

TASMANIA

REPORT

OF THE

DIRECTOR OF MINES

YEAR ENDED 31st DECEMBER,

1964



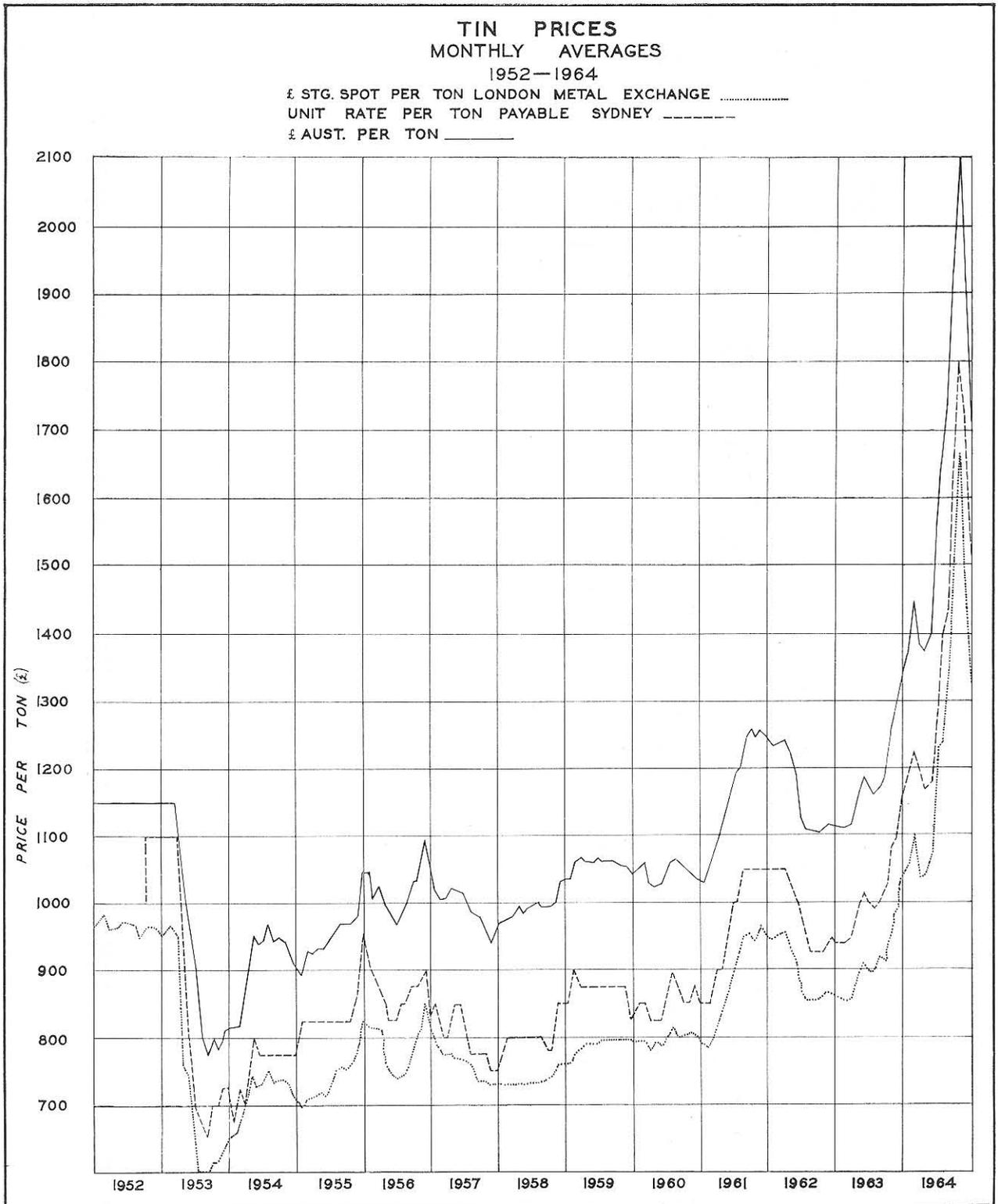
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1965.

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REPORT OF THE DIRECTOR OF MINES

Department of Mines,

Hobart,

10th June, 1965.

THE HONOURABLE THE MINISTER FOR MINES.

I have the honour to present my report for the year ended 31st December, 1964.

The mining industry produced metals and minerals valued at £A52,506,048 for 1964, consisting of production from Tasmanian ores to the value of £A20,006,689 and from imported ores £32,499,359. This is an all-time record for the Tasmanian mining industry, both for Tasmanian ores and the smelting of imported concentrates.

There were increases in the production of copper, gold, lead, scheelite, silver, and zinc and small decreases in the production of tin and wolfram. However, because of the high level of prices for all minerals the value of production increased in all cases. The production of coal declined by some 55,000 tons and employment in the industry was further reduced by 59 men.

The average number of men employed in the industry was 8,815.

NEW MINES

The Dorset Tin Dredge operated by The Storeys Creek Tin Mining Co. N.L. completed the transfer and reconstruction of the dredge at the Black Duck-McGregor area, north of Gladstone and productive mining was commenced on the new site.

Development work is being continued at the Mt. Cleveland Mine near Waratah by the Aberfoyle Tin Development Partnership and ore-dressing investigations are being undertaken in the laboratories of the Department of Mines at Launceston. It is hoped that productive operations will be established in the near future.

The development of the clay deposit in the North-East as a source of raw material required by the papermaking industry at Burnie has not yet proceeded to the productive stage pending completion of marketing arrangements.

Preliminary work is in progress at the old Pioneer Tin Mine at Pioneer which it is planned to reopen as an active producer.

The Broken Hill Pty. Co. Ltd. has located suitable deposits of silica at Beaconsfield as a source of raw material for the manufacture of ferro-silicon and other silicon alloys at the T.E.M.C.O. plant at Bell Bay. Productive operations were commenced during the year.

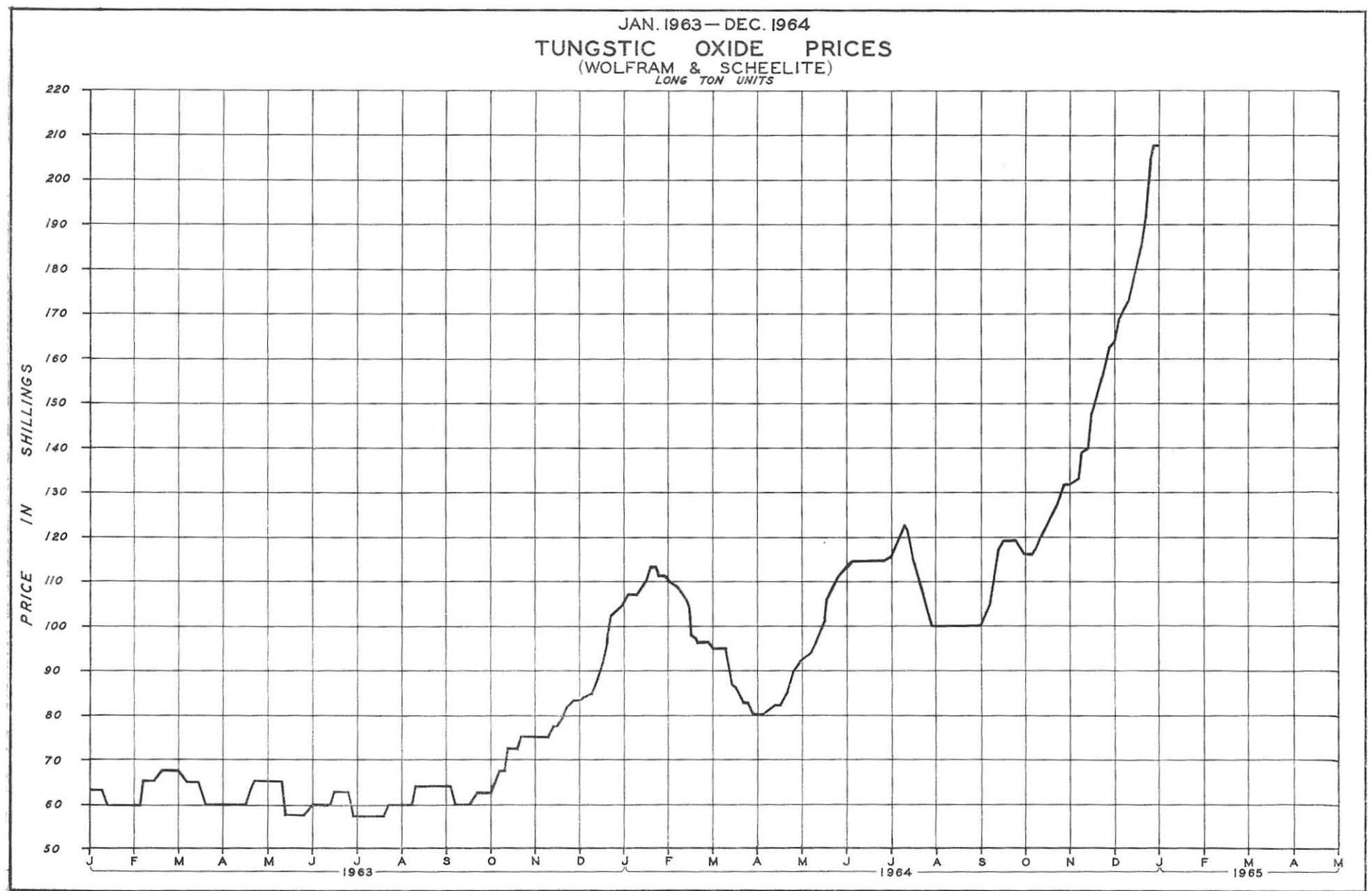
METAL PRICES

Copper.—The average Australian price of copper for 1964 was £331 per ton as compared with £305 for 1963. The Australian domestic price which is based on the London Metal Exchange quotation was £305 per ton at the beginning of 1964, having been at this level since July, 1961. There was a rise to £315 in January, £335 in February, and £340 in March. The price dropped to £320 in April but rose again to £340 in August and remained at this level until the end of the year. The Copper Bounty Act, 1958, was extended until the end of 1965. The Act provides that the Australian price of copper will not fall below £305 per ton and where the price does not exceed this figure the maximum bounty will be £35 per ton, with a profit limitation of 10%. For every £1 by which the price exceeds £305 the maximum bounty falls by an equivalent amount. Provision is also made for a sliding scale tariff based on imported copper according to a determined price as provided by the Copper Bounty Act.

Lead.—The upward trend of prices on the London Metal Exchange was reflected in the domestic price which rose from £95 per ton in January to £165 towards the end of November. The average Australian price was £121 per ton.

Tin.—The average Australian price of tin for 1964 was £A1615, as compared with £A1188 for 1963. The statistical position is that there is a short-fall of some 20,000 tons between production and consumption and the operation of the forces of supply and demand has resulted in price increases. It will be some time before increased production from activity stimulated by the high price can reach the market and in the meantime the only restraint on run-away prices is the

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(No. 33.)

release of quantities of tin from the U.S. stockpile by arrangement through the U.S. General Services Administration. The operation of the Buffer Stock Manager to stabilize prices by buying and selling at price levels determined by the Second International Tin Council was ineffective because of the exhaustion of buffer stocks which, if available, would have been sold when the price rose above £S1200 per ton with the object of increasing market supplies and so forcing down prices being offered for limited stocks. It has been reported that production by Indonesia has increased significantly and that more mines have been opened in Malaya but market observers are of the opinion that political factors such as hostility between these two principal producers could result in tin remaining an unpredictable metal apart from the question of the world supply position.

The price quoted on the London Metal Exchange has ranged from £E1059 per ton in January to a peak of £A1652 in October but there was a downward trend towards the end of the year. The Australian price was £A1361 at the beginning of the year and increased progressively to a high of £A2099 in October but declined to £A1621 at the end of the year. The fall in price in both markets has been attributed to some increased production reaching the market.

The stabilizing of the price of tin at a lower level is in the interests of the tin mining industry. A reported development in the United States of a process for coating of light gauge steel with aluminium and other metals to take the place of tinplate constitutes a real threat to the industry since tinplate is one of the principal uses for tin.

Tasmanian producers who are paid for concentrates at a unit rate based on the percentage of tin contained in the concentrates have received payment ranging from 229/6 per unit to 370/11 per unit equivalent to £A803 to £A1248 per ton of 70% concentrate. During 1963 the comparative prices were from £A648 to £A798 per ton.

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

As indicated in my last Annual Report the decline in the market price which had commenced in 1961 continued during 1962 and until July 1963 when an improvement was recorded and the price rose to 105/- per unit. This level was maintained until March 1964 when the price again declined to 80/- per unit. An upward trend commenced towards the end of April and apart from some fluctuations this attitude was maintained for the remainder of the year, the peak figure of 207/6 per unit being reached at the end of December.

Operations at the King Island Scheelite Mine were maintained by a subsidy under the King Island Scheelite Agreement Acts of 1963 and over the period of nineteen months to 31st May 1964 a total of £198,955 was made available to the Company by the Government. The increased market price, which passed the basic price of 124/4 per unit provided in the subsidy legislation in mid-October, has enabled operations to be continued on a profitable basis, and repayments based on the agreed formula have been made.

The market for this metal has displayed uncertain features constantly and this has been attributed by market observers to supplies of Russian ore and more lately to reduced quantities being available from producers. A United Nations Committee was formed in 1963 to assess the world tungsten situation and to consider methods of dealing with the depressed state of the market. The Committee has been unable to operate effectively because of lack of information from Communist countries and no positive measures have been taken which are likely to affect the market situation.

Zinc.—The upward trend in the Australian price of zinc which was evident at the end of 1963 continued and reached a peak of £168 per ton in June 1964. The increase followed the London Metal Exchange price but in July 1964 the major overseas sellers in the interest of price stability introduced a producers' pricing basis which at that date was £S125 compared with the L.M.E. price of £S139. Sales in Australia have been made on the producers' pricing basis since July and the price has remained steady at £A143 per ton since September.

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

Mineral	1961		1962		1963		1964	
	£	s. d.	£	s. d.	£	s. d.	£	s. d.
Copper (per ton)	306	13 4	305	0 0	305	0 0	330	16 8
Gold (per fine oz.)	15	12 6	15	12 6	15	12 6	15	12 6
Lead (per ton)	99	3 4	81	13 4	85	0 0	121	9 2
Silver (per oz.)	0	8 7	0	9 8	0	11 6	0	11 8
Tin (per ton)	1,177	13 4	1,160	13 4	1,187	13 4	1,614	18 4
Wolfram (per unit (WO ₃))	143	2	97	5	79	11	145	3
Zinc (per ton)	101	19 1	100	0 0	104	13 4	152	16 3

EXPLORATION

There has been unprecedented interest in the exploration and investigation of the mineral resources of the State both by established producers and by exploration companies. Exploration licences and leases occupy the greater part of the known and potential mineral areas of the State and the whole of the area of Bass Strait within the boundaries of Tasmania is held under a licence to search for petroleum.

On the West Coast, the Mt. Lyell Mining and Railway Company Ltd. at Queenstown is engaged in further exploration of its copper deposits and has increased the area of its leases; the Electrolytic Zinc Company, Rosebery, has continued the search for ore deposits in areas surrounding its leases and has recently taken over the Farrell Mine, a silver-lead producer at Tullah, about eight miles north-west of Rosebery; Renison Limited are engaged in a vigorous programme of development of tin deposits at Renison Bell; Clutha Development Company are testing mineral deposits on the Zeehan field; Comstaff Pty. Ltd. are investigating areas at Waratah and also are exploring a large area south from Waratah; Aberfoyle Tin are developing the Cleveland Mine near Waratah and are engaged in testing in the Stanley River district; the United States Metals and Refinery Company hold a licence in the Jukes-Darwin area; Industrial and Mining Investigations Pty. Ltd. and its associate Pickands Mather International are continuing investigation of the Savage River iron ore deposits; and the Broken Hill Pty. Company Ltd. occupy 6,000 square miles in the west and south-west for minerals exploration.

In the north-east where the interest is principally in tin, Aberfoyle Tin N.L., in addition to productive operations at Rossarden at the Storeys Creek Mine and at the Dorset Tin Dredge at South Mount Cameron, hold areas around Rossarden and on the Blue Tier for exploration purposes; Utah Development Company are engaged in an active programme of exploring and testing by drilling of potential tin producing areas; the Broken Hill Pty. Company Ltd. is about to commence drilling; and preparations are being made to reopen the old Pioneer Tin Mine near the town of Pioneer.

The Department of Mines is engaged in test drilling at the old Tasmania Gold Mine at Beaconsfield, at the old Golden Gate gold mine at Mathinna, the coal measures in the Fingal Valley and potential alluvial tin deposits near Little Boobyalla.

A development programme involving an expenditure of £400,000 is being undertaken on the Savage River iron ore deposits by Pickands Mather and Company International in association with the Japanese company Mitsubishi Shoji Kaisha Ltd. to enable a final decision to be made on the establishment of an iron-mining and pelletizing project. If a decision is made to go ahead, construction work will take about two years and involve an estimated investment of £29 million. The area concerned covers 480 acres which have been applied for as leases and the remainder of the Savage River deposits are still held as an Exploration Licence by Industrial and Mining Investigations Pty. Ltd.

The underground exploratory development at the Cleveland Mine, Waratah, was nearing completion and pilot scale ore treatment tests were being undertaken by the Tasmanian Department of Mines. Production could commence during 1966.

Plans are in hand for expansion of production at the mine operated by Renison Limited at Renison Bell where exploration has proved a reserve of not less than six million tons of ore of economic grade. It is intended to increase the output to 1700 tons of tin a year and Renison would then become the largest single producer of tin in Australia.

The mining industry in Tasmania is enjoying a high level of prosperity and the future outlook is most encouraging.

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

	£
1953-62	1,750,000
1963	430,000
1964	555,000
	£2,735,000

COAL

Production again declined from 206,922 tons in 1963 to 151,161 tons in 1964 and the number of men employed fell by 59 to 108. In my last report I referred to the continued loss of markets by the coal mining industry due to competition from oil. Another of the remaining consumers, namely, Goliath Portland Cement Co., has converted to oil and this has resulted in the immediate closure of the Valley Coal Mine at Fingal.

The Coal Utilisation Research Advisory Committee, set up with the object of strengthening applied scientific and technological aspects of research on the use of all types of Australian coal, has held its inaugural meeting.

The Committee consists of five representatives from private industry, two appointed by the Commonwealth, two each from Victoria and New South Wales, one from the Joint Coal Board, one from the universities and one each from the other States. Funds are to be provided by the various bodies represented. A survey is being made of current work being undertaken by Government and private bodies in order to assess its usefulness. The Committee will then sponsor specific projects. However, Australian Coal Association (Research) Ltd. which is being taken over by the Committee to form National Coal Industry Research Laboratories will be submitting a programme of research for consideration. The proposals and all research work will be kept under close observation by the Director of Mines, who represents Tasmania on the Committee and any possibilities for alternative uses of Tasmanian coal will be fully investigated.

SAVAGE RIVER IRON ORE

The investigations preliminary to bringing this ore body into production continued steadily during the whole of the year under review. Diamond drilling of the ore-body continued during the whole period, and a further 10 holes totalling 6195 feet were commenced during 1964.

As reported in my last report, investigational work on the production of high-grade iron ore pellets has been completed but a programme to check costing, feasibility, harbour locations and ore-body details was commenced during the latter half of the year. The programme was estimated to cost more than £400,000 and this detailed work was in progress at the end of the year under review. The marketing details are still being negotiated and the results of the intensive investigational programme is to be completed before a sales contract will be finalized.

OIL EXPLORATION

Following marine seismic surveys carried out during 1963 the Licence holders made an exhaustive interpretation of all geological and geophysical data relating to the Bass Basin. This was completed by September and a further programme of seismic surveys of the area to the west of King Island was commenced. By the end of the year 159 line miles of the survey had been completed. In April Haematite Explorations Pty. Ltd., the Licence holder, entered into an agreement with Esso Exploration Australia relating to that part of the Licence lying to the east of the Furneaux, Hogan and Kent Groups of Islands.

LEGISLATION

The Mining Act 1929

The major amendment was designed to establish the principle of payment of royalty on mining products produced in the State. No royalties will be payable until Regulations are made to prescribe the rate and method of payment. The main purpose of the amendment was to ensure

that if the iron ore industry develops it will be legally possible to charge a small royalty. In every State of the Commonwealth and throughout the world generally it is the practice to charge a royalty on minerals and the amendment is, therefore, in accord with the usual custom in the mining industry.

Another amendment provided for the lifting of the restriction of twelve months on Special Prospectors' Licences in order to facilitate investigation of areas where drilling and other investigations could not be completed within the limited term previously granted. The Department will continue to control occupation of land by requiring regular submission of reports and by maintaining close liaison with the progress of investigation by licence holders. Other amendments were of a machinery nature and related to transfers, granting of sub-leases, acceptance of certain work in satisfaction of the labour covenant contained in leases and the redrafting of provisions for the issue of secondary water licences in certain circumstances.

The Explosives Act 1916

Reference was made in my last report to an amendment having been made to the Act to control the use of explosives for all kinds of blasting, as distinct from mining. A safe code of blasting practice has now been proclaimed by Regulation and several hundred persons throughout the State have been issued with a Shot-firer's Permit after an Inspector of Explosives had been satisfied as to their ability to load and fire shots safely.

REVENUE

Return showing the Revenue Collected during the Year ending 31st December, 1964.

Head of Revenue	Amount £
Public Works and Services—Mines Department	20,004
Rent and Fees of Auriferous and Mineral Lands	23,802
Survey Fees	1,728
Fees under the Explosives and Inflammable Liquids Act	14,165
Total	£59,699

Comparative Statement of Revenue from Mines, being Rents, Fees, Storage of Explosives, &c., Paid to the Treasury during the Years 1957 to 1964.

