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Mineral Resources
Tasmania
Annual Review
1992-93



TASMANIA
DEVELOPMENT
AND RESOURCES

710

Annual Review 1992–93



Mineral Resources Tasmania

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MISSION

“To achieve increased and sustainable development of the State’s mineral sector.”

OBJECTIVES

- To create a competitive investment climate for growth in exploration for mineral deposits.
- To ensure a fair and sustainable return to the community for the resources used.
- To achieve world-class standards in occupational health and safety and dangerous goods control.
- To communicate with our staff and to maintain skills and professionalism by delegation of authority and accountability.

MINERAL SECTOR OVERVIEW

Tasmania's mineral sector is a vital component of the State's economy. It creates wealth for the population and provides for significant small business activity. Production of processed metals, mineral concentrates and industrial minerals in 1992/93 totalled \$1.02 billion.

The industry has, however, been in decline over the last decade. This is demonstrated by historically low levels of exploration investment and little or no real growth in mineral production.

The present Government's policies, which are strongly supportive of the mining and mineral processing industry, provide the necessary confidence for investors to arrest the decline in activity and return the sector to growth.

Mineral Resources Tasmania is responsible to Government and the community for the regulation and overall economic well being of Tasmanian mining. Government-initiated changes to the organisation have provided for the re-establishment of "Mines" as a lean, goal-oriented organisation. The Division's energies will be directed at:-

- Better use of presently identified resources.
- Expansion of exploration activity in the State to a level three times that of the present.
- Growth in industrial mineral activities through market research and encouragement.
- Continuing improvement in occupational health and safety performance.
- Improvement in environmental management to a level of acknowledged excellence.

This direction of effort and acceptance of accountability to the community is enshrined in the Division's Mission Statement, Objectives and Budget outcomes.

MINERAL PRODUCTION

Under the general influence of world-wide recessionary conditions, Tasmanian mineral producers continued with the challenge of again becoming internationally competitive. Tasmania remains a producer of base metals, iron ore, copper and tin. Present gold and silver production is in the form of by-products.

Production of copper, iron ore, tin and zinc increased, whereas the output of gold, silver, lead and tungsten fell.

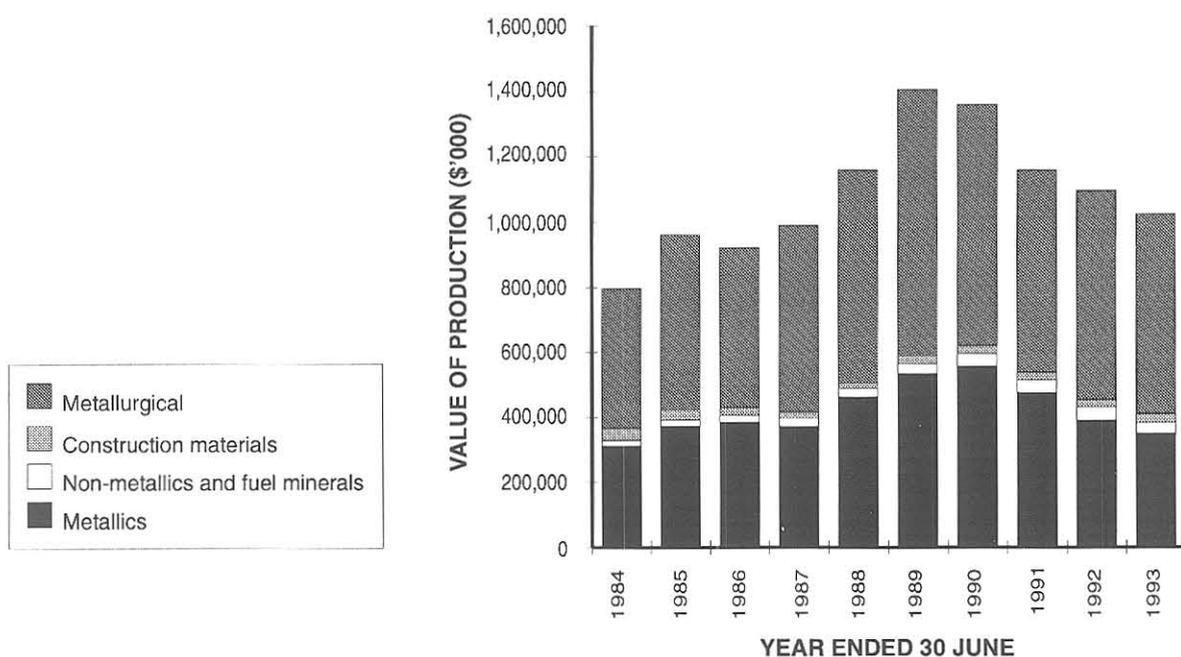
Run of mine coal production rose to 494 873 tonnes. The expansion of the Goliath Portland Cement Co. Ltd works at Railton to one million tonne per annum capacity, should provide a much needed local market expansion for coal.

