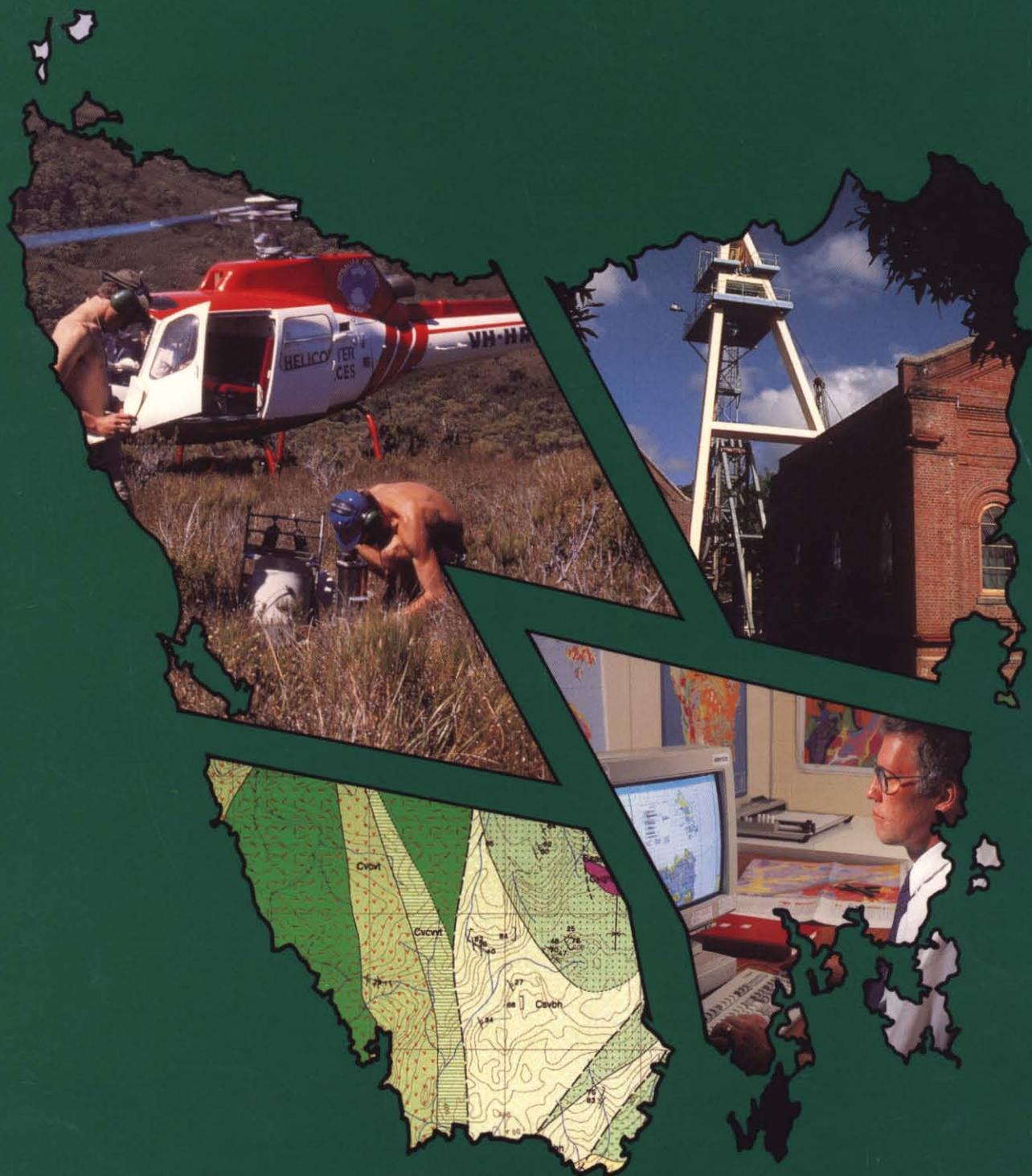


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ANNUAL REVIEW

1996-97



Mineral Resources Tasmania

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Mineral Resources Tasmania

Annual Review
1996/97

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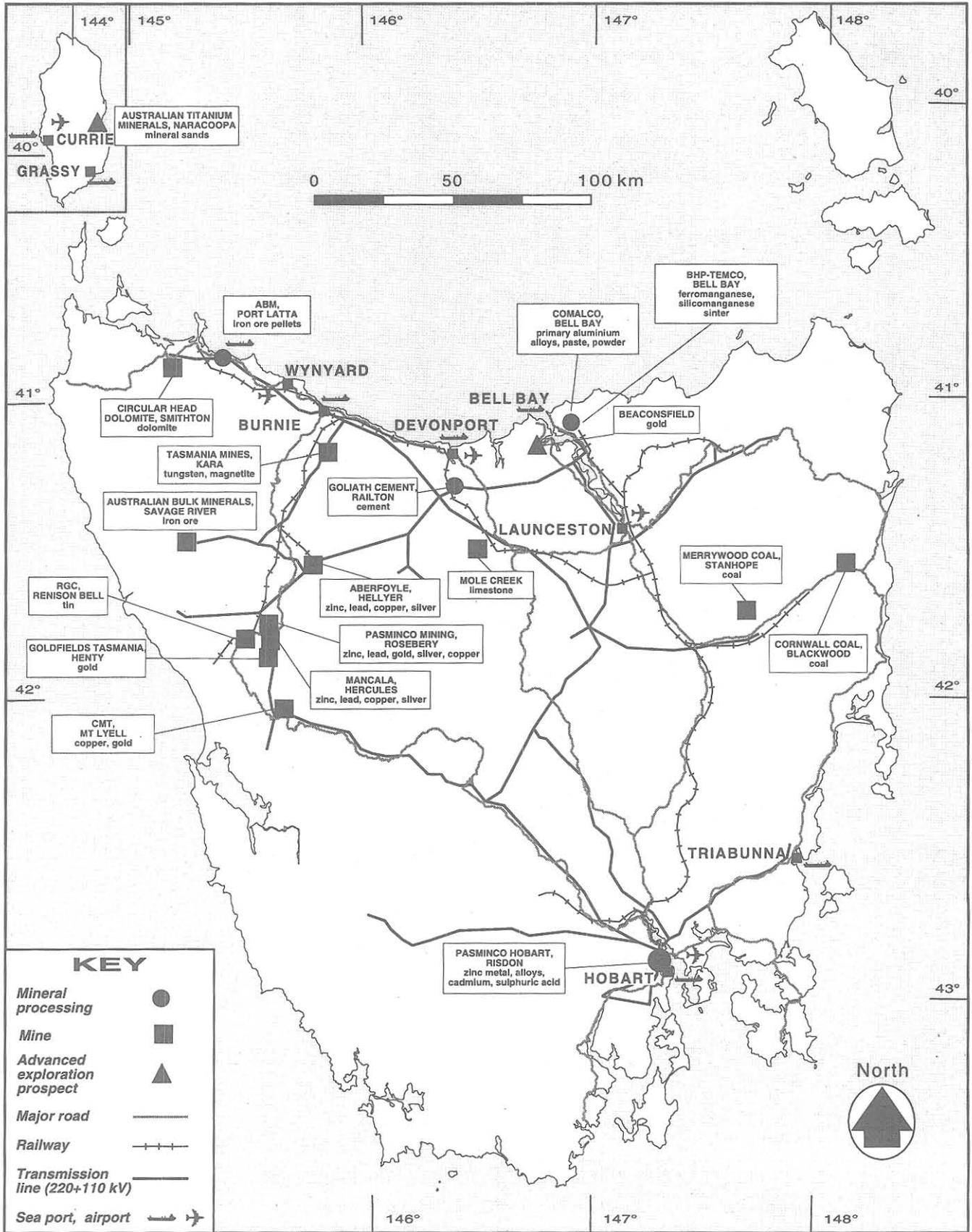
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— TASMANIA —
**Major Mining and Mineral
 Processing Operations**
(as at 30 June 1997)



Mineral sector overview

One of the main achievements for 1996/97 was the agreement between industry and Government on an equitable royalty regime, with new royalty rates being approved by the Premier in August 1997. The new regime will, hopefully, result in the doubling of royalty revenue by the year 2000/01.

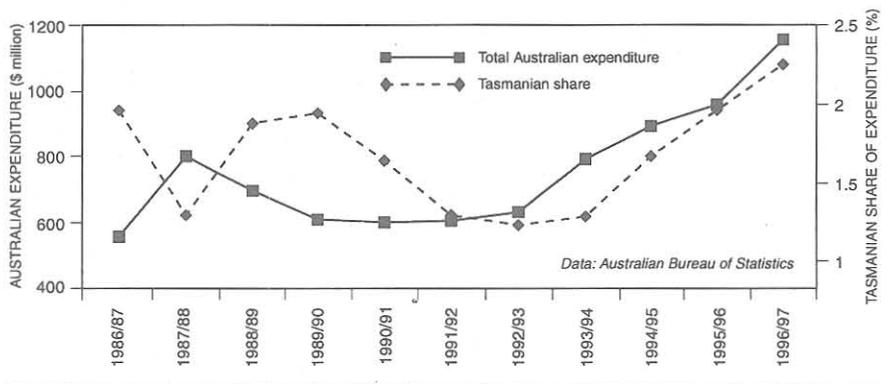
The new royalty rates will maintain the competitive position of Tasmania against other States as far as industry attraction is concerned. The regime is also fair in that it is linked to the overall profitability of the industry and recognises the economic contribution of downstream processing to the State. The new royalty arrangements provide some comfort to the mining sector at a time of volatility in the price of copper and depressed tin and gold prices.

Features of the new royalties include:

- Mining companies that expand into downstream processing to produce a metal will receive an automatic 20% rebate on royalties payable;
- Companies that produce gold doré will be able to claim a 10% rebate on royalties;
- The Treasurer will have the discretion to increase the gold doré rebate to 20%, depending on criteria such as high levels of financial investment and significant employment increases from future downstream processing investment;
- The cap on royalties payable will remain at 5% of net sales;
- The profit calculation component of the royalty regime will be varied to increase the exponential factor from 0.3 to 0.35 in 1998/99 to 0.4 in 2000/01 and beyond. The increase in the exponential factor will result in increased revenue from mining company profits.

Year	Australian Expenditure (\$ Million)	Tasmanian Expenditure (\$ Million)	Tasmania as % of Australian Expenditure
1986/87	556.8	10.9	1.96
1987/88	802.2	10.4	1.30
1988/89	697.6	13.1	1.88
1989/90	607.5	11.8	1.94
1990/91	601.5	9.9	1.65
1991/92	603.7	7.8	1.29
1992/93	631.7	7.8	1.23
1993/94	792.6	10.2	1.29
1994/95	893.4	14.9	1.67
1995/96	960.2	18.8	1.96
1996/97	1156.8	26.0	2.25

Source: Australian Bureau of Statistics — Actual and Expected Private Mineral Exploration, Australia.



- The *ad valorem* component of the royalty regime will increase from 1.2% in 1996/97 to 1.4% in 1997/98, 1.5% in 1998/99, to 1.6% in 1999/2000 and beyond;

Royalty receipts for 1997/98 are estimated to be \$8.5 million. This estimate excludes royalties from the new Savage River mine operator, which expects to start sending product to Port Latta in late 1997.

Mineral exploration expenditure in Tasmania continues to grow at an impressive rate. Figures released by the Australian Bureau of Statistics show that mineral exploration companies invested \$26.0 million in Tasmania during the financial year ended 30 June 1997, an increase of \$7.2 million on the figure for the previous financial year.

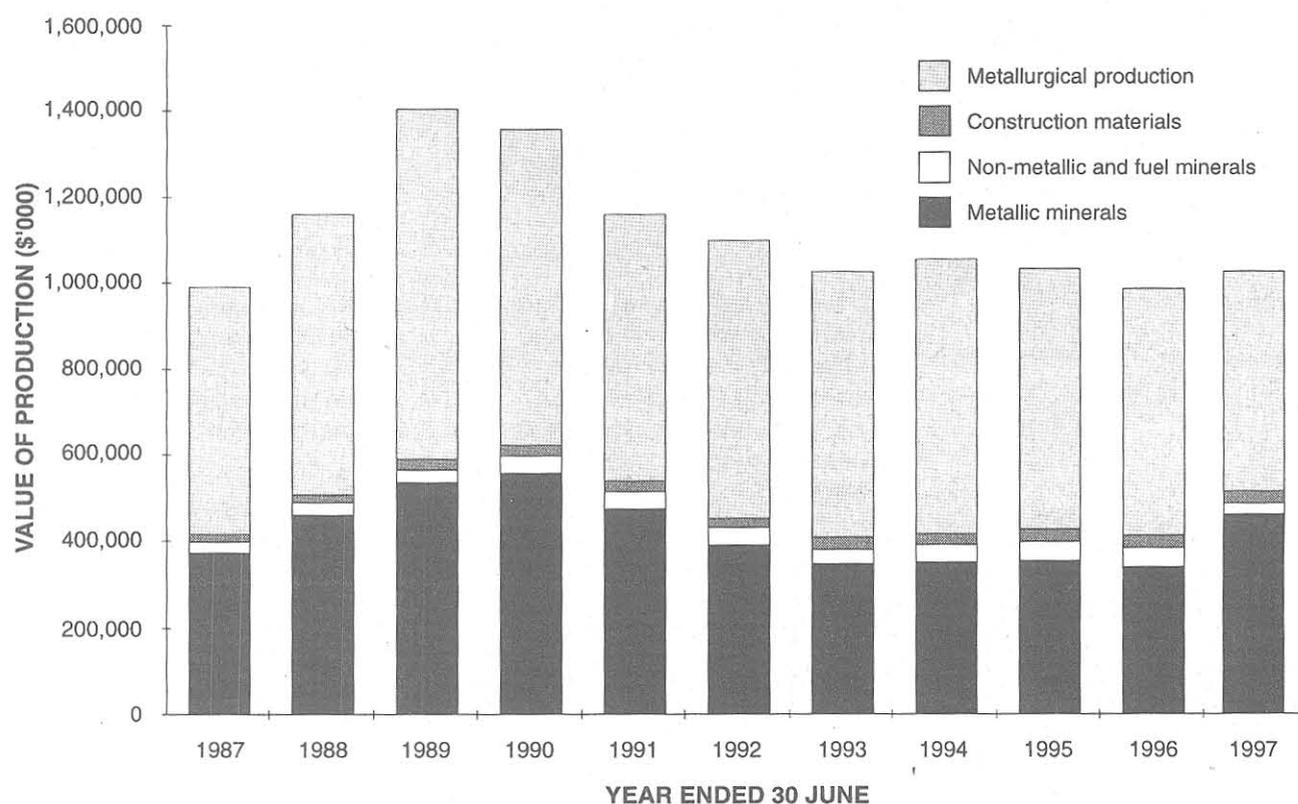
Annual mineral exploration expenditure in Tasmania has now increased for the fourth consecutive year, and has been growing at over 25% per year, representing a sustained increase in the effort being applied to mineral exploration in Tasmania. Tasmania's share of national mineral exploration expenditure is now 2.25%, and is approaching a level that was last achieved in the mid-1980s.

Expenditure in the June quarter was \$10.1 million, more than twice the expenditure for the same period last year and represented 2.84% of the national total, up from 1.65% for the corresponding quarter of 1995/96. Of the June quarter total, 64% was spent in exploring for gold, compared with 36% in 1995/96.

Large areas of the State have the potential to contain gold deposits, such as in the northeast where the Beaconsfield mine is on track

Value and production of minerals 1995/96 and 1996/97

	1995/96		1996/97		% Change
	Tonnes	A\$'000	Tonnes	A\$'000	
Gold	1.02	-	2.44	-	+139.2
Silver	144	-	166	-	-13.2
Zinc	198 376	-	186 406	-	-6.0
Copper	11 481	-	24 759	-	+115.7
Lead	38 565	-	37 974	-	-1.5
Tin	8 647	-	8 732	-	+1.0
Tungsten	77	-	2	-	-97.4
Iron ore pellets	1 681 332	-	809 359	-	-51.9
Others	114 512	-	136 603	-	+19.3
Total metallic minerals	-	338 056	-	460 907	+36.3
Non-metallics and fuel minerals	-	44 596	-	48 452	+8.6
Construction materials	-	28 933	-	26 962	-6.8
Metallurgical production from imported ores	-	572 811	-	706 686	+23.4
Value of mining and mineral processing sectors	-	984 396	-	1 243 008	+26.3



to begin production next year; in the northwest, where the joint venture between Titan Resources NL and Goldstream Mining NL has spent over \$1 million in the last year; and in the southeast, where Sedimentary Holdings NL is drilling in the Weld River area. A recent drop in the price of gold, together with pessimistic predictions for its future value, will impact on gold exploration world-wide, and may impact on expenditure on gold exploration in Tasmania.

In order to minimise the predicted downturn in gold exploration, Tasmania will need to promote its prospectivity for both gold and other commodities. Tasmania's world-class base metal mines on the West Coast can be used to attract mineral exploration investment, as companies Australia-wide look for other metals to target.

Over 10 000 square kilometres, or 16% of Tasmania, is currently being explored for commodities other than oil. During 1996/97, 150 exploration licences for metallic and non-metallic minerals were active, covering an area of 10,019 square kilometres, compared to 137 licences over 7,359 square kilometres during 1995/96, an increase of 36% in the area covered and 8.5% in the number of licences. Much of the increased area comprises large exploration licences in the northwest of the State. Exploration for minerals in these areas will initially be of a reconnaissance nature.

Over the past few years the Tasmanian Government, through Tasmania Development and Resources (TDR) and more recently Major Projects Tasmania (MPT), has been able to secure the rejuvenation of two of Tasmania's major mines, Mount Lyell and Savage River. The innovative approaches and vision shown by Copper Mines of Tasmania and Australian Bulk Minerals respectively have resulted in most exciting developments.

Other mines have also been active in securing their future: Renison with the RENDEEP

development; Rosebery with its exploration program identifying a further 2.7 million tonnes of ore; Henty coming into full development; Hellyer continuing to improve its processing technology with the new high intensity conditioning circuit despite only three years' ore remaining; the Beaconsfield Joint Venture on track for the mine reopening in 1998; and Goliath Cement developing a new pit at Railton. Unfortunately Mancala closed the Anchor mine in northeast Tasmania but resumed production at Hercules on the West Coast.

The mineral processing industry has also shared in the positive developments.

Pasminco Hobart Smelter improved its operating efficiency with the commissioning of a second zinc stripping machine and associated cathode handling system. An environmental milestone will be achieved in late 1997 with the cessation of jarosite production and ocean disposal.

