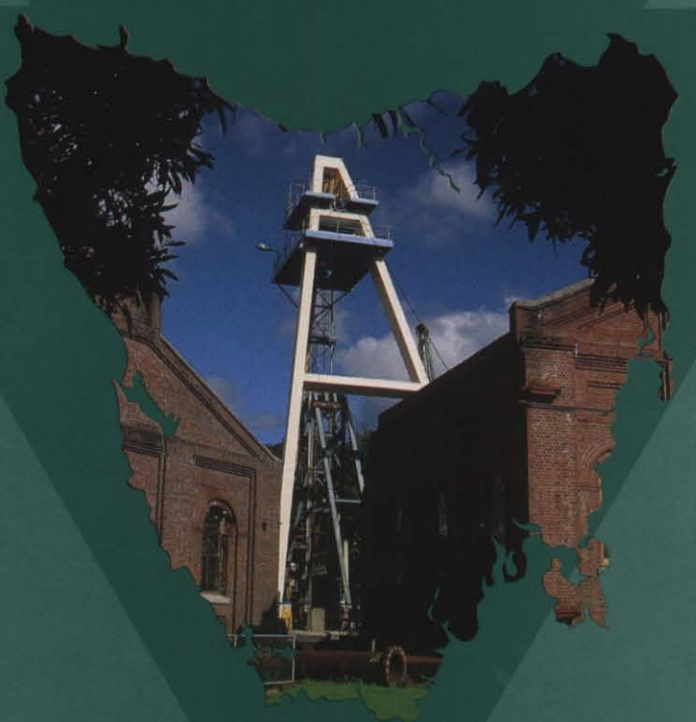
Mineral Resources Tasmania



Annual Review 1995/96

TASMANIA
DEVELOPMENT
AND RESOURCES

Mineral Resources Tasmania

Annual Review 1995/96

TASMANIA
DEVELOPMENT
AND RESOURCES

MINERAL RESOURCES TASMANIA

CONTENTS

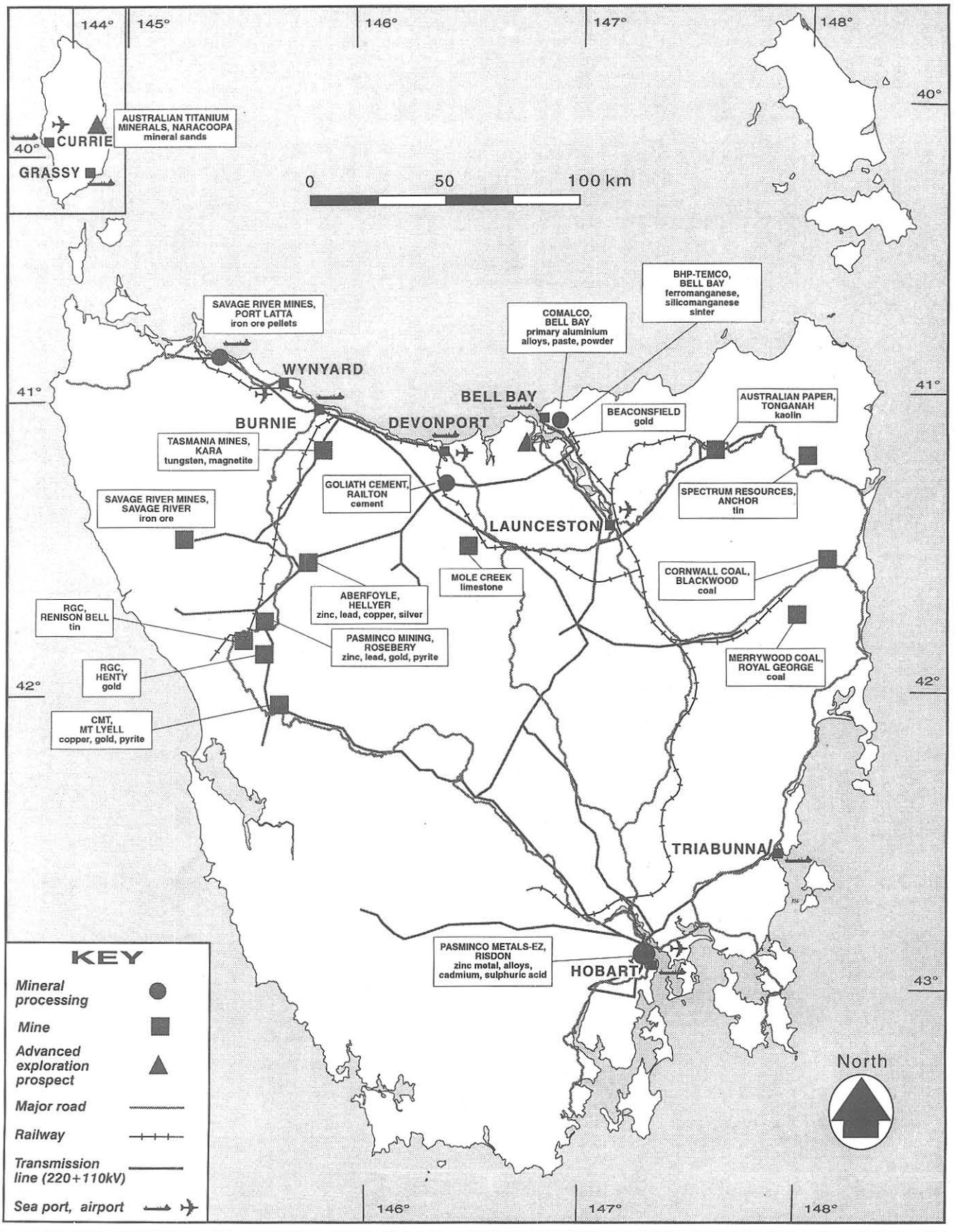
TASMANIA
DEVELOPMENT
AND RESOURCES

MINERAL RESOURCES TASMANIA

Mineral Resources Tasmania PO Box 56 Rosny Park Tasmania 7018

Phone: (03) 6233 8333 ● Fax: (03) 6233 8338

Tasmania
Major Mining and Mineral Processing Operations



5 cm

The 1995/96 financial year saw a continuation of the strong growth in mineral exploration activity experienced in 1994/95, with annual mineral exploration expenditure reported by the Australian Bureau of Statistics (ABS) increasing by 26% to $18.8 million dollars. This is the highest level of investment in exploration in over a decade. In 1995/96 Tasmania's share of national mineral exploration expenditure was 1.96%, an increase of 17% on the previous year.

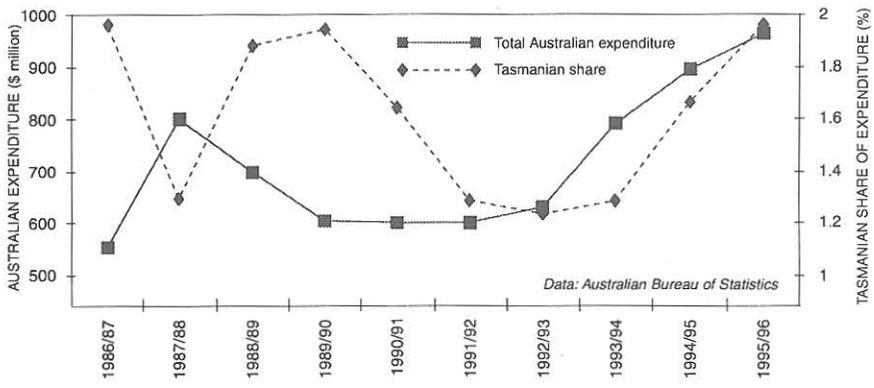
The total number of exploration licences increased from 136 to 141, with the area held increasing from 11 684 km^2 to 19 180 km^2. Although the area covered by exploration licences for metallic and non-metallic minerals declined from 8170 km^2 to 7359 km^2, expenditure per square kilometre increased by 38%, which may indicate a more focused approach to target selection. Exploration licences cover 11% of the State and 29% of Strategic Prospectivity Zones. A 36% decrease in the amount of drilling is attributed to the conclusion of some major exploration projects, including some on mining leases.

The total sales of mining and mineral products for 1995/96 has been estimated by a Tasmanian Minerals Council survey as $1202 million. The industry exported over $700 million worth of products, representing 40% of the total value of Tasmanian exports. The mineral industry's gross State product is higher than farming, fishing and forestry combined.

The $55 million refurbishment of the Mt Lyell mine was completed by Copper Mines of Tasmania Pty Ltd in December 1995, with copper concentrate shipments commencing in March 1996. A substantial weakening of the copper price has been partly offset by the forward selling of 70% of the company's copper production at US $1.07/lb for the 18 months to the second quarter of 1997/98. Pilot plants are to be established during the 1996/97 financial year for copper recovery from flotation concentrates and acid drainage. Copper cathodes of 99.999% purity will be produced by electrowinning.

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

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



Savage River Mines ceased mining operations in April 1996 and plan to complete concentrate and pellet production by December 1996. An agreement has been negotiated between the Crown and Singapore-based Ivanhoe Capital Pty Ltd and its Australian subsidiary Goldamere Pty Ltd, trading as Australian Bulk Minerals (ABM) which will enable ABM to mine and treat the Savage River magnetite resource. It is hoped that a revival of the Savage River operation, with or without downstream processing, will commence in April 1997.

Dewatering and refurbishment of the Hart Shaft by Beaconsfield Mine Joint Venture progressed to 375 metres below shaft collar where an old excavation was re-opened, enabling development towards the Tasmania Reef to proceed. A works programme costing $18 million has been approved for ongoing development, services and exploration. Gold production is expected to commence around mid-1998.

Gold doré production commenced at the Henty gold mine in June 1996. The initial source of ore was the Sill Zone, which lies between 50 and 150 metres below the surface and is accessed by an 800 metre long decline. Ore is expected to flow from the deeper, high-grade Zone 96 via a sub-shaft in October 1996. Exploration of the Intermediate Zone, which lies between the Sill Zone and Zone 96, and in the Mt Julia area (about 1.2 km south of Zone 96) has produced encouraging results

5 cm

which may lead to an extended mine life.

Aberfoyle's Hellyer mine has a remaining ore reserve life of only four years. Deep exploration drilling is being carried out in the same stratigraphic horizon as the known orebody in the hope of finding further reserves. High intensity conditioners have been installed in the mill to improve lead recovery and enhance zinc circuit performance, which will increase revenue by about 5%.

Despite depressed world zinc prices, Pasminco Mining Rosebery made an operating profit for 1995/96. This was the first time in five years that the mine has shown a profit. Deep exploration development and drilling are still on track to substantially increase the ore reserves and life of the mine, whilst $7.5 million has been committed for surface drilling over the next three years to explore strike extensions of the defined ore resource.

Mancala Pty Ltd have been granted a sub-lease by Pasminco over the old Hercules mine. Ore production from this source is expected to commence in November 1996 and will supplement Pasminco's mill supply.

Concentrator operating problems, which were experienced for much of the year at Spectrum Resources' Anchor mine, were overcome and the outlook for the future of the mine is now much brighter. Surface resources were depleted and the mining operation is now focused on the extraction of ore from underground.

The 600 metre deep Renison shaft system was fully commissioned by year end. This has resulted in a substantially reduced average truck haul distance, making ore extraction from the lower orebodies financially more attractive and adding at least six years to the life of the mine. Mine management is investigating the feasibility of downstream value adding by matt fuming or smelting to produce tin metal.

A Queensland mineral sands mining company, Australian Titanium Minerals, has obtained the necessary approvals from the local council and relevant State Government bodies to mine sand in the Naracoopa area of King Island for the extraction of zircon, rutile and ilmenite.

Comalco (Bell Bay) Limited has signed a Memorandum of Agreement with the Government and the Hydro-Electric Commission. Included in the Agreement is a provision for the negotiation of a new power agreement for the supply of 256 MW of power to the year 2014. This represents an increase of 19 MW. Production of aluminium will be increased by 140 000 tonnes per annum.

Cement production by the Goliath Portland Cement Company Limited during the 1995/96 financial year approached one million tonnes. Almost 30% of the limestone quarried was sourced from a new quarry located to the north of the Railton plant. A 1000 tonnes per hour crusher is to be installed in this quarry, and will feed the plant via a trunk conveyor system. The project, expected to be commissioned in late 1997, will cost approximately $16 million.

A process plant to convert manganese mud into marketable manganese sulphate was commissioned at Risdon by Hydromet Operations — Tasmania in January 1996. The plant treats discarded material stockpiled by Pasminco Metals–EZ.

Impact Fertilisers, also located adjacent to Pasminco Metals–EZ, continued its expansion in regional Tasmania with the construction of a depot at Deloraine and blending plants at Devonport, Scottsdale, Burnie and Smithton.

Work commenced at Pasminco Metals–EZ on the conversion from jarosite to paragoethite production. This will eliminate the dumping of jarosite waste at sea off the coast of Tasmania, as paragoethite will be further processed on the Mainland.

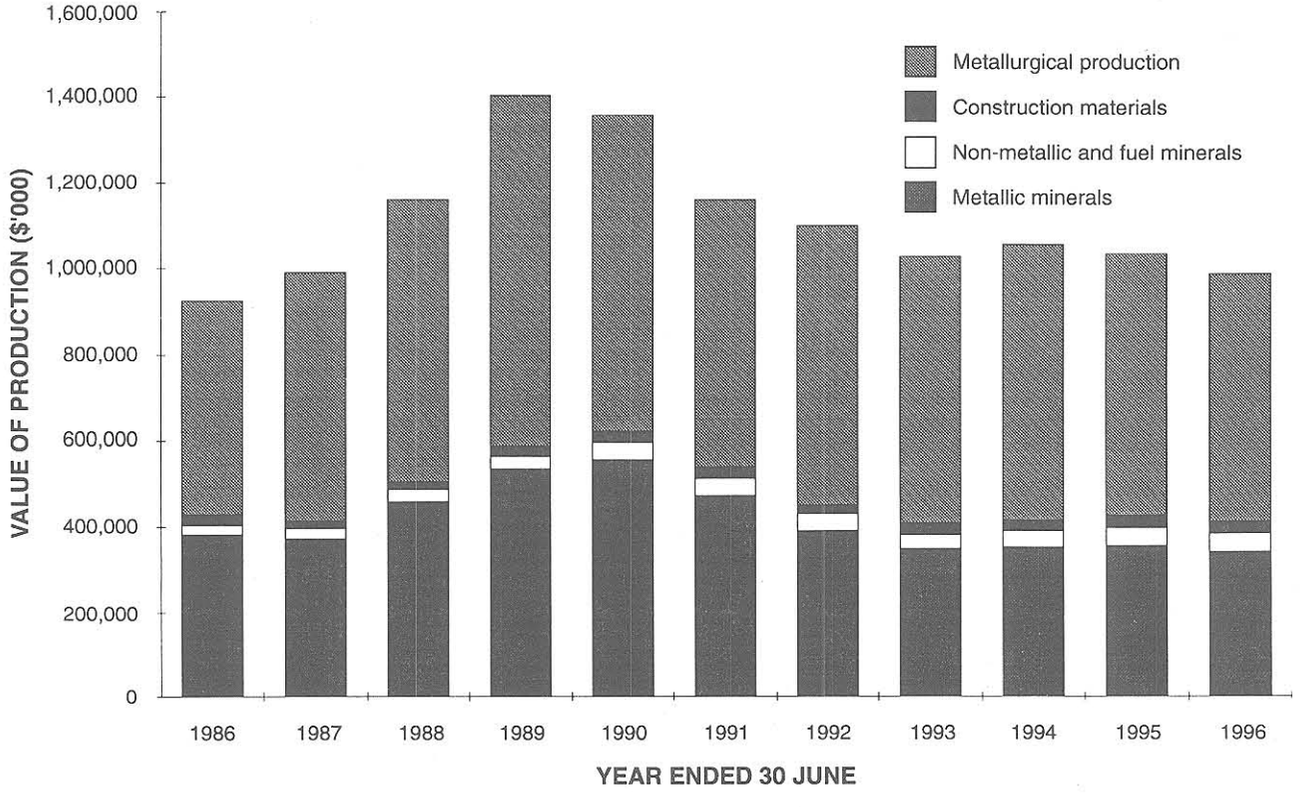
There is a strong possibility that production capacity will be increased by 70% at the TEMCO (Bell Bay) plant with the addition of a fifth furnace to produce high carbon ferromanganese and an increase in the capacity of an existing silicomanganese furnace. Studies into the feasibility of these projects are being carried out. Also under consideration is the construction of a facility for the conversion of high carbon ferromanganese to medium carbon manganese.

Tioxide Australia Pty Ltd ceased operations at its Heybridge plant in July 1996. The plant, commissioned in 1948, was too old and too small to be competitive in the national market. Decommissioning and rehabilitation are being undertaken in accordance with a plan approved by Mineral Resources Tasmania, the Department of Environment and Land Management, and the Burnie City Council.

Value and production of minerals 1995/96 and 1994/95

	1995/96		1994/95*		% Change
	Tonnes	A$'000	Tonnes	A$'000	
Gold	1.02	-	0.98	-	+0.1
Silver	144	-	143	-	+0.1
Zinc	198 376	-	177 263	-	+11.9
Copper	11 481	-	15 064	-	-23.8
Lead	38 565	-	60 418	-	-36.2
Tin	8 647	-	7 461	-	+15.9
Tungsten	77	-	39	-	+97.4
Iron ore pellets	1 681 332	-	1 483 830	-	+13.3
Others	114 512	-	136 603	-	-16.2
Total metallic minerals	-	338 056	-	355 211	-4.9
Non-metallics and fuel minerals	-	44 596	-	40 664	+9.7
Construction materials	-	28 933	-	28 617	+1.1
Metallurgical production from imported ores	-	572 811	-	609 664	-6.0
Value of mining and mineral processing sectors	-	**984 396**	-	**1 034 157**	-4.8

* Production figures for a number of commodities were incorrectly shown in the 1994/95 Annual Review. The corrected figures are shown in this table.



5 cm

As in previous years the structure of Tasmania Development and Resources (TDR) has continued to evolve. Following the February 1996 State Election, the Industry Safety and Mines Division of TDR was de-amalgamated. Mineral Resources Tasmania (MRT) became a stand-alone division of TDR, while the remainder of the old Industry Safety and Mines Division was formed into a new and separate Agency, the Workplace Standards Authority (WSA).

MRT still gives effect to Government policy in relation to minerals and petroleum resources and provides essential information for land management in Tasmania, with WSA undertaking all occupational health and safety matters, including the Mines Inspectorate. WSA have produced their own Annual Report which contains all data relating to health and safety in the mining industry.

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

Under the new funding structure operated by the Department of Treasury and Finance, Mineral Resources Tasmania is funded to undertake four outputs:

1. Tenement Management and Royalty Administration;
2. Metallic Mineral Resource Investigation and Promotion Programme;
3. Non-Metallic and Hydrocarbon Investigation and Promotion Programme;
4. Land Management, Environment and Rehabilitation Programme.

Details of all activities undertaken within each output are listed on the following pages.

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.

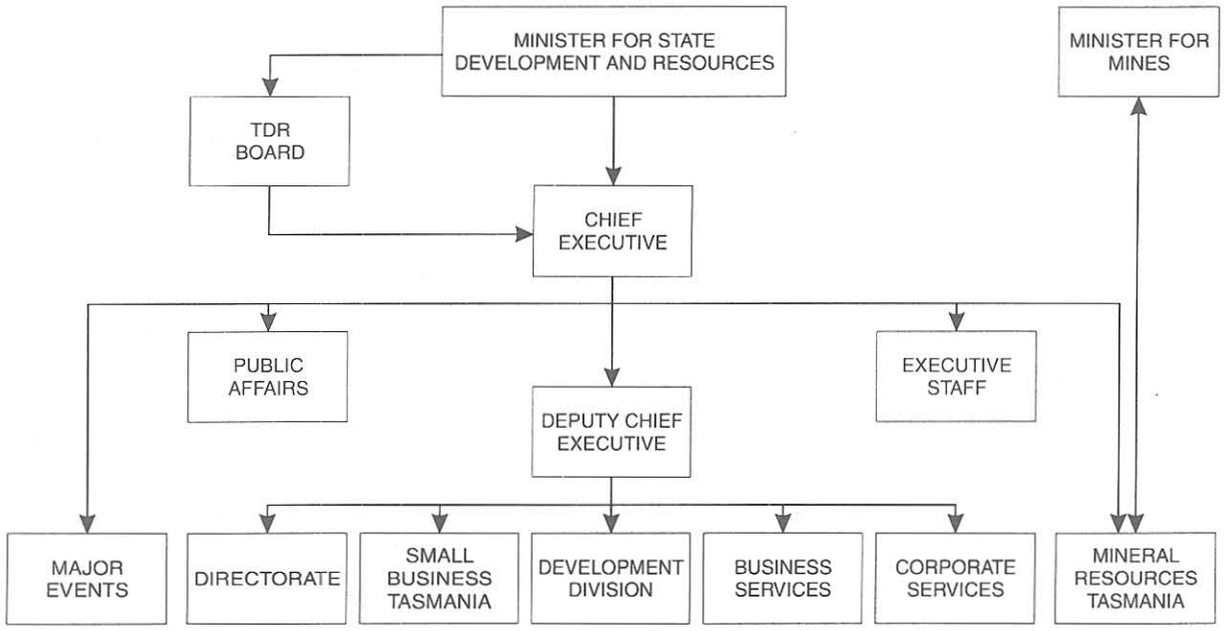
Under present Government legislation and policy, MRT is responsible for:

- 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 acceptance of mining as an essential industry.
- 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.
- Geological information is essential for municipal planning to ensure residential development does not sterilise mineral and stone resources.
- 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.