The value of production of non-metallic minerals and construction materials rose from \$22.3 million to \$26.9 million. The Division believes that active market research by this industry should provide for significant growth into exports in the years ahead. The high quality of Tasmanian stone, combined with competitive international shipping systems and pricing, should provide for the establishment of 'super quarries' at appropriate sites adjacent to deep water facilities.

*Value and production
of minerals
1991/92 and 1992/93*

	1991/92		1992/93		% Change
	Tonnes	A\$'000	Tonnes	A\$'000	
Gold	1.7	-	1.4	-	-17.7
Silver	104.2	-	95.3	-	-8.6
Zinc	210 853	-	233 837	-	+10.9
Copper	27 292	-	28 395	-	+4.0
Lead	73 853	-	66 459	-	-10.0
Tin	5 729	-	6 760	-	+18.0
Tungsten	229	-	142	-	-38.0
Iron ore pellets	1 451 585	-	1 458 909	-	+0.5
Others	205 622	-	245 083	-	+11.9
Total metallic minerals	-	388 780	-	348 169	+10.4
Non-metallics and fuel minerals	-	40 927	-	32 766	-20.0
Construction materials	-	22 251	-	26 897	+20.9
Metallurgical production from imported ores	-	645 196	-	616 908	-4.4
Value of mining and mineral processing sectors	-	1 097 154	-	1 024 740	-6.6

*Value of production
of minerals
1983/84 to 1992/93*



METAL PRICES AND MARKETS

Trends and Outlook, 1992/93

The base metal markets remained depressed, with US\$ prices for tin, copper, zinc and uranium falling throughout 1992/93. Inventories are generally higher than those held at the end of the last recession in the early 1980s. Australian producers have, as a result, been seriously affected. In addition to the generally stagnant state of major world economies, the influence of China and the C.I.S. countries, as exporters of metals in their quest for foreign exchange, has restricted any potential for price gains.

At the end of 1992/93, most base metals were trading at least at their five-year lows. Zinc was at a six-year low, copper at a five-year low, and tin at a 20-year plus low.

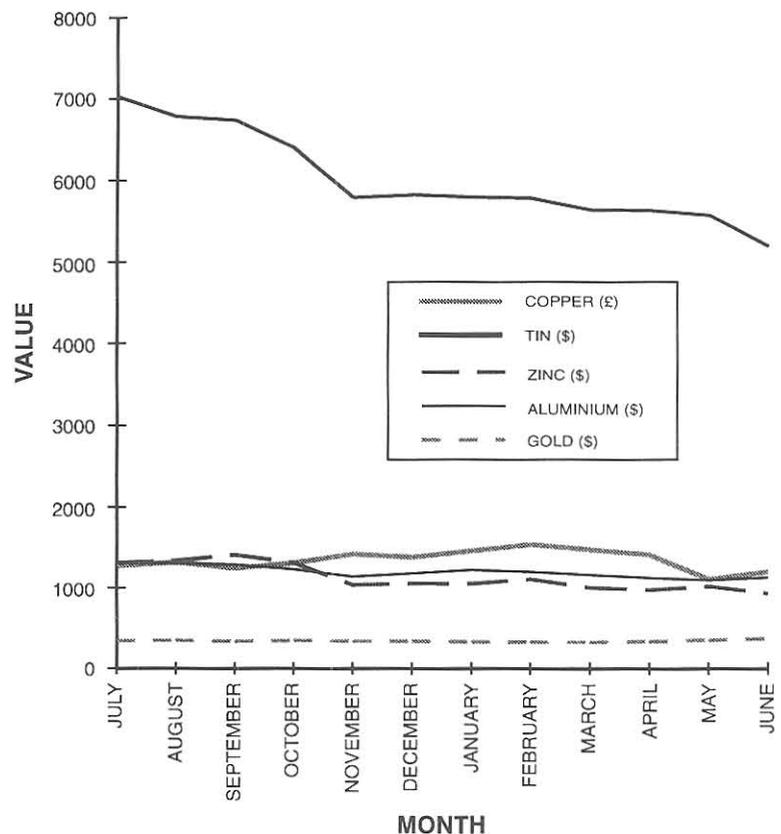
These realities have confronted miners and processors, and have forced an acceptance that there is no sign of an end to the long-term decline in real metal prices. Companies now budget for reality. Unfortunate consequences for employment have resulted.

Gold, on the other hand, rose to a five-year high by year end, with realistic market expectations of further gains ahead. Australian gold producers have been able, through productivity and technological improvements, to maintain reasonable profit margins. This has provided for investor interest in the metal. As a consequence, growth in mainland exploration has been underpinned by gold search activity.

It is now accepted that Tasmania is highly prospective for gold. This belief, supported by the Henty discovery and the historical record of gold production in the northeast of the State, must be strongly marketed to explorers.

