

TASMANIA

REPORT

OF THE

DIRECTOR OF MINES

YEAR ENDED 31ST DECEMBER

1966



TASMANIA.

D. E. WILKINSON, Government Printer, Tasmania.

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REPORT OF THE DIRECTOR OF MINES

Department of Mines,
Hobart,

THE HONOURABLE THE MINISTER FOR MINES.

22nd June, 1966.

I have the honour to present my report on the mining industry for the year ended 31st December, 1966.

The value of metals and minerals produced was \$123,869,616 consisting of production from Tasmanian ores to the value of \$51,180,693 and \$72,688,923 from imported ores processed in the State. This represents an increase of \$9,351,880 as compared with the value for 1965.

The year 1966 was an outstanding one for the mineral industry throughout Australia and the Tasmanian mining industry was an important contributor. Though metal prices eased in some instances there was a general air of confidence which promoted further expenditure on expansion and on exploration.

There have been increases in the production of copper, gold, lead, scheelite, silver, tin, wolfram and zinc.

The average number of men employed was 10,122.

NEW DEVELOPMENTS

It is pleasing to report that Mt. Cleveland Tin N.L. has been formed by the Aberfoyle Tin Development Partnership to establish productive mining operations at the old Cleveland Mine near Waratah on the West Coast. Partners in the project consist of Aberfoyle Tin N.L., Paringa Mining and Exploration Co., Metals Exploration N.L., and North Australian Uranium Corporation N.L. Ore reserves have been assessed at nearly 3,000,000 tons containing 1.02% tin and 0.43% copper. Annual production is expected to be 250,000 tons of ore with a recovery of 2,200 tons of tin concentrates containing 1,240 tons of metallic tin, and 3,800 tons of copper-tin concentrates containing 665 tons of copper and 266 tons of tin of a total value of about \$5 million. Most of the capital is being provided by the participating companies, but the Company is borrowing \$1.1 million for construction of the mine township at Luina which will house the 120 men proposed to be employed. The Government has guaranteed the loan to the extent of \$1 million and have taken a debenture over the assets of the Company to secure the guarantee.

Productive alluvial tin mining operations have been established at the old Pioneer Mine at Pioneer on the North-East Coast.

The Cornwall Coal Mining Co. N.L. whose operations have been reduced from three collieries to one pit producing 76,000 tons per annum, are endeavouring to diversify their interests and are engaged in investigating the old Royal George tin mine near Avoca. Work to date has been encouraging and the Department is providing technical advice towards the project.

The construction of the new treatment plant by Renison Ltd. at Renison Bell is nearing completion and this will increase throughput to 1,000 tons of ore per day. The expansion has resulted from development of the Federal and Bassett lodes where ore reserves are estimated at 12 million tons averaging 0.95% tin.

Production resulting from development of Renison and Cleveland mines and other projects under active investigation in this State can have a significant influence on the Australian mineral production and on the economy of this State. Present Australian Production of tin is less than 4,000 tons and over 1,200 tons is imported at a cost of \$4 million. Tasmania produced 1,031 tons in 1966 and when Renison and Cleveland mines become fully productive our output of metallic tin could rise to 6,500 tons annually.

The Mt. Lyell Mining & Railway Co. Ltd., which is a subsidiary of the Consolidated Gold-fields group, is planning to resume underground mining to add to its present open-cut production. Exploratory work over several years has revealed an extension of the ore body being worked

by open-cut, and drilling has confirmed its continuity and persistence down to a depth of 1,250 feet below the open-cut. It has been estimated that there are reserves of from 40 to 45 million tons of about 1% copper ore. This more than trebles present calculated reserves of 19 million tons average 0.99% copper. A feasibility study to determine mining methods and economics is to be made.

The Electrolytic Zinc Co. of Australasia Limited continued with its exploration and development programme at the three mines operated by the Company. At the Rosebery Mine diamond drilling established additional ore reserves of 1.5 million tons bringing the total to seven million tons. During the year a study was commenced on a proposed second shaft for the Rosebery Mine.

METAL PRICES

Copper.—The Australian Producers price at which copper was sold for domestic consumption in Australia was \$790 per ton as at 4th January, 1966. This was increased to \$870 per ton on 5th January, 1966, and despite the fact that world producers abandoned a common pricing policy in April the Australian Copper Producers maintained a price of \$870 per ton until 5th August, 1966. At that time the Mt. Lyell Company announced that it would base its domestic sales on the London Metal Exchange forward trading price (£S490) and declared a price of \$1,250 per ton and the Australian Copper Producers lifted the domestic price to that figure. This price was lowered to \$1,150 per ton on 16th August, 1966, and remained at that figure at the end of the year. The Chairman of the Mt. Lyell Company has stated that the large disparity between the Australian domestic price and the higher London Metal Exchange price resulted in substantial increases in exports of copper in semi-fabricated form with a resulting shortage for home consumption. The arrangement to relate the Australian price to the London Metal Exchange price should ensure that supplies will be available to Australian fabricators and will eliminate profits from exporters taking advantage of the disparity between Australian and London prices.

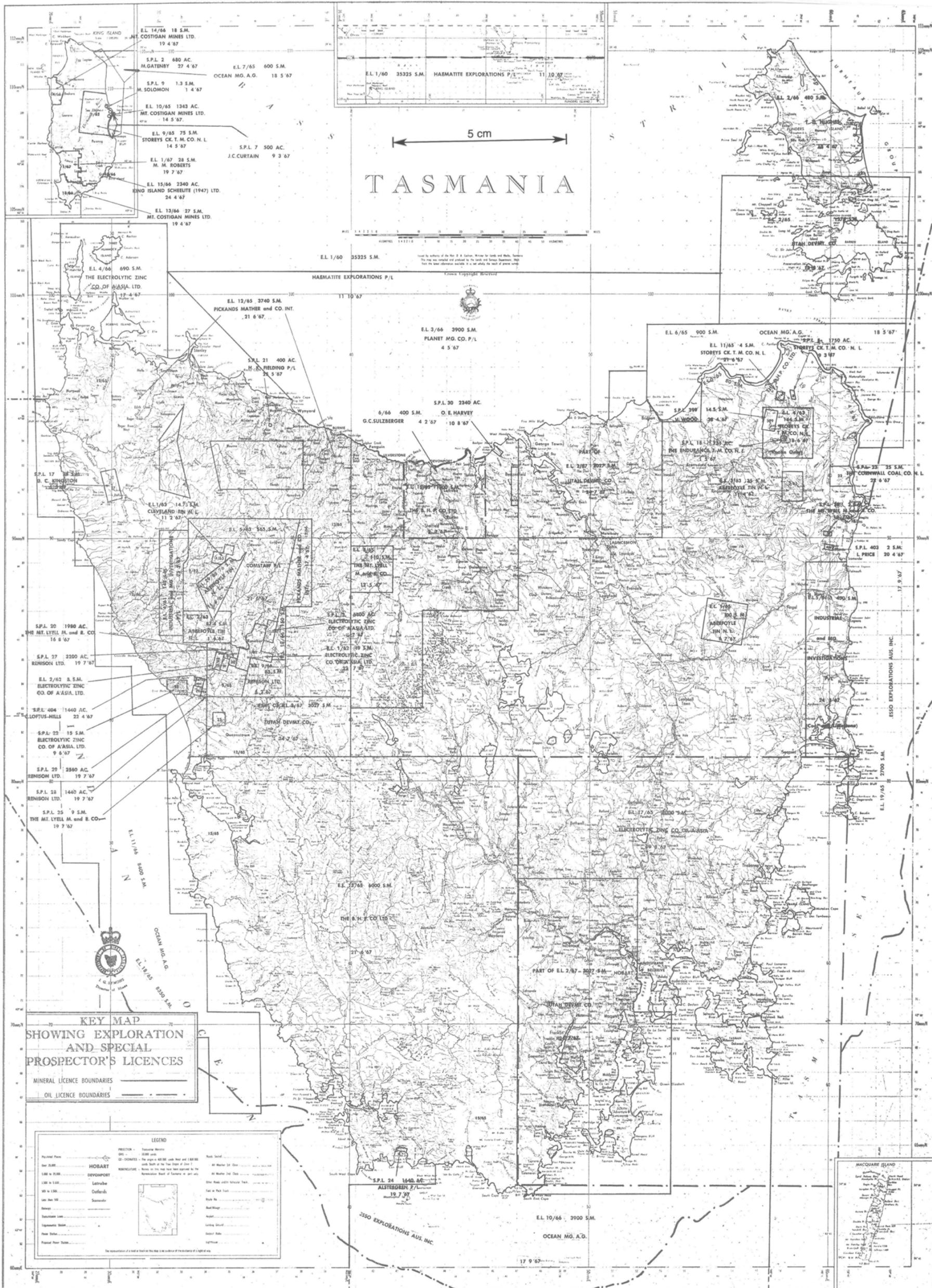
Lead.—The Australian price of lead ranged between a high of \$280 per ton in the early part of the year and a low of \$225 per ton at the end of the year, with an overall average of \$247 per ton.

Tin.—The average Australian price of tin was \$3,323 per ton which represents a decrease of \$315 per ton on the average price for 1965.

The increased availability of tin supplies from higher mine production and continuing sales from the United States stockpile have reduced the deficiency between available supplies and commercial consumption on a world basis. This position is reflected in the price quoted on world tin markets which has recorded a downward pressure on prices. On the London Metal Exchange the price declined steadily from a high of £S1,452 in February, 1966, to a low of £S1,200 in December, 1966. The Australian price has recorded a similar decline and ranged between \$3,674 and \$3,144 per ton.

It is under these conditions that the Third International Tin Agreement is designed to operate to control the price. The current agreement has set a price of £S1,200 to £S1,400 per ton at which the Manager of the International Tin Council will sell tin from the buffer stock, £S1,200 to £S1,300 per ton at which he may buy and £S1,000 to £S1,100 per ton at which he will buy tin to cause an upward trend in prices by reducing tin supplies on the market. Present prices are, however, such that there could be variations through market influences originating from consumers and unless there is a further decline it is probable that no action will be taken either through the International Tin Council or by measures to limit releases from the United States stockpile. Since Australian prices are based on those quoted on the London Metal Exchange a permanent deterioration of the position could adversely affect exploration and expansion activities in the tin mining industry of this State. The market controls referred to should preserve an economic price for producers.

Tasmanian producers are paid for tin concentrates at a unit rate based on the percentage of tin contained in concentrates. The rate quoted is for 70% concentrates with adjustments for variations in grade and payments ranged from \$32.21 per unit in February, 1966, to \$26.93 per unit in October, 1966. There have been no reports of production having been affected by the decrease in price. The ruling unit rate at the end of the year was \$27.03 per unit equivalent to \$1,892 per ton of 70% concentrates.



EL. 14/66 18 S.M.
MT. COSTIGAN MINES LTD.
19 4 67

S.P.L. 2 680 AC.
M. GATENBY 27 4 67

S.P.L. 9 1.3 S.M.
M. SOLOMON 1 4 67

EL. 10/65 1343 AC.
MT. COSTIGAN MINES LTD.
14 5 67

EL. 9/65 75 S.M.
STOREYS CK. T. M. CO. N. L.
14 5 67

EL. 1/67 28 S.M.
M. M. ROBERTS
19 7 67

EL. 15/66 2340 AC.
KING ISLAND SCHEELITE (1947) LTD.
24 4 67

EL. 13/66 27 S.M.
MT. COSTIGAN MINES LTD.
19 4 67

EL. 1/60 35325 S.M. HAEMATITE EXPLORATIONS P/L 11 10 67

5 cm

TASMANIA

EL. 1/60 35325 S.M.

HAEMATITE EXPLORATIONS P/L

EL. 3/66 3900 S.M.
PLANET MG. CO. P/L
4 5 67

S.P.L. 30 2340 AC.
O. E. HARVEY
4 2 67 10 8 67

EL. 6/65 900 S.M.

OCEAN MG. A.G. 18 5 67

EL. 11/65 4 S.M.
STOREYS CK. T. M. CO. N. L.
27 6 67

S.P.L. 3 1750 AC.
STOREYS CK. T. M. CO. N. L.
9 3 67

S.P.L. 20 1980 AC.
THE MT. LYELL M. and B. CO.
16 8 67

S.P.L. 27 3200 AC.
REINSON LTD. 19 7 67

EL. 2/65 8 S.M.
ELECTROLYTIC ZINC
CO. OF A'ASIA LTD.

S.P.L. 404 1440 AC.
LOFTUS-HILLS 22 4 67

S.P.L. 22 15 S.M.
ELECTROLYTIC ZINC
CO. OF A'ASIA LTD.
9 8 67

S.P.L. 29 2560 AC.
REINSON LTD. 19 7 67

S.P.L. 28 1440 AC.
REINSON LTD. 19 7 67

S.P.L. 25 9 S.M.
THE MT. LYELL M. and B. CO.
19 7 67

KEY MAP SHOWING EXPLORATION AND SPECIAL PROSPECTOR'S LICENCES

MINERAL LICENCE BOUNDARIES
OIL LICENCE BOUNDARIES

LEGEND

PROSPECTOR'S LICENCE - Dashed line
MINERAL LICENCE - Solid line
OIL LICENCE - Solid line

Place Names:
HOBART
DEVONPORT
LAUNCESTON
ULSWATER
SANDWICH

Scale:
1:50,000
1:100,000
1:200,000

Other Symbols:
Railway
Road
River
Coastline
Island



Tungsten.—The price of tungstic oxide determines the price obtained for wolfram concentrates from the Storeys Creek and Aberfoyle Mines and for scheelite concentrates from the King Island Scheelite Mine.

The price of tungsten has been characterized since 1961 by violent fluctuations which adversely affected producers. During 1965 and 1966 whilst these fluctuations persisted they were generally on a higher level and the average price payable to producers enabled profitable operation. The average price for 1965 was 224s. sterling per unit of tungstic oxide and whilst the price ranged between 255s. and 360s. sterling per unit during 1966 the average of 288s. sterling was satisfactory.

King Island Scheelite (1947) Ltd. which received Government subsidies in 1963 and 1964 during the period of depressed market prices operated profitably and during the year completed repayment of the subsidies which amounted to \$397,910.

It is expected that existing forward sale contracts held by producers together with a continuation of the present strong world demand for tungsten will enable producers to stabilize present production and undertake an expansion of activities.

Zinc.—The Producers Price continued to be the basis of sales of zinc. This remained comparatively stable and ranged between \$286 and \$266 per ton.

The London Metal Exchange trading in zinc was maintained and prices remained in close proximity to the producer price. The London Metal Exchange price varied from a high of £S109.8 per ton (Producer £S110) to a low of £S96 (Producer £S102) per ton.

The disposal of zinc in the United States from the Government stockpile has had a significant effect on the world market. The overall statistical position points to a surplus production of zinc and also of lead and as a consequence it appears that prices of both metals could record some decline. A variation of the policy of releases from the United States stockpile, some reduction in production or re-introduction of the United States quota system which was abandoned towards the end of 1965 could, if applied, affect the price which may be available to producers in 1967.

Table showing the Average Australian Annual Prices for Minerals during Recent Years.

	1963	1964	1965	1966
	\$A	\$A	\$A	\$A
Copper (per ton)	610.00	661.67	742.00	961.67
Gold (per fine oz.)	31.25	31.25	31.25	31.25
Lead (per ton)	170.00	242.92	280.00	247.08
Silver (per fine oz.)	1.15	1.17	1.17	1.17
Tin (per ton)	2375.33	3229.83	3637.97	3322.83
Wolfram (per unit WO ₃)	7.99	14.52	24.91	36.30
Zinc (per ton)	209.33	305.62	326.00	309.33

EXPLORATION

Exploration activities have continued with undiminished vigour by exploration companies and by existing mines and keen competition has developed between companies for the right to explore areas.

A total of 58 exploration licences and special prospectors licences are held for the purposes of investigating the mineral resources of the State. These comprise 41 licences for 15,102 square miles on land, 13 licences for 23,903 square miles to search for minerals off-shore and four licences for 54,375 square miles to search for oil in Tasmanian waters embracing the whole of the continental shelf surrounding the State. The whole of the land area of the State where minerals may occur is being actively explored with the exception of known gold fields in northern and eastern Tasmania and extensive programmes of investigation are being conducted off-shore off the northern, eastern, western and south-western coastlines. The search for oil is mainly confined to Bass Strait but geophysical surveys are being made in other off-shore areas. A small area in north-western Tasmania is also under investigation.

Pickands Mather & Co. who are managing the Savage River iron-ore project have been granted an exploration licence to search for minerals in the west and north-west of the State which is the scene of extensive exploration activities. Electrolytic Zinc Co., Mt. Lyell Co.,

Placer Prospecting Pty. Ltd., Comstaff Pty. Ltd., Aberfoyle Tin N.L., Cleveland Tin N.L., Renison Ltd., and Industrial and Mining Investigations Pty. Ltd. are all holders of licences in that area and are engaged in detailed programmes of investigation. The Broken Hill Pty. Co. Ltd. hold 6,000 square miles covering the south-western quarter of the State and in addition are engaged in investigations of areas in the north and north-west of the State. In the north-east Utah Development Co., Storeys Creek Tin Mining Co., Endurance Tin Mining Co., and Aberfoyle Tin N.L. are testing extensive areas mainly to locate further deposits of tin. Utah Development Co. also occupy Cape Barren Island and the surrounding sea and Flinders Island is being investigated for its tin potential on behalf of Mr. E. R. Hudson the promotor of the Savage River iron ore industry. An interesting development is the location of beach sand mineral deposits on King Island by Mt. Costigan Mines, a Canadian Company, and it appears likely that productive mining operations will be established.

The investigation of possible mineral deposits in off-shore areas opens up a new phase in the development of the mining industry of the State. The major participant is Ocean Mining A.G. which holds areas in northern, eastern, western and south-western waters. Extensive surveys and sampling programmes are being carried out and recently a specially equipped vessel was brought from U.S.A. to assist in the work. It is of particular interest to note that the expenditure is being financed by a consortium of companies consisting of Ocean Science & Engineering Inc., Bethlehem Steel Corp., Charter Consolidated Anglo-American Corporation and the Electrolytic Zinc Co. Planet Mining Co. Pty. Ltd. have a licence for an area of 3,900 square miles off the north-west coast and also occupy the whole of Macquarie Harbour. The Electrolytic Zinc Company are examining an off-shore area surrounding the Hummock Group of islands and the Broken Hill Pty. Co. Ltd. have an area close to the coastline in north-eastern Tasmania to test for tin deposits which may have been carried down by rivers flowing through the known tin alluvial areas in north-eastern Tasmania.

Haematite Explorations Pty. Ltd., a subsidiary of The Broken Hill Pty. Co. Ltd., in association with Esso Exploration has continued its search for oil in Bass Strait. The first bore in the Bass Basin which was drilled to 7,717 feet was unproductive and in April last a second bore was drilled.

This was completed at 5,910 feet and again no gas or oil was located. The drilling rig was moved back to Victorian waters for further work in the Gippsland Basin and plans are being made for further drilling in Tasmanian waters. Esso Exploration have been granted licences to search for oil on the Continental Shelf off western and eastern Tasmania and the Electrolytic Zinc Co. hold an area in south-western Tasmania including the estuary of the Derwent River. Air-borne geophysical surveys are planned in these areas. Recently a licence to search for oil in the vicinity of Elizabeth Town on the North-West Coast was granted to Mr. C. G. Sulzberger of Deloraine who has purchased a boring plant and proposes to drill for oil where boring was carried out unsuccessfully over 40 years ago.

Expenditure on exploration outside existing mining leases was as follows:—

	\$
1953-64	5,470,000
1965	2,901,240
1966	2,445,922
	\$10,817,162

Established mining companies have continued to increase ore reserves as the result of exploration within the boundaries of existing mine leases and one major producer has recently applied for additional leases of 2,000 acres to cover possible extensions of known ore occurrences.

The Department of Mines has continued with regional investigations and in economic and engineering geological work as part of its policy of investigation and exploration of the mineral resources. Research into the potential of underground water supplies has been stepped up and a programme of drilling is in progress in the Longford area to determine the volume and quality of available ground water and its possible use for primary industry in the locality. Departmental drilling plants have been engaged in boring at the old Tasmania Gold Mine at Beaconsfield, Fooks Lode near Waratah, alluvial tin deposits in the north-east, iron ore deposits on the North-West Coast, gold reefs at Mathinna, coal exploration at Fingal and boring for supplies of underground water for farmers throughout the State.

All geological, engineering and metallurgical reports and regional geological maps are published and are in constant demand by mining and exploration companies. The laboratories operated by the Department have continued to supply ore dressing, metallurgical and assay services and our resources have been fully taxed in analyses of samples particularly from off-shore investigations and from exploration of beach sand deposits at King Island.

IRON ORE

The arrangements for the establishment of an iron ore pellet export industry based on the Savage River Iron Ore deposits were detailed and are contained in my Annual Report for 1965.

The lease of the mine site at Savage River, the pipeline area between Savage River and Port Latta and the site of the pellet making plant and port facilities at Port Latta was issued to North-West Iron Co. Ltd. and Dahlia Mining Co. Ltd. on 3rd June, 1966 in accordance with the provisions of the Iron Ore (Savage River) Agreement Act 1965. Both companies have drawn funds from United States lending institutions and rapid progress is being made with construction work. Clearing has advanced at the site of the open-cut mine to be established at Savage River, the township of Savage River is being built and construction work is in progress on the concentrating plant which will upgrade the iron ore from 38% iron to 67%. Clearing, grading and laying is under way on the pipeline which will convey this concentrate in slurry form a distance of 56 miles to Port Latta on the North-West Coast, where erection of the pellet plant and the port facility is well advanced. The Tasmanian Government has undertaken to provide a loan of \$4 million towards the establishment of the harbour facilities. The contractors are American firms, the principal being the Betchel Pacific Corporation which is responsible for the concentrating plant and the pipeline. Austin Anderson Pty. Ltd. are constructing the pellet making plant and Pomeroy-Holland-Gerwick the port facilities at Port Latta. Consolidated Home Industries (Tas.) Pty. Ltd. has the townsite at Savage River under construction where mine employees estimated at 375 men will live. The Government has already diverted the Bass Highway to facilitate construction work at Port Latta and will provide homes through the Housing Department at a reasonable distance from Port Latta for the 135 men to be employed there. The Government has the road to the Savage River township at an advanced stage, and will provide a medical centre, a school and other necessary public services. The Hydro-Electric Commission will provide power for the industry which will be the third largest consumer in the State.