With the signing of a new power contract, Comalco has secured its future and is implementing process and environmental improvements. Unfortunately, Temco is experiencing the effects of very competitive markets, but is proceeding with the upgrade of a furnace which will result in an increase in silicomanganese production.

Sadly, the news was not uniformly good. Tioxide ceased production in June 1997 and the Southern Aluminium wheel plant closed. In addition to the closure of the Anchor mine, production at the Tonganah kaolin operation has been scaled down.

These changes demonstrate the dynamic nature of the industry. The future can be secured by two things: the discovery of new economic resources and the development of new downstream processing industries.

There are good prospects for future developments, with a renewed interest in the gold potential of northwestern Tasmania, and continued interesting results from the

Forster Prospect in the southeast. RGC Exploration have reported an encouraging intersection of high-grade gold mineralisation south of the Henty mine, while Allegiance Mining NL reported extensions to the lateritic nickel-cobalt mineralisation near Beaconsfield.

If the present level of activity is maintained, the opening of a new mine should not be too far away. Nothing generates increased exploration more effectively than the discovery of new economic resources.

The Regional Forest Agreement has finally been signed. Achieving a balanced outcome under the RFA has been an exhaustive process for all concerned. The signing of this agreement will remove the uncertainty in land tenure and access for at least 20 years, which should provide industry with the confidence needed to maintain the growth in mineral exploration.

To improve the delivery of geoscientific data to the mineral exploration industry, the Government has funded the implementation of Phase Three of the Tasmanian Information on Geoscientific and Exploration Resources Project, or Project TIGER. With funding of \$100,000 per year for the next three years, Phase Three of TIGER will upgrade all existing digital data and integrate the databases into a single data management system.

The generation of new geoscientific data will resume this summer with the mapping of the Dempster sheet, in northwest Tasmania, and the Cethana sheet, which covers part of the Mount Read Volcanics in the central north. Existing maps will also be upgraded into a digital format and will be released with the supporting databases. Studies of the gold mineralisation in southeast Tasmania, and of the structural controls of gold mineralisation in the northeast, will be completed and published this year.

The minerals industry, through the Tasmanian Minerals Council, has joined the State and

Commonwealth Governments in supporting a proposed study of the Western Tasmanian Mineral Province as part of the Regional Minerals Program. When implemented, the study will address the future infrastructure needs of the industry in western Tasmania, including the possibility of bringing natural gas ashore from the Yolla gasfield in Bass Strait to supply the needs of possible future downstream processing projects.

There is a large potential for future industrial development based on downstream processing of indigenous resources. The Tasmanian Government will be awaiting with a great deal of interest the outcome of the feasibility study being carried out by Australian Bulk Minerals on pig iron and steel manufacturing. It is also aware that other identified resources in the North West, such as ochre, magnesite and silica, offer potential for

future Tasmania-based metallurgical industries.

MRT is grateful to the Tasmanian Minerals Council (TMC) for its support in the past year of the direction we are taking. MRT believes that by continuing to work closely with industry, the Tasmanian Government can continue to deliver a climate which will encourage further investment by the minerals industries in this State for the benefit of all Tasmanians.

Mineral Resources Tasmania

At the end of 1996/97, following four years of rolling restructurings, Mineral Resources Tasmania (MRT) has a resolved and workable structure consisting of 52 Full-Time-Equivalent officers.

MRT has evolved into a stand alone Division of Tasmania Development and Resources (TDR) and gives effect to Government policy in relation to minerals and petroleum resources, and provides essential information for land management in Tasmania. TDR supplies MRT's requirements for Corporate Services.

All occupational health and safety matters associated with the mining industry, including the Mines Inspectorate, are now under the auspices of the Tasmanian Workplace Standards Authority (WSA).

MRT's Mission

- To provide geoscientific information essential for the development of the State's mineral and petroleum resources and for responsible land management.

MRT's Objectives

- To increase the investment in exploration for, and development of, minerals and petroleum in Tasmania.
- To provide geoscientific information essential for

responsible land management in Tasmania.

- To ensure a fair and sustainable return to the community when petroleum and mineral resources are mined.

MRT's Budget Outputs

Mineral Resources Tasmania is funded to undertake five outputs:

1. Metallic Mineral Resource Investigation and Promotion Program
2. Industrial Minerals and Hydrocarbon Investigation and Promotion Program
3. Land Management, Environment and Rehabilitation Program
4. Digital Geoscientific Data Capture, Maintenance and Output Program
5. Tenement Management and Royalty Administration

Focus and Role of MRT

The focus of MRT is to produce and promote up-to-date geoscientific information on Tasmania as an aid to the mineral and petroleum exploration industries, other government agencies and the general public, in order to improve the State's economic position, and to promote sustainable land-use planning and environmental management.

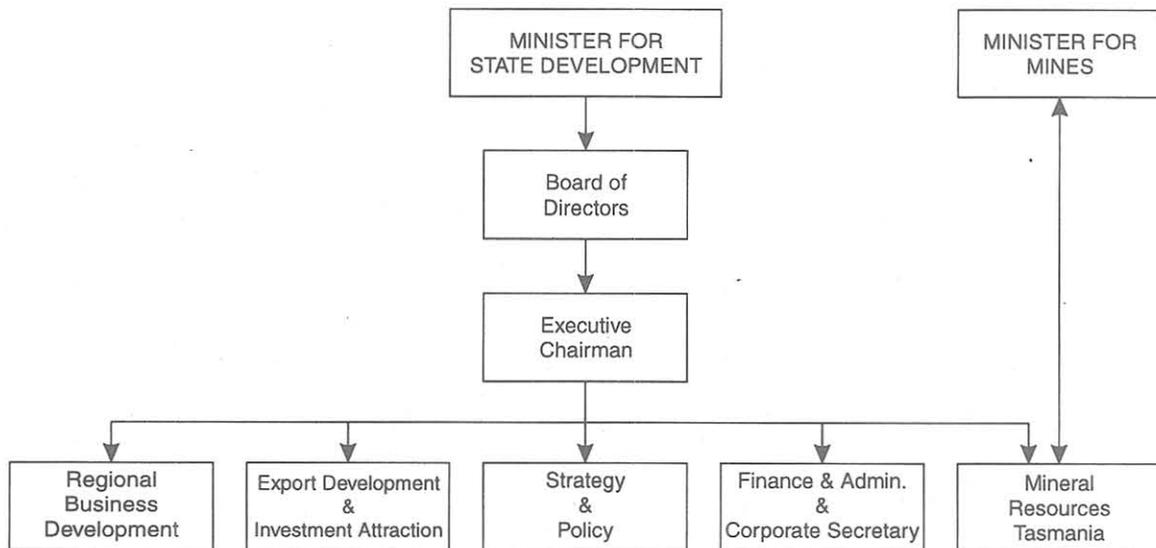
Under present Government legislation and policy, MRT is responsible for:

- the acquisition of geoscientific data for responsible land management of Tasmania;
- the regulation and environmental monitoring of the Tasmanian mineral exploration and mining industry;
- ensuring a sustainable future for the mineral exploration, mining, quarrying and mineral processing industries. The future will be based on new mineral discoveries arising out of strong private sector commitment to Tasmania's mineral prospectivity;
- encouraging and assisting the mining sector to make better use of the State's resources by exploration, market research and improvement in environmental performance.

These aims are based on a number of principles.

- The long-term vigour of Tasmania's mining sector depends on strong exploration and research expenditure, to identify new opportunities and ensure identified resources are properly utilised.
- The pursuit of excellence in environmental management benefits the mining sector as well the broader community, and increases community

TASMANIA DEVELOPMENT AND RESOURCES



Management of Mineral Resources Tasmania (as at 30 June 1997)

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Dr Robert G. Richardson
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Mr Ken G. Bird
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Manager, Finance and Administration —

Mr Matthew N. Fitzgerald
Telephone (03) 6233 8370

Registrar of Mines —

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- acceptance of mining as an essential industry.
- Geological information is essential for municipal planning to ensure residential development does not sterilise mineral and stone resources.
 - The use of geoscientific data is essential for rational land-use planning. Management of geohazards (e.g. landslides, identification of waste disposal sites, and protection of groundwater resources) is essential.
 - Geoscientific information is also required to develop management strategies for all Crown Land, so that the provision of future mineral and stone resources required by the community can be managed without compromise to other values.

MRT PERFORMANCE INDICATORS — 1996/97

Area	Goal	1995/96	1996/97	% increase
Exploration Expenditure (financial year)	To increase to a minimum of \$20 million per year	\$18.8 million	\$26.0 million	+38%
Exploration Expenditure (calendar year)	To increase to a minimum of \$20 million per year	\$17.3 million (1995)	\$20.6 million (1996)	+19%
Area held under Exploration Licence	To obtain an increase	7359 km ² (Note 1)	10 019 km ² (Note 1)	+26.5%
Number of Exploration Licences granted	To obtain an increase	141	153	+8.5%
Exploration drilling metres completed	To obtain an increase	25,815 (1995)	28,472 (1996)	10.3%
Percentage of Strategic Prospectivity Zone (SPZ) area held under EL's	To obtain an increase	27.9%	35.1%	20.5%
Expansion of GIS coverage	To obtain an increase			
1:250 000 scale maps and associated data bases	5 maps needed to cover the State	2 maps completed	Revision of data	Positive result
1:25 000 scale	418 maps needed to cover the State	5 maps completed	8 maps completed	Positive result

Note 1: These figures are for metallic and non-metallic minerals only. A further 11 897 km² was held for onshore oil exploration in 1996/97.

Summary of Exploration Licences, 1996/97

Licence Type	Area (km ²)		% of State 1996/97
	1995/96	1996/97	
Metallic Exploration and Retention Licences	7 113	9 964	14.6
Non-metallic Exploration and Retention Licences	559	390	0.6
Onshore petroleum Exploration Licences	11 821	11 897	17.4

Performance Measures

The 1996/97 financial year was the best year for mineral exploration expenditure for many years, with mineral exploration expenditure continuing to grow, not only in dollars expended but also in the percentage of total Australian expenditure.

According to the Australian Bureau of Statistics, explorers spent \$26 million during 1996/97, a 38% increase over the same period last year. For calendar year 1996, expenditure was \$20.6 million, up from \$17.3 million during 1995, a 19% increase. This places expenditure on mineral exploration at the highest rate for 13 years.

It is also significant that Tasmania's share of the total Australian mineral exploration expenditure for commodities other than coal and oil has more than doubled from 0.98% in 1992 to 2.25% in 1996/97. This figure compares well with other States as it represents a proportion well in excess of Tasmania's 0.88% share of the land area of Australia.

There were 150 active exploration licences for metallic and non-metallic minerals during 1996/97 compared to 137 licences during 1995/96. These licences covered an area of 10,019 square kilometres compared to 7,359 square kilometres in the previous year. This represents an increase of 36% in the area covered and 8.5% in the number of licences.

At 30 June 1997, mining leases covered 619 square kilometres, or 0.9% of the State. This is in comparison with 509 square kilometres during 1995/96. A significant proportion of the increase was due to the re-commencement of the Savage River Mine lease.

Twenty-six exploration tender areas were offered during 1996/97 and the resulting successful companies were issued with exploration licences. Companies submitted 162 exploration reports during 1996/97, bringing the total

of exploration reports now indexed on the TASXPLORE database and incorporated into the division's collection to 4,790.

During 1996/97 MRT officers continue to represent Tasmania on mineral and land access issues at the Standing Committee of Officials and various subcommittees and working groups of the Australian and New Zealand Minerals and Energy Council (ANZMEC). The Director, Mineral Resources also represents TDR on the State Land Information Co-ordination Committee and on the Forest Policy Taskforce and State-Commonwealth Standing Committee for the Regional Forest Agreement. Numerous officers from MRT also served on working groups associated with the Regional Forest Agreement process.

During the year, MRT staff interacted with industry and other agencies through seminars and conferences, meetings of the Mineral Resource Industry Advisory Panel (MRIAP) and the bi-yearly Tasmanian Minerals Council Exploration Group meetings.

Activities

Project TIGER (Tasmanian Information on Geoscientific and Exploration Resources)

Tasmania's geoscience information resources are fundamental to initiating investment in minerals and effective land-use planning. These data have been collected over the past 100 years and are held by MRT, predominantly as maps and reports in paper form.

In the twelve-year period from 1984 to 1996 a total of \$163 million dollars was spent on data collection by the mineral exploration industry and MRT. While the greatest proportion of this expenditure was made by

industry, all the data collected are held by MRT.

Project TIGER was initiated in September 1993 to transform MRT's data and information management from paper-based to digital technology. The NETGOLD Project, which commenced shortly after this date, was a major government initiative to quickly establish a core of digital data for a specific area. This project was completed successfully and a comprehensive digital data set for northeast Tasmania was launched in April 1994. Expenditure on the NETGOLD Project, which was funded under separate arrangements, totalled \$600,000 and was used to complete geological mapping, geophysical surveying and the publication of several reports. Arc/Info was proven as a suitable spatial data management system and many of the information management protocols put in place during NETGOLD are still in use.

Since the completion of NETGOLD, work on Project TIGER has concentrated on the digital capture of recently printed maps, populating digital geoscientific data bases from company exploration reports (Phase 2, 1994/95-1996/97), and the development of a prototype Public Access Inquiry System (PAIS) (Phase 1, 1994).

Since 1994 MRT has spent over \$1 million on upgrading and expanding digital data sets. With an integrated information management system MRT can maintain high quality data and Tasmania will maximise the benefits of mineral investment and land management.

The Tasmanian Government has allocated a budget of \$300,000 over the next three years, with expenditure capped to \$100,000 per year for Phase 3. Completion of this phase will incur modest recurring costs for system maintenance but deliver a vastly improved information resource for government, industry and the community.

Phase 3 of Project TIGER will commence in 1997/98 and will:

- integrate and secure all existing MRT digital data;
- create a system architecture which can be expanded to meet future requirements to store all MRT data;
- allow for the maintenance of consistently high standards across all digital data sets;
- permit MRT to deliver a comprehensive range of information products and contribute to a seamless Government-wide information resource.

The current MRT data management system can be described as an information archipelago. The unconnected islands of information have been developed at various times to meet the specific needs of groups within the organisation without paying attention to corporate or government-wide management issues. During Phase 3, data sets will be continually improved so they can be migrated to the new system. Conversion of non-digital and paper-based data will have to be completed as a separate project.

An integrated information management system will allow MRT to continually increase the quality and diversity of data sets and the information which is generated from these data sets. Future phases of Project TIGER will rely upon a robust data management system to put in place delivery systems to external clients.

Regional Forest Agreement

The Regional Forest Agreement is expected to be signed during November 1997. The RFA process has attempted to obtain a balanced outcome for the forestry, conservation and the minerals industries. It has been an exhaustive process for all concerned, consuming large amounts of time and energy over the past 18 months. With the signing of the Agreement, the Tasmanian Government hopes that uncertainty in land tenure

and access will be removed for the next twenty years, which should provide industry with the confidence needed to maintain the growth in mineral exploration, although it is recognised that commodity prices may also affect the level of activity.

The minerals industry can, following the signing of the Regional Forest Agreement, invest with certainty in Tasmania. The Prime Minister has confirmed that the Agreement is to be legally binding between the Commonwealth and the State and one which will pay compensation for any change to a statutory lease, licence or authority which precludes a company from carrying out exploration or a mining operation.

Regional Minerals Program

The purpose of the Regional Minerals Program is:

- to facilitate regional development in the minerals industry; and
- to improve the competitive standing of currently operating mines and processing plants.

The current Commonwealth Government established the Regional Minerals Program (RMP) in August 1996. The program was created following the success of the Carpentaria-Mt Isa Minerals Province Study in northern Australia, which has been used to facilitate regional development in that area. The study enabled a co-ordinated, tripartite approach to the provision of infrastructure necessary for the development of the region.

The Carpentaria-Mt Isa study is now seen as a model for facilitating development in other regions where major projects are being undertaken, and a project of this type has also been undertaken in the Northern Goldfields Mineral Province of Western Australia.

Each RMP involves a partnership between the Commonwealth and State governments and the minerals

industry. Under this partnership, the RMP is designed to identify the mineral resources and processing potential of selected regions, co-ordinate planning of infrastructure and government services, remove impediments and unnecessary duplication, and streamline approval processes.

A draft proposal for a RMP over the Western Tasmanian Minerals Province was developed by MRT and was presented to the Commonwealth Department of Primary Industries and Energy (DPIE) for funding during 1995/96. On the basis of this preliminary proposal, the Commonwealth Government agreed in December 1996 for an RMP project to proceed over the Western Tasmanian Minerals Province.

Following discussions between officers of the DPIE, MRT and the Tasmanian Minerals Council, a basic plan was designed and respective bodies were approached for finance. The Tasmanian Government allocated up to \$150,000 per year for two years as its portion of the project funding, with the Commonwealth Government and industry making similar commitments. When funding for the 1997/98 financial year is approved the process will begin with consultants being appointed to undertake a scoping study.

TASGO — The Tasmanian National Geoscience Mapping Accord Project

Mineral Resources Tasmania, in co-operation with the Australian Geological Survey Organisation (AGSO), carried out a National Geoscience Mapping Accord Project (NGMA) between December 1994 and June 1997.

The purpose of the project, code named 'TASGO', was to provide new, comprehensive and diverse geological and geophysical data sets which could be used to re-evaluate Tasmania's mineral and petroleum potential, and to evaluate the relationship of known deposits to major crustal structures at depth.

During the interpretation stage, personnel from the Australian Geodynamics Cooperative Research Centre (AGCRC), industry and universities also participated. The project was originally set to finish at the end of December 1997 but was cut short due to funding constraints. It is anticipated that a 'TASGO' Project wrap-up workshop will be held in Hobart in May 1998.

Project highlights and products include:

- *New 1:500 000 scale Stratotectonic Elements map with geological synthesis of Tasmania*: summarised in time-space format against the new AGSO Timescale, with accompanying notes (*Tasmanian Geological Survey Record* 1995/01).
- *Seventeen new U-Pb zircon dates, and Cambrian and Ordovician faunas evaluated*: Zircon dating revealed age of Tasmania's basement; minor Delamerian magmatism found; Mount Read Volcanics-equivalent confirmed in southwest; Tasmania's tectonic history better known; (*AGSO Record* 1997/15).