TASMANIA DEVELOPMENT AND RESOURCES



Management of Mineral Resources Tasmania

(as at 30 June 1996)

Director of Mines and State Chief Geologist —
Dr A. (Tony) V. Brown

Managing Geologist (Non-Metallics, Hydrocarbons and Tenements) —
Ms Carol A Bacon

Managing Geologist (Metallic Minerals) —
Dr Geoffrey R. Green

Chief Geologist (Engineering Geology and Groundwater) —
Mr W. Loyd Matthews

Manager, GIS and Geophysics —
Dr Robert G. Richardson

Manager, Data Management —
Mr Ken G. Bird

Manager, Finance and Administration —
Mr Matthew N. Fitzgerald

Supervising Geochemist —
Dr William E. Baker

Registrar of Mines —
Mr Dennis R. Burgess

Legislation

The *Mineral Resources Development Act 1995* (MRDA) received approval from both Houses of Parliament during the Autumn sitting. The MRDA replaced the *Mining Act 1929*, the *Aid to Mining Act 1927* and the *Mineral Resources Act 1951*. The MRDA came into effect on 1 July 1996.

For the holders of exploration licences (ELs), the major changes include:

- Licences will be issued for five years and will only be renewed under special circumstances. There will be no compulsory reduction during the term of the licence.
- Fourteen days notice is required prior to access to private land. The period may be shortened with agreement of the owner.
- Disputes relating to mining tenements will continue to be dealt with by a specialised mining court, the Mining Tribunal, which consists of a Magistrate appointed by the Chief Magistrate. The Director of Mines is obliged to attempt to resolve disputes before forwarding them on to the Mining Tribunal.
- No annual renewals of ELs after the next renewal anniversary. This will eliminate the time consuming task of submitting the licence document annually for Ministerial endorsement and the renewal fee of $300. However the requirements for full annual technical reporting, brief quarterly reports, annual rental and approval of work programmes will remain. The Minister retains the power to revoke an EL, or levy a fine against the bond in cases of unsatisfactory performance.
- All ELs will be extended for the remainder of their terms in 'once only' extensions at the next renewal date.
- Under the MRDA, areas under a former EL or retention licence will be exempted from the Act for a period of at least two months. Following representations from industry, there has been a significant change in the process to be followed compared with that under the former *Mining Act 1929*. Under the new legislation an application may not be lodged until the exempt period has finished. The day on which applications may first be received will be advertised in the *TasXplorer* flyers. Applications received on any day are considered simultaneous and are considered before any application received on a later day.
- Mineral Resources Tasmania will be responsible for placing advertisements for new licences in the appropriate local newspaper. The cost of advertising has been included in the revised application fee.
- Fees for exploration licence applications are to be supplied at the time of application and not prior to granting as previously. The application fee will be non-refundable under most circumstances.

Performance Measures

Mineral exploration expenditure in Tasmania continued to grow during 1995/96, not only in dollars expended but also in the percentage of total Australian expenditure.

The 1995/96 financial year was the best year for mineral exploration expenditure for five years. According to the Australian Bureau of Statistics (ABS), explorers spent $18.8 million during the year, a 26% increase over the preceeding financial year. For calendar year 1995, expenditure was $17.3 million, up from $12.2 million during 1994, a 42% increase. This places expenditure on mineral exploration at the highest rate for 12 years.

It is also significant that Tasmania's share of mineral exploration expenditure for commodities other than coal and oil has almost doubled from 0.98% in 1992 to 1.91% in 1995. This figure is below the 2.4% for 1989 but represents a proportion well in excess of Tasmania's 0.88% share of the area of Australia.

There were 141 active exploration licences during 1995/96 covering an area of 19 180 square kilometres, compared to 136 licences over 11 648 square kilometres during 1994/95, an increase of 65% in the area covered and 4% in the number of licences. Twenty-eight retention licences covered a further 313 square kilometres.

At 30 June 1996, mining leases covered 509 square kilometres or 0.7% of the State. This is in comparison with 699 square kilometres or 1% of the State (not 128 km^2 and 0.2% of the State as incorrectly reported in last years report). A significant proportion of the reduction was due to the expiration of the Savage River mine lease. It is confidently expected that this lease will be taken up by another company during 1996/97.

Thirty-one exploration tender areas were offered during 1995/96 and the resulting successful companies were issued with exploration licences. Companies submitted 146 exploration reports during 1995/96, bringing the total number of exploration reports now indexed on the TASXPLOR data base and incorporated into the division's collection to 4,613.

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

MRT PERFORMANCE INDICATORS — 1995/96

Area	Goal	1994/95	1995/96	% increase
Exploration Expenditure (financial year)	To increase to a minimum of $20 million per year	$14.9 million	$18.8 million	+26%
Exploration Expenditure (calendar year)	To increase to a minimum of $20 million per year	$12.2 million (1994)	$17.3 million (1995)	+42%
Area held under Exploration Licence	To obtain an increase	8170 km^2 (Note 1)	7359 km^2 (Note 1)	-10%
Number of Exploration Licences granted	To obtain an increase	136	141	+3:6%
Exploration drilling metres completed	To obtain an increase	30,302 (1994)	22,641 (1995)	-39% (Note 2)
Percentage of Strategic Prospectivity Zone (SPZ) area held under EL's	To obtain an increase	30.0%	30.7%	2.3%
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	2 maps completed	Total of 5 maps completed. Positive result
1:25 000 scale	418 maps needed to cover the State	10 maps completed	5 maps completed (Note 3)	25 maps completed. Positive result

Note 1: These figures are for metallic and non-metallic minerals only. A further 11 821 km^2 was held for onshore oil exploration in 1995/96 (3478 km^2 in 1994/95).

Note 2: Exploration drilling metreage is down, even though expenditure has increased by 42% due to a change of emphasis by exploration companies towards the capture of remote sensing and the inclusion in the 1994 drilling figure of extensive mine exploration drilling at Renison and Rosebery.

Note 3: Due to one FTE being absent on stress leave this area has suffered in output. However, pro rata output is on target.

Summary of Exploration Licences, 1995/96

Licence Type	Area (km^2)		% of State
	1995/96	1994/95	1995/96
Metallic Exploration and Retention Licences	7 113	8 153	10.4
Non-metallic Exploration and Retention Licences	559	485	0.8
Onshore petroleum Exploration Licences	11 821	3 478	17.3

Director of Mines also represents TDR on the Land Information Co-ordination Committee and on the Forest Policy Taskforce and State–Commonwealth Standing Committee for the Regional Forest Agreement.

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

Activities

During 1995/96 staff of the Geological Survey continued to work on two major projects as well as undertaking field programmes and associated backup activities.

TASGO — The Tasmanian National Geoscience Mapping Accord Project

This joint project between Mineral Resources Tasmania and the Australian Geological Survey Organisation (AGSO), under the National Geoscience Mapping Accord (NGMA), commenced in July 1994, with the aim of using high technology studies to determine the character of Tasmania's principal geological structures at depth and to test the various models existing for some key structures. The project has proceeded close to schedule and will terminate at the end of 1996, six months earlier than originally proposed. Invited studies by external groups will continue beyond this date.

Analysis of data collected during 1994/95 continued throughout 1995/96. Problems with contractors have resulted in an extension of the time expected to be taken for analysis of the off-shore data collected during the circumnavigation of Tasmania by AGSO's research vessel R/V *Rig Seismic* during March 1995.

The main aim of this part of the project was to map the crustal structure at depth around the periphery of Tasmania. Correlation with onshore geology, together with results of other components of the project such as aeromagnetics, onshore deep seismic reflection and refraction tomography, will lead to a much better understanding of the three dimensional structure and tectonic architecture of Tasmania as a whole, and its geological evolution through time.

Results of studies over the first year of the project were presented at a one-day workshop held in Hobart during November 1995. This workshop attracted attention and participation of people working in exploration companies, academic institutions, and State and Commonwealth Government agencies.

A number of products were released at this workshop, these include:

Stratotectonic Elements Map of Tasmania (1:500 000 scale)

This new map incorporates most of the data from the recently completed and revised 1:250 000 scale digital geological coverage of the State, but with the geology presented in a more synthesised format than in the standard 1:500 000 scale coverage. Also depicted are major faults and fold trends, major gravity and magnetic lineaments, and the interpreted two kilometre depth contour of Devonian granites. The intent is to highlight the main stratotectonic elements (at surface and concealed) of the State.

This map essentially replaces the 1976 *Structural Map of pre-Carboniferous Rocks of Tasmania* (now out-of-date and out-of-print).

Time-Space Diagram of Tasmanian geology

In constructing this wallchart-sized diagram, the State was divided into seven main regions or 'Elements' with differing geological histories, presented in columnar format based on the most recent geological timescale. Information shown includes major stratigraphic sequences and rock types, radiometric and biostratigraphic age control points, deformation events, metamorphic events, igneous intrusive events, and significant mineralisation events.

The diagram provides an excellent synoptic view of the relationships in time and space of the main stratigraphic units and tectonic events in Tasmania's complex geological history, and complements the stratotectonic elements map.

Explanatory Notes

A 62 page report titled *Explanatory Notes for the Time–Space Diagram and Tectonic Elements Map of Tasmania* (Tasmanian Geological Survey Record 1995/01) was also released. This report gives summary descriptions of the elements, units and events represented on the time-space diagram and stratotectonic elements map, and updates the many recent changes in ideas about, and knowledge of Tasmanian geology. A listing of significant recent references is included.

The progress of the other major activities during 1995/96 was:

- *Aeromagnetic data:* Data for Tasmania (including King Island) and surrounds were released; basement element interpretation was completed; interpretation of specific areas is partially complete.
- *Geological compilations:* Time-space diagram, stratotectonic element map and notes were released; review of Cambrian biostratigraphy was released; time-space diagram and text for general Tasmanian region in progress.
- *Seismic surveys:* Land seismic data and associated gravity data processed and released; marine seismic data being processed; digitising and

profile generation of seismic refraction data commenced.

- *King Island:* Fieldwork for the gravity infill and physical property study was completed.
- *U-Pb zircon dating:* Last three samples processed.
- *Isotope chemostratigraphy of Neoproterozoic carbonates:* 115 new C and O isotope analyses and 11 new Sr isotope analyses completed.
- *Acritarch search of Neoproterozoic and Cambrian shales:* Study completed, but no identifiable organic residues. Some thermal alteration index data obtained.
- *Rare earth finger-printing of mafic/ultramafic rocks:* Nd-Sm and Sr isotope analysis of 35 samples completed.
- *Source rock/maturation:* Pilot study completed.
- *Chemical analysis of shot-hole samples:* Major elements for all 530 samples completed. Trace elements in progress.
- *Boat Harbour Fault:* Pilot study of mesoscopic structures completed. Regional significance being assessed.
- *Pb isotope study in northeast Tasmania:* Intended to clarify the source of Au and the depth of fracturing.
- *Sampling of small islands, northwest Tasmania:* All samples collected.

Although many of the major activities are still in progress, preliminary results of partial compilations are available for all work completed to date.

Project TIGER

With the restructuring of MRT in 1993 one of the main changes in direction was a requirement by Government that the Geological Survey should move away from traditional printed reports and maps into digital data format and data bases with a print-on-request capacity.

To undertake this change, Project TIGER (Tasmanian Information on Geoscientific and Exploration Resources) was developed. The aim of the project is to provide a comprehensive set of integrated data systems to allow for the efficient and effective use of the Division's geoscientific and exploration information resources.

Phase one of the project involved the completion of the prototype, the Public Access Information System (PAIS), in April 1995. PAIS is a 'self-help' system which allows external clients access to information resources within MRT.

Phase 2 of TIGER also commenced during 1994/95 and will continue until the end of 1996/97. This three-year phase, employing temporary staff under an ATI-funded project, will enable all transferable geoscientific information from MRT's published and unpublished sources and open-file company reports to be placed into digital data bases. At the end of year two the project is on target.

During 1995/96 a draft Business Case for Phase 3 of TIGER was prepared. The third phase will develop the core of MRT's information management system and the interfaces needed for data custodians to maintain a quality data base. This means consolidating existing data into a single integrated data base and a spatial data management system.

The draft business case was based on the results of an Information Products Questionnaire and feedback from a cross-section of our client base. The questionnaire was aimed at finding what priorities clients placed on MRT information, and what media and mode of delivery they preferred. A break-down of the respondents is given below, according to client subgroups.

Mining and petroleum respondents rated open file reports, point data bases and geophysical data much higher than the Other Industry group. Conversely Other Industry rated engineering maps much higher than Mining and Petroleum, which considered them unimportant.

Mining and Petroleum showed a preference for paper products except for point databases and geophysical data. It is surprising that this group prefer digital point databases of structure and geochemistry and paper geological maps. An anomaly with this group is a strong preference for paper-based engineering geology maps. Other Industry has a uniform preference for information to be paper based.

Industry clients were satisfied with current MRT digital products. Point data bases were the lowest scoring dataset due to their complex data structure. The option to deliver data in 'flat' tables will be a component of Phase 2 development.

Responses to Information Products Questionnaire, Project TIGER

Stakeholder Group	*Responses*	*Comments*
Mining and petroleum industry	38	Mostly mining and consultants, only four energy companies replied
Other industry	17	Mostly local engineering and environmental consultants
State Government land management	5	DELM and PLUC
State Government resources	3	DPI, Forestry Tasmania and Works
Local Government	8	
Federal Government	4	AGSO, National Library, BRS
Research/education	3	Utas CODES, Zoology and CSIRO-Forestry

Posting out digital or paper media was preferred, followed by remote access to a MRT file archive, with use of the Public Access Inquiry System at MRT's Rosny Park office the least popular option. In general industry groups did not perceive the Internet as a viable option to access data but more as a mechanism to browse indexes or meta data.

The Digital Bookshelf

Mineral Resources Tasmania has been distributing 1:25 000 scale digital geological maps with associated structure, mineral deposit, stream-sediment geochemistry, whole-rock geochemistry and drill hole location information for two years and has put substantial resources into the verification and correction of these datasets.

Requests are now being received from explorers for digital datasets relating to particular exploration licences or company reports. MRT is currently unable to provide most of these data in digital format. With the assistance of explorers, MRT proposes setting up 'The Digital Bookshelf', which will contain exploration data exactly as supplied by companies, with no verification by MRT apart from checking to see that the data are in an acceptable format and are accompanied by an accurate description.

Copies of the data will be made and backed up regularly to ensure that the data are preserved. Open file data will be licensed in the normal manner to ensure that all copies of the data are attributable to the reference data set.

The mechanics of the operation of the Digital Bookshelf will be defined fully after feedback from relevant companies. It is envisaged that future reports will be submitted in both hard copy and digital form, with a requirement that data must be of good quality and be easily accessible. Datasets covering multiple tenements, for example aeromagnetic or digital terrain data, would be lodged in accordance with company policy for relinquishment of areas and also in their entirety. Similarly for tabular data, it may be easier for companies to provide all data to date on a tenement rather than just the data referenced within a particular report. At relinquishment complete datasets should be lodged.

1995/96 Field Projects

Several new field projects were undertaken over the 1995/96 summer, mainly in areas which have not previously received much attention. Most of the projects involved, as one of the major aims, the production of one or more digital geological maps at 1:25 000 scale.

Three field projects are being undertaken as part of a larger project looking at the mineral potential of Central and Southeast Tasmania. A fourth project is based in the far northwest, while a fifth project will allow for completion of mapping in the Loongana–Pencil Pine area.

Reconnaissance mapping of cover rocks on the Maydena, Skeleton, and Nevada Sheets

Traverses have been conducted along roads, tracks and major streams in the Snowy Range–Styx Range area to fill in the 'bones' of the Permian-Triassic-Jurassic sequences. Three map sheets will be produced, using mapping of the basement rocks which has already been completed to the west. This should indicate where the major structures are, and where the most shallow basement rocks and possible drilling targets are located.

Geological mapping of the Weld River–Huon River–Manuka Creek area

This project is concentrating on the pre-Permian rocks of the Weld River inlier and the Manuka Creek area west of Mt Weld. An Exempt Area has been declared over this sheet and adjacent sheets until the mapping programme is completed.

Cygnet Goldfield study

An Exempt Area has been declared over this goldfield, which was active around the turn of the century and yielded about 3000 ounces of gold. Some modern exploration was undertaken in the 1970s and 1980s and a small amount of drilling was done, but the work was terminated in 1988 without sufficient follow up. The gold is associated with Cretaceous syenite intrusions hosted within basal Permo-Carboniferous mudstone, sandstone and tillite, and appears to occur within brecciated zones, veins and contact zones.

The study will aim to determine the origin of the gold and associated sulphide mineralisation, the nature of the transport and concentrating processes, and the further potential of the field for exploration and development. The petrology and chemistry of the syenite rocks will also be studied, in part to determine if they have any potential for nepheline syenite glass production. Initial findings from the study should be available by mid to late-1996.

Arthur–Balfour mapping

Mapping has been undertaken in the Roger and Sumac sheets in the Arthur River area south of Smithton. This project will continue southwards in future years to cover the Balfour copper-tin mineral field and provide the basic geoscientific data to encourage exploration in this area. Rock sequences are predominantly of Proterozoic age, and include dolomitic and basaltic units.

Loongana area mapping

Mapping of the Loongana, Pencil Pine and Lea Sheets, which contain rocks within and adjacent to the Mt Read belt, was completed.

Map production and new products from MRT

1:250 000 scale digital geological map series

Production of the Southwest 1:250 000 scale sheet, the last in the series of four maps which cover the major part of the State, was completed during the year. The map covers most of the Mt Read belt and the tectonically complex areas of Lower Palaeozoic rocks in west and southwest Tasmania.

A fifth map will cover the far northwest of the State, King Island, and the small Bass Strait islands off northwest Tasmania. Completion of these maps gives a complete digital coverage of the State's geology, and will allow for the production of a composite State geological map.

1:25 000 scale digital geological map series

Another five map sheets in northeast Tasmania (Bell Bay, Beaconsfield, Lilydale, Lisle, Springfield) were completed during 1995/96, and twenty-five maps of this series are now complete and available, twenty from the northeast and five from the Mt Read belt. These will be followed by a series of five maps in the Trowutta area of northwest Tasmania (Mawbanna, Milabena, Folly, Tayatea, Holder), and another three maps from the Mt Read belt (Darwin, Lea, Pencil Pine).

Trowutta 1:50 000 scale geological map sheet

This will be the last paper-format geological map sheet to be produced, with production work being undertaken by the Department of Environment and Land Management. Production is expected to be completed early in the 1996/97 year.

New Tectonic Map of Tasmania

As part of the NGMA 'Tasgo' project, a new map of stratotectonic elements of Tasmania has been compiled. The map incorporates most of the data from the new 1:250 000 scale digital compilations, but in a simplified, easily readable form. In addition to the stratotectonic elements, major faults and fold trends, major magnetic and gravity lineaments, and the two kilometre granite depth contour are shown.

Lake River Explanatory Notes

The explanatory notes for the 1:50 000 scale geological map of the Lake River area was issued during the year. These notes cover the geology and petrology of the rocks in the quadrangle, and detail the groundwater and economic resources of the area.

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.

Under the *Tasmanian State Service (Restructuring) Order 1996*, Mineral Resources Tasmania and the Workplace Standards Authority (WSA) were created from the former Industry Safety and Mines (ISM) Division of TDR, effective from 1 July 1995. TDR retained responsibility for the administration and management of Mineral Resources Tasmania.