The first production of pellets is to be made towards the end of 1967 and maximum capacity of between two and three million tons per annum will be reached in 1969. The lease authorizes the shipment of 60 million tons of pellets spread over a maximum of 30 years. Royalty payable to the Government will amount to a maximum of \$340,000 a year on full production. The pellet production is to be sold to five Japanese steel mills, Yawatta Iron and Steel Co., Nippon Kokan Kabushiki Kaisha, Sumitomo Metal Industries Ltd., Kawasaki Steel Corporation and Nisshin Steel Co.

The Commonwealth Government has issued an export permit and the agreement as to price is stated to be in accordance with an approved formula in the following terms. Half the production will be based on cost and the remainder on market prices. The cost price will fluctuate but is expected to be in the vicinity of 15 cents per Fe unit. The market price is reported to be not lower than 18.5 cents per unit with a proviso for a sliding scale under which in the first and second year the price will be 20 cents per unit; third to fifth year 19 cents; and 18.5 cents per unit in the sixth to eighth years.

The lease which has been granted at Savage River comprises 2,530 acres and relates to portion only of the area of 140 square miles held under Exploration Licence by Industrial and Mining Investigations Pty. Ltd. Investigational work, including diamond drilling, is being continued by the company and Mr. E. R. Hudson, Managing Director, is actively pursuing his original aim to establish a steel industry based on the Savage River deposits.

LEGISLATION

Underground Water Act 1966

This legislation was introduced to give effect to a recommendation of the Australian Water Resources Council. The object is to prevent contamination of underground water supplies and to conserve groundwater so that the available resources can be distributed equitably amongst land owners.

The Act provides that no person may sink a bore to a greater depth than 40 feet unless he advises the Department. When completed, the Department must be informed of the depth at which water is struck, the level of the water in the bore and details of the material through which the bore was sunk. The Department can also require that samples of such material are preserved or lodged with the Department. It is made an offence for any person to introduce any deleterious material into a bore or well where it causes or is likely to cause contamination of any underground water. Provision has been made for the setting up of an Underground Waters Contamination Advisory Committee to make recommendations to the Minister on matters relating to contamination of underground waters.

The Governor may by order declare any area as a Protected Area where there are particular conditions which make such action necessary to prevent undue depletion or waste of underground water, to ensure equitable distribution of underground water and to prevent its contamination.

In a Protected Area a licence must be obtained to sink or extend a bore or well below a depth of 40 feet. Such licence may contain conditions to control the method of sinking, the quantity of water which may be taken, maintenance of the bore or well, and regulation of the flow of water. Boring in a Protected Area must be carried out by or under the supervision of a person holding a certificate from the Director of Mines that he is capable of carrying out the boring. The general provisions of the legislation regarding notification or results of boring, lodgment of samples and prevention of contamination of underground water sources apply particularly in Protected Areas.

The Mining Act 1966

There are extensive areas in north-eastern Tasmania, to be known as the Boobyalla Development area, which are suitable for pastoral purposes but which also contain known tin deposits and areas of potential tin bearing grounds. The object of the legislation was to reconcile the claims of rural and mining interests so that both industries may proceed side by side. The Mining Act 1929 provided that cultivated private land was not available for mining purposes unless with the consent of the owner and occupier and, in these circumstances, the Department of Mines could not consent to the sale of Crown Land of potential mineral value because by so doing it could have a detrimental effect on the development of the mining industry. Under the Mining Act 1966, it is provided that the lands in the north-east to which reference has been made will be sold subject to mining but compensation will be payable for damage to improvements and other matters which may result from mining. The effect is to enable entry on the land without the consent of the owner even though the land may be cultivated or otherwise improved. Many years ago there was constant conflict between holders of grazing leases and mining lessees who wanted to use the same land for their separate purposes. This conflict was resolved in 1959 by making grazing leases subject to mining with provision for compensation for improvements and there has been no further conflict of interests. The same arrangement will apply to Crown land in the Boobyalla area sold after the passing of the Mining Act 1966.

The second purpose of the Act was to remove any legal doubts as to the right of the Department to issue Exploration Licences to enable the search for minerals in off-shore areas adjacent to the land area of the State and to enable leases to be issued for the mining of minerals which may be discovered.

The Act also contains some amendments of an administrative nature, mainly in re-stating and improving certain definitions. Certain substances previously defined as "stone" were in fact "minerals" and the definition of "stone" was restored to its original intention of including substances normally regarded and used as stone.

The Mines and Works Regulation Act 1915

The following amending Rules and Orders were made:—

Mines and Works Regulation Amendment Rules (S.R. 1966, No. 19).

This rule requires mine owners to supply properly fitting eye protective equipment to certain employees. Other amendments relate to misfires and S.A.A. wiring rules.

Mines and Works Regulation Order 1966 (S.R. 1966, No. 20).

This Order applies the Act and Rules to tunnels, works and undertakings in connection with sewerage, drainage or water supply schemes.

Proclamation under Section 36 of the Mines and Works Regulation Act 1915 (S.R. 1966, No. 88).

This Proclamation declares that any of the certain works executed or carried out by or on behalf of Pickands Mather & Co. International in relation to the carrying on of the industry referred to in the Iron Ore (Savage River) Agreement Act 1965 to be work of necessity as provided by Section 36 of the Act.

Proclamation under Section 36 of the Mines and Works Regulation Act 1915 (S.R. 1966, No. 95).

This Proclamation declares that any of the works executed or carried out by or on behalf of Renison Ltd. at Renison Bell and any other work incidental or ancillary thereto to be a work of necessity as provided by Section 36 of the Act.

Mines and Works Regulation Amendment Rules, No. 2, 1966 (S.R. 1966, No. 199).

These rules alter the maximum height of backs in Rule 19, provide for additional limitations on voltages, and require the testing of electrical systems and the keeping of plans thereof. The rules also require notices explaining the treatment of electric shock to be exhibited, prescribe the location of electrical equipment containing inflammable liquids, specify safeguards for equipment operated by remote control, and set forth certain provisions relating to the earthing of electrical systems.

The Inflammable Liquids Act 1966

Inflammable Liquids Regulations 1966

These regulations are a consolidation and revision of the Inflammable Liquids Regulations 1960 which they rescind. The regulations contain the following provisions:—

- (a) General requirements for vessels and wharfs on which inflammable liquids and dangerous commodities are conveyed, loaded, or unloaded;
- (b) Provisions applicable to vessels and tank ships conveying inflammable liquids and dangerous commodities in bulk and otherwise than in bulk;
- (c) Provisions relating to packages, registered containers, and tanks containing inflammable liquids and dangerous commodities;
- (d) Provisions relating to the licensing of premises for the manufacture or keeping of inflammable liquids and dangerous commodities; and
- (e) Various other provisions, including those relating to the conveyance, loading and unloading of inflammable liquids and dangerous commodities, and those relating to liquified petroleum gas and anhydrous ammonia, and to inflammable liquids and dangerous commodities used for industrial and commercial purposes.

Explosives Act 1916

The following amendment was made to the Regulations:—

Explosives Amendment Regulations 1966 (S.R. 1966, No. 22).

These Regulations amend the Principal Regulations with respect to the definition of nitrate mixture, the marking of packages of explosives, the importation of explosives, and the maximum amount of certain explosives that may be kept on premises for certain purposes. The regulations also provide that vehicles in which quantities of explosives exceeding fifty-five pounds are conveyed shall be equipped with a carbon tetrachloride fire extinguisher.

REVENUE

Return showing the Revenue collected during the year ended 31st December, 1966.

Head of Revenue	Amount \$A
Public Works and Services—Mines Department	19,990
Rent and Fees of Auriferous and Mineral Lands	77,690
Survey Fees	4,290
Fees under the Explosives and Inflammable Liquids Act	33,380
Total	\$135,350

Comparative Statement of Revenue from Mines, being Rents, Fees, Storage of Explosives, &c., Paid to the Treasury during the years 1959 to 1966.

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

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

LEASES AND LICENCES

Return showing number and area of New Leases and Licences issued during the year ended 31st December, 1966.

Leases and Licences	Number	Area (Acres)	Sluiceways
Clay and Sand	9	749	....
Coal	2	180	....
Copper	1	40	....
Easements	2	10	....
Gold	1	5	....
Iron	1	31	....
Lead	2	80	....
Osmiridium	8	330	....
Scheelite	2	119	....
Stone	7	577	....
Tin	31	1,469	....
Water Licences	12	10	22
Total	78	3,600	22

Return showing the Total Number of Leases and Licences in Force on 31st December, 1966.

Leases and Licences	Number	Area (Acres)	Sluiceways
Beach Sands	6	404	....
Bauxite	5	454	....
Clay	15	621	....
Coal	14	4,429	....
Copper	2	6,291	....
Copper-Nickel	3	120	....
Dolomite	4	309	....
Easements	66	909	....
Feldspar	2	15	....
Gold	21	450	....
Granite	3	25	....
Iron Ore	6	5,060	....
Limestone	24	1,673	....
Mica	1	20	....
Minerals	34	7,502	....
Ochre	2	8	....
Osmiridium and Chromite	23	690	....
Sand and Gravel	19	3,126	....
Scheelite	6	1,074	....
Silica	17	1,492	....
Silver-Lead	9	1,260	....
Stone	54	5,143	....
Tin	214	9,805	....
Tin-Wolfram	9	2,253	....
Water Licences	126	908	909
Total	685	54,041	909

Return showing Number and Area of Leases and Licences Applied for during the year ended 31st December, 1966.

Leases and Licences	Number	Area (Acres)	Sluiceways
Cassiterite	1	10	....
Coal	1	100	....
Copper	26	2,028	....
Gold	3	35	....
Gravel	1	7	....
Iron Ore	2	4,839	....
Minerals	4	144	....
Osmiridium	18	160	....
Peat	1	50	....
Uranium	1	50	....
Stone and Sand	6	290	....
Tin	39	678	....
Water	23	58	42
Total	126	8,449	42

Return showing Total Number and Areas of all Types of Authorities to Prospect Held as at 31st December, 1966.

Type and Authority	Number	Area
Permits to enter and search on private land including owner's permissions	8	14,578 acres
Exploration Licences	42	93,248 sq.miles
Special Prospector's Licences	16	132 sq.miles
Prospector's Licences	124	6,200 acres
Miner's Rights	99	50 acres
Authorities to prospect under Aid to Mining Act 1927	3	21,220 acres

WARDEN'S COURT

D. D. Pearson v. J. Dunham—Application for forfeiture of lease 360P/M—Forth.

This application was forwarded to the Warden of Mines, Devonport for hearing but was withdrawn. A transfer of the lease to the plaintiff was lodged and registered.

EXEMPTIONS

The following exemptions were granted:—

J. Bibby and G. M. Hall. Leases 26M/60, &c., at Adamsfield, 20th September, 1966, to 20th January, 1967.

N. R. and D. Fenton. Lease 82M/39 at Avoca from 17th October, 1966, to 17th April, 1967.

H. K. Turner. Leases 62M/63 and 63M/63 at Mt. Lindsay from 15th December, 1966, to 28th February, 1967.

Aberfoyle Tin N.L. Exemption Exploration Licence 1/65 at Rossarden until 6th January, 1967.

Aberfoyle Tin N.L. Exemption Exploration Licences 2/63 at Mt. Lindsay and 29/65 at Waratah from 15th August, 1966, to 30th November, 1966.

MINE MANAGER'S CERTIFICATES

During the year the Board of Examiners granted Metaliferous Mine Manager's Certificates of competency to:—

Ellis Newton Hughes,
Reginald John D'Elboux.

Certificates were also issued to:—

Peter Joseph McGushin,
Hugh Murchie,

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

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

	Value \$A
1957	25,183,374
1958	23,676,108
1959	25,532,522
1960	26,774,520
1961	26,758,954
1962	30,874,136
1963	32,206,272
1964	40,013,378
1965	43,755,904
1966	51,180,693

MINERAL PRODUCTION SINCE 1880

Quantity and Value of Mineral Production as at 31st December, 1966.

Mineral	Total Quantity	Value \$A
METALLIC MINERALS—		
Antimony	(tons) 3	2,034
Bismuth	(tons) 84	59,288
Cadmium	(tons) 1,600	4,473,513
Cobalt Oxide	(tons) 19	34,763
Copper (Blister) to 1918 (now shown under Silver and Copper)	(tons) 166,600	27,577,054
Copper Matte	(tons) 6,227	267,472
Copper Ore to 1918 (now shown under Copper)	(tons) 41,769	1,155,746
Copper (from 1919)	(tons) 466,008	168,010,809
Crocoite	(specimens only) —	1,066
Gold	(fine oz.) 2,694,784	33,520,171
Ilmenite	(tons) 550	2,512
Iron Oxide (including Hematite, Limonite and Magnetite)	(tons) 114,288	249,037
Lead (from 1919)	(tons) 376,489	49,013,963
Manganese	(tons) 1	6
Manganese Dioxide (from 1957)	(tons) 2,435	78,022
Monazite	(tons) 33	1,214
Nickel	(tons) 233	81,036
Osmiridium	(oz.) 31,088	1,417,062
Pyrite	(tons) 1,704,897	7,701,984
Rutile	(tons) 1	36
Scheelite	(tons) 22,305	42,823,250
Silica for Silicon Alloy Production	(tons) 15,609	116,664
Silicon as Silicon Alloys	(tons) 1,865	268,560
Silver Lead Ore to 1918 (now shown under Silver and Lead)	(tons) 1,083,898	12,858,582
Silver (from 1919)	(fine oz.) 47,264,853	27,196,865
Sulphur as Sulphuric Acid (from 1957) (mono tons)	407,534	3,940,756
Tin	(tons) 151,048	82,199,357
Wolfram	(tons) 15,932	20,435,372
Zinc	(tons) 836,452	129,134,398
Zinc Sulphate (from 1957)	(tons) 2,613	258,869
NON-METALLIC MINERALS—		
Asbestos	(tons) 3,980	34,284
Barite	(tons) 2,205	16,478
Clay—(from 1958)		
Brick	(cubic yards) 942,717	1,749,815
Tile	(cubic yards) 31,491	36,148
Other	(cubic yards) 177,737	368,377
Dolomite	(tons) 29,446	172,309
Graphite	(tons) 40	214
Kaolin	(tons) 111,086	883,018
Limestone—		
Agricultural and other	(tons) 633,956	1,527,339
Carbide	(tons) 718,437	1,959,376
Cement	(tons) 4,912,802	6,723,827
Chemical and Metallurgical	(tons) 4,186,471	4,944,093
Ochre	(tons) 2,459	16,740
Pebbles (from 1957)	(tons) 6,390	96,319
Silica	(tons) 179,599	258,147
Talc	(tons) 333	2,154
FUEL MINERALS—		
Coal	(tons) 9,409,458	24,250,710
Shale	(tons) 41,572	62,462
CONSTRUCTION MATERIALS—		
Building Stone—		
Freestone	(cubic yards) 4,874	60,712
Granite	(cubic yards) 5,627	82,472
Other	(cubic yards) 1,480	3,614
Crushed and Broken Stone—(from 1958)		
Basalt	(cubic yards) 983,129	1,817,943
Dolerite	(cubic yards) 5,079,122	14,642,990
Limestone	(cubic yards) 220,210	538,797
Sandstone	(cubic yards) 35,435	53,391
Other	(cubic yards) 1,193,516	2,312,575
Gravel (from 1958)	(cubic yards) 9,886,978	10,138,903
Sand (from 1958)	(cubic yards) 766,682	1,006,533
Other Road Materials	(cubic yards) 614,845	779,784
		<u>\$687,418,985</u>

STATISTICS RELATING TO THE MINERAL INDUSTRY

Mineral.	Year ended 31st December, 1965.		Year ended 31st December, 1966.	
	Total Quantity.	Value \$A	Total Quantity.	Value \$A
<i>Metallic Minerals:</i>				
Cadmium (tons)	70	357,116	75	341,111
Cobalt Oxide (tons)	1.52	3,348	1	3,193
Copper (tons)	14,573	10,856,872	15,158	14,688,857
Gold (fine oz.)	30,084	940,126	32,655	1,020,453
Iron Oxide (tons)	3,524	9,836	2,797	7,903
Lead (tons)	11,126	3,103,600	12,162	2,994,513
Manganese Dioxide (tons)	371	14,300	401	15,238
Pyrite (tons)	58,868	353,208	68,077	408,462
Scheelite (tons)	1,185	2,090,600	1,311	3,776,862
Silica for Silicon Alloy Production (tons)	5,381	58,310	403	4,030
Silicon as Silicon Alloys (tons)	Nil	Nil	Nil	Nil
Silver (fine oz.)	1,383,859	1,612,716	1,507,421	1,764,113
Sulphur as Sulphuric Acid (mono tons)	64,172	641,720	65,013	650,130
Tin (tons)	1,027	3,761,758	1,031	3,419,153
Wolfram (tons)	492	903,040	510	1,367,704
Zinc (tons)	38,096	12,419,442	40,904	12,648,558
Zinc Sulphate (tons)	340	38,414	301	32,809
<i>Value of Metallic Minerals</i> .....	.....	37,164,406	.....	\$43,143,089
<i>Non-Metallic Minerals:</i>				
Clay:				
Brick (cubic yards)	123,749	219,298	106,599	216,853
Tile (cubic yards)	3,750	8,250	3,765	8,282
Other (cubic yards)	20,297	55,456	48,584	100,353
Dolomite (tons)	1,145	6,784	2,606	15,097
Kaolin (tons)	Nil	Nil	Nil	Nil
Limestone:				
Agricultural (tons)	29,685	69,690	34,364	77,407
Carbide (tons)	30,315	118,432	29,218	114,056
Cement (tons)	249,107	487,818	252,393	494,437
Chemical and Metallurgical (tons)	29,075	90,874	28,489	88,983
Other (tons)	232	4,792	270	5,670
Ochre (tons)	40	544	65	1,008
Pebbles (tons)	920	14,002	895	15,183
Silica (tons)	4,562	10,528	5,014	10,261
<i>Value of Non-Metallic Minerals</i> .....	.....	\$1,086,468	.....	\$1,147,590
<i>Fuel Minerals:</i>				
Coal (tons)	102,457	\$420,346	82,664	\$353,238
<i>Construction Materials:</i>				
Crushed and Broken Stone:				
Basalt (cubic yards)	227,073	459,020	294,351	537,429
Dolerite (cubic yards)	780,585	2,021,836	1,018,180	2,977,616
Limestone (cubic yards)	18,753	44,068	14,451	35,421
Sandstone (cubic yards)	24,690	41,628	4,627	6,727
Other (cubic yards)	198,927	408,826	269,578	651,713
Building Stone:				
Freestone (cubic yards)	949	12,670	757	8,650
Grey Granite (cubic yards)	20	40	Nil	Nil
Red Granite (cubic yards)	Nil	Nil	Nil	Nil
Other (cubic yards)	205	344	140	300
Gravel (cubic yards)	1,601,131	1,721,240	1,681,381	1,842,479
Sand (cubic yards)	146,973	195,350	228,559	261,837
Other Road Material (cubic yards)	175,973	179,662	203,154	214,604
<i>Value of Construction Materials</i> .....	.....	\$5,084,684	.....	\$6,536,776
<i>Total Value with Australian Metal Prices</i> .....	.....	\$43,755,904	.....	\$51,180,693
<i>Metallurgical Production from other than Tasmanian Ores:</i>				
Alumina (tons)	.....	70,761,832	.....	72,688,923
Aluminium (tons)	.....	.....	.....	.....
Aluminium Sulphate (tons)	.....	.....	.....	.....
Cadmium (tons)	.....	.....	.....	.....
Cobalt Oxide (tons)	.....	.....	.....	.....
Ferro-Manganese (tons)	.....	.....	.....	.....
Titanium Dioxide (tons)	.....	.....	.....	.....
Zinc (tons)	.....	.....	.....	.....
<i>Value of Mining and Metallurgical Production</i> .....	.....	\$114,517,736	.....	\$123,869,616
Average Number of men employed .....	.....	9,038	.....	10,122

AID TO MINING

The major item of expenditure of funds available for the purposes of the Aid to Mining Act 1927 was in drilling operations but, in addition, three small parties were assisted with the purchase of plant.

The drilling commenced last year at the Briseis Mine, Derby, to determine the availability of sufficient volumes and grade of tin bearing ground to warrant the re-establishment of active mining operations, was continued. Technical drilling problems retarded progress and it was found impossible to obtain satisfactory results with the type of drilling plant available. The results which had been obtained were not encouraging and it was decided to abandon the drilling.

Drilling was also undertaken on Fooks Lode near Waratah on an area which had previously been held under an Authority to Prospect. Two holes were completed, one of which intersected the ore-body with satisfactory results. The drilling is being continued.

The Endurance Tin Mining Co. N.L., which received substantial assistance in 1964 for the purchase and installation of cyclones and jigs encountered some operational difficulties with the units and repayments from production did not reach expectations. It now seems that the plant is operating satisfactorily. King Island Scheelite (1947) Ltd. which received subsidies amounting to \$397,910 under the King Island Scheelite Agreement Acts 1963, in order to maintain operations during a period of depressed market prices, continued to benefit from higher prices and has now completed repayment in full of the subsidies.

The Aid to Mining Reserve of all land within a radius of three miles of the town of Waratah remained in occupation partly by small tribute parties and under Authorities to Prospect.

A total of 11 tributes were granted but actual production has been confined principally to one party which has operated profitably in alluvial areas. Activities by most other parties have been limited to part-time occupation, and this has been allowed to continue because of the demand for labour by contractors at Savage River and at the Cleveland Mine, Luina. It is normally required that tributors should engage in full-time activities.

The holders of the three current Authorities to Prospect continued with investigational work and drilling.

The Storeys Creek Tin Mining Co. N.L. which operates the Dorset Tin Dredge at Gladstone made a repayment of \$22,000 in accordance with the agreement made when a loan of \$220,000 was granted in 1963 to transfer the dredge from South Mt. Cameron to Gladstone. Interest payable has been met on the due date.

Mining Plant.—The mining plant purchased by the Department for hire to small parties for testing discoveries has been used for short periods on a wolfram tin prospect. A compressor has also been on hire to one of the tribute parties at Waratah.

The Department is prepared to purchase additional plant units if there is a reasonable demand but to date the demand has been limited to only a few parties.

STATEMENT OF RECEIPTS AND PAYMENTS OF THE MINING TRUST FUND FOR THE YEAR ENDED
31st DECEMBER, 1966.