Cambrian faunas examined; Mount Read Volcanics-equivalents determined (*AGSO Record* 1995/69); Ordovician faunas reveal magnitude of Delamerian unconformity (*AGSO Record* 1996/23).

- *81 000 line kilometres of aeromagnetic data acquired at 800 m line spacing (400 m at King Island) over the inshore surrounds of Tasmania*: Data merged with existing data sets; new colour and greyscale 1:500 000 and 1:1 000 000 scale aeromagnetic maps of Tasmania and surrounds released:
 - Aeromagnetic data interpreted (*AGSO Record* 1996/29);
 - Bass Basin aeromagnetism interpreted (*AGSO Record* 1996/14);

- Sorell Basin interpreted (*Australian Journal of Earth Sciences* 44:579–596).
- *120 line kilometres of land seismic data acquired and released*: Dundas Element (Lines 1, 2 plus a 1.2 km high resolution line near Hellyer mine); Northeast Tasmania Element (Line 3); Tasmania Basin (Lines 4 and 5):
 - Operations Report (case history) (*AGSO Record* 1995/72);
 - Dundas Trough seismic interpretation, showing Arthur Lineament dipping to east at depth (*AGSO Research Newsletter* 25:17–19);
 - Hellyer area high-resolution interpretation (showing potential of seismic in minerals exploration below 500 m) (*Abstracts Geological Society of Australia* 44:78);
 - Gravity along seismic lines (*Tasmanian Geological Survey Record* 1995/7);
 - Geochemistry of seismic shothole cuttings (AGSO ROCKCHEM database);
- *1758 line kilometres of deep (20s) marine seismic data acquired over major structures extending offshore*: data processed; interpretation in progress:
 - Cruise proposal (background information) (*AGSO Record* 1995/13);
 - Cruise report (*AGSO Record* 1995/27).
- *Seismic refraction*: Recordings of the *RV Rig Seismic's* airguns through a statewide network of 46 stations accomplished; digitising of data well advanced; modelling commenced; data with AGCRC for methodology development and future tomography. Operations report (*AGSO Record* 1995/74).
- *Geological studies completed*:
 - Pilot acritarch search (*AGSO Professional Opinion* 1997/5);

- Pilot petroleum source rock and maturation study of Tasmanian strata (*AGSO Professional Opinion* 1996/12);
- Boat Harbour Fault study, northwest Tasmania (*Tasmanian Geological Survey Record* 1997/09);
- Reconnaissance apatite fission track thermotectonic imaging of Tasmania (88 samples) (*AGSO Record* 1997/35);
- C, O and Sr-isotope chemostratigraphy of Neoproterozoic and Early Cambrian carbonate rocks, northwest Tasmania (*Tasmanian Geological Survey Record* 1996/10);
- Geology of remote islands between Tasmania and King Island (*Tasmanian Geological Survey Record* 1997/3) (in press).
- *Work in progress*
 - Marine seismic interpretation and data release;
 - Time-space plot for surrounds of Tasmania;
 - North coast structural transect;
 - King Island gravity infill and physical properties;
 - Nd-Sm isotopic analyses of 35 mafic rocks;
 - Pb isotope determinations on galena from northeast Tasmania.

Map production and new products from MRT

A further five 1:25 000 scale digital geological map sheets in northeast Tasmania (Blue Tier, Brilliant, Pyengana, Spurrs Rivulet and Lanka) and three in the Mt Read Volcanics region (Loongana, Lea and Pencil Pine) were completed during the year.

Two 1:25 000 scale maps (Ulverstone–Kindred and Devonport–Latrobe) for the Land Stability Hazard Mapping Project in northwest of Tasmania were completed.

Two issues of the *ProspecTas* newsletter were produced during the year, and the *Fossicking Areas in Tasmania* booklet was completed and printed. The *Mineral Exploration Opportunities in Tasmania* promotional book was updated.

Financial Performance

In accordance with the *Financial Management and Audit Act 1990* the Department is required to report on the year's financial transactions against the original appropriation. Detailed records are published in the *Tasmania Development and Resources (TDR)* annual report to Parliament.

Of the total 1996/97 TDR Consolidated Fund Budget of \$30.731 million, the Mineral Resources Outputs were allocated \$5.059 million. Of this allocation, \$3.936 million was allocated for operating expenses, \$198,000 for project expenditure, \$350,000 for the Rehabilitation of Degraded Mining Lands program and \$575,000 in head-office support.

During 1996/97 MRT continued to carefully monitor all costs in order to contain expenditures within the budget allocation.

Revenues from Rents and Fees from Mineral Lands raised \$0.854 million which exceeded the budget of \$0.770 million due to increased activity in exploration and as a result of additional revenues from petroleum leases.

Revenues from mineral royalties raised a total of \$7.769 million which was overall below budget. The sale of the stockpile from the Savage River mine contained the budget shortfall, as some mining companies did not perform as expected in difficult market conditions.

In 1997/98 outputs funding will be increased by \$48,000 (1%) to \$5.107 million. The increase is the net result of various adjustments to the division's appropriation, which includes some positive movements for salary indexation, transfer of cleaning and rental allocations and a negative movement for the ongoing cost of the employee rationalisation program. Operating expenditure effectively increased by \$62,000, which does not adequately cover the ongoing cost burdens placed on MRT.

Outputs — Application of Funds, 1996/97

	\$'000
Metallic Mineral Resource Investigation and Promotion Program	1,412
Industrial Mineral and Hydrocarbon Investigation and Promotion Program	999
Land Management, Environment and Rehabilitation Program	1,024
Tenement Management and Royalty Administration	1,106
Administered Payments	518
	5,059

Output 1

Metallic Mineral Resource Investigation and Promotion Program

Activities undertaken due to Legislation

- Geoscientific database development, maintenance and marketing.
- Produce 1:25 000 scale compilation maps and associated databases.
- Increase the State geoscientific database and provide strategic direction to mineral deposit research through liaison with CODES, by provision of Government scholarships, and input into AMIRA projects.
- Upgrade geological mapping in areas currently not receiving strong exploration activity and produce 1:25 000 scale digital geological maps, associated databases and reports in the year of the mapping.
- Preparation of reports on past geological mapping projects.
- ETA marketing, including *Tasplorer*.
- Assessment of ETA tenders.
- Assessment of exploration performance.
- Assess impact on mineral sector of the sale or lease of Crown lands and advise Government accordingly.
- Produce reports on the potential for exploration for, and development of, specific metallic and industrial minerals in the State.
- Provide access to and information on drill core.

Activities undertaken due to Government Policy

- Promotional activities associated with increasing the number of exploration companies operating in Tasmania and area covered by exploration licences.
- Policy development on mineral industry facilitation.
- Regional Forest Agreement (RFA) resource and economic impact assessments.
- Interpretation of data acquired during the National Geoscience Mapping Accord (NGMA) TASGO Project and prepare reports.
- Briefing notes, question time briefing notes.
- Public inquires:
 - Geological;
 - Mining tenement, database inquiries;
 - Resources.
- Prepare and contribute to issues of *ProspecTas*.

Legislation administered by Mineral Resources Tasmania associated with Output 1

- Mineral Resources Development Act 1995*.
- Mining (Strategic Prospectivity Zones) Act 1993*.
- Local Government (Building and Miscellaneous Provisions) Act 1993*.

Legislation to which Mineral Resources Tasmania has input related to Output 1

- Crown Lands Act 1976*.
- World Heritage Properties Conservation Act 1975*.
- National Parks and Wildlife Act 1970*.
- Historic Cultural Heritage Act 1995*.
- Public Land (Administration and Forests) Act 1991*.

Government Policy associated with Output 1

- Policies of the Tasmanian Liberal Government, State Election 1996.
- Various inter-departmental policies.
- MRT policies.

Output 2

Industrial Minerals and Hydrocarbon Investigation and Promotion Program

Activities undertaken due to Legislation

- Promotion of Tasmanian offshore petroleum basins.
- Preparation of geological material on the offshore areas.
- Geoscientific database development, maintenance and marketing.
- Project work: Field work and management of field projects.
- Production of maps and reports on the potential for exploration for, and development of, various non-metallic minerals, coal and petroleum, e.g. silica, clay, limestone, magnesite as required.
- Safety inspection of coal mines and petroleum drilling.
- Engineering appraisals.
- ETA marketing, including *Tasexplorer*.
- Assessment of ETA tenders.
- Assessment of exploration performance.
- Provide access to and information on drill core.
- Assess impact on mineral sector of the sale or lease of Crown land, and advise Government accordingly.
- Upgrade geological mapping in areas currently not receiving strong exploration activity and produce 1:25 000 scale digital geological maps, associated databases and reports in the year of the mapping.

Activities undertaken due to Government Policy

- Promotional activities associated with increasing the number of exploration companies operating in Tasmania and area covered by exploration licences.
- Preparation of displays, e.g. Mining Week, Launceston and Hobart Shows, Agfest, Gemboree, press conferences, various geological conferences and open days, and sundry other events.
- Presentation of papers at relevant conferences on aspects of Tasmanian geology.
- Palynological research linking onshore and offshore basins.
- NGMA projects: Geology of west Bass Strait; Neoproterozoic–Cambrian correlation.
- Australian Geological Survey Organisation (AGSO) joint projects on biostratigraphy, aeromagnetism, deep seismic, etc.
- Publications with AGSO on magnetism and biostratigraphy in progress.
- Midlands mapping and drilling project.
- Construction materials: surveys, preparation of reports, maintaining database.
- Policy development on mineral industry facilitation.
- Public enquires:
 - geological;
 - mining tenement, database;
 - resources.
- Preparation of mining guidelines which will outline the Department's view on a wide variety of topics.
- Prepare and contribute to issues of *ProspecTas*.

Legislation administered by Mineral Resources Tasmania associated with Output 2

- Mineral Resources Development Act 1995.*
- Commonwealth Petroleum (Submerged Lands) Act 1967.*
- Petroleum (Submerged Lands) Act 1982.*
- Mt Cameron Water Race Act 1926.*
- Mining (Strategic Prospectivity Zones) Act 1992.*
- Local Government (Building and Miscellaneous Provisions) Act 1993.*

Legislation to which Mineral Resources Tasmania has input related to Output 2

- World Heritage Properties Conservation Act 1975.*
- National Parks and Wildlife Act 1970.*
- Historic Cultural Heritage Act 1995.*
- Public Land (Administration and Forests) Act 1991.*
- Crown Lands Act 1976.*

Government Policy associated with Output 2

- State Coastal Policy.
- State Water Policy.
- Policies of Tasmanian Liberal Government, State Election 1996.
- Various inter-departmental policies.
- MRT policies.

Output 3

Land Management, Environment and Rehabilitation Program

Activities undertaken due to Legislation

- Continual updating of the *Mineral Exploration Code of Practice*.
- Regular review of the *Quarry Code of Practice*.
- Manage *Rehabilitation of Abandoned Mining Land Trust Fund* (schedule, design, finance, monitor and report).
- Approve work programs. Field inspections of exploration work. Liaison with other agencies.
- Set exploration licence bonds.
- Determine rehabilitation requirements on exploration sites and ensure compliance.
- Ensure orderly assessment of programs by the Mineral Exploration Working Group.
- Monitor environmental performance on leases:
 - Inspection of coal operations;
 - Liaise with Mines Inspectors in relation to mines and quarry inspections;
 - Blast vibration work.
- Assess mine and quarry operations:
 - Draft Environmental Management Plan requirements;
 - Review Environmental Management Plans.
- Launceston Urban Engineering Geology Project: compilation of map, reports and database.
- Comment on land use plans by other agencies, Parks and Wildlife Service, Forestry Tasmania.
- Regional landslide risk surveys.
- Proclamation of landslide areas.
- Data storage, map and report preparation.
- Administration of *Groundwater Act 1985*.
 - Resource assessments;
 - Quality protection;
 - Monitor quality and use;
 - Data collection, map storage and report preparation;
 - Advice to property owners;
 - Mineral water.

Activities undertaken due to Government Policy

- Town planning, land use planning.
 - Panel, and managing agencies.
 - Comment on Council planning schemes.
 - Draft submissions for councils, Land Use Planning Review.
 - Advice on proposals for subdivision and zoning by councils.
 - Appeals if required.
- Policy development.
- Public enquires.
- Inter-departmental liaison.
- Input into West Coast Range National Estate nomination and Australia-wide responses to documents such as the Wild Rivers Conservation Plan and the Natural Heritage Charter.
- Urban mapping.
- Advise on building foundation conditions.

Legislation administered by Mineral Resources Tasmania associated with Output 3

- Mineral Resources Development Act 1995*.
- Groundwater Act 1985*.
- Local Government (Building and Miscellaneous Provisions) Act 1993*. S. 36–40.
- Workplace Health and Safety Act 1995*.

Legislation to which Mineral Resources Tasmania has input related to Output 3

- World Heritage Properties Conservation Act 1975*.
- National Parks and Wildlife Act 1970*.
- Environmental Management and Pollution Control Act 1994*.
- Historic Cultural Heritage Act 1995*.
- Public Land (Administration and Forests) Act 1991*.

- Land Use Planning and Approvals Act 1993.*
- Crown Lands Act 1976.*
- State Policies and Projects Act 1993.*
- Resource Management and Planning Appeal Tribunal Act 1993.*

Government Policy associated with Output 3

- State Coastal Policy.
- State Water Policy.
- Policies of Tasmanian Liberal Government, State Election 1996.
- Various inter-departmental policies.
- MRT policies.

Legislation which Mineral Resources Tasmania administers

- Mineral Resources Development Act 1995* which will replace:
- Commonwealth Petroleum (Submerged Lands) Act 1967.*
- Petroleum (Submerged Lands) Act 1982.*
- Mt Cameron Water Race Act 1926.*
- Mining (Strategic Prospectivity Zones) Act 1992.*
- Groundwater Act 1985.*
- Local Government (Building and Miscellaneous Provisions) Act 1993. S. 36–40.*

Legislation into which Mineral Resources Tasmania has a working input due to primary legislative responsibility

- World Heritage Properties Conservation Act 1975.*
- National Parks and Wildlife Act 1970.*
- Environmental Management and Pollution Control Act 1994.*
- Historic Cultural Heritage Act 1995.*
- Public Land (Administration and Forests) Act 1991.*
- Land Use Planning and Approvals Act 1993.*
- Crown Lands Act 1976.*
- Resource Management and Appeals Tribunal Act 1993.*
- State Policies and Projects Act 1993.*

Output 4

Digital Geoscientific Data Capture, Maintenance and Output Program

Activities undertaken due to Legislation

- Geoscientific database development, maintenance, marketing and distribution.
- Production of 1:25 000 scale digital geological maps and associated databases.
- Engineering Geology map production and database distribution.
- Capture, verification and distribution of digital data to all levels of government, the private sector and the public.
- Production of maps and diagrams for reports.
- Production of maps and diagrams for ETA marketing, including *Tasexplorer*.
- Production of maps for the promotion of Tasmanian petroleum basins.
- Capture, maintain and distribute the exploration report and activity databases.
- Supply background information and maps for commenting on land use plans.
- Prepare and distribute promotional material.
- Maintain a database of information on drill core.
- Capture, maintain and distribute mineral tenement data in digital and hardcopy form.
- Public enquires: mining tenement and geoscientific databases.

Activities undertaken due to Government Policy

- Provide data and maps to companies on issues relating to land access.
- Represent Mineral Resources Tasmania on working groups and committees.
- Prepare displays.
- Town planning, land use planning.
 - Supply background data and maps for commenting on Council planning schemes.
- Construction materials: maintain database and produce maps.
- Produce maps and digital data and maintain databases for urban mapping.
- Prepare diagrams for and contribute to issues of *ProspecTas*.
- Public enquires — mining tenement databases.

Legislation administered by Mineral Resources Tasmania associated with Output 4

- Mineral Resources Development Act 1995.
- Mining (Strategic Prospectivity Zones) Act 1993.
- Commonwealth Petroleum (Submerged Lands) Act 1967.
- Groundwater Act 1985.
- Petroleum (Submerged Lands) Act 1982.

Legislation to which Mineral Resources Tasmania has input related to Output 4

- World Heritage Properties Conservation Act 1975.
- National Parks and Wildlife Act 1970.
- Local Government (Building and Miscellaneous Provisions) Act 1993.
- Environmental Management and Pollution Control Act 1994.
- Land Use Planning and Approvals Act 1993.
- Historic Cultural Heritage Act 1995.
- Public Land (Administration and Forests) Act 1991.
- State Policies and Projects Act 1993.
- Resource Management and Planning Appeal Tribunal Act 1993.
- Crown Lands Act 1976.

Government Policy associated with Output 4

- Policies of the Tasmanian Liberal Government, State Election 1996.
- Various inter-departmental policies.
- MRT policies.

Output 5

Tenement Management and Royalty Administration

Activities undertaken due to Legislation

- Administer exploration and retention licences and leases, approve applications, renew tenements, verify reports, etc., advise on industry to internal and external clients for exploration/mining/petroleum.
- Inspect leases and lease applications.
- Draft lease conditions.
- Set bonds.
- Collect and record mineral statistics.
- Public enquires.

Activities undertaken due to Government Policy

- Advise companies on issues relating to land access, Recommended Areas for Protection, the Public Land Use Commission and the Australian Heritage Commission.
- Represent Mineral Resources Tasmania on working groups and committees.
- Prepare briefings for government.
- Prepare replies to Ministerial correspondence.

Legislation administered by Mineral Resources Tasmania associated with Output 5

- Mineral Resources Development Act 1995.
- Mining (Strategic Prospectivity Zones) Act 1993.
- Commonwealth Petroleum (Submerged Lands) Act 1967.
- Petroleum (Submerged Lands) Act 1982.

Legislation to which Mineral Resources Tasmania has input related to Output 5

- World Heritage Properties Conservation Act 1975.
- National Parks and Wildlife Act 1970.
- Environmental Management and Pollution Control Act 1994.
- Public Land (Administration and Forests) Act 1991.
- Crown Lands Act 1976.

Government Policy associated with Output 5

- Policies of the Tasmanian Liberal Government, State Election 1996.
- Various inter-departmental policies.
- MRT policies.

The Tasmanian Geological Survey is responsible for:

- Resource investigations and promotions;
- Geophysical services;
- Analytical services;
- Engineering geology and groundwater; and
- Petrology and mineralogy.

Metallic Minerals

Mineral exploration and mining

The 1996/97 year has been one of change for the major metalliferous mining industry of Tasmania, with most developments signalling the robustness and future success of the industry.