A significant gold find would have the capacity to rekindle investor interest in Tasmanian mining.

*LME metal prices
1992/93*



5 cm

In the aluminium market, given the high stock levels and continued consumer weakness, it is unlikely that further plant capacity shutdowns will be sufficient to balance the physical market during the coming fiscal year. Price recovery is therefore likely to be delayed.

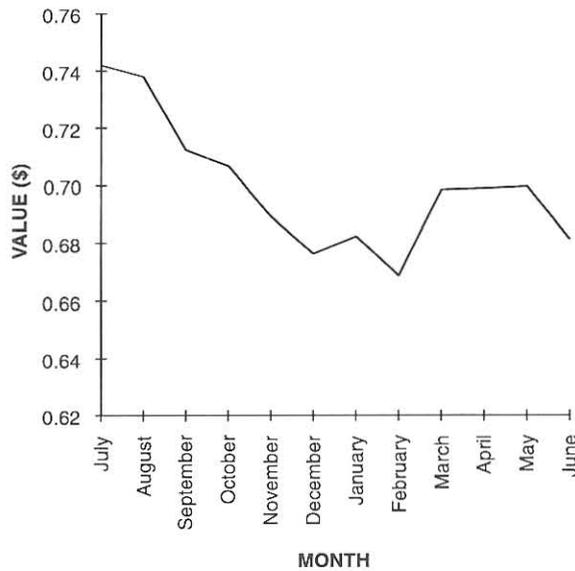
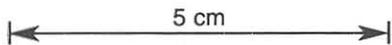
In the case of iron ore, the average 11% fall in prices negotiated during 1992/93 are unlikely to be regained, with downward pressures appearing to predominate.

The zinc industry is unlikely to see much relief from the current low prices for a major part of the 1993/94 year. Prices are likely to average around US\$950/tonne for the year, but begin to pick up in the early part of 1994/95.

The Effect of Exchange Rate Variation

Tasmanian miners and processors, with contracts for sales based on US dollars, have been partially protected from the effects of the depressed markets. At year end, the exchange rate for the Australian dollar against the US currency was approximately 67 cents. This compares with a 74 US cent value for the Australian dollar in July 1992, i.e. ± 10% depreciation on sales of one billion US dollars. This allows for an additional A\$140 million in revenue for the state's exporters, or a A\$20 million rise or fall in revenue for every one cent depreciation or re-valuation.

Value of Australian Dollar against US Dollar 1992/93



Outlook for 1993/94

In summary, ABARE forecast a continuing weakness in 1993/94, with prices falling a further 3% on the 10% fall averaged in 1992/93. The prediction also warns against the likelihood of further Australian dollar depreciation offsetting the effect of weaker world markets.

EMPLOYMENT

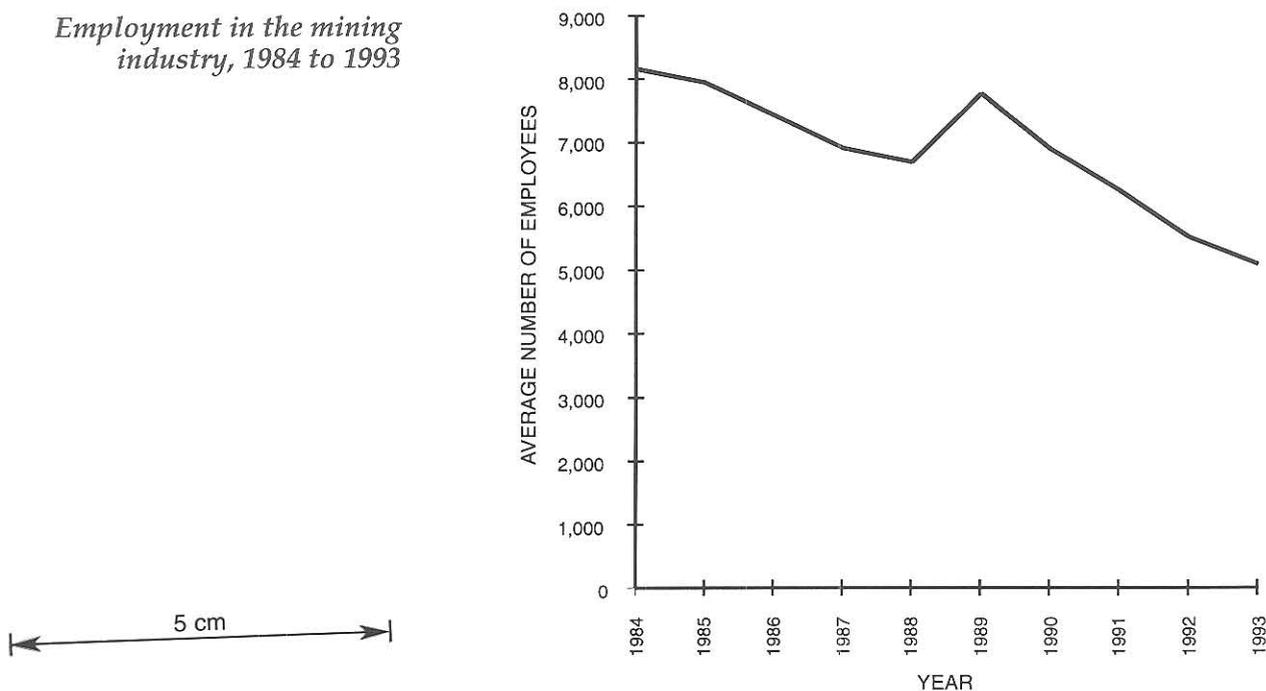
During 1992/93, the Mineral Sector provided for the direct employment of 5086 Tasmanians. Using the accepted multiplier of two indirect jobs for every directly employed person, the mining and mineral processing sector can claim responsibility for the provision of approximately 14-15,000 Tasmanian jobs.