Year	Amount £
1957	23,827
1958	22,187
1959	32,288
1960	41,726
1961	47,598
1962	44,121
1963	57,036
1964	59,699

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, 1964.

Leases and Licences	Number	Area (Acres)	Sluiceways
Clay and Sand	2	51	....
Copper	1	3,943	....
Easements	2	21	....
Gold	6	110	....
Gravel	1	10	....
Iron	2	140	....
Minerals	2	10	....
Osmiridium and Chrome	5	60	....
Silica	2	8	....
Stone	11	644	....
Tin	26	2,540	....
Water Licences	11	5	52
Total	71	7,542	52

Return showing the Total Number of Leases and Licences in Force on 31st December, 1964.

Leases and Licences	Number	Area (Acres)	Sluiceways
Bauxite	5	454	.....
Clay	22	897	.....
Coal	17	5,145	.....
Copper	3	7,086	.....
Copper-Nickel	3	120	.....
Dolomite	4	309	.....
Easement Licences	47	455	.....
Feldspar	2	15	.....
Gold	28	687	.....
Granite	3	25	.....
Iron Ore	5	210	.....
Limestone	22	1,641	.....
Mica	1	20	.....
Minerals	31	9,764	.....
Ochre	2	8	.....
Osmiridium and Chromite	9	130	.....
Sand and Gravel	13	751	.....
Scheelite	5	1,000	.....
Silica	5	29	.....
Silver-Lead	10	1,270	.....
Stone	52	4,904	.....
Tin	197	5,216	.....
Tin-Wolfram	4	20	.....
Uranium	1	50	.....
Water Licences	95	700	675
Total	586	40,906	675

Return showing Number and Area of Leases and Licences Applied for during the Year ended 31st December, 1964.

Leases and Licences	Number	Area (Acres)	Sluiceways
Clay	6	570	.....
Coal	1	10	.....
Copper	6	4,743	.....
Gold	6	122	.....
Gravel	3	86	.....
Iron Ore	7	570	.....
Manganese	1	5	.....
Minerals	21	946	.....
Ochre	1	9	.....
Silver Lead	1	5	.....
Stone and Sand	12	538	.....
Tin	48	12,444	.....
Water Licences	18	12½	101
Wolfram	1	5	.....
Total	132	20,065	101

Return showing particulars of Exploration Licences and Special Prospector's Licences in force at 31st December, 1964.

Licence No.	Holder	Area	Situation	Mineral
EL3/59	Mt. Lyell Mining and Railway Co. Ltd.	12 square miles	West Coast	Minerals
EL1/60	Haematite Explorations Pty. Ltd.	35,325 square miles	Bass Strait	Oil and gas
EL4/61	Industrial and Mining Investigations Pty. Ltd.	147 square miles	Savage River	Minerals
EL5/61	Industrial and Mining Investigations Pty. Ltd.	450 square miles	East Coast	Coal and limestone
EL1/62	Electrolytic Zinc Co. of Australasia Ltd.	49 square miles	Rosebery	Minerals

Licence No.	Holder	Area	Situation	Mineral
EL2/62	Electrolytic Zinc Co. of Australia Ltd.	8 square miles	Dundas	Minerals
EL1/63	Aberfoyle Tin N.L.	14.75 square miles	Waratah	Tin
EL2/63	Aberfoyle Tin N.L.	87.4 square miles	Mt. Lindsay	Minerals
EL3/63	Aberfoyle Tin N.L.	35 square miles	Blue Tier	Tin
EL4/63	Storeys Creek Tin Mining Co. Ltd.	114 square miles	Moorina	Kaolin
EL5/63	Comstaff Pty. Ltd.	925 square miles	West Coast	Minerals
EL6/63	Utah Development Co.	384 square miles	North-East	Tin and gold
EL1/64	Broken Hill Pty. Co. Ltd.	6,000 square miles	South West	Minerals
EL2/64	United States Metals Refining Co.	84 square miles	West Coast	Minerals
SPL 399	V. Wood	17.5 square miles	Mt. Cameron	Tin
SPL 400	W. C. Burrows	4 square miles	Branxholm	Tin
SPL 403	L. Price	2 square miles	Scamander	Tin
SPL 404	C. Loftus Hills	1,440 acres	Zeehan	Tin
SPL 406	Clutha Development Pty. Ltd.	3,200 acres	S. Dundas	Minerals
SPL 407	Clutha Development Pty. Ltd.	2,560 acres	Zeehan	Minerals
SPL 409	J. H. Curtain	1,695 acres	King Island	Tin
SPL 410	G. C. Kingston	25 square miles	Balfour	Minerals
SPL 411	G. R. Abel	5 square miles	Macquarie Harbour	Minerals
SPL 412	Broken Hill Pty. Co. Ltd.	960 acres	Upper Scamander	Minerals
SPL 1	Electrolytic Zinc Co. of Aust. Ltd.	15 square miles	Trial Harbour	Minerals
SPL 2	M. Gatenby	680 acres	King Island	Minerals

Return showing the Total Number and Areas of all Types of Authorities to Prospect held as at 31st December, 1964.

Type of Authority	Number	Area
Permits to enter and search on private land including owners' consents	19	3,473 acres
Exploration Licences	14	43,635 sq. miles
Special Prospector's Licences	12	54,375 acres
Prospector's Licences	161	8,050 acres
Miner's Rights	143	286 acres
Authorities to prospect under the Aid to Mining Act 1927	4	21,300 acres

WARDEN'S COURT

R. N. Woodfield v. D. B. Lipscombe—Objection to Application 19M/64 65 acres at Pioneer.

This application was heard by the Warden of Mines at Launceston on 6th July, 1964. The defendant did not appear and the Warden upheld the objection.

S. P. Adams and D. R. Saville v. M. E. Burns—Application for forfeiture of lease 64M/63 80 acres at Weldborough.

This application, which was listed to be heard by the Warden of Mines, Launceston, was withdrawn after a mutual settlement between the parties.

EXEMPTIONS

The following exemptions were granted to the labour covenant of leases:—

Eagle Metal and Industrial Products Pty. Ltd. Leases 45M/52, 46M/52, and 47M/52—Dundas.

J. Bibby and G. M. Hall. Leases 27M/60, 26M/60, 59M/63, 60M/63, 61M/63 and 71M/63—Adamsfield.

L. D. McRae. Lease 5M/63—Coles Bay.

R. L. Palmer and L. Price. Leases 23M/62 and 33M/62—Upper Scamander.

H. K. Turner. Leases 62M/63 and 63M/63—Mt. Lindsay.

Estate late M. E. Gorrington and H. Jones & Co. Lease 558P/M—Hamilton.

MINE MANAGERS' CERTIFICATES

During the year the Board of Examiners granted Metalliferous Mine Managers' Certificates of competency to—

Valentine John McSweeney

Michael Lewis Houston

Norman Lawson Lindsay

Roger Harry Pooley.

A Certificate was also issued to—

Brian Fraser Titcombe,

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

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

	Value £A		Value £A
1955	11,069,444	1960	13,387,260
1956	14,374,621	1961	13,379,477
1957	12,591,687	1962	15,437,068
1958	11,838,054	1963	16,103,136
1959	12,766,261	1964	20,006,689

MINERAL PRODUCTION SINCE 1880

Quantity and Value of Mineral Production as at 31st December, 1964.

<i>Mineral</i>	<i>Total Quantity</i>	<i>Value £A</i>
METALLIC MINERALS—		
Antimony	(tons) 3	1,017
Bismuth	(tons) 84	29,644
Cadmium	(tons) 1,455	1,887,643
Cobalt Oxide	(tons) 16	14,111
Copper (Blister) to 1918 (now shown under Silver and Copper)	(tons) 166,600	13,788,527
Copper Matte	(tons) 6,277	133,736
Copper Ore to 1918—(now shown under Copper)	(tons) 41,769	577,873
Copper (from 1919)	(tons) 436,277	71,232,540
Crocoite	(specimens only)	533
Gold	(fine oz.) 2,632,045	15,779,796
Ilmenite	(tons) 550	1,256
Iron Oxide (including Hematite, Limonite and Magnetite)	(tons) 107,967	115,649
Lead (from 1919)	(tons) 353,201	21,457,925
Manganese	(tons) 1	3
Manganese Dioxide (from 1957)	(tons) 1,663	24,242
Monazite	(tons) 33	607
Nickel	(tons) 233	40,518
Osmiridium	(oz.) 31,088	708,531
Pyrite	(tons) 1,577,952	3,470,157
Rutile	(tons) 1	18
Scheelite	(tons) 19,809	18,477,894
Silica	(tons) 6,571	13,142
Silica for Silicon Alloy Production	(tons) 2,804	14,020
Silicon as Silicon Alloys	(tons) 1,865	134,280
Silver Lead Ore to 1918 (now shown under Silver and Lead)	(tons) 1,083,898	6,429,219
Silver (from 1919)	(fine oz.) 44,373,573	11,910,018
Sulphur as Sulphuric Acid (from 1957) (mono tons)	278,349	1,324,453
Tin	(tons) 148,990	37,509,223
Wolfram	(tons) 14,930	9,082,314
Zinc	(tons) 757,452	52,033,199
Zinc Sulphate (from 1957)	(tons) 1,972	93,823
NON-METALLIC MINERALS—		
Asbestos	(tons) 3,980	17,142
Barytes	(tons) 2,205	8,239
Clay—(from 1958)		
Brick	(cubic yards) 712,369	656,832
Tile	(cubic yards) 23,976	9,808
Other	(cubic yards) 108,856	106,284
Dolomite	(tons) 25,695	75,214
Graphite	(tons) 40	107
Kaolin	(tons) 111,086	441,509
Limestone—		
Agricultural and other	(tons) 569,405	684,890
Carbide	(tons) 658,904	863,444
Cement	(tons) 4,411,302	2,870,786
Chemical and Metallurgical	(tons) 4,128,907	2,382,118
Ochre	(tons) 2,354	7,594
Pebbles (from 1957)	(tons) 4,575	33,567
Silica	(tons) 170,023	118,679
Talc	(tons) 333	1,077
FUEL MINERALS—		
Coal	(tons) 9,224,337	11,738,563
Shale	(tons) 41,572	31,231
CONSTRUCTION MATERIALS—		
Building Stones—		
Freestone	(cubic yards) 3,168	19,696
Granite	(cubic yards) 5,607	41,216
Other	(cubic yards) 1,135	1,485
Crushed and Broken Stone—(from 1958)		
Basalt	(cubic yards) 461,705	410,747
Dolerite	(cubic yards) 3,280,357	4,821,769
Limestone	(cubic yards) 187,006	229,654
Sandstone	(cubic yards) 6,118	2,518
Other	(cubic yards) 725,011	626,018
Gravel (from 1958)	(cubic yards) 6,604,466	3,287,592
Sand (from 1958)	(cubic yards) 391,150	274,673
Other Road Materials	(cubic yards) 235,718	192,759
		<u>£296,241,122</u>

STATISTICS RELATING TO THE MINERAL INDUSTRY

Mineral.	Year ended 31st December, 1963.		Year ended 31st December, 1964.	
	Total Quantity.	Value £A.	Total Quantity.	Value £A.
<i>Metallic Minerals:</i>				
Cadmium (tons)	73	182,737	76	255,501
Cobalt Oxide (tons)	1.59	1,748	1.46	1,601
Copper (tons)	15,602	4,758,613	15,217	5,036,689
Gold (fine oz.)	31,989	499,837	31,551	492,980
Iron Oxide (tons)	4,221	6,004	6,808	9,681
Lead (tons)	11,889	1,011,543	11,823	1,439,803
Manganese Dioxide (tons)	325	6,337	304	5,947
Pyrite (tons)	56,402	169,206	66,381	199,143
Scheelite (tons)	1,010	279,103	1,063	554,641
Silica (tons)	....	....	6,571	13,142
Silica for Silicon Alloy Production (tons)	....	....	2,804	14,020
Silicon as Silicon Alloys (tons)	....	....	1,865	134,280
Silver (fine oz.)	1,438,858	828,991	1,477,416	863,533
Sulphur as Sulphuric Acid (mono tons)	46,355	231,775	57,926	289,630
Tin (tons)	1,005	1,192,513	990	1,618,643
Wolfram (tons)	382	111,651	364	195,567
Zinc (tons)	38,589	4,018,785	40,072	6,128,213
Zinc Sulphate (tons)	355	19,515	507	30,725
<i>Value of Metallic Minerals</i> .....	....	£13,318,358	....	£17,283,739
<i>Non-Metallic Minerals:</i>				
<i>Clay:</i>				
Brick (cubic yards)	98,949	94,075	113,664	104,173
Tile (cubic yards)	1,250	1,250	1,600	3,360
Other (cubic yards)	16,153	18,653	20,992	28,852
Dolomite (tons)	2,623	8,139	923	2,640
<i>Limestone:</i>				
Agricultural (tons)	22,627	37,284	29,961	34,502
Carbide (tons)	26,782	50,630	27,219	53,199
Cement (tons)	272,117	266,447	261,030	255,568
Chemical and Metallurgical (tons)	32,463	49,238	32,996	50,184
Other (tons)	476	5,135	312	3,268
Ochre (tons)	51	328	69	462
Pebbles (tons)	518	3,793	727	5,060
Silica (tons)	2,641	2,965	4,231	4,193
<i>Value of Non-Metallic Minerals</i> .....	....	£537,937	....	£545,461
<i>Fuel Minerals:</i>				
Coal (tons)	206,922	£429,422	151,161	311,315
<i>Construction Materials:</i>				
<i>Crushed and Broken Stone:</i>				
Basalt (cubic yards)	104,095	94,540	196,860	190,085
Dolerite (cubic yards)	597,537	749,373	557,981	677,690
Limestone (cubic yards)	28,676	34,563	24,292	26,668
Sandstone (cubic yards)	693	520	659	327
Other (cubic yards)	108,964	116,499	136,525	134,436
<i>Building Stone:</i>				
Freestone (cubic yards)	1,079	6,673	755	4,760
Red Granite (cubic yards)	34	4,030	3,569	3,672
Other (cubic yards)	232	109	195	287
Gravel (cubic yards)	1,173,982	634,312	1,286,348	694,220
Sand (cubic yards)	105,523	73,148	113,255	65,146
Other Road Material (cubic yards)	100,625	103,652	106,498	68,883
<i>Value of Construction Materials</i> .....	....	£1,817,419	....	£1,866,174
<i>Total Value with Australian Metal Prices</i> .....	....	£16,103,136	....	£20,006,689
<i>Metallurgical Production from other than Tasmanian Ores:</i>				
Alumina .....	....	....	....	....
Aluminium .....	....	....	....	....
Cadmium .....	....	....	....	....
Cobalt Oxide .....	....	23,978,797	....	32,499,359
Ferro-Manganese .....	....	....	....	....
Titanium Dioxide .....	....	....	....	....
Zinc .....	....	....	....	....
<i>Value of Mining and Metallurgical Production</i> .....	....	£40,081,933	....	£52,506,048
<i>Manufactured Products:</i>				
Product.	Total Quantity (tons)		Total Quantity (tons)	
Acetylene Black	146		221	
Ammonium Sulphate	35,434		30,226	
Carbide	12,590		13,259	
Cement	193,398		201,355	
Superphosphate	91,045		84,075	
Average Number of men employed	8,836		8,815	

AID TO MINING

Financial assistance was provided under the Aid to Mining Act 1927 in several instances after mining or geological reports had been submitted by officers of the Department.

Assistance continued to be advanced to the Storeys Creek Tin Mining Co. N.L. to complete the transfer and reconstruction of the Dorset Tin Dredge which was commenced last year. The final amount advanced was £110,000 which is secured by a mortgage on the assets of the Company. Productive mining has been established and repayments will commence at the end of June.

An amount of £9,916 was advanced to the Endurance Tin Mining Co. N.L. at South Mt. Cameron for the purchase of cyclones and jigs to enable tin recoveries to be improved and to modernize mining practices. Under the existing system of mining there are periodical "clean-ups" to recover tin concentrates for marketing but with the aid of the new equipment financed through the Department there can be constant production and higher returns from mining activities.

Interest was displayed by a Mainland firm with Japanese affiliations in the possibility of producing iron ore from small deposits at Hampshire and Highclere for shipment to Japan. In order to establish a sufficient volume and grade of ore a loan of £936 was made to Mr. A. Pearson, the holder of mining leases at Hampshire, to meet the cost of diamond drilling which was undertaken by the Department on a charge basis. The Hampshire deposit was not sufficiently large to supply the potential market and another small deposit at Highclere has been investigated. No finality has been reached as to the available market.

Four small parties also received assistance, mainly for the purchase of plant for use in alluvial tin mining operations.

King Island Scheelite (1947) Ltd.—Further advances were made to the Company of the assistance provided by the King Island Scheelite Agreement Act (No. 2) 1963. Total subsidies paid under this Act and the earlier Act (No. 20 of 1963) to 31st May, 1964, which is the terminal date prescribed under the No. 2 Act, amounts to £198,955. Both the Acts referred to contain provision for the repayment of the loan if the quotation for scheelite as quoted in the London Metal Bulletin exceeds basic prices prescribed and provide for application of a formula to fix the repayment rate. In the case of the first Act (No. 20 of 1963) the base price is 124/4 per long ton unit and repayments cease after 31st December, 1968. In the case of the No. 2 Act (No. 68 of 1963) the repayment formula is the same but in this case the basic price is 130/6 per long ton unit and repayments cease after 30th June, 1972. The subsidy under the first Act must be repaid first. During 1964 the price of scheelite improved beyond the base rate provided in the legislation and repayments became due. An amount of £12,500 has been received.

Mt. Bischoff Mine, Waratah.—Portions of the old Mt. Bischoff Tin Mine have continued to be worked by a few small tribute parties, one of which has treated alluvial areas in the Watarah River profitably.

Programmes of drilling and other investigational work have been pursued by holders of authorities to prospect on the reservation covering a radius of three miles from Waratah.

Particulars of authorities held are—

No.	Holder	Area
1AP/AM	N. F. Fooks	80 acres
3AP/AM	E.S. & A. Nominees	320 acres
4AP/AM	E.S. & A. Nominees	18,218 acres
5AP/AM	Aberfoyle Tin N.L.	2,682 acres

Mining Plant.—Mining equipment was purchased some years ago and is available for hire to small parties to sink and drive on mineral prospects. During the year the small compressor and rock drill were used on two prospects in the north-east and the larger portable compressor was hired to a tribute party at Mt. Bischoff.

STATEMENT OF RECEIPTS AND PAYMENTS OF THE MINING TRUST FUND FOR THE YEAR ENDED
31st DECEMBER, 1964.

<i>Receipts.</i>	£	s.	d.	<i>Payments.</i>	£	s.	d.
Balance, 1st January, 1964	40,865	14	1	Assistance	37,737	18	6
Repayment of Loans	2,722	10	0	Maintenance tribute plant Mt. Bischoff Mine, Waratah	328	14	10
Tribute Royalty	259	18	10	Mining Plant Maintenance	163	5	2
Hire of Mining Plant	225	1	6	Recovery of Abandoned Plant	178	5	2
Interest on Loans	222	14	5	Miscellaneous	13	19	6
Authorities to Prospect	22	3	0				
					38,422	3	2
				Balance to next Account	5,895	18	8
					£44,318	1	10
	£44,318	1	10		£44,318	1	10

STAFF

The following were the staff movements during the year:—

Name	Position	Remarks	
Barton, C. M.	Geologist	Appointed	17.2.64
Davies, C. D. (Miss)	Typist	Appointed	2.1.64
Down, V. (Miss)	Typist	Appointed	20.3.64
Eaves, B. D.	Field Assistant	Appointed	1.7.64
Furst, J.	Chemist	Appointed	30.3.64
Horwood, A. (Miss)	Typist	Resigned	23.8.64
Jennings, D. J.	Geologist	Appointed	30.3.64
Knox, B.	Surveyor	Appointed	23.12.63
Manchester, P. S.	Cadet Chemist	Appointed	11.2.64
Moore, W. R.	Geologist	Appointed	4.3.64
Smith, C. P.	Clerk	Resigned	21.10.64
Tetlow, P.	Chemist	Resigned	21.3.64
Webster, F.	Storeman	Appointed	23.11.64
Wellington, H. K.	Senior Metallurgical Engineer	Appointed	1.1.64

SCHOLARSHIPS

The holder of the geology scholarship, Mr. D. E. Leaman, graduated as a Bachelor of Science and was granted an extension of his scholarship for a further period of one year to study for an Honours Degree.

The Chemistry Scholarship holder, Mr. D. Pitcher, completed his first year of study and will continue his course at the University of Tasmania in 1965.

Applications are being invited for a Geology Scholarship and an award will be made so that studies may be commenced in 1965.

MINES DRAUGHTING SECTION

Number of Working Plans in use and kept up-to-date	245
Working Plans renewed and additional plans brought into use	9
Lithographs entered to date for sale	227
Miscellaneous Plans and Tracings prepared	50
Mineral Survey Diagrams drawn	27
Mineral Leases drawn	29
Mineral Leases drawn subject to Survey	49
Copies of reduced charts prepared for the Launceston Office	25
Copies of reduced charts prepared for the Derby Office	25

PUBLICATIONS

The following publications were issued during the year:—

Geological Map—Launceston Sheet (No. 39 of Geological Atlas)

Explanatory Report—Devonport Geological Map Sheet.

Technical Report—No. 8.

Pamphlet—Geology, Mineral Resources and Mining Industry.