Savage River Mines ceased its operations at Savage River and Port Latta, but significant progress was made by a new operator, Australian Bulk Minerals, to upgrade and reopen the mine and processing facility. The Henty gold mine commenced production during the year. Mancala closed the Anchor tin mine at Lottah, but reopened the Hercules mine, south of Rosebery, sub-leased from Pasminco Mining.

Mineral exploration expenditure continued to climb, increasing by 38% from \$18.8 million in 1995/96 to \$26 million in 1996/97. Over 99% of this total was on gold and base metals, with 60% on gold. Many of the major exploration projects were on mining leases, including the deep exploration project by Pasminco Mining at Rosebery, the latter stages of the RENDEEP resource drilling at the Renison tin mine, and exploration in the Mount Julia Prospect–Zone 96 area on RGC's Henty lease. Positive results were obtained from both these projects, as well as from exploration by Copper Mines of Tasmania at Mount

Lyell and by the Beaconsfield Joint Venture at the Beaconsfield gold mine.

The main programs on exploration licences included over \$1 million spent on gold exploration in the Arthur Strategic Prospectivity Zone (SPZ) by a joint venture between Titan Resources NL and Goldstream Mining NL, a welcome rejuvenation of activity in an area which had received little exploration in recent years. There was also a high level of activity in the Mount Read Volcanics by Resolute Limited at South Henty, and by RGC Exploration Pty Ltd at White Spur and Lynchford, Pasminco Exploration at Tullah and Burns Peak, and Aberfoyle Resources Ltd at Henty River. Elsewhere in western Tasmania, Rio Tinto Exploration Pty Ltd conducted drilling for nickel near Zeehan and for copper at Balfour.

The promising Forster Gold Prospect in southeast Tasmania was being actively explored by Sedimentary Holdings NL. In northeastern Tasmania, extensions to lateritic nickel mineralisation were located by Allegiance Mining NL at Andersons Creek and there was drilling on gold prospects near Beaconsfield by the BJV partners and at Golden Ridge, near Scamander, by MPI Limited.

There was continued strong interest in exploration in the State to the end of the financial

year. Highlights included nine exploration licence applications received for areas in northwestern Tasmania, King Island and Cape Sorell from Morritt Holdings Pty Ltd and a further seven applications for areas on King, Hunter and Robbins Islands, in northwest Tasmania, and at Cygnet from Pacific-Nevada Mining Pty Ltd.

Activities

During 1996/97 the Metallic Minerals Section was involved in a number of projects and programs.

Regional Forest Agreement

In collaboration with the Commonwealth Bureau of Resource Sciences, the section carried out a comprehensive review of the mineral resource potential of mainland Tasmania as part of the Regional Forest Agreement process. This review was based on methodology established by the United States Geological Survey and involved adaptation or development of over forty separate models of mineralisation and testing these against geological criteria. The work was reviewed and endorsed by an independent panel of experts.

Geoscientific data generation

Primary geological data acquisition for the Wilmot 1:25 000 scale map sheet in the Mount Read Strategic

Prospectivity Zone was completed. Mapping of the Weld sheet, including the host rocks to newly-discovered gold mineralisation, was also completed.

Compilation of new primary geoscientific data was completed for the Roger, Sumac, Weld, Nevada, Maydena and Skeleton 1:25 000 scale map tiles in the form needed for digital capture.

Fourteen geological map sheets (Blue Tier, Brilliant, Pyengana, Spurr's Rivulet, Lanka, Rosebery, Dundas, Oceana, Trial, Mawbanna, Tayetea, Milabena, Holder and Folly) were prepared for digital capture.

Reports on sub-projects of the National Geoscience Mapping Accord TASGO Project were prepared and progress was made on other projects:

- a report was completed on studies of the isotopic composition and age of Precambrian carbonate sequences in Tasmania;
- a report was close to completion on the geology of some islands in western Bass Strait;
- a report was close to completion on the Boat Harbour Fault, a major structure in northwest Tasmania;

- progress was made on studies of the age of the Mount Read Volcanics and other rock units, the interpretation of the seismic survey of offshore Tasmania, and the lead isotope composition of mineral deposits in northeast Tasmania.

Good progress was made on a study of the nature of gold mineralisation in the Cygnet and Weld River areas.

A regional study of the structural controls on gold mineralisation of northeastern Tasmania was initiated.

Promotion of Tasmania's exploration potential

MRT's exploration promotional booklet was completely revised and was used in successful visits to mining and investment companies in Perth, Melbourne, Sydney and Adelaide.

An article on the prospectivity of Tasmania for gold was written for *Gold Mining Journal* and published during the year.

Core library

Liaison with developers interested in Tasmanian magnesite deposits resulted in material from the MRT core library being supplied for metallurgical testing.

Core from the MRT core library from the Tasmania mine was supplied to the Beaconsfield Joint Venture (BJV) partners for metallurgical testing. The success of this work has accelerated planning for the project. The BJV undertook to replace the core with new intersections of the Tasmania Reef when underground development permitted access for drilling.

Because of the critical shortage of space at the core library, arrangements were made to lease supplementary storage for some 14 kilometres of core. With a number of requests received for MRT to take core from former mineral tenements, it is anticipated that the ancillary storage will be filled during 1997/98, making a decision on a new or extended facility an imperative for the coming year.

On-going activities

Mineral exploration report and exploration performance assessments were carried out as needed, as was preparation of promotional leaflets for Exploration Tender Areas.

Numerous meetings were held with industry and requests for information were answered promptly. Presentations were given to the Tasmanian Minerals Council Exploration Group meetings.

Engineering Geology and Groundwater

The section comprised a Chief Geologist and a Senior Geologist for most of the year, with a third geologist being appointed in April 1997. Urban mapping was undertaken by a Project Geologist from another section and two temporary geologists were involved with input of groundwater data and the collection of field information.

During the year emphasis was placed on the collection and compilation of groundwater information and the completion of the Launceston urban mapping project. Other activities included the continuation of the North West Coast landslide risk study,

groundwater protection issues, groundwater and landslide monitoring, compilation of groundwater information for the Oatlands and Sorell areas, and application for funds from the Commonwealth for several projects. Advice was given on groundwater prospects and land stability conditions as a result of a large number of enquiries from the public, companies, local government and other agencies. There was input into a study of landslides affecting the Emu Bay Railway line. There was also involvement with the State of Environment Report and committees dealing with water

and water quality, waste water reuse, and soil conservation.

Groundwater

The updating of information on the groundwater database comprised a significant part of the work undertaken on groundwater. This work involved the field location of contract bores in the eastern half of the state, particularly in the southeast, field quality tests on water samples and gathering information on groundwater use.

Monitoring of the regional groundwater bores around the State continued. This project

involves measurement of water level variations, largely as a result of natural influence, and variations in water quality. The effects of the large groundwater use that takes place in the Devonport region continued to be monitoring by a number of bores.

Compilation of groundwater information for the Oatlands area continued and a start was made on a similar study for the Sorell area in the southeast. Collection of information on groundwater in coastal sands is proceeding and some field investigations were made in northeast Tasmania in areas where information is sparse. A demonstration of spear bore installation was undertaken at Waterhouse at the request of the Department of Primary Industry and Fisheries.

Waste disposal and the effects on groundwater quality were issues dealt with at a number of locations. Several consultants' reports on waste disposal and contaminated sites were assessed at the request of the Division of Environment and Planning. Groundwater information was provided to several companies investigating possible contamination of sites at a wide range of locations but often involving petrol stations or where petroleum products have been stored.

Advice was given to property owners and drillers on groundwater prospects at many locations throughout the State.

Engineering Geology

Compilation and production of maps associated with the Launceston urban mapping project was completed during the year. Three 1:25 000 scale maps, comprising a detailed geological coverage, an engineering geology map and legend, and a land stability zonation map, have been produced to cover the 145 km² project area. More detailed maps, at 1:10 000 scale, were produced to cover thirteen sub-areas.

Detailed geological mapping has been started in the Hobart area and it is proposed to extend this survey to cover the urban area of

Hobart. The information from this survey will be used as an important input into the zonation of areas subject to landslide risk and other foundation problems.

Further progress has been made with the regional landslide risk study of northwest Tasmania. Maps on a scale of 1:25 000 have been produced for the Latrobe–Devonport and Ulverstone–Kindred areas. These will provide valuable information to planners and developers when considering planning schemes and particular projects. Field surveys have continued in the Burnie area.

Landslides threatened houses at a number of locations, particularly in southeast Tasmania. Movements developed largely as a result of unusually heavy rains in the summer and autumn of 1996. Of particular note is a large shallow angle landslip covering about 4 ha at Pelverata, where one house was situated on the moving mass and another was only 0.5 m from the slide.

Landslides have been identified at three locations along the Emu Bay Railway Company's line. Seismic surveys were undertaken to aid in the interpretation of subsurface materials in conjunction with a local consultant.

A large number of requests were received for advice on land stability for a wide range of locations throughout the State, although most were for northwest and Tamar locations. Enquiries originated from individual property owners, developers and local government, and usually related to housing developments. The effects of landslides on farm dams were examined at several locations in northwest Tasmania.

A small subsidence was examined south of the mine at Beaconsfield. It appears the collapse is either taking place into old unrecorded mine workings or is due to sink hole development in limestone.

Foundation conditions, involving the logging of test pits and trenches, for a dam at Symmons Plains were examined

in conjunction with a local consultant. Drill core was examined and a seismic survey was conducted as part of a study into the feasibility of replacing the Bridgewater bridge and causeway.

Technical advice on the Rosetta landslide has been provided on a regular basis to the Glenorchy City Council. Water levels in boreholes within the slip have been measured monthly.

Movement on landslides in northern Tasmania continue to be monitored by a contract surveyor. Significant movement has taken place on some of these, including the slip at Pleasant Hills subdivision at Legana where an access road has been seriously affected.

Information on groundwater and geohazards was compiled for several municipalities for use in their planning scheme development.

General

Application was made for Commonwealth funds under the Rural Adjustment Scheme to examine the potential of groundwater in the drought prone areas of the northern Midlands and Fingal Valley. Four applications were made for Natural Heritage Trust funds for a range of projects including the affect of waste disposal on groundwater quality, acid drainage, soil salinity and geological hazard information for planning schemes. Other work involved:

- input into several sections of the State of the Environment Report;
- part supervision of a university student undertaking a landslide risk study in the Glenorchy municipality;
- discussions with the Australian Geological Survey Organisation on the possible extension of their Cities Project to Tasmania;
- representation on various committees dealing with water, water quality and soil conservation.

Hydrocarbons and Tenement Management

Oil and gas exploration

Another offshore permit was granted for oil and gas exploration in 1997. This permit, covering an area west of King Island, was granted to the Malaysian company Benaris International NV.

The retention licence over the Yolla gasfield in Bass Strait is held by a consortium headed by Boral Energy Resources. Efforts are continuing to find a market for the gas in either Tasmania or Victoria.

Exploratory drilling by Great South Land Minerals continues in onshore southern Tasmania.

Strategic Prospectivity Zones

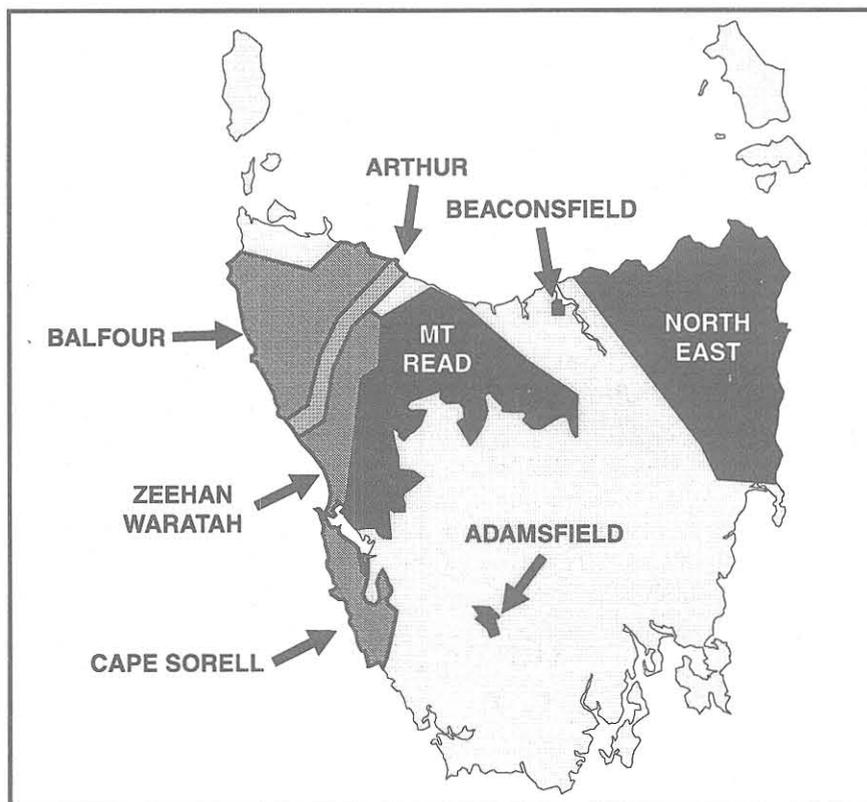
Strategic Prospectivity Zones (SPZ) cover 25 200 km² or 37% of the State. The areas in each SPZ occupied by mining tenements at the end of June are shown below.

Industrial minerals

The quarrying of limestone and dolomite for cement and agricultural purposes forms a large part of the non-metallic minerals industry in Tasmania. The development of a new open pit and primary crusher by the Goliath Portland Cement Company Ltd at Railton is nearing completion and the pit will be in full production in the next financial year. Active exploration for limestone and magnesite is occurring in the State's northwest.

Silica is quarried in the Beaconsfield area for use by Temco in the production of silico manganese. Silica flour is mined by H. Nolan from deposits near Corinna and is processed by Index Minerals Pty Ltd at Heybridge. The silica flour is used in the production of high quality lenses and in the electronics industry. Recent exploration in the Arthur River area has discovered similar occurrences.

SPZ	Area (km ²)	% Occupied	
		Metallics	Non-Metallics
Adamsfield	0.0	0.0	0.0
Arthur	941.7	85.0	0.1
Balfour	2077.3	53.1	0.1
Beaconsfield	18.9	99.6	21.0
Cape Sorell	836.3	60.5	0.0
Mount Read	2497.6	34.8	0.0
North East	1572.3	16.2	274.0
Zeehan/Waratah	619.8	33.8	24.0



The conversion of the Burnie paper plant to a calcium carbonate based whitener resulted in the announced closure of the Tonganah clay mine.

Construction materials

The quarrying industry is generally depressed along with construction activity. The export of dimension stone is a notable exception, with steady upgrading of Tasmanian Sandstone Pty Ltd's quarry and cutting facilities at Buckland.

The Division was involved with planning scheme and permit submissions to facilitate future access to resources. The most important submissions were to the Land Use Review Panel concerning the buffer zone around the Mornington quarry in

Clarence. This hearing was complex, with competing skyline protection, residential development and quarrying interests. The Panel's recommendations were subject to a successful High Court appeal so further hearings will be necessary.

Coal industry

Two companies continue to supply Fingal Valley coal for the Tasmanian domestic market. The Cornwall Coal Company mined most of their coal from the underground Blackwood mine, with some production from the Huntsman No. 2 open cut. The Merrywood Coal Company ceased mining at the Merrywood open cut and began development of a new open-cut mine at Stanhope, north of Avoca. Supply problems

during the year resulted in Australian Newsprint Mills, one of the State's major coal consumers, importing two shipments of coal from NSW.

A potential resource exists at Kimbolton near Hamilton but its development is not yet resolved.

Environmental Management

The environmental monitoring of exploration programs continued with diligence and attention to detail. Revision of the *Mineral Exploration Code of Practice* commenced in preparation for its gazetting as part of the *Mineral Resources Development Act 1995*. The Code will then have legislative backing in common with similar Codes. Regular field visits were made to ensure exploration work was being conducted in an environmentally responsible manner and that rehabilitation of past sites was successful.

The Rehabilitation of Mining Lands Trust Fund was advanced \$350,000 from a 20% increase in the *ad valorem* component of mining royalties. A committee of government agencies and industry bodies has agreed on a program of future remediation works. During the year these works were undertaken at Zeehan and Rossarden.

The open Montana mine shaft at Zeehan was capped and collapsing mine openings were back filled. A study of acid and metal discharges in the Zeehan area and rehabilitation options for mining sites is being carried out by the University of Tasmania to provide planning information.

At Rossarden the former mine site and tailings dams were unsightly, and windblown sand and dust affected surrounding land. Earth works undertaken included re-contouring and placing a clay cover over 15 ha of land, which was then fertilised and seeded.

Mining Heritage

MRT commissioned consultants to make an archaeological survey of the Lucy Spur goldfield near

Corinna, where a small series of alluvial and underground workings with associated processing plant operated intermittently from 1886 to 1902.

Registry Section

The Registry Section maintains a number of registers and data bases, and provides advice to

TDR officers, inquirers from other agencies, the mining industry and the legal profession, on a wide range of matters associated with mining tenements and legislation.

Processing of applications for mining tenements and issue of tenement documentation continues to provide the majority of work for the section's officers.