<i>Receipts.</i>	\$	<i>Payments.</i>	\$
Balance, 1st January, 1966	14,429.27	Assistance	5,511.20
Repayment of loans	6,575.16	Boring at Waratah	5,338.75
Interest on loans	1,779.63	Maintenance of mining plant	201.62
Tribute royalty	650.24	Miscellaneous	139.89
Hire of mining plant	149.31		<hr/>
Authorities to Prospect	62.60		11,191.46
		Balance to next Account	12,454.75
	<hr/>		<hr/>
	\$23,646.21		\$23,646.21
	<hr/>		<hr/>

STAFF

The following were the staff movements during the year:—

Name	Position	Remarks	
Jack, R. M.	Geologist	Resigned	6.1.66
Down, V.	Typist	Resigned	28.1.66
Eaves, B. D.	Field Assistant	Appointed	1.2.66
Hay, L.	Cadet Chemist	Appointed	10.2.66
Bravo, A. P.	Geologist	Appointed	23.2.66
Pearn, H. D.	Typist	Appointed	17.3.66
Valentine, M.	Clerk	Resigned	24.3.66
Deayton, K. M.	Clerk	Appointed	28.3.66
Pepper, J. S.	Draughtsman	Transferred	30.3.66
Legge, P. J.	Geologist	Appointed	6.5.66
Marshall, B.	Geologist	Resigned	25.5.66
Clements, D.	Ceramic Technologist	Appointed	29.10.66
Murchie, H.	Mining Engineer	Appointed	13.11.66
Stevenson, P. C.	Senior Geologist	Appointed	1.12.66

Scholarship

Mr. Robert Cuttriss was granted a Metallurgy Scholarship tenable at the Melbourne University.

Retirements

Mr. W. St. C. Manson, Chief Chemist and Metallurgist at the Department's Laboratories at Launceston, retired on 17th January, 1966, after 47 years' service.

Mr. K. L. R. Evans, Drilling Superintendent, retired on 26th November, 1966, having completed 11 years' service.

CONCLUSION

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

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

J. G. SYMONS, Director of Mines.

OPERATIONS AND PRODUCTION

1.—METALLIC MINERALS

CADMIUM

Quantity produced:—

	Tons	Value \$
1924-62	1,306	2,898,810
1963	73	365,474
1964	76	511,002
1965	70	357,116
1966	75	341,111
Total	1,600	\$4,473,513

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

COBALT OXIDE

The source of the 1.47 ton of cobalt oxide of value \$3,193 was the same as that of cadmium above.

COPPER

Quantity and value of production:—

Year	From Tin Ores		From Lead-Zinc Ores		In Blister Copper		In Copper Ores		Total	
	Tons	\$	Tons	\$	Tons	\$	Tons	\$	Tons	\$
1919-1962	339	248,582	9,864	5,227,790	394,851	117,376,942	404	21,162	405,458	122,874,476
1963 .....	.....	.....	1,157	705,776	14,445	8,811,450	.....	.....	15,602	9,517,226
1964 .....	.....	.....	1,075	712,046	14,142	9,361,332	.....	.....	15,217	10,073,378
1965 .....	.....	.....	1,078	802,362	13,495	10,054,510	.....	.....	14,573	10,856,872
1966 .....	.....	.....	1,214	1,168,996	13,944	13,519,861	.....	.....	15,158	14,688,857
Total	339	\$248,582	14,388	\$8,616,970	450,877	\$159,124,095	404	\$21,162	466,008	\$168,010,809

The Mount Lyell Mining and Railway Company Limited, Queenstown

Mining—		Tons
Overburden removed		2,247,327
Ore Mined—		
West Lyell		2,057,149
Crown Lyell		23,736
Razorback		74,918
Royal Tharsis		3,650
Limestone delivered to works		9,498
Reduction—		
Concentrates smelted		53,782
Crown Lyell ore smelted		10,779
Precipitate smelted (North Lyell and Comstock)		65
Blister copper produced		14,058
Containing—		
Copper (tons)	13,945	
Gold (fine oz.)	8,307	
Silver (fine oz.)	59,877	
Pyrite concentrate shipped		68,077
Total value of production		\$13,748,053

Average number of men employed—

Mining—	
Open cut	223
Underground	73
Other	1,175
Total	1,471

Production from the inception to 31st December, 1966—

Copper (tons)	609,472
Gold (fine oz.)	620,066
Silver (fine oz.)	16,190,537

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

Mine (Level)	Driving Feet	Rising Feet	Total Feet
Crown Lyell	2,077	350	2,427
Royal Tharsis	555	30	585
Totals	2,632	380	3,012

Ore reserves at 30th June, 1966, totalled 19,085,000 tons assaying 0.99% copper, 0.117 oz. silver per ton and 0.018 dwt. gold per ton. Of this total the West Lyell opencut accounted for 11.9 million tons averaging 0.78% copper. Drilling during recent years has indicated the existence of 40-45 million tons of material, containing about 1% copper, to a depth of 1,250 feet below the final opencut bottom. Diamond drilling continued at a high level during the year. The chief objects of the drilling programme are to locate orebodies and obtain geological information in the Crown Lyell "corridor" area, to determine more precisely the tonnage of opencut ore in the North Lyell-Lyell Tharsis area, and to obtain further information on the Prince Lyell-Royal Tharsis orebodies beneath the present West Lyell opencut workings.

Preparations are well advanced for the mining of a small high grade orebody in the North Lyell area. The final primary blast at the Razorback Mine took place during the year and at the year end only a low tonnage remained to be drawn from this orebody.

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

1. One diamond drill received.
2. Purchase of a Schramm T64-H-B Rotadrill to replace churn drills at the West Lyell opencut.
3. Two rubber-tyred bulldozers and one heavy duty truck machine to replace existing units at the West Lyell opencut.
4. Truck-crane for shovel maintenance at the West Lyell opencut.
5. Dust collection system for the crushing and screening plant.
6. Two banks of No. 60 Agitair Flotation cells in the concentrator.
7. One 15 ton overhead travelling crane for the smelter. This crane was being erected at the end of the year.
8. New blower for converters.
9. Completion of 41 employee houses and another unit to accommodate 24 single men.

Electrolytic Zinc Company of Australasia Limited, Rosebery

This company, reviewed under Zinc, produced 12,083 tons of copper concentrate containing 1,214 tons of copper valued at \$1,168,996.

GOLD

Quantity produced—

	Fine oz.	Value \$
Prior to 1963	2,568,505	29,573,958
1963	31,989	999,674
1964	31,551	985,960
1965	30,084	940,126
1966	32,655	1,020,453
Total	<u>2,694,784</u>	<u>\$33,520,171</u>

The Mount Lyell Mining and Railway Company Limited, Queenstown

This company recovered 8,307 fine oz., valued at \$259,593, from sludge in the electrolytic copper refinery.

Electrolytic Zinc Company of Australasia Limited, Rosebery

Concentrates produced by this company contained 24,269 fine oz., valued at \$758,398.

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

From the tin concentrate of this dredge, reviewed under tin, 79 fine oz. of gold, valued at \$2,462 was recovered.

IRON OXIDE

Quantity produced—

	Tons	Value \$
Prior to 1963	96,938	199,928
1963	4,221	12,008
1964	6,808	19,362
1965	3,524	9,836
1966	2,797	7,903
Total	<u>114,288</u>	<u>\$249,037</u>

Iron Cliffs Mine, Penguin

Mr. A. Pearson continued to work the secondary ore at the Iron Cliffs Mine and supplied a cement works with 2,784 tons of hematite valued at \$7,709 and 13 tons of limonite valued at \$194. Employment averaged four men.

Savage River Mines, Savage River and Port Latta

Construction at both the mine site at Savage River and the pelletizing site at Port Latta proceeded apace. At Savage River by the end of the year the administration building was occupied, the workshops and warehouse building was completed and erection of the concentrator steelwork was proceeding.

The mine site was cleared of timber and the initial work on establishing mining benches was undertaken. The material from a newly established basalt quarry is being processed in a concrete aggregate plant.

The Hydro-Electric Commission provided power, the Public Works Department virtually completed road reconstruction and a start was made on road sealing.

At Port Latta the administration and warehouse buildings were completed and occupied; the pellet plant building was almost completed and installation of the pelletizing equipment had commenced. Construction work on the concentrate pipe-line, to be used for pumping iron concentrates from the concentrator at Savage River to the pellet plant at Port Latta, commenced during the latter part of the year. It is expected that the first shipments of pellets will be made early in 1968.

LEAD

Quantity produced—

	Tons	Value \$
1919-62	329,489	38,013,158
1963	11,889	2,023,086
1964	11,823	2,879,606
1965	11,126	3,103,600
1966	12,162	2,994,513
Total	376,489	\$49,013,963

Electrolytic Zinc Company of Australasia Limited, Rosebery

This company, reviewed under Zinc, produced 14,462 tons of lead concentrate and the total content of lead in the lead, zinc and copper concentrates was 12,162 tons valued at \$2,994,513.

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 401 tons was valued at \$15,238.

OSMIRIDIUM

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

PYRITE

Quantity produced—

	Tons	Value \$
1915-62	1,455,169	6,203,616
1963	56,402	338,412
1964	66,381	398,286
1965	58,868	353,208
1966	68,077	408,462
Total	1,704,897	\$7,701,984

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

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

This company mined 403 tons of silica, valued at \$4,030 for export to Newcastle for the manufacture of silicon alloys.

SILVER

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

Producer	Source	Quantity Fine oz.	Value \$
E.Z. Co. of A/asia Ltd.	Copper, Lead & Zinc Concentrates	1,447,543	1,694,043
Mt. Lyell M. & R. Co. Ltd.	Refinery Sludge	59,878	70,070

Quantity and value of production:—

Year	From Tin and Other Ores		From Silver-Lead Ore		From Copper Ore		From Lead-Zinc Ore		Total	
	Fine Oz.	\$	Fine Oz.	\$	Fine Oz.	\$	Fine Oz.	\$	Fine Oz.	\$
1919-62	121,787	101,764	17,594,263	5,638,096	3,572,540	1,287,878	20,168,709	13,407,250	41,457,299	20,434,988
1963 ..	..	..	54,674	62,838	62,771	72,484	1,321,413	1,522,660	1,438,858	1,657,982
1964 ..	..	..	41,663	48,700	59,807	69,922	1,375,946	1,608,444	1,477,416	1,727,066
1965 ..	..	..	..	..	52,228	60,864	1,331,631	1,551,852	1,383,859	1,612,716
1966 ..	..	..	..	..	59,878	70,070	1,447,543	1,694,043	1,507,421	1,764,113
TOTAL ..	121,787	\$101,764	17,690,600	\$5,749,634	3,807,224	\$1,561,218	25,645,242	\$19,784,249	47,264,853	\$27,196,865

SULPHUR AS SULPHURIC ACID

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

Quantity and value of production:—

	Mono Tons	Value \$
1957-1962	174,068	1,606,096
1963	46,355	463,550
1964	57,926	579,260
1965	64,172	641,720
1966	65,013	650,130
Total	407,534	\$3,940,756

TIN

Quantity produced:—

	Tons	Value \$
1873-1962	146,995	69,396,134
1963	1,005	2,385,026
1964	990	3,237,286
1965	1,027	3,761,758
1966	1,031	3,419,153
Total	151,048	\$82,199,357

Aberfoyle Tin N.L., Rossarden

Mr. W. R. Tindal, Mining Engineer, Hobart, reports that the tonnage of ore milled was 89,412 tons, an increase of 2,174 tons over the preceding year. In addition 36,382 tons of accumulated tailings were re-treated.

Production from the ore treated consisted of 580 tons of tin concentrate containing 403 tons of tin valued at \$1,336,619 and 161 tons of wolfram concentrate containing 120 tons of tungstic oxide (WO₃) valued at \$429,715.

Underground Development comprised:—

	Feet
Driving	1,653
Rising	1,532
Crosscutting	160
Winzing	26
Main Ore Pass (Rising)	157
Total	3,528

Underground diamond drilling consisted of 24 holes completed with a footage of 6,158 and three in progress at a footage of 294, making a total footage for the year of 6,452 feet.

Capital works:—

1. 11 KV substation on 10 level.
2. New pumping station on 10 level.
3. 11 KV cable from surface to 10 level.
4. 6-inch rising main to surface completed.
5. Battery locomotive installed on 5 level and Lutwyche prospect.
6. H.M.S. automatic sampler.
7. Metal detector on No. 1 conveyor belt.
8. P.I.F. analyser bought for laboratory.
9. Kempe diamond drill.
10. Conveyors and other equipment to enable the coarse tailings to be re-treated.

Average number of men employed:—

Surface	124
Underground	144
	268
Total	268

Cleveland Tin N.L., Luina

Until the last quarter of the year activity was confined to surface geological work, surveying of potential town and works sites, and further technical investigations. In October work commenced on the town and concentrator sites and on the construction of access roads to the future sub-levels of the mine.

It is planned to mill at a daily rate of 1,000 tons and to produce annually about 1,600 tons of tin and 750 tons of copper.

Placer Prospecting Pty. Ltd., Zeehan

Underground development and diamond drilling continued on the Razorback, Grand Prize and St. Dizier prospects but late in the year the company decided to discontinue operations in the area. Average employment was 21 men.

At the Razorback mine, 2,495 feet of driving and cross-cutting and 130 feet of winzing was carried out. At the Grand Prize mine 19 feet of driving completed the exercise. Diamond drilling consisted of 4,082 feet in 11 holes at St. Dizier, and 100 feet completing the last hole at Razorback.

Renison Limited, Renison Bell

This company traded 53,657 tons of ore for the production of 593 tons of concentrates containing 385 tons of metallic tin valued at \$1,280,253. Practically the entire ore production was from the Battery mine.

Trial milling at the new plant commenced late in the year. Mill feed was drawn from the Battery mine supplemented by ore from small opencut deposits in the area.

The main decline adit was advanced 3,175 feet from the portal and in addition the mining of ventilation and fill rises was well advanced.

The following mine development was carried out at the Federal mine:—

Cross-cutting	Rising/Winzing	Main Adit	Total
998 feet	881 feet	3,055 feet	4,934 feet

In addition excavations were cut totalling 53,104 cubic feet.

Diamond drilling:—

Federal and Bassett Lodes: 14 holes—4,498 feet.

Sill Deposits: 74 holes—22,666 feet of which 31 holes (8,765 feet) were drilled with a Schramm down-the-hole machine.

The average labour force was 345 of which 47 men were employed underground, 130 on surface, and 168 by contractors on construction work.

Total ore reserves at 30th June, 1966, were 13,774,000 tons averaging 0.75% Sn. Further drilling has indicated that this tonnage will be increased.

Capital Works

The new crusher, concentrator, assay offices, workshops, store and administration blocks were completed and occupied. Commissioning of the concentrating plant was in progress by the year-end. The Zeehan housing project was completed and 55 units were occupied. Single men's quarters were completed and occupied.

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

This company treated 316,160 cubic yards from the Clifton Workings for the production of 51 tons of concentrate, containing 38 tons of tin, valued at \$127,669.

The average number of men employed was 20 in the open cut and 17 other, total 37.

Transfer of the barge and sluicing and pumping equipment to a higher level on the Clifton lead was accomplished, also the commissioning of the new jig ore treatment plant.

Mussel Roe Mine, Pioneer

Vastly improved throughput was achieved by Mr. V. Wood at his two working faces near the Mussel Roe River with a production of 18 tons of tin concentrate containing 13 tons of tin valued at \$42,426 from a total of 58,400 cubic yards. Average number of men employed was four.

Star Hill Syndicate, Gladstone

No. 1 or Main Creek Face continued as principal producer for the syndicate although two smaller faces were worked as water permitted. Yardage figures were incomplete although tin values were judged to be the same as for 1965. Concentrate produced totalled 23 tons with a tin content of 17 tons valued at \$55,608, an average of six men being employed.

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

Declining values in the McGregor area are reflected in the lowered production of 65 tons of concentrate containing 49 tons of tin valued at \$163,011. This necessitated a move into the richer Aberfoyle area. Overall the dredge treated 1,499, 200 cubic yards, an average of 43 men being employed. Along with this production, 84 oz of alluvial gold were obtained, valued at \$2,462.

Pioneer Mine, Pioneer

Handicapped by water shortage in the first quarter of the year, Mr. V. Wood employing four men treated 113,000 cubic yards to produce concentrate containing 7 tons of tin valued at \$24,627. Sluicing was confined to the top 25 feet of less valuable overlying material as a means of developing the reserves on bottom.

Mount Cameron Tin Syndicate, South Mount Cameron

Concentrate produced by this syndicate yielded 9 tons of tin valued at \$29,567. Employment averaged two men. The yardage of gravel sluiced was 44,200.

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

This company, reviewed under Tungsten, produced 96 tons of concentrate containing 69 tons of tin, valued at \$226,651.

Cornwall Coal Co. N.L., Royal George

Dewatering of the underground workings was completed. The inclined shaft was rehabilitated and converted into a two compartment shaft. The silt on the floor of No. 2 level has been partially stored on No. 2 level and some pumped out of the mine.

Sampling of the floor of No. 2 level has been completed and diamond drilling from the surface to intersect the ore body below the No. 2 level has been carried out. Six holes with a footage of 1,527 have been completed and one is in progress at a footage of 23. Two diamond drill holes on No. 2 level were completed with a footage of 193.

Mr. G. Machen, Waratah

Mr. Machen carried on two sluicing operations in North Valley and prepared to establish a further operation. Production was 16 tons of concentrate containing 11 tons of tin valued at \$36,610. An average of four men were employed.

Production by Small Workers

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

WARATAH

Mr. L. W. Wills produced concentrate containing 0.019 ton of tin, valued at \$61 from a small underground vein by working part-time.

Mr. M. G. Glozier from his underground working on Thompson's Lode, produced concentrates containing 0.050 ton of tin valued at \$160 by part-time work.

Mr. J. Housego produced concentrate from tailings in the Waratah River containing 0.636 ton of tin, valued at \$2,177 working full time.

Mr. C. Housego produced concentrate from the North Valley workings containing 0.214 ton of tin, valued at \$698 working full-time.

Mr. W. Housego, working part-time, produced concentrate containing 0.021 ton of tin, valued at \$71.

Messrs. Packham and Kingston produced concentrate containing 0.227 ton of tin, valued at \$808 in Tinstone Creek, West Valley. Two men were employed part-time.

Other small producers were:—

Name	Tin Content ton	Value \$	Employment
Mr. K. Prouse	0.051	178	1 part-time
Mr. A. N. Duncombe	0.025	85	.....
Messrs. Gerwood and Wolfe	0.038	120	2 part-time

WEST COAST

Mr. E. Coleman continued to produce small quantities from his mine and small plant at Mt Heemskirk. He produced concentrate containing 0.098 ton of tin, valued at \$322, working part-time only.

Mr. C. D. King, Port Davey, produced from the Melaleuca Mine concentrates containing 1.519 tons of tin, valued at \$4,869.

Mr. A. R. Smith from his holding on the Tasman River at North Heemskirk produced concentrate containing 2.349 tons of tin, valued at \$7,711. Mr. Smith was employed full-time.

Mr. D. Dunkley produced 2.731 tons of concentrate containing tin and lead from his mine at Queen Hill and treatment plant at Zeehan.

EAST COAST

Mr. W. D. Clarke, Coles Bay: Sluicing an area off Saltwater Creek, a party of four recovered concentrate with a tin content of 1.955 tons, valued at \$6,491.

Mr. D. Lewis, Coles Bay installed a sluice box, a gravel pump and a water pump (diesel driven) to operate a monitor in Middleton Creek. A small dam was built on the creek to conserve water on the upstream side of the workings. Lack of water has limited the sluicing, but some concentrate was produced containing 0.095 ton of tin, valued at \$299.

Mr. L. McRae, Coles Bay: Tin deposits of Saltwater Creek have been partially prospected and some plant installed, but to date no production has taken place.

Mr. B. J. Goodluck, St. Helens, working in the Golden Fleece area, produced concentrate containing 0.441 ton of tin valued at \$1,390.

Miscellaneous: Messrs. H. Clark and S. J. Wright produced concentrate containing 0.135 ton of tin, valued at \$433.

AVOCA

Messrs. Brinckman and Dicker, Mount Rex, mined some ore and put it through a small mill on Buffalo Creek. They have had a considerable amount of trouble with the commissioning of the mill, and are not in production.

Messrs. L. R. and D. Fenton, Mount Rex, sluiced detrital deposits for a recovery of concentrate containing 0.215 ton of tin, valued at \$677.

Mr. D. Fitzallan produced concentrate containing 0.108 ton of tin, valued at \$343.

SCOTTSDALE

Miscellaneous: Messrs. M. Hodgetts and I. M. Alexander produced individually concentrate containing 0.041 ton of tin, valued at \$137.

RINGAROOMA-BRANXHOLM-DERBY

G. Rayner and Party, Derby, were compelled by a rising bottom and cut off of values to close their workings in the Cascade River. Concentrate produced contained 4.287 tons of tin valued at \$14,030. The party consisted of three men.

Mr. K. C. Phillips, The Valley, Derby, tested ground east of the road in an attempt to prove the continuation of the old Valley lead. Negligible production of 0.015 ton of tin valued at \$53 resulted from his operation.

Mr. T. Merritt, Ringarooma River Beaches, screened and boxed 1,417 cubic yards, producing concentrate containing 0.442 ton of tin, valued at \$1,423.

Mr. K. Kerrison, Ringarooma River (Mutual Area), by treating river beaches, produced concentrate containing 0.694 ton of tin, valued at \$2,322.

Miscellaneous: Messrs. W. G. Stevens, E. J. Holmes, R. G. Burr, R. Loone, F. Smith, A. G. Machen, W. J. McWatters, R. J. Wolfe, A. A. Quinn, K. and G. Barnes, C. Mansell, M. Salter, and T. Mundy produced individually small quantities of concentrate containing a total of 0.796 ton of tin, valued at \$2,639.

GLADSTONE

Mr. E. King, Fly by Night Mine, produced concentrate containing 0.771 ton of tin, valued at \$2,429.

Mr. H. Standage, Amber Creek, commenced operating in the second half of the year and from a throughput of 900 cubic yards won concentrate containing 0.695 ton of tin, valued at \$2,194.

Miscellaneous: Messrs. R. Lawry, H. A. and M. F. Fenton, A. K., D. R. and F. D. Richardson, J. R. Groves, B. G. Groves, N. Moore, M. L. Watt, G. Wilcox, and G. Willis produced individually small parcels of concentrate containing a total of 2.979 tons of tin, valued at \$9,453.

MOUNT CAMERON-PIONEER

Mr. R. L. Rainbow, Banca Mine, treating 7,955 cubic yards of gravel as against 11,160 cubic yards in the previous year, produced concentrate containing 2.205 tons of tin, valued at \$7,264. Values differed but yield was the same as for 1965.

Mr. G. Cox, White Rock, operating single handed, produced concentrate containing 1.121 tons of tin, valued at \$3,866.

Miscellaneous: Messrs. Kerrison and Son, F. Mullins, H. Summers and Bros., and Probert and Groves were responsible individually for the production of small quantities of concentrate containing a total of 0.472 ton of tin, valued at \$1,507.