As illustrated below, direct employment has fallen dramatically over the last ten years. This is a result of mine closures, productivity-driven

retrenchment programmes, and a trend towards the use of part-time labour and contractors.

This trend has stabilised, but will not be reversed without the discovery of new ore bodies, establishment of additional value-adding infrastructure, or the opening of new industrial mineral quarries.

Employment in the mining industry, 1984 to 1993



CAPITAL INVESTMENT

Reflecting the state of the economy and the paucity of mine discovery, capital investment by the mining sector remained depressed. Major capital expenditure during the year included:-

- Goliath Cement — \$68.50 million
- Pasminco-EZ, Risdon — \$24.20 million
- Temco — \$14.00 million
- Comalco — \$7.90 million
- Pasminco Rosebery — \$5.56 million
- Renison Ltd — \$5.45 million
- Hellyer — \$4.47 million
- Mt Lyell — \$3.20 million
- Cornwall Coal — \$1.08 million

The commencement of the Henty Mine project, early in 1993/94, should assist in capital expenditure growth in the coming year.

MINERAL EXPLORATION AND DEVELOPMENT

There has been a continuing decline in mineral expenditure by private companies in the State which is causing concern for the long term future of the mining industry in Tasmania.

The table below, showing Australian Bureau of Statistics figures for mineral exploration expenditure for the past decade to June 1993, illustrates the dramatic decline in expenditure from \$18.6 million in 1982-83 to \$7.8 million in 1992-93. Over the same period, Tasmania's market share of the Australian exploration expenditure declined from 4.25% to 1.23%.

Decline in mineral exploration in Tasmania

Year	Australian Expenditure (\$ Million)	Tasmanian Expenditure (\$ Million)	Tasmania as % of Australian Expenditure
1982–83	437.9	18.6	4.25
1983–84	428.7	18.0	4.20
1984–85	437.3	17.8	4.07
1985–86	442.0	10.6	2.39
1986–87	556.8	10.9	1.96
1987–88	799.2	10.4	1.30
1988–89	697.6	13.1	1.88
1989–90	607.5	11.8	1.94
1990–91	601.7	9.9	1.65
1991–92	604.0	7.9	1.31
1992–93	631.8	7.8	1.23

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

There are a variety of reasons for the decline including:-

- the collapse of the tin price and the dissolution of the International Tin Council in 1985. Tasmania is Australia's premier tin province and hence is not gaining the benefit of exploration interest in this still depressed metal.
- the perception by companies that Tasmania is not a gold province meant that the State did not benefit from the gold exploration boom of the late 1980s.
- a deteriorating public support for mining and mineral processing for mainly environmental reasons.
- a resulting view by industry that access to land by explorers, and sovereign right to title on discovery, were at unacceptably high risk levels.

Paralleling this decline in mineral exploration has been the closure of six major mines — Rossarden/Storeys Creek mine, the King Island Scheelite mine, the Que River base metal mine, the Oakleigh Creek mine, the Cleveland Tin mine and the Anchor tin mine. Only two new orebodies have been discovered to replace these mines, with the Hellyer base metal mine now fully operational and the Henty gold mine in a pre-development phase. The amount of exploration in the last decade has not been sufficient to replace the mines closing down for reasons of ore exhaustion and economics.

Stimulating Mineral Exploration

The Tasmanian Mining Industry provides over 5,000 direct jobs, over 10,000 indirect jobs, generates mineral wealth of over \$1 billion per annum, and produces 52% of the State's overseas exports.

Recognising the vital role of the mineral industries in the Tasmanian economy, together with the decline in mineral exploration, the Government has put in place a series of important initiatives to attract exploration investment to the State.