CONCLUSION

Appreciation is recorded of the services rendered by officers of the Department, including officers of the Mines Draughting Section, Warden of Mines and Registrar 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 and 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.
1924-60	1,172	1,222,946
1961	62	98,286
1962	72	128,173
1963	73	182,737
1964	76	255,501
Total	1,455	£1,887,643

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 1.46 ton of cobalt oxide of value £1,601 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	£
1919-1960	272	103,794	8,081	2,068,342	371,128	51,430,715	404	10,581	379,885	53,613,432
1961	34	10,394	769	236,174	10,821	3,322,646	....	....	11,624	3,569,214
1962	33	10,103	1,014	309,379	12,902	3,935,110	....	....	13,949	4,254,592
1963 .....	....	....	1,157	352,888	14,445	4,405,725	....	....	15,602	4,758,613
1964 .....	....	....	1,075	356,023	14,142	4,680,366	....	....	15,217	5,036,689
Total	339	£124,291	12,096	£3,322,806	423,438	£67,774,862	404	£10,581	436,277	£71,232,540

The Mount Lyell Mining and Railway Company Limited, Queenstown

Mining—	Tons
Overburden removed	2,115,056
Ore Mined—	
West Lyell	2,120,346
Crown Lyell	19,509
Razorback	20,285
Prince Lyell	3,454
Royal Tharsis	2,537
Limestone delivered to works	8,663
Reduction—	
Concentrates smelted	53,468
Crown Lyell ore smelted	11,485
Precipitate smelted (North Lyell and Comstock)	49
Blister copper produced	14,230
Containing—	
Copper (tons)	14,142
Gold (fine oz.)	8,708
Silver (fine oz.)	59,807
Pyrite concentrate shipped	66,381
Total value of production	£4,938,778
Average number of men employed—	
Mining:	No.
Open cut	251
Underground	85
Other	1,211
Total	1,547
Production from the inception to 31st December, 1964—	
Copper (tons)	582,032
Gold (fine oz.)	603,233
Silver (fine oz.)	16,078,432

Mr. J. B. Braithwaite, Senior Mining Engineer, reports that development work in the underground mines was as follows:—

Mine	Driving Feet	Rising Feet	Total Feet
Crown Lyell—			
Levels	1,505	....	....
Stope	162	483	....
Drill Chambers	11	45	....
	<u>1,678</u>	<u>528</u>	<u>2,206</u>
Royal Tharsis—			
Levels	357	....	....
Drill Chambers	32	140	....
	<u>389</u>	<u>140</u>	<u>529</u>
Razorback—			
Stope	689	872	1,561
Prince Lyell—			
Levels	486	....	....
Drill Chambers	50	85	....
	<u>536</u>	<u>85</u>	<u>621</u>
Totals	<u>3,292</u>	<u>1,625</u>	<u>4,917</u>

A total of 32,178 feet of diamond drilling, comprising 101 holes, was drilled. This includes some surface holes at North Lyell.

Ore Reserves at 1st March, 1964, were as follows:—

Mine	Tons	Copper %	Silver oz.	Gold oz.
West Lyell	15,900,000	0.78	0.045	0.008
North Lyell	2,500,000	0.80	0.350	0.010
Lyell Tharsis	800,000	1.00	0.150	0.010
Razorback	188,000	1.80	0.08	0.016
Crown Lyell No. 2	51,000	5.7	1.27	0.021
Crown Lyell No. 3	3,435,000	1.6	....	....
Total	<u>22,874,000</u>	<u>0.93</u>	<u>....</u>	<u>....</u>

Development of the Razorback orebody was completed and production by horizontal ring drilling from footwall rises has commenced. Diamond drilling of the Crown Lyell No. 3 orebody was completed and plans for mining the economic orebody thus established are being prepared.

In the West Lyell open cut a Drillmaster drill was brought into operation and experiments with metallized T.N.T.-ammonium nitrate slurries were very successful. Experiments in the use of ammonium nitrate-fuel oil mixtures underground have commenced.

A rock mechanics section has been formed to assist in the planning of future large scale underground operations.

In the reduction plant the last of the pneumatic flotation cells was removed and the increase in flotation capacity in December resulting from the bringing into the circuit of three more 14-cell Agitair units lifted the recovery by a further 3%. Other improvements included the installation of a 16' x 4' Nordberg horizontal vibrating screen, water metering devices, two auto-weighers and a pulp density indicator. A 6' x 12' ball mill for regrinding middlings is being installed and tests on rubber-covered and all rubber screens proved their superiority over punched steel plates.

In the smelter the replacement of 15% of the coke fuel for the blast furnace by oil firing at the tuyeres has resulted in an overall saving in fuel costs and a reduction in the copper loss in the slag.

The change over to road transport between Queenstown and Strahan resulted in the expected reduction in operating costs and the opening of a road to the power station at Lake Margaret will mean a reduction in maintenance costs on the station and power line as well as an improvement in living conditions for the staff.

Electrolytic Zinc Company of Australasia Limited, Rosebery

This company, reviewed under Zinc, produced 10,214 tons of copper concentrate containing 1,075 tons of copper valued at £356,023.

GOLD

Quantity produced—

	Fine oz.	Value £
Prior to 1961	2,515,304	13,955,694
1961	24,528	383,268
1962	28,673	448,017
1963	31,989	499,837
1964	31,551	492,980
Total	<u>2,632,045</u>	<u>£15,779,796</u>

The Mount Lyell Mining and Railway Company Limited, Queenstown

This company recovered 8,708 fine oz., valued at £136,063 from sludge in the electrolytic copper refinery.

Electrolytic Zinc Company of Australasia Limited, Rosebery

Concentrates produced by this company contained 22,746 fine oz., valued at £355,404.

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

From the tin concentrates of this dredge, reviewed under Tin, 74 fine oz. of gold, valued at £1,157 was recovered.

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

This company, reviewed under Tin, saved 4 fine oz. of gold, valued at £62 from tin concentrates.

Mathinna

Mr. J. K. Guy sold 3 fine oz. of gold, valued at £46.

Maydena

Mr. J. U. Britten sold 6 fine oz. of gold, valued at £93.

Anonymous

An unknown person sold 10 fine oz. of gold, valued at £155.

IRON OXIDE

Quantity produced—

	Tons	Value £
Prior to 1961	90,547	90,267
1961	2,309	3,827
1962	4,082	5,870
1963	4,221	6,004
1964	6,808	9,681
Total	<u>107,967</u>	<u>£115,649</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 6,707 tons of hematite valued at £9,227. Employment averaged two men. In addition, 101 tons of limonite valued at £454 was supplied for use as a catalyst in coal gas generation.

LEAD

Quantity produced—

	Tons	Value £
1919-60	307,606	17,031,956
1961	10,278	1,026,909
1962	11,605	947,714
1963	11,889	1,011,543
1964	11,823	1,439,803
Total	<u>353,201</u>	<u>£21,457,925</u>

Electrolytic Zinc Company of Australasia Limited, Rosebery

This company, reviewed under Zinc, produced 14,209 tons of lead concentrates and the total content of the lead, zinc and copper concentrates was 11,412 tons valued at £1,389,800.

Farrell Mining Co. Ltd., Tullah

Ore mined and milled was 3,877 tons giving 644 tons of lead concentrates containing 411 tons of metallic lead of value £50,003. The silver content is shown under that heading. The average number of men employed was 20 on the surface and 13 underground.

At the beginning of December the property of this company was acquired by the Electrolytic Zinc Company of Australasia Limited and subsequent production is included in the operations of that company, reviewed under Zinc.

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 304 tons was valued at £5,947.

OSMIRIDIUM

There was no production in 1964. Total production, 1910-1964, has been 31,088 oz., valued at £708,531.

PYRITE

Quantity produced—

	Tons	Value £
1915-60	1,329,453	2,724,660
1961	71,087	213,261
1962	54,629	163,887
1963	56,402	169,206
1964	66,381	199,143
Total	1,577,952	£3,470,157

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

SILICA**The Broken Hill Proprietary Company Limited, Beaconsfield**

This company mined 9,375 tons of silica, valued at £27,162 for export to Newcastle for the manufacture of silicon alloys. This company also produced 6,680 cubic yards of gravel which appears under Construction Materials.

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

As a trial this company smelted a quantity of slag from silico-manganese production with silica to produce 1,865 tons of silicon as silicon alloys, valued at £134,280.

SILVER

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

Producer	Source	Quantity oz.	Value £
E.Z. Co. of A/asia Ltd.	Copper & Lead Concentrates	1,375,946	804,222
Farrell Mining Co. Ltd.	Lead Concentrate	41,663	24,350
Mt. Lyell M. & R. Co. Ltd.	Refinery Sludge	59,807	34,961

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.	£
1919-60	88,148	36,189	17,460,998	2,758,084	3,456,632	590,623	17,717,306	5,581,310	38,723,084	8,966,206
1961	16,373	6,958	62,576	26,880	48,290	20,770	1,165,529	499,825	1,292,768	554,433
1962	17,266	7,735	70,689	34,084	67,618	32,546	1,285,874	622,490	1,441,447	696,855
1963	.....	.....	54,674	31,419	62,771	36,242	1,321,413	761,330	1,438,858	828,991
1964	.....	.....	41,663	24,350	59,807	34,961	1,375,946	804,222	1,477,416	863,533
Total	121,787	£50,882	17,690,600	£2,874,817	3,695,118	£715,142	22,866,068	£8,269,177	44,373,573	£11,910,018

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 £
1957-1960	96,706	435,602
1961	33,564	158,850
1962	43,798	208,596
1963	46,355	231,775
1964	57,926	289,630
Total	278,349	1,324,453

TIN

Quantity produced:—

	Tons	Value £
1873-60	144,905	32,272,237
1961	879	1,022,094
1962	1,211	1,403,736
1963	1,005	1,192,513
1964	990	1,618,643
Total	148,990	£37,509,223

Aberfoyle Tin N.L., Rossarden

Mr. L. W. Morris, Mining Engineer, Launceston, reports that the tonnage of ore milled was 85,824 tons, an increase of 9,779 tons over the preceding year.

In addition 37,145 tons of accumulated tailings were re-treated.

Actual production was:—

	Concentrate Tons	Metal Tons	Value £
Tin	609	422	679,347
Wolfram	100	74	55,451

Capital works completed during the year included re-arrangement of the conveyor system from the shaft bin to the heavy media plant, and replacement of the primary crusher and re-arrangement of the layout.

Underground development comprised:—

Driving	480 feet
Rising	514 feet
Crosscutting	109 feet
Total	1,104 feet

Underground diamond drilling consisted of 23 holes, totalling 654 feet. There was no surface diamond drilling during the year.

Average employment—

Surface	100
Underground	151
Total	<u>251</u>

Cleveland Mine, Luina

The Aberfoyle Tin Development Partnership vigorously pursued the Cleveland Tin Development Project as described hereunder:—

Underground—

Hall's Lode—

Main adit advanced	325 feet
Driving on lode	1,174 feet
Crosscutting	571 feet

Henry's Lode—

Crosscut advanced	152 feet
Driving on lode	356 feet

Total	<u>2,578 feet</u>
-------------	-------------------

An electric locomotive, two mechanical boggers, eight 1-ton trucks and a 3-stage Aerofoil fan were put into use.

Surface—

Constructed—

1. Road from the Waratah-Corinna road to the main adit portal, 65 chains.
2. Sample reduction plant.
3. Loading ramps at main adit.
4. Telephone line to Waratah.

Installed—

1. Two diesel alternators and transmission lines.
2. Two air compressors, total capacity 970 c.f.m.

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

This company treated 395,700 cubic yards from the Clifton Workings for the production of 56 tons concentrate, containing 42 tons of tin, valued at £71,071

The average number of men employed was 25 in the open cut and 12 others, total 37.

The old workings ahead of the present face were drained during the year. Jigs and cyclones were acquired to replace the sluice boxes and some preliminary preparation was made for their erection.

Mussel Roe Mine, Pioneer

From his two working places near the Mussel Roe River, Mr. V. Wood treated 66,500 cubic yards of gravel for the production of 24 tons of concentrate containing 17 tons of tin, valued at £28,313. Average employment was six men.

Pioneer Mine, Pioneer

Mr. V. Wood employed four men on reopening this mine. The tail race from the Frome Power Station was reconditioned and a bridge built across the Ringarooma River to carry a syphon. The laying of the 39-inch pipeline was commenced.

Razorback Mine, Dundas

This mine, operated by Messrs. Hodge and Bye, produced less than one ton of concentrates, valued at £648. A considerable amount of prospecting was carried out by Clutha Development Limited under option. This consisted of a cross-cut adit of 492 feet and 386 feet of driving on lode. The ore was put through a bulk sampling plant erected for the purpose and bulk samples were treated in Mr. Dunkley's mill at Zeehan. On the surface diamond drilling consisted of 7,360 feet in 11 holes.

Renison Limited, Renison Bell

Renison Associated Tin Mines N.L. was liquidated in November and the assets were transferred to the holding company, Renison Limited.

This company mined 29,687 tons of ore from the Battery Mine and treated a total of 31,110 tons, including some ore from development of the Federal Mine. The ore showed an average assay of 1.54 % Sn and yielded 462 tons of concentrate containing 300 tons of tin valued at £488,929.

Development work included—

Battery Mine—

Driving	2,537 feet
Rising	665 feet

Federal Mine—

Driving	636 feet
Rising	217 feet
Sinking	38 feet

The average labour force was: surface, 46; underground, 20.

The diamond drilling of the Federal and Bassett lodes was completed and comprised 13 holes totalling 10,722 feet, including four deviations from previous holes. Five underground holes and one surface hole were drilled in the Battery area to assist development layout and totalled 958 feet. Drilling was also started at the Montana area but only two holes totalling 33 feet were completed by the end of the year.

The mill continued to operate as a pilot plant and greatly assisted research for future operation. The capacity is now being doubled to eight tons per hour by the addition of new plant, the major items being—

- 1 2-feet Gyratory Crusher.
- 1 5-feet x 4-feet Ball Mill.
- 16 24-inch Agitair Flotation Cells.
- Sundry Holman Tables and Fieldhouse Vanners.

This increase in the present mill capacity is merely a temporary measure pending the implementation of the plans for a major expansion of mining and the construction of a new mill.

Ore reserves as at 30.6.64 were as follows:—

Lode:	Battery-Boulder	Federal	Bassett	Black Face	Other	Total
Developed	111,000	....	....	19,500	....	130,500
Part Developed	140,000	....	....	....	....	140,000
Prospective	76,500	3,500,000	2,400,000	....	127,000	6,103,500
Totals	327,500	3,500,000	2,400,000	19,500	127,000	6,374,000
Assays % Sn	1.26	0.75	1.20	0.77	9.89	0.95

Star Hill Syndicate, Gladstone

This syndicate operates one mine and several small prospecting ventures in the vicinity.

Production for the year was 21 tons of concentrate containing 16 tons of tin valued at £26,279 from 110,000 cubic yards of gravel handled. Average employment was six men.

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

The dredge treated 1,232,000 cubic yards for the production of 77 tons of concentrate, containing 57 tons of tin valued at £104,876 and 74 oz. of gold, valued at £1,157. The average number of men employed was 44. Dredging commenced on the Black Duck-McGregor area north of Gladstone in March with satisfactory results. Check boring of the Scotia Lead was commenced late in the year but there was little activity connected with the kaolin project.

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

This company, reviewed under Tungsten, produced 125 tons of concentrates containing 93 tons of tin.

Production by Small Workers

Many miners and prospectors throughout the State produced small quantities of concentrates by reason of either small-scale or part-time working. Hereunder their work is described under the headings of various districts.

MOUNT BISCHOFF

M. G. Glozier & Partner, Thompson's Lode: Part-time work on this mine yielded tin concentrates containing 0.723 tons of tin, valued at £1,153. Employment averaged one man over the whole period. The rise was completed and some stripping of walls yielded the ore treated.

W. J. Hankey, Webster's Gully: Treating rich but very stony ground this operator produced concentrate with a content of 1.66 tons of tin valued at £2,723. Much work was carried out including the erection of a new camp to replace one destroyed by fire, road maintenance and scrub clearing.

G. Housego, North Lode Tribute: Dependent upon tunnel drainage and stormwater runoff this tributer was able to operate for nine months of the year. Treating detrital wash he produced concentrates containing 0.526 tons of tin, valued at £911.

B. Housego: Fossicking around the old 60 mill site and old aerial terminal, this operator treated spillage for the recovery of concentrates containing 0.189 tons of tin, valued at £317. He was not operating full-time.

J. Housego, Waratah Creek: Re-treatment of mill tailings yielded concentrates containing 1.206 tons of tin, valued at £2,037.

E. Kelly and C. Rist, Wheal Workings: Desultory work by this party during the second half of the year yielded concentrates containing 0.206 tons of tin, valued at £372. E. Kelly and F. Prouse produced concentrates containing 0.043 tons of tin, valued at £81 from the slopes below the Shovel Bench.

D. Kenworthy, Pig Flat Dyke: Operations by this tributer were of an experimental and prospecting nature yielding concentrates with a content of 0.096 tons of tin, valued at £154.

G. Machen, Don Hill: This operator installed an additional pumping plant and with the two plants in operation treated the Don Hill detritus for concentrates containing 5.121 tons of tin, valued at £8,723. Employment was three men.

C. J. Neighbour, North Valley: Single-handed sluicing operations of a desultory nature by this operator yielded concentrates with a tin content of 0.154 tons, valued at £250. Work was confined mainly to an area south of the North Valley battery site.

L. W. Wills, Black Tank: Underhand stoping from the surface, this operator worked part-time to obtain concentrates containing 0.205 tons of tin, valued at £360. His ore was crushed, tabled, and subsequently calcined and re-dressed.

N. F. Fooks, Waratah East: Operations on this area yielded concentrates containing 0.076 tons of tin, valued at £108.

G. Brown, Black Tank Area: This operator produced concentrates containing 0.173 tons of tin, valued at £248.

Harrington Bros. and Dishington: This party worked the Waratah Creek bed part-time for the recovery of concentrates with a tin content of 0.058 tons valued at £81.

DERBY-RINGAROOMA.

G. Raynor and Party, Briseis: This two-man party sluiced a terrace in the Cascade River on tribute to the Briseis Company. They produced concentrates containing 3.159 tons of tin, valued at £5,175. In 1963 they produced concentrates containing 3.823 tons of tin, valued at £4,445.

Messrs. T. and L. Merritt, Ringarooma River, produced concentrates containing 1.021 tons of tin, valued at £1,616 from the beaches.

Messrs. A. G. and G. J. Machen, Derby, mined Ringarooma River beaches to produce concentrates containing 1.312 tons of tin, valued at £2,214.

K. Kerrison, Derby, produced concentrates containing 1.685 tons of tin, valued at £2,642.

Miscellaneous: Messrs. L. Locsei, G. Cotton, L. G. Burr, L. Barnett, M. C. Chintock, J. M. Naylor, R. G. Hyde, C. Gibbons, R. J. Wolfe, A. Mott, A. F. Rainsford, H. Dean, W. J. McWatters, A. Kincade, H. K. Singline, J. Cox, and F. G. Smith produced individually small quantities of concentrates containing in all 1.65 tons of tin, valued at £2,758.

GLADSTONE.

J. Bartels, Gladstone: Mr. Bartels and Son continued to work in Cameron Creek, producing concentrates containing 0.955 tons of tin, valued at £1,693.

Dunstan and King, Amber Hill: This party produced concentrates containing 3.588 tons of tin, valued at £5,863.

Miscellaneous: Messrs. F. D., A. G., and K. Richardson, B. G. R., L., J., and M. J. Groves, A. G. Floyd, H. Fenton, J. W. Watt, B. S. H. and N. B. Moore, M. J. Brown, W. J. and J. Ponting, M. F. Fenton, T. M. Wilson, and R. C. Lawrey produced individually small quantities of concentrates containing in all 2.184 tons of tin, valued at £3,618.

MOUNT CAMERON-PIONEER

R. L. Rainbow, Banca Mine: Mr. Rainbow and Son continued to work the Banca Mine to produce concentrates containing 1.683 tons of tin, valued at £2,746.

Messrs. Kerrison, Pioneer: Messrs. J., M. J., and B. Kerrison worked on miner's right claims near the Wyniford River using two monitors supplied with water from the Frome Power Station tail race. They produced concentrates containing 2.565 tons of tin, valued at £4,481.

Mount Cameron Tin Syndicate, South Mount Cameron: This syndicate worked on a hillside adjoining the northern end of the Dorset Flats. A diesel-driven pump supplied pressure water and two men were employed. Production of tin in concentrates was 3.043 tons, valued at £5,035.

Miscellaneous: Messrs E. Kerrison, K. Barnes, S. F. Fenton, L. Torley, H. L. Summers, and T. Burrows produced individually concentrates containing in all 0.501 tons of tin, valued at £833.

ST. HELENS

M. G. Bevan: Mr. Bevan produced 0.038 ton, valued at £71, by cleaning up around old dumps in the Argonaut area.

A. B. Counsel: Mr. Counsel produced 0.208 ton, valued at £366, from some very poor shallow ground near the Rosebud Mine.

H. Moses: Mr. Moses produced 0.078 ton, valued at £144, from his mine in the Transit area.

Miscellaneous: Messrs. J. M. Brook, W. Kirwan, J. C. Berwick, D. and F. V. Bailey, W. Richards, C. J. Clifford, J. P. Reynolds, and F. L. Coker-Williams produced individually concentrates containing 0.832 tons of tin, valued at £1,434.

MOORINA-WELDBOROUGH

W. L. Boon: Mr. Boon worked his claim near the Weld River continuously, and produced 1.783 tons, valued at £3,110.

Messrs. J. and M. Lambert produced from the old school ground and vicinity at Weldborough. Their production was 0.701 tons, valued at £1,183.

Miscellaneous: Messrs. H. W. Terry, Adams and Saville, Burns and Adams, E. Russell and F. J. Mullins produced individually concentrates containing in all 0.285 tons of tin, valued at £427.

WEST COAST

C. D. King, Port Davey: Mr. King produced from the Melaleuca Mine concentrates containing 3.221 tons of tin, valued at £5,169. The method of working was unchanged.

A. R. Smith, North Heemskirk: Mr. Smith produced concentrates containing 0.673 tons of tin valued at £1,180 from his alluvial workings.

Miscellaneous: Messrs E. W. Coleman and Cook and Smith produced individually concentrates containing 0.092 tons of tin, valued at £152.

