the transport of dangerous goods by road.

An annual inspection sheet was drafted by the mechanical engineer with assistance from the section. In addition an information booklet for drivers was being prepared.

General

(a) A detailed list was being formed of the type of dangerous goods that were being stored, manufactured and transported in Tasmania;

(b) A large quantity of dangerous chemicals and explosives were collected and disposed of during the year: including approximately 400 anti-hail rockets;

(c) Approximately 150 complaints were investigated. These were mainly storage of flammable liquids, selling of fireworks and blasting complaints;

(d) Advice was given to 1 440 people seeking information concerning all aspects of dangerous goods; and

(e) Considerable time was spent in analysing and commenting on S.A.A. Codes, Transport of Dangerous Goods Code and draft legislation from other States.

Occupational Health

Assistance and advice was given to a number of firms and government departments concerning the precautions required when handling dangerous chemicals.

A number of lectures was given to associations and government departments on occupational health and toxic chemicals.

Committees

The section represented the Department on a number of committees and seminars during the year —

(a) L.P. Gas Safety Committee.

(b) Inter-departmental Committee on L.P. Gas.

(c) A.T.A.C.s Advisory Committee on the Transport of Dangerous Goods.

(d) Standards Association of Australia CH/9 Committee on the Safe Handling of Chemicals.

(e) Building Regulations Board.

(f) National Seminar on Occupational Health.

(g) Seminar Safe Handling of Chemicals

(h) Seminar on Autogas.

Incidents and Accidents

A total of 29 incidents and accidents were investigated.

L.P. Gas (Class 2.1)

(a) A home was badly damaged by explosion and fire where a display L.P. Gas heater leaked gas.

(b) A L.P. Gas operated toilet exploded causing burns to legs and hands of the user.

(c) A gas leak from a 1 tonne tank caused an area to be evacuated. A damaged gasket was the origin of the leak.

(d) A flat tray truck conveying empty 45 kg L.P. Gas bottles, lost its load when it was forced off the Midland Highway by an unknown semi-trailer.

(e) Minor leaks from cylinders: five incidents.

(f) Overfilling of L.P. Gas cylinders: seven incidents.

Flammable Liquids (Class 3)

(a) Side of road collapsed under a stationery vehicle conveying flammable liquid causing an 80 litre spillage.

(b) Man received burns to the legs and hands when petrol he was disposing of at an oil company depot caught fire.

(c) A major fire destroyed a service station; investigations revealed that the fire was not caused by the storage of dangerous goods.

(d) Incorrect packaging and conveying of methylated spirits resulted in considerable spillage caused potential fire and explosion hazards in a closed transport van. Apparently the situation frequently happened while carrying other dangerous goods — ether, chloroform.

In addition to the above hazard the driver was also affected by the high vapour concentration and an accident was liable to happen.

Flammable Solids (Class 4)

(a) A fire and a dangerous situation occurred when two damaged drums of calcium carbide evolved acetylene after the drums were affected by water.

(b) A fire was caused in a school by the spontaneous combustion of a flammable solid.

Oxidising Agents (Class 5)

(a) Incorrect packaging and storage of hydrogen peroxide caused a dangerous situation at a factory. The container burst among other combustible materials including kerosene and oils.

(b) Disposal of organic peroxides caused two fires at different schools.

Corrosives (Class 8)

(a) Spillage of hydrochloric acid in an anhydrous ammonia section of a storage compound.

(b) Spillage of sodium hydroxide from a road tanker.

(c) Two instances of sulphuric acid spills from derailed railway tankers.