Of the total TDR Consolidated Fund Budget of $35.78 million, the Mineral Resources Outputs were allocated $4.01 million. Of this allocation, $2.93 million was allocated for operating expenses, $280,000 for project expenditure and $800,000 in head-office support.

In 1996/97 outputs funding will be increased by approximately $896,000 to $5.059 million. The increase in appropriation is due to the transfer of the MRT rental costs for the Rosny building from WSA and the allocation of $350,000 for the rehabilitation of abandoned mining lands. This $350,000 is to be funded from the 0.2% increase in mineral royalties effective from 1 July 1996. The operating budget of MRT has in fact declined in real terms due to Treasury not funding the cost of the Three Streams wage translation and the new vehicle hiring regime. MRT must fund these costs internally. The administrative order which split ISM also resulted in a loss of administrative funding from MRT to WSA.

Overview

Mining has been a cornerstone of Tasmania's economy for over 120 years. Over the last 10 to 15 years it has also been the only major primary industry to invest large amounts of capital in Tasmania, with the opening of the Que River, Hellyer and Henty mines, major redevelopment at the Renison, Rosebery and Beaconsfield mines, and the re-opening of the Mt Lyell mine. In addition, spending on exploration for new mineral deposits since 1984 has exceeded $125 million.

According to figures obtained in an April 1996 survey by the Tasmanian Minerals Council, mining and mineral processing in Tasmania in 1995 generated $1202 million of total sales with export sales being $671 million. This represents 40% of Tasmania's export income for that year.

In 1995 the mining and minerals industry directly employed 3654 people; spent $654.5 million on goods and services, of which $422 million was with or through Tasmania suppliers; and paid $18.8 million in State Government taxes and charges.

To ensure that the Tasmanian minerals industry thrives, exploration activity must continue so that new ore bodies may be found to become the mines of the future, to replace those that will be closing during the next decade.

- MRT provides the 'seed' data to attract the mineral and petroleum exploration industry to the State. In return, the exploration and mining industry contributed approximately $6 million in royalties and approximately $19 million in other State Government taxes and charges during 1995/96.
- MRT collates, upgrades and promotes the Government's geoscientific data bases and provides this information to a wide variety of stakeholder groups.
- MRT allocates and monitors work programmes and environmental factors relating to mining and exploration.

All of this means that with a workforce of 56.4 full-time-equivalent people (plus 7.6 FTE provided by Corporate Services of TDR), MRT must be effective and efficient and use computer systems wherever possible to enhance our everyday work, as well as our data compilation, maintenance and outputs.

Background of MRT

The Department of Mines was formed in 1882. Prior to this the regulation of the mining industry had been undertaken by a branch of the 'Lands and Works Department' (now the Department of Environment and Land Management).

In July 1989, after 107 years as a stand alone agency, the Department of Mines was amalgamated with the Rivers and Water Supply Commission to form the Department of Resources and Energy. The Hydro-Electric Commission was also to be involved with this super-agency, which was to give effect to Government policy in relation to mineral, water and energy resources.

The amalgamation was abandoned in February 1992 and the Department of Mines reconstituted following the election of the Groom Government. This lasted for one year, as in February 1993 the Department was amalgamated with the Tasmanian Development Authority (TDA) and the Industry Services Division of the Department of Employment, Industrial Relations and Training (DEIRT) to form the Department of State Development and Resources (DOSDAR), which later became known as Tasmanian Development and Resources (TDR). The former Department of Mines became known as Mineral Resources Tasmania (MRT).

Following a Government Programme Review Team report into the Department of Mines and the imperatives of the 1993/94 budget process, MRT was formed in March 1993. The Corporate Service Division was transferred to TDR Head Office and amalgamated with the Corporate Services Division of the old TDA, and the remaining staff were reduced from 88 to 64 FTEs for the 1993/94 financial year.

In December 1994 MRT was amalgamated with the Industry Safety Division to form a single division — Industry Safety and Mines (ISM), within TDR.

Following the March 1996 State election, ISM was divided up into the Workplace Standards Authority (WSA), a new stand alone Government Agency, and Mineral Resources Tasmania, which remained a Division within TDR.

Before the first amalgamation in 1989, the Department of Mines had a full time staff of 132. At the end of June 1996 the total was 56.6, with a further 7.6 FTE being provided by TDR's Corporate Services Division.

In 1989/90 the department's budget was $7.654 million. This has been progressively reduced to its present level of $5.059 million with the cuts occurring in three main actions:

1. As part of the budget process in 1990/91 an effective reduction of Geological Survey funding of $700,000 was required. It was planned to achieve this goal by an expenditure reduction of $400,000 and an increase in receipts from consultancy services of $300,000.

   The expenditure reduction was obtained by closing down the Metallurgical and Chemical Laboratory in Launceston, discontinuing all

metallurgical services to industry, and transferring those chemical services, needed to provide analytical services to MRT, to Hobart.

Earnings, excluding royalties, by MRT during 1989/90 were $160,000. The target for 1990/91 was set at $460,000. $379,000 was earned. During 1991/92 MRT was again set an income requirement of $460,000.

2. An integral part of the March 1993 reorganisation was the Division's participation in the 1993 Employment Rationalisation Programme. This process provided for the downsizing of the Division, by voluntary redundancies, from 88 employees in 1992/93 to 64 in 1993/94. The Geological Survey was reduced from 51 to 33 FTE and renamed the 'Resource Exploration and Development Branch'.

   As part of the restructuring process the Division's Drilling Section was abolished. The management structure was flattened, the vehicle fleet halved, and the Regional Mapping and Economic Geology branches were amalgamated. The Drafting and Cartographic Sections were amalgamated and renamed the Data Management Section, with half the original combined number of officers. These changes removed the capability for MRT to undertake external earnings except by publication and map sales, and some consulting activities undertaken with excess to internal requirement capacity in the Geochemical Laboratory.

3. During the 1993/94 financial year the entire Geological Survey field programme budget of $600,000 was applied to the NETGOLD Project. In the 1994/95 financial year this $600,000 was removed from MRT's budget by Treasury as a 'saving', leaving MRT with only the TDR's *Assistance to Industry* budget from which to fund new data gathering programmes.

The Role of the Geological Survey

Following the downsizing, and before the task of re-engineering, the role of a Geological Survey was examined. Geological knowledge is a fundamental requisite for understanding the environmental conditions on any part of the Earth with respect to determining the type and quality of development possible. Geological knowledge enables an appreciation of one area of the Earth's surface in comparison to other or adjacent areas, so that effective land management decisions can be made.

With a growing awareness of our dependence on the earth sciences for exploration, development and management of our mineral and energy resources, there are various levels of appreciation and understanding by the public, environmental groups and Government of the work of Geological Surveys and the role which earth scientists play in planning and developing land use options.

The Geological Survey provides a qualified and continued scientific organisation which can work objectively in the interests of its clients, the whole State, and society in general. The survey has the task of obtaining and evaluating geological and related scientific knowledge and the understanding required for defining mineral and petroleum resource potential and the restraints or limitations in the development of natural resources, including groundwater, land stability and waste management.

An objective and well qualified geological staff is required to provide knowledge about the terrain for formulating State policies, defining goals for development, and controls for environmental protection. They have an important contribution to make in evaluating the implications of development proposals as they affect the environment and the use or management of a natural resource heritage.

In Australia, the fundamental role of the State Geological Surveys is to provide a comprehensive inventory and understanding of the geoscientific framework of the State in order to study the environment; the appraisal of mineral and petroleum resources; in the development and applied research of the geosciences; and in establishing standards, controls and systems, and scientific support through consultation and collaboration in other scientific and engineering activities.

The past achievements of the Geological Survey are vitally important for the strategic development of a State, but the lack of support and interest by the public and Governments for the organisation has left much disappointment and frustration for the professional staff involved.

The role and contribution to be expected from the Geological Surveys needs to be constantly evaluated and adapted for a developing society. Geological Surveys are organisations and institutions employing geoscientists and technical specialists, whose purpose is to provide a basis of geological knowledge required for devising policies for attracting mineral, oil and gas exploration, for Government and industrial planning, environmental controls, and for information services, education and advising the public and other clients.

The first elementary stage of geological reconnaissance has been completed in Tasmania, but the systematic, detailed and specialist geoscientific study required for resource and environmental appraisal is a continuing process which needs to keep pace with changing technology and community expectations.

Because the majority of operating funds had been removed from MRT by June

1994, the Division has, since then, had to rely on funds from TDR's Assistance to Industry (ATI) budget to fund projects and programmes. This also includes the funding of the development of Project TIGER (Tasmanian Information on Geoscientific and Exploration Resources), MRT's 'engine room' for the future, as well as the funding of the Government's contribution towards the CODES Key Centre at the University of Tasmania, and for the combined Commonwealth/State National Geoscience Mapping Accord Project 'TASGO'.

The 1993 re-engineering of MRT

The voluntary redundancy scheme put in place in the middle part of 1993, during the downsizing of the then Mineral Resources Tasmania Division (MRT) of Tasmania Development and Resources (TDR), meant that positions were lost not only from a wide range of geoscientific specialities but also from technical and clerical areas, without any strategic approach as to which positions were being lost.

Following the downsizing and due to the above situation, it was necessary to undertake a total re-engineering of MRT in December 1994. The new structure was based on the 'output' requirements of the then Government, and the remaining staff were placed into this structure.

The new organisation had to be proactive in support and promotion of Tasmania as a State in which to explore, mine or process minerals, oil and gas, and to assist in effective land management as far as groundwater, construction materials and geohazards were concerned. The new organisation was not to have an applied research role and it was to become as computerised, as far as economically possible, in all data handling and process work. It was to cease publication of maps and reports in traditional print runs but be able to provide a hardcopy on demand service for geoscientific maps and reports.

The new organisation, with 40% less staff, was to achieve major productivity gains by using modern technology wherever possible. This was achieved with major changes in work practices and training in new skills for many of the remaining staff.

To try and reduce the pain and stress induced by this re-engineering, the process needed the whole-hearted support and commitment of senior management and the remaining staff. To undertake the changes and to enable staff re-training within the reduced budget, an implementation period of three years was accepted by management.

New structure — 1996

The first priority for the new direction was to reallocate surviving operational funds to obtain the computing power necessary to undertake the new tasks required. Project TIGER was developed to provide the vehicle for consolidating existing data. This project was designed to have a three year (1994/95 to 1996/97) implementation period, and after nearly two years, the project is on target.

The new direction given by Government in 1993 meant that most positions in the new structure of MRT, especially within the Geological Survey Branch, had to be multi-disciplinary. This necessitated the spreading of most people's time and experience over a number of output programmes.

During April 1996, MRT was again reconstituted as a stand-alone Division of TDR following a sixteen month (December 1994 to March 1996) amalgamation with the workplace safety inspectors as the Industry Safety and Mines Division (ISM) of TDR.

With the latest restructuring, MRT consists of 56.6 FTE with 7.6 FTE from TDR Head Office providing Human Resource, Accounting and Computer back-up services.

Of MRT's staff, 52 are full-time permanent positions, one is a Jobs Skills employee, and 3.6 are temporary positions. The temporary positions are being used to develop the internal data bases required for Project TIGER by converting existing hard copy data to a digital data base format.

MRT has four budget outputs:

1. Tenement Management and Royalty Administration;
2. Metallic Mineral Resource Investigation and Promotion Programme;
3. Non-Metallic and Hydrocarbon Investigation and Promotion Programme;
4. Land Management, Environmental and Rehabilitation Programme.

To demonstrate the multi-disciplinary approach taken during the re-engineering of MRT in 1995 and 1996, and especially in the Geological Survey Branch, of the 56.6 positions only ten are attached to one specific output programme; eight FTE's are spread across two programmes, 23.6 FTE's across three programmes and 15 FTE's across four programmes.

The spread of FTE's across programmes is shown below.

Output Programme	*FTE*	*Head Office FTE*
1	17.6	2.42
2	14.5	2.09
3	11.7	1.48
4	12.8	1.61
Total	56.6	7.60

The corporate structure of MRT is based on a combination of the requirement for outputs and the requirement for the grouping of specific work functions, especially in computing.

Another requirement of the 1993 change was that the level of geoscientific staff should not exceed that required to monitor, promote and upgrade the geoscientific data bases needed to increase exploration and mining activities, and to sustain land management activities associated

with hazard monitoring, environmental aspects of exploration and mining, and rehabilitation of abandoned mine sites.

The geoscientific staff has been reduced from 33 in the late 1980's to 17 permanent plus 3.6 temporary (May 1996), with technical staff having been reduced by 10 (from 16 to 6) over the same period. Staff employed on tenement and digital map production were reduced from 12 to 7 and publications staff from 2 to 1. In both the latter cases the reductions were obtained by employing the latest computer-based techniques, whereas in the former case the reductions were at the expense of cuts in programmes, especially field mapping.

The use of temporary staff to produce the proto-geoscientific data bases, containing the data extracted from hard copy reports sourced from both the old Department of Mines and industry data held within MRT's library, has been very successful. This has allowed an initial data base to be developed from hardcopy in-house data.

The need for three new permanent staff to undertake the on-going maintenance and continual upgrading of the data bases is an issue for the immediate future, as the recycling of old data into new formats to attract new exploration can only succeed in the short term.

Due to the budget task set for 1996/97, it is estimated that a further 5 to 6 permanent positions will have to be lost by the end of 1996.

Budget Outputs, 1996/97 — Output 1

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.
- Drafting lease conditions.
- Setting bonds.
- 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 1

- *Mineral Resources Development Act 1995* which will replace:
  - *Mining Act 1929*;
  - *Aid to Mining Act 1927*;
  - *Mining Act 1958*;
  - *Mining Amendment (Beaconsfield Gold Mine) Act 1988*;
  - *Mining Amendment Act 1989*;
  - *Mineral Resources Act 1951*;
- *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 1

- *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 1

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

Budget Outputs, 1996/97 — Output 2

Metallic Mineral Resource Investigation and Promotion Programme

Activities undertaken due to Legislation:

- Geoscientific database development, maintenance and marketing.
- Produce 1:25 000 scale GIS 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, 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 *Tasxplorer*.
- Assessment of ETA tenders.
- Assessments 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 the 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 report.
- 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 2:

- *Mineral Resources Development Act 1995* which will replace:
  - *Mining Act 1929*;
  - *Aid to Mining Act 1927*;
  - *Mining Act 1958*;
  - *Mining Amendment (Beaconsfield Gold Mine) Act 1988*;
  - *Mining Amendment Act 1989*;
  - *Mineral Resources Act 1951*.
- *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 2:

- *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 2:

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

Budget Outputs, 1996/97 — Output 3

Non Metallic and Hydrocarbon Investigation and Promotion Programme

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 *Tasxplorer*.
- Assessment of ETA tenders.
- Assessments 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 the 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.
- AGSO joint projects on biostratigraphy, aeromagnetics, deep seismic, etc.
- Publications with AGSO on magnetics and biostratigraphy in progress.
- Midlands mapping and drilling project.
- Construction materials: surveys, preparation of reports, maintaining databases.
- 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 3:

- *Mineral Resources Development Act 1995* which will replace:
  - *Mining Act 1929*;
  - *Aid to Mining Act 1927*;
  - *Mining Act 1958*;
  - *Mining Amendment (Beaconsfield Gold Mine) Act 1988*;
  - *Mining Amendment Act 1989*;
  - *Mineral Resources Act 1951*.
- *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 3:

- *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*.

Budget Outputs, 1996/97 — Output 3 *(continued)*

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.

Budget Outputs, 1996/97 — Output 4

Land Management, Environment and Rehabilitation Programme

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 programmes. 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 programmes by the Mineral Exploration Working Group.
- Monitoring environmental performance on leases:
  - Inspection of coal operations;
  - Liaise with Mines Inspectors in relation to mines and quarry inspections;
  - Blast vibration work.
- Assessing mine and quarry operations:
  - Drafting Environmental Management Plan requirements;
  - Reviewing Environmental Management Plans.
- Launceston Urban Engineering Geology Project map compilation and database report: compilation of map reports and database.
- Commenting on land use plans by other agencies, e.g. 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;
  - Monitoring 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;
  - Commenting on Council planning schemes;
  - Drafting 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.

Budget Outputs, 1996/97 — Output 4 *(continued)*

Legislation administered by Mineral Resources Tasmania associated with Output 4:

- *Mineral Resources Development Act 1995* which will replace:
  - *Mining Act 1929*;
  - *Aid to Mining Act 1927*;
  - *Mining Act 1958*;
  - *Mining Amendment (Beaconsfield Gold Mine) Act 1988*;
  - *Mining Amendment Act 1989*;
  - *Mineral Resources Act 1951*.
- *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 4:

- *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 4:

- 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:
  - *Mining Act 1929*;
  - *Aid to Mining Act 1927*;
  - *Mining Act 1958*;
  - *Mining Amendment (Beaconsfield Gold Mine) Act 1988*.
- *Mining Amendment Act 1989*.
- *Mineral Resources Act 1951*.
- *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*.

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

Following the retirement of Dr K. D. Corbett in December 1995, a re-organisation of positions resulted in the responsibility for managing exploration activities for metallic minerals throughout the State consolidated under the former Managing Geologist — Eastern and Western Regions. This position also involves responsibility for the management of the majority of regional geological mapping activities. The position of Managing Geologist — Central Region was abolished.

Exploration activity

The year saw a continuation of the strong growth in mineral exploration activity experienced in 1994/95, with annual mineral exploration expenditure reported by the Australian Bureau of Statistics (ABS) increasing by 26% to $18.8 million dollars. This is the highest level of investment in exploration in over a decade. In 1995/96 Tasmania's share of national mineral exploration expenditure was 1.96%, an increase of 17% on the previous year.

Although the number of exploration licences increased to 141, there was a decrease in the area held for metallic minerals. However expenditure per square kilometre increased by 38%, which may indicate a more focused approach to target selection. Exploration licences cover 11% of the State and 29% of Strategic Prospectivity Zones. A decrease in the amount of drilling (-36%) is ascribed to the conclusion of some major exploration projects, including some on mining leases.

The ABS figures record expenditure on the three classes of mineral tenement; exploration licences, retention licences and mining leases. Approximately 40% of expenditure is currently on mining leases on which tenure is secure. Much of the exploration success in recent years has resulted in focused programs on mining leases, with major new additions to resources at Mt Lyell, Renison, Rosebery and Savage River. Recent exploration by Copper Mines of Tasmania has demonstrated that more copper remains in the ground at Mt Lyell than has been extracted in over a century of mining.

However, in the longer term, the mining industry needs to be sustained by discoveries outside the established mines. In a study conducted under the Regional Forest Agreement process, Mineral Resources Tasmania analysed the pattern of expenditure on exploration and retention licences over the calendar years 1989 to 1995. These data demonstrated that uncertainty in relation to future land access is a major inhibitor of investment in mineral exploration. Expenditure on licences decreased from $10.45 million in 1989 to $5.11 million in 1991 following the Commission of Inquiry into the Lemonthyme and Southern Forests (Helsham Commission) and subsequent additions to the World Heritage Area and National Park system. Expenditure remained depressed until 1995, when there was a sharp increase to $10.15 million. Over a similar period, ABS figures show that Tasmania's share of Australian exploration expenditure dropped from 1.94% in 1989/90 to 1.65% the following year. The proportion then further declined and remained at between 1.2 and 1.3% for the next three financial years until 1994/95 when it increased to 1.65%, with a further increase to 1.94% in 1995/96. This indicates that the slump from 1991 to late 1994 was not merely due to external factors.

Consequently, the establishment of reserves resulting from the Regional Forest Agreement process that prohibit access to land for mineral exploration and mining in areas of significant mineral resource potential would also be expected to result in the withdrawal of exploration capital from the State. In a climate of increasing international competition for exploration investment, this could have long term deleterious consequences to the future of Tasmania's mining industry.

In 1995/96 base metal exploration accounted for approximately three-quarters of mineral exploration expenditure, with two-thirds of this being directed towards the Mt Read Volcanics belt in western Tasmania. Major western Tasmania exploration programmes are being conducted by RGC Exploration near Queenstown, CRA Exploration Pty Ltd near Zeehan, and Pasminco Exploration near Tullah, with a further 16 companies also exploring in the region. Intensive mineral exploration is also being conducted in the vicinity of the Mt Lyell, Henty, Rosebery and Hellyer mines.

Significant land acquisitions in western Tasmania include a highly prospective block south of the Henty Gold Project, which was awarded by tender to the Western Australian company Resolute Samantha Ltd. CRA Exploration Pty Ltd has continued to accumulate ground underlain by limestone in order to explore for base metals, Pasminco Exploration has consolidated and expanded its holdings west of Waratah, and a joint venture between Titan Resources NL and Goldstream Mining NL has taken up ground in the Arthur Strategic Prospectivity Zone targeting gold in ironstone. The same two companies have continued an active exploration program for gold and zinc in the Moina area.