More detailed performance indicators for 1992/93, collected by Mineral Resources Tasmania, indicate that compared with the previous year:

- drilling is up 31% (from 17 579 m to 23 006 m), an encouraging sign of real improvement (RENDEEP drilling is an additional 12 823 m).
- expenditure was down 3% (from \$7.4 million to \$7.2 million). However if RENDEEP lease drilling is added, expenditure would be \$8.2 million, up 11%.
- the overall number of exploration licences was down 7% (from 108 to 100), although new licences granted have increased by 59% (from 17 to 27).
- the total area held under exploration licences is down 2% (from 5814 to 5672 km²).

These indicators, although mixed, show cause for cautious optimism that a recovery is underway.

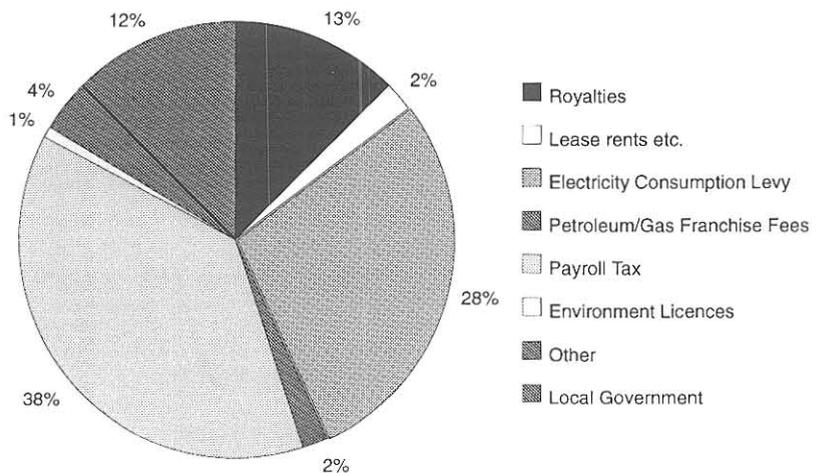
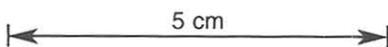
The prediction for 1993/94 is for a modest increase in the level of activity, as companies concentrate on exploration on mining leases to optimise resources close to established infrastructure or new ground is selected by companies attracted by promotional advertising and targeting.

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. The extent of this contribution is shown in the table below.

	<i>Actual</i> 1991/92 (\$,000)	<i>Estimate</i> 1992/93 (\$,000)
Royalties	4 729	5 700
Leases, rents etc.	784	750
Electricity consumption levy	10 651	10 500
Petroleum/gas franchise fees	716	720
Vehicle fees	102	110
Stamp duty (estimated)	95	95
Payroll tax	13 965	14 000
Land tax	368	300
State Debts Tax/FID	233	235
Environment licences	319	300
Other	1 475	1 440
Total State Government	33 437	34 150
Local Government	4 592	5 000
Total	38 029	39 150

Distribution of taxes and charges paid by mining and mineral processing operations



REVIEW OF DIVISIONAL CHANGES

The year 1992/93 was one of change. The Mines Department lost its independent agency status by amalgamation with the Tasmanian Development Authority and the Industrial Services Division of the Department of Employment, Industrial Relations and Training. This occurred in February 1993, following a reshuffle of Ministerial responsibilities. The new development and employment-focused Department that resulted was called the Department of State Development and Resources. To underline the importance of the new Department to the State's future, the Premier, the Hon. Ray Groom MHA, undertook ministerial control of the new agency.

Following a Government Programme Review Team report into Mines and the imperatives of the 1993/94 budget process, the Division was restructured in March. This allowed Management to review the outcomes and outputs needed to achieve the Government's objectives within the framework of the new Department.

An integral part of this reorganisation was the Division's participation in the 1993 Employment Rationalisation Programme. These processes provided for the downsizing of the Division by a combination of natural wastage and voluntary redundancy from 122 full time employees in June 1992 to a planned strength of 64 people for the coming year. This reduction was facilitated by the following initiatives:-

- The winding up of the Department's drilling section. This activity is better provided by the private sector.
- The centralisation of the bulk of the corporate services functions in the Department's ANZ Centre Head Office.
- The amalgamation of Cartography and Drafting groups into one Data Management Section. This move signals the end of traditional map production by the Division and the full conversion of data storage and presentation to a Geographic Information System.
- The formation of the Resource Exploration and Development Branch, centralising all geoscientific activity under the State Chief Geologist.
- The inclusion of Petroleum Geology into the Hydrocarbons and Tenement Management Branch.
- Rationalisation of responsibilities within the Mines Inspectorate and the Dangerous Goods Division, allowing for continued service delivery at less cost.
- A flattening of the management structure.