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. Banks and Coombes, Launceston.	Mr. P. L. Richardson, Avoca.
Mr. W. F. Marshall, Launceston	Mr. H. A. Anderson, Avoca.
Mr. T. K. Peterson, Launceston	Mr. M. Hodgetts, Scottsdale.
Mr. G. Wise, Launceston.	Mr. G. Chugg, Scottsdale.
Mr. T. Barrett, Cape Barren Island.	Mr. T. J. Holmes, Scottsdale.
Mr. D. Maynard, Cape Barren Island.	Mr. W. C. Archer, Gordon.
Messrs. Hayes & Sutcliffe, Gipps Creek.	Mr. C. J. Bayley, Smithton.
Messrs. Hayes & Cornelius, Gipps Creek.	Mr. R. Gillie, Middleton.
Messrs. Burr & Chugg, Scottsdale.	Mr. R. Maraldo, Hobart.
Mr. B. Mitchell, Swansea.	Mr. J. Pearce, Hobart.
Mr. L. McRae, Coles Bay	Mr. W. H. Young, Devonport.

The concentrates produced by all these operators contained 1.18 tons of tin, valued at £1,831.

TUNGSTEN (SCHEELITE)

Quantity produced:—

	Tons (Concentrates)	Value £
1917-60	15,730	16,809,658
1961	1,022	505,758
1962	984	328,734
1963	1,010	279,103
1964	1,063	554,641
Total	19,809	£18,477,894

King Island Scheelite (1947) Ltd., Grassy

Mr. L. F. Egan, Mining Engineer, Burnie, reports as follows:—

Mining.—Output totalled 422,324 tons, comprising 196,019 tons of ore and 226,305 tons of overburden. Mining was completed on the 70-foot level and the 40-foot level was well advanced on the footwall side. Ore was mined on the 10, 20, 40 and 50-foot levels.

Ore Reserves.—Ore reserves to the 110-foot horizon at 31st October, 1964, were 1,485,400 tons at an estimated grade of 0.525% WO_3 .

Blasting.—Trials were made with the water-compatible "Hydromex" explosive. It was found that considerable attention must be given to priming the explosive for effective initiation.

Milling.—Concentrate produced was 1,063 tons, valued at £554,641. The grade of concentrate was 70.544% WO_3 and the recovery averaged 72% of head assay.

Employment.—An average of 136 men were employed.

TUNGSTEN (WOLFRAM)

Quantity produced—

	Tons (Concentrates)	Vale £
1899-1960	12,443	7,958,720
1961	812	416,184
1962	929	400,192
1963	382	111,651
1964	364	195,567
Total	14,930	£9,082,314

Aberfoyle Tin N.L., Rossarden

Wolfram concentrates produced contained 74 tons of WO_3 valued at £55,451. This company is reviewed under Tin.

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

Tonnage of ore delivered to the mill was 28,459 tons, which is 2,944 tons more than the previous year.

Production from the ore treated was—

	Concentrates Tons	Metal Tons	Value £
Wolfram	264	193	140,116
Tin	125	93	147,405

Underground development comprised—

Driving	2,004 feet
Rising	26 feet
Total	2,030 feet

A total of 906 feet of diamond drilling was completed underground in 15 holes.

Capital works comprised—

1. Installation of two de-watering cones to condition mill tailings for use as stope fill.
2. Installation of piping and associated works necessary to enable fill to be placed underground.

The average number of persons employed was—

Surface	25
Underground	46
Total	71

ZINC

Quantity produced:—

	Tons	Value £
1919-60	608,829	34,831,526
1961	31,794	3,237,863
1962	38,168	3,816,812
1963	38,589	4,018,785
1964	40,072	6,128,213
Total	757,452	£52,033,199

Electrolytic Zinc Company of Australasia Limited**EXTRACTION FROM CONCENTRATES: RISDON***From other than Tasmanian Ores—*

	Tons
Zinc	98,733
Cadmium	261
Cobalt Oxide	23
Superphosphate	91,045

From Tasmanian Ore—

Zinc	38,526
Cadmium	69
Cobalt Oxide	1.46

Manufactured product—

Ammonium Sulphate	35,434
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Men employed—

The average number of men employed: 2,727

WEST COAST DIVISION*Ore Mined—*

	Tons
From Hercules Mine	25,944
From Rosebery Mine	269,115
From Farrell Mine	178
Total	295,237

Concentrates Produced—

	Tons
Zinc Concentrates	84,791
Lead Concentrates	14,659
Copper Concentrates	10,214
Total	109,664

Recoverable Quantity in Ore Mined—

Zinc	40,073	tons
Lead	11,412	tons
Copper	1,075	tons
Cadmium	76	tons
Silver	1,375,946	oz.
Gold	22,746	oz (fine)
Cobalt Oxide	1.46	tons
Manganese Dioxide	304	tons
Zinc Sulphate	507	tons
Sulphuric Acid	57,926	mono tons

Total Value of Production—£9,174,212.

Average Number of Men Employed—

	Surface	Underground	Total
Hercules Mine	9	29	38
Rosebery Mine	388	296	684
Farrell Mine	3	4	7
Total	400	329	729

ROSEBERY, HERCULES AND FARRELL MINES

Excluding driving and rising work in connection with sub-levels and ore passes from main to sub-levels, development at the Rosebery Mine consisted of:—

	Feet
<i>Driving on—</i>	
No. 16 Level	102
No. 14 Level	1,297
No. 13 Level	979
No. 12 Level	262
No. 11 Level	105
Total driving	2,736

Rising from—	Feet
No. 14 Level	529
No. 13 Level	763
No. 11 Level	128
Total rising	<u>1,420</u>

In connection with the deepening of the main shaft a winze was advanced 237 feet to 591 feet, 67 feet below No. 17 level. A crosscut was commenced from No. 16 level plat towards the shaft position. Driving towards the southern end of the ore-bodies was continued on Nos. 13 and 14 levels. The above footages driven include 698 feet and 81 feet on Nos. 14 and 12 levels respectively to provide access to diamond drill sites.

Development at the Hercules Mine consisted of—

Driving on 6 Level	126
Rising from 5 Level	40
Rising from 3A Level	120
Rising from 3 Level	73
Total driving and rising	<u>233</u>

Diamond drilling at the Rosebery Mine totalled 15,869 feet of which 8,034 was exploration and 7,835 development. At the Hercules Mine the total was 2,290 feet, of which 1,228 was exploration and 1,062 development.

The Farrell Mine was acquired in December, the mill shut down and the ore carted to the Rosebery Mill where it is crushed with Hercules ore. Diamond drilling at this mine was 70 feet and 26 feet of driving was carried out on No. 9 level.

On the treatment side the new 36" x 24" jaw crusher for Rosebery ore was brought into operation together with a dust collecting system which is also connected to the crushers operating on Hercules and Farrell ore. Increased regrind capacity was installed in both the lead and zinc sections of the mill and cyclones are being tested as replacements for the rake classifiers. Twelve new zinc recleaner flotation cells replaced worn units.

RISDON WORKS.

Work by the Research Department on the treatment of residues containing lead, silver and gold, in addition to the zinc residue, has resulted in the development of a pilot plant and construction work has now started on this. The following additions and alterations were also made:—

A new plant to produce aluminium sulphate was constructed and brought into operation.

New equipment for the production of superfine zinc dust was installed.

The sulphuric acid capacity was increased by the addition of new plant.

The zinc melting furnaces were converted to use furnace oil.

The superphosphate plant was modified to allow the preparation of mixed fertilizers and the control of electric power was centralized.

ZINC SULPHATE

This is a by-product from the treatment of zinc concentrates by the Electrolytic Zinc Company of Australasia Limited. The quantity produced was 507 tons and value £30,725.

2.—NON-METALIC MINERALS

CLAY

Quantity produced—

	Cubic yards	£
1958-60	363,064	288,403
1961	115,860	112,372
1962	113,669	121,786
1963	116,352	113,978
1964	136,256	136,385
Total	<u>845,201</u>	<u>£772,924</u>

Company	Clay cu. yd.	Value £	No. of Men	Product
Agripipe Pottery Pty. Ltd., Relbia	1,413	707	5	Pipes
Burnie Brick Co., Cooee	7,950	2,935	13	Bricks
Campbell, John, Pty. Ltd., Launceston	810	236	14	Pipes
Crisp & Gunn Co-op. Ltd., West Hobart	1,614	20,524	41	Bricks
Goliath Portland Cement Co. Ltd., Railton	13,258	22,542	3	Cement
Hazell Bros., Margate	5,236	6,535	1	Bricks
Hobart Brick Co., New Town and Granton	11,718	14,647	34	Bricks
Huttons Bricks Pty. Ltd., Prospect	5,937	4,066	13	Bricks
Kings Bay Contractors, Kingston	16,526	6,867	1	Bricks
Kings Meadows Bricks, Kings Meadows	15,433	15,433	20	Bricks
Luck Brick and Pipe Pty. Ltd., Dulverton	8,712	6,533	19	Bricks
McHugh Bros. Bricks Pty. Ltd., Granton	11,600	14,500	18	Bricks
McHugh Bros. Pty. Ltd., Granton	1,054	1,712	17	Pipes
McHugh Bros. Pty. Ltd., Launceston	2,377	2,615	22	Pipes
McHugh Bros. Pty. Ltd., Prospect Vale	11,133	11,133	12	Bricks
Wise, G. R. & Son, Relbia	2,080	1,040	1	Bricks
Wynyard Brick, Wynyard	3,000	1,000	4	Bricks
Wunderlich Pty. Ltd., Loira and Launceston	1,600	3,360	25	Tiles

DOLOMITE

Quantity produced—

	Tons	Value £
Prior to 1961	18,824	54,546
1961	1,108	3,155
1962	2,217	6,734
1963	2,623	8,139
1964	923	2,640
Total	25,695	£75,214

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

This company, the sole producer, employed an average of two men and decreased production by 1,700 tons. The stone is milled for top-dressing in agriculture.

KAOLIN

There was no production in 1964. The total quantity produced, 1940-1964, was 111,086 tons, valued at £441,509.

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	£
1919-60	3,512,433	1,999,197	549,897	667,371	4,002,937	2,171,100	475,388	550,462	8,540,655	5,388,130
1961	132,580	121,288	26,632	45,501	24,816	46,663	19,314	23,308	203,342	236,760
1962	233,142	228,286	28,374	46,743	35,695	64,933	21,327	30,931	318,538	370,893
1963	272,117	266,447	26,782	50,630	32,463	49,238	23,103	42,419	354,465	408,734
1964	261,030	255,568	27,219	53,199	32,996	50,184	30,273	37,770	351,518	396,721
Totals	4,411,302	2,870,786	658,904	863,444	4,128,907	2,382,118	569,405	684,890	9,768,518	6,801,238

Australian Commonwealth Carbide Company Ltd., Ida Bay and Electrona

This company quarried 27,219 tons of limestone, valued at £53,199, at Ida Bay and transported it to Electrona where most of it was used in the manufacture of calcium carbide.

The products were calcium carbide amounting to 12,590 tons, valued at £706,238, and 146 tons of acetylene black, valued at £15,070. The labour employed by the company was—

Limestone quarry	26
Calcium carbide production	172
Acetylene black	8
Total	206

Australian Newsprint Mills Ltd., Junee

This company quarried 5,988 tons of high-grade limestone, valued at £15,070, from their Junee quarry and transported it by road and rail to the mill at Boyer where it was burnt to lime and used in the production of newsprint. Six men were employed in the quarry.

The Mount Lyell Mining and Railway Company Limited, Hall's Creek

This company quarried 8,663 tons of limestone, valued at £12,996, 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.

A. R. Beams, Flowery Gully

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

	£
560 tons agricultural limestone, valued at	1,680
18,215 tons limestone for chemical and metallurgical purposes, valued at	21,858
310 tons burnt lime for various purposes, valued at	3,255
19,085 tons Total Value	£26,793

Fourteen men were employed.

R. K. Sulzberger, Launceston and Flowery Gully

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

	£
566 tons agricultural limestone, valued at	1,162
130 tons limestone for chemical and metallurgical purposes, valued at	260
696 tons Total Value	£1,422

Men employed are recorded under Construction Materials.

Goliath Portland Cement Co. Ltd., Railton

Limestone quarried and used in the manufacture of cement weighed 261,030 tons, valued at £255,568. Average employment in the quarry rose from 20 to 26 men. Cement production consisted of 123,169 tons of fine cement, valued at £1,108,521, and 70,229 tons of clinker cement, valued at £351,145, making an overall total of 193,398 tons, valued at £1,459,666. The average employment was 257 men.

Consistent with the progressive outlook of this company is the following list of recent major additions to the work's equipment:—

- (1) N.C.K. Rapiere electric shovel, 3½ cu. yd. capacity.
- (2) New quarry substation for 3.3 KV. power; 500 KVA transformer.
- (3) Two Leyland Super-Hippo 200 h.p. lorries, capacity 22 cu. yd.
- (4) L.W. 16 Le Tourneau Westinghouse bulldozer.
- (5) Aveling Austin grader.
- (6) Railway lines through bagging section relaid and the floor concreted throughout.
- (7) Provision for covered loading point for bulk cement road vehicles.
- (8) Lockers Convey weight feeders for both coal firing plants.
- (9) Autoclave unit in the asbestos cement factory, consisting of a 42 feet x 6 feet autoclave and a 200 h.p. Maxitherm oil-fired boiler.
- (10) Oil firing installation for No. 1 and No. 3 Kilns consisting of a 750 tons oil storage tank, two Radco hot oil units, together with Pillard oil firing burners and associated pumping equipment.
- (11) The floor of the men's change-room has been tiled, and 140 new steel lockers provided. Showering facilities have been improved.
- (12) Concrete entrance road to the works constructed.
- (13) Extensions to general office building.

Melrose Agricultural Lime Quarries, Eugenana

Work was resumed in the old No. 2 quarry during the year, a lower bench being developed with a drainage outlet to the river, production of ground limestone fell to 2,020 tons, valued at £5,042, an average of three men being employed in the quarry and two in the workshop and crusher house.

Mineral Supplies, Ulverstone

Sales of stocks on hand by this firm amounted to five tons, valued at £42.

Railton Lime Works, Railton

Two men were employed at this works to crush and mill 22,205 tons of limestone, valued at £21,448, supplied by the Goliath Company.

Wright Stephenson Pty. Ltd., Pulbeena

Reduced demand was reflected in the decreased production of 4,905 tons of limesand, valued at £6,130, compared with 6,628 tons in the previous year. Average employment was two.

OCHRE

Quantity produced—

	Tons	Value £
1918 to 1960	2,099	5,905
1961	75	509
1962	60	390
1963	51	328
1964	69	462
Total	<u>2,354</u>	<u>£7,594</u>

A. Pearson, Spalford and Deep Creek

Production of red and yellow ochre from these pits was 69 tons, valued at £462.

PEBBLES**A. Pearson, Ulverstone**

The collection of pebbles for grinding was continued on the beaches around Ulverstone. The output was 727 tons, valued at £5,060.

SILICA

Quantity produced—

	Tons	Value £
1936-60	161,222	106,425
1961	1,415	2,042
1962	514	3,054
1963	2,641	2,965
1964	4,231	4,193
Total	<u>170,023</u>	<u>£118,679</u>

Australian Glass Manufacturers Ltd., South Arm

This company obtained 3,351 tons of silica sand, valued at £2,881, for the manufacture of glass.

Mineral Supplies, Ulverstone

This firm supplied 880 tons of silica, valued at £1,312. Of this, 864 tons were extracted from the Leven River pit for use in cement manufacture and 16 tons were mined at the Forth quarry for use as a metallurgical flux.

3.—CONSTRUCTION MATERIALS

BUILDING STONE

Quantities produced—

	Cubic Yards	Value £
Freestone	755	4,760
Granite	3,569	3,672
Other	195	287
Total	<u>4,519</u>	<u>£8,719</u>

Freestone was quarried and dressed in three quarries near Hobart for walls, fireplaces and paving. A quartz schist was put to similar usage at Burnie. Granite was used by the Utah Company in breakwater construction in Burnie harbour.

CRUSHED AND BROKEN STONE

The largest producers were Government and semi- and local government authorities, accounting for 383,118 cubic yards of crushed and broken stone, valued at £480,125. Dolerite, being both suitable and widespread, was quarried most extensively for road and concrete making.

Basalt

Quarry	Men	Cu. yd.	Value £
A.F.H., Surrey Hills	4	3,082	2,627
A.N.M., Maydena	5	27,117	22,163
Bonney, Mooreville	7	16,900	12,675
Brighton Council	4	7,300	5,475
Esperance Council .. .. .	..	1,045	863
Harrison, East Risdon	1	3,305	2,479
H.E.C., Meadowbank	13	98,501	109,354
H.E.C., Repulse	3	4,973	8,715
H.E.C., Butlers Gorge	3	980	1,220
Utah, Mooreville	3	19,037	13,271
Weily, Bridgewater	7	11,384	7,203
Wynyard Council	7	3,236	4,040
Total	<u>57</u>	<u>196,860</u>	<u>£190,085</u>

Dolerite

Quarry	Men	Cu. yd.	Value £
Bain, Dynnyrne	9	19,530	19,530
Esperance Council	2	8,248	7,831
Gordon, Glenorchy	6	18,800	16,520
Grubb, Moonah	6	21,866	19,451
Hobart Quarries, New Town	29	139,340	159,975
H.E.C., Arthurs Lakes	2	13,730	10,984
H.E.C., Butlers Gorge	11	16,939	18,062
H.E.C., Poatina	9	17,672	19,233
Launceston Quarries, Mowbray	16	80,452	91,255
McHugh, Waverley	7	10,016	11,932
Public Works Department	152	170,217	261,774
Others	10	41,171	41,143
Total	<u>259</u>	<u>557,981</u>	<u>£677,690</u>

Limestone

Quarry	Men	Cu. yd.	Value £
Melrose, Eugenana	1	2,480	2,580
Stone & Sons, Devonport	3	6,350	4,763
Weily, Glenorchy	13	15,462	19,325
Total	<u>17</u>	<u>24,292</u>	<u>£26,668</u>

Other Stone

Quarry	Men	Cu. yd.	Value £
Devon Metal Supplies, Devonport	11	12,148	9,111
Eastern Shore Quarry, Flagstaff Gully	5	8,887	7,446
Electrolytic Zinc, Rosebery	2	1,924	3,831
Fingal Council	.....	1,380	970
Harris, Middlesex	.....	1,500	1,125
Hobden, Rokeby	3	6,719	5,039
H.E.C., Poatina	.....	5,702	4,002
Jones, Burnie	2	5,875	4,405
Mt. Lyell Co., West Lyell	4	62,262	73,997
Sorell Council	5	20,341	16,735
Others	7	9,787	7,775
Total	39	136,525	£134,436

Gravel

Pit	Men	Cu. yd.	Value £
Associated Forest Holdings	3	37,258	18,628
Beaconsfield Council	2	28,594	14,297
Bonney, Calder	4	17,500	8,750
Circular Head Council	2	55,681	27,340
Deloraine Council	2	27,356	13,678
Devonport Council	2	17,943	8,971
Flinders Island Council	2	20,867	10,433
George Town Council	3	23,703	11,850
Hobart City Council	2	24,000	12,000
Kentish Council	9	15,563	7,781
New Norfolk Council	2	20,424	10,212
Ringarooma Council	2	27,091	13,544
Scottsdale Council	2	19,280	9,640
Woodfield and French, Launceston	15	56,162	56,162
Government Departments	62	516,223	258,161
Others	37	378,703	212,773
Total	151	1,286,348	£694,220

Sand

Pit	Men	Cu. yd.	Value £
Bonney, Calder	1	8,450	4,225
Churchill, Sandford	2	5,200	4,230
Devon Metal Supplies, Devonport	2	4,647	2,323
Fielding, Calder	1	7,122	3,560
Grubb & Sons, South Arm	1	8,401	4,200
Johnson, Seven Mile Beach	1	5,669	2,835
Long, South Arm	3	31,800	15,900
Priest, South Arm	.....	7,540	3,770
Woodfield & French, Launceston	.....	4,008	2,640
Others	12	30,418	21,463
Total	23	113,255	£65,146

Other Roadmaking Materials

Pit	Men	Cu. yd.	Value £
Devonport Council	1	15,430	7,715
H.E.C., Poatina	5	25,617	27,986
Jones, Round Hill	2	4,675	2,264
Estate E. B. Watchorn, Prospect	1	4,922	2,460
Woodfield & French, Launceston	.....	45,626	22,813
Others	4	10,228	5,645
Total	13	106,498	£68,883

4.—FUEL MATERIALS**COAL**

Quantity produced—

	Tons	Value £
Prior to 1960	8,040,414	9,065,569
1960	297,670	673,543
1961	255,828	611,140
1962	272,342	647,574
1963	206,922	429,422
1964	151,161	311,315
Total	9,224,337	£11,738,563

Mr. W. R. Tindal, Mining Engineer, reports that there has been a drop in production of 55,761 tons of coal, equivalent to 27%. The number of employees decreased from 167 to 108, of whom 65 were employed underground. The production per man year increased from 2,249 to 2,376 tons for underground employees and from 1,299 to 1,400 overall.

The fall in production has been caused by loss of markets due to increased use of fuel oil.

Cornwall Coal Mine, Cornwall

Production from this colliery, operated by the Cornwall Coal Company N.L., ceased at the end of January, except for the driving of one of the headings in Blair Tunnel to the outcrop. Equipment and material is being withdrawn from the various sections.

Duncan Coal Mine, Fingal

The workings of this colliery, operated by the Cornwall Coal Company N.L., are confined to one seam, which is the same as that worked in the Fingal Coal Mine. The seam is between eight and ten feet high with a very good roof and a soft mudstone floor which, if water is present, has a tendency to break up.

With the closure of the Cornwall Mine operations at this colliery were increased to cope with the orders held by the Company. A second conventional mechanized unit was started working bord and pillar. The first working of the panel, being worked by the first mechanized unit, was completed and a start was made on extracting the pillars.