The success of the NETGOLD project has been further underscored by the continued growth of exploration activity in the northeastern part of the State. Some $1.3 million was spent during calendar year 1995, the bulk of which was on gold exploration. Drilling programmes were carried out in the Golden Ridge, Mathinna, Branxholm, Alberton, Forester, Lefroy and Golconda areas. Some significant and encouraging drill intersections were achieved.

In addition to the gold exploration programmes, The Merrywood Coal Company has been active in tin resource definition in the Scamander area.

Data conversion

1:250 000 scale geology

The 1:250 000 scale digital geological map of southwest Tasmania was produced and marketed with a data package containing structure and mineral deposit locations. This map completed the first edition digital geological coverage of the geology of the State at this scale.

Eastern Tasmania

Five 1:25 000 scale digital geological maps (Bell Bay, Beaconsfield, Lilydale, Lisle and Springfield), covering old gold producing and adjoining areas, were captured together with data on mineral deposit locations, structure, and locations of stream-sediment and rock geochemical samples and drill holes.

Projects

Norwestmin

The geological mapping of the Roger and Sumac 1:25 000 scale sheets in far northwestern Tasmania was completed during the year, as was the infill mapping of the Loongana, Pencil Pine and Lea 1:25 000 scale sheets. By the end of the year, the compilation of mapping for GIS entry was well advanced. Past mapping of parts of the Cethana, Wilmot and Sheffield sheets was compiled in anticipation of a resumption of mapping in this area. This work will complement and integrate work carried out in western and adjacent areas of northwestern Tasmania under the Mt Read Volcanics Project and the regional mapping programme.

Southgold

Mapping of the 1:25 000 scale Maydena, Skeleton, Nevada and Weld sheets was completed by two geologists, with some areas being mapped to a planned reconnaissance standard. Compilation was well underway at the end of the year.

Studies of the geological association and formation of gold mineralisation in the Cygnet and Weld River areas commenced during the year and significant advances in the knowledge of these significant, but poorly understood, goldfields was made.

Promotion

Separate teams of three people, including representatives from Mineral Resources Tasmania and the Development Division of Tasmania Development and Resources, made promotional visits to mining and exploration companies in Melbourne, Sydney and Perth. The companies varied widely in size and industrial interests. Some broad conclusions could be drawn:

- gold remains the major exploration target, but there is a re-awakening of interest in some base metals;
- there was strong support for the concept of the State promoting its opportunities to business and of the range of information services provided, such as the quarterly *ProspecTas* newsletter and the *Tasxplorer* fax sheet, which informs the industry about new ground available for exploration licence applications;
- there was praise for the quality of the digital geological maps and other data provided by the Tasmanian Geological Survey;
- there was appreciation of the potential of the joint State–Commonwealth TASGO project to deliver an enhanced understanding of the geology of Tasmania, leading to the identification of new opportunities for mineral exploration; and
- there was support for innovations in legislation delivered in the *Mineral Resources Development Act 1995*.

There are still some pockets of concern regarding security of access to land for mineral exploration and development in parts of the State. Particular concern was expressed about the prospect of further reserved land being withdrawn from access to

mineral exploration and development as a result of the Regional Forest Agreement.

The promotional visits are of great value in providing a forum to address these concerns by face-to-face meetings with senior company management.

Promotional booths were prepared for the PACRIM '95 conference in Auckland in November and the Australian Geological Convention in Canberra in February.

Numerous contacts were made with visiting mining and exploration company personnel and mail and telephone queries were addressed.

Regional Forest Agreement

Proposals were prepared for projects related to the mineral exploration, mining and metallurgical industries to be carried out under the Comprehensive Regional Assessments leading to the Regional Forest Agreement. This has involved close liaison within the State Government, with industry groups and with Commonwealth agencies. The co-operation of all groups was essential to enable the highest standard of data provision to the process.

It is anticipated that contributing to these projects will be the major Geological Survey activity for the first quarter of 1996/97.

Core library

The section was involved with briefing a consultant architect on the design of an extension to MRT's core library at Mornington. A schematic design, sketch plan, cost estimate and engineering report were completed during the year. The need for the extension is now acute, with the existing storage capacity almost exhausted.

Other projects

Members of the section have continued to contribute to the ongoing joint Commonwealth–State TASGO project, which is part of the National Geoscience Mapping Accord. Geologists from the section presented papers at a symposium on the progress of the project held in Hobart in November and contributed to papers associated with the project. This included interpretation of new aeromagnetic data of northwest Tasmania and King Island acquired by the TASGO Project. The geological causes of various magnetic anomalies in the western Bass Strait islands were followed up in the field during the maiden cruise of the research vessel *ORV Alguita* in November.

A paper was prepared on the geology and mineralisation of Tasmania for a publication celebrating the Golden Jubilee of the Australian Geological Survey Organisation.

ANZMEC Native Title Working Group

The section represents Tasmania on the Australian and New Zealand Minerals and Energy Council Working Group on native title. Two meetings were attended during the year and contributions were made to out of session papers.

Staff training

All members of the section received training in the use of computer software packages and several successfully completed introductory management courses and upgrades of First Aid certificates.

Staff attached permanently to this section during the year comprised a Chief Geologist and a Senior Geologist. A seconded Project Geologist undertook work associated with an urban mapping project, and a graduate trainee worked in the section for a period of three months. Other staff of the Division have important input into the work of this section.

The more important activities undertaken during the year dealt with the collection and assembly of information on groundwater, groundwater monitoring, protection of groundwater quality, a detailed study of groundwater quality in the Devonport area, and advice on the siting of waste disposal facilities. A regional survey of landslide risk along the northwest coast continued and advice was given on land stability at numerous locations throughout the State. Compilation and map preparation for the Launceston Urban Mapping Project continued, and a study was made of gravel production and reserves at Calder.

Groundwater

Collection of groundwater data

Groundwater data collection continued, particularly from bores installed by private contract drillers. This information will be combined with data from holes drilled by MRT for the production of groundwater prospectivity maps and should result in a marked reduction of risk for property owners when considering whether to drill for groundwater. These maps will cover all of Tasmania.

It is necessary to ensure that groundwater quality is maintained as near as possible to its natural condition, and activities that could affect groundwater quality, such as waste disposal and land use, need careful consideration. Advice has been given on the suitability of a number of areas throughout the State where groundwater could be affected. This work remains a major activity for the section and is usually undertaken in association with Environment Tasmania, a division of the Department of Environment and Land Management.

Groundwater quality study, Devonport

The Australian Geological Survey Organisation sampled 57 bores in the Devonport–Port Sorell–Sassafras and Spreyton areas for detailed chemical and biological analyses. This joint project with MRT will provide significant information on the effects of land use on groundwater quality. There is extensive cash cropping, grazing and dairying on basalt soils in the Devonport–Port Sorell–Sassafras area, while orcharding is undertaken on soils derived from Permian mudstone in the Spreyton area. Fertiliser and agricultural chemicals (herbicides, fungicides and insecticides) are extensively used in these areas, and as the same activities take place on similar soils throughout the State, the results of these studies should be broadly applicable to other areas.

The results of the analyses are expected to be available during 1996/97. Preliminary results indicate that there is more widespread bacterial contamination of groundwater than expected.

Oatlands Quadrangle groundwater study

Compilation of this detailed study continued. When completed it will provide information on groundwater prospects in map form and a report will describe groundwater conditions in this dry part of the State.

Groundwater monitoring

Groundwater levels and quality are monitored in 35 bores located throughout the State. This programme provides essential background information on variations in the water table levels and quality. Continuous water level monitoring is being established and samples are collected twice yearly for chemical analysis.

Monitoring of groundwater use is currently being undertaken in the Devonport–Port Sorell–Sassafras area where there is extensive use of groundwater.

Other areas will also require monitoring in future to guard against over-use and ensure that the resource is sustainable in the long term.

Groundwater in coastal sand

Coastal sand deposits contain appreciable quantities of good quality groundwater in many areas, and isolated studies have been made of individual sand bodies. Small town supplies and supplies for recreation facilities (golf courses, camping areas etc.) are obtained from coastal sand areas. A compilation of information on groundwater in coastal sand areas is in progress.

Lake Dulverton

This lake had been dry for some years and the local Council requested advice on whether groundwater resources were available to fill the lake. After discussion it was agreed that there may be sufficient water to fill a small portion of the lake and a section of some 2 ha was separated from the remainder by an earth wall. The siting, supervision of drilling and pump testing of a bore resulted in the successful completion of the project.

Engineering Geology

Land Stability Mapping Project — Northwest Coast

Field work on this project continued in the Burnie area. Methods of presentation of the information in map form have

been examined for some of the completed areas. The information will be based on geology, slope of land, morphology of the land, and past and present landslide activity. The maps and data from this survey will be particularly valuable for planners, property developers, land owners and potential purchasers of property.

Launceston Urban Mapping Project

The compilation and map preparation for this project is nearing completion. It is planned to produce detailed geological maps, derived engineering geology maps, and land stability zonation maps at a scale of 1:10 000. The study covers an area of around 145 km^2 and the results will provide a significant update of the geology, soil properties and land stability zonation for the Launceston area over that currently available. The information from the study will provide valuable data to planners, developers, surveyors and geotechnical practitioners.

Advice on land stability

Field-based advice on stability risk has been given at numerous locations throughout the State. Although the number of such requests has decreased over that of recent years, it is important that some stability work continue to be undertaken so that a knowledge of field conditions and the range of developments that may affect stability is maintained.

The wetter period over the last year has seen an increase in the development of landslide movements and in a number of cases houses and other property are being threatened.

Surveys of particular landslides

The movement of particular landslides in northern Tasmania, in areas where property and access roads are being affected, is being monitored on a continuing basis by a contract surveyor. These surveys are undertaken two to three times per year to measure progress of the movements.

Groundwater levels continue to be monitored in the Rosetta landslide as rising water levels are an indication that movement may recommence.

Calder gravel reserves

There have been several proposals to subdivide areas within the Calder district for housing. Once development takes place any remaining gravel reserves would be largely sterilised. Consequently a study was made of the Calder gravel and sand deposits, involving field examination of the deposits, discussion with pit operators on uses, and examination of previous reports of investigations on the area.

Previous operations generally resulted in the utilisation of the easily accessible and better quality material, with the deeper and poorer quality material often being left. As reserves diminish those remaining deposits will become more valuable. A reliable estimate of reserves can only be obtained by drilling and test pitting. The study to date should be valuable for planners in assessing the most appropriate land use.

General

- More than 1000 office enquiries regarding foundation conditions, land stability and groundwater prospects were dealt with over the year;
- Technical advice was given to the Glenorchy Council on the landslip at Rosetta;
- MRT has been represented on the committee developing the Policy on Water Quality Management, with input mainly being on groundwater issues;
- Advice on groundwater issues was provided to the Lauderdale Tip Advisory Committee.

This section is run by a Managing Geologist who is responsible for the following programs:

- promotion of the non-metallic mineral resources of Tasmania;
- promotion and registration of petroleum exploration in Tasmania and off-shore waters administered by the State;
- administration of the *Mineral Resources Development Act 1995* and regulations, including the issuing of legal titles to mining tenements, collation and recording of statistics relating to mining production, and the demand and monitoring of the collection of fees and rentals;
- setting and monitoring of standards for the performance of exploration programmes by private companies on licences throughout the State and the technical reporting of exploration records and case histories;
- environmental control of exploration; and
- management of mining heritage and land-access issues.

Activities

Oil and gas exploration

Four offshore permits are held for oil and gas exploration in Tasmanian waters. Seismic surveys were conducted over three of these permits during the year.

One retention licence (over the Yolla gas field) is held by a consortium headed by Boral Energy Resources Limited (BERL). Efforts continued throughout the year to find a suitable market for the gas.

Coal industry

The State's two coal producers continued to supply sufficient coal for the domestic market. Exploration continued to delineate potential open-cut coal resources.

Environmental management

The appraisal and monitoring of mineral exploration programmes continued with diligence and attention to detail. The *Mineral Exploration Code of Practice* was reprinted. The Code is something of a landmark document and has been widely praised by both industry and government sources. Regular field visits were made to ensure company operations were being conducted in an environmentally responsible manner.

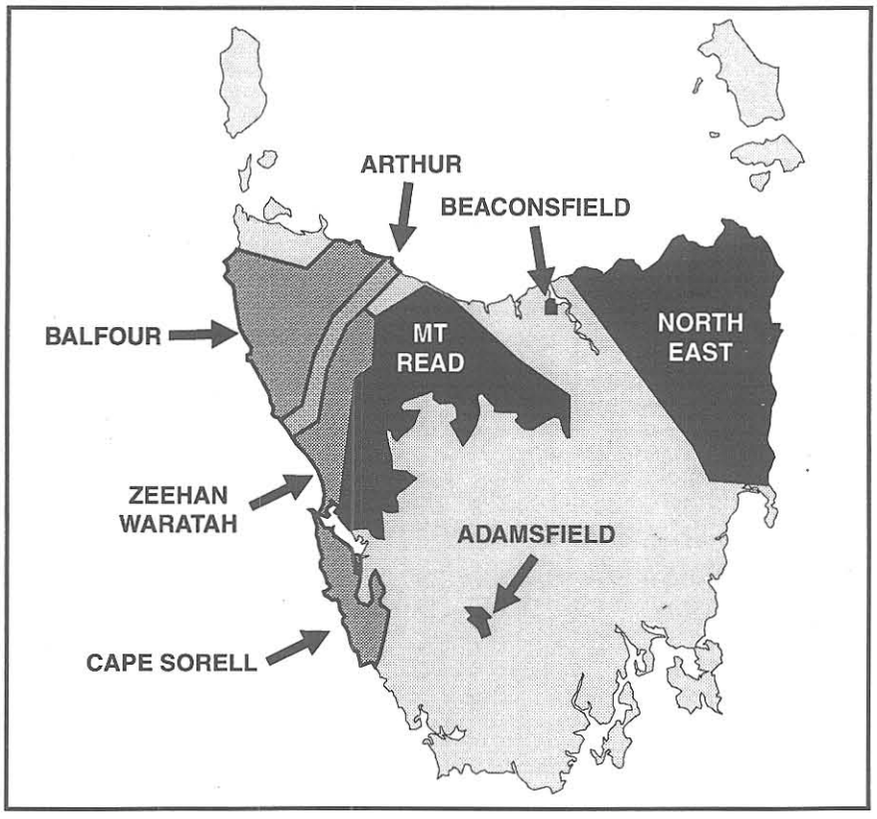
An extensive rehabilitation project at the former Rossarden and Storys Creek mines continued into its third year. Vegetation trials were established prior to the implementation of larger scale revegetation works.

Plans were advanced for the establishment of a Trust Fund for the remediation of abandoned mining lands. The funds for such work are anticipated to be generated by an increase in mining royalties, yet to be implemented. A committee, consisting of representatives from government agencies and industry bodies, agreed on a programme of works which could be funded in due course.

Strategic Prospectivity Zones

Strategic Prospectivity Zones (SPZ) cover 25 200 km^2 or 37% of the State. The areas in each SPZ occupied by mining tenements at the end of June are shown below.

SPZ	Area (km^2)	% Occupied Metallics	Area (km^2)	% Occupied Non-Metallics
Adamsfield	0.0	0.0	0.0	0.0
Arthur	591.1	53.3	1.6	0.1
Balfour	341.5	8.7	3.4	0.1
Beaconsfield	18.9	99.6	4.0	21.0
Cape Sorell	664.5	48.1	0.0	0.0
Mount Read	2540.9	35.4	0.0	0.0
North East	1895.5	19.5	268.0	2.9
Zeehan/Waratah	686.2	37.4	24.0	1.3



5 cm

Registry Section

The Registry Section maintains a number of registers and data bases, and provides advice to MRT officers, 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 the issue of tenement documentation continues to provide the majority of work for the section's officers.

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

Thirty-one areas were offered to potential explorers by way of the *Tasxplorer* 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) received approval from both Houses of Parliament during the Autumn sitting. The MRDA replaced the *Mining Act 1929*, the *Aid To Mining Act 1927*, and the *Mineral Resources Act 1951*. The MRDA came into effect on 1 July 1996.

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 fulfill the needs of industry and the community.

Lease and Licence Applications

Licences applied for during 1995/96

Product	*Number*	*Area (ha)*
All minerals	16	1161
Coal	1	10
Gold	1	418
Gravel	6	31
Gravel and clay	1	29
Lime sand	2	2
Limestone	1	56
Sand	5	235
Sandstone	1	1
Silica	1	12
Silica, sand and stone	2	4
Stone	23	267
Stone and gravel	1	23
Total	61	2249

Licences granted during 1995/96

Product	*Number*	*Area (ha)*
All minerals	4	4684
All minerals and stone	1	80
Easements	3	134
Gold	3	310
Gravel	8	77
Gravel and clay	1	29
Lime sand	3	5
Sand	4	62
Sand and gravel	1	88
Sandstone	1	1
Stone	20	372
Total	49	5842

Total number of all types of prospecting rights held as at 30 June 1996

Mining Tenement	*Number*	*Area*
Exploration Licences —		
All minerals	130	7 060 km^2
Non metallic	7	299 km^2
Oil	4	11 821 km^2
Retention Licences —		
All minerals	13	53 km^2
Non metallic	15	260 km^2
Prospectors Licences	13	304 ha
Miners Rights	2	5 ha
Permits to explore for Petroleum under *Petroleum (Submerged Lands) Act 1967*	4	296 Blocks
Retention Licence under *Petroleum (Submerged Lands) Act 1967*	1	9 Blocks

Total number of leases and licences in force at 30 June 1996

Principal product	*Number*	*Area (ha)*
All minerals	48	20 428
All minerals and stone	2	130
Clay	6	102
Coal	14	6 610
Copper	2	8
Dolerite	1	2
Dolomite	4	141
Easements	60	1 345
Gold	25	1 679
Granite	6	59
Gravel	145	3 396
Gravel and clay	1	29
Kaolin	2	373
Lime sand	3	4
Limestone	11	1 266
Magnesite, silica and talc	1	29
Peat	3	372
Quartzite	1	219
Sand	56	1 922
Sand and gravel	28	3 040
Sand and stone	7	154
Sandstone	5	50
Shale	4	39
Silica	14	1 112
Silver and lead	1	8
Slate	5	186
Specimens	2	8
Stone	259	5 940
Stone and gravel	8	519
Tin	20	1 774
Total	744	50 9447

The MRDA simplified the number of tenements to three basic tenements allowing for exploration, resource protection and mining.

Several rights under the previous legislation, dating from the gold booms of the 1850s, ceased to exist. However the small prospector and miner is still catered for under the MRDA but in a manner that allows for closer control and a more responsible level of activities.

With the impending introduction of the MRDA the opportunity was taken to revise forms, brochures and procedures to provide a more efficient and effective service 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. Two cases were referred to the Warden's Court during the year. The first was withdrawn before the hearing. The second matter involved an application for forfeiture of a lease. The application was unsuccessful.

Under the MRDA there will be a Mining Tribunal consisting of one magistrate who will have coverage of the whole State. The jurisdiction of the Warden's Court has been widened to include appeal against some ministerial decisions.

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.
- production of maps for the urban mapping project in the Tamar area;
- work under the National Geoscience Mapping Accord TASGO project;
- precise levelling of aeromagnetic data sets and production of composite images;
- completion of a geophysical interpretation of the Oatlands area.

Data capture

The emphasis has been on entering historical open-file geochemical data and drill-hole locations into digital databases. To date 33,336 stream-sediment geochemistry sample sites have been entered from open-file company reports for all of eastern Tasmania, the far northwest region, and a strip covering the highly prospective Mt Read Volcanics extending from the Black Bluff area south to Mt Darwin.

All the obvious whole-rock geochemistry analyses from open-file company reports have been entered. Additional analyses from other sources have been entered for published 1:25 000 scale geological map sheets. The whole-rock geochemistry and geochronology data set now comprises 6715 sample sites.

Digital geochemical and drilling data are being progressively released at the same time as the corresponding 1:25 000 scale geological map sheets.

Building of a spatial data base of exploration activity commenced in the latter part of the year. This data base contains attributes relating to the types and general specifications of the activities undertaken, as well as the area of the activity.