IMPORTS OF INFLAMMABLE LIQUIDS

	Bell Bay	*Burnie*	*Devonport*	*Hobart*	*Total*
Inflammable liquids imported in bulk (tonnes)					
Aviation gasoline	3 090	....	2 744	41 988	47 822
Kerosene —					
Aviation	4 882	....	....	....	4 882
Lighting	1 231	2 475	....	1 400	8 657
Power	....	....	1 216	....	1 216
Motor Spirit —					
Regular	14 747	7 255	9 371	17 587	48 960
Premium	48 775	30 787	56 002	111 706	247 270
L.P. Gas	5 272	....	....	3 622	8 894
Distillate	29 352	36 916	29 871	55 090	151 229
Fuel Oil	7 266	2 465	24 976	44 377	79 084
Totals	114 615	79 798	127 600	278 470	600 483
Tankerships No.	28	8	14	23	73

Licences to Keep	2 552
Plans approved	403
Magazine Licences	124
Import Licences	21
Other Licences	334
Start Work Notices	1 366
Approved installers autogas	12
Vehicles converted to autogas	40
Incidents and Accidents	29
Shotfirers Permits	60
Exemptions Granted	4

IMPORTS OF EXPLOSIVES 1979

Blasting Explosives (kg)	973 125
Detonators (ea)	1 783 800
Detonating Cord (m)	480 666
Explosive Shipments	31
A.N. for use as an Explosive (t)	2 400
Fireworks shipments —	
Display	6
General	15

SPECIAL INVESTIGATIONS

Mr P. Allan, Mining Engineer, Hobart reports that —

Diesel Engines Underground

Stabilised economic conditions and pressures brought about by delayed replacement of existing diesel equipment has produced an increase in the number of applications for the use of diesel engines underground.

Engine approvals granted during the year were:—

Caterpillar 3304T in a 'Wigbus' temporarily approved.
Caterpillar 3304T in a Caterpillar 120G approved.
(2) Caterpillar 3306PCT in a Horwood Bagshaw LHD approved.
Caterpillar 3306TC in a Caterpillar 966 FEL approved.
Caterpillar 3406DI in a Caterpillar 980C approved.
(2) Caterpillar 3408TAC in a Wigtruck 631D temporarily approved.
Caterpillar 3408PCTA in a DJB D550 approved.
Deutz F 4L 912W in an Eimco 964/911B approved.
Deutz F6L 912 in a Gardner Denver jumbo approved.
Deutz F10L 413 in a Wagner ST8 temporarily approved.
Ford 2712E in a transit agitator approved.
Ford 2714E in a Ford F100 approved.
Hino EC100 in a Hino KLB 300 Personal Carrier approved.
Perkins 2·248 in a Domino Minesmobile approved.
(2) Toyota B in a S.W.B.
Volvo TD 70B (N·7) in a transit agitator approved.
Volvo TD 100A (N·10) in a Volvo tip-truck approved.

Investigations

Our vibration and building damage investigation service continues in demand with this year's enquiries covering the following:—

Hobart City Council — Effects of ground compaction on Bowen Park Pyramids.
Hobart City Council — Effects of traffic vibration and road condition on property in Sandy Bay.
Dept of Housing and Construction — House damage complaints Bastick Street, Rosny.
Clarence Council — Building inspection, St Mathews Church, Rokeby.
Clarence Council — Road interchange construction, Bellerive.
Department of Main Roads — Blasting limits Midland Highway, Lemon Hill.
Department of Main Roads — Vibration roller limits, Huon Highway.
Department of Main Roads — Vibration roller limits, Allanvale Connector.
Department of Mines — Blasting vibration limits Pioneer Quarry, Flagstaff Gully.
Insurance Company — Property damage, Brightwater Road, Howden.
Insurance Company — Possible blast damage, East Derwent Highway.
Insurance Company — Property inspection, Basin Road, West Launceston.
Insurance Company — Property inspections in Karoola Drive, Lindisfarne.
Public Complaint — Property inspection, Vermont Road, Launceston.
Public Complaint — Property inspection, Allanvale Road, Launceston.

MECHANICAL INSPECTION

W. C. Hodgson, M.I.E. (Aust.), Hobart

All mines and works were visited at least once during the year.

New designs and plant examined for approval included:—

Goliath Portland Cement

The designs for the $10 000 000 Pyroclon project and associated expansion were vetted and construction work commenced, using a FAVCO STD 350 Tower Crane.