Coal was conveyed from the face by D.C. shuttle cars which loaded onto gate belts and thence to trunk belts. The trunk belts discharged into skips which were taken to the surface by an endless rope haulage. The coal was taken by road to the Company's washery at Fingal.

The production from this colliery was 88,424 tons, an increase of 16,676 tons, with 50 employees. This gives an increase in overall production per man year from 1,594 to 1,768 tons. Production for almost the whole of the year has been on four shifts per week with the fifth shift being utilized for maintenance.

Fingal Coal Mine, Fingal

In this mine the Fingal Coal Company Pty. Ltd. has confined its workings to the virgin areas in the re-entrant block near the Duncan workings and to the area on the right-hand side of the main tunnel being opened up at the end of 1963.

The right-hand side workings gradually thinned and became too thin and inferior to work, so the winning of the coal was then moved to a block between the Fingal and the Tasmanian Colliery. The roof in the areas being worked was good and the floor reasonable.

The getting of coal from this colliery was by hand methods using horse wheeling and main and tail haulage to the surface. Production from this colliery was 21,434 tons, a decrease of 313 tons with the same number of employees, namely 17. There was a decrease in overall production per man year from 1,279 tons to 1,261 tons.

Valley No. 2 Coal Mine, Fingal

This colliery worked the whole of the year in conditions similar to those of 1963, being extension of the workings on the right-hand side, and using the same methods, namely mechanical cutting, hand loading, horse wheeling and main and tail haulage to surface.

Due to the part owners, Goliath Cement Company at Railton, deciding to change over to oil the colliery was closed at the end of the year.

Production was 11,997 tons, an increase of 345 tons, with 12 employees as in the previous year, and an overall production of 1,000 tons per man year.

Seymour Coal Mine, Seymour

This colliery ceased production on 30th July. The workings were extended to the west and the north with the seam thinning in each direction and rising. The method of production was by hand using hand wheeling. Production for the past year was 2,528 tons from three employees at a rate of 1,124 tons per man year.

New Stanhope Coal Mine, Avoca

The output from this colliery was obtained from pillar extraction in No. 1 Tunnel and from primary workings in No. 2 Tunnel. The extraction of pillars has been temporarily stopped. The pillars are being extracted by multiple splits and mining of the fenders on the retreat. The loading of the coal has been by scraper loader into skips which are drawn to the surface by a main and tail haulage.

The method of working at the No. 2 Tunnel is mechanized. The coal is grunched and loaded onto scraper chain conveyors, either by a trackless Joy loader or an electrically operated calf dozer which discharges onto a rubber conveyor belt running to the bins at the washing plant. The coal is sold as two products, either large unwashed or washed smalls.

Production from this colliery was 20,544 tons, an increase of 2,558 tons, with an increase of one in the number of employees to 14. Overall production per man year was 1,467 tons, an increase of 83 tons.

Mt. Christie Coal Mine, Avoca

This colliery is still working the small area of coal near the major fault with its steep grade. Virgin coal remaining is very small and extraction of pillars will soon start. The same method of working has been used during the year.

Production for the year was 1,808 tons, an increase of seven tons with an overall production per man year of 904 tons, an increase of four tons.

Sandfly Coal Mine, Kacota

Mr. O. L. Roberts produced a semi-anthracitic coal for use in hop kilns and for household purposes.

The area of virgin coal between the major fault and old workings has almost been worked out and pillar-extraction will soon commence. There has been no change in the method of working or the physical conditions.

Production from this colliery was 2,065 tons, a decrease of 16 tons for the year, with the same number of employees, namely four, giving an overall production per man year of 516 tons, a decrease of four tons.

5.—FOREIGN ORES

The total value of the metallurgical products of four large works treating foreign ores imported into Tasmania was approximately £32,499,359.

ALUMINIUM

During the year Comalco Aluminium (Bell Bay) Ltd. produced 43,771 tons of aluminium from 109,445 tons of bauxite from Weipa and 33,221 tons of imported alumina. Average employment was 954 persons.

Capital works completed during the year included—

- (1) The metal casting station and associated equipment.
- (2) Boiler conversion from coal to fuel oil burning.
- (3) 600 Sec. fuel oil system and associated equipment.

Work commenced included the conversion of reduction furnaces and 110 KV bus zone protection.

FERRO-MANGANESE

The Tasmanian Electro-Metallurgical Company Pty. Ltd., Bell Bay, during the year smelted 61,345 tons of imported manganese ore for the production of 34,719 tons of ferro-manganese. No major capital works were carried out. The average employment was 87 men.

TITANIUM DIOXIDE

Australian Titan Products Pty. Ltd. is to extend its plant capacity to 25,000 tons of pigment per annum at an estimated cost of £500,000. The market continued firm and export markets were successfully opened up. A total of 15 grades of pigment are produced.

The whole of the ilmenite, 40,190 tons, was imported from Western Australia and the quantity of pigments produced was 20,011 tons, an increase of 3,881. The average employment was 498 persons. An already very low accident frequency rate was much reduced, to 8.2 per million man hours worked.

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, Terence D. Hughes, B.Sc., M.Aus.I.M.M.

There were no changes in geological staff throughout the year and this stability added greatly to the efficiency of the Survey. As usual, members of other divisions of the Survey were seconded to the Regional Geology section for the short (January to April) field season and further progress was made in the mapping of the Mackintosh Sheet in appalling weather conditions and under exceedingly trying field conditions. In contrast the mapping of the Pipers Sheet in the North-East, although carried out in the winter and spring, was completed under much easier field conditions.

On the economic side, attention was again focussed on tin and iron deposits, although re-appraisals of most of the major gold deposits of the State were carried out and drilling commenced on targets at the old Tasmania Gold Mine at Beaconsfield and the old Golden Gate Mine at Mathinna.

The activities of the engineering section were concentrated more on dam sites and bridge sites than on unstable town areas as in the previous year.

Congratulations are extended to C. M. Barton on gaining his Ph.D. degree and to Cadet D. E. Leaman on completing his B.Sc. degree. B. Knox was promoted from Senior Field Assistant to Surveyor and B. Eaves was appointed Field Assistant.

REGIONAL GEOLOGY

Senior Geologist E. Williams reports:—

During the year regional geological mapping was continued on a number of 1-mile sheets. Progress was as follows:—

(1) *Launceston 1-mile Sheet*—

Geologist M. J. Longman completed the mapping and the sheet has been published. Explanatory notes are with the Publications Officer prior to publication.

(2) *Pipers River 1-mile Sheet*—

Geologists C. M. Barton, D. J. Jennings, B. Marshall and Temporary Geologist I. H. Naqvi completed the mapping and the sheet is now in the process of being published.

(3) *Table Cape 1-mile Sheet*—

Geologist R. D. Gee has completed the mapping and the sheet is being prepared for publication.

(4) *Burnie 1-mile Sheet*.

Geologist R. D. Gee has completed most of the mapping and little remains before the sheet can be prepared for the drafting section.

(5) *Mackintosh 1-mile Sheet*—

Ten geologists were engaged in mapping this difficult terrain in unpleasant weather. However, some 70% of the area was completed.

ECONOMIC GEOLOGY

Senior Geologist A. J. Noldart reports:—

METALLIC MINERALS

Tin—

In the North-East percussion and auger drilling in the Great Fraser deep lead was completed and a report compiled by Geologist R. Jack. No significant deposits of tin were located.

A geophysical (gravimeter) survey to delineate potential tin-bearing deep leads in the Ringarooma-Boobyalla area was continued by personnel of the Bureau of Mineral Resources.

A level survey of portion of the North-East tinfields was made by Surveyor B. Knox.

Geologist R. Jack examined tin-bearing gravel deposits on Flinders Island and periodically examined prospects and workings throughout the North-East.

The regional economic appraisal of the Meredith Range-Yellow Band Creek-Mt. Frazer tin province was continued in the early part of the year and a preliminary report and maps submitted by Geologists R. Jack and D. I. Groves.

In other localities examinations were made of Fooks Prospect, Thompsons Lode, Mt. Bischoff and Cleveland in the Waratah district; the Razorback Mine, Dundas; and Cranes Prospect, Upper Natone.

Gold—

The Mangana-Mathinna-Alberton gold province survey was extended north to the Mt. Horror district, and a covering report and maps submitted by Geologist V. M. Threader. The suspended diamond drilling programme on the Golden Gate Mine, Mathinna, was resumed.

A resurvey of the Lefroy gold mining centre was completed by Geologist D. I. Groves and a report and plans prepared. Some magnetometer traverses carried out to determine buried basaltic coverage in the area were not successful.

Diamond drilling of the Tasmania quartz reef at depth was commenced and a gravimeter survey carried out over the Beaconsfield deep lead by personnel of the Bureau of Mineral Resources.

Some prospecting was carried out by W. Pitulej in the Corinna area.

Iron—

Field mapping and petrological studies of the Savage River-Rocky River iron ore deposits were completed and a preliminary report compiled by Geologist G. Urquhart. Some surveying of additional drill sites in the area was carried out by Surveyor B. Knox.

A portable magnetometer survey of the Rocky River iron ore deposits was carried out by the Chief Geologist, T. D. Hughes, Senior Geologist A. J. Noldart, and Surveyor B. Knox in conjunction with the field mapping.

A magnetometer survey was also carried out on the Highclere deposits and diamond drilling programmes completed on these and the Hampshire deposits. Plans and reports on both projects were compiled by Geologist R. Jack.

Magnetometer checks were also carried out by Geologist R. Jack over other aeromagnetic anomalies in the Burnie-Hampshire area and an examination of superficial iron occurrences on Bruny Island was made by Geologist D. I. Groves.

Silver Lead—

A report and accompanying maps on the Tullah silver-lead field was prepared by Senior Geologist A. J. Noldart and Geologist D. I. Groves.

Manganese—

A manganese occurrence in the Natone area was examined by Geologist R. Jack and a report submitted.

Molybdenum—

Molybdenum occurrences in the Mt. Remus area and at Camden Road in the North-East were examined by Geologist V. M. Threader and reports compiled.

FUEL MINERALS

Coal—

A geological survey of portion of the Fingal coal field was carried out by Geologist V. M. Threader and a report submitted.

Diamond drilling commenced on a previously suspended drill hole in the area.

NON-METALLICS

Clay—

Deposits of potential brick-making materials were examined in the Wynyard and Kingston districts by Geologist V. M. Threader and reports compiled. A brief auger drilling programme was completed on the Kingston deposits.

Clay deposits at Mathinna, Railton and possible bentonitic deposits in the Launceston area were also examined.

Construction Materials—

A potential basalt quarry site at Waterhouse in the North-East was examined and reported on by Geologist R. Jack.

Potential deposits of road gravel and aggregate in the Beaconsfield district were examined by Senior Geologist A. J. Noldart.

Sand—

Sand deposits in the Kingston area were examined by Geologist V. M. Threader and some prospecting was carried out on deposits in the Railton district. Coarse sand deposits in the Grass Tree Hill area were also examined as a possible source of aggregate material.

Silica—

An examination was made of high-grade silica deposits in the Beaconsfield area by Senior Geologist A. J. Noldart.

GENERAL

Revisions were completed on the mineral section of the Tasmanian Industrial Index and on the Department of Mines Mineral Resources and Mining Industry Pamphlet.

A revision of Bulletin 44 was commenced.

A granite sampling project was carried out on Granite Tor utilizing helicopter transport and a portable powered jack hammer.

ENGINEERING GEOLOGY AND WATER SUPPLY

Senior Geologist I. B. Jennings reports:—

The main engineering geology study during the year was that of the geological conditions likely to be encountered in the construction of a major dam at Risdon Brook, near Hobart. In addition to this, numerous other smaller projects were investigated including bridge and building foundations, reservoir sites and pipeline routes, landslides and highway problems.

Underground water investigations were confined mostly to the far North-West and the Cygnet district. A separate study was made of a proposal to obtain fairly large quantities of groundwater for industrial use at Wesley Vale.

Details of this work are given below—

ENGINEERING GEOLOGY

Risdon Brook Dam—

Geologist W. R. Moore prepared detailed geological maps and sections in the vicinity of the damsite incorporating all surface and subsurface information obtained during the investigations. A regional map of an area surrounding the dam site was also prepared and arrangements made for a geophysical survey of the area.

Bridges—

Geological investigations were made for proposed new bridges at Trevallyn, Little Swanport and Hadspen. At the Batman Bridge a study was made of the occurrence of corrosive groundwater.

Buildings—

Geological advice was sought and investigations, including boring programmes in most instances, were undertaken with respect to foundations for the following buildings:—

- (a) Factory sites near Hobart.
- (b) Proposed medical school, Lower Collins Street, Hobart.
- (c) Proposed grain silos at Perth.
- (d) Additions to Cadbury's factory, Claremont.
- (e) Proposed additions to the premises of the Bellerive Yacht Club.

Reservoir Sites and Pipelines—

Reservoir sites at Howrah and Geeveston were examined and alternative pipeline routes at Geeveston were reported on. The stability of pipeline routes for a proposed North-West Regional water supply was examined by Geologist W. L. Matthews. This required traversing approximately 21 miles of proposed pipeline and indicating the general geology and zones of unstable ground.

Landslides—

A small landslip affecting the access road to Boat Harbour was examined and a report and recommendations prepared. Geologist W. L. Matthews commenced a study of landslip areas in the vicinity of Devonport.

General Mapping—

In order to assist geological planning of proposed future water developments and storage sites on the eastern shore two regional geological maps of the district were prepared by Geologists M. J. Longman and W. R. Moore. As well as serving as a basic guide for pipeline routes and dam foundations the maps will be issued to other parties for use in regional planning.

General—

Road cuttings and foundation conditions for road underpasses along portion of the Southern Outlet Road and the Bass Highway were studied.

WATER SUPPLY

Advice was tendered to property owners regarding groundwater resources in various parts of the State and a number of bore sites were selected. At Wesley Vale a site was selected for a bore to supply large quantities of groundwater for industrial purposes. By the end of the year the boring had been completed to a zone of water-bearing sand but technical difficulties prevented testing the water-bearing strata for the time being.

MINERALOGY AND PETROLOGY**Mineralogist and Petrologist G. Everard reports:—**

Extensive suites of rocks from Launceston and Mackintosh Quadrangles were examined in thin section in connection with regional mapping of those areas. Many specimens of the porphyroid group and associated rocks, collected from new exposures on the Murchison Highway, were petrographically described.

Individual specimens and groups of specimens were examined from Rocky River, Risdon Brook, Kingston, Florentine Valley, Geeveston and Woodbridge.

Diamond drill core from Hampshire and the Fraser River and bore core from Wesley Vale was examined in thin section.

Concentrates from Mount Cleveland Mine and the Onah Mine, Zeehan, were investigated.

Specimens of granite from Ben Lomond were reported on with a view to their suitability as building stone, and rock specimens from the Mathinna district were described for the Forestry Commission. Pottery clay from the Wynyard Brick Company was examined and finally identified by means of X-ray equipment at the University of Tasmania.

Thirty rock and mineral specimens were examined and identified for the general public, and rock and mineral specimens were supplied singly and in collections for scientific and educational purposes.

Over 400 specimens were added to the Department of Mines rock and mineral collection during the year.

MAPPING AND ENGINEERING DRAUGHTING SECTION**Senior Draughtsman K. T. Kendall reports:—**

The production of Geological Atlas one mile series maps advanced with the printing of Launceston Sheet No. 39 (twelve plates) and the production of a one mile topographical base map of Pipers River Sheet No. 31, final geological compilations of which were commenced toward the end of the year. Base map material for field compilations of Mackintosh Sheet No. 44, and Table Cape Sheet No. 22 was supplied to the Regional Geology Section.

Other material prepared for publication includes—

One 4-colour map of Burnie Area, plus 40 monocolour maps, sections and diagrams for Technical Reports No. 8 (1963).

One monocolour map, seven photographs and cover artwork for a pamphlet on Tasmania: Geology, Mineral Resources and Mining Industry.

Eleven monocolour maps, sections and photographs for Explanatory Report K/55-10-59 St Clair.

One hundred and one maps, sections, diagrams and photographs for Explanatory Report K/55-6-29 Devonport.

A quantity of unpublished and out of print material was reproduced by various methods for Exploration Licence holders.

On behalf of the inspectorial staff, safety posters and notices were designed and prepared for display purposes.

A conference of Chief Draughtsmen of State Geological Surveys and the Bureau of Mineral Resources was attended in Brisbane. The meeting dealt with various technical problems related to geologic cartography.

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

PUBLICATIONS**Publications Officer E. M. Smith reports:—**

The following volume was published during 1964:—

Technical Reports No. 8.

The following papers were placed in the hands of the Government Printer: —

Tasmania: Geology, Mineral Resources and Mining Industry (Pamphlet, new edition).

Explanatory Report, 1-mile Geological Map Series, K/55-6-29, Devonport: by K. L. Burns.

Explanatory Report, 1-mile Geological Map Series, K/55-10-59, St Clair: by A. B. Gulline.

The following papers were prepared for inclusion in Technical Reports No. 9:—

Brick-making material near Wynyard: V. M. Threader.

Reconnaissance survey of sand deposit, Kingston: V. M. Threader.

Brick-making material, Proctors Road, Kingston: V. M. Threader.

Quarry site at Waterhouse: R. Jack.
Natone manganese deposit: R. Jack.
Drilling results, Hampshire iron ore deposits: R. Jack.
Geology of the Mt. Meredith-Yellow Band Creek area: R. Jack and D. I. Groves.
Highclere iron deposit: R. Jack.
Geology of the Tullah mining field: D. I. Groves and A. J. Noldart.
Fraser River boring: R. Jack.
The Geology of the Lefroy Goldfield: D. I. Groves.
Geology of the Risdon Vale area: W. R. Moore.
The easterly extension of the Fingal coalfield: V. M. Threader.
Geology of the Penguin area: W. L. Matthews.
Geology of proposed water scheme, North-West Coast: W. L. Matthews.
Geeveston water supply: stability of pipeline routes and reservoir sites: I. B. Jennings.
Preliminary report on landslides on the Boat Harbour road: I. B. Jennings.
Foundation conditions at Perth railway station: I. B. Jennings.
Geological report on the Risdon Brook dam site: I. B. Jennings.
Foundation investigations at the proposed extension of Cadbury's factory, Claremont: W. R. Moore.
Results of boring for underground water in Northern Tasmania: W. L. Matthews.
Results of boring for underground water in Southern Tasmania: M. J. Longman.

Geologist Brian Marshall published the following paper in *Nature*, vol. 204, pp. 772-773:—
Kink-bands and Related Geological Structures.

CHEMICAL AND METALLURGICAL BRANCH

Report of the Chief Chemist and Metallurgist, Mr. W. St. C. Manson, M.Aus.I.M.M.

Analyses were made of ores, minerals, rocks, ferrous and non-ferrous alloys, clays, coal, mill and research products associated with ore dressing investigations.

Ore dressing research and associated milling problems continue to be a major activity.

This year activity has shown a marked increase in the number of analyses undertaken, and it is a reflection of the additional activity by several companies in the testing of mineral deposits predominantly for tin.

Determinations made during the year amounted to 9,148 and were as follow:—

Types	Number
Aluminium	68
Antimony	30
Arsenic	39
Bismuth	10
Calcium	90
Carbon (and Carbon Dioxide)	42
Chlorine	7
Chromium	19
Coal Analyses	41
Copper	1,654
Gold	74
Iron	763
Lead	51
Magnesium	40
Manganese	67
Molybdenum	59
Monazite	7
Nickel	17
Phosphorus	130
Potassium	30
Qualitative Tests	74
Silicon	80
Silver	142
Sodium	33
Sulphur	337
Tantalum and Niobium	6
Tin	4,251
Titanium	128
Tungsten	90
Water Analysis	62
Vanadium	18
Zinc	33
Zirconium	3
pH Tests	7
Ash (Coals)	67
Fusibility Tests	12
Grit in Clays	22
Ignition Loss	21
Insoluble	140
Pyrometer Testing	1
Rochelle Salt	6
Sodium Carbonate	6
Sodium Cyanide	6
Specific Gravity	111
Water	68
Sieve	
Infrasizer	
Cyclosizer	
Alodine Solution	3
	183
	3
Total	9,148

Research investigations undertaken during the year were reported as follows:—

Types	Number
Tin	5
Beach Sands	4
Iron	3
Silica	1
Coal	1
Ceramics	9
	—
Total ..	23
	—

Tin—Aberfoyle Tin, N.L.: Slime Table Tailings

R.471

Sample

Sample of mill slime table tailings submitted for investigation of the nature of tin losses in this material. Sample assayed 1.38 per cent tin, and 1.23 per cent van tin.

Investigation

1. Sieve and infrasizer analysis of sample.
2. Concentration test for recovery of tin by—
 - (a) hydraulic classification to yield—
 - (i) product settling in a rising current of 40 mm per second,
 - (ii) product settling in a rising current of 6 mm per second,
 - (iii) overflow product.
 - (b) Products (i) and (ii) above tabled.
 - (c) Slime product, (iii) above, treated on Buckman Tilting Deck, and deck concentrate then tabled.

Summary

1. Sizing analysis showed 37.6 per cent coarser than 200 mesh. This fraction contained negligible tin, and its removal from the slime table feed could improve performance.
2. Infrasizer fractions 1, 2 and 3 contain 75 per cent of the tin which should be recoverable by gravity means if free. Vanning assay indicates this could be so.
3. The sum of the table concentrates contained 78.8 per cent of the tin, and assayed 23.8 per cent tin.
4. The use of Buckman tilting decks and vanners for recovery of this tin is suggested.

Tin—Aberfoyle Tin, N.L.: Concentration Tests on Fault Ore.