Project TIGER

Development of the Tasmanian Information on Geoscience and Exploration Resources (TIGER) business case continued with assistance from the Corporate Information Projects Unit of the Department of Premier and Cabinet. A draft business case document has been prepared and a questionnaire circulated to external stakeholders in the project. The questionnaire has provided feedback on the information needs of external stakeholders and the results are being used to focus the outputs of the project.

Urban mapping

Production continued on a suite of digital engineering geology maps for the Launceston area, in co-operation with the Launceston City Council, the West Tamar Municipality and the Meander Valley Municipality. Preliminary data have been released to the Launceston City Council for inclusion in the council's planning process.

TASGO Project

This project, which is a joint undertaking with the Australian Geological Survey Organisation (AGSO), was planned to determine the character of Tasmania's principal geological structure. Releases to date include a magnetic pixel map of Tasmania and surrounding waters (available from AGSO), a major basement elements map produced after a multi-discipline interpretation of the magnetic data, and seismic reflection data from five on-shore traverses throughout the State. Final versions of the off-shore seismic reflection data recorded close to the coast around Tasmania have not yet been received from the contractor. The first formal TASGO presentation was in November 1995.

Gravity–magnetics

Apart from a small gravity survey to assist an exploration company, the section has not acquired any new gravity data. Several new data sets have been received from staff and students of the Geology Department, University of Tasmania.

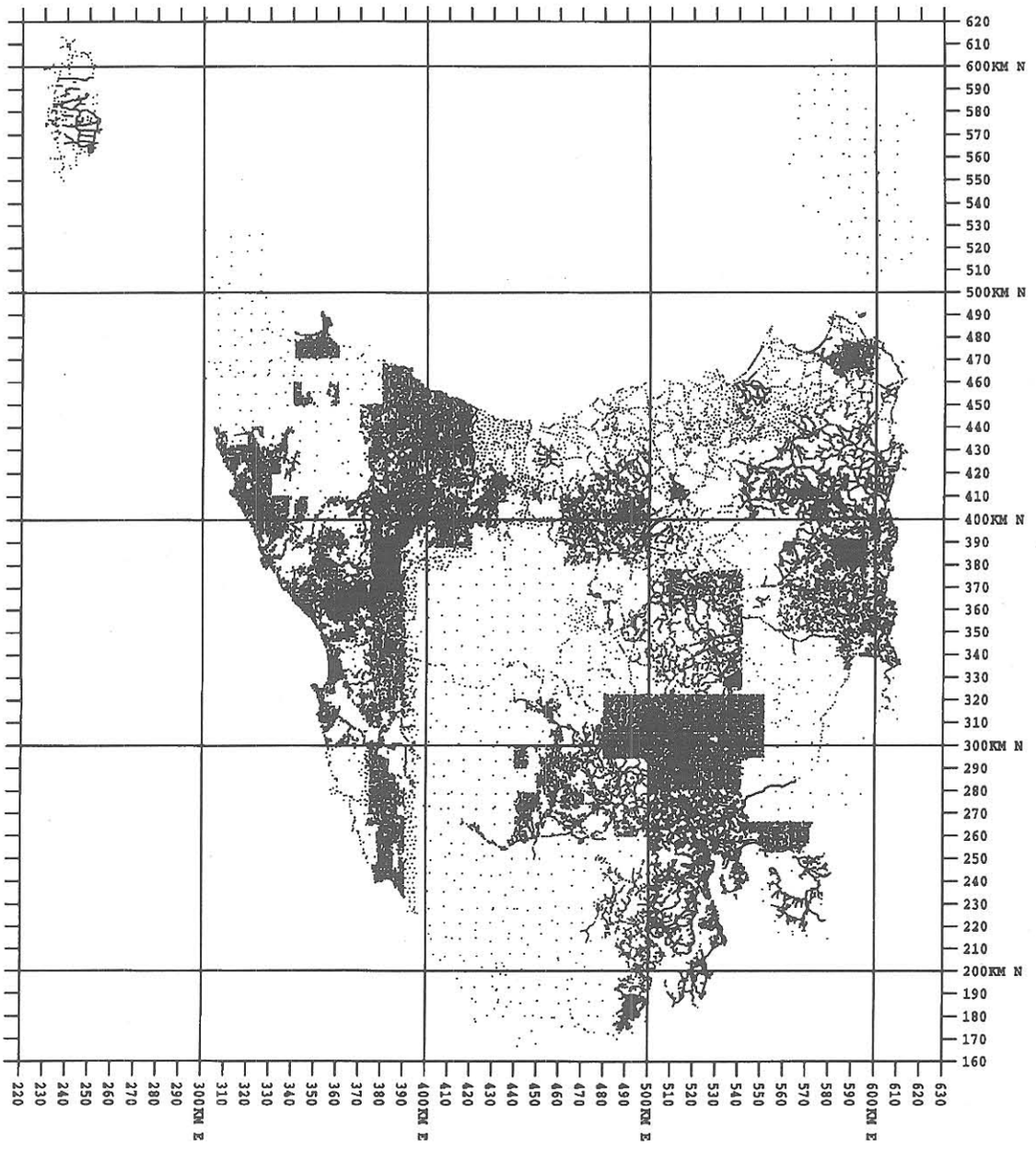
A high resolution fixed-wing aeromagnetic and radiometric survey of the Arthur River–Pieman River area was completed in April 1996 with funding from the Commonwealth Department of Primary Industries and Energy. The new data are of very high quality and provide a detailed insight into the geological structure of the area. Copies of the data, in digital format, will be available from AGSO.

The level of data lodgements and requests by exploration companies reflects the active state of exploration in Tasmania. Extensive high resolution helicopter surveys, which produce very large data volumes, are now being flown as a routine part of exploration programmes and merged with pre-existing data sets obtained from Mineral Resources Tasmania. To improve our service to clients, we are applying an improved micro-levelling technique, developed in co-operation with Exploration Computer Services, to ensure data sets are of the best possible quality. A set of index maps, presently on paper but ultimately in digital format, are being produced.

Magnetic maps of the State at scales of 1:500 000 and 1:250 000 have been produced and will be revised as levelled data sets are incorporated. Small amounts of specialist processing were undertaken to assist exploration companies.

An interpretation of the gravity and aeromagnetic data from the Oatlands area shows that the Permo-Triassic and Jurassic cover rocks in the area are

DISTRIBUTION OF TASMANIAN GRAVITY STATIONS AS AT 30 JUNE 1996



relatively thin and are underlain by rocks having the physical properties of Cambrian and Precambrian materials. The detail of the interpretation is limited by the quality of the data.

Computing

The facilities available have expanded over the past year to accommodate the escalating demands being made. To assist with meeting client requirements, a second large-format plotter has been purchased and additional types of removable digital media are now installed. The volume of data required to be held on-line has doubled in the past two years and is expected to do so again within the next 18 months.

A training course was held to introduce the MRT geoscientific staff to the use of, and applications for, ERMapper image processing software. Following this course there was a strong demand for the production of Landsat Thematic Mapper coverage of areas scheduled for geological compilation.

General

Other significant tasks undertaken include:

- support for CODES and Geology Department, University of Tasmania students and short courses;
- input on planning issues;
- supervision, indexing and distribution of TASXPLOR;
- preparation of display and promotional material;
- marine seismic survey of the mouth of the North Esk River.

5 cm

Chemical Laboratory

The chemical laboratory has been fully extended during the year, meeting the requirements of both internal and external clients. Chemical analyses for external Government and private clients accounted for about 25% of the laboratory activities.

During the year new DOS-based software was installed to control the x-ray fluorescence spectrometer and a Philips sample changer was acquired to enable continuous operation. A modem link was provided to the operator's home to allow remote monitoring of the equipment overnight and during weekends.

Analysis of the regional set of water samples from southwest and western Tasmania has not been possible due to lack of equipment capable of meeting the detection limits required. The samples will remain in storage until suitable equipment becomes available in one of the Government laboratories.

A total of 1710 samples were processed during the year requiring 10,160 individual determinations. The samples comprised 1236 water, 144 rock and 330 minerals and products. This sample processing has achieved a 14% increase in productivity over that for 1994/95.

Petrology

A total of 818 non-Geological Survey samples were received for investigation, mostly by x-ray diffraction. These samples include 394 for CODES (under an in-kind agreement), 69 from the Workplace Standards Authority, and 355 samples for paying customers. This work came from a wide range of external sources, including the HEC, Transport & Works and various other 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 included geological materials (clays, mineral concentrates, rocks, soils, sands, and ore samples) and anthropogenic materials (asbestos, industrial materials, dusts, etc.). The identification of quartz-bearing dusts, asbestos, and other environmental hazards is still very important, with 261 samples being described and/or identified or tested. Mines inspection work completed included analyses of dust from APPM, Cornwall Coal and Amcor.

Departmental studies included wollastonite samples from Hampshire, rocks from various goldfields around Tasmania (particularly Cygnet and Glovers Bluff), possible petroleum source rocks, and drill-core samples from the Shittim 1 diamond-drill hole on Bruny Island.

Considerable petrological work (89 samples) was undertaken as a part of the Tasmanian alkali-aggregate reactivity research project (TAARRP) in conjunction with the HEC, DRT, 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.

Gold

Investigations and promotional activities on gold deposits in various parts of Tasmania continue. Samples were studied from Alberton and Corinna and, under contract, from Lefroy and Golconda. A report was produced on drilling in the Lisle goldfield. Investigations were also conducted into gold prospects at Glovers Bluff, Cygnet and Kettering in the southeast of the State. These will continue into the next financial year as part of the Central Tasmania project. An interim report on the petrology of samples from the Forster Prospect at Glovers Bluff was prepared. Contributions were made to an AGSO volume on the metallogeny of Australia.

A talk on the mineralogy of Mt Lyell, with particular reference to departmental studies of the gold mineralogy, was presented at the National Mineralogical Symposium, held in Sydney in June.

Databases

The MIRLOCH database of mineral deposits in Tasmania now has approximately 3600 entries, covering coal, metallic and industrial minerals. It is being steadily updated and most of the State is now well covered.

A Tasmanian minerals database is being set up on Access and the TASROCK database of rock samples is being maintained.

Miscellaneous

Other resource investigations included production of a report on corundum and sapphires in Tasmania, and on a petroleum occurrence at Lonnavale.

Curatorial work has included the updating of databases, preparation of displays and posters, and supervision of the rock store. The fossicking area report was updated.

Petrology Laboratories

The lapidary laboratories prepared 1206 standard thin sections, 246 polished thin sections, 50 large sections and 14 other types, making a total throughput of 1516 samples. Most of these were done on a part-time basis by a field assistant.

The technical officer for petrological services processed 1066 samples by x-ray diffraction, including 173 quantitative dust analyses and 111 illite crystallinity analyses. He also conducted five soil tests and 61 optical asbestos identifications, a total of 1132 samples being processed. Some time was spent operating the XRF.

The lapidary and petrology laboratories provided a total of $82,892 worth of analyses and services to both Government and external clients.

Data Management Group

The Data Management Group 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 Division's Geographical Information System (GIS) continues to be developed, maintained and used to meet the requirements of our clients, while the Computer-Aided Drafting system (CAD) continues to be used as a support tool for many projects.

The capture of geological data continued during 1995/96 resulting in:

- the completion of the 1:250 000 scale digital geology of southwest Tasmania project. As a result there is now a complete 1:250 000 scale digital geology data set for all of Tasmania;
- the capture and output of five digital geological maps (Bell Bay, Beaconsfield, Lilydale, Lisle and Springfield) at a scale of 1:25 000 in northeast Tasmania.
- 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.

Capture of data commenced for three 1:25 000 scale digital geological maps (Loongana, Lea and Pencil Pine) in the Mt Read Volcanics region.

As part of the joint Commonwealth/State NGMA TASGO Project, the GIS was used to produce the 1:500 000 scale *Stratotectonics Elements Map of Tasmania*, with the Computer-Aided Drafting system being used to produce a time-space diagram for Tasmania.

Output maps of digital geological data were plotted on the Agency's inkjet plotters as required.

Seventy-seven data sets of geological or tenement data were produced for clients.

During 1995/96 production of the Trowutta 1:50 000 geological map was completed by the Land Information Bureau of the Department of Environment and Land Management.

Value of the Mining Industry

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

MRT collects royalties and rents and fees from mineral lands, which are forwarded to Treasury. In 1995/96, revenue amounted to $7.13 million compared to $9.5 million in 1994/95. The decrease in revenue of $2.37 million was due to the temporary closure of the Mt Lyell copper mine. The revenue collected was $1.18 million above budget, mainly as a result of the sale of the Savage River Mines pellet stockpile.

Revenue for the 1996/97 year is estimated at $7.13 million, the surplus of revenue over direct expenditure is therefore $2.59 million.

Royalty administration

The 1995/96 budget estimate for royalties was based on revenue received in 1994/95, with adjustments made for changes in production levels and companies entering or leaving the industry.

Audit

The Mines Inspectorate continues to provide significant assistance in the validation of production and royalty returns. The ongoing interrogation of the mining lease database highlights areas for further investigation.

The royalty administration program was audited by KPMG during 1995/96, with a favourable report on practices and procedures being provided to the Director of Mines.

Policy review

A review of royalties on Tasmanian minerals and construction materials was completed and approved by the Government. However part of the new regulations were rejected by the Upper House.

Under the new regulations, specific rate royalties payable on non-metallic minerals and construction materials have been increased by 20%.

For metallic minerals the minimum amount of royalty payable in 1996/97 will be 1.2% of the net sales value of the mineral. This figure would have increased by 0.2% each subsequent year until the year 2000/01, when the minimum amount of royalty payable would have increased to 2% of net sales value. These further increments were rejected by the Upper House until further negotiations are held with the Tasmanian mining industry.

Other changes for metallic minerals royalties include a 5% cap on the total amount of royalty to be paid in any one year. The automatic entitlement to a reduction in the amount of royalty payable for the production of a metal has been removed, and the entitlement to a rebate against profits for exploration expenditure has also been removed.

The additional amount of royalty to be collected by the 20% increase is estimated at $350,000. This additional revenue is to be directed to the rehabilitation of degraded mining sites.

Metal Prices and Future Trends

Prices for the majority of minerals drifted downwards over the year to June 1996, reflecting weaker than anticipated demand growth associated with the failure of some important world economies to grow at the predicted rates. Changes in average monthly prices between December 1995 and August 1996 ranged from no change for gold to falls of around 15% for nickel and more than 30% for copper.

Significantly improved average prices for most metals and mineral products are anticipated in 1997. Strengthening world growth from the last quarter of 1996 onwards, and limited prospects for substantial increments to production capacity in many metal and mineral industries, will be the main factors driving this outcome.

Factors affecting price movements

The global economy

There were substantial differences in economic performance in the world's major economies in 1995/96. There were signs of stronger growth in the US economy and evidence that Japan is beginning to emerge from its deep and prolonged recession. There was a slowdown in growth in the East Asian countries, albeit from high levels. Growth in the European Union countries, particularly Germany, continued to be sluggish.

The outlook for 1996/97 is considerably more promising. While projections vary, higher

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

Projected International Growth Forecasts

	Japan		*USA*		*East Asia*	
	1996	*1997*	*1996*	*1997*	*1996*	*1997*
OECD	2.2	2.4	2.3	2.0	6.4	6.6
ABARE	2.4	2.7	2.0	2.2	7.0	6.8
Westpac	2.0	2.5	2.0	2.5	7.5	7.5

Source: Tasmania: Economic Insights and Outlook, Department of Treasury and Finance

average growth rates are forecast for 1996/97 for most of Tasmania's major trading partners including Japan, Tasmania's most important export market. Increasing investment, higher corporate profits, record low interest rates and a devaluation of the Yen were the main forces producing an improved Japanese performance in 1995/96.

The projected international growth forecasts from various sources are shown above.

Stock levels

With moderate increases in demand relative to production growth, Australian stocks in most metals and minerals have remained steady or increased slightly through the 12 months to June 1996. Lead stock movements have been the most notable exception to this trend, dropping to historically low levels at the beginning of 1996.

Exchange rates

The Australian dollar recovered during 1995/96 from depressed levels in the first half of 1995. From its low point of US 71 cents at the start of the financial year, the dollar increased by 9% against the US dollar, to roughly US 79 cents by the end of 1995/96.

Rising international commodity prices, increasingly optimistic world growth projections and positive differentials between Australian and overseas interest rates were the main factors driving the dollar's appreciation. Strong demand for Australian bonds by the Japanese was particularly important in underpinning the Australian dollar for much of the year.

Reserve Bank of Australia projections for 1997 suggest that the dollar will remain strong in the coming financial year and will probably strengthen to US 80 cents or above if world economic growth rates improve, as most commentators believe they will. This will work against other positive influences on export value — such as rising commodity prices and a strengthening Japanese economy — and act to reduce mining and mineral product exports from Tasmania and Australia as a whole.

Individual metal prices

Copper

Prices fell substantially in 1995/96 and showed marked volatility throughout the year. Uncertainty created by the trading difficulty announcements made by the Japanese company Sumitomo in June 1995, and increasing global stock levels, were the main factors influencing these outcomes.

Expectations for 1996/97 are for further price falls and continuing volatility in the market. Production increases over the next 18 months, including some major expansions of capacity in Chile, are predicted to outstrip demand growth and exert a negative influence on world prices.

Tin

After fluctuating throughout 1995/96, tin prices finished the year at levels significantly below the June 1995 price. Soft demand in the developed nations, particularly in the first half of 1996, was one of the main factors that shaped this result.

With strengthened demand and diminishing stock levels anticipated, prices should move upward over 1996/97. Longer term tin prices will depend greatly on the competitiveness of tin as a manufacturing input against its major substitute aluminium.

Aluminium

The world aluminium market in 1995/96 was characterised by rising production, weak demand, accumulating stocks and falling prices. Most of the production increase was accounted for by capacity restarts.

Prospects for the coming financial year are considerably more favourable. Increased consumer purchases, resulting from improved world growth, are predicted to reverse the downward trend in prices experienced in 1996. Australian Bureau of Agricultural and Resource Economics (ABARE) forecasts suggest that the London Metals Exchange spot-price for aluminium will rise by approximately 15% in 1997.

World stock levels of aluminium are also predicted to reduce in 1996/97 as world consumption growth outstrips the combined supply increases associated with additional capacity restarts and new plant start-ups.

Iron ore

Strong steel demand in Asia and projected growth in world blast furnace production of 12 million tonnes in 1997 is expected to place upward pressure on prices for steel making inputs, and particularly lump iron-ore prices over the coming year.

Increases in Australian iron-ore production are anticipated, and the trend of increasing Australian exports experienced in 1995/96 is predicted to continue into 1996/97.

Zinc

Weak demand and high stock levels acted together to ensure that world zinc prices remained relatively static in the first half of

1996 at levels similar to those observed in 1995.

After a period of strong consumption growth in the second half of 1995, consumption growth in the six months to June 1996 was low. World production growth was slightly higher than consumption growth, accounting for the accumulation of stocks during the period.

Strengthening demand — particularly in the US and the developing nations — combined with modest supply increases are likely to see stock levels fall and prices rise in 1996/97. ABARE predictions suggest that the world zinc price will rise by roughly 12% in 1997.

Gold

After displaying some volatility at the beginning of 1996, gold prices have now stabilised at about US$392/oz, a level slightly higher than the previous year.

With strong growth expected in both production and consumption in 1996/97, prices are forecast to remain reasonably flat for the next 12 months.

Production levels within Australia are set to rise significantly in 1996/97 as mining companies reap the rewards of consistently high levels of gold exploration expenditure over the past few years. In the longer term, the steady erosion of the production cost advantage enjoyed by South Africa — the world's largest producer — is likely to stimulate increased production activity in Australia.

Lead

World prices for lead increased strongly in 1995/96 for the second year in succession. ABARE estimates suggest an increase in the lead price by as much as 29% over the year to December 1996.

Following on from this trend, lead prices are expected to rise further in 1996/97. Already low OECD stocks will fall further in 1996/97 as world consumption growth again outstrips world production growth.

Australian mine lead output rose by 9.8% to 505 000 tonnes in 1995/96, with increased production at Mount Isa and new production at McArthur River more than offsetting production falls at some other mines.

Tasmanian export earnings increased by 12.8% to $21.1 million in 1995/96. This mirrored a similar experience at the national level.