Lease and Licence Applications

Licences applied for during 1996/97

<i>Product</i>	<i>Number</i>	<i>Area (ha)</i>	<i>Sluiceways</i>
All minerals	6	1412	
Clay	1	5	
Coal	2	5738	
Gold	2	30	
Gravel	11	272	
Iron	1	4067	
Lime sand	1	203	
Peat	1	486	
Sand	8	448	
Sand and gravel	1	20	
Sandstone	1	6	
Stone	12	120	
Stone and gravel	1	4	
Easements	3	64	1
Total	51	12 875	1

Licences granted during 1996/97

<i>Product</i>	<i>Number</i>	<i>Area (ha)</i>
All minerals	2	548
Clay	1	5
Coal	1	249
Gold	2	423
Gravel	4	25
Iron	1	4067
Limestone	1	56
Sand	3	320
Stone	11	125
Total	26	5818

Total number of all types of prospecting rights held as at 30 June 1997

<i>Mining Tenement</i>	<i>Number</i>	<i>Area</i>
Exploration Licences —		
All minerals	138	9 964 km ²
Non metallic	12	390 km ²
Oil (onshore)	3	11 897 km ²
Retention Licences —		
All minerals	15	58 km ²
Non metallic	13	267 km ²
Prospectors Licences Issued	70	Not applicable
Permits to explore for Petroleum under <i>Petroleum (Submerged Lands) Act 1967</i>	5	397 Blocks
Retention Licence under <i>Petroleum (Submerged Lands) Act 1967</i>	1	9 Blocks

**Total number of leases and licences in force
at 30 June 1997**

Principal product	Number	Area (ha)	Sluiceways
All minerals	45	22 278	
All minerals and stone	2	130	
Clay	7	107	
Coal	16	12 348	
Copper	2	8	
Dolerite	1	2	
Dolomite	4	141	
Easements	27	373	30
Gold	25	1 271	
Granite	5	54	
Gravel	148	3 218	
Gravel and clay	1	29	
Iron	1	4 067	
Kaolin	2	373	
Lime sand	2	4	
Limestone	11	1 266	
Peat	4	858	
Quartzite	1	219	
Sand	61	2 305	
Sand and gravel	28	3 034	
Sand and stone	8	154	
Sandstone	5	50	
Shale	4	39	
Silica	11	1 063	
Silica, sand and stone	1	50	
Silica sand	1	11	
Silver and lead	1	8	
Slate	5	186	
Specimens	2	8	
Stone	256	5 915	
Stone and gravel	9	443	
Tin		17	1 706
Water	1	16	5
Total	715	61 937	35

Close liaison is maintained with officers of the Geological Survey particularly in regard to maintenance of the TASXPLO data base, monitoring of exploration expenditure, circulation of company reports, and preparation and circulation of the *Tasexplorer* news sheet.

Twenty-eight Exploration Tender Areas were offered to potential explorers by way of the *Tasexplorer* news sheet which is circulated widely within the Australian mining community.

Implementation of the Government's 'Use it or Lose it' policy continues on an ongoing basis, with individual mining leases monitored by way of quarterly production reports.

Mining legislation

The *Mineral Resources Development Act 1995* (MRDA) came into force on 1 July 1997. The MRDA replaced the *Mining Act 1929*, the *Aid to Mining Act 1927* and the *Mineral Resources Act 1951*. The aims of the MRDA are:

- to create and maintain an internationally competitive and secure investment climate for exploration;
- to help ensure a sustainable mining industry for Tasmania's future;
- to provide best current practice Mineral Tenement Legislation; and
- to best fulfil the needs of industry and the community.

After twelve months of operation with the new Act industry feedback has been positive and supportive of the legislation and it is unlikely that only minor amendment will be required in the near future.

The opportunity was taken with the introduction of the MRDA to revise forms, brochures and procedures to provide a more efficient and effective service. All forms under the MRDA are available in digital form and have been provided at no charge to clients of the section.

Court of Mines

Until implementation of the MRDA Tasmania was divided into four mining districts each with a Warden of Mines. Under the MRDA there is a Mining Tribunal, consisting of one magistrate, who has coverage of the whole State. The new Act extended the jurisdiction of the Tribunal to include appeal against some ministerial decisions. Under the MRDA an obligation is placed on the Director of Mines to attempt to resolve disputes before formal hearing before the Tribunal.

Two matters were referred to the Mining Tribunal during the year.

P, K & B Smith v Minister for Mines

- P, K and B Smith appealed against the Minister's decision to refuse renewal of mining lease 47M/73 at Linda. The matter was listed for mention on 16 April 1997. The matter was adjourned *sine die* when the appellants failed to appear. Mineral Resources Tasmania has asked the Tribunal to relist the matter to bring it to a conclusion.

L Lowery v Connemara Gold Mines Pty Ltd

- An objection was lodged by L Lowery against exploration licence application 3/97 at Mathinna. A meeting of the two parties was arranged by the Registrar of Mines to attempt to resolve issues of contention, and the objection was subsequently withdrawn.

Staffing of the GIS and Geophysics section changed considerably throughout the year. Up to three temporary staff assisted with the capture of historical data during the year but this project has been terminated until the completion of Phase 3 of Project TIGER. A permanent GIS Officer and a Technical Officer will be appointed early in the new year to allow for the capture of incoming data. IT support within MRT is now provided by two computer systems officers in the GIS and Geophysics section.

The main projects of the GIS and Geophysics section were:

- data capture from exploration reports;
- development of the Project TIGER (Tasmanian Information on Geoscience and Exploration Resources) business case;
- completion of the maps for the urban mapping project in the Tamar area;
- IT support for both MRT and the Workplace Standards Authority;
- seismic refraction and gravity surveys for special investigations;
- precise levelling and indexing of aeromagnetic data sets.

Data capture

Entry of open file stream-sediment geochemistry into databases continued throughout the year. To date 35,027 stream-sediment samples have been entered, representing a total of 235,282 analyses. Samples were mainly from the northeast, west and northwest of Tasmania. Digital geochemical data are being progressively released at the same time as the corresponding 1:25 000 scale digital geological map.

Over 1300 company reports have been entered into the TASXPLORE spatial index of exploration activity. This index includes all open file, closed file

and restricted reports from mid 1987 to the present. The index allows location of the reports detailing any exploration activity that lies within or overlaps an area defined on a map of Tasmania. A preliminary release of the open file index and the corresponding TASXPLORE data has been made in Arcview format on CD-ROM.

The groundwater database, which holds information gathered from water bores throughout Tasmania, was transferred to a modern database system and some checking carried out. Many bores were not well located and a program was commenced to visit all bores and verify their location. Most bores in the southeast corner of the State have been located and the corresponding entry in the database updated. At present the database holds data on approximately 5100 water bores, 548 of which have been visited.

Project TIGER

A draft business plan for Phase 3 of Project TIGER has been completed. The plan outlines the background to the initiative and benefits that will arise from completing all phases of the project. Overall the project will increase the quality and diversity of digital information delivered by MRT. This phase will see the development of an integrated database management system for MRT which will be populated in a later phase of Project TIGER.

Arcview, a GIS-based mapping application, was made available to all MRT geologists on their desktop PC. This gives staff easy access to existing digital spatial data. Arcview will provide access to an increasing range of on-line geoscientific and tenement data as project TIGER progresses.

Urban mapping

Production of a suite of digital engineering geology maps for the Launceston area was completed. Final maps were plotted and a

distribution CD will be written for supply to the stakeholders including the Launceston City Council, the West Tamar Municipality and the Meander Valley Municipality.

IT support

The computer systems officers provided support to both MRT and the Workplace Standards Authority (WSA) during the reporting period. At the start of the year MRT and WSA shared one computer network but during the course of the year separate networks were established. All services were segregated including the email and records systems, with independent servers being installed. Approximately 600 support calls were logged with about 62% being for WSA. This level of activity is not sustainable and was only achieved by operating in a reactive manner.

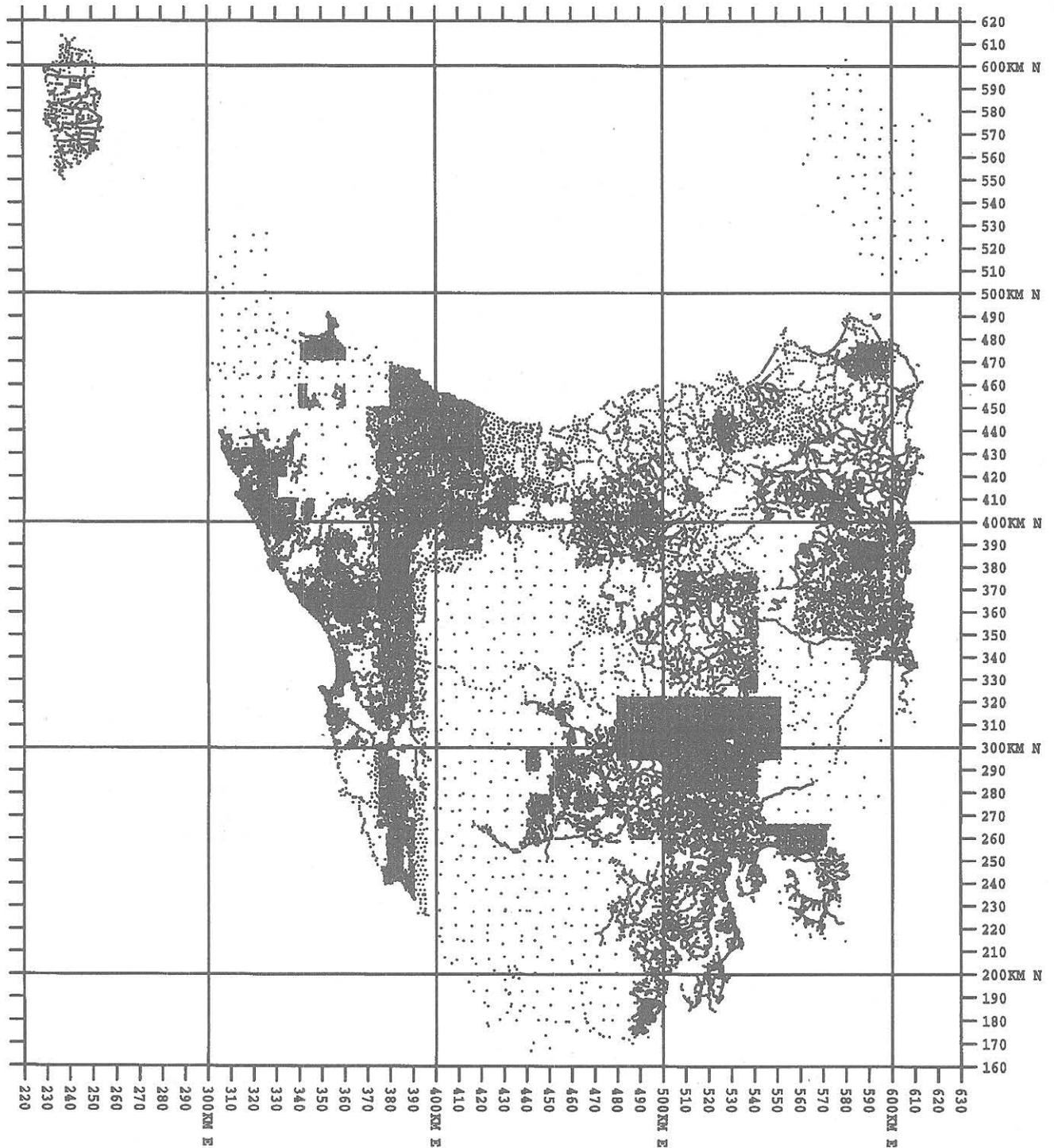
The introduction of Arcview as a desktop application for all MRT geologists required the installation of X-terminal software and high-quality graphics cards to allow access to GIS data on the divisional Unix network from PCs. In addition, the Unix network has been upgraded to accommodate both the additional user load and the rapidly increasing data volumes now in use.

The division has been actively involved in the technical aspects of the Networking Tasmania Project. The decision by TDR to implement Lotus Notes required the upgrading of storage capacity of many of the desktop PCs.

TASGO Project

This joint undertaking with the Australian Geological Survey Organisation (AGSO) commenced in 1994 with the aim of using high technology studies to determine the character of Tasmania's principal geological structures. Final sections of the off-shore seismic reflection data recorded close to the coast

DISTRIBUTION OF TASMANIAN GRAVITY STATIONS AS AT 30 JUNE 1997



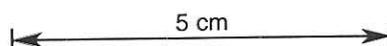
around Tasmania were received by AGSO late in 1996. A group of geoscientists from MRT joined with AGSO staff to produce an initial interpretation of the deeper structure visible on these seismic lines. The data quality was only fair and a final interpretation will benefit from further processing and modelling. AGSO have also started digitising and plotting

seismic refraction profiles by combining signals from the marine energy sources with recordings from a number of vertical component land-based instruments.

Geophysics

Preparation and compilation of data for the Regional Forest

Agreement process (RFA) impacted significantly upon the geophysical work program for the year. In addition to the metadata and geophysical images supplied to the Bureau of Resources Sciences, contributions were made to the content and compilation of a report on the mineral resource potential of Tasmania. Metadata statements



were prepared in accordance with the ANZLIC template.

A request was received for assistance with the geophysical aspects of a preliminary investigation of the river crossing at Bridgewater. It was thought that a thick Tertiary section would be encountered under the river, as was found at the Bowen and Tasman bridges, and a gravity survey was carried out across the Bridgewater bridge and in the surrounding area. The expected Tertiary sediments were not present, which implies the presence of a Tertiary waterfall downstream from the Bridgewater bridge. Two drillholes on the existing causeway showed Triassic sediments at depths of 34

and 42 metres, while Permian sediments crop out at the southern end of the bridge.

Seismic refraction surveys were carried out for the Emu Bay Railway Company on landslides that have affected operations in recent times in the Boco Gorge and near Burnie. At the Boco Gorge site the base of the weathered zone was delineated but there were no arrivals from good quality rock at the site near Burnie. Drilling at the latter site has confirmed the seismic interpretation.

The map showing the form of the upper surface of the major Tasmanian granitoids has been revised following correction of

drafting errors which had caused differences of several kilometres between actual outcrop positions in parts of northwest and northeast Tasmania and those plotted on the map. This map was used during the RFA process to develop tracts for granite-related mineral potential.

The precise levelling of magnetic data sets has continued as a background activity throughout the year. A number of data sets have been lodged by explorers and several previously archived data sets have become open file. Many of the newer open file data sets are from helicopter aeromagnetic surveys at line spacings of 200 metres or less.

Petrology

Petrology and Lapidary Laboratories

The lapidary and petrology laboratories provided a total of \$55,461 worth of analyses and services to both Government and external clients. Most of the external work cannot be otherwise conducted within the State.

The lapidary laboratories prepared 387 standard thin sections, 128 polished thin sections and 10 fluid inclusion chip types, making a total throughput of 525 samples. Most of these were done on an as-needed basis by a field assistant.

The technical officer for petrological services processed 696 samples by X-ray diffraction, including 132 quantitative dust analyses and 38 illite crystallinity analyses. He also conducted eight soil and sizing tests and 96 optical asbestos identifications, a total of 800 samples processed, valued at \$37,661. Much of his time was spent preparing samples for, and operating, the XRF for the geochemistry section.

A total of 609 external samples were received for investigation, mostly by X-ray diffraction. These samples included 183 for the Key

Centre for Ore Deposit and Exploration Studies at the University of Tasmania (CODES) (under an in-kind agreement), 254 for occupational health clients, and 172 samples for other paying customers. This work came from a wide range of external sources, including the University and various Government departments; various mining, mineral processing and exploration companies; and the general public and miscellaneous businesses. CODES also made use of our photomicrographic equipment.

Samples studied include geological materials (construction materials, mineral concentrates, ore samples, rocks, soil, sand, and clay) and anthropogenic materials (asbestos, industrial materials, dusts, etc).

Project Work

Gold

Investigations and promotional activities on gold deposits in various parts of Tasmania continued. Investigations into gold prospects were conducted at Glovers Bluff and Cygnet, in the southeast of the State, as part of the Midlands project. An interim report on the petrology, mineralogy and genesis of

samples from the Forster Prospect at Glovers Bluff is in press. A report was published on the Division's gold exploration in the Lake Chisholm area near the Arthur River and contributions were made to promotional publications on the mineral potential of Tasmania.

Other

Research was conducted into the mineral potential (platinoids, nickel, copper, gold and other commodities) of the ultramafic complexes of Tasmania. A paper on this was presented at a symposium in Brisbane, and a report is in preparation. Other resource investigations included studies on the zeolites of Tasmania (report in press), heavy mineral sands and rare earths.

Construction material studies continued, with 31 samples studied as a part of the Tasmanian alkali-aggregate reactivity research project (TAARRP) in conjunction with the Hydro-Electric Corporation, Department of Roads and Transport, Concrete Institute and various companies. Some of the work has been produced as consultant reports, and most of the costs are being covered by individual sponsors. The project is investigating the concretes and

aggregates used in major structures (bridges, dams, etc.) in Tasmania, in regard to the form of deterioration known as alkali-aggregate reactivity.

Curatorial and displays

Curatorial work has included the updating of rock collection and storage databases, preparation of displays and

posters, and supervision of the rock store. The fossicking area report was revised and officially launched at the Launceston Gemboree. Crocoite was made the official State Mineral Emblem at the same venue.

Databases

The MIRLOCH database of mineral deposits in Tasmania

now has approximately 4000 entries, covering metallic and industrial minerals and coal. It is being updated steadily and most of the State is now well covered. The Bureau of Resource Sciences in Canberra are licensed to distribute the data.

The TASROCK database of rock samples is being maintained. The petrologist also helps with Tasxplor keywording.

Chemical Laboratory

Further downsizing resulted in the loss of the Laboratory Manager and both technical officers. As a result staff permanently engaged in this section was reduced to a Senior Chemist and the part services of a geologist/geochemist. A replacement technical officer was recruited during the year, allowing the laboratory to function in its restructured capacity.

Two offices and two laboratories were vacated as a result of the restructuring.

As a consequence of the restructuring the Section no longer does work for external

clients. Irrespective of this, and an ageing XRF, the laboratory continues to supply the analyses which are an integral source of information necessary to maintain the MRT geoscientific databases.

A major upgrade of the claisse fluxer was undertaken during the year, allowing a more streamlined production of glass discs used to determine the major elements in rock samples. Continued upgrading of the XRS software and ancillary apparatus is planned for 1997/98 to better meet the demands incumbent on the old system.

To save on the very large volume of cooling water required by the X-ray tube, and to limit the possibility of a potentially dangerous flood on the ground floor, it is anticipated that a recycling cooling system will be installed in the coming year. Any additions will be compatible in the event of a new XRF being installed.

A total of 939 samples which required 11,602 individual determinations were submitted for analysis during the year. This involved a total of 13,790 separate chemical determinations. The distribution of general sample types was 559 water, 280 rock, and 100 minerals and products.

Data Management

The Data Management Section is responsible for the recording of mining tenements on the Division's maps and plans, the management of the Division's Geographical Information System and Computer-Aided Drafting system, and the provision of support drafting services.

The GIS continues to be developed, maintained and used to meet the requirements of our clients.