E.Z. Rosebery

Work commenced on the new mill extension and the 17 level workshop complex, which will provide full repair, reconditioning and servicing facilities for all vehicles working in F lens.

Once underground, these machines will not in their normal working life be brought to the surface again.

The decision was made to re-design and re-commission the No. 2 shaft auxiliary winding engine and cage. This equipment has been out of service since 18.12.73 following a brake failure and a broken rope.

The Williamsford aerial ropeway had a new rope fitted (13·5 km long).

Renison

The 850 000 tonne per year plant expansion commenced.

E.Z. Risdon

Excavation work for the new sulphuric acid plant commenced, as did the construction of the new mechanical zinc stripping complex.

It is expected that manual stripping will be gradually phased out.

Comalco

The proposal to extend No. 4 potline was deferred due to the uncertain future of power availability. The decision to modernise No. 1 potline was made.

Aberfoyle

Storeys Creek winding engine has now been completely reconditioned.

Aberfoyle escapeway emergency hoist equipment was well advanced.

H.E.C. Pieman Scheme

The Bastyan Dam Power Station Excavation equipment and procedure was examined for design approval.

Certificates of Competency

Fifty-one candidates were examined for certificates of competency to drive cranes — winding engines and internal combustion engines.

Dangerous Goods

The main activity in this area has been in the preparation of inspection and survey procedures for dangerous goods vehicles in collaboration with the Transport Commission. It is hoped that this will be finalised next year.

ELECTRICAL INSPECTION

E. J. Bartkus, M.I.E. (Aust.), Hobart

Inspection of electrical installations and equipment continued throughout all mines and works.

Throughout the industry various sections of aged installations were up-graded and modernised.

The year 1979 was free of electrical accidents.

The following proposed electrical installations and equipment were investigated and approved:—

Central Tasmanian Tungsten Pty Ltd, Diesel Power Station and Treatment Plant.
Aberfoyle Tin N.L., Rossarden, 11 kV. U/G Ring Main System.
Aberfoyle Ltd, Que River, Main Substation, Distribution Centre, U/G and surface reticulation.
Goliath Portland Cement Co. Ltd, extensions to main substation.
Renison Ltd, plant expansion stage 2.

New electrical plants inspected and approved on completion:—

Coles Bay Granite Quarries, electrical installations.
Electrona Carbide Industries, new arc furnace and auxiliaries, carbon black plant and HV substations.
Hazell Bros. Quarries, substation, reticulation and plant.
Pioneer Quarries, Lindisfarne, Main Substation, control centre and plant rewiring.
Launceston Quarries, distribution centre and plant rewiring.
Readymix Quarries Nook, Diesel Power Station, distribution centre and plant.
Comalco Aluminium, new induction furnace, fume towers, cryolite recovery plant, MRP plant.

DRILLING

R. Billingham, Mining Engineer, Hobart

Diamond Drilling

The major projects through the year were the continuation and expansion of coal exploration and the North-East water investigation programme.

In April the State Government decided that exploration for coal on the area of the Fingal Tiers exempt from the Mining Act should be considerably increased. Consequently all suitable drilling rigs were moved into the area, and funds were provided for the purchase of additional equipment. A new fully equipped Longyear 44 diamond drill was acquired in November and an order was placed for a hydraulic top-rotation truck mounted Warman 1000 rig. Drilling crews worked overtime on the Fingal Tiers. The total depth drilled for coal exploration increased from 2 517·6 m in 1978 to 5 803·92 m in 1979. On the Fingal Tier reserve nine holes were completed and diamond and down-the-hole hammer drilling amounted to 5 267 m. Other holes were drilled at the Duncan Colliery and in the Bicheno area.

In the north-east and east coast areas numerous water-bores were drilled as part of the water programme or under contract to local landowners, mainly using the Failing rig.

The Keystone 55 churn drill was used mainly for mineral exploration in the Beaconsfield area investigating the chromite deposits and in the north-east investigating tin deposits. For most of the year it was operated under contract to Amdex Pty Ltd to drill on their tin leases at Pioneer.