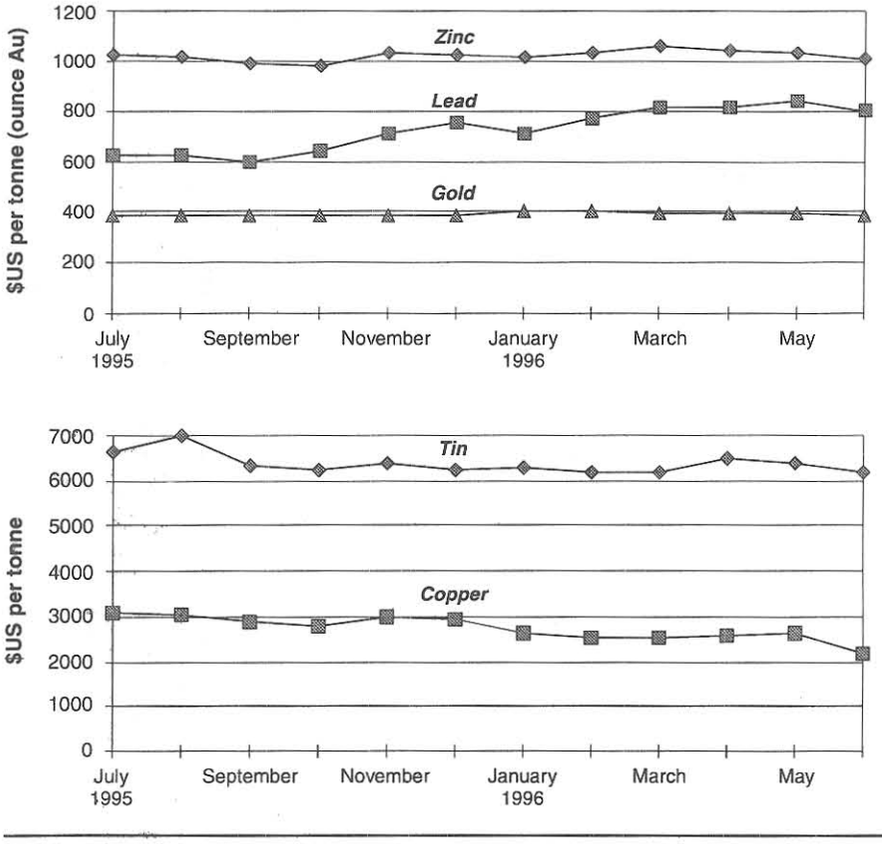
Exports

Despite the negative impact of the Sumitomo incident on the copper market, the overall value of Tasmania's metal and mineral exports in 1995/96 was $701.8 million, 13.4% higher than the previous year. Exports of iron ore and concentrates, tin ores and concentrates, iron and aluminium all grew in value by over 20%.

These results compared favourably to the national figures, with the value of Australian exports of metal and mineral products increasing by 12% over the year to 1995/96.

The predicted increase in export value for 1996/97 for Australia is 4.2%. This increase will occur partly because of the strength of the Australian dollar and partly because growing international demand for mineral and metal products will drive prices upwards in the majority of metal and mineral markets over the coming year.

AVERAGE MONTHLY LME PRICES, 1995/96



Employment

Employment in the mining and mineral processing sector increased from 4423 to 4669, reflecting the resumption of mining operations at Mt Lyell, development of Henty, and the high level of contract employment associated with major capital projects. It is expected that employment numbers will fall in 1996/97 due to the closure of Tioxide and Savage River. The recommencement of mining at Savage River by Australian Bulk Minerals will have some effect in 1995/96 but will not have its full impact until 1997/98.

5 cm

Investment

Capital investment in mining and mineral processing was strong in 1995/96. Australia-wide capital expenditure in mining increased by 8.1% to $7.2 billion over the year.

Based on projected company expenditures, investment levels for 1996/97 are expected to increase dramatically in the coming financial year, rising by as much as 25% to $9 billion.

In the medium to long term the investment outlook at the national level is also positive. In 1995/96 the four-year trend of increasing exploration expenditure continued, with expenditure growth being particularly strong in the gold industry.

In Tasmania investment in the mining extraction and metal and mineral processing sectors in 1995/96 has also been strong. With continuing State Government support for exploration — through programmes such as NETGOLD and the establishment of the strategic prospectivity zones — and a positive external investment climate, this trend should continue into 1996/97.

Details of the major investments made or planned in the mining and metal and mineral processing sectors in Tasmania over the past year are shown below.

BHP TEMCO

TEMCO is investigating a number of possible projects that would increase the quality of its product, add value and increase capacity.

Projects being considered are adding a new furnace at its Bell Bay operation and upgrading an existing furnace.

Comalco Aluminium (Bell Bay) Ltd

The continuing operation of Comalco's aluminium smelter at Bell Bay was secured following the signing of a provisional follow-on power agreement between the HEC and Comalco late in 1995.

This agreement — which should be finalised by the end of 1996 — cleared the way for Comalco to commence its planned $200 million five-year investment programme to upgrade the Bell Bay plant. This investment has the potential to create approximately 100 direct jobs.

Goliath Portland Cement

Goliath Cement announced its intention to develop a $16.8 million crusher at its Railton plant as part of its development plans to upgrade and improve the company's business. The upgrade has required the purchase of new trucks to cope with increased production levels, with the first of the new vehicles arriving in June 1996.

Pasminco Metals–EZ

Pasminco is considering an upgrade and expansion of the Risdon smelter that would require an additional block of power.

Whether or not this investment goes forward will depend largely on the outcome of negotiations concerning a follow-on power supply contract that are presently underway.

Australian Titanium Minerals

Australian Titanium Minerals (ATM) is to invest $12 million to establish a rutile/zircon mining operation on King Island. The sand extraction operation will deliver substantial economic benefits to the King Island community, including the generation of between 45 and 55 direct jobs for the five-year life of the mine. ATM achieved formal approvals in November 1996.

Beaconsfield Mine Joint Venture

Progress continued on the Beaconsfield gold project, a joint venture between Allstate Explorations NL, Beaconsfield Gold and Golden Shamrock Mines Ltd to further advance the evaluation and development of a gold-mining operation at the old Tasmania mine at Beaconsfield.

The main activity undertaken during the past year was the de-watering of the mine, which progressed at a rate of 17 metres per month from July 1995. The Hart Shaft is now de-watered to the planned depth of approximately 400 metres and the 375 metre level is being developed in preparation for future mining. Other capital work included the installation of the permanent headframe and winder, and installation of a pumping station at the 181 metre level.

Work has commenced on the feasibility study and a final decision to proceed is expected by mid-1997. The joint-venture partners have recently announced that operations may commence in mid-1998 at a rate of 80–100 000 ounces of gold per year.

Copper Mines of Tasmania

In June 1994, the State Government signed a Memorandum of Understanding with Gold Mines of Australia (GMA) to take over the Mt Lyell lease on the departure of Renison Goldfields Consolidated.

In June 1995, GMA announced that it had approved the Mt Lyell redevelopment project following a detailed feasibility study and satisfactory resolution of power and concentrate transport contracts. GMA established a subsidiary company, Copper Mines of Tasmania (CMT), to carry out work associated with the Mt Lyell copper and gold mining operation. Over $50 million has been invested in the initial 2.5 million tonnes/year phase of the operation. Planning is underway on the expansion to 3.5 million tonnes/year and research is continuing into value-added processing.

Progress over the past financial year towards reaching the target production rate of 3.5 million tonnes per annum (mtpa) within the next three years has been considerable. Production at a rate of 1.5 mtpa commenced in December 1995, with the first 10 000 tonnes of concentrate being shipped in the March quarter of 1996.

Hazell Brothers completed construction of Stage 1A of the $10 million main tailings dam in late April 1996. Research continued on assessing downstream processing options for the future, and GMA intends to proceed to production of copper metal after three years if adequate copper reserves are established.

Goldamere Pty Ltd (Savage River)

Extensive and complex negotiations took place during 1995/96 in relation to the future of the Savage River iron-ore mine. The purpose of these negotiations was to find a new operator for the mine and prevent the scheduled early-1997 cessation of operations.

After over a year of discussions, the mine operators, Pickands Mather and Co. International, the Government, and the new proponent Goldamere Pty Ltd, reached agreement regarding the transfer of ownership of the mine. This agreement — which was publicly announced on 27 November 1996 — is likely to secure the future of the mine for at least the next 25 years.

The re-development of the mine will involve an initial investment of $110 million and create 250 jobs. Production is scheduled to recommence at the mine in October 1998.

If the new operation is successful further direct investment of approximately $390 million is anticipated over the next five years as downstream processing of the iron-ore concentrate into pig iron, and later possibly steel, is progressively brought on line.

If these downstream processing operations proceed the industrial demand for gas in Tasmania will increase, thus enhancing the likelihood of the Yolla gas development going ahead. Development of Yolla would bring additional investment to Tasmania of up to $500 million.

Pasminco Rosebery

Pasminco Mining committed to a deep exploration project at the Rosebery zinc mine during 1994/95. This $45 million project aimed to define and develop 10 million tonnes of ore below current working levels. Of this amount, $25 million is earmarked for ore access for diamond drilling and mine production purposes.

The company also has investment underway in the construction of a tailings storage dam at a cost of $2 million and the construction of a pump station at a cost of $8 million.

Rendeep Project

This $38 million development project at the Renison tin mine was completed during 1995/96. The project involved the mining of a 582 metre deep internal shaft, the provision of associated underground crusher and conveyor systems for transporting ore to the surface, and the extension of the North Renison Decline at depth to access the high-grade Rendeep ore bodies. The project is expected to extend mine life to at least 2007.

Henty Gold Project

The Henty gold mine, operated by Goldfields Tasmania Limited, was officially opened by the Premier on 2 July 1996. The project is the culmination of over thirty years effort by RGC and its associated companies in exploration of the region. It is the first new stand-alone gold mine developed in Tasmania this century and the first major gold discovery in the Mt Read Volcanics.

The mine has been developed over the last three years at a capital cost of some $55 million for mine development, including a 400 metre deep internal shaft, gold processing plant and tailings disposal ponds. Up to 200 people have been engaged in development. On current estimates of the ore resource, the mine is scheduled to operate for 4½ years at a production rate of 110 000 tonnes/year to produce 90,000 ounces of gold per year. Permanent employment levels are expected to be about 70.

Base Metals

Aberfoyle Resources Ltd (Hellyer Division)

Mining

Development achievement, at 1857 metres, was of the same order as 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 1 291 908 tonnes of ore at an average grade of 12.8% Zn, 6.1% Pb and 165 g/t Ag, was mined from underground sources. Waste rock mined during the year amounted to 71 810 tonnes.

Ore recovered from pillars abutting cemented fill stopes accounted for 35% 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.

Preparatory work over the preceding twelve months culminated in the successful breaking of over 600 000 tonnes of ore in a major mass blast at year-end.

Ore reserves

Proved ore reserves at 30 June 1996 were reported as 5.8 million tonnes containing 11.6% Zn, 5.7% Pb, 0.3% Cu, 130 g/t Ag and 2.1 g/t Au.

Milling

Concentrator throughput totalled 1.34 million tonnes of ore at a headgrade of 12.6% Zn, with 357 000 tonnes of concentrates being produced. Mill headgrade was lower than in the previous year but concentrate production and recoveries were in line with forecast. Concentrator availability was in excess of 96% and ore throughput was marginally higher than for the previous year.

Concentrate production was:

- Zinc concentrate — 247 790 t @ 50.3% Zn;
- Lead concentrate — 59 412 t @ 56.0% Pb;
- Bulk concentrate — 38 565 t @ 32.8% Zn, 11.8% Pb, 254 g/t Ag;
- Copper/silver concentrate — 11 339 t @ 11.0% Cu, 4476 g/t Ag.

Shipments of concentrate railed to Burnie totalled 393 391 tonnes, with 426 416 tonnes of concentrate being shipped to smelters.

Developments

Refinements of the control strategy resulted in improved grinding performance and flexibility of the SAG mill crushing circuit.

Laboratory and pilot plant testwork established that an enhanced form of high intensity conditioning will improve lead recoveries and zinc circuit performance. It was subsequently decided to incorporate a full-scale high intensity conditioning plant ahead of the lead flotation circuit. Equipment is on order.

Exploration

Exploration during the year was focused on deep diamond drill testing of the Hellyer alteration system down-plunge and up to 900 metres north of the mine. A total of 2965 metres was drilled in three holes. The Hellyer ore position was barren but the alteration zone was intersected, extending the known strike of the system by 600 metres.

Capital expenditure

Capital expenditure incurred during the year totalled $2,279,000, with improvements accounting for $1,116,000 of this amount.

Environmental initiatives

Most buildings and infrastructure have been removed from the Que River and Cleveland Tin mines and revegetation is well advanced.

Rehabilitation of disturbed areas no longer in use at the Hellyer mine continued. An effluent water clarifier was completed in June at a cost of $750,000.

Employment

The total workforce as at 30 June 1996 was 258, comprising 165 employees, 81 contractors and 12 apprentices and casuals.

Pasminco Mining – Rosebery

Mining

Mine development activity totalled 4668 metres and produced approximately 61 500 tonnes of ore. About 294 200 tonnes of waste rock, including approximately 33 900 tonnes derived from capitalised drive stripping, were excavated.

Development was focused mainly in the advance of the Deep Exploration and J lens declines, J lens footwall drives, and 19B incline and associated stope development.

Ore Production

A total of 597 606 tonnes of ore were mined at an average grade of 11.11% Zn. This compared favourably with the planned tonnage and grade of 576 000 tonnes and 10.9% respectively.

Underground sources accounted for 540 038 tonnes while the balance (57 568 tonnes) was won by the mining of two small open cuts.

Waste dilution in open stopes was low, although some dilution due to lateral overbreak of pillar fill material occurred in isolated cases.

Ore Reserves

Identified ore reserves at June 1996 were 3.249 million tonnes grading 3.5% Pb, 10.6% Zn, 0.47% Cu, 116 g/t Ag and 2.4 g/t Au. These reserves comprised:

- Proved — 1.95 million tonnes @ 3.2% Pb, 9.6% Zn, 0.44% Cu, 98 g/t Ag and 2.0 g/t Au;
- Probable — 1.295 million tonnes @ 3.9% Pb, 12.1% Zn, 0.51% Cu, 143 g/t Ag and 3.0 g/t Au;

This compares with the total ore reserves reported as at 30 June 1995 of 3.317 million tonnes with an average grade of 10.9% Zn and 2.3 g/t Au.

The measured, indicated and inferred resource quoted as at June 1996 was 8.291 million tonnes at a zinc grade of 13.1% and a gold grade of 2.6 g/t.

Resource infill and near-mine exploration underground drilling amounted to 23 000 metres. Deep Exploration Project underground drilling was concentrated in the K lens area and to the south of and below J lens. A total of 30 180 metres was drilled in connection with the project. Approximately 1900 metres was drilled from the surface in and around the Rosebery open cut with the aim of delineating further open-pittable ore.

Milling

Ore treated in 1995/96 totalled 600 053 tonnes, all of which was sourced from the Rosebery mine. Lower feed grades and fine grained mineralogy contributed to poorer lead metallurgy than in previous years. A second stage cleaner was installed in the zinc flotation circuit, which assisted in improving the concentrate grade. Development work to enable higher grade concentrates to be produced is continuing. An external R&D project, in conjunction with the University of South Australia, to further improve copper metallurgy will continue.

The mill headgrade was reported as 11.11% Zn, 2.99% Pb, 0.36% Cu, 103.2 g/t Ag and 1.72 g/t Au, compared to the previous year's headgrade of 11.04% Zn, 3.70% Pb, 0.41% Cu, 114 g/t Ag and 1.64 g/t Au.

Concentrate production for the year was:

- Zinc concentrate — 113 750 t @ 52.15% Zn;
- Lead concentrate — 20 050 t @ 61.0% Pb, 1379 g/t Ag;
- Copper concentrate — 4650 t @ 21.3% Cu, 9.2% Pb, 3024.8 g/t Ag, 70.1 g/t Au.

The gold plant produced 237 kg of doré containing 32% silver and 68% gold. Gold recovery was below expectation and development work is in progress in an endeavour to improve gold doré production.

Exploration

Ten diamond-drill holes, totalling 3587 metres, were drilled in the mine lease and mine lease extension areas by Pasminco Exploration.

Geological mapping was conducted in the North and East Hercules areas and geochemical and geophysical surveys were carried out in the South Hercules/White Spur/Hercules area.

Capital expenditure

Capital expenditure during the year amounted to $18.2 million. Of this amount, $8.2 million was spent on the Deep Exploration Project.

Environmental initiatives

A new Environmental Management Plan was approved by Environment Tasmania.

Environmental improvement programmes for sulphate and chloride in water discharged to Lake Pieman, and a revised environmental improvement programme for the Hercules mine, were approved.

The abandonment of No.1 and No.5 tailings dams under water cover commenced.

Planned work to rehabilitate a number of disturbed areas on the lease was completed.

Employment

The number of employees as at 30 June 1996 was 297. No days were lost due to industrial disputes.

Copper

Copper Mines of Tasmania Pty Ltd

The Sustainable Development Advisory Council completed a full assessment of CMT's project to redevelop the Mt Lyell mine at Queenstown as a Project of State Significance in August 1995. On 21 September 1995 the Minister gave direction that the project might proceed.

A $55 million refurbishment programme was completed in December 1995, resulting in the re-opening of the mine at an ore treatment rate of two million tonnes per annum, increasing to 2.5 million tonnes per annum during 1996.

The mine was officially reopened by the Premier of Tasmania on 15 December 1995.

Mining

Mine development totalled 7359 metres. The decline was extended from below 1660 level to a temporary sump position below 1620 level. Three levels for sub-level cave stoping were developed.

Several large stockpiles were built up prior to the commissioning of the concentrator in November.

A total of 96 587 wet tonnes of development waste rock was hauled to surface by truck.

Production

Total ore production for the year was 938 753 wet tonnes at 1.17% copper. Sub-level cave stoping commenced in November and produced 504 374 tonnes of ore. Development ore accounted for the balance. The ore was crushed underground and hoisted through the Prince Lyell shaft.

Ore reserves

Proved ore reserves at 30 June 1996 were 9.3 million tonnes grading 1.18% Cu and 0.3% Cu. Probable reserves totalled 12.1 million tonnes @1.2% Cu, for a total proved and probable reserve of 21.4 million tonnes.

Total measured, indicated and inferred resources were 203 million tonnes at 0.8% Cu. Gold grade is not currently available because of a lack of reliable data.

Milling

Ore treated totalled 910 533 tonnes with an average headgrade of 1.12% copper. Concentrate production totalled 35 449 tonnes at 27% copper, at a recovery of 92.1% Cu, and 5.7 g/t contained gold. The first shipment of concentrate was made in March 1996.

Construction of the preliminary Stage 1 Tailings Dam was completed in August and Lift 1A of the Princess Creek Tailings Dam was commissioned for tailings storage in April 1996 following successful operation of the preliminary dam.

Exploration

Exploration work was concentrated on determining the potential for a large tonnage, open pittable copper–gold resource surrounding the area known as West Lyell. Work has been directed towards compiling of the geological and mining database to assess the project. A resource and reserve have been prepared for the Western Tharsis zone and drilling indicates that it persists to depth.

Capital expenditure

The $55 million refurbishment programme included the construction of tailings dams, underground development, stripping and rebuilding of the surface crushing and flotation plant, re-engineering of the underground crusher and substantial works in the shaft. The programme was completed in December.

New developments

Engineering design work by Minproc to increase production to 3.5 million tonnes of ore per annum by July 1998 is being undertaken.

Laboratory test work is in progress to determine the potential for the deposition of copper from acid drainage and for the extraction of copper, gold, silver and, potentially, cobalt from copper concentrates using bacterial leaching technology. Both projects are well advanced and pilot plants are planned for the 1996/97 financial year.

Environmental initiatives

An environmental management system in accordance with the ISO 14000 standard is being implemented. This will ensure improved control of pollution sources.

Excellent results have been achieved with a waste management system, with at least 82% of all waste oil being recycled.

Employment

Employment at year end totalled 260 people, although the manning level had exceeded 400 at times during peak construction periods. The employment total comprised 98 employees of CMT and 162 contractors.

Gold

Beaconsfield Mine Joint Venture

This project is being undertaken by joint venture partners Beaconsfield Gold NL (38%), Allstate Explorations NL (40%) and Golden Shamrock Mines Limited (22%).

A management team has been established to develop a feasibility study up to the gold production stage. Gold production is forecast to commence around mid-1998.

Development

A new shaft headframe and hoisting system was commissioned in January. This system is designed to provide capacity for ultimate production duties.

Dewatering and refurbishment of the Hart shaft was completed to below the 375 metre level and access development commenced from an existing excavation off the shaft on this level.

The 180 megalitre pump station was successfully commissioned in July 1995.