R.477

Six samples of fault ore were submitted for gravity concentration tests to recover the tin. Each sample contained considerable clay-like material. The samples assayed—

Sample No.	Per Cent Tin	Van Tin Per Cent
0435-A86	0.22	.....
0436-A87	0.45	0.32
0437-A88	0.19	.....
0438-A89	0.09	.....
0439-A90	0.56	0.33
0440-A91	1.15	0.91

Investigation

1. Because of the low tin content no further work was done on 0435-A86, 0437-A88, and 0438-A89.
2. On sample 0436-A87 and 0439-A90 only van tin determinations were made.
3. On sample 0440-A91 the following work was done:—
 - (a) Jaw and roll crushed to minus 7 mesh;
 - (b) Wet screened on 14, 25, and 52 mesh;
 - (c) These three fractions were jig concentrated;
 - (d) The minus 52 mesh fraction was hydraulically classified in a rising current of 20 mm per second;
 - (e) These two hydraulically classified products were tabled.

4. Prior to wet screening on 14 mesh the sample was agitated for 10 minutes at 50 per cent solids, with 1 lb per ton of sodium silicate to disperse fine clay-like material.

Summary

- 1. Gravity concentrates contained 75.1 per cent of the tin in products averaging 21.8 per cent tin.
- 2. The hydraulic classifier overflow contained 42 per cent by weight of the sample, and 38.9 per cent of the total tin. The tin recovery from this fraction was 57.3 per cent.
- 3. The clay-like material was dispersed by the treatment cited above.

Tin—Dorset Dredge: Jig Tailings

R.479

Sample

A sample of minus 20 mesh primary jig tailing was submitted for investigation of tin losses.

Investigation

- 1. Primary concentration was done with a Humphrey's spiral using a feed rate of 1 ton per hour at 20 per cent solids, and taking 15 per cent of the feed as a primary concentrate.
- 2. This primary concentrate was upgraded by tabling.
- 3. The spiral tailing was examined by tabling.
- 4. A sizing analysis was made on the table concentrate.

Summary

- 1. A tin recovery of 1.72 ounces per cubic yard was made from the jig tailing. This tin concentrate assayed 4.73 per cent tin.
- 2. Tin recovery on the spiral was high as no tin was visible when the spiral tailing was tabled.
- 3. In upgrading the spiral concentrate on the table, the table tailing contained only a trace of tin.
- 4. The concentrate sizing analysis showed 83 per cent of the tin in the minus 100 mesh fraction, and 9 per cent minus 200 mesh.

Tin—Ardlethan Tin, N.S.W.; Examination of Mill Products

R.484

Sample

Sample of mill products were submitted for examination as detailed hereunder.

Investigation

- 1. Final mill tailing for—
 - (a) sizing analysis,
 - (b) heavy media tests at specific gravities 2.9 and 4.0 on material plus 200 mesh,
 - (c) table concentration of minus 200 mesh material.
- 2. Heavy media tests at specific gravities 2.9 and 4.0 on D.S.M. screen oversize.
- 3. Coarse concentrate for sizing analysis.

Summary

1. Final mill tailing contained 0.21 per cent of tin, and 28 per cent of the tin was contained in the plus 200 mesh material. Fifty-three per cent of the tin was contained in the fractions down to infrasizer fraction No. 3.

The heavy media tests showed 10 per cent of the total tin was recovered in the 4.0 sink product.

In tabling the minus 200 mesh material 17 per cent of the total tin was recovered. Overall recovery as free cassiterite and heavy composites amounted to 0.056 per cent tin, or about 27 per cent of the total tin.

2. The D.S.M. screen oversize heavy media results at S.G. 4.0 were—

Fraction	Sinks at 4.0 Sp.G.	
	Assay Tin per cent	Tin Distribution per cent
Minus 14, plus 28	36.4	40.7
Minus 28, plus 48	48.3	56.3

3. The coarse mill concentrate sizing showed:—

Fraction	Per Cent Weight	Assay Per Cent Tin	Tin Distribution Per Cent
Plus 52	12.7	52.2	11.3
Minus 52, plus 200	53.6	61.9	56.7
Minus 200	33.7	55.6	32.0

*Tin—Aberfoyle Tin Development Partnership: Mt. Cleveland***R.482***Introduction*

This project is incomplete, but being extensive an interim report is furnished at this stage.

As work on this project involved the pilot plants reference to them is included herein.

Small Pilot Plant

In order to obtain for batch concentration tests a product from a continuous closed circuit grinding plant the small pilot plant was modified to do this.

The object, namely a ground product containing 25 to 30 per cent solids and therefore suitable for direct flotation, was not obtained because of pumping difficulties in the grinding circuit.

Finally a grinding circuit was established with automatic control. Providing the feed met the normal crushing requirement the plant was trouble free, but unfortunately the samples from Mt. Cleveland were not uniformly crushed. It was necessary to screen samples of feed and reject for further crushing any material containing more than 5 per cent plus 4 mesh.

Water control to the plant was by orifice plates in the lines. The flows were predetermined, and remained constant and were all controlled from a single valve.

The ground product was a pulp containing 15 and 18 per cent solids, which required a thickening operation before flotation.

An Agitair 10 kg flotation cell was used for larger scale batch tests. After removal of the sulphides, the flotation tailing was run from the cell to a Geco hydraulic classifier which made three spigot products.

The rising water flow in each spigot was controlled by predetermined orifice plates in the water lines to each spigot thus ensuring uniform classification conditions in all tests.

Various treatments were used on the classifier overflow to produce more sized products for gravity concentration. Sedimentation and cycloning were the most used. Cycloning had the disadvantage of employing pumps, which with a limited sample gave excessive losses.

Although modifications were made to the circuit to eliminate possible residence places for heavy particles, and efforts were made to reduce segregation in the feed bin to a practical limit, unexplained local variations in the tin content of test samples continued to occur, although in most tests the average tin content was as expected.

On the Hummer screen in the grinding circuit three screens were used to produce different products which were sized—

Screen	Screen Number (*Tyler Catalogue)					
	B.S.	76		2688*		434*
	Wght %	Cum. Wght %	Wght %	Cum. Wght %	Wght %	Cum. Wght %
+ 36 .....	.....	.....	.....	.....	13	13
+ 44 .....	.....	.....	.....	.....	6	19
+ 52 .....	.....	.....	5	5	4	23
+ 60 .....	.....	.....	11	16	6	29
+ 72 .....	.....	.....	6	22	5	34
+ 85	5	5	9	31	.....	.....
+ 100	8	13	8	39	9	43
+ 120	9	22	8	47	.....	.....
+ 150	8	30	5	52	9	52
+ 170	7	37	5	57	.....	.....
+ 200	5	42	3	60	5	57
— 200	58	100	40	100	43	100

Note. Results for Screen 76 were the result of many tests, Screen 2688 of three tests, and Screen 434 only one test.

Samples

An extensive sampling campaign at the mine produced many large samples from eight cross cuts through the lode. Sixty-six of these samples were used to make composite samples of the lode in each cross cut. Composite samples from cross cuts R, N, and K, which were the extreme and centre openings in the ore body, were separately tested to ascertain if any physical differences occurred in the lode.

From the cross cut composites a composite sample to represent the lode was made, and this was used in the 100 kg test made up from ten 10 kg flotation tests.

Batch Tests on 2 kg

Batch tests were made on 2 kg samples of cross cuts R, N, and K, using the conventional batch grinding technique. The procedure was—

- (a) batch grinding in three minute cycles and hand screening on 60 mesh screen,
- (b) rougher flotation of the sulphides in a 2 kg Denver laboratory flotation cell,
- (c) after the sulphide concentrate had been further ground to minus 200 mesh, it was floated in a 500 g Denver D-1 cell. The cleaner sulphide concentrate was discarded and the flotation tailing treated to yield a tin concentrate,
- (d) the rougher flotation tailing was screened on 120 and 200 mesh, and then the three fractions so made tabled on a Deister laboratory table,
- (e) the tailings from the above tabling were screened, reground in stages, and pan concentrates made after each stage of sizing until all tailings were rejected at minus 200 mesh.

Batch Grinding to Minus 60 Mesh

Mesh B.S.	" R " Cross Cut		" N " Cross Cut	
	Weight %	Cum. Weight %	Weight %	Cum. Weight %
+ 85	7.3	7.3	11.3	11.3
+ 100	6.2	13.5	7.0	18.3
+ 150	15.4	28.9	14.8	33.1
+ 200	10.3	39.2	10.0	43.1
— 200	60.8	100.0	56.9	100.0

Summary

" R " Cross Cut

Description	Weight %	Assay % Tin	Tin Distribution %
Primary Tin Conc.	2.42	17.9	53.8
Regrind Tin Conc.—			
ex Sulphides	0.13	21.9	3.5
ex Table Tails	0.35	28.3	12.5
Total Conc.	2.90	19.3	69.8
Total Gravity Tailing	75.41	0.25	23.7
Cleaner Sulphide Conc.	21.69	0.24	6.5
Total Residue	97.10	0.25	30.2
Head	100.00	0.81	100.0

" N " Cross Cut

Description	Weight %	Assay % Tin	Tin Distribution %
Primary Tin Conc.	2.33	28.0	56.7
Regrind Tin Conc.—			
ex Sulphides	0.27	21.1	4.9
ex Table Tails	0.25	31.3	6.7
Total Con.	2.85	27.7	68.3
Total Gravity Tailing	71.73	0.40	24.4
Cleaner Sulphide Conc.	25.42	0.33	7.3
Total Residue	97.15	0.38	31.7
Head	100.00	1.15	100.0

"K" Cross Cut

Description	Weight %	Assay % Tin	Tin Distribution %
Primary Tin Conc.	2.85	20.7	71.2
Regrind Tin Conc.—			
ex Sulphides	0.12	17.0	2.4
ex Table Tails	0.10	3.2	0.4
Total Conc.	3.07	20.0	74.0
Total Gravity Tailing	81.03	0.20	20.4
Cleaner Sulphide Conc.	15.90	0.29	5.6
Total Residue	96.93	0.22	26.0
Head	100.00	0.83	100.0

Batch Test on 10 kg

On the same cross cuts 10 kg samples were batch tested after being ground in the pilot plant to pass No. 76 screen on the Hummer. The procedure was—

- (a) Flotation in the 10 kg Agitair cell to produce a rougher sulphide concentrate. Reagents used in all tests were in the following ranges:—
- (i) Copper sulphate: 1.5 to 1.9 lb/ton
 - (ii) Pot. ethyl xanthate: 0.3 to 0.4 lb/ton
 - (iii) Pot. amyl xanthate: 0.3 to 0.4 lb/ton
 - (iv) MIBC frother: 0.03 to 0.05 lb/ton
 - (v) Sulphuric acid: 1.0 to 1.4 lb/ton
- (b) The rougher sulphide concentrate was cleaned in a 2 kg Denver flotation cell using additional sulphuric acid (0.5 to 0.7 lb/ton). The cleaner tailing was returned to the rougher tailing for tin concentration.
- (c) The combined flotation tailings were hydraulically classified, the Geco classifier overflow running into a bucket to give a further fraction for gravity concentration, and the bucket overflow being treated as a slime waste.
- (d) The three hydraulic classifier spigot products, plus the bucket sediment were separately tabled on the laboratory Deister table to yield a tin concentrate and a tailing.

*Summary**"R" Cross Cut—Test F52*

Description	Weight %	Assay % Tin	Tin Distribution %
Primary Tin Conc.	3.17	14.7	52.6
Primary Tailings	81.34	0.45	41.1
Sulphide Residue	15.49	0.36	6.3
Head	100.00	0.89	100.0

"N" Cross Cut—Test F54

Description	Weight %	Assay % Tin	Tin Distribution %
Primary Tin Conc.	4.33	14.1	52.7
Primary Tailings	72.06	0.62	38.8
Sulphide Residue	23.61	0.42	8.5
Head	100.00	1.16	100.0

"K" Cross Cut—Test F55

Description	Weight %	Assay % Tin	Tin Distribution %
Primary Tin Conc.	1.93	23.7	58.0
Primary Tailings	86.35	0.35	38.7
Sulphide Residue	11.72	0.29	3.3
Head	100.00	0.96	100.0

In these tests the flotation of sulphides was incomplete in the cleaner stage, and the return of these sulphides to the rougher tailing meant that in subsequent tabling separation of tin on the table was masked.

The slime waste amounted to around 30 per cent by weight, and contained some recoverable tin, the recovery of which was not attempted.

No regrinding was done on any products.

Batch Tests on 100 kg (Test GC-1)

This test was undertaken on a scale large enough to—

- allow the use of an hydraulic cyclone to size the hydraulic classifier overflow to a cyclone overflow devoid of recoverable tin,
- produce sufficient tin concentrate to allow further concentration tests to be made, and also an analysis for impurities,
- permit secondary and tertiary tin concentrates to be made using metallurgical machines rather than hand panning.

The method used was similar to that employed in the 10 kg tests previously described. These previous tests, the first using the equipment, served as a testing ground, and shortcomings were corrected in the series of ten 10 kg tests composing Test GC-1.

The attached flowsheet gives the treatment. Down to hydraulic classification there were ten separate tests. The four hydraulic classifier products from each of these ten tests were combined. Likewise the flotation sulphide products.

The gravity concentration and hydraulic cycloning were thus done on large samples of classified products.

In flotation a scavenging stage (3 Flotation) was employed to prevent sulphides interfering in gravity concentration. Details of flotation were—

Description	Units	1 Flotation (Rougher)	2 Flotation (Cleaner)	3 Flotation (Scavenger)
<i>Reagents—</i>				
Sulphuric Acid	lb/ton	1.1	....	0.44
Copper Sulphate	lb/ton	2.0	....	0.2
Pot. ethyl xanthate	lb/ton	0.54	....	0.04
Pot. amyl xanthate	lb/ton	0.54	....	0.04
MIBC	lb/ton	0.08	....	0.008
Conditioning Time	min.	5	....	2
Flotation Time (average)	min.	11	10	6
pH .....	....	up to 4.6	4.9 to 6.0	2 to 3
Machine Used .....	....	10 kg Agitair	2 kg Denver	500 g Denver D-1

Flotation conditions on reground table products were—

Description	Units	4 Flotation	5 Flotation	6 Flotation
<i>Reagents—</i>				
	(¹)			
Sulphuric Acid	lb/ton	0.52	0.61	0.73
Copper Sulphate	lb/ton	0.26	0.31	0.37
Pot. ethyl xanthate	lb/ton	0.03	0.03	0.04
Pot. amyl xanthate	lb/ton	0.03	0.03	0.04
MIBC	lb/ton	0.01	0.01	0.01
Conditioning Time	min.	3	3	3
Flotation Time	min.	4	8½	4
pH .....	....	2.2 to 2.5	2.0 to 2.1	1.7 to 1.8
Machine Used .....	....	Denver D-1 used in all tests		

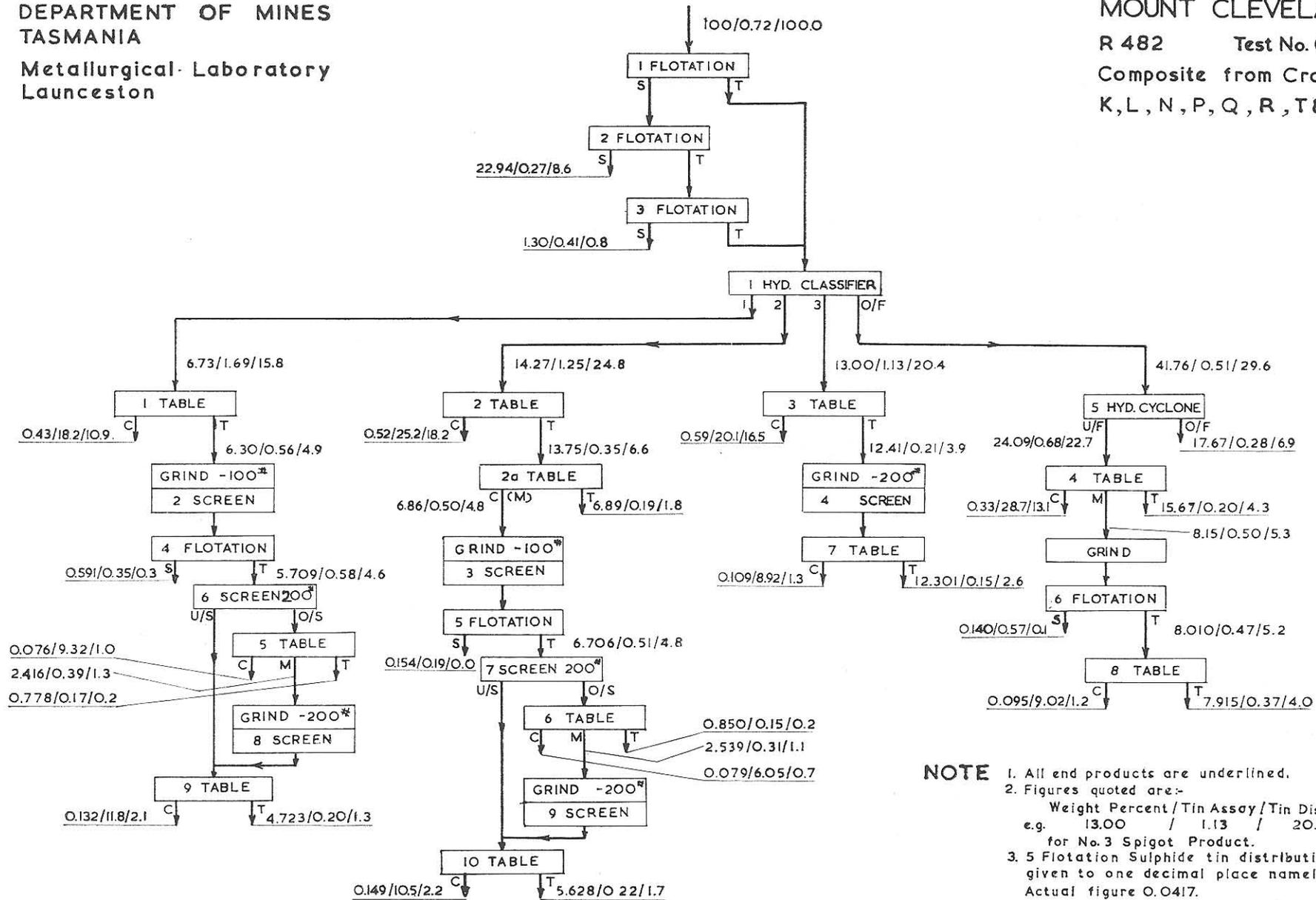
(Note. (¹) Calculated in terms of original ore.

Ball Mill Feed Size

Screen (B.S.)	Weight %
+ 4	3.4
+ 5	27.0
+ 7	15.4
+ 10	10.5
— 10	43.7

DEPARTMENT OF MINES
TASMANIA
Metallurgical Laboratory
Launceston

MOUNT CLEVELAND
R 482 Test No. GC-1
Composite from Crosscuts
K, L, N, P, Q, R, T & V.



1965.

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(No. 33.)

K. Welling 7Ap.65.

The screen undersize from the Hummer screen (No. 76) sized—

Fraction	Weight %	Cum. Weight %
+ 85	5.8	5.8
+ 100	6.9	12.7
+ 120	9.7	22.4
+ 150	8.0	30.4
+ 170	5.9	36.3
+ 200	4.6	40.9
+ 2240	4.4	45.3
C.S. 1	7.2	52.5
2	12.7	65.2
3	7.6	72.8
4	6.2	79.0
5	3.1	82.1
— C.S. 5	17.9	100.0

(C.S. 1 to 5 refers to sized products produced in a cyclosizer developed by Kelsall and McAdam and produced by Warman & Co.).

Products for gravity concentration sized—

Mesh (B.S.)	Spigot 1	Spigot 2	Spigot 3	Hyd. Cyclone U/F
+ 85	26.9	13.6	1.4	....
+ 100	25.2	22.1	4.4	....
+ 120	23.0	28.8	13.7	....
+ 150	8.1	15.4	18.8	....
+ 170	4.8	8.6	18.4	2.2
+ 200	3.3	4.0	13.3	2.5
+ 240	2.5	2.8	10.1	4.5
— 240	6.2	4.7	19.9	80.8 ⁽¹⁾

Note. ⁽¹⁾ Sub-sieve analysis given below in cyclone underflow analysis.

Hydraulic cycloning was done with—

- (a) Warman 3-inch hydraulic cyclone.
- (b) Warman $\frac{3}{4}$ -inch by 1-inch sand pump operating at 1910 R.P.M.

The cyclone underflow nozzle diameter was $\frac{1}{8}$ -inch, and the vortex finder $\frac{3}{8}$ -inch diameter.

Material	Pulp Density (gpl)	Per Cent Solids	Dry Weight (kg)
Feed Pulp	1040	6	34.8
Underflow	1260	33	20.1
Overflow	1015	2	14.7

The cyclone products sized—

Description	Underflow Weight %	Overflow Weight %
+ 170 mesh	2.2	....
+ 200 mesh	2.5	....
+ 240 mesh	4.5	....
C.S. 1	20.4	0.5
2	21.0	0.9
3	22.6	2.6
4	15.4	6.6
5	3.9	9.4
— C.S. 5	7.5	80.0

A summary of the products made in the test—

Product	Weight	Per Cent Tin	Tin Distri- bution
<i>Concentrates—</i>			
Primary	1.87	22.6	58.7
Secondary	0.359	8.4	4.2
Tertiary	0.281	11.1	4.3
Total	2.51	19.3	67.2
<i>Non-Sulphide Residues—</i>			
Primary	40.17	0.23	13.0
Secondary	21.844	0.23	7.0
Tertiary	10.351	0.21	3.0
Total	72.365	0.23	23.0
<i>Sulphide Residues—</i>			
Primary	24.24	0.28	9.4
Secondary	0.885	0.36	0.4
Total	25.125	0.28	9.8
Head	100.00	0.72	100.0

Cyclosizer

For sizing in the sub-sieve range a recent development by Messrs. Kelsall & McAdam of C.S.I.R.O., Melbourne, is a five cyclone unit operating in series.