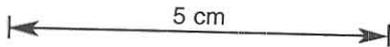
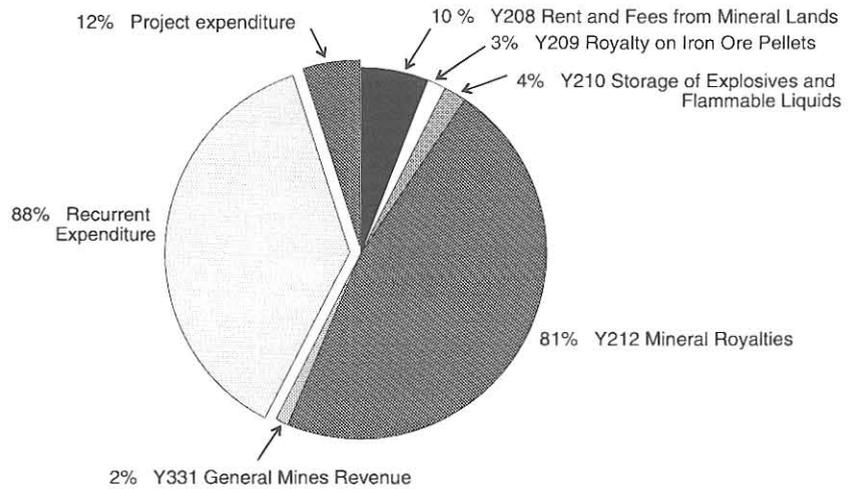
FINANCIAL PERFORMANCE

In accordance with the requirements of the *Financial Management and Audit Act 1990* the Division is required to report on the years financial transactions against the original Appropriation.

In the 1992/93 financial year expenditure adjusted for the twenty-seventh pay period totalled \$7.2 million, which was offset by revenue of the same amount.

In future years and following reorganisation of Mineral Resources Tasmania, expenditure is estimated at \$5.2 million, i.e. approximately \$2 million less than recoverable from the mining and mineral processing industries by way of royalties and fees.

Estimated revenue (\$7m) and expenditure (\$5.1m) for the financial year 1993/94



FOCUS FOR THE FUTURE

- The Dangerous Goods Inspectorate and the Mines Inspectorate will continue to deliver a service to the community that will provide for excellence in dangerous goods handling, storage and transport, and workplace occupational health and safety. Particular note should be made of the continuing improvement in the mining sector lost-time frequency rate, down by 38% in 1992/93, from 62 accidents per 10⁶ manhours in 1991/92 to 42 in 1992/93. A target for 1993/94 will be established with the industry. Closer liaison with the ISD group can be expected, along with progress towards the establishment of a single Occupational Health and Safety Act for Tasmania.
- A strong focus will be placed on returns to the State in the form of mineral royalties. Following any sustained improvement in commodity prices, a review of royalty rates would be justified.
- The management of mineral tenements will continue to focus on speedy processing of lease title documents and the effective performance of title holders. Strict adherence to the policy of "use it or lose it" will ensure maximum access to prospective ground or defined resources by *bona-fide* developers and explorers. Continuing high standards in environmental performance will be demanded.
- The Resource Exploration and Development Branch will focus strongly, in its projects and programmes, on areas seen as most likely to result in increased exploration investment and mineral discovery. A team-based approach will place responsibility on geoscientists for the identification and marketing of vacant, but prospective land. This will involve promotion and marketing of Tasmanian opportunity to international and interstate investors. The Division's budget in 1993/94 will provide for the NETGOLD project. By March 1994, an information package for explorers will have been assembled. This will contain magnetic and radiometric data, gravity survey data, geological mapping, structural information, and a resource index. Following the release of the data, the vacant areas in the northeastern gold province will be put up for tender using the ETA system.

This form of project expenditure will continue to be pursued by Mineral Resources Tasmania as a means of expanding the State's area of mineral prospectivity. Future projects may involve work in the North West, the Midlands and the East Coast.

- The Engineering Geology and Groundwater Section will continue its community service role. As anticipated in the new Land Use Planning Legislation, State policies will require the involvement of this section prior to land use development decisions being taken. The

section's past responsibility for providing a conveyancing search facility has been transferred to the private sector.

LEGISLATIVE CHANGES

In a response to investors' concerns over access to land and sovereign risk perceptions, Government took the following steps during 1992/93.

- Part of the South West Conservation Area north of Macquarie Harbour was revoked, along with certain scenic reserves on the Murchison Highway.
- The *Mines (Strategic Prospectivity Zones) Act 1992* was passed. This provides for a high level of security for explorers investing in defined areas of high prospectivity in Tasmania. The Act calls for changes of land tenure in these zones to be passed by both State Houses of Parliament and, following such action by the State, for compensation to be paid to any explorer where exploration or development is curtailed by the change in land status.