Capital expenditure

Project expenditure for the year under review comprised $8.15 million on the Hart Shaft dewatering and refurbishment (including the new headframe and winder) and $565,000 on exploration.

A further $18 million has been budgeted for a works programme related to the feasibility study. The works programme includes underground exploration, installation of a second pump station and dewatering to below the bottom of the Hart Shaft, upgrading of the hoisting system and the mining of a ventilation rise/escapeway.

Ore reserves

Indicated and inferred resources are estimated at 930 000 tonnes at 23 g/t Au. A further 230 000 tonnes at 6.4 g/t Au are inferred for a resource on the fringes of the reef.

Exploration

Deep drilling has indicated continuity of the Tasmania Reef below 1000 metres, with one intersection of 7.0 metre horizontal thickness at 9.2 g/t Au.

Employment

The workforce at year end consisted of three joint venture employees and 27 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.

Shaft equipping was completed and the winder and hoisting systems were commissioned for fully automatic operation. Temporary pumping and electrical facilities were installed at plat level and development of the 300 metre long access crosscut to the Zone 96 orebody (300 to 500 metres below surface) commenced.

Reaming of a 385 metre vertical pilot hole to 2.4 metre diameter to serve as a ventilation rise and escapeway was in progress at year end.

Production

Ore extraction to enable the timely commissioning of the treatment plant was from the Sill Zone, which occurs between 50 and 150 metres below surface and is accessed by means of a 800 metre long decline. Until such time that ore becomes available from the Zone 96 orebody, the Sill Zone will continue to provide ore for treatment.

During the gold plant commissioning period, 13 328 tonnes of ore at a grade of 7.53 g/t Au were treated and yielded 3086 ounces of gold.

Gold recovery is achieved by standard carbon-in-pulp/ carbon-in-leach technology.

Ore reserves

The mine has a projected life of 4½ years based on the probable reserve of 506 000 tonnes at an average grade of 26.9 g/t Au in Zone 96.

Capital expenditure

Capital committed to the project is $53 million. A further $6 million is provided for pre-production expenditure, including the purchase of four load-haul dump units and two multi-purpose service platforms.

Environmental initiatives

The mine has been developed in a manner such that the impact on the environment is minimal. Innovative environmental management practices have been introduced.

Exploration

Three parent surface drill holes and six wedges were drilled by RGC Exploration in the vicinity of Mt Julia, approximately 1.5 km south of the current mine workings. A total of 5716 metres was drilled.

Employment

An average of 140 persons were engaged, either as contractors for project development work or as direct employees, during the year. At year end there were 55 persons in full-time employment with the mine. This number will be increased to 70 when the mine is fully operational.

Paraclete Resources Pty Ltd

Further geological studies were undertaken on the Lynchford mining lease. Bulk sampling of the oxide zone, adjacent to old surface workings, for metallurgical testwork was carried out. Based on geological interpretations and the metallurgical testwork, it was decided to erect a pilot gravity separation plant for the recovery of gold from this zone over a period of two years. It is estimated that the project will cost approximately $970,000.

A joint venture partnership has been negotiated with Stoneyfell Mining NL for the purpose of carrying out this project and to conduct an investigation into the full precious metal potential of the Paraclete tenements. Stoneyfell Mining NL is a Perth-based company soon to be listed on the stock exchange.

A Development Proposal and Environmental Management Plan is being drafted.

Iron ore

Savage River Mines

Mining of the Savage River ore bodies to the final Savage River Mines pit design limits was completed in April. A 2.7 million tonne stockpile of ore to supply mill feed for the remainder of the 1996 calendar year had, at that time, been accumulated.

The concentrator at Savage River and the pelletising plant at Port Latta are scheduled for closure in December 1996, with the final shipment of the remaining inventory being scheduled for May 1997, with closure of the offshore loading facility due for the following month.

At year-end, Government agencies were negotiating with an interested proponent regarding take-over arrangements.

Production for the year comprised:

	tonnes
All material	4 950 680
Rock to waste	746 640
Crude ore	4 204 040
Concentrate produced	1 792 869
Concentrate pumped	1 794 258
Pellets produced	1 681 332
Pellets shipped	1 721 396
Pellet inventory	270 762
Concentrate and chip sales	145 564

There was a strong demand for pellets from both the Australian and the Asian markets, requiring an increase in production to 1 681 332 tonnes over an original budgeted 1.5 million tonnes.

Mine development

The South Lens was depleted to lift 14 and the Northern Deposit open cut was mined to lift 21 on the northern end.

There were no significant pit slope failures during the year but some minor failures occurred as a result of final mining activities on the lower benches.

Pelletising plant production

Three furnace lines were utilised to produce the requisite tonnage of pellets. The workforce

strength remained steady throughout the year.

Capital expenditure

Expenditure of a capital nature was committed to waste stripping, pit slope dewatering, stabilisation and drainage, replacement of the light vehicle and mine service fleets, plant corrosion control, concentrate pipeline maintenance, mine site rehabilitation and offshore loading facility maintenance.

Rehabilitation

The rehabilitation of abandoned areas continued in line with the environmental rehabilitation plan. This included the rehabilitation of waste dumps and disused roads. Major surface runoff has been re-directed into pit areas to avoid the deposition of solids into the Savage River system and pit overflow spillways have been excavated.

A twelve metre high dam has been constructed across the Central Deposit open cut to raise the water level in the southern end of the pit in an endeavour to reduce acid drainage from the east wall.

Employment

There were 150 employees as at 30 June 1996, including 12 contractors. This was a decrease from the workforce of 203 in June 1995.

Tasmania Mines Limited

Magnetite production from the Kara mine totalled 76 094 tonnes for the year, while scheelite concentrates produced contained 5338 mtu's WO_3. Sales totalled 110 092 tonnes of magnetite, with no scheelite concentrate sold.

A decision was taken towards the end of the year to restrict the production of run-of-mine magnetite to 20 000 tonnes per annum to supply a cement manufacturer. Magnetite for steel production would no longer be accumulated due to an unfavourable FOB price and the heavy wear experienced in the processing plant.

Production would in the future be focused mainly on coal washery-grade magnetite and scheelite. A market for 25 000 tonnes of coal washery-grade magnetite has been secured.

Capital expenditure included $19,136 spent on work associated with the new coal-washery grade magnetite circuit and $35,295 in relation to the future construction of an additional tailings dam.

An average of 25 persons was employed during the year.

Tin

Renison Limited

Primary mine development at the Renison Bell mine totalled 1374 metres, with a further 108 metres of mine development and 41 metres of shaft-related development being undertaken by contractors. Development of the North Renison Decline totalled 1665 metres.

A total of 745 metres of rising was completed by longhole drilling and blasting or by contract raiseboring.

Contractor involvement in the development of the North Renison Decline (2381 metres) was completed in June. Further extension of the decline (1319 metres) will be undertaken by the Renison workforce commencing in August 1996 for an estimated period of 15 months.

Ore production

Ore production totalled 706 424 reconciled tonnes at 1.55% Sn. The actual production compared favourably with the budgeted performance of 675 000 tonnes at 1.55% Sn. Ore haulage distances were greatly reduced with the commissioning of the shaft system towards year end.

Ore reserves

Ore reserves, as at 30 June 1996, were:

	tonnes (000's)	*Sn (%)*
Proved	2514.5	1.51
Probable	3807.3	1.86
Total	6321.8	1.72

The total measured, indicated and inferred resources at year end were 12.2 million tonnes at 1.68% Sn.

Mineral processing

Ore treated in 1995/96 totalled 706 424 tonnes at a headgrade of 1.55% Sn, compared to 660 176 tonnes at 1.42% Sn in the previous year. Concentrate production was 16 090 tonnes at a grade of 51.7% Sn, containing 8319 tonnes of tin metal in concentrate.

Tin recovery into concentrates for the year, at 76.4%, fell short of that realised in 1994/95. This was attributed in part to a change in one of the flotation reagents to a more environmentally friendly reagent. The decline in the recovery is being further investigated.

Two Mozley multi-gravity separators were being commissioned at year end to upgrade the tin content of the concentrates.

Exploration

Seven diamond-drill holes totalling 700 metres were drilled at magnetic targets immediately south of the mine workings. Results were disappointing.

Magnetic modelling of the Renison deposit, based on petrophysical properties of the mine sequence, continued throughout the year. The intention is to model the response expected from the Renison target if buried at various depths below Crimson Creek Formation sediments.

Three holes, to test a Tunnel Hill target on the southwestern edge of the lease, were drilled a total of 2058 metres. Thick intervals of mine sequence were intersected, but the dolomite was typically unmineralised.

Major projects

Excavation of the 600 metre deep shaft was completed in February 1996, approximately five months behind schedule. In order to make up lost time, the shaft sinking contractor relocated from the winder chamber to mid-shaft to enable the upper

shaft steelwork and the permanent winder to be installed.

The underground crusher and conveying system were commissioned in early May and the first hoisting of rock was effected on 23 May, with final commissioning of the shaft system on 3 June, three months ahead of schedule.

The shaft was officially opened by the Premier of Tasmania on 22 June 1996.

Capital expenditure

The total expenditure on items of a capital nature amounted to $30.3 million, more than twice that of the previous year. The major items of capital expenditure were $18.6 million for the shaft project, $5.5 million for the North Renison Decline, $2.8 million for lateral development and rises, $0.9 million for Mozley multi-gravity separators, and $0.6 million for Banana screen installation.

New developments

New developments in the treatment plant are planned to include trials to upgrade the low grade cassiterite flotation fraction and the recovery of cassiterite from the gravity section slimes fraction using the multi-gravity separators.

Processing experiments of Rendeep-type ore have commenced.

Environmental initiatives

The CSIRO has been engaged to conduct a major research programme on modelling tailings dam geochemistry through a variety of studies over a three-year period. The objectives of the study are to assess the efficacy of the mine's approach to controlling acid mine drainage formation by the sub-aqueous disposal of tailings and to develop a tailings dam 'close out' model which will ensure that the water quality in Lake Pieman is not compromised after mine closure.

Employment

The workforce at year end comprised 257 persons, compared to 241 at the end of 1994/95.

In addition to the number of persons in direct employment, 90 contractors' employees were on site at year end.

No days were lost due to industrial disputes.

Spectrum Resources Australia Pty Ltd (Anchor mine)

During the year under review, efforts were directed towards progressing from the initial four days per week to a seven days per week operation.

Mining

On the resumption of underground mining activities, the existing underground workings consisted of partly developed room and pillar stopes. During the year the focus was towards open stoping, employing both uphole retreat and downhole stoping methods.

A total of 32 000 tonnes of ore at 0.44% Sn were mined from development and stoping. The ore resource was estimated at year end as 295 000 tonnes at 0.5% Sn.

Concentrate production

Operational problems, resulting in poor plant availability for much of the year, were overcome and the operation showed significant signs of improvement towards the end of the year.

Eleven shipments totalling 216.5 tonnes of concentrate at 65.1% Sn were despatched to the Malaysian Smelting Company. A market is actively being sought for 20 tonnes of copper-rich sulphide concentrate, recovered by flotation in the treatment circuit.

Capital expenditure

No capital expenditure was incurred during the year. Consolidation of the existing operation and infrastructure is required before capital upgrades take place. These will occur in the mill, with increased grinding capacity and improved ore handling being the primary objectives.

Environmental issues

Mine water is controlled and monitored in its course through the tailings dam. The tailings dam is to be extended.

Employment

At year end, 23 persons were employed.

The Cornwall Coal Company (No Liability)

Duncan Colliery

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

Blackwood Colliery

Development was carried out beyond the old Mt Nicholas workings for 550 metres. Faulting, narrowing of the seam and an igneous intrusion led to the cessation of development. Pillar retreat commenced in November 1995.

Floor heave continued to be a major factor in pillar extraction, affecting operating costs and yields and limiting the width of goaf areas and mining recovery.

Coal quality was variable, with areas of high ash content (25% washed coal) and low yields (down to 45% on a daily basis).

Blackwood No. 2 open cut

Floor heave material from underground continued to be dumped on some of the open cut area. Following coal depletion, the remaining area was rehabilitated.

Huntsman No. 2 open cut

Extraction of coal commenced with an overburden ratio of 6:5:1 by volume. Coal quality was very good, with ash content of 15–17% and yields above 80%.

Above seam material is generally very incompetent, limiting the potential for underground mining.

Production

Raw coal production totalled 322 995 tonnes and was sourced from the Blackwood Colliery (297 663 t), Blackwood No. 2 open cut (15 044 t) and Huntsman No. 2 open cut (10 288 t). Approximately 119 368 tonnes of reject material was dumped on the Duncan reject dump.

Coal sales for the year amounted to 208 327 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

Drilling was restricted to obtaining information for the mining of the Huntsman open-cut seam.

Capital expenditure

Major items of capital expenditure were related to the acquisition of the Shell leases and significant modifications to the washery plant, totalling $1.3 million.

Rehabilitation

Revegetation at Blackwood No. 2 and Huntsman No. 1 open cuts has been successful, with good growth of young trees evident.

Employment

Employment numbers at year end comprised 62 direct employees, nine coal cartage contractor employees, and five contractor employees in the open cuts.

No days were lost due to industrial disputes.

Merrywood Coal Company Pty Ltd

Heavy rainfall between January and June resulted in very difficult and costly mining conditions in the open cut. Wall stability and the rehandling of overburden necessitated the use of extra equipment and a requirement for additional weekend work.

Stockpiled low-grade raw coal was relied upon in an effort to maintain supplies.

A large landslide developed on the eastern side of the open cut during March as a direct result of the heavy rains. Remediation measures, recommended by a consultant, will be undertaken when weather conditions permit.

Production

Coal sales totalled 182 000 tonnes from a total of 243 000 tonnes of raw coal processed. Raw coal stocks were depleted by 100 000 tonnes during the year. Overburden removal totalled 1.8 million cubic metres.

Coal was supplied to Australian Newsprint Mills for the full year from the Merrywood source despite a trial of Kimbolton coal in the previous year for this purpose. Joint venture negotiations for the Kimbolton coal project broke down in November.

The closure of Tioxide Australia Pty Ltd at year end has resulted in a market loss of 24 000 tonnes of coal per annum.

Capital expenditure

Capital expenditure during the year totalled $455,000 and was restricted to additional earthmoving equipment, a crusher upgrade, a new workshop, and exploration at Merrywood.

A further $36,000 was spent on exploration work on other exploration licences.

Rehabilitation

Due to the extremely wet conditions, no rehabilitation was carried out during the year, apart from minor landscaping around the office and workshop areas.

Employment

Including contractor employees, an average of 38 persons were employed in the Merrywood operation during the year.

An Enterprise Bargaining Agreement, concluded during the year, will become effective in the 1996/97 financial year. The agreement includes improved training and wage levels based on competency. An employee mediator/training officer has been employed to facilitate the concept of self-managed work teams.

Kaolin

Australian Paper, Tonganah clay mine

Inconsistent brightness of North Tonganah clay was of concern. Calcium carbonate, used as a filler by Australian Paper's competitors, is a considerably brighter material and produces paper with an alkaline base, compared to the acid base of paper using clay as a filler. In order to remain competitive, clay must be produced at an acceptable cost.

Production

A total of 184 847 tonnes of clay were mined for immediate use or was stockpiled. Mine development material removed and relocated for rehabilitation purposes totalled 121 914 tonnes, and 56 329 tonnes of tailings from the process were set aside for the same purpose.

Sales

Sales for the year amounted to 32 384 tonnes. Of this, 26 378 tonnes were railed to the Burnie paper mill, with the balance being transported to Wesley Vale. Total sales exceeded the plan for the year by 8.5%.

Capital expenditure

The main items of capital expenditure were the purchase of a new vacuum pump, the replacement of the roof on the treatment plant, a minor drilling programme, rotary air vents in the processing plant, and concrete drains to direct the flow of white water from the stockpile area.

Environmental initiatives

A large settling dam was established to control the flow of road run-off water as part of a project to settle suspended solids during periods of heavy rainfall.

Tailings dams have been constructed in other areas for the settlement of solids and for the dilution of process water with run-off water in order to raise the pH.

Work continued in the backfilling of No.3 mine.

Employment

The average number of persons employed, including contractors, for the year under review was 12, four less than for the previous year.

Multi-skilling of the workforce has resulted in higher productivity and lower unit costs.

Limestone and dolomite

Beams Brothers Transport Pty Ltd

Production for the year totalled 105 550 tonnes, comprising 28 550 tonnes of metallurgical limestone, 45 600 tonnes of Aglime and dolomite fines, 6880 tonnes of aggregate for drainage and water treatment, and 24 500 tonnes of ironstone aggregate mixes.

Approximately 7000 m^3 of waste was stripped from the limestone deposit at Flowery Gully and 18 000 m^3 from the dolomite deposit at Cressy.

Ore resources

Approximately five million tonnes of *in situ* limestone has been identified at the Flowery Gully site. The total remaining resource is probably of the order of 10 to 15 million tonnes. The identified dolomite resource on the Cressy lease is estimated at 450 000 tonnes, with a probable total resource of between one and three million tonnes.

Capital expenditure

Expenditure of a capital nature was incurred on a semi-mobile screening station, two front-end loaders, and a generating set. Total capital expenditure was $523,000.

Environmental initiatives

Contouring and tree planting were carried out in the ironstone area. Crusher discharge points at the Flowery Gully plant were covered to reduce dust.

Employment

A total of 22 persons were employed, 17 in mining activities and five on administrative duties.

Circular Head Dolomite and Trading Co. Pty Ltd

Production for the year totalled 31 207 tonnes of metallurgical grade dolomite and 59 290 tonnes of agricultural dolomite.

Capital expenditure of $235,000 was committed to the purchase of plant and machinery.

Employment totalled 12 people, with one contractor on site at year end.

David Mitchell Limited (Mole Creek)

Sales of limestone and lime totalled 70 402 tonnes. An overburden and waste to limestone ratio of 1.34:1 was achieved for the year. This is a substantially lower ratio than the requirement for the life of the operation of 4:1.

The reduced stripping ratio was effected in view of a market downturn. However, a slight upturn was realised at the end of the year under review and it is anticipated that a major increase in sales will occur as from mid 1997.

No projects were undertaken and no capital expenditure was incurred.

Employee numbers were reduced from 26 to 24.

Goliath Portland Cement Company Limited

Overburden stripping from the old quarry amounted to 14 913 tonnes, while 450 450 tonnes of overburden were removed from the new quarry area.

Production

A total of 974 000 tonnes of cement was produced during the year from 1.485 million tonnes of limestone and 47 000 tonnes of clay quarried. Production of limestone from the new quarry was reported as 434 187 tonnes.

Major project

A contract has been signed with Krupp Engineering (Australia) Pty Ltd for the supply and installation of a 1000 tonnes per hour twin-rotor hammer crusher in the new quarry area and a trunk conveying system from the quarry to the plant. The project is expected to be completed in the second half of 1997 and will cost approximately $16 million.

Capital expenditure

Capital expenditure of $10.95 million was incurred during the year. This was allocated to plant improvements ($7.43 million), environmental and pollution control ($2.36 million), renovations ($0.49 million), computer and office equipment ($0.31 million) and miscellaneous projects ($0.36 million).

Environmental initiatives

Overburden banks in the southeast corner of the old quarry were stabilised and topsoil spread. Drainage works on the southern side of old quarry overburden dumps were completed.

Part of the overburden area of the new quarry was topsoiled and seeded. Two settling ponds were excavated in the new quarry area to improve the quality of water discharging into Caroline Creek.

An amount of $365,000 was spent on rehabilitation during the year.

Employment

The number of permanent employees increased from 183 to 196. Five casual employees and 16 contractor employees were also utilised.

There were no major industrial disputes during the year.

An Enterprise Bargaining Consultative Committee, consisting of four employees and four management representatives, was formed.

Pigments

Savage Resources Limited

No work was carried out on the yellow ochre, brown umber or black pigment deposits at the Savage River sites. Material produced in fine milling trials in Europe was tested by a number of pigment manufacturers and end users.

Archaeological and botanical investigations confirm that there are no heritage or environmental issues of concern with regards to the sites.

Joint venture discussions with a USA and two Australian companies continued.

Silica flour

Cominex

Silica sales for the year were only half those of the previous year due to marketing difficulties experienced by the Japanese distributor. A recently appointed distributor is expected to enhance sales.

Development

The northern pit at Corinna was further developed, with the year's entire production being won from this source. A total of 4000 m^3 of Tertiary gravel was stockpiled for future sale as road material, with 2000 m^3 of stripped waste being used as backfill in pit rehabilitation.