MOORINA-WELDBOROUGH

Mr. W. L. Boon, Moorina: A lower production of concentrate compared with the previous year yielded 0.670 ton of tin, valued at \$2,204 as against a production of 1.924 tons of tin in 1965.

Mr. T. Yaxley, Weldborough, reopened old workings in Niagara Creek and produced concentrate containing 0.864 ton of tin, valued at \$2,777.

Messrs. M. and J. Lambert, Weldborough, again worked the Race Course Flat lease for a return of concentrate containing 0.866 ton of tin, valued at \$2,881.

Mr. H. Moses, Blue Tier, from a recorded throughput of 2,800 cubic yards, produced concentrate containing 1.375 tons of tin, valued at \$4,494. Sluicing was conducted in two different locations on Seven Mile Creek.

Messrs. K. Banks and F. Coombes produced concentrate containing 0.345 ton of tin, valued at \$1,185.

Mr. F. J. Mullins produced concentrate containing 0.901 ton of tin, valued at \$3,025.

MISCELLANEOUS

There are many small producers, some of whom produce tin as a week-end pastime. In a number of these cases, the locality from which production takes place is difficult to fix, as a few pounds are often produced from several places. Among such producers are Messrs. G. Archer, A. Harrison, and C. Marshall.

The concentrate produced by all these operators together contained 0.078 ton of tin, valued at \$264.

TUNGSTEN (SCHEELITE)

Quantity produced:—

	Tons (Concentrate)	Value \$
1917-62	17,736	35,288,300
1963	1,010	558,206
1964	1,063	1,109,282
1965	1,185	2,090,600
1966	1,311	3,776,862
Total	22,305	\$42,823,250

King Island Scheelite (1947) Ltd., Grassy

Production statistics:—

Mining:

Overbuden removed	458,136 tons
Ore mined	229,339 tons

Treatment:

Ore milled	230,174 tons
Concentrate recovered	1,311 tons
WO ₃ content	945 tons
Value	\$3,776,862

Ore reserves as at 1st November, 1966, were estimated to be 1,465,000 tons, averaging 0.488% tungstic oxide, down to 110 feet below sea level.

Diamond drilling and geological work continued to the northeast of No. 3 fault. Investigations are proceeding to determine the best method of extracting the ore beneath the projected lower limit of the opencut. A geochemical prospecting programme has been commenced in the mine and within the area of Exploration Licence No. 15/66.

Diamond drilling during the year comprised the following:—

North of No. 3 fault	3,711 feet in twelve holes.
Opencut area	993 feet in three holes.

A new 2.5 cu.yd. diesel shovel and a 900 c.f.m. compressor were commissioned and the installation was completed of a treatment plant for the town water-supply. In the treatment plant a new dust collection system has been commissioned in the crushing and screening section. Employment throughout the year averaged 131 persons.

TUNGSTEN (WOLFRAM)

Quantity produced—

	Tons (Concentrate)	Value \$
1899-1962	14,184	17,550,192
1963	382	223,302
1964	364	391,134
1965	492	903,040
1966	510	1,367,704
Total	15,932	\$20,435,372

Aberfoyle Tin N.L., Rossarden

Wolfram concentrate produced contained 120 ton of Tungstic oxide (WO₃) valued at \$429,715. This company is reviewed under Tin.

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

Tonnage of ore delivered to the mill was 36,455 tons, which is 5,791 tons more than the previous year.

Production from the ore treated consisted of 350 tons of wolfram concentrate containing 258 tons of tungstic oxide (WO₃) valued at \$937,989 and 96 tons of tin concentrate containing 69 tons of tin valued at \$226,651.

Underground development comprised:—

Driving	2,147 feet
Cross cutting	405 feet
Rising	678 feet
Shaft sinking	53 feet
Total	3,283 feet

Diamond Drilling

One surface diamond drill hole was drilled to 80 feet on the Eastern Hill prospect, with poor results, and in addition 23 underground holes were drilled with a footage of 3,797, making a total footage for the year of 3,851 feet.

Capital Works

1. Deepening main shaft.
2. Excavating ore passes to 10 level.
3. New pump station 9A level.
4. Special development at northern end on Nos. 3 and 6 levels.
5. New rod mill installed for regrinding tailings and so increase the amount of sand available for fill underground.
6. Additional equipment provided for fire fighting
7. Vibratory feeder placed below crude ore bin to feed secondary crusher.

The average number of persons employed was:—

Surface	38
Underground	72
Total	110

ZINC

Quantity produced:—

	Tons	Value \$
1919-62	678,791	83,772,402
1963	38,589	8,037,570
1964	40,072	12,256,426
1965	38,096	12,419,442
1966	40,904	12,648,558
Total	836,452	\$129,134,398

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

From other than Tasmanian Ore—

Zinc	Tons	104,283
Cadium	273	
Cobalt Oxide	23	
Superphosphate	100,670	

From Tasmanian Ore—

	Tons
Zinc	38,603
Cadmium	70
Cobalt Oxide	1.47

Manufactured products—

Aluminium Sulphate	2,059
Ammonium Sulphate	44,475

Men employed—

The average number of men employed : 2,827.

WEST COAST DIVISION

Ore Mined—

Mine	Pb %	Zn %	Fe %	Cu %	Ag oz./ton	Au dwt/ton	Tons
Hercules	6.3	18.6	14.4	0.38	7.17	1.92	24,894
Rosebery	5.5	17.7	16.2	0.60	6.22	2.06	262,698
Farrell	14.6	6.9	10.0	0.22	14.25	Nil	7,149
							294,741

Concentrate Produced—

Zinc Concentrate	83,761
Lead Concentrate	14,462
Copper Concentrate	12,083
Total	110,306

Recoverable Quantity in Ore Mined—

Zinc	40,904	tons
Lead	12,162	tons
Copper	1,214	tons
Cadmium	75	tons
Silver	1,447,543	oz. (fine)
Gold	24,269	oz. (fine)
Cobalt Oxide	1.47	tons
Manganese Dioxide	401	tons
Zinc Sulphate	301	tons
Sulphate as Sulphuric Acid	65,013	mono tons

Total Value of Production—\$18,777,569.

Average Number of Persons Employed—

	Surface	Underground	Total
Hercules Mine	8	23	31
Rosebery Mine	346	334	680
Farrell Mine	6	14	20
Total	360	371	731

ROSEBERY, HERCULES AND FARRELL MINES

Mine Development

Rosebery:—

Level Development	1,235 feet
Rising	1,610 feet

On No. 14 level a further 962 feet was driven to provide access to diamond drill sites for testing the orebody at depth.

Planning for a new vertical internal shaft had reached an advanced stage by the end of the year. It is proposed that the shaft be 22 feet in diameter and sunk to a depth of 3,500 feet below the elevation of No. 8 level adit. The shaft, to be used for men, material, and rock will allow for hoisting an increased tonnage of ore.

Hercules: A total of 306 feet of driving and crosscutting was completed.

Farrell: Development footage in drives and crosscuts totalled 603 feet.

Diamond Drilling

Rosebery: A total of 22,015 feet which includes, 2,770 feet of pilot and ventilation drilling.

Hercules: A total of 1,940 feet.

A further 4,281 feet were drilled at Tullah, Melba Flat and Trial Harbour.

GENERAL

The use of A.N.F.O. explosive was commenced in the Rosebery and Hercules mines and its use is being gradually extended. The first piece of trackless mining equipment, a rubber-tyred ore loader, has been successfully used in the Rosebery cut and fill stopes.

Two additional oil-fired steam generators, each capable of producing 5,000 lb. of steam per hour, are being installed for pulp heating. A start was made on the erection of fifteen new houses at Primrose.

RISDON WORKS

Mr. J. B. Braithwaite, Senior Mining Engineer, Hobart, reports that the average number of employees was 2,827, an increase of 74 over last year.

During the year the fourth unit in the contact sulphuric acid plant was completed, bringing the total capacity up to 250,000 tons per year. A 1,000 ton storage tank for acid was also built. In the superphosphate plant capacity was increased by the addition of one International Combustion ball mill to the circuit, and a Doyle scrubber was installed to remove noxious matter from the gases discharged to the atmosphere.

ZINC SULPHATE

This is a by-product from the treatment of zinc concentrate by the Electrolytic Zinc Company of Australasia Limited. The quantity produced was 301 tons of value \$32,809.

2.—NON - METALLIC MINERALS

CLAY

Quantity produced—

	Cubic yards	Value \$
1958-62	592,593	1,045,122
1963	116,352	227,956
1964	136,256	272,770
1965	147,796	283,004
1966	158,948	325,488
Total	1,151,945	\$2,154,340

Company	Clay Cu. yd.	Value \$	No. of Men	Product
Agripipe Pottery Pty. Ltd., Relbia	896	896	2	Pipes
Burnie Brick Co., Cooee	5,750	4,180	12	Bricks
Campbell, John, Pty. Ltd., Launceston	1,000	1,001	13	Pipes
*Fenton, E. V., Kingston	4,743	11,782	1	Bricks
Goliath Portland Cement Co. Ltd., Rail- ton	17,718	44,882	3	Cement
*Hazell Bros., Margate	9,756	24,141	1	Bricks
Hobart Brick Co., New Town and Gran- ton	10,262	25,395	39	Bricks
Huttons Bricks Pty. Ltd., Prospect	14,650	29,300	13	Bricks
Luck Brick and Pipe Pty. Ltd., Dulverton	5,766	9,819	19	Bricks
Machens Brick Pty. Ltd., Kings Meadows	15,572	31,504	20	Bricks
McHugh Bros. Bricks, Pty. Ltd., Gran- ton	12,500	31,250	17	Bricks
McHugh Bros. Pty. Ltd., Granton	1,295	4,079	16	Pipes
McHugh Bros. Pty. Ltd., Launceston	2,113	4,649	20	Pipes
McHugh Bros. Pty. Ltd., Prospect Vale	13,323	19,265	12	Bricks
Melrose Agricultural Limestone Quar- ries, Eugenana	135	68	....	Roadwork
Roche Bros., Miena	25,712	44,996	2	Dam Core
*Wells, D. S., Blackmans Bay	4,590	11,387	1	Bricks
Wise, G. R. & Son, Relbia	192	192	....	Bricks
Wynyard Brick, Wynyard	9,210	18,420	13	Bricks
Wunderlich Pty. Ltd., Loira and Laun- ceston	3,765	8,282	28	Tiles

* Suppliers to Hobart Brick Company.

Hobart Brick Company, New Town, installed a further 10 Prometheus heavy fuel injectors in the kiln, bringing the total to 50.

DOLOMITE

Quantity produced—

	Tons	Value \$
Prior to 1963	22,149	128,870
1963	2,623	16,278
1964	923	5,280
1965	1,145	6,784
1966	2,606	15,097
Total	<u>29,446</u>	<u>\$172,309</u>

Circular Head Dolomite and Trading Co. Pty. Ltd., Smithton

This company, the sole producer, employed an average of one man and produced 2,606 tons, an increase of 1,461 tons. The stone is milled for top-dressing in agriculture.

KAOLIN

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

LIMESTONE

Quantity and value of production and usage—

Years	Manufacture of Cement		Manufacture of Carbide		Chemical and Metallurgical		Agriculture and Other		Totals	
	Tons	\$	Tons	\$	Tons	\$	Tons	\$	Tons	\$
1919-62	3,878,155	4,697,542	604,903	1,519,230	4,063,448	4,565,392	516,029	1,209,402	9,062,535	11,991,566
1963 ..	272,117	532,894	26,782	101,260	32,463	98,476	23,103	84,838	354,465	817,468
1964 ..	261,030	511,136	27,219	106,398	32,996	100,368	30,273	75,540	351,518	793,442
1965 ..	249,107	487,818	30,315	118,432	29,075	90,874	29,917	74,482	338,414	771,606
1966 ..	252,393	494,437	29,218	114,056	28,489	88,983	34,634	83,077	344,734	780,553
TOTALS	4,912,802	6,723,827	718,437	1,959,376	4,186,471	4,944,093	633,956	1,527,339	10,451,666	15,154,635

Addison and Coates, Currie

This firm produced 4,000 tons of limestone valued at \$8,000. An average of one man was employed.

Australian Commonwealth Carbide Company Ltd., Ida Bay and Electrona

This company quarried 29,218 tons of limestone at a cost of \$114,056 at Ida Bay and used it for the production of calcium carbide at Electrona. Calcium carbide production was 14,061 tons valued at \$1,675,875 and acetylene black production was 169 tons valued at \$80,689. The average number of persons employed was 194, of whom 23 were at the quarry.

Australian Newsprint Mills, Limited, Maydena

This company quarried 5,724 tons of limestone at a cost of \$28,212. The limestone was burnt at their Boyer Mill and used in newsprint production. Six men were employed in the quarry throughout the year.

A. R. Beams, Flowery Gully

From his quarry, crushing plant and lime kiln, Mr. Beams produced:—

	\$
1,165 tons agricultural limestone, valued at	2,796
13,065 tons limestone for chemical and metallurgical purposes, valued at	31,356
270 tons burnt lime for various purposes, valued at	5,670
<hr/>	
14,500 tons Total Value	<hr/> \$39,822 <hr/>

Twelve men were employed. New crushing, screening and storage equipment was purchased with a view to its installation in the coming year.

Goliath Portland Cement Co. Ltd., Railton

Limestone quarried and used in the manufacture of cement totalled 252,393 tons, at a cost of \$494,437. Employment in this quarry, for limestone for cement manufacture only, averaged 20 men.

Cement production totalled 175,799 tons valued overall at \$2,869,674. This production consisted of 128,031 tons of fine cement valued at \$2,304,558 and 47,768 tons of clinker cement valued at \$565,116. Average employment was 310.

The following equipment has been installed during the year:—

Quarry

A new 300 tons per hour crusher has been located in the quarry together with feed hoppers and apron feeders for limestone and clay, dust collecting equipment, maintenance crane and automatic control equipment. The crusher will take feed up to 40" cube size and crush it to 95% minus 1" in a single pass. It is a Humboldt twin rotor hammer type and is driven by two 300 h.p. motors.

A 30" wide belt conveyor has been installed to transport the crushed stone and clay from the crusher to the raw material storage area. The capacity is 350 tons per hour.

Production Plant

A new raw mill has been installed equipped to proportion, blend and dry the raw meal and to prevent dust emission. It is driven by a 1,600 h.p. motor and has a capacity of 74 tons per hour. All the necessary ancillary gear such as a hot gas producer, control panel and maintenance crane are incorporated.

Three raw meal silos have been erected, the outer two having a capacity of 1,500 tons each and the central one a capacity of 1,200 tons. Above and integral with the two larger silos are two blending silos each with a capacity of 960 tons. Ancillary equipment includes rotary compressors, Fuller Kinyon pumps, aeration pads, dust collectors and control panel.

A 900 ton per day kiln has been erected fitted with a Humboldt preheater and a Claudius Peters grate type cooler with all necessary ancillary gear including an electrostatic dust collector.

Additional to the above a silo and weighbridge have been installed for loading bulk cement to rail waggons or road trucks. Two silos have been erected on the wharf at Devonport. They are equipped for the rapid, dust free unloading of cement and for ship loading.

Melrose Agricultural Lime Quarries, Eugenana

Production of ground limestone fell to 1,700 tons, valued at \$8,200, an average of one man being employed in the quarry.

Mineral Supplies, Ulverstone

Sales of stocks on hand by this firm amounted to four tons, valued at \$39.

The Mount Lyell Mining and Railway Company Limited, Halls Creek

This company quarried 9,498 tons of limestone, valued at \$28,494, for delivery to the works at Queenstown from the quarry at Halls Creek. Quarrying operations were on a contract basis and the limestone was used as flux in the blast furnace or burnt to produce lime for use in the flotation plant.

Railton Lime Works, Railton

Two men were employed at this works to crush and mill 20,932 tons of limestone, valued at \$41,005, supplied by the Goliath Company. New equipment for the storing, conveying, screening and reduction of oversize by hammer mill of the crushed material supplied by the Goliath Company is being installed.

R. K. Sulzberger, Launceston and Flowery Gully

From his quarry at Flowery Gully and crushing plant at Launceston, Mr. Sulzberger produced:—

	\$
496 tons agricultural limestone, valued at	2,200
200 tons limestone for chemical and metallurgical purposes, valued at	900
<hr/>	
696 tons Total Value	<hr/> \$3,100 <hr/>

One man was employed.

Wright Stephenson Pty. Ltd., Pulbeena

This company produced 6,067 tons of limesand, valued at \$15,167, compared with 6,163 tons in the previous year. Average employment was two men.

OCHRE

Quantity produced—

	Tons	Value \$
1918-62	2,234	13,608
1963	51	656
1964	69	924
1965	40	544
1966	65	1,008
Total	2,459	\$16,740

A. Pearson, Spalford and Deep Creek

Production of red and yellow ochre from these pits was 65 tons, valued \$1,008.

PEBBLES

Quantity produced—

	Tons	Value \$
1957-62	3,330	49,428
1963	518	7,586
1964	727	10,120
1965	920	14,002
1966	895	15,183
Total	6,390	\$96,319

A. Pearson, Ulverstone

The collection of pebbles for grinding was continued on the beaches around Ulverstone. The output was 895 tons, valued at \$15,183.

SILICA

Quantity produced—

	Tons	Value \$
1936-62	163,151	223,042
1963	2,641	5,930
1964	4,231	8,386
1965	4,562	10,528
1966	5,014	10,261
Total	179,599	\$258,147

Australian Glass Manufacturers Ltd., South Arm

This company obtained 3,630 tons of silica sand, valued at \$6,638, for the manufacture of glass.

Minerals Supplies, Ulverstone

This firm supplied 1,384 tons of silica, valued at \$3,623. Of this, 1,362 tons were extracted from the Leven River pit for use in cement manufacture and 22 tons were mined at the Forth quarry for use as a metallurgical flux.

3.—CONSTRUCTION MATERIALS**BUILDING STONE**

Quantities produced—

	Cubic yards	Value \$
Freestone	757	8,650
Other	140	300
Total	897	\$8,950

CRUSHED AND BROKEN STONE

Basalt

Quarry	Men	Cubic yards	Value \$
A.F.H., Surrey Hills	1	11,661	23,322
A.N.M., Maydena	2	20,676	29,774
Bonney Bros., Mooreville	3	23,000	34,500
Brighton Council	2	7,301	10,952
H.E.C., Meadowbank	15	53,707	136,752
King Island M.C. ....	....	5,065	7,597
Savage River Mines .....	....*	155,000	267,500
Weily, Bridgewater	6	15,058	22,587
Others	2	2,883	4,445
Total	31	294,351	\$537,429

Dolerite

Quarry	Men	Cubic yards	Value \$
Bain, Dynnyrne	2	8,992	16,461
Davis Contractors	4	160,500	240,750
Eastern Shore Quarries, Flagstaff Gully	6	24,439	60,638
Gordon, Glenorchy	5	21,060	32,750
Hobart Quarries, New Town	33	208,532	484,242
H.E.C., Miena	6	15,563	37,990
H.E.C., Repulse	17	112,858	342,371
H.E.C., Tarraleah	7	10,347	47,794
Launceston Quarries, Mowbray	13	48,764	116,161
Public Works Department	250	244,221	1,133,185
Roche Bros., Miena and Port Latta	12	94,961	266,712
Rouse, G., St. Leonards	4	13,302	36,580
Savage River Mines .....	....*	35,231	111,368
Others	9	19,410	50,614
Total	368	1,018,180	2,977,616

Limestone

Quarry	Men	Cubic yards	Value \$
S.B. Contracting Pty. Ltd., Smithton .....	....	1,867	3,939
Weily, Glenorchy	9	12,584	31,482
Total	9	14,451	35,421

Other Stone

Quarry	Men	Cubic yards	Value \$
Devon Metal Supplies, Devonport	1	27,571	41,356
Lewis Hobden, Rokeby	1	2,286	3,429
Hilder, Loyatea	2	2,700	3,650
H.E.C., Mersey-Forth	12	20,583	154,372
H.E.C., Miena	9	36,840	147,360
King Island Scheelite, Grassy .....	....	2,720	3,615
Mt. Lyell Co., Queenstown	4	66,736	119,961
Roche Bros., Port Latta	3	61,500	93,000
Savage River Mines, Savage River .....	....*	25,000	42,500
Sorell Council	4	5,996	14,056
Transport Commission, Leith	4	11,405	19,299
Others	6	6,241	9,115
Total	46	269,578	\$651,713

* See Iron Oxide.

GRAVEL

Pit	Men	Cubic yards	Value \$
Associated Forest Holdings	4	73,156	73,156
Beaconsfield Council	2	31,600	31,600
Bothwell Council	2	30,595	30,595
Circular Head Council	2	42,937	42,937
Deloraine Council	2	36,785	36,785
Flinders Island Council	4	29,315	29,315
Hobart City Council	5	49,265	49,265
Kentish Council	2	20,636	20,636
Latrobe Council	5	26,971	26,971
Murrumbidgee Sand Co., Merseylea	6	22,518	22,518
Scottsdale Council	1	31,950	44,800
Westbury Council	1	33,603	33,603
Woodfield and French, Launceston	21	92,519	92,519
Government Departments	203	646,396	717,970
Others	85	513,135	589,809
Total	345	1,681,381	\$1,842,479

Murrumbidgee Sand and Gravel Co., Merseylea

This company commenced operations in the second quarter of the year and installed a washing and screening plant consisting of a 20 cubic yard steel hopper, rotary screens, 90 feet conveyor belts and 200 tons storage hopper. Buildings erected consisted of office, store and amenities rooms.

SAND

Pit	Men	Cubic yards	Value \$
Burnie Marine Board	1	55,041	55,041
Devon Metal Supplies, Devonport	4	6,858	9,290
Fielding, Calder	2	11,145	12,785
Johnson, Seven Mile Beach	1	7,328	7,328
Long, South Arm	4	51,454	51,454
Males, South Arm	1	8,550	8,550
Savage River Mines .....	.....*	15,000	20,000
Woodfield and French, Launceston .....	.....	13,513	13,513
Others	22	59,670	83,876
Total	35	228,559	\$261,837

OTHER ROADMAKING MATERIALS

Pit	Men	Cubic yards	Value \$
Devonport Council	1	11,104	11,104
Dillinghams Constructions, Zeehan	1	14,600	14,600
Gardam, Devonport .....	.....	6,000	6,000
Holloway, Round Hill	5	22,868	27,901
Lutwyche, Prospect Vale	2	10,401	10,401
Savage River Mines, Savage River .....	.....*	25,000	25,000
Ulverstone Council	1	9,042	9,042
Woodfield and French, Launceston .....	.....	67,952	67,952
Others	8	36,187	42,604
Total	18	203,154	214,604

* See Iron Oxide.