Numerous site investigations were carried out for bridge foundations, road cuttings and building construction under contract to the Materials and Research Section of the Deparment of Main Roads using the Gemco 210 and a Mindrill F20C.

DRILLING DETAILS 1979

Location	*Purpose*	*Drill*	*No. of holes*	*Total depth (m)*
Diamond —				
Fingal	Coal investigation	Longyear 44	1	260·06
Fingal	Coal investigation	Longyear 38	5	2 173·42
Fingal	Coal investigation	Ecco	2	980·40
Fingal	Coal investigation	Joy 30 HD	3	1 227·43
Fingal	Coal investigation	Mayhew	1	265·00
Fingal	Coal investigation	F20C	1	47·18
Cranbrook	Coal investigation	F20C	1	136·06
Apslawn	Coal investigation	F20C	1	47·17
Bicheno	Coal investigation	F20C	1	350·00
Boobyalla	Stratigraphic	Joy 30 HD	1	166·00
Margate	Stratigraphic	F20C	1	12·00
Bothwell	Stratigraphic	Mayhew	2	218·00
Kempton	Stratigraphic	Mayhew	1	250·00
Winnaleah	Water investigation	F20C	2	90·50
Musselroe	Water investigation	F20C	1	56·20
Hampshire	Site investigation	F20C	7	154·30
Legana	Site investigation	F20C	1	12·84
Midland Highway	Site investigation	F20C	6	51·27
		Total	38	6 497·83
Churn Drill —				
Beaconsfield	Mineral investigation	Keystone 55	9	176·50
Gladstone	Water investigation	Keystone 55	3	20·30
Springfield	Water investigation	Keystone 55	2	23·30
Gladstone	Tin investigation	Keystone 55	9	99·00
Pioneer	Tin investigation	Keystone 55	22	1 054·00
Derby	Tin investigation	Keystone 55	2	90·00
Scotia	Tin investigation	Keystone 55	2	88·00
		Total	49	1 551·10
Rotary/Percussion —				
Fingal	Coal exploration	Failing WW1	9	317·20
Winnaleah	Water investigation	Failing WW1	9	281·81
Rushy Lagoon	Water investigation	Failing WW1	2	67·00
Cape Portland	Water investigation	Failing WW1	1	30·48
Gladstone	Water investigation	Failing WW1	1	50·24
Scottsdale	Water investigation	Failing WW1	6	342·70
Swansea	Water investigation	Failing WW1	15	147·27
St Helens	Water investigation	Failing WW1	1	28·95
Binalong Bay	Water investigation	Failing WW1	1	44·16
Waterhouse	Water investigation	Failing WW1	1	60·88
Springfield	Water investigation	Failing WW1	2	34·14
Lebrina	Water investigation	Failing WW1	3	67·03
Lilydale	Water investigation	Failing WW1	2	85·28
Brown Mountain	Water investigation	Failing WW1	3	105·12
Telita	Water investigation	Failing WW1	1	36·56
		Total	57	1 698·82
Diamond/Auger —				
Jericho	Site investigation	Gemco 210	5	77·27
St Johns Park	Site investigation	Gemco 210	4	26·27
Launceston	Site investigation	Gemco 210	10	147·66
Winkleigh	Site investigation	Gemco 210	3	35·50
Longford	Site investigation	Gemco 210	3	35·85
Freshwater Point	Site investigation	Gemco 210	1	8·50
Legana	Site investigation	Gemco 210	1	15·11
Rocherlea	Site investigation	Gemco 210	5	34·59
Norwood	Landslip investigation	Gemco 210	5	83·82
Burnie	Bridge foundation	Gemco 210	5	58·90
Hobart	Site investigation	Gemco 210	5	31·40
Wandle River	Bridge foundation	Gemco 210	2	25·00
Fingal	Seismic investigation	Gemco 210	11	56·26
		Total	60	636·13