During 1996/97 the capture of geological data continued resulting in:

- the capture and output of five 1:25 000 scale digital geological maps (Blue Tier, Brilliant, Pyengana, Spurrs

Rivulet and Lanka) in the northeast Tasmania;

- the capture and output of three 1:25 000 scale digital geological maps (Loongana, Lea and Pencil Pine) in the Mt Read Volcanics region;
- the creation of GIS data sets, covering the above project areas, of other databases relative to mineral deposits, drill hole locations, stream-sediment geochemistry locations and rock chemical analysis sample locations;
- the capture and output of two 1:25 000 scale maps (Ulverstone-Kindred and Devonport-Latrobe) for the Land Stability Hazard

Mapping Project in northwest Tasmania;

- capture of data for four 1:25 000 scale digital geological maps (Rosebery, Dundas, Oceana and Trial) in western Tasmania commenced;
- capture of data for seven 1:25 000 scale digital geological maps (Mawbanna, Roger, Tayatea, Milabena, Sumac, Holder, and Folly) in northwest Tasmania commenced;
- capture of data for four 1:25 000 scale digital geological maps (Maydena, Skeleton, Nevada and Weld)

in southern Tasmania commenced;

- capture of data for the digital geological maps of Macquarie Island commenced;
- capture of digital historic exploration licence boundaries commenced.

As part of the joint Commonwealth/State Regional

Forest Agreement, GIS was used extensively for data capture and the production of maps during the data gathering stage of this project. During the Negotiation Stage of this project, the GIS, was again used, for hard copy output, as well as 'on screen' analysis, of data.

Fifty-five data sets of geological or tenement data were produced

for clients. Output maps, plotted on the Division's inkjet plotters, of digital geological data were produced on demand.

The drawing of all mining lease plans and diagrams on CAD, as opposed to hand drawing, commenced during the year. CAD continues to be used as a support tool for many projects.

Publications

The Publications Section is responsible for the production of geological reports, promotional books, newsletters and material for displays, Exploration Tender Area flyers and other reports and leaflets as required. Major publications produced during the year included:

- The Mineral Resources Tasmania *Annual Review*;
- *Guidelines for Fossicking Areas*; and
- *Mineral Exploration Opportunities in Tasmania*.

Reports issued in the *Tasmanian Geological Survey Record* series included:

- 1996/05 — *Corundum and sapphire in Tasmania*, by R. S. Bottrill
- 1996/06 — *Structure of GIS databases (Revision 1)*, by M. P. McClenaghan, R. S. Bottrill and K. G. Bird;
- 1996/07 — *A brief history of the Department of Mines, 1882 – 1996*, by C. A. Bacon;
- 1996/08 — *The field relationships and petrology of the Upper Blessington granodiorite, Ben Lomond Quadrangle*, by J. L. Everard;
- 1996/09 — *The search for petroleum, onshore Tasmania*, by C. A. Bacon, K. C. Morrison and C. J. Boreham;
- 1996/15 — *Mineralogy and petrography of some rocks from the Glovers Bluff/Weld River area*, by R. S. Bottrill;
- 1996/16 — *Combined interpretation of new aerial-survey geophysical datasets for northwest Tasmania*, by M. P. McClenaghan and D. B. Seymour;
- 1997/05 — *A landslide at Pelverata*, by W. L. Matthews;
- 1997/06 — *The Lake Chisholm Exempt Area*, by D. McP. Duncan and R. S. Bottrill;
- 1997/07 — *Zeolites in Tasmania*, by R. S. Bottrill and J. L. Everard;
- 1997/08 — *Bedrock geological National Estate values of the West Coast Range*, by C. R. Calver.

Library

A permanent Librarian was appointed in February 1997 after several years of having the position temporarily filled. This has provided stability and direction in the maintenance and development of the collection.

It is vital that funding be sufficient to support the provision of services and the upkeep of the collection.

A Library Assistant has been provided two days a week which has allowed work to begin on some previously neglected areas. Emphasis is placed on making the collection more accessible.

Technical Services

The Inmagic software has been upgraded to Inmagic DB/Textworks 2.0 for Windows. New books and serials are catalogued using this software and accession lists are generated and circulated regularly to staff.

Collection

Whereas previously the collection was a combination of industry, safety and mines material, it is now a purely mineral resources collection. The Workplace Standards Authority

collection is maintained separately.

The library comprises a large collection of books, journals, annual reports and MRT publications. It is also a repository for mining company reports on Tasmanian mining activities and exploration. These reports are in constant demand. The library also provides access to the AESIS and Worldwide Mining CD-ROMs.

Collection development of the book stock has continued slowly. Books have been purchased in the areas of petroleum, mineralogy, geochemistry, environmental management and mining directories.

Review of Mineral Sector Operations 1996/97

Value of the Mining Industry

As well as the direct contribution to the Tasmanian economy through infrastructure development and employment, the mining and mineral processing industries also contribute to the State through royalty, taxes and charges paid to State and Local Governments.

MRT collects royalties and rents and fees from mineral lands, which are forwarded directly to consolidated revenue.

In 1996/97, royalty revenue amounted to \$5.81 million compared to \$7.13 million in 1995/96. The decrease in revenue of \$1.32 million was the result of lower than anticipated prices and production levels for certain minerals, and the delay in royalty revenue from a new processing operation.

Revenue for the 1997/98 year is estimated at \$8.50 million, an increase in revenue which is due partly to the successful negotiations between the Government and the mining industry to increase the royalty regime.

Audit

The audit program continued for 1996/97, although at a lower level from the previous financial year. The program will be stepped up for 1997/98, with a total of 17 mines to be visited.

Royalty review

The new royalty regime was approved by the Premier in August 1997, following negotiations with the mining industry.

The new regime will take effect from 1 July 1997. Its implementation will result in changes to the *ad valorem* and profit components used in the calculation of royalty payable. The Government has re-allowed rebates for downstream processing.

The minimum amount of royalty payable in any year is to increase from 1.2% of net sales in 1996/97 to 1.4% in 1997/98, 1.5% in 1998/99 and to 1.6% in 1999/2000 and beyond.

Calculation of the profit component is also to change, with the exponential factor moving to 0.35% in 1998/99 and then to 0.4% in 2000/01 and beyond.

Mining companies that expand into downstream processing to produce a metal will receive an automatic 20% rebate on royalties payable. Companies that produce gold doré will now be able to claim a 10% rebate on royalties. The Minister will have the discretion to increase the gold doré rebate to 20%, depending on criteria such as the level of investment undertaken.

Metal Prices and Future Trends

Markets for mineral commodities were mixed over the 1996/97 period, with differences in supply being the main determinant of market outcomes. Although growth in demand for most metals was strong, the prices received for lead, gold and copper were significantly lower than expected. Continued strong growth in industrial production and economic growth is expected to be accompanied by strong

growth in mineral consumption. However differences in supply between commodities will see variable results in mineral prices, with aluminium and zinc prices forecast to increase significantly but prices for lead and copper expected to ease.

Individual metal prices

Copper

Prices for copper rose throughout 1996/97 in response to increasing demand and low stock levels. Although demand is expected to increase further, mine output is expected to increase substantially in 1997/98 with a resultant decline in copper prices as supply exceeds demand.

Tin

Although there was some fluctuation during 1996/97, tin prices finished the year at levels significantly below the June 1996 price, following the trend of the previous year.

Aluminium

After initially falling, prices in 1996/97 rose to finish higher than at the beginning of the year. Despite expected increases in smelter production, continuing strong demand for aluminium is likely to result in further price increases in 1997/98.

Iron ore

Increasing economic activity has been accompanied by a strong global demand for steel, and the consequent increase in demand for iron ore. This demand should provide support for iron ore prices over the next year.

Zinc

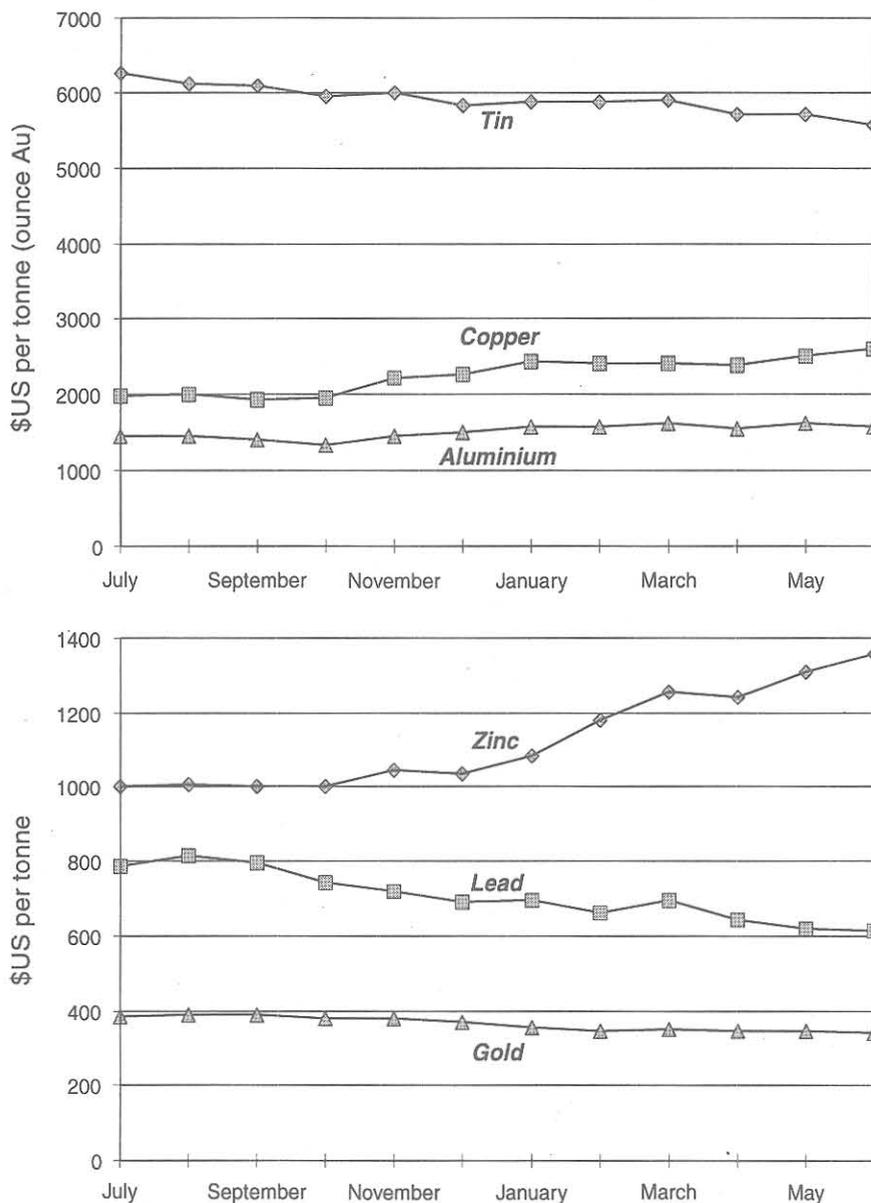
Zinc prices rose strongly in 1996/97 and are expected to continue to rise as consumption continues to grow faster than production.

Revenue from royalties, rents and fees

	1994/95 (\$,000)	1995/96 (\$,000)
Royalties	8,652	6,267
Rents and Fees from Mineral Lands	795	783
Miscellaneous	61	76
	9,508	7,126

Source: Tasmania Development and Resources

AVERAGE MONTHLY LME PRICES, 1996/97



Lead

After an initial rise lead prices fell during the year, reflecting subdued consumer demand after a relatively mild northern hemisphere winter resulted in lower battery demand. World consumption of lead is forecast to rise by a small amount, but forecast strong rises in production should result in further price falls.

Gold

After initially rising, gold prices fell throughout much of the year, with the price reaching its lowest level for 12 years in June. Low inflationary expectations and uncertainty over future divestment of gold stocks by both the official and private sectors fuelled the price fall. Increasing fabrication and investment demand, and the expectation of fewer central bank supply sales, should result in some recovery in prices.

Metallic minerals

Base Metals

Aberfoyle Resources Ltd (Hellyer Division)

Mining

Development achievement, at 1750 metres, was slightly less than that of the previous year. Apart from development required for direct access to production stopes, the mine is fully developed for the extraction of the identified ore resource.

Ore production

A total of 1 475 258 tonnes of ore at an average grade of 12.2%

Zn, 6.6% Pb and 166 g/t Ag, was mined from underground sources. Waste rock mined during the year amounted to 54 641 tonnes.

Ore recovered from pillars accounted for 66% of the total production. Waste dilution from these sources was kept to a minimum and the resultant mined ore grade was in line with predictions, although lower than that of the previous year.

Ore reserves

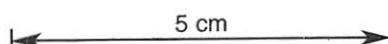
Proved ore reserves at 30 June 1997 were reported as 4.2 million tonnes containing 11.3% Zn, 5.7% Pb, 0.3% Cu, 130 g/t Ag and 2.1 g/t Au.

Milling

Concentrator throughput totalled 1.39 million tonnes of ore at a headgrade of 11.9% Zn, with 374 600 tonnes of concentrates being produced. Mill headgrade was lower than in the previous year but concentrate production and recoveries were above forecast. Concentrator availability was in excess of 96% and ore throughput was higher than for the previous year.

Concentrate production was:

- Zinc concentrate — 248 407 t @ 50.6% Zn;
- Lead concentrate — 75 709 t @ 57.9% Pb;



- Bulk concentrate — 37 974 t @ 33.9% Zn, 13.2% Pb
- Copper/silver concentrate — 12 510 t @ 11.0% Cu, 4815 g/t Ag.

Shipments of concentrate railed to Burnie totalled 416 174 tonnes, with 423 001 tonnes of concentrate being shipped to smelters.

Developments

A \$2.9 million High Intensity Conditioning circuit was commissioned in November and resulted in significantly improved lead recoveries and improved quality of zinc concentrate.

Exploration

Exploration during 1996/97 continued on deep diamond-drill testing of the Hellyer alteration system. One hole encountered three intersections of the faulted footwall alteration zone and some mineralised stringer veins, but no DHEM anomalies were detected.

TMI (transported metal ion) soil geochemical sampling continued.

Capital expenditure

Capital expenditure incurred during the year totalled \$5.98 million, with improvements accounting for \$5.3 million of this amount. Major improvements were the High Intensity Conditioning circuit (\$2,889,000) and raising the tailings dam wall (\$1,809,000).

Environmental initiatives

Rehabilitation work continued on the Que River and Cleveland Tin mine sites. All remaining buildings were sold and revegetation is well advanced.

Rehabilitation of disturbed areas no longer in use at the Hellyer mine continued. The tailings dam wall was raised to its final designed height and water release from the site was minimal during the last 6 months of the year.

Employment

The total workforce as at 30 June 1997 was 287, comprising 163 employees, 110 contractors and 14 apprentices and casuals.

Pasminco Rosebery Mine

Mining

Mine development activity totalled 5228 metres. The main areas of development activity were Lower J Lens, the Deep Exploration Project and Upper B Lens. Development commenced at the Southern Open Cut to exploit 100 000 tonnes over an 18 month time frame.

Ore Production

A total of 644 721 tonnes of ore was mined at an average grade of 10.0% Zn. Nine percent of the ore was extracted from three small open-cut operations on the Rosebery mine lease, and 3% from the recommissioned Hercules mine operated by Mancala Pty Ltd. Of the underground ore, 57% was extracted from J Lens, 39% from B Lens and the remainder from remnant extraction in H Lens.

Ore Reserves

Identified ore reserves at June 1997 were 3.652 million tonnes grading 3.7% Pb, 10.7% Zn, 0.46% Cu, 119 g/t Ag and 2.4 g/t Au. These reserves comprised:

- Proved — 2.22 million tonnes @ 2.9% Pb, 8.7% Zn, 0.43% Cu, 87 g/t Ag and 1.8 g/t Au;
- Probable — 1.43 million tonnes @ 4.9% Pb, 13.6% Zn, 0.50% Cu, 167 g/t Ag and 3.4 g/t Au;

This compares with the total ore reserves reported as at 30 June 1996 of 3.249 million tonnes with an average grade of 10.6% Zn and 2.4 g/t Au.

The measured, indicated and inferred resource quoted as at June 1997 was 10.949 million tonnes at a zinc grade of 11.7% and a gold grade of 2.4 g/t.

Resource infill and near-mine exploration underground drilling amounted to 21 353 metres. Deep Exploration Project and other underground drilling totalled 31 030 metres.

Drilling in connection with surface exploration on the mine lease totalled 13 540 metres.

Milling

Ore treated in 1996/97 totalled 640 593 tonnes, of which 71 028 tonnes was sourced from outside the Rosebery mine, including the recommissioned Hercules mine (18 371 t). This was a significant increase on the 600 053 tonnes treated last year.

Zinc recovery was at the level of the previous year with a slight improvement of grade. Lead metallurgy continues to be problematic, but some improvement in grade was achieved at the expense of recovery.

Copper metallurgy improved in both grade and recovery, in part due to research work through the University of South Australia. Gold recovery as doré remains below expectations.

The mill headgrade was reported as 10.02% Zn, 2.94% Pb, 0.39% Cu, 103.9 g/t Ag and 1.51 g/t Au, compared to the previous year's headgrade of 11.1% Zn, 2.99% Pb, 0.36% Cu, 103.2 g/t Ag and 1.72 g/t Au.

Concentrate production for the year was:

- Zinc concentrate — 108 390 t @ 52.67% Zn;
- Lead concentrate — 19 816 t @ 63.43% Pb, 1423 g/t Ag;
- Copper concentrate — 5821 t @ 23.8% Cu, 6.89% Pb, 3205 g/t Ag, 68.3 g/t Au.

The gold plant produced 226 kg of doré containing 30% silver and 65% gold.

Exploration

Geological mapping was conducted in the Jupiter area, and soil and rock-chip samples were collected to aid in the assessment of the prospect.

Capital expenditure

Capital expenditure during the year amounted to \$19.5 million, with \$8.7 million being spent on the Deep Exploration Project and \$8.0 million on underground development.

Environmental initiatives

The No. 1 and No. 2 Tailings Dams have been placed in an 'abandoned' state by shallowly flooding all tailings. Trials and monitoring programs have commenced to determine optimum water depth and water quality and to establish reed beds.

An artificial wetlands system has been established below No. 2 Dam to naturally treat seepage.

Planned rehabilitation works around No. 2 Dam, the town site and process areas have been progressed.

Employment

The number of employees as at 30 June 1997 was 331.

Mancala Pty Ltd: Hercules mine

A sub-lease agreement between Mancala and Pasminco was reached in July 1996, providing for the mining of ore from Hercules and delivery to the Rosebery mill until February 2000.

Site establishment at Hercules, including the construction of all infrastructure, commenced in August 1996. Underground production commenced in December/January, initially as remnant ore from existing stopes but progressing to production from new stopes. Total ore production shipments to Pasminco for 1996/97 were 17 927 tonnes @ 0.30% Cu, 1.8% Pb, 10.1% Zn, 34 g/t Ag and 0.91 g/t Au.