Hobart Quarries Pty. Ltd., New Town

During the year this company brought a new RB54 excavator with a 2½ yard shovel into operation, and installed a new crushing section in the road material plant.

4.—FUEL MATERIALS

COAL

Quantity produced—

	Tons	Value \$
Prior to 1963	8,866,254	21,995,652
1963	206,922	858,844
1964	151,161	622,630
1965	102,457	420,346
1966	82,664	353,238
	<hr/>	<hr/>
Total	9,409,458	\$24,250,710
	<hr/>	<hr/>

Mr. W. R. Tindal, Mining Engineer, reports that there has been a drop in production of 19,793 tons of coal, equivalent to 19%. The number of employees decreased from 70 to 66 of whom 36 were employed underground. The production per man year decreased from 2,439 to 2,296 tons for underground employees and from 1,464 to 1,252 overall. The fall in production is due to the effect of the increased use of fuel oil.

Duncan Coal Mine, Fingal

Production from this coal mine, operated by the Cornwall Coal Company N.L., is obtained from one seam, being the same as that worked in the now defunct Fingal and Tasmanian coal mines.

The left-hand panel of the trunk belt has been worked only intermittently and has been partially developed. The main belt panel was developed sufficiently to enable a further panel to be developed to the right-hand and at the end of the period work was still continuing. Conditions in the left-hand panel have considerably improved with the height of the seam returning to almost normal, and the quality of the coal appears to have improved.

The method of working has not changed and the whole of the output has been washed at the Company's washery at Fingal. Drying and bagging equipment has been installed at the washery to bag large coal for household use.

Production from this mine was 65,628 tons gross, a decrease of 13,022 with a complement of 54 employees. This gives a decrease in overall production per man year from 1,542 tons to 1,215. Production for the year has been on a three or four day week basis with the remainder of the time on maintenance.

New Stanhope Coal Mine, Avoca

The whole of the year's production came from No. 2 Tunnel. This was driven further in disturbed and faulted ground, mainly downthrow faults not large enough to cause much trouble in crossing. The faults are transverse to the tunnel direction.

The coal has not deteriorated and the same methods of first working have been used. Most of the coal is washed on a Diester table but the large coal is sold unwashed.

Production from this coal mine was 14,628 tons, a decrease of 1,376 tons with an overall production per man year of 1,828 tons, an increase of 50 tons. The number of employees decreased from nine to eight.

Sandfly Coal Mine, Kaoota

Coal from this coal mine is semi-anthracitic and is used in hop kilns, for household purposes and for lime burning at Boyer.

Extraction of pillars continued for the whole of the year. Methods of working the coal have not altered. The life of this mine is just a little over 12 months and provision is being made to start a new tunnel on the same seam.

Production from this colliery was 2,333 tons, an increase of 188 tons for the year with four employees, giving an overall production per man year of 583 tons, an increase of 47 tons.

Cardiff Open Cut

A small open cut on the outcrop of the seam worked in the Cardiff mine was worked for six months on a week-end basis and 75 tons of household coal was produced. Production has now ceased.

5.—FOREIGN ORES

The total value of the metallurgical products of four large works treating foreign ores imported into Tasmania was approximately \$72,688,923.

ALUMINIUM

Comalco Aluminium (Bell Bay) Ltd., Bell Bay

Operations by this company showed an increase of 6,325 tons of aluminium over the previous year.

Other products were—aluminium hydrates, 4,927 tons; and alumina, 4,043 tons.

In all, 52,202, tons of aluminium were extracted from 134,409 tons of bauxite from Weipa and 51,272 tons of imported alumina. Average employment rose by 89 to 1,014.

Early in 1966 a decision was made to install additional smelting capacity to increase production from 54,000 tons per year to approximately 72,000 tons per year, or 64% of the national capacity. This involves electrical equipment, buildings, furnaces and ancillary equipment estimated to cost \$9,000,000. The schedule date for completion is 1st October, 1967. Construction commenced about mid-1966 and at 31st December, 1966, was well advanced.

During 1966 Comalco announced its intention to install an aluminium powder and paste plant at Bell Bay. Construction is expected to commence in 1967. Initially, the plant will produce about 1,000 tons per year. On 21st September, 1966, the Bell Bay plant achieved 1,000,000 man hours without a lost time accident—the first time this has been achieved in Tasmania.

FERRO-MANGANESE

The Tasmanian Electro-Metallurgical Co. Pty. Ltd., Bell Bay

This company smelted 103,415 tons of imported manganese ore for the production of 48,079 tons of ferro manganese. Average employment was 140 men.

The Temco plant at Bell Bay produced ferro manganese mostly for Australian steel plant consumption, but the first export shipment of 11,000 tons left Bell Bay in October, 1966, for the United States. A second furnace was commissioned in October, 1966, to double the annual ferro manganese production capacity to approximately 75,000 tons. During the year manganese ore was received mainly from Groote Eylandt in the Northern Territory.

TITANIUM DIOXIDE

Australian Titan Products Pty. Ltd., Heybridge

This company imported 43,403 tons of West Australian ilmenite from which was produced 20,232 tons of finished titanium dioxide pigment. Average employment was 479.

ZINC, CADMIUM, COBALT OXIDE AND SUPERPHOSPHATE

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

GEOLOGICAL SURVEY BRANCH

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

Exploration by private companies into the mineral potential of various areas of the State continued throughout the year. The Geological Survey continued to record and assess the data, reports and records as required. The economic investigations of the Branch were somewhat restricted due to the pressure of this work and because most of the potential mineral bearing ground is held under licence by private companies. However, a programme of study into the problems of the genesis and distribution of both primary and secondary tin deposits in NE Tasmania was continued.

The expanded programme of investigation into the ground water resources of the State was continued, and this together with an increased demand for geological advice for engineering projects has fully occupied resources of the Engineering and Ground Water Section. The effect of this has been to reduce the number of geologists available through the field season for regional mapping. Some difficulty is therefore anticipated in the future in maintaining the present rate of Regional Geological Maps production. Nevertheless the Regional Mapping Section during the year completed two map sheets, continued to map in three map areas and commenced geological mapping in a further two 1-mile areas.

Staff accommodation for the Geological Survey Branch for some years has been severely overcrowded and unsatisfactory. Arrangements have been made to transfer part of the geological staff to alternative accommodation outside Head Office in order to alleviate the position. This move will result in some lack of liaison between certain Sections of the Branch but it is hoped that the dislocation will be temporary.

Staff Movements

Geologist B. Marshall resigned during the year to take up a teaching position and Geologist R. Jack resigned to take up a position with a private company. Geologists A. P. Bravo and P. J. Legge were appointed to fill vacancies in the Branch. Cadet Geologist D. E. Leaman completed his Honours Degree at the University of Tasmania and commenced full-time duty as a geologist with the Department. Mr. I. Naqvi was re-appointed as a temporary geologist on completion of an Honours Degree. Senior Geologist P. C. Stevenson has been appointed to the Engineering and Ground Water Section and will take up duty at the beginning of 1967.

REGIONAL GEOLOGY

Senior Geologist E. Williams reports:—

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

1. *Pipers River 1-mile Sheet*—

Explanatory notes are in preparation.

2. *Mackintosh 1-mile Sheet*—

The sheet has been published and explanatory notes are being compiled.

3. *Table Cape 1-mile Sheet*—

The sheet has been published and explanatory notes are being compiled.

4. *Burnie 1-mile Sheet*—

Geologists R. D. Gee, A. B. Gulline and A. P. Bravo completed the mapping and the sheet is now in the process of being published. Explanatory notes are being prepared.

5. *Noland Bay 1-mile Sheet*—

Geologist D. J. Jennings completed the mapping and the sheet is now in the process of being published.

Explanatory notes are being prepared.

6. *Quamby 1-mile Sheet*—

Geologist B. Marshall and Temporary Geologist I. H. Naqvi continued mapping in this area.

7. *Pieman Heads 1-mile Sheet*—

Geologists A. B. Gulline, R. D. Gee, A. P. Bravo and P. J. Legge continued mapping in this area.

8. *Frankford 1-mile Sheet*—

Geologists A. B. Gulline and A. P. Bravo and Temporary Geologist I. H. Naqvi started mapping in this area.

9. *Beaconsfield 1-mile Sheet*—

Geologists R. D. Gee and P. J. Legge started mapping in this area.

Publications

WILLIAMS, E., 1966.—An Analysis of the Deformation in a Fold in NE Tasmania. *Geological Magazine, Cambridge*. Vol. 103, No. 2. pp. 115-119.

———, in press. Joint Patterns at Dalrymple Hill, North-East Tasmania, *Geological Magazine, Cambridge*.

———, in press. Notes on the Determination of Shortening by Flexure Folding Modified by Flattening. *Papers of the Royal Society of Tasmania*.

——— and GROVES, D. I., in press. Examples of Intrusive Acid Dykes in Eastern Tasmania. *Papers of the Royal Society of Tasmania*.

MARSHALL, B., 1966. Further Comments on Kink-bands and Related Structures. *Nature, London*. Vol. 210, No. 5042, pp. 1249-1251.

GULLINE, A. B., in press. The First Proved Occurrence of Carboniferous in Tasmania. *Australian Journal of Science, Sydney*.

ECONOMIC GEOLOGY**Senior Geologist A. J. Noldart reports:—****METALLIC MINERALS***Tin*

Geologist R. Jack examined in detail the "Banca" workings, Winnaleah district, and submitted a report.

Geologist G. Urquhart carried out examinations of Mr. D. Lewis's prospecting claim at Coles Bay; the Trial Flats deposits, Upper Natone district; and the Loila Tier prospect, Scamander area. He compiled reports for each. Detailed examinations were made of the Mt Rex and Royal George Mines, Avoca district and reports and recommendations given.

Geologist D. J. Jennings commenced a detailed investigation of the North-East Tasmania detrital tin deposits.

The Boobyalla River drilling programme was completed with the location of a deep lead carrying only minor amounts of cassiterite. Investigations were made for further exploration lines closer to the source areas for future drilling programmes.

The Scamander River valley was examined in detail, maps and a report compiled, and potential drilling sites selected to outline any buried lead.

An examination was made of the Bluff River tin deposits by A. J. Noldart and D. J. Jennings and a report and plan submitted.

Geologist D. I. Groves continued mapping of the internal structures of granites in the Blue Tier region. An interim report was submitted.

The diamond drilling programme was continued on "Fook's" lode, Waratah district. The programme is not yet completed.

Gold

A diamond drilling programme was commenced at Alberton in the NE under the supervision of Geologist V. M. Threader to delineate potential auriferous structures.

Drilling was continued on the Tasmania Gold Mine, Beaconsfield to obtain confirmatory intersections of the orebody.

Osmiridium.

Brief examinations were made on the Bald Hill osmiridium field in the NW.

Wolfram

D. I. Groves examined the Interview River wolfram deposits in conjunction with regional field mapping in the Piemen Heads area.

Manganese

G. Urquhart examined occurrences of manganiferous gravel in the Mersey district in the NW.

FUEL MINERALS

Coal

V. M. Threader continued field mapping of the coal measures in the Fingal Valley. Investigations were extended to include the Avoca-Merryvale district and easterly toward St. Marys.

NON-METALLIC MINERALS

Clay

Further attention was paid to the location of clay and shale deposits in Tasmania and deposits were examined in the Launceston, Ringarooma and Kingston areas.

Dolerite

An investigation of dolerite reserves of the Eastern Shore Quarries, upper Flagstaff Gully was made by V. M. Threader. Sections were compiled and reserves calculated.

Gravel

Attention was given to the location of natural gravel and stone suitable for crushing for road construction in the Campbell Town-Oatlands district and Nichols Rivulet in the Cygnet district by V. M. Threader and in the Pipers River and Frankford districts by D. J. Jennings.

Limestone

An examination of limestone occurrences in the Smithton district was carried out by A. J. Noldart.

General

Periodic inspections were made of prospects, workings and exploration ventures throughout Tasmania.

GEOPHYSICAL

Resistivity surveys were carried out by Geologist D. E. Leaman on potential tin deposits at the Monarch working in the NE, in the Scamander River area, and at Coles Bay to determine overburden depths and conditions. Subsequent drilling was undertaken at the Monarch and Coles Bay.

A detailed magnetometer survey was made of the tin and sulphide deposits at "Laffer's Claim" in the North Heemskirk district on the West Coast using a portable "Jalander" magnetometer.

Geologist M. J. Longman carried out resistivity and gamma ray bore logging on Parkers Ford Hole No. 1 (C. G. Sulzberger), Port Sorell.

SURVEYING

Surveyor B. Knox carried out survey programmes at the following localities: Howden explosives magazine site; percussion drilling sites at the Briseis deep lead, NE tinfields; Fingal district; Adamsfield osmiridium field lease boundaries; proposed dam sites, Kingston district.

The survey levelling programme in the Longford district and the NE tinfields was continued.

Survey programmes were carried out by Field Assistant B. Eaves in the Fingal area, Royal George tin mine, and the Eastern Shore Quarries, Flagstaff Gully. A level traverse was made between Winnaleah and the Boobyalla River drill sites.

ENGINEERING GEOLOGY AND GROUND WATER

During the year the work of the Section was expanded considerably due to the demands made by the expanded programme of investigation into the groundwater resources of the State. This programme has resulted in the appointment of an additional geologist trained in geophysics to assist in groundwater studies. The use of geophysics in groundwater and engineering geology investigations increased considerably during the year and it is anticipated that this trend will become more pronounced in the future.

In addition to the groundwater investigations a larger proportion than usual of the Section's time was devoted to geological investigations and various engineering proposals.

ENGINEERING GEOLOGY

Risdon Brook Dam

Geologist M. J. Longman continued to provide geological advice during the construction stage of this project. This involved detailed mapping of the dam foundations and cut off trench for record purposes and in order to determine a depth of excavation; together with the logging of various bore holes. In conjunction with Geologist D. Leaman, resistivity surveys were made of the quarry site, minor faults down stream from the dam and other features. Observation bores were installed in order to study the behaviour of the water table before and after the dam is placed into service.

Devonport Cement Silo Site

Geologist W. R. Moore carried out an extensive geological investigation into the problems associated with this project. The work involved detailed geological mapping, supervising siting, logging the results of a diamond drilling programme and providing advice and recommendations to the construction and design engineers.

Devonport Outer Harbour Site

Geologist W. R. Moore investigated the geological problems likely to be associated with the construction of an artificial harbour outside the Mersey River at Devonport. A unique feature of this investigation was a programme of underwater geological mapping using Scuba equipment, probably the first usage of such methods in geological investigations in Tasmania.

Victoria Bridge, Devonport

Geologist W. R. Moore conducted the investigation into the engineering geology of the proposed replacement for the Victoria Bridge at Devonport. This work entailed setting out a diamond drilling programme and logging of samples obtained, underwater geological mapping and the preparation of geological reports, sections and maps.

New Public Building, Hobart

Geologist M. J. Longman supervised and logged the map from a diamond drilling programme on this building site. Geological sections were compiled incorporating the results of this work.

Dam Sites, Kingston Area

Geologist W. R. Moore commenced the investigation of two proposed dam sites on White-water Creek, near Kingston. A geological map of the area was prepared, preliminary recommendations for a drilling programme set out and in conjunction with geologist D. Leaman a geophysical survey of the proposed dam site was planned. By the end of the year much of the line cutting and topographic surveys for the geophysical traverses had been completed.

GROUNDWATER INVESTIGATIONS

Longford Basin

The main groundwater project carried on through the year was the investigation of the groundwater potential of the Longford Tertiary basin. Geologist W. L. Matthews was employed for most of the year on geological mapping in the area between Longford and Campbell Town, whilst Geologists W. R. Moore and M. J. Longman spent some time mapping in other areas. The overall compilation of the geological map of the basin is being carried forward by Mr. Matthews.

Four investigation bores were completed in the basin, the holes were set out by Mr. Longman who also logged the cuttings and ran electric and gamma ray logs of the holes. Resistivity probes of selected areas within basin were made, and Mr. Longman carried out a gravity study of portion of the basin.

Deloraine

An investigation was made in this district in order to assess the possibility of obtaining a supply of groundwater for industrial purposes. Geologist W. L. Matthews prepared a geological report on the area, and Geologist M. J. Longman sited a bore hole, supervised and logged the bore and carried out pump tests to determine the probable groundwater yield.

Coles Bay

Geologist D. Leaman conducted an investigation into the possibility of obtaining a supply of groundwater for the township of Coles Bay. This work entailed geological mapping of an area adjacent to the township, siting and logging investigation bores, evaluation of the potential groundwater yield and resistivity testing.

Riana-Cuprona

Geologist M. J. Longman made geological and resistivity studies in this area resulting in the siting of several very successful bores.

Colebrook Area

Geologist D. Leaman commenced a large mapping project in this district in order to provide data for a systematic ground study of the Colebrook-Campania area. This work is proceeding.

General

Various geologists were employed selecting bore sites in the Smithton, Grove, Hamilton, Richmond, and other local areas.

Publications

D. Leaman spent some time on compilation and preparation of a Bulletin and Water Supply Paper concerning the geology and groundwater resources of the Cygnet district.

MINERALOGY AND PETROLOGY

Mineralogist and Petrologist G. Everard reports:—

Field work on basalt and dolerite exposure was carried out, and this work is still continuing.

A varied programme of laboratory investigation was followed as described:—

Specimens of core were selected and examined in this section from D.D.H. No. 4 Beaconsfield, D.D.H. No. 1 Rocky River and D.D.H. S5 Risdon Brook.

Core from Esso boreholes No. 1 and No. 9 Bass Strait, was examined in this section. Ore specimens from the Mount Cleveland Mine were examined in polished section.

Core from D.D.H. No. 4 and D.D.H. No. 6 Laffers Show, Heemskirk, was examined in thin section.

Rock specimens were examined in thin section from King Island; Savage River pipeline; Fook's Lode, Waratah; Cygnet; Savage River, Oyster Bay and Cambridge.

Samples of concentrates were examined from Coles Bay Bore No. 1 and Bore No. 2, and sand samples from Boobyalla borehole No. 6.

Beach sands and concentrates were examined for Ocean Mining A.G. from Ringarooma Bay, and from Friendly Beaches, the Hazards and Boulters Point.

Cuttings and specimens of core from Parkers Ford Bore No. 1 were examined under the microscope.

During the year, 33 individual specimens and samples of rocks, minerals, ores, sands and concentrates were examined for the general public and selected material was supplied for scientific and educational purposes.

During October 17th-22nd laboratory equipment was exhibited and demonstrated at the Devonport Scientific and Industrial Exhibition.

During the year 380 registered specimens were added to the general rock and mineral collection in which much material, collected many years ago and hitherto unregistered, has now been included. In addition the whole collection has been rearranged and the specimens made more readily available.

MAPPING AND ENGINEERING DRAUGHTING SECTION

Senior Draughtsman K. T. Kendall reports:—

Geological Atlas 1-mile series: The fair drawing and printing of Table Cape Sheet No. 22 (11 plates), and Mackintosh Sheet No. 44 (14 plates) brings the number of completed units to thirteen, totalling an area of 5,200 square miles or approximately 1/5 of the State.

A 1-mile topographic base map of Burnie Sheet No. 28 was produced and final geological compilations of both Burnie and Noland Bay Sheet No. 23 were nearing completion towards the end of the year, fair drawings for which will commence early in 1967. Base map material for field compilations of Beaconsfield Sheet No. 30, Frankford Sheet No. 38 and Quamby Sheet No. 46 was supplied with relevant airphoto coverage to the Regional Geology Section.

Australia 1:250,000 series: Compilation base sheet material at a scale of 1:126,720 of Launceston sheet SK/55-4 was supplied to the Regional Geology Section.

Other material prepared for publication included:—

One 4-colour map and 27 monocolour maps, sections and diagrams for Geological Survey Bulletin No. 49, "Geology and Geophysics of the Cygnet District".

One 5-colour map and 12 monocolour maps, &c., for Underground Water Supply Paper No. 6 "Groundwater Resources in the Cygnet District".

Twenty-eight monocolour maps, &c., for Technical Reports No. 10 (1965).

Two monocolour graphs for Director of Mines Annual Report (1965).

Sixteen monocolour maps, &c., for Explanatory Report one mile Geological Map Series K/55-7-39 Launceston.

One monocolour map for the pamphlet "Gemstones in Tasmania"

Material was also prepared for display at the Industrial and Scientific Exhibition held at Devonport (17th-21st October, 1966).

The installation of a dry process copying machine alleviated the increasing demand for out-of-print and unpublished material.

A Conference of Chief Draughtsmen of State Geological Surveys and Bureau of Mineral Resources was attended in Perth. The meeting dealt mainly with technical and standardization problems related to geologic cartography in Australia.

The balance of time was utilized in draughting geological, geophysical and engineering plans associated with normal field services.

PUBLICATIONS

Publications Officer E. M. Smith reports:—

The following volumes were published during 1966:—

Explanatory Report, 1-mile Geological Map Series, K/55-7-39, Launceston: by M. J. Longman.

Technical Reports No. 10 (1965).

Bulletin 48, Magnetite Deposits of the Savage River-Rocky River Region: by G. Urquhart.

Pamphlet on Gemstones in Tasmania.

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

Underground Water Resources Paper No. 6, The Groundwater Resources of the Cygnet District: by D. E. Leaman.

Bulletin 49, Geology and Geophysics of the Cygnet District: by D. E. Leaman and I. H. Naqvi.

CHEMICAL AND METALLURGICAL BRANCH

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

A change has been made in the method of reporting the analyses made during the year. For comparative purposes the 1965 figures are also given.

The differences occur by including heavy mineral and ceramic tests, and by excluding sizings done as part of metallurgical investigations.

The determinations have been subdivided into the following groups:--

I. QUANTITATIVE TESTS

(a) Elements. (All the chemical elements).

(b) Miscellaneous.—Ash (coals); Coal Analyses (Moisture, V.C.M., Ash, S, C.V., &c.); Insoluble; Moisture (free and combined); Monazite (P and rare earth oxides); Radicles and Complexes (NH₃, NaCN, NaOH, Rochelle Salt, &c.); Water Analyses (Elements, T.D.S., Hardness, pH, &c.).

II. QUALITATIVE TESTS

III. CERAMIC TESTS

(Simple Pressing and Firing Tests).

IV. METALLURGICAL TESTS

Density; Heavy Minerals (Heavy Liquids, Tabling, Panning, &c.); pH; Sizings; Miscellaneous (includes magnetic separation, heat treatment, &c.).

Subdivisions I and II contain all determinations made, including those from metallurgical work. Subdivisions III and IV do not contain any tests made for research projects.

During the year interest in the exploration of beach sands and offshore sediments is shown by the increased heavy mineral, titanium, and zirconium determinations made.