SUMMARY OF DRILLING

Drill Type	*No. of drills operating*	*Depth drilled (m)*
Diamond	6	6 497·83
Diamond/Auger	1	636·13
Rotary/Percussion	1	1 698·82
Churn	1	1 551·10
	9	10 383·88

NORTH-WESTERN DISTRICT

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

T. E. Evans, B.Sc., (Eng.), A.R.S.M., F.I.M.M., C.Eng.

R. N. Hampson, A.C.S.M., M.I.M.M., M.S.A.I.M.M., C.Eng.

General

The closure of North-West Acid resulted in acid shipments from Risdon being discharged at the port of Burnie into the bulk tanks previously owned by North-West Acid. Temporarily the acid is discharged with the M.V. Zincmaster berthed at the tanker berth at the breakwater, however, the necessary wharf modifications are being carried out to permit acid discharge at the bulk loading berth. The new rail and road acid loading station was completed at the end of the year. Responsibility for the acid storage and distribution was handed over to the Emu Bay Railway Co. Ltd by North-West Acid.

Three requests for financial assistance under the Aid to Mining Trust Fund were investigated, recommendations being forwarded to the Director.

Three investigations into alleged safety issues, which in two cases resulted in industrial action, were conducted at two mines. It is regretted that no notification of the issue was given to the Inspectorate before the action was taken.

Mr Leyland attended the annual conference of the Australasian Institute of Mining and Metallurgy in Perth and visited the mines in the Kalgoorlie district. Operating procedures, with particular reference to large pillar blasts, and the utilisation of heavy duty diesel trucks, were investigated.

Dangerous Goods

A section of the 250 mm I.F.O. pipeline owned by Mobil Oil Australia Ltd, but traversing land belonging to the Burnie Marine Board and A.N.L., developed a small leak during tanker discharge. The section was sealed and a new line re-routed to avoid the more developed areas. No significant oil pollution resulted.

The investigation of several blasting incidents in town areas has revealed that the person designing the blast has failed to ensure that the shotfirer can perform his function without breaching the regulations.

During the year a number of accidents were reported due to spillage from road tankers, these were mainly on the roads of the West Coast. Trailer and semi-trailer vehicles carrying acid were involved in minor accidents with other road users but no serious injury to persons resulted.

A serious fire and minor explosion resulted from the use of a naked flame near to a tank containing a small mixture of flammable and combustible liquids at the Smithton depot of the Forestry Commission. Two men died as a result of the injuries received.

A quantity of explosives was destroyed during the year, after their recovery from farms in the area, which had changed ownership.

On 10 July fire destroyed a sports and toy shop at Wynyard. The premises had in stock a small quantity of powder (propellant), cartridges and some unsold fireworks. The cause of the fire was thought to be a battery charger. At Brambles transport depot a fire was started when an oil heater was inadvertently knocked over, little damage was caused to the building or contents.

Advice and assistance has been given to all enquiries from members of the public in relation to Dangerous Goods.

Exploration

Exploration continued at a high level during the year on the West Coast Exploration Licence areas and several prospects are promising enough to continue the exploration programmes in 1980.

NORTH-EASTERN DISTRICT

J. W. Dempster, A.C.S.M., F.I.M.M., M.Aust.I.M.M., F.I.Q., C.Eng.

Interest in small alluvial tin mining operations remained at substantially the same high level as in 1978. With the dramatic rise in the price of gold members of the public showed a marked interest in the old gold areas in the districts of Mathinna, Lisle and Lefroy.

Exploration teams have been active in the area especially in prospecting for tin in the South Mount Cameron and Blue Tier areas.

A notable development was that a company commenced a project to de-water the old Tasmania gold mine at Beaconsfield to gain access to the lower levels of the old mine for a diamond drilling programme to follow up the previous diamond drilling efforts.

Export demand for the products of TEMCO and COMALCO remained at a high level for the year.

The Department dealt with complaints from the public involving blasting operations and alleged damage to buildings.