The mining reserve at the start of 1997/98 was 173 512 tonnes @ 0.53% Cu, 2.5% Pb, 10.8% Zn, 37 g/t Ag and 0.81 g/t Au.

Approximately 120 metres of diamond drilling was carried out during the year, primarily in the delineation of known resources.

A total of 23 employees were working at the project at the end of the financial year.

Copper

Copper Mines of Tasmania Pty Ltd

Mining

Underground development for the year consisted of 119 metres of incline, 543 metres of lateral waste (mainly consisting of ventilation access drives) and 3273 metres of lateral ore. Decline development will recommence early in 1998. National Mine Management Pty Ltd is contracted for both development and production.

Production

Ore production was made up of 1 935 676 tonnes of ore grading 1.34% Cu. This ore comprised 1 725 271 tonnes from sub-level cave stoping and 210 405 tonnes from development. Sub-level caving is now drawn over three levels, making this the largest sub-level cave mine in Australia. Drilling and blasting patterns were progressively enlarged as experience in cave behaviour was gained.

Waste from underground development totalled 31 120 tonnes and was disposed of on the waste dump near the old smelters. The area was progressively compacted, sealed and revegetated.

Ore reserves

Proved ore reserves at 30 June 1997 were 7.9 million tonnes grading 1.32% Cu and 0.3 g/t Au. Probable reserves totalled 12.1 million tonnes @ 1.2% Cu, for a total proved and probable reserve of 20.0 million tonnes.

Total measured, indicated and inferred resources were 201 million tonnes at 0.8% Cu.

Milling

Availability, throughput, grades and recoveries all increased on the previous year, resulting in throughput of 1 802 673 tonnes at an average headgrade of 1.30% Cu. This yielded over 21 700 tonnes of copper, 14,700 ounces

of gold and 107,100 ounces of silver.

Shipments of copper concentrates from Burnie to various overseas smelters totalled 82 994 wet tonnes.

Major work undertaken included plant expansion to increase throughput to 2.25 Mtpa, preparations for a further upgrade to 3.5 Mtpa (incorporating autogenous and conventional milling) and the establishment of a secondary processing pilot plant for the treatment of concentrate.

Exploration

An underground diamond drilling project revealed excellent down-dip continuity of the Prince Lyell orebody.

Surface drilling, rock-chip sampling and re-logging were undertaken at West Lyell open cut. Re-logging and review of the North Lyell area was aimed at identifying smaller but higher-grade copper deposits.

Capital expenditure

Capital expenditure consisted of \$13.0 million, made up of \$6.8 million in underground capital development, \$2.7 million in plant upgrades, \$1.8 million in exploration, and \$1.7 million of smaller items.

New developments

An expansion study was undertaken to take advantage of greater mining and milling scale, including new underground crushing, expanded hoisting, and autogenous grinding in the mill. The expansion was deferred in the short term so as to better establish existing plant capabilities and to be able to incorporate expected results from surface and underground drilling.

Environmental initiatives

A review of the 1995 Environmental Management Plan was prepared and submitted.

A series of action plans and key environmental performance indicators are being developed to facilitate continuous improvement and develop the environmental management

system. An audit has been carried out and key areas of environmental risk and non-compliance have been identified and actioned.

Employment

Employment at year end totalled 251 people. This comprised 99 employees of CMT and 152 contractors.

Gold

Beaconsfield Mine Joint Venture

The Project Feasibility Study has been completed and is being evaluated. It is currently anticipated that the Beaconsfield gold mine will be in production during the 1998/99 financial year and will be amongst the lowest cash cost gold producers in Australia at that time.

Development

Development was focused on the establishment of the 375 metre level for resource evaluation diamond drilling and the establishment of permanent pumping facilities.

Other work included the erection of the life-of-mine skyshaft beneath the Hart Shaft headframe.

A total of 740.5 metres of level development was completed on 375 mL for the year. Waste rock hoisted to surface totalled 50 375 tonnes.

Capital expenditure

Virtually all expenditure incurred over the past year was of a capital nature and amounted to approximately \$15 million.

Ore reserves

The mine contains a total (indicated and inferred) resource of 2.095 million tonnes @19.96 g/t Au, and a probable ore reserve of 1.534 million tonnes @22.32 g/t Au.

Exploration

Resource definition drilling continued and greenfields

exploration was carried out on two exploration tenements. This included drilling at Pease Creek and North Tasmania, northwest of Beaconsfield, and a magnetic survey at Salisbury Hill, south of Beaconsfield.

Environmental initiatives

Management of the mine water discharge wetlands continued throughout the year. Considerable effort was expended during the year to ensure that noise generated on site was brought in line with permissible levels.

The draft Development Proposal and Environmental Management Plan statement for the proposed operation at Beaconsfield is well advanced and will be submitted in October 1997.

Employment

The workforce at year end consisted of six joint venture employees and 89 contractor employees.

Goldfields (Tasmania) Limited: Henty gold mine

The mine was officially opened by the Premier of Tasmania on 2 July 1996, following the commissioning of the gold plant in June 1996.

Mining

Ore production early in the year was adversely affected by development delays and by initial difficulties in accessing high grade ore in Zone 96. Mill feed at the start of the year was sourced from the near-surface, lower grade Sill Zone.

Mining in Zone 96 commenced in October 1996. Production improved significantly in the last half of the year, with the last four months gold production exceeding budgeted levels.

Development

Development mining included completion of an incline and decline, each 300 metres in length, to the orebody, two 200 metre long diamond-drill drives, and 1200 metres of additional ramp and decline development for orebody access.

Production

Ore treated during the first year of operations totalled 72 657 tonnes at an average grade of 21.1 g/t Au, for the recovery of 48,377 ounces of gold.

Environmental initiatives

Henty has continued to set new benchmarks in environmental management in an area of high sensitivity and ecological significance, particularly with innovative water management practices. The company recently won the Water Environment Merit Award 1996/97 of the Australian Water and Wastewater Association (Tasmania).

Biomonitoring programs demonstrate the continued success and efficiency of environmental management at the operation.

Exploration

The Mt Julia prospect, and the region between Mt Julia and Zone 96, continued to show encouraging results during the year. A total of nine parent surface drill holes and ten wedges (8900 m) were drilled during 1996/97.

Resource definition of the Intermediate Zone, between Zone 96 and the Sill Zone, has also produced encouraging results. An exploration and access incline is currently planned for the Intermediate Zone during 1997/98.

Employment

Employment grew during the year to 72 full-time personnel. An additional 68 contractors were engaged in surface haulage, underground development, plant maintenance and diamond drilling.

Paraclete Resources Pty Ltd

Following successful geological and metallurgical test work, Paraclete Resources Pty Ltd successfully completed joint venture negotiations with Stonyfell Mining NL to develop the King River gold mine near Lynchford. An oxide ore pilot

plant is scheduled to be commissioned in October 1997.

To date some \$360,000 has been spent on the initial site works including access roads, dams and power supply. The total capital cost to commissioning is estimated to be \$750,000. Additional deep diamond drilling to test the underground sulphide potential is also planned.

Paraclete Resources Pty Ltd is currently preparing a Development Proposal and Environmental Management Plan concerned with future tailings reclamation associated with the Queen River environmental clean up.

Iron ore

Savage River Mines

Mining of the Savage River orebody ceased in April 1996, following which a 2.7 million tonne stockpile of ore was used to supply mill feed until December 1996. The concentrator at Savage River and the pelletising plant at Port Latta ceased production in that month, with the final shipment of the remaining inventory leaving Port Latta in March 1997. Both sites underwent a 'care and maintenance' program during January-March 1997 prior to take-over by Australian Bulk Minerals. The Wynyard office closed on 30 April 1997.

Production for the year comprised:

	Tonnes
All material	0
Rock to waste	0
Crude ore	0
Concentrate produced	764 560
Concentrate pumped	867 801
Pellets produced	806 022
Pellets shipped	1 072 269
Pellet inventory	0
Concentrate and chip sales	148 348

Rehabilitation

Construction works related to rehabilitation continued prior to abandonment of the mine. These included soil covering of tailings on the Main Creek and Emergency Tailings Dams,

capping of the Main No. 1 Dam, and stabilisation of dumps.

Employment

Two people remained in administrative employment at 30 June 1997.

Australian Bulk Minerals

Goldamere Pty Ltd took over the Savage River mining lease and Port Latta processing plant on 26 March 1997. The operations are currently being refurbished with the intention of resuming production in November 1997. A preliminary study is underway into the production of pig iron, and possibly steel, at Port Latta.

Ore Reserves

Measured mineral resources at Savage River at 30 June 1997 were:

- 112 631 000 tonnes at 52% DTR;
- Indicated mineral resource 80 217 000 tonnes at 50% DTR; and
- Inferred mineral resource 9 288 000 tonnes at 43% DTR.

The total mineral resource is 202 136 000 tonnes at 51% DTR.

Exploration

A drilling program, totalling 3947 metres, was completed as part of the feasibility study by Goldamere Pty Ltd of the Savage River magnetite deposit. This drilling generally confirmed the existing geological interpretation.

Capital Expenditure

A \$110 million refurbishment program is being undertaken to allow production to recommence in November 1997, building up to full production by July 1998. The work includes relocation of the main run-of-mine ore crusher and installation of a new conveyor to carry ore to the concentrator.

Rehabilitation

An Environmental Management Plan for the redevelopment of the Savage River mine, incorporating landform design, reconstruction and revegetation, is being prepared. This work is integrated

with the Department of Environment and Land Management's commitment to the rehabilitation of the previous Savage River mine operations.

Employment

There were six permanent employees and 78 contractors at Savage River and Port Latta as at 30 June 1997.

Tasmania Mines Limited

Magnetite production from the Kara mine totalled 39 123 tonnes for the year, while scheelite concentrates produced contained 2132 MTU WO³. Sales of magnetite totalled 40 483 tonnes, with no scheelite concentrate sold.

Capital expenditure amounted to \$143,164 on the new tailings dam.

An average of 25 persons was employed during the year.

Tin

Renison Limited

Development

A total of 1436 metres of development was carried out, including 405 metres of capital.

Ore production

Ore production totalled 695 402 tonnes at an average grade of 1.72% Sn. The Rendeep orebodies provided 11% of this production.

Ore reserves

Ore reserves at 30 June 1997 totalled 5.055 million tonnes @1.88% Sn. These comprised:

- Proved: 2.925 million tonnes @1.93% Sn;
- Probable: 2.130 million tonnes @ 1.81% Sn

The total measured and indicated resources at year end were 6.84 million tonnes at 1.81% Sn.

Mineral processing

Ore treated in 1996/97 totalled 692 248 tonnes at a headgrade of

1.71% Sn, compared to 706 424 tonnes at 1.55% Sn in the previous year. Ore grade and recovery improved as more amenable ore types were accessed. Concentrate production was 16 140 tonnes at a grade of 53.5% Sn, containing 8635 tonnes of tin metal in concentrate. This is the highest annual production on record.

Exploration

Renison completed its evaluation of the Laffers alluvial deposit and declined to proceed any further with this project. All other exploration was contained within the existing mining lease. Underground drilling totalled 142 holes for 13 564 metres.

Capital expenditure

Capital expenditure was mainly allocated to shaft and mine development, with subsidiary amounts going to tailings dams, process improvements and mobile equipment.

New developments

Approval has been given to recommission the Leach Plant and continue with the Rendeep access development.

Environmental initiatives

During the year Renison completed its Environmental Improvement Program, achieving compliance with the National Aquatic Ecosystem Water Quality Standards for receiving waters. Renison is midway through a three-year research program on tailings dam rehabilitation in conjunction with the CSIRO. These achievements are in addition to the general philosophy of continuous improvement through minimising waste and maximising recycling.

Employment

The workforce at year end comprised 232 persons, compared to 257 at the end of 1995/96.

In addition to the number of persons in direct employment, 56 contractors' employees were on site at year end.

Mancala Pty Ltd: Anchor mine

Operations at the Anchor mine ceased on 20 December 1996, and the project was placed on care and maintenance. This decision was based on continuing grade problems and further weakening of the tin price.

Ten people were employed on the site at the time of closure.

Concentrate production for the six months to December 1996 was 177 tonnes.

Since being placed on care and maintenance various clean-up works have been performed, including earth bunding of portals and the removal of mobile equipment and materials from the site.

Coal

The Cornwall Coal Company (No Liability)

Duncan Colliery

This mine remained on care and maintenance for the entire year.

Blackwood Colliery

Workings have been progressively retreated. Floor heave and thin seam conditions have continued to affect mining rates and washery yields, although they have gradually improved overall.

All available coal from the Blue Upper Seam has now been extracted from this mine.

Huntsman No. 2 open cut

Production has increased. Coal quality remains good and trials of unwashed coal have been successful.

Production

Raw coal production totalled 409 022 tonnes. This was sourced from the Blackwood Colliery (361 124 tonnes) and Huntsman

No. 2 open cut (47 898 tonnes). Approximately 132 787 tonnes of reject material was dumped on the Duncan reject dump.

Coal sales for the year amounted to 271 398 tonnes.

Modifications to the washery plant have enabled all fines to be included in the final product, with the resultant progressive depletion of the fines stockpile.

Exploration

Four holes, drilled east of Huntsman No. 1 to assess potential for further open cut reserves, intersected dolerite talus, eliminating the potential.

Capital expenditure

Major items of capital expenditure were related to the acquisition of the Shell leases and a small portion to the purchase of capital items for the Blackwood mine and washery.

Rehabilitation

Progressive rehabilitation, including seeding, is occurring at

Huntsman No. 2. Tree growth on rehabilitated areas (Blackwood No. 2 and Huntsman No. 1) has been very good. The fines stockpile has been reduced by over 8000 tonnes.

Employment

Employment numbers at year end comprised 61 direct employees, nine coal cartage contractor employees, and nine contractor employees in the open cut.

No days were lost due to industrial disputes.

Merrywood Coal Company Pty Ltd

Merrywood open cut

Poor ground conditions, higher strip ratios and extreme wet conditions forced the closure of the Merrywood open cut in April 1997.

Markets were reduced because of the poor operating conditions and the resultant inconsistent supply.

A feasibility study is ongoing regarding exploiting the remaining resource using modified continuous mining methods.

Stanhope

The Stanhope area was developed during the year in an effort to improve the reliability of supply and maintain contracts.

The washery is still being used intermittently to wash some coal from this open cut. Further analysis regarding the feasibility of recovering coal from washery reject continued.

Production

Coal sales from the Merrywood open cut totalled 90 938 tonnes from a total of 130 000 tonnes of raw coal mined. Raw coal stocks of 5000 tonnes were entirely depleted during the year. Overburden removal totalled 1.1 million cubic metres.

Coal sales from the Stanhope open cut were 15 690 tonnes of product from 21 000 tonnes of raw coal mined. Approximately 80 000 cubic metres of overburden were removed.

Capital expenditure

Capital expenditure during the year totalled \$270,000, comprising \$120,000 on exploration in the mine areas and analysis and bulk trials, and \$150 000 on infrastructure.

Rehabilitation

All major contouring of the open cut area at Merrywood was completed, with minor topsoil placement to be completed during the coming year.

Progressive rehabilitation commenced at Stanhope.

Non-metallic minerals

Kaolin

Australian Paper, Tonganah clay mine

Production at the Tonganah clay mine was scaled down following the decision of Australian Paper to use calcium carbonate as a filler in place of clay. The Burnie mill, the largest customer, ceased using clay as filler from late May.

Production

Clay mined totalled 169 000 tonnes, with additional clay being reclaimed off stockpiles. Mine development was limited because of the loss of market.

The processing plant produced 26 776 tonnes of clay, with sales amounting to 29 993 tonnes. Improvements in efficiency resulted in the cost of production being lower than planned.

Environmental initiatives

Australian Paper has committed itself to rehabilitating worked out areas of the mine and the processing plant site. Environmental consultants have provided plans and guidelines for the work, much of which has been carried out by local contractors.

Limestone and dolomite

Beams Brothers Pty Ltd

Production for the year comprised metallurgical limestone, aglime and mixing stone, and scalplings.

It is planned to install a bigger jaw crusher at Flowery Gully and another tertiary crusher for more aglime production.

A total of 24 persons was employed.

Circular Head Dolomite and Trading Co. Pty Ltd

Production for the year totalled 9438 tonnes of metallurgical grade dolomite, 52 182 tonnes of agricultural dolomite, and 10 708 tonnes of dolomite screenings.

Capital expenditure of \$58,800 was committed to the purchase of plant and machinery.

Employment totalled 13 people, with one contractor on site at year end.

David Mitchell Limited (Mole Creek)

Production for the year comprised crushed and screened limestone, ground limestone, and quicklime and hydrated lime.

A major new lime supply contract was negotiated with Pasminco Hobart, with deliveries commencing in June 1997. This required a plant production and storage upgrade, a move to seven-day week operation, and the addition of four to the workforce, bringing the total to 27 full-time employees.

Capital expenditure totalled \$756,000 and included expenditure on increased lime storage, an upgrade of lime kiln capacity, and a new front-end loader.

A major upgrade of settling ponds was completed.

Goliath Portland Cement Company Limited

Production

A total of 1.029 million tonnes of cement was produced from 1.398 million tonnes of limestone and 82 000 tonnes of clay, with 1.09 million tonnes of overburden being removed during the year. Usage of coal for the year was 129 000 tonnes. Drilling, testing and mine development work continued.

Major projects

The installation of the 1000 tonnes per hour twin-rotor hammer crusher and trunk conveying system from the new quarry to the plant continued,

with the project expected to be completely operational by October 1997.

Major replacement of four kiln shell sections and straightening of the kiln axis was planned for August 1997.

Capital expenditure

Capital expenditure of \$18.11 million was incurred during the year. This included \$16.4 million on plant improvements and \$0.73 million on environmental and pollution control.

Environmental initiatives

The southeast embankment of the new mine was topsoiled and seeded. Drainage works were carried out on the western side of the new mine, a new screening mount was created, and a landslip section of the old mine was stabilised.

An Environmental Management Team has been established with the aim of finalising an Environmental Management

System and a Greenhouse Energy Management System by early 1998.

Rehabilitation expenditure during the year amounted to \$565,300.

Employment

The number of permanent employees decreased from 196 to 191. Three casual employees and three contractor employees were also utilised.

There were no major industrial disputes during the year.

An Enterprise Bargaining Agreement was implemented on 4 December 1996.