Included in the tin determinations are 584 assays made in calibrating the XRF. This work is aimed at finding a method applicable to all ores and is proceeding.

TYPE	NUMBER	
	1966	1965
I. QUANTITATIVE TESTS		
(a) Elements—		
Aluminium	53	22
Antimony	34	8
Arsenic	54	18
Bismuth	25	12
Cadmium	7	3
Calcium	66	65
Carbon (and Carbon Dioxide)	91	163
Chlorine	10	....
Chromium	4	106
Cobalt	2	14
Copper	434	1,115
Fluorine .....	....	14
Gold	146	66
Iron	227	169
Lead	72	27
Magnesium	42	21
Manganese	46	84
Mercury	3	....
Molybdenum	4	333
Nickel	53	138

Phosphorus	86	100
Platinum .....	.....	10
Potassium	44	17
Silicon	122	130
Silver	99	60
Sodium	40	17
Sulphur	157	638
Tantalum and Niobium	2	3
Tin (includes Van Sn)	4,664	6,188
Titanium	960	234
Tungsten	53	53
Uranium	6	.....
Vanadium	14	15
Zinc	91	167
Zirconium	644	3
	<hr/>	<hr/>
	8,335	10,013
 (b) Miscellaneous—		
Ash (Coals)	45	4
Coal Analyses	3	27
Insoluble	219	218
Moisture	72	39
Monazite	15	3
Radicles and Complexes	33	23
Water Analyses	73	62
	<hr/>	<hr/>
	470	380
II. QUALITATIVE TESTS	33	56
III. CERAMIC TESTS	3	1

TYPE	NUMBER	
	1966	1965
IV. METALLURGICAL TESTS		
Density	13	.....
Heavy Minerals	1,246	173
pH	4	8
Sizings	33	28
Miscellaneous	5	1
	<hr/>	<hr/>
	1,301	206
Totals	<hr/>	<hr/>
	10,142	10,656

Research investigations undertaken during the year were:—

Tin	8
Tin and Copper	1
Tungsten	4
Non-Metallic Minerals	3
Coal	1
Ceramics	5
	<hr/>
Total	22

During almost the whole of the year metallurgical work was affected by the lack of a Senior Metallurgical Engineer.

After the laboratory had been several years without a Ceramic Technologist, Mr. D. Clements commenced duties in November.

Tin—Aberfoyle Tin Development Partnership. Mt Cleveland

R.482, R.527

Introduction

Project R.482 was completed during the year. Project R.527, which covers the large pilot plant operations, is still current.

R.482. Magnetic Separation

The products made by the Gill wet magnetic separator were assayed for CO₂ to obtain siderite distribution. Other results from these tests have been published in the 1965 report.

Product	Screen No. 2688			Screen No. 647		
	Wt %	CO ₂ %	Distribution CO ₂ %	Wt %	CO ₂ %	Distribution CO ₂ %
Cleaner Mags.	23.1	4.27	23.7	27.0	4.07	25.6
Cleaner Non-Mags. ..	6.7	8.87	14.3	4.6	9.44	10.1
Rougher Non-Mags.	70.2	3.67	62.0	68.4	4.03	64.3
Head	100	4.16	100	100	4.29	100

R.482. Vanner and Tilting Deck Tests

During operations in the pilot plant Stokes hydrosizer overflow was hydraulically cycloned to give an underflow which was fed to:—

- (a) A Fieldhouse vanner, or
- (b) A Buckman tilting deck.

The vanner recovered 82.9% of the tin as a concentrate assaying 6.15% Sn from a feed assaying 0.54% Sn.

A wide range of tilting deck conditions were used. These gave concentration ratios between 2.0 and 14.2.

From a head assay of 0.92% Sn a rougher deck concentrate assaying 4.22% Sn and containing 80.2% of the tin was made. This deck concentrate was dressed on a table to yield a 28.2% Sn concentrate which contained 58.9% of the tin (overall).

By comparison tabling alone recovered 58.5% of the tin as a 36.3% Sn concentrate. However, to achieve this result the feed rate was only a fraction of the combined tilting deck-table operations.

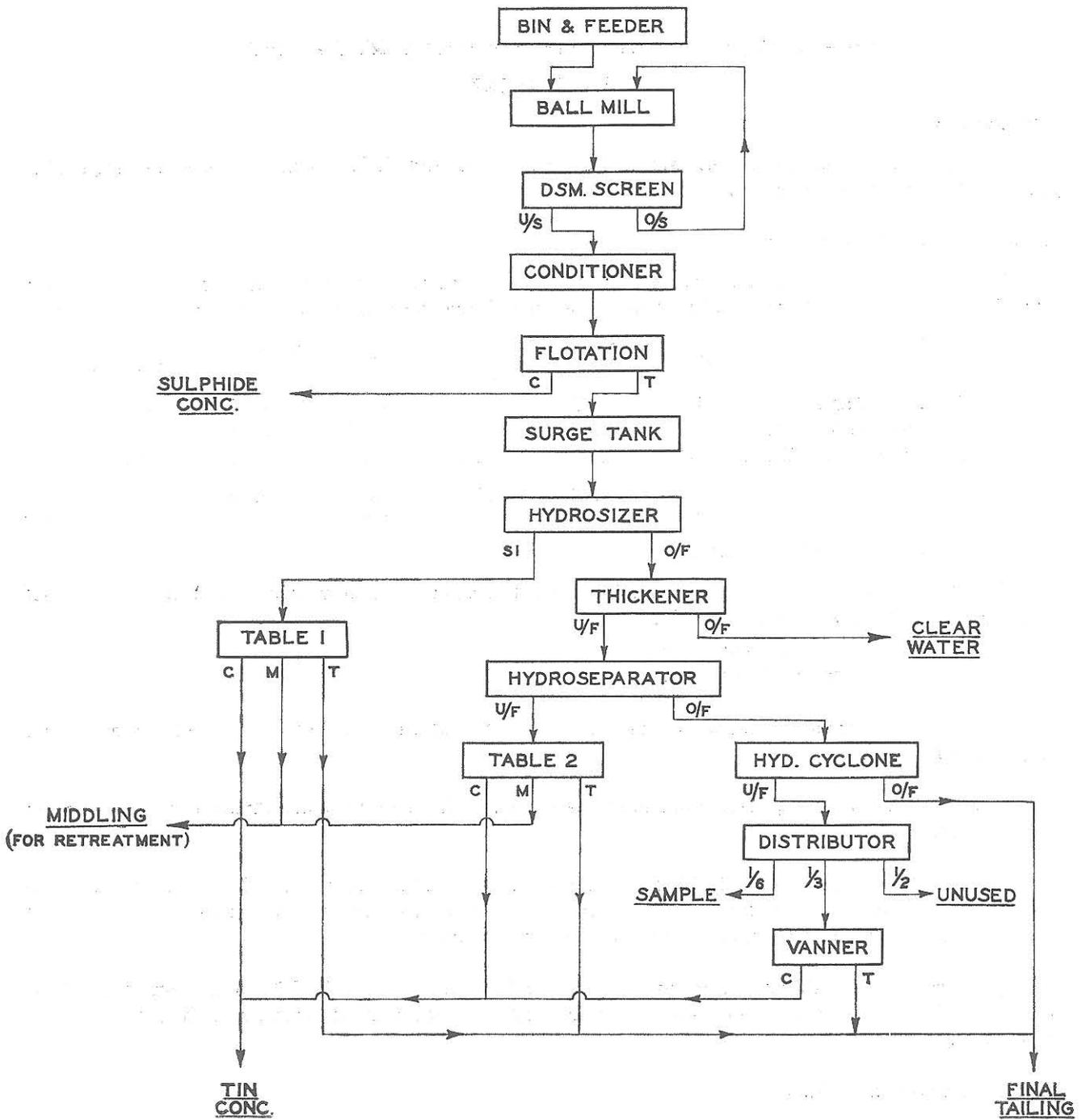
R.527. Large Pilot Plant

The large pilot plant was used according to the attached flowsheet. A number of different flowsheets were tried before this workable one was found. The flowsheet was continuous except that sulphides and middlings were not fed back into the circuit.

The following points should be noted about this flowsheet, viz.—

- (a) the flotation of sulphides was incomplete, the cells being unsuited to this work,
- (b) only one compartment of the Stokes Hydraulic Sizer was used. This yielded a sand table feed. Even using only one compartment the Stokes overflow contained so much water that thickening was necessary before further sizing could be done,
- (c) a hydro separator was used to obtain the slime table feed,
- (d) an hydraulic cyclone was used to discard slime ahead of the vanner, and
- (e) the vanner could handle only one third of the feed made for it.

Results from the operations are incomplete at this time.



MT. CLEVELAND PILOT PLANT FLOWSHEET
R 527 - TEST N-6

R.527. *Test N1, Magnetic Separation*

In order to investigate further the removal of siderite from the rougher tin concentrate Aberfoyle Tin Development Partnership arranged for C.S.I.R.O., Melbourne, to make tests using their Gill wet magnetic separator.

The results of the C.S.I.R.O. two stage wet magnetic separation were:—

Test No.	Product	Wt %	Assay %				Distribution %			
			Sn	Fe	CO ₂	S	Sn	Fe	CO ₂	S
603	Mags.	34.3	7.0	23.35	11.0	5.6	12.6	69.1	54.2	75.1
	Non-Mags.	65.7	25.44	5.45	4.85	0.97	87.4	30.9	45.8	24.9
	Head	100	19.11	11.6	6.95	2.55	100	100	100	100
604	Mags.	24.4	4.82	28.0	11.7	7.72	6.1	58.5	42.7	71.8
	Non-Mags.	9.9	12.57	12.55	7.75	0.88	6.5	10.6	11.5	3.3
	Head	34.3	7.05	23.6	10.6	5.75	12.6	69.1	54.2	75.1
605	Mags.	17.6	4.75	31.05	12.55	9.66	4.4	47.7	30.8	69.2
	Non-Mags.	16.7	9.25	14.65	10.05	0.86	8.2	21.4	23.4	5.9
	Head	34.3	6.95	23.1	11.4	5.4	12.6	69.1	54.2	75.1

The magnetic concentrate from Test 603 was divided, while damp, into three parts of about equal weights, two parts of which were used in Tests 604 and 605.

The difference between Tests 604 and 605 was that in 604 0.75 g.p.m. of wash water was used, whereas in 605 1.5 g.p.m. was used.

The magnetic fractions from C.S.I.R.O. Tests 604 and 605 were combined for the following experimental work which Aberfoyle Tin Development Partnership requested us to do.

Davis tube tests produced a magnetic fraction which amounted to 22.2% by weight, and assayed 1.41% Sn. This fraction was composed mainly of coarse pyrrhotite.

Superpanning of sized fractions showed that there is negligible free cassiterite above 85 mesh. From the finer fractions 68% of the tin was recovered in high grade concentrates.

Tin—Renison Ltd.: Tin Concentration Tests on Ore from Dreadnought Area

R.516

Sample

Renison Ltd. submitted a composite sample from diamond drill cores from the Dreadnought Hill area for concentration tests similar to present mill practice.

Method

The sample was roll crushed to pass 10 mesh then ball mill ground to pass 60 mesh. The sulphides were removed by flotation, then cleaned in a second flotation stage. The cleaner sulphide concentrate was ground to pass 200 mesh, then tabled.

The cleaner flotation tailing was screened on 200 mesh, the oversize being ground to pass 200 mesh before gravity concentration.

The rougher flotation tailing was screened on 100 and 200 mesh, the three fractions thus made being tabled, followed by successive reductions, screenings and tablings until all final tailings were minus 200 mesh.

Flotation reagents used were sulphuric acid, copper sulphate, potassium ethyl xanthate, potassium amyl xanthate, and M.I.B.C.

<i>Results—</i>	Wt %	Sn %	Tin Distribution %
Sulphide Flotation—			
Cleaner Concentrate	61.01	0.34	17.9
Cleaner Tailing	4.21	2.33	8.4
Rougher Concentrate	65.22	0.47	26.3
Rougher Tailing	34.78	2.47	73.7
Head	100	1.17	100
Gravity Concentrates—			
Primary Tin Concentrates	1.34	51.4	59.0
Secondary Tin Concentrates	0.28	11.5	2.75
Tertiary Tin Concentrate	0.03	3.91	0.10
Total Conc. from Rougher Float Tail	1.65	43.8	61.85
Total Conc. from Cleaner Float Tail	0.14	19.5	2.35
Tin Conc. from Cleaner Float Conc.	1.33	4.04	4.60
Total Tin Conc.	3.12	25.8	68.8
<i>Final Residue</i>	96.88	0.38	31.2

Tin—Renison Ltd. Mill Sulphide Flotation Cleaner Sink Concentration Tests

R.517

Sample

Approximately 10 gallons of pulp were supplied by the above company for tests consisting of two stages of tabling, followed by the rejection of sulphides by flotation from the gravity concentrates.

The sample assayed:—

	%
Sn	4.40
S	5.34
As	0.80

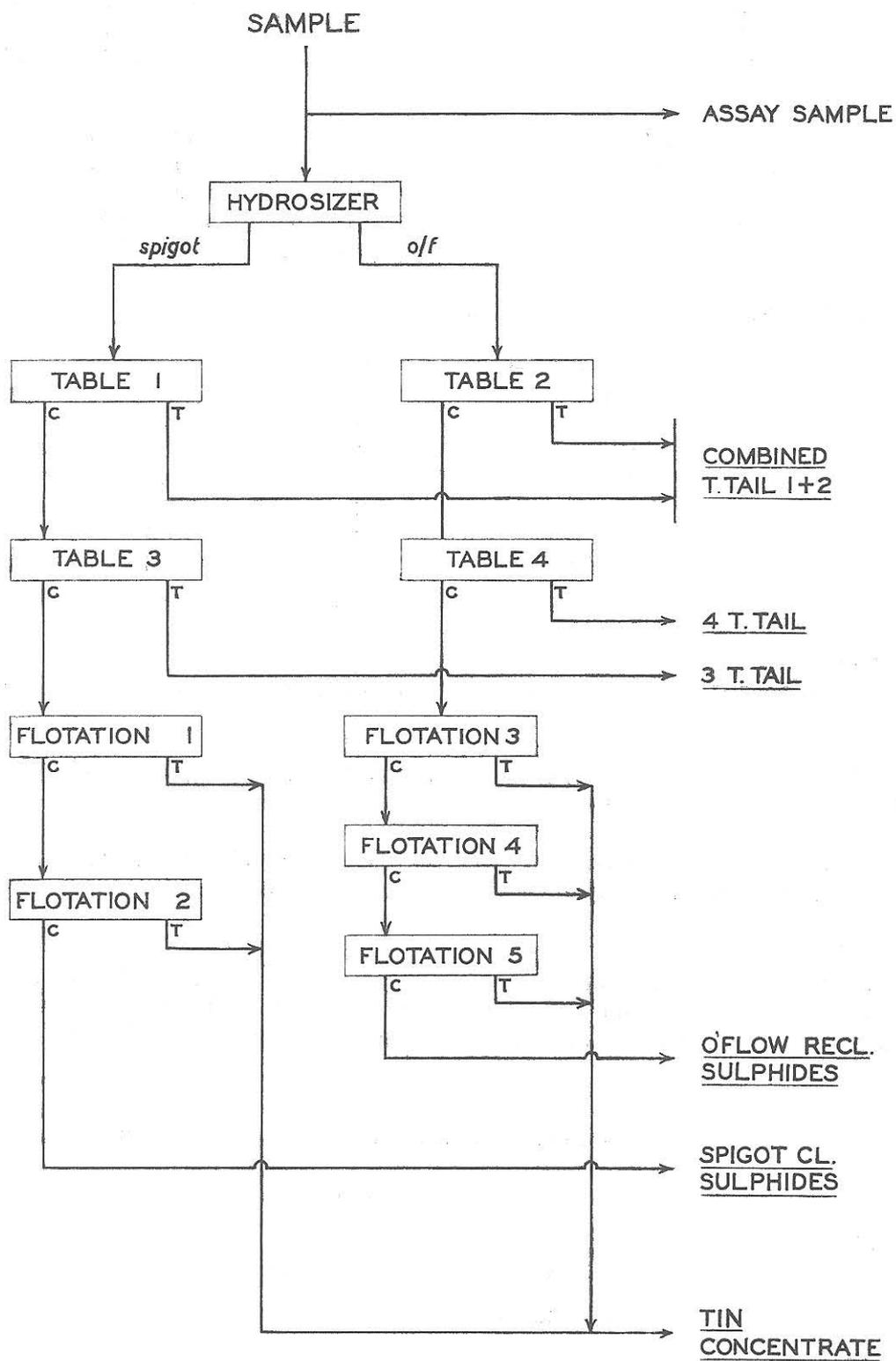
Method

The method of investigation is shown in the attached flowsheet. The hydrosizer was set to yield a nominal minus 75 micron cassiterite overflow. Sulphide flotation was done using sulphuric acid, copper sulphate, sodium ethyl xanthate, potassium amyl xanthate, and cresylic acid as reagents.

Test Results (These should be read in conjunction with the flowsheet)

Product	Wt %	Sn %	S %	Distribution %	
				Sn	S
Tin Concentrates:—					
Spigot—					
F1T	0.95	24.5	4.18	5.0	0.8
F2T	0.06	8.0	20.2	0.1	0.2
O/F—					
F3T	4.19	44.2	0.50	40.2	0.4
F4T	0.43	45.5	1.65	4.2	0.1
F5T	0.30	23.6	9.39	1.5	0.5
Total Tin Concentrate	5.93	39.7	1.82	51.0	2.0

TEST FLOWSHEET



R 517
RENISON LTD
MILL CLEANER SINK:
CONCENTRATION TEST
(FINAL PRODUCTS UNDERLINED)

Product	Wt %	Sn %	S %	Distribution %	
				Sn	S
<i>Sulphides—</i>					
Spigot F2C	0.23	1.40	33.2	0.1	1.4
O/F F5C	1.33	3.90	37.5	1.1	9.3
Total Sulphide	1.56	3.5	36.9	1.2	10.7
<i>Gravity Tailings—</i>					
T1T + T2T	87.64	2.25	5.12	42.8	83.4
Spigot T3T	2.76	4.65	3.55	2.8	1.8
O/F T4T	2.11	4.85	5.44	2.2	2.1
Total Gravity Tail	92.51	2.38	5.36	47.8	87.3
Head	100.00	4.61	5.38	100.0	100.0

Tin Recovery in Individual Size Fractions:—

Size Fraction (Mesh B.S.S.)	Grain Size* (Microns)	% Tin Recovery in This Fraction
+200	75	88.6
+300	53	94.5
CS.1	23	99.1
CS.2	17	93.1
CS.3	12	70.1
CS.4	8	31.6
Mean Recovery		57.2

* Nominal cassiterite grain size.

Summary

This method of treatment has resulted in the recovery of 51.0% of the tin in a concentrate assaying 39.7% tin and 1.8% sulphur.

This recovery is of the order to be expected for table concentrate of a feed containing 54% of the tin in the minus 17 micron range.

Sulphide rejection was not easy from the spigot products using current Renison reagents. After cleaner flotation, sulphide rejection was only 61%.

Discussion

Work on this project was confined to what was specified by the company, but there are indications that, by hydraulic cycloning this material before the test procedure used, some 60% of the weight could have been discarded without loss of recoverable tin.

*Tin—Renison Ltd.: Examination of Mill Products***R.518***Samples*

The five samples received were described as follows:—

1. Flotation "Float" (Sulphides).
2. Table Tailing.
3. Vanner Tailing.
4. Combined Tailing.
5. Mill Feed.

On samples 1, 2 and 3 the following was requested:—

- (a) Van tin determination,
- (b) Sizing analysis with tin distribution, and
- (c) Superpanner concentration tests on screen fractions to determine free or rich composites of tin.

On samples 4 and 5 sizing analyses were requested.

SIZING ANALYSES.

Fraction Mesh BSS Microns			Sample No. 1			Sample No. 2			Sample No. 3			Sample No. 4			Sample No. 5		
			%			%			%			%			%		
			Wt	Sn	Cum. Sn Dist.	Wt	Sn	Cum. Sn Dist.	Wt	Sn	Cum. Sn Dist.	Wt	Sn	Cum. Sn Dist.	Wt	Sn	Cum. Sn Dist.
60	250		..	..	..	5.7	0.37	2.3	..	..	..	..	..	..	..	..	..
72	210		..	..	..	..	..	..	..	..	..	1.6	0.41	1.7	5.8	0.67	3.3
100	150		..	..	..	26.9	0.53	17.6	..	..	..	6.0	0.45	8.4	12.9	0.62	10.2
150	105		10.2	0.21	5.6	22.2	0.74	35.3	..	..	..	10.4	0.41	19.3	19.1	0.79	23.1
200	75		8.8	0.26	11.6	8.0	0.53	39.9	2.9	0.51	1.9	12.3	0.34	30.0	12.5	1.23	36.3
300	53		12.5	0.28	20.8	16.0	1.13	59.3	7.7	0.46	6.5	17.0	0.34	44.8	11.8	1.60	52.5
C.S.1	*45(23)		22.0	0.64	57.8	7.5	2.94	83.0	6.4	0.58	11.3	19.4	0.47	68.1	13.2	2.80	84.2
C.S.2	34(17)		17.7	0.20	67.1	9.4	1.15	94.6	12.3	0.24	15.1	8.9	0.24	73.6	5.9	0.88	88.7
C.S.3	24(12)		8.9	0.21	72.0	2.5	1.47	98.6	19.1	0.45	26.2	7.8	0.22	78.0	5.5	0.87	92.8
Head			0.38			0.93			0.77			0.39			1.17		

*Nominal quartz particle size. Calculated nominal cassiterite size in brackets.

Van Tin Results

Sample No.	Total Sn %	Van Tin %	Sn Recovery %
1	0.35	0.31	88.6
2	0.93	0.72	77.4
3	0.76	0.17	22.4

Super Panner Concentration

In sample 1 the best concentrate made was from CS. 1 where 74.9% of the tin was recovered in a concentrate assaying 6.0% Sn.

In sample 2 most fractions produced only low grade concentrates, but the following high grade concentrates were made:—

Fraction	Assay % Sn	Tin Recovery %
+300	46.0	57.0
CS. 1	66.2	94.6
CS. 2, 3 and 4	65.3	81.6

In sample 3 besides the low grade concentrates made there were two high grade concentrates, namely:—

Fraction	Assay % Sn	Tin Recovery %
CS.1	46.8	88.8
CS. 2, 3 and 4	39.2	56.0

*Tin—Cornwall Coal Company N.L.: Royal George Tailing Dump***R.520***Samples*

In its investigation of the above mine the Cornwall Coal Co. sampled the tailing dump. The samples taken were each assayed for tin, then composites of lots of five samples each representing different areas of the dump and also a composite of the whole dump, were made up for investigational work.