In the ore dressing investigations, fraction C.S. 1-5 refers to these cyclosizer fractions.

The apparatus has been standardized on a sample of quartz, and the sizes for quartz and equivalent cassiterite are shown below.

	Quartz		Cassiterite
Cyclone No. 1	+ 44 microns		+ 23 microns
Cyclone No. 2	— 44 + 34.5 microns	— 23	+ 17 microns
Cyclone No. 3	— 34.5 + 23.5 microns	— 17	+ 12 microns
Cyclone No. 4	— 23.5 + 15.5 microns	— 12	+ 8 microns
Cyclone No. 5	— 15.5 + 12.1 microns	— 8	+ 6 microns
No. 5 Overflow	— 12.1 microns	— 6	microns

Beach Sands—Mr. J. Braithwaite, Fraser River, King Island

R.459

Sample

The sample submitted for tests on tin concentration. Visual examination showed considerable ilmenite and garnet, and only minor amounts of quartz. The tests aimed to recover cassiterite and rutile.

Investigation

1. High intensity dry magnetic separation of ilmenite and garnet from non-magnetic cassiterite, rutile and zircon and quartz.

2. Table concentration to recover the cassiterite, rutile and zircon from the quartz.

Summary

1. The sample contained only 0.08 per cent tin.

2. A tin concentrate was made assaying 18.1 per cent tin, and containing 34.5 per cent of the tin in the sample.

3. A further rutile concentrate contained 0.08 per cent tin, which was a further 32.0 per cent recovery of tin; and 41.3 per cent titanium dioxide (rutile).

4. Thus the total tin recovered in concentrates was 66.5 per cent.

5. It is assumed the rutile concentrate contains zircon which could be removed by electrostatic separation,

*Beach Sands—Mr. W. C. Burrows, Fraser River, King Island***R.461***Sample*

Tests to recover cassiterite, rutile, monazite and gold were requested on this sample which was stated to come from the vicinity of the Cable Station.

Assays

Tin	0.13 per cent
Rutile	17.7 per cent
Gold	Nil

Investigation

Jigging followed by table concentration of jig tailing and magnetic separation of concentrates thus produced.

Magnetic separation followed by table concentration of the non-magnetic fraction.

Table concentration followed by magnetic separation of both table concentrates.

In all above tabling tests two concentrates were made, one essentially cassiterite, the other the remaining heavy minerals.

Summary

No concentration of tin or rutile was made by jigging.

Initial magnetic separation followed by table concentration gave high recoveries of tin and rutile. The tin concentrate assayed 17.8 per cent tin, and contained 84.9 per cent of the tin; it also contained 1.18 per cent rutile. The rutile concentrate assayed 32.3 per cent rutile, and contained 97 per cent of the rutile; it also contained 0.02 per cent tin.

The sample contained a small quantity of monazite, and a concentrate of suitable quality was produced and amounted to 0.4 per cent.

*Beach Sands—Messrs. Curtain and Gatenby, Fraser River, King Island***R.475***Sample*

A sample of table concentrate made from beach sand was submitted to ascertain the nature and sizing of the concentrate.

Tabling had been done so that quartz, garnet, ilmenite and rutile were rejected as tailings.

Investigation

The sample was submitted to dry magnetic separation.

Summary

Product	Weight	Per Cent			Per Cent Tin Distribution
		Tin	Rutile	Monazite	
Highly Magnetic	17.0	2.0	....	....	3.0
Feebly Magnetic (Monazite)	12.3	3.1	....	87.3	3.4
Non-Magnetic	70.7	15.1	4.0	....	93.6

Sizing analysis of the concentrate—

+ 100 mesh	34.9
+ 200 mesh	58.2
— 200 mesh	6.9

Sixty-six per cent of the cassiterite reported in the minus 150 plus 200 mesh fractions, and twenty per cent in the minus 200 mesh fraction.

*Beach Sands—Messrs. Curtain, Burrows and Gatenby, Fraser River, King Island***R.478***Sample*

The sample was obtained by the Chief Chemist and Metallurgist with a view to determining applicability of jigs in beach sand treatment.

The sample, which contained 0.58 per cent tin, contained 88 per cent of "heavy minerals", i.e., those sinking in a medium of specific gravity 2.95.

Investigation

The object of the test was to produce a concentrate assaying about 5 per cent tin, using a Denver M1 laboratory jig.

Summary

No appreciable concentration of tin was achieved.

The heavy minerals were mainly monazite, zircon, ilmenite and rutile.

A sizing analysis showed that 93.5 per cent of the sample was coarser than 150 mesh, but that 88 per cent of the tin was finer than this size; a clear indication of hydraulic classification of this sand by the sea producing heavy minerals of similar hydraulic properties, and which would contribute to the poor concentration in the test jig.

*Iron—Hampshire Iron Ore Investigation***R.467, R.468 and R.469***Sample*

Four samples were taken by departmental personnel from trenches and old workings to assist Tradasia Pty. Ltd. in their appraisal of the Hampshire Iron Ore Deposit.

The object of the metallurgical tests was to achieve concentrates meeting the specification of Tradasia's Japanese principals.

The concentrate specification was—

- (a) grade not less than 60 per cent iron, and preferably 64 per cent iron in all products;
- (b) lump ore to size all minus 50 mm and plus 6 mm;
- (c) powdered ore all minus 6 mm.

Investigation

Washing and screening tests on minus 50 mm plus 6 mm material.

Jig concentration tests on minus 7 mesh material.

Magnetic concentration on—

- (a) Minus 50 mm plus 6 mm material;
- (b) Minus 7 mesh (2411 micron) material.

Sample No.	Assay Per Cent Iron
1	49.5
2	55.7
3	60.2
4	45.3

Summary

1. Washing and screening was not a satisfactory way of concentrating the iron ore. In only two screen fractions was a grade better than 60 per cent iron obtained.

Sample No.	Assay % Iron	Iron Recovery %	Remarks
2	60.2	41.5	Plus 6 mm product
3	66.5	25.6	Minus 6 mm product

In neither case was recovery satisfactory even though grade was acceptable.

2. For the jig concentration tests the material was reduced to all minus 7 mesh. Three jig concentrates of satisfactory grade were obtained, viz.—

Sample No.	Assay % Iron	Iron Recovery %	Remarks
2	63.5	59.6	
3	65.0	54.6	
4	65.5	45.3	See paragraph 7

However, the recovery of iron in the concentrates was low.

3. Magnetic concentration on coarse material (minus 50 mm plus 6 mm) was done with a hand magnet. Satisfactory grades obtained were—

Sample No.	Assay % Iron	Iron Recovery %
2	63.7	32.2
3	62.6	67.6

However, recovery in each case was low.

4. Magnetic concentration of material crushed to minus 7 mesh required desliming or 100 mesh before a satisfactory separation could be made. In these tests all samples yielded satisfactory grades, but although recoveries were better the best was still considered too low.

Sample No.	Assay % Iron	Iron Recovery %	Remarks
1	61.4	54.0	
2	63.9	61.0	
3	66.9	78.5	See paragraph 7
4	60.1	71.5	

5. From these tests it was concluded that no satisfactory lump product was possible. For all samples the lumps were easily broken, and transport of such material would probably cause excessive fines.

6. Better results were obtained on minus 7 mesh material in both jigging and magnetic concentration, but the mineral composition (presence of limonite) probably precludes high recoveries of iron.

7. The highest grade concentrates from jigging and magnetic methods were further analysed.

Sample No.	Iron	Per Cent Silica	Alumina	Remarks
4	65.5	2.98	1.01	Jig conc. see paragraph 2
3	66.9	1.07	1.73	Mag. conc. see paragraph 4

Silica—Tasmanian Electro-Metallurgical Co., Beaconsfield

R.474

Sample

Three large samples were received for sizing analysis as under.

Investigation

The company desired screening tests to be done in the "as received" condition, which meant on samples containing 7 per cent moisture, and also wet screening of a composite of the three samples. From each sample an 80 kg sample was cut for the sizing analysis.

Summary

1. The sizings were—

Screen Aperture (Inches)	Per Cent Weight Sizings at 7 Per Cent Moisture			Wet Screening of Composite
	Sample 1	Sample 2	Sample 3	
+ 3	4	6	2	....
+ 1½	22	25	17	....
+ 1	18	13	12	....
+ ¾	16	12	15	50.5
+ ½	12	8	13	....
+ ¼	12	10	16	15.9
— ¼	16	26	25	33.6

2. A comparison was made between screening in the 7 per cent moisture condition and wet screening. The differences occur because fine material adheres to larger particles in the moist condition.

Screen Aperture (Inches)	Per Cent Weight	
	Wet Screening of Composite	Calculated Moist Composite
+ ¾	50	54
+ ¼	16	24
— ¼	34	22

Coal—Cornwall Coal Co.

R.462

Sample

A sample of washery jig middlings was submitted for heavy media testing to determine the quantity of usable coal that could be obtained by re-treatment, consisting of reduction to minus one inch size and heavy media sink-float separations. The sample as received contained 48.7 per cent of ash,

Investigation

Sizing analysis of "as received" sample.

On reduction of sample to all minus one inch size sample was subjected to heavy media tests at the following specific gravities: 1.4, 1.5 and 1.6. The heavy media tests at each s.g. were undertaken on sized fractions, viz., $\frac{3}{4}$ ", $\frac{1}{2}$ ", $\frac{1}{4}$ ", 6 mesh and 30 mesh. The examinations were undertaken on plus 30 mesh sizings only.

Summary

Initial sizing was—

Screen Aperture (Inches)	Weight Per Cent
+ 3	6
+ 2	15
+ $1\frac{1}{2}$	14
+ 1	14
+ 4 mesh	33
— 4 mesh	18

The quantities and grades of coal obtained were—

Description	Weight	Per Cent	Ash
Float at s.g. 1.4	2.5		13.1
Sink 1.4 and Float 1.5	12.8		22.2
Sink 1.5 and Float 1.6	16.5		33.9

*Ceramics—Machen's Bricks***R.463***Sample*

Two samples were submitted by the company marked "Kings Meadows" and "Quarantine Road" hereinafter "K" and "Q" respectively.

Investigation

The company requested manufacturing tests by the stiff-plastic pressing method, and firing at 1100°C for the individual samples and the following blends:—

- Blend A: 3 parts "K" to 1 part "Q".
- Blend B: 2 parts "K" to 1 part "Q".
- Blend C: 1 part "K" to 1 part "Q".

Summary

Sample "K". Raw material showed moderate to good plastic cohesion properties. The green pressed bricks were well formed of good strength and no evidence of lamination. After firing bricks were of reasonably good quality and appearance, but abraded rather easily on edges, were slightly roughened and showed random hair-line cracking.

Sample "Q". This showed somewhat better plasticity and cohesions than "K". The green pressed bricks were well formed, of good strength, showed no evidence of lamination, but showed a slight tendency to stick to die surfaces. Firing produced slight distortions, slightly roughened surfaces, random hairline cracks and high contraction, hence this material was considered unsuitable for brick manufacture except when blended.

The blends A, B and C behaved similarly to "K".

*Ceramics—Luck Bros. Pty. Ltd., Devonport.***R.464***Sample*

Three white siliceous clay samples were submitted for manufacturing tests by semi-dry and stiff plastic pressing methods.

The samples numbered 1, 2 and 3 were from a road cutting near Sheffield from the same locality as Sample 1542 submitted in August 1963.

Summary

Satisfactory bricks were produced from each sample. The material was considered suitable for building bricks or fire bricks that would withstand temperatures not exceeding 1300°C.

Bricks fired at 1100°C were coloured pale cream, of good appearance and regular dimensions, but the transverse breaking strength was somewhat low for good quality building bricks.

Refractoriness tests showed a slight softening and vitrification at 1500°C, most marked in Sample 3.

Sample 1 showed a tendency to laminate during pressing. The stiff-plastic pressed bricks of all samples showed cracks and curved surfaces to a slight degree, but these defects were not considered significant.

Several bricks from Sample 1 were fired at 1350° C. These showed a slight glazing and were a greyish white colour.

Bricks from all samples were fired at 1450°C. Those from semi-dry pressings of Samples 1 and 2 were vitrified, but not distorted. Those from stiff-plastic pressing were vitrified and slightly distorted. Bricks from Sample 3 were rather bloated and showed signs of incipient fusion.

Ceramics—Clay from Wynyard

R.465 and R.466

Sample

Departmental Officers obtained two samples from the Quiggins Road area for brick manufacture tests in order that results from samples previously submitted by Brian R. Archer Pty. Ltd. from the same locality could be verified.

The samples were—

R.465. Quiggins Road—Forestry Quarry (c.f. R.443-4).

R.466. Quiggins Road—Walker (c.f. R.444-5 and R.445-6).

Investigation

Preparation was similar to that outlined in reports R.440 to R.448. Manufacturing tests were done by semi-dry and stiff-plastic pressing methods.

Summary

The results of these tests were similar to those on the materials previously submitted.

Ceramics—Crisp & Gunn Co-operative Ltd., Hobart

R.472

Samples

The Chief Chemist and Metallurgist obtained four samples for brick making tests using the stiff-plastic pressing method. These four samples were described—

1. Knocklofty shale.
2. Mt. Romney shale.
3. Kingston Permian mudstone.
4. Kingston cream clay.

In addition, a green half brick, representing current raw material, was submitted.

Investigation

Samples 1 and 2 were to be tested individually as blends with each other and Sample 3. As Sample 4 was a more costly material its use was precluded unless the aforesaid blends failed to produce satisfactory bricks.

The green half-brick was submitted to test the effect of finer crushing of the raw materials on the quality of the bricks produced.

Summary

Bricks made from individual samples and blends were of moderate to good quality, in colour they ranged from dark to medium rust, and their green strength appeared to be adequate. Accordingly, no blending with Sample 4 was investigated.

Bricks from Sample 1 were slightly vitrified when fired at 1050°C, hence close kiln temperature control is necessary when firing these bricks.

Blends containing Sample 1 were of superior appearance, but a slight glazing occurred.

The influence of finer crushing in current production is to eliminate disfiguring cracks which develop during drying in bricks pressed from coarse material.

Ceramics—Crisp & Gunn Co-operative Ltd., Hobart

R.473

Sample

The Chief Chemist and Metallurgist obtained for testing by stiff-plastic method two samples, viz.—

- A. Knocklofty sandstone.
- B. Knocklofty bottom mudstone.

Investigation

In preliminary tests blends of the above materials showed that in the green state they would not stand the handling to which they would be subjected.

Accordingly, after approval by the company, blending with these materials of—

R.473-1. Knocklofty shale,

R.473-4. Knocklofty cream clay,

was investigated.

Summary

Materials A and B both lacked the plasticity and cohesiveness to make them or blends of them suitable alone as brick raw materials.

In blends containing not less than 50 per cent of R.473-1 and the remainder A or B, or mixtures of them, bricks of good quality and appearance were made.

Blends of A and R.473-4, the latter in economical quantities, had less green strength than the corresponding economic blend of A and R.473-1. A blend of one part R.473-4 to three parts A produced good quality bricks.

Less bonding agent was required with B than A to give satisfactory results.

Bricks were well fired at the temperatures of 1000°C to 1050°C, those at 1050°C being dark rust red, while those at 1000°C were somewhat lighter and more attractive.

*Ceramics—Luck Bros Pty. Ltd., Devonport.***R.481***Sample*

For brick manufacturing tests by de-aired extrusion five samples were submitted, viz.—

1. Clay from present pit.
2. Clay from new pit.
3. White sand—Port Sorell (Dune Sand).
4. Red sand.
5. Brown sand.

Chemical Tests

Because efflorescence was known to occur in using these materials the following determinations were made:—

Sample 1.

Sulphur	0.41 per cent
Sulphate (SO ₄)	0.25 per cent

Sample 2.

Sulphur	0.02 per cent
Sulphate (SO ₄)	0.02 per cent

Sample 3.

Acid insoluble	76.8 per cent
Iron Oxide plus Alumina	1.7 per cent
Lime	10.9 per cent
Magnesia	0.67 per cent
Sulphate (SO ₄)	0.28 per cent
Carbonate	8.7 per cent

Investigation

Brick making tests on Samples 1 and 2 and blends thereof were made and fired at 950°C and 1050°C.

In the same firing range blends of clay and sand were tested.

In extruding Sample 2 the column was badly dog-eared and brittle, and therefore unusable. The use of sodium carbonate in a 1 per cent solution at 0.5 lb per ton of clay rectified the situation. The use of sodium carbonate was necessary in blends of Sample 2 and sand, but unnecessary when blended with Sample 1.

The following blends in addition to the individual clays were investigated:—

- Blend A: 5 parts No. 2, 1 part No. 1.
- Blend B: 3 parts No. 2, 1 part No. 1.
- Blend C: 1 part No. 2, 1 part No. 1.
- Blend 1/3: 3 parts No. 1, 1 part No. 3.
- Blend 2/3: 3 parts No. 2, 1 part No. 3.
- Blend 2/4: 3 parts No. 2, 1 part No. 4.
- Blend 2/5: 3 parts No. 2, 1 part No. 5.

Summary

Sample 1 was suitable for brick making by de-aired extrusion, either individually or blended with Samples 2 or 3. Bricks appeared overfired at 1050°C. Bricks made from undiluted clay suffered core cracking. Except for Blend A all bricks containing Sample 1 exhibited moderate to heavy sulphate efflorescence. Vanadium efflorescence was slight to moderate being mainly in bricks fired at 950°C. The brick colour ranged from light red (950°C) through medium rust red (1000°C) to dark rust red (1050°C). Firing contractions in bricks from Sample 1 and blends with Sample 2 were high between 1000°C and 1050°C, but were reduced when sand was added to the blends.

Sample 2 was unsuitable for brick making by de-aired extrusion without the addition of sodium carbonate. During drying, salts appeared as a white efflorescence to the corners of the bricks. On firing these corner areas were of darker colour than the rest of the brick. Contraction was high as with Sample 1 when fired at 1050°C at which temperature the bricks appeared somewhat overfired. Apart from the above the bricks were of very good appearance and quality.

Blend 2/3 could be extruded satisfactorily, but the fired bricks were of poor quality. Partial disintegration occurred in bricks fired at 950°C and 1000°C, and at 1050°C dark red bricks were very porous and of poor appearance. Blowing occurred after 2 to 3 weeks standing. This was attributed to lime in Sample 3.

Extrusion of blend 2/4 was not satisfactory. The fired bricks were not of good appearance. Firing at 950°C produced light red bricks, at 1050°C dark rust red bricks which were obviously overfired.

Blend 2/5 behaved similarly to blend 2/4.

*Ceramics—Wynyard Brick Co., Wynyard.***R.485***Sample*

The Chief Chemist and Metallurgist obtained from the company green pressed bricks said to be made from raw materials representative of Walker's Quarry, Quiggins Road.

Investigation

The object was to compare the above green bricks with results obtained in previous tests on this material, viz., R.443-4 and R.444-5.

The methods used were those detailed in R.440-R.448.

Firing temperatures used were 1000°C, 1050°C and 1100°C.

Summary

In general, results verified those of previous investigations.

Bricks fired at 1100°C were overfired, showed high shrinkage and rather severe glazing. Bricks fired at lower temperatures were well fired, of good appearance and quality.

*Ceramics—Hutton's Brick Works.***R.487***Sample*

For pressed brick manufacturing tests the company submitted the following samples:—

1. Hutton's clay.
2. Youngtown clay.
3. Hutton's sand.

Investigation

The company currently makes very pale orange coloured bricks from Sample 1. Could some of Sample 2 be blended with Sample 1 to produce darker coloured bricks?

Secondary, what was the smallest quantity of Sample 2 that could be blended with Sample 3 to produce sound bricks?

All tests employed semi-dry pressed bricks fired at 1050°C. Duplicate specimens were fired in Hutton's kiln for comparative purposes.

Summary

Bricks of good quality and appearance were made by a range of blends containing up to 33 per cent of Sample 2. There was no significant colour variation over the range, all being a pale pink colour.

All blends of Samples 2 and 3 had serious defects in the finished bricks, the most important being very low transverse strength, in fact the 50 per cent of Sample 2 blend could be broken by hand. It was considered that unwarranted amounts of Sample 2 would be required to make a sound brick. A higher firing temperature may have helped, but this was not investigated.

MINES AND EXPLOSIVES BRANCH

Report of the State Mining Engineer and Deputy Chief Inspector of Mines and Explosives,
Mr. P. M. Johnstone, B.E., M.Aus.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 8,815. This represents an overall decrease of 21 although there was a reduction of 59 men in the coal mining section of the industry. This section became more depressed as more users turned to fuel oil. The numbers of persons in metal mining remained steady.

ACCIDENTS

The number of registered accidents was 68 in which 63 men were injured and five killed. In calculating the rates per thousand, 204 employees in the total of 8,815 were disregarded because their employers do not submit accident reports.

LOCATION OF ACCIDENTS

Type of Mining	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	65	....	....	....	43	....	1	2.3	108	....	1	0.9
Copper	85	....	2	2.4	1,462	1	5	0.4	1,547	1	7	0.5
Silver-lead-zinc	342	1	15	4.7	420	....	5	1.2	762	1	20	2.8
Tin and Tungsten	224	....	23	10.3	454	....	4	0.9	678	....	27	4.0
Quarries, Works, &c. ....	....	....	....	....	5,516	3	8	0.2	5,516	3	8	0.2
Total	716	1	40	5.7	7,895	4	23	0.3	8,611	5	63	0.8
Not reported .....	....	....	....	....	204	....	....	....	204	....	....	....
					<u>8,099</u>				<u>8,815</u>			

DESCRIPTION OF FATAL AND SERIOUS ACCIDENTS

Fatal

- K. I. Millar, Mt. Lyell Co.: Bulldozer which he was driving ran off road and over a dump.
R. D. Barwick, E.Z. Co., Rosebery: Struck by fall of ground in stope.
R. H. Mason, Comalco: Skimming crust in a hardening furnace; burnt by dross and flame from an explosion.
J. M. Hall, Adamsfield Osmiridium Co.: Buried by fall of ground in open cut.
C. A. Coombes, Rhyndaston Tunnel: Operating brake on railway wagon towed by bulldozer: crushed betwixt.