Silica flour

Cominex

There was no production of silica flour in the twelve months to 30 June 1997, because of difficulties experienced by the distributor and end users due to

the disruption of the Kobe earthquake in Japan. The outlook for the coming year is more promising, with shipments to Japan expected to resume in 1998.

Production

Three hundred tonnes of material were shipped to the Heybridge plant for beneficiation and distribution to potential customers in France and the USA.

Ore reserves

Estimated ore reserves were 95 000 tonnes proved and 1.6 million tonnes probable.

Exploration

Surface sampling and mapping in an exploration licence taken out in the Arthur River area to explore for silica flour has delineated targets for auger drilling and sampling.

Employment

The workforce strength at year end was two working owners.

Construction materials

Besser Tasmania Pty Ltd

A total of 24 420 tonnes of sand and gravel was produced from the Calder leases, mainly for use in bricks, blocks and pavers.

Progressive rehabilitation of worked-out areas continued.

Two persons were employed on a full-time basis.

Boral Resources

Production from Boral quarries statewide amounted to 845 400 tonnes of crushed rock and 94 400 tonnes of sand and gravel.

A total of \$471,000 was spent on capital items, including a new face loader for the Flowery Gully quarry and a rock breaker for the Launceston quarry site.

A drilling and resource identification program was completed at the Launceston quarry.

Tree planting and rehabilitation work continued.

Twenty-four persons were employed on a full-time basis, with sub-contractors used as required.

Brambles Equipment

The total production from Brambles' quarries was 180 000 tonnes of road base, 180 000 tonnes of aggregates and dust, and 70 000 tonnes of various rock fills.

Capital expenditure of \$800,000 was spent on a loader and dump trucks.

Rehabilitation of the Pipers River pit continued.

The workforce consisted of 20 employees.

Caroline Quarries

Production from the quarry at Railton was 36 385 tonnes of

silica sand, with minor amounts of general sand, roadstone and concrete sand. Capital expenditure was directed to the purchase of a new prime mover.

Most of the worked-out areas of the quarry have been successfully rehabilitated. The settling pond has been enlarged and some water courses rock lined to prevent erosion.

The quarry was operated by the two owners.

CSR Readymix

Production for the year from the Mornington quarry was 187 000 tonnes of crushed dolerite, mainly for road construction.

Capital expenditure was committed to a replacement sales loader, face loader and water cart.

Rehabilitation is proceeding on the highest benches, with over 400 trees planted.

Fourteen people, including two contractors, were employed.

Duggans Pty Ltd

A total of 80 404 tonnes of construction materials was produced, including 10 252 tonnes of aggregate, 19 353 tonnes of sub-base, and 28 658 tonnes of scalps.

Capital expenditure of \$26 000 was spent on loaders and crushers.

A refinement of water sprays to the crushing plant eliminated airborne dust during crushing.

Six full-time employees were engaged at year end.

Hobart Blue Metal Industries

Production for the year comprised 327 000 tonnes of crushed rock, 8000 tonnes of gravel and 34 000 tonnes of sand.

Expenditure on items of a capital nature included \$450,000 on replacement mobile crushers, and \$190 000 on a new wheel loader.

Work continued on revegetation at the Huonville sand pit and tree planting is to be carried out at the Leslie Vale quarry.

Twenty-four employees and two contractors were employed during the year.

Industrial Sands and Silica Pty Ltd

This company produced 10 000 tonnes of road-making product and 1000 tonnes of industrial product. There were three employees.

Pioneer Concrete (Tasmania) Pty Ltd

Production of crushed dolerite from the Flagstaff Gully quarry was 246 734 tonnes. This comprised road construction material (138 238 tonnes), concrete batching material (66 154 tonnes), and miscellaneous material.

A new sales loader, valued at \$250,000, was purchased in June 1997.

The western boundary bund wall was extended and 200 native trees have been planted. Rehabilitated areas continue to show good progress.

Ten employees and three contractors were engaged in quarry operations.

D. J. & K. J. Rowell

The processing of 20 000 tonnes of material produced 12 000 tonnes of saleable siliceous sand.

Capital expenditure on transport equipment amounted to \$232,000.

Six hectares of rehabilitation was completed during the year.

The workforce comprises the owner-operator, two full-time employees and a part-time subcontractor.

Tasmanian Sandstone Pty Ltd

Tasmanian Sandstone Pty Ltd is extending its markets by establishing distributors in Perth and Sydney. An export market is slowly being developed.

A new wire saw comprised the bulk of capital expenditure.

Trees have been extensively planted around the perimeter of the quarry. Two ponds have been constructed to recycle water used in the cutting works.

Trident Consolidated Industries, Quarry Division

Production totalled 68 000 tonnes of basalt and 32 000 tonnes of quartzitic sand and gravel.

Ongoing rehabilitation work included the planting of 100 trees.

Ten persons were employed on a full-time basis.

Treloar Transport

Production for the year was reported as 23 363 tonnes of sub-base 1 and 2 material, 10 712 tonnes of base course material, 2965 tonnes of drain rock and 2640 tonnes of pipe bedding material, a total of 39 680 tonnes.

A modified drilling and blasting procedure has allowed for more economic extraction and an increase in production.

Capital expenditure included the purchase of a secondary crusher and a pump and water spraying conveyor.

Areas of the quarry are being rehabilitated as they are worked out.

Six persons were employed in quarry operations and administration, and a drilling contractor was engaged throughout the year.

Ceramics

The long-running decline in the building industry throughout Australia continued, with a consequent detrimental effect on brick and paver manufacturers.

K & D Bricks and Pavers

A total of 7.9 million bricks and pavers were produced from 2400 cubic metres of clay and shale.

Shipments amounted to 9.07 million bricks and pavers.

Rehabilitation is underway at the Oyster Cove and Hamilton workings.

The number of persons in direct employment during the year was 32.

Nubrik

Clay, shale and sand, extracted from a number of quarries in northern Tasmania, were processed into bricks and pavers to supply the local market.

The average number of employees for the year was 38.

Comalco Aluminium (Bell Bay) Limited

Production for the year totalled 136 000 tonnes of saleable aluminium metal. Raw materials consumed in the process included 257 000 tonnes of alumina, 56 000 tonnes of coke, 13 000 tonnes of pitch and 7000 tonnes of aluminium fluoride.

Capital expenditure

Installation of dry scrubbing technology, at a total cost of \$43 million, accounted for most of the total spent on items of a capital nature.

New developments

The installation of dry scrubbing technology, almost complete at the end of the financial year, provides Bell Bay with the best possible fume scrubbing technology available to the aluminium industry.

Environmental initiatives

Dry scrubbing has reduced fluoride gas emissions by 90%.

The smelter has won a number of environmental and engineering awards for the development of the Wetlands and Spent Cathode Lining Projects.

Employment

The workforce at 30 June 1997 comprised 691 employees and 285 contractor full-time employee equivalents. Contractor numbers are currently unusually high because of work on the dry scrubbing and other projects.

Impact Fertilisers

Production of single superphosphate during the year totalled 106 248 tonnes, of which 76 453 tonnes were shipped to mainland ports.

The process consumed 65 335 tonnes of imported phosphate rock and 31 981 tonnes of sulphuric acid supplied by the Pasmaenco Hobart Smelter.

Major projects

Major projects comprised upgrading maintenance spare parts storage and workshop facilities.

Capital expenditure

Expenditure of a capital nature was incurred at Risdon on constructing a new single super screening plant and a new fertiliser blending plant.

A new front-end loader was purchased. New despatch/storage facilities were established at King Island and Deloraine.

Environmental initiatives

Roadworks and landscaping were commenced at Risdon as part of measures to control dust.

Employment

The workforce during the year totalled 75 people, including seven contractors.

IMP Silica

The silica flour operation experienced another quiet year, treating only 200 tonnes of product. Sales were made to the USA and France. A substantial increase in production and sales is expected in the coming year with new orders from Japan, France and the USA.

The operation employs one permanent administrator plus a chemist and three operators on a casual basis.

Pasmaenco Hobart Smelter

Total tonnage of zinc concentrates treated in 1996/97 was the highest on record, with most concentrates being sourced from the Rosebery and Hellyer mines in western Tasmania. Production of zinc and zinc alloys was the fourth highest on record.

Major projects

A second zinc stripping machine and associated cathode handling system have been commissioned, completing the

mechanisation of the stripping process at the Pasmaenco Hobart Smelter, and providing a prime opportunity for production efficiency improvements.

A co-treatment program, involving Pasmaenco's Port Pirie lead smelter, is well on target and will enable cessation of ocean disposal of jarosite residue by December 1997.

Environmental initiatives

As well as the co-treatment program, significant environmental initiatives included the first stage of the rehabilitation of the jarosite stockpile, with the ultimate aim being the creation of an extensive wetland system in this area. Aboriginal middens discovered during this work will be preserved as part of the overall rehabilitation plan.

Employment

The permanent workforce during the year totalled 613 people, with an additional 150 contractors being employed.

TEMCO

Production for the year totalled 103 565 tonnes of ferromanganese, 85 629 tonnes of silicomanganese, 15 186 tonnes of fines, and 290 929 tonnes of sinter.

Furnace feed included manganese fines from Groote Eylandt, sinter, iron ore, quartzite, dolomite, limestone, coke and coal.

Major projects

The \$11 million upgrade of No. 3 Furnace has begun. This will enable the furnace to increase its production from 51 600 to 63 500 tonnes per annum.

Capital expenditure

Capital expenditure for the year was almost \$11 million. The majority of this expenditure was spent on plant and machinery.

The major capital expenditure was on the No. 3 Furnace upgrade

(\$5.7 million), a 3.3 kv auxiliary power upgrade (\$1.1 million), and an \$0.8 million program logic control upgrade.

Environmental initiatives

A second 'New Work Opportunities' program was undertaken in conjunction with the Commonwealth Department of Employment, Education, Training and Youth Affairs.

All waste water management systems have performed well throughout the year with no identifiable adverse impact on the Tamar Estuary. Discharges have remained within regulation limits.

The 'worked out' lease area of the Beaconsfield quarry has been relinquished to the Beaconsfield Mine JV for the siting of their ore treatment plant. A new environmental management plan for the continued operation to the south of the old pit has been prepared.

Commercialisation of the major by-product, silicomanganese slag, has progressed, with two companies moving towards utilisation of the slag as a supplementary cementitious material.

Employment

There were 322 people employed as at 30 June 1997, including 15 contractors.

Tioxide Australia Pty Ltd

The Heybridge plant ceased production on 7 July 1996 after producing 983 434 tonnes of titanium dioxide pigments since 1948.

Plant decommissioning

An Environmental Decommissioning and Rehabilitation Plan has been agreed with the Burnie City Council, DELM and other relevant Government departments, and was in place by

the time the plant ceased production.

Plant decommissioning and removal of hazardous waste was completed by the end of September 1996 and auctioning of plant equipment was held from October to December. Plant demolition commenced in February 1997 and will be complete by October 1997.

Environmental issues

Removal of concrete slabs and roads followed by site remediation is expected to be completed by early 1998. A new secure landfill has been constructed and is being used to house the demolition waste and for the transfer of the contents of the old Tioxide rubbish tip. The old tip area and the tailings dams will be rehabilitated.

Employment

There were six direct employees and 12 demolition contractors at 30 June 1997.

Mineral production from Tasmanian sources since 1880

Quantity of production as at 30 June 1997

<i>Commodity</i>	<i>Unit</i>	<i>Quantity in Current Year</i>	<i>Total Quantity</i>
METALLIC MINERALS			
Antimony	(tonne)	-	3
Bismuth	(kilogram)	-	110 080
Cadmium	(tonne)	-	5 155
Chromite	(tonne)	-	2 687
Cobalt oxide	(tonne)	-	165.3
Copper (blister) to 1918 (now shown under Silver and Copper)	(tonne)	-	169 273
Copper matte	(tonne)	-	6 326
Copper ore to 1918 (now shown under Copper)	(tonne)	-	42 439
Copper (from 1919)	(tonne)	24 759	1 189 457
Gold	(kilogram)	2 435	131 0627
Ilmenite	(tonne)	-	558
Iron ore pellets	(tonne)	809 359	57 395 347
Iron in iron oxide (including hematite, limonite and magnetite)	(tonne)	39 123	1 588 690
Lead (from 1919)	(tonne)	37 974	1 289 000
Manganese	(tonne)	-	1
Manganese dioxide (from 1957)	(tonne)	-	13 521
Mercury	(kilogram)	-	7 697
Molybdenum	(tonne)	-	162
Monazite	(tonne)	-	34
Nickel	(tonne)	-	237
Osmiridium	(kilogram)	-	960
Pyrite (to 1971)	(tonne)	-	2 124 070
Pyrite (from 1972)	(tonne)	-	1 914 680
Rutile	(tonne)	-	1
Rutile (concentrates)	(tonne)	-	40 027
Scheelite (concentrates)	(tonne)	-	57 261
Silica for silicon alloy production	(tonne)	-	1 137 705
Silicon	(tonne)	-	36 987
Silver-lead ore to 1918 (now shown under Silver and Lead)	(tonne)	-	1 101 295
Silver (from 1919)	(kilogram)	165 811	4 159 846
Tin	(tonne)	8 732	339 900
Tungsten (as tungstic oxide)	(tonne)	2	35 359
Zinc	(tonne)	186 406	3 756 681
Zinc sulphate (from 1957)	(tonne)	-	4 306
Zircon (concentrates)	(tonne)	-	39 001
NON-METALLIC MINERALS			
Asbestos	(tonne)	-	4 044
Barite	(tonne)	-	2 240
Clay (from 1958)	(tonne)	164 456	5 068 135
Dolomite	(tonne)	14 177	536 704

Mineral production from Tasmanian sources since 1880
Quantity of production as at 30 June 1997 (continued)

<i>Commodity</i>	<i>Unit</i>	<i>Quantity in Current Year</i>	<i>Total Quantity</i>
Graphite	(tonne)	-	41
Kaolin	(tonne)	31 251	638 448
Limestone-			
Agricultural and other	(tonne)	157 906	3 276 279
Carbide	(tonne)	-	1 081 509
Cement	(tonne)	1 525 764	24 574 300
Chemical and metallurgical	(tonne)	33 296	6 349 718
Ochre	(tonne)	-	2 949
Pebbles (from 1957)	(tonne)	-	31 757
Sulphuric acid	(mono tonne)	395 820	7 414 015
Sand (moulding)	(tonne)	-	1 442
Silica	(tonne)	-	701 248
Talc	(tonne)	-	338
FUEL MINERALS			
Coal (run of mine)	(tonne)	545 820	20 589 568
Shale	(tonne)	-	42 239
Peat	(m ³)	2 192	61 456
CONSTRUCTION MATERIALS			
Building stone-			
Freestone	(tonne)	1520	35 460
Granite	(tonne)	170	137 698
Other stone	(tonne)	1 618	47 678
Sandstone (from 1993)	(tonne)	587	2 956
Crushed and broken stone (from 1958)-			
Basalt	(tonne)	792 184	22 137 399
Dolerite	(tonne)	1 897 101	36 469 530
Limestone	(tonne)	49 142	1 352 921
Sandstone	(tonne)	311	320 568
Other	(tonne)	177 518	11 952 575
Gravel (from 1958)	(tonne)	81 096	48 670 258
Sand (from 1958)	(tonne)	381 413	11 447 343
Other road-making material	(tonne)	1 574 217	18 686 129

Value of the Tasmanian Mineral Industry

Year ended Commodity	Unit	30 June 1996 Total Quantity	30 June 1997 Total Quantity
METALLIC MINERALS			
Cadmium	(tonne)	0	0
Cobalt oxide	(tonne)	0	0
Copper	(tonne)	11 481	24 759
Gold	(kilogram)	1 016	2 435
Iron ore pellets	(tonne)	1 681 332	809 359
Iron (in magnetite)	(tonne)	114 512	39 123
Lead	(tonne)	38 565	37 974
Molybdenum	(tonne)	0	0
Pyrite	(tonne)	0	0
Silicon (metallic or as alloy)	(tonne)	0	0
Silver	(kilogram)	143 774	165 811
Tin	(tonne)	8 647	8 732
Tungsten as tungstic oxide	(tonne)	77	2
Zinc	(tonne)	198 376	186 406
Value of metallic minerals		\$338 056 036	\$460 907 344
NON-METALLIC AND FUEL MINERALS			
Clay-			
Cement	(tonne)	43 579	102 976
Brick	(tonne)	48 557	38 831
Other	(tonne)	6 975	22 649
Kaolin	(tonne)	28 425	31 251
Dolomite	(tonne)	39 446	14 177
Limestone-			
Agricultural	(tonne)	99 394	106 246
Cement	(tonne)	1 347 339	1 525 764
Chemical and metallurgical	(tonne)	20 063	33 296
Other	(tonne)	26 380	51 660
Silica (glass and other)	(tonne)	174 201	157 945
Sulphuric acid	(mono tonne)	392 302	395 820
Coal (run of mine)	(tonne)	559 270	545 820
Coal (washed)	(tonne)	206 619	297 274
Peat	(m ³)	11 974	2 192
Value of non-metallic and fuel minerals		\$44 596 149	\$48 451 637
CONSTRUCTION MATERIALS			
Building stone-			
Freestone	(tonne)	560	1 520
Granite	(tonne)	1 657	170
Other	(tonne)	2 130	1 618
Sandstone	(tonne)	92	587
Crushed and broken stone-			
Basalt	(tonne)	1 134 399	792 184
Dolerite	(tonne)	1 003 614	1 897 101
Limestone	(tonne)	33 200	57 519
Sandstone	(tonne)	2 128	7 283
Other	(tonne)	206 836	154 195
Gravel	(tonne)	53 701	145 070
Sand	(tonne)	572 632	420 857
Other road materials	(tonne)	1 335 356	1 673 705
Value of construction materials		\$28 933 286	\$26 962 325
TOTAL VALUE WITH AUSTRALIAN METAL PRICES		\$411 585 471	\$536 321 306
METALLURGICAL PRODUCTION FROM OTHER THAN TASMANIAN ORES			
Aluminium)		
Aluminium sulphate)		
Cadmium)		
Cobalt oxide)		
Ferro-manganese)		
Ferro-silicon)	\$572 810 954	\$706 686 390
Silico-manganese)		
Sinter)		
Superphosphate)		
Titanium dioxide)		
Zinc)		
VALUE OF MINING AND METALLURGICAL PRODUCTION		\$984 396 425	\$1 243 007 696
REPORTED AVERAGE NUMBER OF EMPLOYEES¹		4196	4060

(1) Not all operators report full details

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