The changes were well received by Industry at a promotional seminar in Hobart in late 1992, titled "Tasmania, Island of Opportunity"

- Following exhaustive talks with industry and other agencies, the *Mining Act 1929* has been updated to 1990s standards and requirements. The new *Mineral Resources Development Bill* will be tabled in Parliament in the 1994 Autumn Session. It is hoped that this Bill will reflect Government policy on all mining and exploration issues, including that of mineral rights ownership.

MINERAL RESOURCE DEVELOPMENT

The establishment at Rosny of the Development Division's Minerals Team is viewed in a very positive light. This group of four specialists will draw on the MRT professional staff for advice and assistance in the task of turning known resources and processing opportunities into wealth-creating industries and jobs.

RESOURCE AND EXPLORATION DEVELOPMENT

For most of the year, the Geological Survey operated in its traditional structure carrying out core geoscientific investigations in the areas of regional geological mapping, economic geology (including mineral resource mapping), geophysics, geochemistry, petrology and engineering geology and groundwater.

In May 1993, following the retirement of Dr Emyr Williams (Chief Geologist–Regional Mapping), the Geological Survey was progressively restructured over several months into the Resource and Exploration Development (RED) Branch.

Regional Geological Mapping

Until May 1993, the regional mapping group had a substantive workforce of ten geologists and a core store supervisor. Of these, one geologist was engaged in Launceston Geodata mapping, another was working on a University project, and a third was on leave without pay working through AIDAB with the Geological Survey of Zimbabwe. The remaining geologists continued working on the production of maps of the Geological Atlas 1:50 000 Series and associated explanatory notes.

Trowutta Map Project

Mapping in the southeastern part of the map sheet revealed structurally transitional boundaries between rocks of the Arthur Metamorphic Belt and the Rocky Cape Group to the west, and Burnie Formation to the east. Previously unmapped carbonate units with the capacity to act as host rocks for mineralisation were located within this area. Areas of Tertiary basalt and fault slices of Permian-Carboniferous sedimentary rocks were found to be more extensive than shown on previous maps.

To the north, in the area east of the Savage River Pipeline and north of the Arthur River, rocks belonging to the basement Rocky Cape Group and Arthur Metamorphic Belt were found to be similarly overlain by extensive cover of Tertiary basalt, Permian strata and, in places, Jurassic dolerite. Detailed structural and stratigraphic information obtained from all of these units should enable well-controlled structural cross-sections to be constructed for this area.

Sheffield Map Project

Re-mapping in the area south of Roland and west of Lake Barrington to the Claude Road area showed that andesitic rocks of the Beulah Formation are more extensive than depicted on the old 1:63,360 Sheffield map sheet. Acid volcanic rocks belonging to the Minnow Keratophyre exhibit an internal stratigraphy on the northern flanks of Mt Roland. In the area around Lake Roland, some of the conglomerate units, previously mapped as Ordovician sequences, are now known to be of Cambrian age.

Remapping in the Paradise–Lower Beulah–Weegen area has shown that both the Gog Range Greywacke and the Minnow Keratophyre contain an internal stratigraphy, and that the main fold phase affecting these formations has an east–west axis. The dominant northwest–southeast cleavage in this area belongs to a late phase of deformation. The complex fault structures shown on the original 1:63,360 Sheffield map sheet in this area could not be substantiated.