Method and Test Results

The composite sample representing the whole dump sized:—

Screen (Mesh B.S.S.)	Aperture (Microns)	Wt %	Cum. Wt. %
+ 36	420	3.8	3.8
52	300	4.5	8.3
72	210	19.8	28.1
100	150	14.8	42.9
150	105	12.7	55.6
200	75	6.4	62.0
+CS 3	24*	20.0	82.0
—CS 3 .....	....	18.0	100.0
Head .....	....	100.0	....

* Cyclosizer Fraction 3 nominal quartz size (12 micron cassiterite).

The other composite samples were sized on 100 and 200 mesh screens and cyclosized; the fractions +100, —100/+200, and —200/+CS 3 were each assayed for tin, the minus CS 3 material would not contain recoverable tin.

Nowhere was there a concentration of tin in the dump, although there was a variation in particle size.

The plus 200 mesh fractions contained 0.1 to 0.2% tin, which could be expected to be in composite grains, and therefore need grinding to liberate it.

The finest fractions contained about one third of the tin, and each assayed approximately 0.4% tin, but as this is the most difficult tin to recover retreatment of the whole dump does not seem worthwhile.

Tin—Ocean Mining A.G.: Preliminary Testing of Samples from the Seabed

R.523, Parts I and II

Introduction

In order to gain some information on the nature of the off-shore deposits so that a sampling concentration flowsheet could be drawn up, Ocean Mining A.G. supplied samples from its three areas, namely Oyster Bay, North-East Coast of Tasmania, and east of King Island.

Method

Initially the samples were assayed for tin, then screened, the minus 200 mesh fraction also being assayed for tin.

Tabling of the finer fractions (below 52 and 72 mesh) recovered rutile and zircon from some samples.

From this initial work a cradle seemed suitable for making a primary concentrate, hence tests were made using this machine which was followed by tabling and magnetic separation.

Results

The head assay in all cases was too low for the determination of the tin content without some form of concentration.

Sieving gave minus 200 mesh products assaying between 0.03 and 0.20% tin.

The cradle method produced on a combined sample the following:—

Product	Wt %	Assay			
		Unit	Sn	Ti	Zr
Non Magnetic	0.1	%	0.36	2.14	0.76
Magnetic	0.1				
Table Concentrate	0.2				
Table Tailing	22.8				
Cradle Concentrate	23.0				
Cradle Tailing	77.0				
Head	100.0	ppm	4	21	8

Discussion

Sizing and assaying the minus 200 mesh fraction presents a quick way of detecting tin in these samples. However, it ignores any tin coarser than 200 mesh.

The cradle method produces reasonably large quantities for assay and would recover coarse heavy minerals, but is more time consuming.

R.523, Part III

Following treatment of many samples from the "Wando River" the results obtained from these were of a lower order than those from the initial scout sampling.

Small portions of the two highest initial samples were submitted for assay and concentration.

The results were:—

Reg. No.	OMAG No.	Tin Assays (ppm)	
		AMDEL*	Department of Mines
664501	4-19-3	10,000	10,600
664502	3-20-5	7,000	5,000

* Semi-quantitative determinations.

In sample 664501 the tin occurred in the size range 350 to 150 microns, and in sample 664502 between 250 and 75 microns.

From tabling and magnetic separation, recovery of tin by tabling can be expected to exceed 95%. Because of the small sample cradling could not be included, but from the tin size ranges good recoveries could be expected from this operation too.

It would appear that the scout sampling method gave a tin concentration in the samples.

Tin—Messrs Brinkman and Dicker, Mt Rex: Examination of Mill Products

R.525

Introduction

Messrs Brinkman and Dicker had installed a plant to grind the ore in three stages, viz. jaw crusher, rolls, and a rod mill, without any sizing device. The rod mill discharge could be sent to either a table or a jig.

In Test N-1 the rod mill discharge was feeding a table. In Test N-2 a split was made, part of the discharge going to the jig, the remainder to the table.

Following the report on these two tests, the plant was extensively modified for Test N-4 where the flowsheet consisted of a jaw crusher then rolls, with the roll discharge being raised by bucket elevator to a shaking screen the oversize from which returned to the rolls while the undersize was table feed.

Test N-3 concerned the use of table flotation to upgrade the table concentrates from Test N-1.

Results

Test N-1 showed a 67% recovery of tin in a 13.8% Sn concentrate from a table feed assaying 0.76% Sn. The wide size distribution in the table adversely affected tabling as the plus 44 mesh material was too coarse for tabling. The high minus 150 mesh tin content in the table feed indicated overgrinding of the tin. This was to be expected from the grinding circuit.

In Test N-2 the jig feed contained too much fine material; the jig tailing minus 150 mesh fraction contained 93% of the tin in the tailing.

In both tests the finest tin was being lost from the table, because no special provision was being made to recover the slime tin.

In Test N-4 the overgrinding of the tin had been greatly reduced, but the table feed was still too coarse, with the result that fine tin was being lost. Further screening to yield jig and table products was recommended.

Test N-3 showed that the rougher tin concentrate was amenable to table flotation.

Tin—Placer Prospecting Pty., Zeehan: Sampling of Razorback Ore

R.533, Part I

Introduction

As part of its investigation of the above mine the company submitted some 150 lb. samples from its bulk sampling campaign for reduction to assay samples. These samples had been obtained from crushing the 12 ton bulk samples successively to pass 1½ inch and ¾ inch screens. Between reduction stages one tenth part had been automatically removed as sample.

Method

The samples were crushed to minus $\frac{1}{4}$ inch then after two stages of riffling the sample was reduced to pass 7 mesh, after which it was riffled to 2 lb. weight before pulverizing.

When this method was shown to give unacceptable errors a further reduction stage after two rifflings at 7 mesh was incorporated. Further riffling after reduction to 18 mesh gave better results.

Result

As a result of this work the following practice is recommended for this type of ore (2-4% Sn) in lots of 150 lb.—

- (a) Crush to minus $\frac{1}{4}$ inch,
- (b) Riffle out a quarter as sample,
- (c) Crush to minus 8 mesh,
- (d) Riffle out a quarter as sample,
- (e) Crush to minus 22 mesh,
- (f) Riffle down to assay sample and pulverize.

This should result in the sample being within 0.1%, and in most cases within 0.05% Sn.

*Cornwall Coal Co. N.L.: Sampling Royal George Ore***R.533, Part II**

The above recommended method was compared with the former method on this ore, but no difference was found.

*Aberfoyle Tin Development Partnership: Mt Cleveland Ore***R.533, Part III**

The above recommended method was compared with the former method on this ore, but no difference was found.

*Tin and Copper—Placer Prospecting Pty. Ltd.: Concentration of Tin and Copper in Oonah Ore***R.476***Sample*

Placer Prospecting Pty. Ltd. submitted two samples of sulphide ore from the Oonah Mine, Zeehan, for concentration tests. Both samples were combined in approximately equal weights for this test.

Mineral Content

The ore contains tin as cassiterite and stannite and copper as chalcopyrite and stannite. A considerable quantity of silver is also present. In addition sulphides containing iron, arsenic, lead, antimony and bismuth are present.

Preliminary Testing

A vaning assay showed 42.7% of the cassiterite tin was recoverable as a van tin concentrate assaying 53.0% tin. The cassiterite was very fine grained.

Preliminary flotation tests using 500 gram lots investigated selective copper flotation then scavenging the remaining sulphides, and bulk flotation of sulphides, followed by selective copper flotation. This latter flotation method was adopted for the large scale tests.

Test N21

This large 10 kg test produced the following:—

	Metal	Assay	Recovery (%)
Copper Conc.	Silver	196 oz./ton	61.0
	Copper	18.5 %	74.0
	Soluble Tin (Stannite)	10.3 %	62.9
	Insoluble Tin (Cassiterite)	0.86 %	5.9
Tin Conc.	Insoluble Tin	37.6	36.7
	Soluble Tin	0.56	....
	Copper	0.51	....

Summary

This preliminary test work has not studied the optimum degree of grinding to release cassiterite nor the best flotation conditions. It has shown that the fineness of the cassiterite grains precludes recoveries in excess of 40% of the cassiterite tin. However, a copper-tin sulphide concentrate containing appreciable silver is feasible.

*Tungsten—King Island Scheelite (1947) Ltd.: Wet Magnetic Tests on Mill Products***R.505***Samples*

High intensity wet magnetic separation tests were made on two samples of mill products, namely:—

Sample A: Minus 60 mesh, No. 1 Separator Feed.

Sample B: Minus 30 mesh, No. 2 Separator Feed.

Results

Using one pole of the Gill magnetic separator two stages of concentration were used on each sample. However, in neither case was there any prospect of upgrading either product using this machine.

*Tungsten—King Island Scheelite (1947) Ltd.: Tilting Deck Concentration of Vanner Tailings***R.506***Sample*

A pulp sample of vanner tailings assaying 10.5% WO₃ was supplied by the company for tilting deck tests to see if a good grade gravity concentrate could be made from these tailings.

Test Method

Tilting deck tests covering the following variables—deck slope, concentrating period and pulp density—were run. Sizing analyses were made on the feed and tailings from each test.

Results

The tests showed WO₃ recoveries in the range 30.2 to 67.3%, with corresponding grades between 31.3 and 16.0% WO₃. High recoveries were obtained down to CS.3 which is equivalent to a 13 micron scheelite grain. In finer sizes than this recovery decreases rapidly.

As the feed sizing analysis shows 30% of the scheelite coarser than CS.4, it should be possible to recover as sale grade concentrate 30% of the scheelite in these tailings.

*Tungsten—King Island Scheelite (1947) Ltd.: Jig Tests on Table Tailings***R.507 and R.508***Samples*

The company submitted for jiggling tests two samples of mill products, namely:—

R.507. No. 1 and 2 Spigot Table Tailings.

R.508. No. 3 Spigot Table Tailings.

Method

Jig tests were done on both samples and on an equal weight composite of the two.

Results

In each test recovery and ratio of concentration of WO_3 were very low.

Mineragraphic examination of the jig products would be necessary in order to determine whether grinding, followed by table or tilting deck, is applicable for tungsten concentration.

*Mica—Production of a Quantity of Mica Concentrate***R.515***Sample*

Following an inquiry from Tasmanian Board Mills the department obtained a sample of micaceous material from the Fly-by-Night Mine, Gladstone.

Aim

The object of these tests was:—

- (a) To make a quantity of mica concentrate sufficient to allow a potential user to conduct his own tests, and
- (b) To investigate further reagent usage. (Previous work done was reported in R.372 and R.372A).

Method

The ore was crushed then screened on 6 mesh, the oversize being discarded.

The undersize was riffled into 10 kg lots which were wet screened on 22 mesh, the oversize being discarded. The undersize was deslimed initially by screening on 200 mesh, but in later tests by agitation with Calgon then decantation of the unsettled pulp after standing for one minute.

The deslimed pulp was floated using sulphuric acid, Aerofroth 73 and Arquad 12/50.

Results

Flotation without using frother as suggested in R.372 is not possible. Excessive frother could also be detrimental.

Hydraulic desliming yielded less flotation feed than screening on 200 mesh, but the hydraulic method would be that used in practice.

A yield of 16% of the feed in the mica concentrate was obtained. There is a possibility that this could be raised to about 21%.

*Bentonite—Savage River Mines: Testing Samples for Suitability as Pelletizing Bonding Agents***R.524***Introduction*

Reports concerning the use of bentonite in the proposed Savage River pelletizing plant led to the submission of a number of samples for testing to find their suitability for this purpose.

A local source of bentonite would obviate the necessity of importing some 17,000 tons of bentonite per annum.

It was agreed with Savage River Mines that this department would do preliminary suitability tests on any samples submitted to either.

Samples

From the samples submitted two were considered worthy of preliminary testing. These were:—

1. A sample from Circular Head submitted to Pickands Mather by Mr. R. S. Porteous of Burnie, and
2. A sample from Ben Lomond submitted by Mr. R. Bugg of Launceston.

Bentonite Specifications

Pickands Mather & Co. International supplied details of a sizing (grit) test and a viscosity test to be used in this preliminary examination. The ultimate test of suitability is the strength of iron pellets made using the sample for bonding.

Testing and Results

We were not able to follow the specifications, but from apparatus available sizing and viscosity tests were made and compared with a sample of imported bentonite.

Description	% +350 Mesh BSS (43 Microns)	Viscosity (Centipoises) (Spec. conditions)
Blue Label Bentonite	2.9	45
Circular Head (Porteous)	3.2	14
Ben Lomond (Bugg)	16.0	16

Gravel—Mr O. Harvey: Testing Conformance of Gravels to Savage River Mines and B.H.P. Specifications

R.526*Introduction*

Mr Harvey submitted samples of gravel from his leases along the Rubicon Estuary to see if they would meet Savage River Mines and Broken Hill Pty. Co. Ltd. specifications. Savage River Mines required the gravel for starting up their Port Latta pelletizing plant, while B.H.P. required gravel for water filtration beds. Both required a high silica content.

Specifications

Description	Size Range (mm)	Distribution %	Remarks
B.H.P. Type 1	2.5–2.0	35	....
	2.0–1.5	50	....
	1.5–1.2	15	....
B.H.P. Type 2	7–6	5	....
	6–5	35	....
	5–4	30	....
	4–3	30	....
Savage River Mines	25.4–6.3*	100	1"– $\frac{1}{4}$ "*

Results

For every 100 tons of gravel screened the yields would be:—

B.H.P. Type 1	0.7 tons assaying 90.7% SiO ₂
B.H.P. Type 2	60.6 tons assaying 94.6% SiO ₂
Savage River Mines	*36.8 tons assaying 94.4% SiO ₂
Reject	1.9 tons

* If only Savage River Mines material were taken from the deposit the yield would be 45.1 tons.

Coal—Cornwall Coal Company, N.L.: Hydraulic Cycloning of Fine Coal Slurry

R.528*Introduction*

This series of tests was designed to see if a hydraulic cyclone could remove ash from coal slurry. The slurry eventually finds its way into the marketable fine coal where, because of its higher ash content, it raises the level of ash in the market coal.

Because of the quantity of slurry necessary for the cyclone tests, and because the normal plant head of slurry could be sufficient for cycloning, the equipment was taken to the washery for the test.

Method

The tests were made using a 3 inch Warman hydraulic cyclone with a range of nozzles and vortex finders. Some improvisation was necessary to prevent blocking of the nozzle at the smallest aperture used. Available and increased pressure were used on the cyclone feed inlet.

Results

The results indicated unexpected ash concentrations in most of the overflows. To investigate this further, the products of three tests were sized.

From these sizings it became apparent that the coal and ash particles were hydraulically similar, and hence cycloning would not produce a separation of them.

Recommendation

As hydraulic cycloning has been shown to be unsuitable, froth flotation may be worth testing to remove the ash from the slurry.

Ceramics—Salisbury's Foundry Company (1932) Pty. Ltd.: Examination of Materials for Cupola Furnace Patching

R.521*Preamble*

Salisbury's operate a cupola furnace on a daily casting basis. After each run the furnace lining must be patched. To date a prepared refractory "Silocene" has been used, but in Victoria a naturally occurring "clay" is used for patching. Salisbury's approached the department to ascertain if a suitable material could be found around Launceston.

An examination of the Victorian "clay" showed that similar decomposed granitic material occurred in the north-east of Tasmania.

Samples

The following samples were tested:—

- (a) Gladstone clay.
- (b) Ballarat clay (from Victorian foundry, supplied by Salisbury's).
- (c) "Silocene".
- (d) Endurance clay from South Mount Cameron (supplied by Salisbury's).
- (e) Scottsdale clay (Mr Childs).

Testing

The clays alone and with 10% of McHugh's bonding clay blended with them were subjected to:—

- (a) Fusibility tests at 1500°C, and
- (b) Slag corrosion and penetration tests at 1500°C.

Results

The Endurance clay was unsuitable, but there was little difference between the others.

Salisbury's tried Gladstone and Scottsdale clay patches in the cupola where they were said to have performed as well as "Silocene".

Ceramics—Comalco Aluminium (Bell Bay) Ltd. Testing Refractory from Carbon Baking Furnace

R.522*Samples*

The following samples were received from Comalco:—

- A. Pieces of broken refractory from the furnace arch that had been exposed to operating conditions, and
- B. Two moulded samples of the refractory which was to be placed in the furnace during repairs.

Introduction

The refractory was specified not to melt below 1660°C, but at operating temperatures of approximately 1440°C failure had occurred.

Comalco asked that fusibility tests be conducted on both samples in both oxidizing and reducing atmospheres.

Testing Methods and Results

A segment of "A" was heated to 1500°C for 30 minutes after which examination showed that the bond had failed, but the grog was unaffected.

Fritting tests on "A" in the temperature range 1250°C to 1500°C showed that the softening point was between 1350°C and 1400°C in an oxidizing atmosphere.

Fritting tests in a reducing atmosphere gave similar results.

Tests on "B" gave similar results to those on "A".

Ceramics—Painter, Mamo and Associates: Brick Manufacturing Tests

R.529

Introduction

Painter, Mamo and Associates, Consulting Engineers, submitted, on behalf of the Burnie Brick Co., two samples of weathered siltstone from the company's property near Cooe. They asked for brick manufacturing tests on each material and blends using various methods of manufacture.

Results

Fair to moderate quality bricks were made from both materials using semi-dry and stiff plastic pressing methods. Both materials had poor cohesive and plastic properties which were reflected in the extrusion tests.

The bricks were well fired at 1000°C, although the texture was somewhat porous and the edges easily abraded.

The strength of the green bricks, although not good, appeared to be adequate.

The colour of both bricks was attractive, one being pinkish cream, the other dark rust red. A blend of equal parts showed similar properties, but fired to a light rust red colour.

Ceramics—Wynyard Brick Company: Brick Manufacturing Tests

R.530

Introduction

On behalf of the above company Mr. Brian Archer submitted for brick manufacturing tests using stiff plastic pressing two samples described as follows:—

No. 1. Yellow clay from W. Holyman's property near Deep Creek Road.

No. 2. Brown-greyish clay from W. Holyman's property in the bush on the flats.

Results

Moderate good quality bricks were made over the firing range 950°C to 1100°C. Firing contraction increased substantially in specimens fired at above 1050°C. At all firing temperatures the transverse strength easily met the SAA Interim Specification. The brick colour ranged from light orange at 950°C firing to rust red at 1100°. All specimens showed slight vanadium efflorescence. There is a fairly strong tendency to Lamination.

Ceramics—Painter, Mamo and Associates: Brick Manufacturing Tests

R.531

Introduction

The Director of Mines had Mr V. Threader, Geologist, submit four samples on behalf of the above consulting engineers.

Samples

The following samples were submitted for brick manufacturing tests by stiff plastic pressing.

1. Sandy clay from granite, Scottsdale-Bridport Road (3515).
2. Sandy clay from granite, Scottsdale (3516).
3. Warrentinna area (3517).
4. Warrentinna area (3518).

Summary of Results

Of the four samples only Sample 4 could be recommended as a brick making material, and even this requires blending to yield a satisfactory product. In addition Sample 4 is intrinsically unsuitable for stiff plastic pressing unless blended with other material.

Samples 1 and 2 may have applications as blending materials.

MINES AND EXPLOSIVES BRANCH

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

The Mines and Works Regulation Act 1915

EMPLOYMENT

The average number of persons employed in the mining, metallurgical and quarrying industry during the year was 10,122, representing an increase of 1,084. The section of the industry where the greatest increase (822) occurred was works, due to new construction by Savage River Mines, Temco and Goliath Cement. Construction work by Renison and Cleveland contributed very largely to the increase of 284 in the tin mining section.

ACCIDENTS

The number of registered accidents was 82 in which 74 men were injured and eight killed. In calculation of the rates per thousand 431 employees in the total of 10,122 were disregarded because their employers do not submit accident reports.

The great amount of construction going on unfortunately brought with it a decided increase in the number of fatal accidents. A pleasing feature of the statistics shows a tremendous reduction in accidents in the tin mining section, which for many years had been plagued by many and for the most part trivial accidents.

LOCATION OF ACCIDENTS

Section of the Industry	Underground Number of Persons				Surface Number of Persons				Total Number of Persons			
	Employed	Killed	Injured	Per Cent Injured	Employed	Killed	Injured	Per Cent Injured	Employed	Killed	Injured	Per Cent Injured
Coal	36	...	1	2.8	30	...	...	...	66	...	1	1.1
Copper	73	...	...	...	1,398	1	3	0.3	1,471	1	3	0.3
Silver-lead-zinc	371	1	18	5.1	347	...	9	2.7	718	1	27	3.9
Tin and Tungsten	266	...	5	1.9	782	...	8	1.0	1,048	...	13	1.2
Quarries, Works, Prospecting, &c	...	...	...	...	6,388	6	30	0.6	6,388	6	30	0.6
Total	746	1	24	3.4	8,945	7	50	0.6	9,691	8	74	0.8
Not reported	...	...	...	...	431	...	...	...	431	...	...	...
					9,376				10,122			

DESCRIPTION OF FATAL AND SERIOUS ACCIDENTS

Fatal in operating Mines and Quarries.

- T. C. Targett, Electrolytic Zinc Co., Rosebery: Struck by fall of ground.
- B. Nunn, Electrolytic Zinc Co., Risdon: Struck by log rolling off a lorry
- G. L. Harris, Hydro-Electric Commission Quarry: Fell over quarry face.
- W. Chrusciel, Mt. Lyell Co.: Driving a truck which rolled over a bank in the open-cut, due to failure in hydraulic steering system.

Fatal in construction and exploration.

- W. Thomas, Utah Development: Struck on head by spanner thrown from the drum shaft of a churn drill.
- M. J. Jago, Goliath Co.: Fell from building under construction.
- E. F. Casey, Savage River Mines, Port Latta: While riding a load on a crane which gave way, struck by a block and thrown into the sea.
- W. Baxter, Savage River Mines: Struck by fall of ground from a cutting while driving a bulldozer.

Serious.

- B. H. Fitch, Huttons Brickworks: Struck on head by falling clay whilst clearing feed-outlet; temporary paralysis of arm and leg.
- L. J. Bennion, Electrolytic Zinc Co., Rosebery: Cleaning windows of welding shop; arc exposure one eye.
- G. Packham, Esso: Struck by backlash of wrench when catline broken; internal stomach injuries.