Production

Production of silica flour totalled 3800 tonnes with a purity level 99.8% SiO_2 and containing an average 12.6 ppm Fe_2O_3. Material transported to Heybridge for beneficiation prior to export totalled 3190 tonnes.

Ore resources

Estimated ore reserves were 95 000 tonnes proved and 700 000 tonnes probable, with an indicated resource of 1.6 million tonnes.

Exploration

An exploration licence was taken out to investigate the potential for commercial deposits of high purity silica flour in the Arthur River area. Limited preliminary surface sampling was encouraging.

Employment

The workforce strength at year end was two working owners and six contractors.

Besser Tasmania Pty Ltd

A total of 21 673 tonnes of sand and gravel was produced from the Calder leases.

A new pumping system was installed at a capital cost of $9,000. 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 876 000 tonnes of crushed rock and 160 000 tonnes of sand and gravel.

A total of $592,000 was spent on capital items, including the replacement of two front-end loaders and a diamond drilling programme at the Launceston quarry site.

Operations at a new quarry at Flowery Gully for TEMCO commenced. An access road was constructed at a cost of $60,000.

Tree planting was carried out at the Bridgewater quarry and the South Arm sand pit, and rehabilitation of the Mt Nassau quarry was almost completed.

Forty persons were employed on a full-time basis.

Brambles Equipment

The total production from the quarries at Ridgley, Talisker and Western Junction was 50 000 tonnes of road gravel, 180 000 tonnes of road base, 350 000 tonnes of metal and dust, and 130 000 tonnes of various rock fills.

Capital expenditure of $50,000 was spent on a belt weigher, installing a shaper at Talisker, and sealing the Ridgley access road.

The workforce consisted on 20 employees and four contractors.

Caroline Quarries

Production from the quarry at Railton was 29 430 tonnes of silica sand, 528 tonnes of general sand, and 106 tonnes of concrete sand.

Worked-out areas of the quarry were progressively rehabilitated by the planting of *Eucalyptus* seedlings.

The quarry was operated by the two owners.

G. J. Cresswell's Transport Pty Ltd

Production of road-making material totalled 155 720 tonnes. Four employees and three contractors were employed.

CSR Readymix

Production for the year totalled 161 156 tonnes of crushed dolerite.

The number of employees was reduced from 12 to ten during the year and as many as seven contractors were utilised at times.

Preparations were made for revegetating a worked-out bench in the near year.

Hobart Blue Metal Industries

Production for the year comprised 310 000 tonnes of crushed rock, 10 000 tonnes of gravel and 42 000 tonnes of sand.

Expenditure on items of a capital nature included $20,000 on a minimal upgrade at Leslie Vale, $50,000 on sand plant improvements at Huonville, and $50,000 in upgrading mobile plants.

Revegetation commenced at Leslie Vale and at the Huonville sand plant. Water control dams at the Huonville site were increased in size.

On average, 23 persons were employed.

Industrial Sands and Silica Pty Ltd

Five hundred tonnes of sand, 2000 tonnes of metal and 35 000 tonnes of gravel were produced by three employees.

Pioneer Concrete (Tasmania) Pty Ltd

Production of crushed dolerite from the Flagstaff Gully quarry was 189 943 tonnes. This comprised concrete batching material (58 333 tonnes), Emoleum and Besser-grade material (18 994 tonnes), and road construction material (104 469 tonnes).

A new primary scalping system, consisting of two conveyors and a single deck screen, was installed at a capital cost of $10,000.

A bund wall was created using topsoil on the western boundary, and over 200 native trees will be planted. Rehabilitated areas continued 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 earthmoving equipment and a 40 hp pump amounted to $145,000.

A water storage dam was constructed and the construction of a large tailings dam for settling suspended solids commenced.

Rehabilitation is being carried out in three areas on the lease.

Increased sales have required an additional person to be employed on a full-time basis, increasing the workforce strength to the owner-operator, two full-time employees and a part-time subcontractor.

Trident Consolidated Industries, Quarry Division

Production totalled 55 000 tonnes of basalt and 38 000 tonnes of quartzitic sand and gravel.

Expenditure on capital items included $400,000 on the purchase of two front-end loaders and $6,000 on the renewal of a sand plant feed bin.

Four hundred gum trees were planted to provide screening of the crushing plant.

Eleven persons were employed on a full-time basis.

Treloar Transport

Production for the year was reported as 22 224 tonnes of sub-base 1 and 2 material, 9875 tonnes of base course material, 2593 tonnes of drain rock and 2348 tonnes of pipe bedding material, a total of 37 040 tonnes.

A recent purchase of an adjacent quarry from the Kentish Municipal Council will facilitate an increase in production and more efficient sequence of rock extraction.

Capital expenditure of $248,000 included the purchase of a loader, the purchase of the adjacent quarry and modification to the crusher.

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 building industry throughout Australia is in recession. This has had a marked detrimental effect on brick and paver manufacturers.

K & D Bricks and Pavers

A total of 39 760 tonnes of marketable product were manufactured from 30 270 m^3 of clay and shale. Shipments amounted to 33 800 tonnes.

Major projects

Two major projects were in progress at year end. These were for the supply of product for the Wapping Complex and the Elizabeth Street Mall projects in Hobart.

Capital expenditure

A dust extraction system for the raw material section was installed.

New developments

Exports of bricks and pavers to New Zealand were increased. Clay shapes, other than those of standard brick and face treatments, were developed and a new source of clay was being trialed.

Environmental initiatives

Work undertaken in this area during the year included:

- ongoing rehabilitation at all clay and shale pits;
- construction of six settling pits for plant effluent; and
- the installation of a dust extraction system for the raw material section.

Employment

The number of persons in direct employment during the year was 35.

Nubrik

Production for the year totalled 10.573 million brick equivalent units (including bricks, blocks and pavers). Materials quarried totalled 26 660 m^3, with 27 588 m^3 of material being processed.

Sales totalled 10.350 million brick equivalent units.

Major projects

Two major projects were undertaken. These were the supply of over 120,000 clay pavers for a 'Better Cities' project at the former Inveresk railway yards in Launceston, and the supply of clay bricks for the Newstead College project, with 190,000 bricks having been supplied by year end.

Capital expenditure

Modifications to the plant to facilitate the production of clay blocks were undertaken as a capital project.

New developments

Rapidwall clay blocks were re-introduced on the Tasmanian market.

Employment

The average number of employees for the year was 42.

Comalco Aluminium (Bell Bay) Limited

Production for the year totalled 101 928 tonnes of aluminium ingots, bars and blocks. Raw materials consumed in the process included 200 000 tonnes of alumina, 45 000 tonnes of petroleum coke, 11 000 tonnes of liquid pitch and 4000 tonnes of aluminium fluoride.

Capital expenditure

Expenditure on process improvements and environmental and safety projects accounted for most of the $12.1 million spent on items of a capital nature.

New developments

A Memorandum of Agreement with the Government and the Hydro-Electric Commission was signed. Major features of the Agreement included:

- a new power agreement to be negotiated for the supply of 256 MW of power to the year 2014, representing an increase by 19 MW;
- a $200 million capital expenditure programme to be completed by the year 2001; and
- the installation of dry scrubbing by the end of 1997.

Production will be increased to 140 000 tonnes per annum.

Environmental initiatives

The installation of dry scrubbing will lift the smelter's performance substantially. This, together with the increase in production and the extension of smelter life, has necessitated an update of the environmental improvement programme.

Encapsulation of spent cell lining was completed in December 1995. The wetlands, established to lower the quantity of suspended solids and non-filterable residues discharging from the site, was officially opened in June 1996.

A joint venture between Comalco and the Department of Employment, Education, Training and Youth Affairs to beautify 20–30 hectares of land was carried out by a team of long-term unemployed persons.

Employment

The workforce at 30 June 1996 totalled 841 people, comprising 719 full time, 4 part time/temporary employees, and 118 contractor full-time employee equivalent.

An Enterprise Flexibility Agreement, which gives employees the freedom to choose conditions covered by staff contracts, was approved by the Australian Industrial Relations Commission in April 1996.

Hydromet Operations — Tasmania

This company processes manganese mud stockpiled by Pasminco Metals–EZ to produce a marketable manganese sulphate. The operation complements the EZ operation, with the mud stockpile gradually being depleted and residues and liquors from the Hydromet operation being recycled in the EZ process.

Plant commissioning commenced in January 1996.

Production

One thousand tonnes of manganese sulphate, containing 30% water soluble manganese, were produced. The product was despatched to the fertiliser and animal feed industries within Australia.

The operation requires the use of sulphur dioxide and sulphuric acid in the leaching process and lime, manganous oxide and sodium bisulphide in the purification section.

Capital expenditure

Capital expenditure on the plant was $6 million.

Employment

The workforce consists of 18 full-time employees. At year end there were eight contractor employees on site.

Impact Fertilisers

Production of single superphosphate during the year totalled 112 348 tonnes, of which 41 239 tonnes were shipped to mainland ports.

The process consumed 68 203 tonnes of imported phosphate rock and 39 995 tonnes of sulphuric acid supplied by Pasminco Metals–EZ.

Major projects

The installation of new screening and blending plants at the Risdon works was in progress at year end. Construction of a depot at Deloraine will commence in the new financial year.

Capital expenditure

Expenditure of a capital nature was incurred at Risdon on roofing an area for a new shed, modifications to an electrical substation, purchase of a Bobcat, installation of a new weighbridge, and construction of a fluosilicic acid plant.

Blending plants were constructed in Devonport, Scottsdale, Burnie and Smithton. In addition, storage sheds were constructed in Devonport and a front-end loader was purchased for the Burnie depot.

Employment

The workforce during the year totalled 59 people, including four casual and four contractor employees.

IMP Silica

The silica flour operation experienced a quiet year, producing only 2216 tonnes of saleable product. Of this, 2016 tonnes were shipped to Japan and the balance to the USA.

The prospects of penetrating the USA market appears to be quite promising.

In order to recover the saleable product, 3360 tonnes of raw material were processed.

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

Pasminco Metals–EZ

A total of 207 839 tonnes of zinc and zinc alloys was produced, with 206 542 tonnes of product being dispatched.

By-products produced included 392 302 tonnes of sulphuric acid, 26 912 tonnes of secondary leach residue, 318 tonnes of cadmium and 3993 tonnes of copper sulphate.

Zinc concentrate treated during the year totalled 428 409 tonnes, of which 218 049 tonnes were from Tasmanian sources.

Major projects

Construction of a second zinc stripping machine and associated cathode handling system for the cell room was almost completed.

Expenditure commenced on the conversion of the plant to include paragoethite production which, when completed, will eliminate the necessity for the ocean disposal of jarosite residue.

Capital expenditure

The total capital expenditure for the year was $24.9 million.

Environmental initiatives

A programme of accelerated reclamation of a jarosite stockpile was initiated in preparation for the rehabilitation of the area after conversion to the paragoethite process.

The treatment of a manganese dioxide mud stockpile by Hydromet Operations commenced.

Employment

The permanent workforce during the year totalled 656 people, with an additional 122 (employee equivalent) contractors being employed.

TEMCO

Production for the year totalled 89 449 tonnes of ferromanganese, 99 666 tonnes of silico-manganese, 16 342 tonnes of fines, and 243 656 tonnes of sinter.

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

Major projects

Feasibility studies were being conducted into three potential projects. Two of these projects will result in increased production, while the third relates to a downstream value adding process.

The projects under consideration are:

- an increase in the production capacity of No. 3 furnace from 51 600 tonnes per annum of silicomanganese to 63 500 tonnes per annum, at an estimated cost of $9 million. This will require an increase of 6.5 MW of electrical power;
- the construction of a facility for the downstream value-adding process of converting high carbon ferromanganese to medium carbon ferromanganese. This is a low power intensive operation requiring approximately 1.5 MW of electrical power. The estimated cost of the project is $18 million;
- the construction of an additional furnace with a capacity to produce 183 000 tonnes per annum of high carbon ferromanganese. This furnace would require an electrical power load of 53 MW and will cost approximately $85 million. The capacity of this furnace, together with an increase in capacity of No. 3 furnace, will provide an increase of 70% in production capability.

Capital expenditure

Capital expenditure for the year was in excess of $6 million. Apart from $30,000 spent on land and buildings, this expenditure was incurred in plant and machinery.

The major capital expenditure was on sinter plant environmental improvements ($1.5 million), furnace No. 1 and No. 2 environmental improvements ($0.9 million), and purchase of a slag transporter ($0.5 million).

Environmental initiatives

A six-month 'New Work Opportunities' programme, directed mainly towards upgrading the Landcare focus in the wetlands area, was undertaken in conjunction with the Commonwealth Department of Employment, Education, Training and Youth Affairs The wetlands system continued to maintain contaminant levels in stormwater discharge below regulation limits.

After two years of operation, the George Town waste water treatment facility continued to operate efficiently, with discharge having no adverse effects on the Tamar Estuary. The plant treats furnace gas scrubber water, slag and metal quenching water, and George Town sewage.

The commissioning of an electrostatic precipitator for the sinter plant waste gas, and a tapping and casting fume collection system for furnaces 1, 2 and 3 have significantly reduced polluted air emissions from the plant.

Revegetation of the quartzite quarry at Beaconsfield continued. This involved topsoil spreading, reseeding and fertilising in the original pit, which was worked out during the year.

Employment

There were 376 people employed as at 30 June 1996, including 21 contractors

Tioxide Australia Pty Ltd

A decline in the pigment market, coupled with high unit production costs due to the size and age of the plant, resulted in a decision to close the Heybridge plant in July 1996.

Production

During the year under review, 30 225 tonnes of titanium dioxide pigments were produced from 41 940 tonnes of titanium-rich slag imported from Canada. Product shipments totalled 28 476 tonnes.

Capital expenditure

Expenditure on plant cladding replacement and dust extraction at ore drying amounted to most of the $0.94 million incurred on items of a capital nature. The remainder was incurred on equipment replacements.

Environmental issues

An Environmental Decommissioning and Rehabilitation Plan for plant closure was prepared.

Employment

There were 174 employees as at 30 June 1996.

Mineral production from Tasmanian sources since 1880

Quantity of production as at 30 June 1996

Commodity	*Unit*	*Quantity in Current Year*	*Total Quantity*
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)	11 481	1 164 698
Gold	(kilogram)	1 016	128 627
Ilmenite	(tonne)	-	558
Iron ore pellets	(tonne)	1 681 332	56 585 988
Iron in iron oxide (including hematite, limonite and magnetite)	(tonne)	114 512	1 549 567
Lead (from 1919)	(tonne)	38 565	1 251 026
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)	143 744	3 994 035
Tin	(tonne)	8 647	331 168
Tungsten (as tungstic oxide)	(tonne)	77	35 357
Zinc	(tonne)	198 376	3 570 275
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)	99 111	4 903 679
Dolomite	(tonne)	39 446	522 527

Commodity	Unit	Quantity in Current Year	Total Quantity
Graphite	(tonne)	-	41
Kaolin	(tonne)	28 425	607 197
Limestone–			
Agricultural and other	(tonne)	125 774	3 118 373
Carbide	(tonne)	-	1 081 509
Cement	(tonne)	1 347 339	23 048 536
Chemical and metallurgical	(tonne)	20 063	6 316 422
Ochre	(tonne)	-	2 949
Pebbles (from 1957)	(tonne)	-	31 757
Sulphuric acid	(mono tonne)	392 302	7 018 195
Sand (moulding)	(tonne)	-	1 442
Silica	(tonne)	-	701 248
Talc	(tonne)	-	338
FUEL MINERALS			
Coal (run of mine)	(tonne)	559 270	20 043 748
Shale	(tonne)	-	42 239
Peat	(m^3)	11 974	59 264
CONSTRUCTION MATERIALS			
Building stone–			
Freestone	(tonne)	560	33 940
Granite	(tonne)	1 657	137 528
Other stone	(tonne)	2 130	46 060
Sandstone (from 1993)	(tonne)	92	2 369
Crushed and broken stone (from 1958)–			
Basalt	(tonne)	1 134 399	21 345 215
Dolerite	(tonne)	1 003 614	34 572 429
Limestone	(tonne)	57 519	1 303 779
Sandstone	(tonne)	7 283	320 257
Other	(tonne)	154 195	11 775 057
Gravel (from 1958)	(tonne)	145 070	48 589 162
Sand (from 1958)	(tonne)	420 857	11 065 930
Other road-making material	(tonne)	1 673 705	17 111 912

Some inaccuracies with the statistics shown in the 1994/95 Annual Review have become apparent. The correct figures for the 1994/95 financial year were as follows.

Copper

Production was 15 064 tonnes, with a cumulative production total at 30 June 1995 of 1 153 217 tonnes.

Gold

Production was 974 kilograms, with a cumulative production total at 30 June 1995 of 127 611 kg.

Silver

Production was 143 359 kilograms, with a cumulative production total at 30 June 1995 of 3 850 291 kg.

Tin

Production was 7461 tonnes, with a cumulative production total at 30 June 1995 of 322 566 tonnes.

Zinc

Production was 196 109 tonnes, with a cumulative production total at 30 June 1995 of 3 371 899 tonnes.

Lead

Production was 60 418 tonnes, with a cumulative production total at 30 June 1995 of 1 212 461 tonnes.

Coal

Raw coal production was 607 911 tonnes, comprising 394 158 tonnes from underground methods and 213 753 tonnes from open cuts. Total raw coal production from the Cornwall Coal Company was 459 654 tonnes, of which 290 417 tonnes came from the Blackwood Colliery and 65 496 tonnes from two open cuts.

Value of the Tasmanian Mineral Industry

Year ended *Commodity*	*Unit*	*30 June 1995* *Total Quantity*	**30 June 1996** **Total Quantity**
METALLIC MINERALS			
Cadmium	(tonne)	0	0
Cobalt oxide	(tonne)	0	0
Copper	(tonne)	15 064	11 481
Gold	(kilogram)	974	1 016
Iron ore pellets	(tonne)	1 483 830	1 681 332
Iron (in magnetite)	(tonne)	113 698	114 512
Lead	(tonne)	60 418	38 565
Molybdenum	(tonne)	0	0
Pyrite	(tonne)	22 905	-
Silicon (metallic or as alloy)	(tonne)	0	0
Silver	(kilogram)	143 359	143 774
Tin	(tonne)	7 461	8 647
Tungsten as tungstic oxide	(tonne)	39	77
Zinc	(tonne)	196 109	198 376
Value of metallic minerals		**$355 211 401**	**$338 056 036**
NON-METALLIC AND FUEL MINERALS			
Clay–			
Cement	(tonne)	37 826	43 579
Brick	(tonne)	71 564	48 557
Other	(tonne)	11 180	6 975
Kaolin	(tonne)	29 376	28 425
Dolomite	(tonne)	41 969	39 446
Limestone–			
Agricultural	(tonne)	87 892	99 394
Cement	(tonne)	1 341 732	1 347 339
Chemical and metallurgical	(tonne)	31 272	20 063
Other	(tonne)	32 875	26 380
Silica (glass and other)	(tonne)	180 738	174 201
Sulphuric acid	(mono tonne)	347 150	392 302
Coal (run of mine)	(tonne)	607 911	559 270
Coal (washed)	(tonne)	275 157	206 619
Peat	(m^3)	0	11 974
Value of non-metallic and fuel minerals		**$40 663 714**	**$44 596 149**
CONSTRUCTION MATERIALS			
Building stone–			
Freestone	(tonne)	340	560
Granite	(tonne)	987	1 657
Other	(tonne)	5 013	2 130
Sandstone	(tonne)	305	92
Crushed and broken stone–			
Basalt	(tonne)	941 033	1 134 399
Dolerite	(tonne)	1 101 407	1 003 614
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		**$28 617 468**	**$28 933 286**
TOTAL VALUE WITH AUSTRALIAN METAL PRICES		**$424 492 583**	**$411 585 471**
METALLURGICAL PRODUCTION FROM OTHER THAN TASMANIAN ORES			
Aluminium Aluminium sulphate Cadmium Cobalt oxide Ferro-manganese Ferro-silicon Silico-manganese Sinter Superphosphate Titanium dioxide Zinc		**$609 664 012**	**$572 810 954**
VALUE OF MINING AND METALLURGICAL PRODUCTION		**$1 034 156 595**	**$984 396 425**
REPORTED AVERAGE NUMBER OF EMPLOYEES[1]		4173	4196

(1) Not all operators report full details

TASMANIA
DEVELOPMENT
AND RESOURCES

MINERAL RESOURCES TASMANIA
PO Box 56 Rosny Park
Tasmania Australia 7018
30 Gordons Hill Road Rosny Park
Tasmania Australia 7018
Tel: (03) 6233 8333 Fax: (03) 6233 8338