SOUTHERN DISTRICT

R. C. Thomas, A.C.S.M., M.I.M.M., M.Aust.I.M.M., C.Eng.

P. Allan, B.Sc., A.H.-W.C., M.I.E. (Aust.). M.Aust.I.M.M., F.I.Q.

R. Billingham, B.Sc., A.R.S.M., A.M.Aust.I.M.M., M.I.Q.

General

The downturn in the building industry resulted in less complaints from the public in regard to blasting operations. Although the quarry industry generally experienced lower levels of demand other areas of the mining industry enjoyed buoyant conditions and this included the Risdon Works.

In other areas of activity members of the southern branch served on various committees, assisted other government departments as well as the general public.

There was a continuing interest in exploration for coal in the area and this is expected to continue into 1980.

REPORT OF THE MOUNT CAMERON WATER RACE BOARD

FOR THE YEAR ENDED 31 DECEMBER 1979

THE MINISTER FOR MINES

We submit the report of the Mount Cameron Water Race Board for the year ended 31 December 1979.

The loss of $26 250 incurred in this year's operations showed an increase of $4 146 over the previous year ($22 104). Unfortunately there was no increased demand for water from mining companies despite buoyant tin prices throughout the year. This factor, combined with higher operating costs due to National Wage adjustments, has resulted in the increased loss.

The new scale of charges resulted in an increase of $1 213 from the annual contracts for the supply of water. No short-term contracts were made.

During the year one channel-keeper was employed full-time and a second channel-keeper was employed for almost eleven months of the year.

The Manager, N. Petrie, reported that there had been a number of breaks in the race system during the year. These had been repaired, logs removed and sections of the race scrubbed. It had not been possible to spray in December because of climatic conditions. Clearing of weed growth had been carried out.

J. G. SYMONS, Chairman
S. EVERETT, Member
V. WOOD, Member

MOUNT CAMERON WATER RACE SUSPENSE ACCOUNT

Statement of Receipts and Payments for the Year Ended 31 December 1979

Receipts	$	*Payments*	$
Proceeds from sale of water: —			
Fixed rate	2 256·00	Wages and Pay-roll Tax	28 380·71
Domestic rate	248·00	Maintenance	213·57
Other receipts	140·00	Car allowance	300·00
Balance (loss)	26 250·28		
	$28 894·28		$28 894·28

MOUNT CAMERON WATER RACE

Statistics for the Year Ended 31 December 1979

Registered Rainfall		*Production*	*Tonnes*
Great Musselroe	1 263·9 mm	Tin oxide produced —	
Little Musselroe	1 007·0 mm	Fixed scale	21·5
		Royalty scale	....
Water Services		*Employment*	
Average number of claims supplied per week	1	Average per week —	
Greatest number of claims supplied in any one week	2	Fixed scale	6
Sluiceheads supplied —		Royalty scale	....
Fixed scale	282		—
Royalty scale	....		6
	282		

REPORT OF THE RINGAROOMA AND CASCADE WATER BOARD

FOR THE YEAR ENDED 31 DECEMBER 1979

THE MINISTER FOR MINES

We submit the report of the Ringarooma and Cascade Water Race Board for the year ended 31 December 1979.

The Board has maintained the Cascade dam and retained ownership of the Mt Paris dam which is kept empty. There have been no applications for water although tin mining operations in the area have increased as a result of improved tin prices The Board has no other source of revenue.

The cost of caretaking the Cascade dam and the interest charges on the capital cost of the water system is reimbursed from Consolidated Revenue.

J. G. SYMONS, Chairman
S. EVERETT, Member
N. P. EDWARDS, Member

RINGAROOMA AND CASCADE (WATER) SUSPENSE ACCOUNT

Statement of Receipts and Payments for the Year Ended 31 December 1979

Receipts	$	*Payments*	$
Balance (loss)	1 626·84	Ringarooma Race maintenance	150·00
		Interest on capital cost	1 476·84
	$1 626·84		$1 626·84

T. J. HUGHES, Government Printer, Tasmania