- J. Dodd, Temoc: Fell from improperly erected scaffolding; injuries to head and arm.
 B. D. Lacey, Titan Products: Splashed with acid while removing a blank from pipeline; burnt face, chest and arms.
 R. L. Cowen, Carbide Co., Ida Bay: Struck by fall of ground in quarry; broken leg.
 J. Southgate, King Island Scheelite: Held burning capped fuse in hand too long; severely damaged hand.
 D. Newett, Comalco: While reversing a tractor, foot trapped between tyre and mudguard, broken leg.
 E. P. Cameron, Comalco: Stepped into drain containing caustic; burnt leg.
 S. F. Reid, Comalco: Slipped while changing anode, both feet entering furnace; burnt legs.
 S. Mrkelja, King Island Scheelite: Dropped pipe onto a stage, knocking himself and stage to the ground; broken ribs, shoulder blade and arms.
 E. Cieslak, Electrolytic Zinc Co., Rosebery: Struck by blast through a raise diamond drill hole; lacerations involving one eye.
 J. Karas, Comalco: Thrown to the ground by large sheets of aluminium caught in a gust of wind; multiple breaks of elbow.
 R. Walker, Renison Ltd.: Caught between winch rope and drum; lost middle finger.
 P. M. Matthews, Placer: Caught between winch rope and sheave; hand severed at knuckles.
 M. Freeman, Electrolytic Zinc Co., Risdon: Struck by hot metal while blocking furnace tap hole; injured eye.
 W. McAvaney, Savage River Mines; Pulled to ground by cable cut at top of power pole; cuts to chin and throat.
 L. D. Littley, Temco: Over-reaching on a ladder, over-balanced and fell to floor; broken ribs and collar bone, injured cartilage.

TABLE SHOWING RATES PER THOUSAND KILLED OR INJURED

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

* See Report of Director of Mines—1954.

‡ See Report of Director of Mines—1960.

† See Report of Director of Mines—1956.

§ See Report of Director of Mines—1964

INCIDENCE OF ACCIDENTS

Place and Cause of Accident	Number of Persons Killed	Number of Persons Injured (Incapacitated for over 14 days)
<i>Section A.—Metalliferous Mines—</i>		
1. Below Ground:		
(a) Explosions	.....	1
(b) Falls of Ground	1	2
(c) Falling down Shafts, &c.	.....	.....
(d) Other Causes	.....	22
2. Above Ground:		
(a) Machinery in Motion	3	4
(b) Other Causes	2	13
3. Accidents in Batteries, Ore-dressing, Smelting and other Metallurgical Works, &c.	2	31
Total Metalliferous Mines (A)	8	73
<i>Section B.—Coal Mines—</i>		
4. Below Ground:		
(a) Mine Explosions (fire damp, &c.)	.....	.....
(b) Explosives (dynamite, &c.)	.....	.....
(c) Falls of Earth	.....	.....
(d) Other Causes	.....	1

Place and Cause of Accident	Number of Persons Killed	Number of Persons Injured (Incapacitated for over 14 days)
5. Above Ground:		
(a) Machinery in Motion	—	—
(b) Other Causes	—	—
Total Coal Mines (B)	—	1
Total All Mines (A and B)	8	74

INSPECTION

Mr. Hugh Murchie was appointed to the position of Mining Engineer and Inspector of Mines and Explosives at Hobart in November, taking over the southern and part of the eastern divisions, relieving Mr. Tindal for special duties.

DANGEROUS GOODS

The Explosives and Inflammable Liquids Acts

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

	Burnie	Hobart	Launceston	Narcoopa	Strahan	Stanley	Total
Nitro-compounds (lb.)	527,750	236,950	3,323,350	169,100	1,620,750	196,050	6,073,950
Detonators	30,000	146,000	1,606,450	6,000	200,300	....	1,988,750
Explosives Shipments (No.)	6	4	12	4	11	2	39
Ammonium nitrate (imported for use as an explosive) (lb.) .....	....	....	....	....	....	....	1,697,582

NOTE:—Nitro-compounds exported from Launceston, 60,000 lb.

The numbers of licences and permits issued were:—Magazine licences, 118; other licences, 483; and Shot firer's permits, 147; total, 748.

There were six explosives shipments more than in the previous year. The quantity of nitro-compounds imported increased by 1,788,225 lb., 1,635,900 lb. of which were marine seismic explosives. In addition the quantity of ammonium nitrate imported for use in explosives manufacture increased by 1,041,287 lb.

Due to the unsuitability of Burnie as an explosives landing place, the outer berth of the breakwater berth at Stanley was designated a powder berth.

An improved type of anti-hail rocket was imported during the year, which, after examination and test firing under the supervision of inspectors, was released for use by orchardists.

PROSECUTIONS

Two persons were prosecuted for offences against the regulations, one in relation to conveyance of explosives, and the other relating to usage.

ACCIDENTS AND OUTRAGES

Orielton—A man was badly injured by a premature explosion whilst working in a quarry.

Scamander—Damage was caused to a store and two houses during blasting operations on a construction site.

Zeehan—A truck was damaged by explosives, and a man was subsequently charged with being in possession of explosives.

A hotel was damaged by gelignite being deliberately exploded near the front and side doors, but no one was injured.

DESTRUCTION OF UNSERVICABLE EXPLOSIVES

A total of 2,661 lb. of nitro-compounds were destroyed by burning, and 1,200 detonators by detonation.

INFLAMMABLE LIQUIDS IMPORTS

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

	Bell Bay	Burnie	Devonport	Hobart	Narcoopa	Total
Aviation Gasoline	1,092	.....	.....	1,288	.....	2,380
Benzol .....	.....	.....	.....	799	.....	799
Kerosene, Aviation .....	.....	.....	.....	5,016	.....	5,016
Kerosene, Lighting .....	.....	.....	630	1,498	.....	2,128
Kerosene, Power .....	.....	.....	850	850	.....	1,700
Motor Spirit, Premium	29,630	14,125	23,579	60,694	.....	128,028
Motor Spirit, Regular	11,989	5,884	9,398	28,033	400	55,704
L.P. Gas	200	.....	.....	.....	.....	200
Total	42,911	20,009	34,457	98,178	400	195,955
Tankships (No.)	13	6	10	27	1	57

A large area of New Town Bay was reclaimed and B.P. (Aust.) Ltd. commenced construction of an ocean terminal, which it is hoped will be in operation by the end of 1967. Mobil Oil Aust. Ltd. moved to their new installation at Selfs Point and closed down their installation at Macquarie Point.

During the year the Hobart Gas Co. changed over from using coal for gas making, having constructed an O.N.I.A.-G.E.G.I. gas plant which uses a light distillate petroleum feedstock. A 2,000 ton storage tank was constructed at their Macquarie Street premises for the storage of this product.

OIL POLLUTION

A spillage of 3,000 gallons of motor spirit occurred at H. C. Sleigh's depot at Selfs Point and polluted the river, and at the same terminal 5,500 gallons of distillate were discharged into the river accidentally.

INSPECTION

Importations of fireworks from interstate and overseas were sampled and tested and were found to conform with the regulations. Nitro-compound shipments were inspected and found to be in good order in most cases. Magazine and inflammable liquid installations have been regularly inspected. Officers have supervised blasting operations carried out by municipal councils and construction firms.

Explosives:—Magazine Licences, 118; Other Licences, 483; Shotfirer's Permits, 147 (total, 748).

Inflammable Liquids:—Licences to keep, 2,167; plans approved, 331; exemptions granted, 166.

DRILLING

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

	Number of Holes	Total Footage	Object
<i>Diamond</i> —			
	1	538	Mineral Exploration—Beaconsfield
	1	207	Mineral Exploration—Mathinna
	2	1,364	Mineral Exploration—Waratah
	1	349	Mineral Exploration—Alberton
	2	311	Coal Exploration—Fingal
	36	1,134	Foundation Testing
	—	—	
	43	3,903	
	—	—	

	Number of Holes	Total Footage	Object
<i>Churn—</i>			
	21	1,293	Water Boring
	59	1,698	Foundation Testing
	3	139	Testing for Tin and Water
	28	477	Testing Aluvials for Tin—Monarch
	1	200	Testing Alluvials for Tin—Boobyalla
	3	88	Testing Alluvials for Tin—Derby
	*6	132	Testing Alluvials for Tin—Flinders Island
	<hr/> 121	<hr/> 4,027	
*Plant supplied by hirer but operated by Department crew.			
<i>Rotary—</i>			
	3	1,827	Water Investigation—Longford
	3	375	Site Investigation—Hobart
	1	265	Water Boring—Deloraine
	2	94	Testing Alluvials for Tin—Derby
	<hr/> 9	<hr/> 2,561	
<i>Augur—</i>			
	25	599	Testing Alluvials for Tin—Flinders Island
	<hr/>	<hr/>	

DIAMOND DRILLING

Three plants operated continuously on mineral investigation and a fourth was either on coal or foundation testing. A fifth plant operated for a short time on foundation work. At Beaconsfield the core was lode material from 1,689 feet to 1,708 feet and after wedging from 1,491 feet a further intersection was obtained from 1,681 feet to 1,704 feet. Further wedging was carried out from 1,314 feet and another intersection is expected shortly. At Mathinna the last hole was continued to 1,023 feet but without any interesting intersection. At Waratah tin mineralization was intersected and a further hole is being drilled from the same site. At Alberton no intersections of interest have yet been made. Only limited work was carried out at Fingal as for most of the year no crew was available. Numerous foundation investigations were largely responsible for the lower footage compared to last year. The depths were small and, in addition to much of the ground being difficult and requiring cementing, many of the holes were from barges or stages over tidal waters.

CHURN DRILLING

One plant was engaged wholly on alluvial tin testing, except for one small area where this was combined with water boring. Another crew divided its time between water boring and foundation testing. As with the diamond drilling, the foundation work was largely over tidal water and this involved setting 650 feet of casing not included in the total shown as drilled.

Twenty-one bores were sunk in the north-west of the State and 18 obtained satisfactory water flows of 250 gallons per hour or better. Of the other three, one was abandoned at 20 feet owing to very hard basalt, one was dry and one produced only 150 gallons per hour and was abandoned, as a better site was found nearby. Both the unsatisfactory sites had been chosen by diviners.

AUGER DRILLING

The auger drill was used for scout boring for alluvial tin on Flinders Island.

ROTARY DRILLING

This drill was brought into operation early in the year with a crew transferred from one of the churn drills and was used mostly for underground water investigation work in the Longford district.

Southern District

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

EMPLOYMENT

The average number of men showed an increase of 50 to 3,242. The increase was at the Electrolytic Zinc Company of Australasia Ltd., but the brick industry showed a further decline.

ACCIDENTS

The year was remarkably free of reportable accidents, there being only one fatal, two serious and one minor.

The fatal accident occurred on the wharf at the Electrolytic Zinc Company of Australasia Ltd., at Risdon. The man killed was employed by a contractor delivering timber piles and he was crushed when the load rolled off the lorry.

At Ida Bay a quarry worker suffered a broken leg when a fall of rock from the face occurred.

The other serious accident was to a furnace operator who suffered slight permanent injury to an eye when he was splashed with molten zinc while tapping a furnace. He was wearing normal safety spectacles which, although they do not give 100% protection, seem to be preferred because of their greater comfort.

HEALTH AND SAFETY

Regular visits of inspection were made to all mines and works in the area to ensure that the Mines and Works Regulation Act was being complied with.

EXPLOSIVES

Hobart Quarries introduced electric firing of secondary blasts during the year and this seemed to reduce the nuisance effect. One or two slightly larger explosions are much less noticeable than several hundred spread over several minutes but there are still occasional complaints, probably due to atmospheric conditions causing more air-blast than normal.

No accidents or damage by blasting were recorded during the year.

Western District

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

EMPLOYMENT

The build-up of mining activity in the western areas of the State during the latter half of 1965 was accelerated in 1966 with major construction programmes either at their peak or in their early stages. By the year-end new construction at Renison Limited's property was almost complete and trial milling had commenced. Construction work on all aspects of the Savage River Mines project was continued and work commenced on the establishment of a new mine and concentrator for Cleveland Tin N.L.

Total employment for the region was 4,064 persons of whom 495 were employed underground. Exploration and prospecting account for 97 men while construction of mine and treatment plants accounted for about 750 persons.

ACCIDENTS

Accidents reported during the year totalled 58 of which it is regretted to report that four were fatal. One of the fatal accidents was due to a fall of rock underground, one was due to a rock-slide during road-making operations, one was due to the failure of crane lifting gear and one resulted when a quarry workman fell or slipped over a quarry face.

EXPLORATION AND PROSPECTING

There were 27 exploration licences and 17 special prospecting licences current in the western regions during the year. S.P.L. 2, 7 and 9 and E.L. 7/65, 9/65, 10/65, 13/66, 14/66, and 15/66 are on King Island.

- E.L. 12/65—*Pickands Mather & Co. International*: E.L. 27/65 and 28/65 were incorporated during the year. This company did considerable geological, geophysical and survey work. One diamond drill hole H-101 was drilled at North Heemskirk, footage being 527 feet. Average employment was 14 men.
- S.P.L. 20 and 25; E.L. 8/65—*Mt. Lyell Mining & Railway Co. Ltd.*: This company conducted geological, geophysical, and geochemical work particularly in the Moina area covered by E.L. 8/65.
- S.P.L. 1, 3, 22; E.L. 2/62, 1/62, 4/66—*Electrolytic Zinc Co. of Australasia Ltd.*: S.P.L. No. 1 was relinquished during the year. This company drilled a total of nine holes; on its Trial Harbour area—five holes and on Melba Flat area—four holes. Average employment was 18 men.
- S.P.L. 27, 28, 29; E.L. 9/66—*Renison Limited*: The company is actively examining its prospecting areas. Average employment was five men during the November-December period.
- E.L. 2/63, 29/65—*Aberfoyle Tin N.L.*: Exploration work and geological work continued during the fine weather period. Average employment was eight men.
- E.L. 1/63—*Cleveland Tin N.L.*: Geological exploration continued on this area. Four men were employed during the latter part of the year.
- S.P.L. 404—*Dr. C. Loftus-Hills*: The option is held by Placer Prospecting.
- E.L. 4/61—*Industrial & Mining Investigations*: Diamond drilling and geological investigations continued. Holes were drilled on the orebodies both north and south of the Savage River holdings. Average employment were four men.
- S.P.L. 17—*Mr. G. C. Kingston*: The Broken Hill Company abandoned its option on the area at Balfour.
- E.L. 13/65 and 15/65—*Broken Hill Pty Ltd.*: The company was active on both these areas, prospecting work being the chief activity. Employment figures for E.L. 15/65 go to the Launceston Inspectorate. Average employment on E.L. 13/65 was eight men, the maximum being 30 for the December quarter.
- E.L. 5/63—*Comstaff Pty. Ltd.*: This company was active in the Mount Bischoff area, having from one to three diamond drills in operation. Mapping and prospecting in the rest of the area was the chief activity. Average employment was five men.
- E.L. 9/65—*Storey's Creek Tin Mining Co.*: Scout drilling was completed.
- E.L. 15/66—*King Island Scheelite (1947) Ltd.*: A geochemical programme has been mapped out and work is in progress.
- E.L. 10/65, 13/66, 14/66; S.P.L. 2, 9—*Mt. Costigan Mines Ltd.*: Further sampling and investigations have been carried out on these areas, which are all on King Island, by boring and bulldozer cuts.
- S.P.L. No. 7—*Mr. J. C. Curtain*: This area, under option to Mt. Costigan Mines Ltd., has received attention and included in the work by that company.
- E.L. 7/65—*Ocean Mining A.G.*: Has done sampling of the ocean bed when weather permitted.
- S.P.L. 11, 12, 13—*Placer Prospecting Pty. Ltd.*: The company was active until the latter half of the year when a decision was taken to abandon the areas. Plans and development details have been supplied by the company. Average employment is included in figures for tin.
- S.P.L. No. 6—*J. G. Loftus-Hills*: No work was done. The area was relinquished during the year.

HEALTH, SANITATION AND SAFETY

Installations being provided at the new mines and works are adequate and at the established properties improvements are frequently made to maintain facilities at a high standard.

INFLAMMABLE LIQUIDS AND EXPLOSIVES

All shipments of explosives and inflammable liquids were discharged without major incident. The new oil discharge point at Burnie, alongside the recently completed breakwater, was commissioned during the year. Explosives for the district are now discharged at Stanley, where the wharf is remote from the town.

Northeastern District

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

ACCIDENTS

A total of 13 accidents of which two were fatal were recorded.

The first fatality occurred at a drilling site on Cape Barren Island where the driller in charge was struck by a large spanner used to sprag the bull reel during the raising of casing from a hole. The brake slipped on the drum and the spanner was thrown some six feet, striking the driller on the head and inflicting fatal injuries. The other fatality occurred on a construction site when a youth fell from the sixth floor level of a structure, being killed instantly.

Of the 11 non-fatal accidents, seven occurred at a major metallurgical plant. Here six accidents occurred during the first half of the year. An intensification of the safety first programme may have had some effect in reducing the number of accidents to one for the second half.

These accidents were of a diverse nature and are briefly summarized as follows:—

1. A process worker received severe lacerations above the left eye when an air hose under pressure snaked upwards, striking him.
2. While changing an anode block with both feet on the sloping heat shield, a furnace-man sustained severe burns when his feet slipped and penetrated the crust of the furnace. This was one of the older high bank type of furnaces, since replaced.
3. An electrical fitter fell 20 feet from a ladder onto a concrete floor below, fracturing and dislocating his left wrist.
4. Attempting to take a sample of mischmetal on a milling machine not meant for the purpose, a worker caused a methylated spirits fire from which he received first degree burns to forearms, thigh, chest and abdomen.
5. A foreman stepped backwards into a drain which contained hot caustic soda, suffering severe caustic and thermal burns to his right leg.
6. A man reversing a tractor with cutaway mudguards had his foot trapped between tyre and mudguard and suffered a compound fracture of the left leg.
7. A foreman assisting to load 40 feet x 3 feet aluminium sheets onto a lorry was knocked to the ground when a sudden gust of wind blew the sheet against him. He suffered multiple fractures of the right elbow.

Of the other accidents, one occurred on one of the larger alluvial mines when a reservoir caretaker suffered a strained back in an attempt to lift a fallen tree from the water race.

On another metallurgical plant a licensed rigger overbalanced and fell 17 feet from a staging onto the concrete foundation below, suffering injuries to head and arm.

On the same works a foreman rigger fell eight feet onto a brick floor suffering four broken ribs, a broken collar bone and injuries to knee cartilage. On this occasion a beam bolt slipped causing him to over-balance from his ladder.

The remaining accident occurred at a brickmaking plant when a man was struck on the back of the head by a lump of clay which rolled from the top of the heap.

SAFETY AND HEALTH

A feature of inspection work has been the eradication of accident and health hazards whenever encountered. In all cases of accident the investigation has covered all aspects including the introduction of remedial measures where considered necessary. In regard to the preservation of good health among employees, attention has been directed throughout the year to maintenance of low dust content atmosphere in working places, including crane cabins and industrial plants in general. To this end atmospheric dust surveys have been conducted with a Watson Koni-meter on a number of occasions. Maintenance of clean adequate bathing and changing facilities as well as crib and first aid rooms has been a firm requirement.

PROSPECTING

Utah Development & Mining Co. continued their investigation of Exploration Licences 6/63 (based at Winnaleah) and 2/65 based on Cape Barren Island. Employment on Exploration Licence No. 6/63 averaged four men while E.L. 2/65 averaged five men.

Aberfoyle Tin Development Partnership operated E.L. 1/65 on the Blue Tier in the vicinity of the old Anchor Mine. A drilling programme was prosecuted but results at the end of the year were not conclusive.

Ausminex: A brief examination was made of Mr. V. Wood's S.P.L. 399 covering the Monarch area and also of Mr. L. Price's S.P.L. 403 but these were not persevered with. The examinations covered three months only.

Kathleen Investments continued the investigation of Mr. V. Wood's S.P.L. 399 and exploratory work was still proceeding at the end of the year. This company also took up exploratory rights over an extensive area of Flinders Island (E.L. 2/66) and pursued a vigorous programme of investigation.

Ocean Mining A.G., operating offshore E.L. 7/65, introduced an innovation to offshore drilling in the form of the "Wando River", a motor vessel of 150 tons. Carrying its own rig and casing, this unit is capable of drilling through 100 feet of sediment in depths down to 30 fathoms. Exploratory work was carried out by this method and extensive areas were examined for mineral potential and results charted.

Mr. C. G. Sulzberger was granted an Exploration Licence (6/66) to drill for oil in the Port Sorell-Harford-Sassafras area and to this purpose acquired an E 5000 Mindrill machine. The first hole was commenced at Parkers Ford and had reached 500 feet at the end of the year.

EXPLOSIVES AND INFLAMMABLE LIQUIDS

Explosives magazines and inflammable liquids outfits have been inspected regularly and inspection reports prepared for new installations. A total of 26 men were examined for shot firer's permits in conjunction with the Inspector of Explosives, Mr. D. R. Bonham, and 24 permits were granted.

Complaints by local residents of flyrock and ground vibration at a quarry were investigated and a system of 25 millisecc delay blasting was introduced for the purpose of minimizing the possibility of flyrock and reducing the alleged ground vibration. The millisecc delay blasting proved extremely effective.

A total of 90 lb. of defective explosives was handed in by the police and others and was destroyed.

The Inspector of Explosives supervised the following shipments of dangerous goods:—

- 11 Class A tankships.
- 2 L.P. Gas tankships.
- 10 Explosives, inwards.
- 7 Explosives, outwards.
- 5 Caustic Soda in bulk.

Eastern District

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

EMPLOYMENT

Employment in the coal mining industry was 66 men, a decrease of four, being made up of 36 employees underground and 30 on the surface.

The quarrying industry employed 46 men.

Employees in the metalliferous mines were 219 underground and 164 on surface making a total of 383. An additional 10 men were employed rehabilitating the Royal George Mine so that it could be sampled and diamond drilled.

ACCIDENTS

There were no accidents on the surface but four occurred underground. Three accidents, all of which were minor, occurred in metalliferous mines. The other accident involved serious injury to an employee's neck in a coal mine.

ELECTRICAL

The survey of conditions of electrical installations and equipment of mines and works was continued and where conditions were unsatisfactory orders were issued to conform with the requirements of the Mines and Works Regulation Act 1915. The state of a number of installations is being steadily improved and altered to conform with required standards.

SAFETY

The safe working of all mines and quarries was watched by regular inspection. Testing showed that the air used in the ventilation of the coal mines was free from inflammable and noxious gases and the hygrometer readings showed that the air complied with the requirements of the Act. Dust concentrations were checked by means of a Watson Konimeter and where not satisfactory measures for improvement were taken.

EXPLOSIVES AND INFLAMMABLE LIQUIDS

Magazines and inflammable liquids installations have been inspected regularly. An additional 34 shot firer's permits were issued under the Explosives Amendment Regulations 1964. Some complaints concerning the use of explosives were received and investigated, and if necessary orders were issued for compliance with the requirements.