Serious

- R. Burrows, E.Z. Co., Risdon: Tripped on piece of timber on a scaffold; broken arm.
K. J. Woods, E.Z. Co., Rosebery: While moving away from barring down operations, tripped over scraper and struck by fall of ground; broken leg, lacerations and shock.
M. G. Bennion, E.Z. Co., Rosebery: Fell from ladder which collapsed under weight; broken arm, bruised body and shock.
J. W. Naylor, Mt. Lyell Co.: Removing smelter flue lining, struck by falling steel plate; broken leg.
H. G. Hitherington, E.Z. Co., Rosebery: Struck by wire rope while testing scraper hoist; doubly broken leg.
L. T. Harrison, E.Z. Co., Rosebery: Struck by fall of ground while placing cap; doubly broken leg, cut head.
G. S. Batchelor, Renison: Struck by rock rolling down rill while shovelling; broken leg and injured head.
M. Campbell, E.Z. Co., Risdon: Hot metal splashed into eye while feeding furnace; lost 85 per cent of sight in one eye.
E. E. B. Dowling, Mt. Lyell Co.: Manipulating steel plates under a power hammer; crushed hand (amputated).
B. J. Batchelor, Mt. Lyell Co.: Loose clothing caught in lathe; broken ribs, bruised shoulder.
K. R. Baker, Storeys Creek: Struck by fall of ground; broken foot.
L. J. Housego, Aberfoyle: Handling timber slung under cage; hernia.
H. Papahristos, E.Z. Co., Risdon: Splashed with molten zinc from furnace feed-hole; burnt eye, arm and hand.
D. E. Kean, Seymour: Explosion of detonators apparently caused by sparks from grinding wheel; burnt face, injured eyes and ears.
F. T. Grubb, E.Z. Co., Rosebery: Struck by fall of ground; broken pelvis,

TABLE SHOWING RATES PER THOUSAND KILLED OR INJURED

Period	Number of Persons Employed	Number of Accidents	Number of Persons			Number per Thousand		
			Killed	Injured	Total	Killed	Injured	Total
1892-1930*								
1931-1940†								
1941-1950‡								
1951	5928	49	2	50	52	0.337	8.335	8.772
1952	6820	62	1	61	62	0.147	8.944	9.091
1953	7370	73	6	67	73	0.801	9.091	9.892
1954	7289	75	3	72	75	0.411	9.877	10.289
1955	7095	98	4	96	100	0.563	13.531	14.094
1956	7692	130	4	126	130	0.520	16.381	16.901
1957	8137	79	.....	80	80	.....	10.786	10.786
1958	8309	103	3	100	103	0.399	13.303	13.702
1959	8236	92	2	91	93	0.269	12.256	12.525
1960	8299	93	1	92	93	0.133	12.309	12.443
1961	8493	108	1	107	108	0.119	12.720	12.839
1962	8708	68	2	66	68	0.234	7.726	7.961
1963	8836	86	4	83	87	0.461	9.575	10.037
1964	8215	68	5	63	68	0.581	7.316	7.897

* See Report of Director of Mines—1954.

† See Report of Director of Mines—1956.

‡ See Report of Director of Mines—1960.

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	.....	2
(b) Falls of Ground	1	9
(c) Falling down Shafts, &c.	.....	.....
(d) Other Causes	.....	29
2. Above Ground:		
(a) Machinery in Motion	1	4
(b) Other Causes	.....	11
3. Accidents in Batteries, Ore-dressing, Smelting and other Metallurgical Works, &c.	3	7
Total Metalliferous Mines (A)	5	62
<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	.....	.....
5. Above Ground:		
(a) Machinery in Motion	.....	.....
(b) Other Causes	.....	1
Total Coal Mines (B)	.....	1
Total All Mines (A and B)	5	63

INSPECTION

During the year Mr. J. B. Braithwaite was promoted to the position of Senior Mining Engineer and Senior Inspector of Mines and Explosives, and Mr. K. D. G. Sear to be Senior Inspector of Explosives, both at Hobart. The post of Mining Engineer at Queenstown remained vacant during the year and a similar post at Hobart was not filled.

The Explosives Act 1916

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

	Burnie	Currie	Hobart	Launceston	Strahan	Total
Nitro-compounds (lb.)	422,150	99,000	273,775	444,870	1,560,700	2,800,495
Detonators	80,000	10,000	323,800	615,250	213,600	1,242,650
Explosive shipments (No.)	5	6	5	8	11	35

Ammonium nitrate (215,450 lb.) was also imported for use as an explosive.

ACCIDENTS AND OUTRAGES

In a quarry an explosion occurred while a blasthole was being charged. The cartridges of gelignite were too large for the hole and one was detonated by grit and friction. An explosion occurred underground when a miner drilled into fracture remaining in the face from the previous round. In another case underground a miner was injured when he attempted to light too many fuses. The first shot went off before he had finished lighting up. An explosion occurred in a school chemistry laboratory when a scholar experimented with unauthorized chemical mixtures. Another boy stole explosives, primed cartridges, and took them to school, but did not attempt to initiate them.

PROSECUTIONS

Four prosecutions were successful against offenders, three for illegal storage and one for conveyance without warning signs.

LEGISLATION

Following an amendment to the Act in 1963 a set of regulations was made in July 1964, requiring shotfirers to hold permits and setting out rules for the usage of explosives.

INSPECTION

Lectures on explosives were given to some women's organizations, Police Cadets and organized classes. An exhibit showing the dangers and correct handling of explosives and other dangerous goods was mounted at the Hobart, Launceston and Burnie shows.

Considerable attention was given to fireworks importations, 17 types being prohibited and destroyed. Some 500 lb. of deteriorated gelignite was destroyed. Following the introduction of permits for shotfirers examinations were held, both theoretical and practical, and 475 permits issued. The number of licensed magazines was 124 and 536 licences to sell, import and convey were issued.

The Inflammable Liquids Act 1929

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

	Bell Bay	Burnie	Devonport	Hobart	Naraco	Total
Aviation Gasoline	1,158	....	....	1,850	....	3,008
Benzol	....	....	....	500	....	500
Kerosene, Aviation	....	....	....	5,769	....	5,769
Kerosene, Lighting	....	....	925	847	....	1,772
Kerosene, Power	....	....	1,450	550	....	2,000
Motor Spirit, Premium	25,636	9,848	22,014	51,243	....	108,741
Motor Spirit, Regular	12,884	3,990	10,871	26,451	1,443	55,639
Total	39,678	13,838	35,260	87,210	1,443	177,429
Tankships (No.)	10	5	9	28	2	54

There were six tankships less than in the previous year but the quantity landed was 8,733 tons greater.

INSPECTION

At the 30th June the number of licensed premises was 2,004, a decrease of 48 in 12 months. During the year 442 applications for approval to construct or alter premises were dealt with, mainly minor bulk storage depots.

The first factory licence was issued to a bitumen refinery at Self's Point which was brought into production during the year. A new tanker berth was built at Devonport and construction of an island berth was commenced at Burnie where bulk storage capacity was increased.

ACCIDENTS

One accident occurred, a man being injured by an explosion which he caused by welding a petrol tank.

PROSECUTION

One prosecution was made for illegal storage of inflammable liquids, successfully.

DRILLING

Diamond

Number of Holes	Total Footage	Object
1	715	Mineral Exploration—Beaconsfield
2	633	Mineral Exploration—Mathinna
11	908	Mineral Exploration—Hampshire
18	1,149	Engineering Investigations
23	1,002	Foundation Testing
1	48	Coal Exploration
<hr/> 56	<hr/> 4,455	

Churn

Number of Holes	Total Footage	Object
20	1,356	Water Boring—North-West
1	640	Water Boring—North
29	2,435	Water Boring—South
5	381	Testing Alluvials for Tin—Great Fraser
22	531	Foundation Testing
<hr/> 77	<hr/> 5,343	

Auger

Number of Holes	Total Footage	Object
22	645	Testing Alluvials for Tin—Great Fraser
12	353	Geological Investigations—Bridport District
<hr/> 34	<hr/> 998	

DIAMOND DRILLING

Drilling at mineral targets was carried out in three fields, Beaconsfield and Mathinna for gold and Hampshire for iron ore. At Beaconsfield a new machine of 3,000 feet capacity was set up on an initial target at 2,000 feet vertically. Many difficulties were overcome in penetrating unconsolidated material and underlying cavernous limestone. In the light of previous experience on this field every known precaution is being taken to prevent deviation, which in the first 700 feet has been negligible.

In the field of civil engineering projects were undertaken on the testing of foundations, including those for the Hadspen Bridge and two large buildings. In addition a potential dam site at Risdon Brook was tested, and two possible landslip areas.

CHURN DRILLING

Three crews were variously engaged in boring for water and testing for foundations and alluvial tin. In the north-west two of the 20 wells put down were dry. The productive wells varied between 150 and 1,000 gallons per hour from depths between 37 and 175 feet. In the north one bore was sunk 640 feet through basalt to reach an underlying aquifer. On Bruny Island five bores were dry but the other five produced from 200 to 300 gallons per hour at depths between 78 and 150 feet. Results in the Huon district were more satisfactory, of 16 bores two only were dry and one gave salt water. The producing wells varied between 200 and 500 gallons per hour, the depths ranging between 40 and 78 feet. Three wells in the south-east gave similar outputs.

Testing for alluvial tin in the Great Fraser River area was completed. Foundation testing was carried out for the Little Swanport bridge, wheat silos at Perth and a medical school in Hobart.

AUGER DRILLING.

The newly-acquired Proline auger was used for scout boring ahead of the churn drill in the Great Fraser River area to survey basement contours. Near Bridport the drill was used to determine the depth through Quaternary and Tertiary sediments to granite basement.

Mr. J. B. Braithwaite, B.C.E., B.M.E., M.Aus.I.M.M., A.M.I.E.Aus., Hobart, reports:—

EMPLOYMENT

The average number of men employed in the industry was 3,173, a slight decrease on the figure for 1963. There was a fall of 29 in the number employed by the Electrolytic Zinc Company of Australasia Ltd. at Risdon but this was partially balanced by an increase in other sections, particularly at Electrona where there was an increase of 10 in the number engaged in making calcium carbide.

ACCIDENTS

A fatal accident occurred at Adamsfield when a foreman was smothered by a fall of ground from a decomposed serpentine open-cut face. One serious accident occurred in a quarry when a stone rolling down a rill broke the leg of a machine man boring pops. A further five serious accidents occurred in the Risdon works of the Electrolytic Zinc Company of Australasia Ltd. In two, men received eye injuries from splashes of molten zinc from the feed hole of a furnace. The men were wearing safety spectacles but the injuries occurred in spite of this and the design of the feed hole has now been altered. Two of the accidents resulted in broken thumbs, one man having been hit by his mate's hammer and the other having been jammed between a bucket and a hook. The fifth accident resulted in a broken leg when a carpenter tripped and fell off a stage only four feet above the ground. There were no minor accidents involving absence from work of over 14 days.

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. A suggestion by a union that several cases of chronic pulmonary emphysema might be due to welding fumes in a plate shop was investigated but it was found that the ventilation conditions and general precautions taken were excellent.

New regulations under the Explosives Act brought the use of explosives in places other than mines under the control of the Department and this necessitated the testing of a large number of applicants for shotfirers' permits. Numerous claims of vibration damage due to blasting were investigated but none was substantiated. One case of excessive fly-rock was traced to the firing of shallow holes with no stemming, but no damage was caused. Many clay pits and gravel quarries have greatly reduced blasting by the use of heavy bulldozers fitted with rippers.

West Coast District

EMPLOYMENT

The average number of persons employed in the industry was—

Quarry or Open-Cut	256
Other Surface	1,664
Underground	437
Total	<u>2,357</u>

This is again a slight decrease on previous years and contrasts with an overall increase in production.

ACCIDENTS

Two fatal accidents occurred during the year. In the first a bulldozer went off the road and plunged down a steep slope. No explanation of how the machine got off the road was discovered. In the second a miner was killed by a fall of ground in a stope as he was about to bar down after the previous night's firing.

There was a total of 12 serious accidents, six on the surface and six underground. Three of the underground accidents were caused by falls of ground and the other three in handling equipment. On the surface one accident was caused by the use of a makeshift ladder, one by pushing plates under a power hammer by hand, and one when loose clothing caught in a lathe. The other three occurred in handling materials.

There were nine minor accidents underground and five on the surface. Three of the serious accidents and six of the minor resulted in injuries to fingers.

Mr. L. W. Morris, A.W.A.S.M., M.Aus.I.M.M., Launceston, reports:—

EMPLOYMENT

The average number of persons employed in the industry in this district was 1,757, of whom 201 were employed underground. This is a decrease of 54 on the previous year, with a decrease of four employed underground.

ACCIDENTS

There were 23 lost time accidents, of which one was fatal. The fatal accident occurred when the contents of a melting furnace exploded and set the man on fire. A coroner's inquiry was not able to establish the cause of the explosion. Of the other accidents, all but one were of a minor nature. The more serious one was caused by a rock, apparently wedged between the timber in a manway and the side of the rise, falling and causing severe facial and arm wounds.

HEALTH AND SANITATION

The facilities for health and sanitation have previously been generally satisfactory and during the year this condition has been continued and improved.

EXPLOSIVES AND INFLAMMABLE LIQUIDS

Storage and means of conveyance have been generally satisfactory, but one oil company and its customers have been somewhat unco-operative in efforts to keep storages to the required standards. Seven shipments of explosives were landed, under the supervision of the Inspector of Explosives (Mr. D. R. Bonham), without shortages and in good order. Ten shipments of inflammable liquids and one of L.P. gas were landed at the Mobil installation, Bell Bay.

A pipeline leak occurred on one occasion.

Ten parcels of explosives were received from military authorities, police and the public for destruction. These explosives were destroyed at the Magazine Reserve, Dilston, well away from the magazines, but no record of quantity was kept.

PROSPECTING AND EXPLORATION

Storeys Creek Tin Mining Co. N.L. (Dorset Tin Division) continued prospecting by boring the Scotia Lead near the new site of the dredge.

Aberfoyle Tin N.L. continued exploration under Exploration Licence 7/62, the principal activity being diamond drilling at the old Anchor Mine, Blue Tier.

The Broken Hill Pty. Co. Ltd. did very little work in the Constable Creek area, near St. Helens, before abandoning the option. Options were taken over S.P.L. 398, Upper Scamander from Mr. L. Price, covering the old Pyramid Workings, and over S.P.L. 399 from Mr. V. Wood, which covers the old Monarch Mine, Mt. Cameron. Exploration of S.P.L. 398 was continued during the year by survey, geophysical survey, one diamond drill hole and several percussion drill holes. Exploration of S.P.L. 399, started by Mr. Wood, was continued by the Company, using a Conrad 16" drill, and a 6" churn drill was moved, by agreement with the Department, to the Boobyalla area exempted from the Act.

Utah Development Company drilled Mr. V. Wood's Great Musselroe area to a considerable extent before abandoning the option. Geological and geophysical work continued on Exploration Licence 6/63, together with some drilling on selected targets. At the close of the year, arrangements were in hand to keep two drills in operation with arrangements made for a third to commence in 1965.

Exploration Licence 4/63 is held by Storeys Creek Tin Mining Co. N.L. for kaolin at South Mt. Cameron. There was very little activity on this tenement during the period.

Mr. W. R. Tindal, A.W.A.S.M., M.Aus.I.M.M.

EMPLOYMENT

In the coal mining industry, due to a decrease in the demand for coal, the total number of employees on surface and underground fell from 167 to 108, a decrease of 59. The decrease affected both surface and underground where the number of men fell by 32 and 27 respectively. The number of employees underground was 65 and on surface 43. In addition 72 men were employed in the quarrying industry.

ACCIDENTS

One fatal and one serious accident were reported for the year. Both of these accidents occurred on surface. The fatal accident occurred at Rhyndaston Tunnel where a loaded railway wagon was being hauled from the portal of the tunnel to the dump by a bulldozer by means of an 18-ft wire rope sling which had been doubled on this occasion. The grade from the tunnel was a gentle upgrade which then changed to a slight downgrade. Normally the brakes were applied on the upgrade necessitating the bulldozer to pull it on the downgrade. It appears that the brakes had not been fully applied and the employee who was fatally injured apparently was still applying the brake and got caught between the bulldozer and the wagon. The serious accident occurred when an employee switched on the power to a grinder and a quantity of detonators exploded on the bench causing injuries to the eyes, ears and face.

RHYNDASTON TUNNEL

The size of the railway tunnel at Rhyndaston being inadequate for present-day loadings the "Mole", which had been used at Poatina, was employed to enlarge it to a diameter of 17 feet and a height of 18 feet.

The undertaking was proclaimed under the Mines and Works Regulation Act 1915. So as not to interrupt the normal workings of the railways the Mole was only used at the weekends, commencing on 19th September. The work was completed in December. The length of the tunnel to be widened was 3200 feet and the advance of the Mole was 300 feet a weekend.

The only trouble with the roof and sides of the tunnel was in the parts which had already been supported by brickwork. In these areas the strata was meshed and held in place by rock bolts and afterwards covered with gunite.

The spoil from the widening was discharged into a side-tipping wagon and hauled to the dumping area by a diesel-electric locomotive. Extensive testing was carried out for noxious fumes from the locomotive but, by the use of an axial flow fan on the upcast shafts along the tunnel, the volume of air flowing in the tunnel enabled these to be kept to very low concentrations. A first-aid station with trained personnel in attendance was established.

SAFETY

Attention has been directed to the safe working of all mines and quarries by regular inspection. Hygrometer readings were taken in all working faces and found to be within the requirements of the Act, and all mines found to be free of inflammable gas. Particular attention has been paid to the electrical installations in the coal mines.

EXPLOSIVES AND INFLAMMABLE LIQUIDS

Magazines and inflammable liquids installations, old and new, have been regularly inspected and where they did not conform with the regulations, orders were issued for the requirements to be fulfilled.

The Explosives Amendment Regulations 1964 require that all persons who prepare and fire a charge of explosives must have a permit to do so, and to enable people to comply shot firers' examinations have been conducted and 107 permits issued. A series of lectures on explosives were given to representatives of various municipal councils and other interested persons.

Mr. L. F. Egan, A.M.Aus.I.M.M., Burnie, reports:—

EMPLOYMENT

Average employment showed an increase of 99 men over the previous year, the total figure of 1,144 comprising 145 men employed in quarrying and open cut operations, 22 underground and 977 in other categories.

ACCIDENTS

Three accidents involving injuries of a minor nature were reported for registration. In each case the circumstances were investigated and where warranted remedial action was proposed. In each instance a fractured finger was sustained through crushing.

Matters affecting the health and safety of employees on all mines and works have been kept under constant review. Clinical examinations of employees under the auspices of the Workers' (Occupational Diseases) Relief Fund Act have afforded an excellent check on communicable diseases, no cases of pneumoconiosis being detected during the year. In the matter of mine hygiene the various companies have shown an awareness of the importance of this subject and their attention to the provision of amenities and adequate ventilation of mine workings has been a source of satisfaction.

PROSPECTING

Operations were continued by five companies, centres under particular examination being Balfour, Mt. Bischoff, Mt. Cleveland, Savage River, and Mt. Lindsay. In addition the examination of West Bischoff was commenced by one of the companies already in operation. Average employment totalled 27, of whom 10 were engaged in underground operations. One important aspect of the prospecting work carried on by two of the major companies was the appraisal and assessment of known deposits with view to their large scale development.

INFLAMMABLE LIQUIDS AND EXPLOSIVES

Supervision of the landing of inflammable liquids at Devonport, Burnie and King Island was carried out in the main by Mr. H. R. Powell, Inspector of Explosives, Burnie. In all 15 shipments were covered, five being to the port of Burnie, nine to Devonport and one to Naracoopa. All discharges were carried out safely and smoothly and devoid of untoward incidents.

Mr. Powell supervised the landing of five shipments of explosives at Burnie. The Harbour Master, King Island, exercised authority on our behalf at the discharge of a cargo of explosives at Naracoopa. Following the gazettal of the Explosives Amendment Regulations 1964 in July, candidates for shot-firers' permits were examined and 100 permits were granted.

**REPORT OF THE RINGAROOMA AND CASCADE WATER BOARD FOR THE
YEAR ENDED 31st DECEMBER, 1964**

SIR,

We have the honour to submit the report of the Ringarooma and Cascade Water Board for the year ended 31st December, 1964.

The Board has continued to function for the purpose of maintaining the two principal dams and to meet fixed charges on the capital cost of the system. The principal item of expenditure was interest which totalled £436 14s. 1d. and the only other expenditure was £56 5s. 0d. for dam maintenance. The deficit for the year was £492 19s. 1d.

An amount of £85 was received from the sale of two old cottages and £50 from the sale of old pipes recovered from syphons. These amounts were off-set against the original capital cost of the water system which amounted to £10,000. Further amounts will be received as other assets of the Board are sold.

Since the closure of the race system the main purpose of the Board no longer exists but it will continue to function under the provisions of the Ringarooma and Cascade Water (Agreement) Act 1947.

We have the honour to be, Sir,

Your obedient servants,

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

The Hon. the Minister for Mines, Hobart.

RINGAROOMA AND CASCADE (WATER) SUSPENSE ACCOUNT.

Statement of Receipts and Payments for the year ended 31st December, 1964.

<i>Receipts.</i>	£	s.	d.	<i>Payments.</i>	£	s.	d.
Balance (Loss)	492	19	1	Ringarooma Race—			
				Wages	56	5	0
				Cascade System—			
				Interest on Capital Cost of Ringarooma and Cascade Water System	436	14	1
	492	19	1		492	19	1