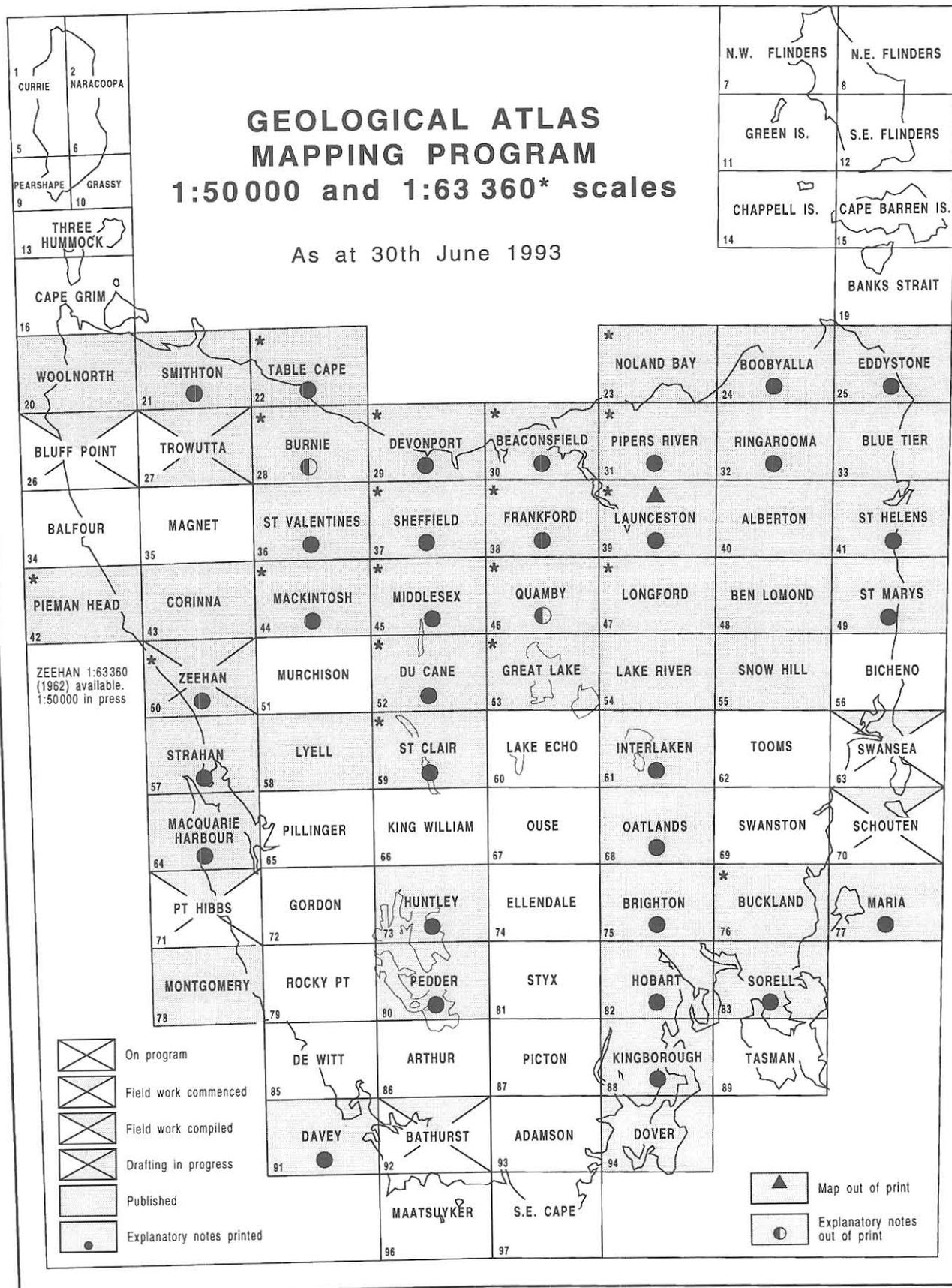
Hobart Map Project

Mapping in the Kingston area of the Hobart 1:50 000 map sheet indicates remnants of a complex thin veneer of Tertiary basalt flows with associated sediments, including expansive montmorillonite clays. The exhumed Tertiary landscape is developed on rocks of the Parmeener

GEOLOGICAL ATLAS MAPPING PROGRAM

1:50 000 and 1:63 360* scales

As at 30th June 1993



5 cm

Supergroup, which are deeply weathered in places. Investigations have been greatly assisted by deep trenching associated with water pipelines and cable laying by Telecom.

Following the restructuring, systematic regional mapping was suspended.

COMPLETED 1:50 000 COMPILATIONS AND EXPLANATORY NOTES

The 1:50 000 maps of the Dover and Alberton Quadrangles were published. The Zeehan sheet is being drafted and the Trowutta sheet compiled.

In the 1:250 000 map series, the Northeast map sheet was entered into GIS format and the Southeast map sheet is nearing completion.

Explanatory notes for the Macquarie Harbour 1:50 000 map sheet were completed and published. The notes for the Lake River map sheet are in press. Preparation of explanatory notes for the Montgomery, Lyell, Zeehan, Alberton, Ben Lomond/Snow Hill and Woolnorth 1:50 000 map sheets commenced or continued until such time as work was suspended due to the restructuring. It is hoped that work will resume in the future. In the meantime, completed sections for these explanatory notes will be published as part of Mineral Resources Tasmania's 'Report' series.

GENERAL

During August and early September all available regional section geologists were occupied producing 1:25 000 compilation maps of the Zeehan, Trowutta and Alberton Quadrangles for poster displays at the 'Tasmania — An Island of Potential' conference held at the Hobart Sheraton hotel on 17/18 September 1992, and a summary review paper *Current systematic regional mapping: new potentials for mineral discovery* for the associated Bulletin 70.

A second paper, *Platinum group elements and their host rocks in Tasmania*, was delivered at the conference and was also included in Bulletin 70.

During the year ANZMEC subcommittee meetings relating to mining legislation and mineral royalties were attended.

Core Storage

With the transfer of core from the old leased core store to the new Government-owned facility at Mornington, the new core store is now filled to 93% capacity. The necessity of selecting and housing core drilled by exploration companies, and from a number of mines which have either closed down (such as Cleveland) or are contemplating possible closure (such as Mt Lyell and Savage River), will require the provision of an additional core storage facility within the next few years.

Economic Geology

Staffing levels of the Section (until May 1993) were reduced to ten permanent officers, with the loss of one geologist to the Hydrocarbons and Tenement Management Branch. This left six geologists and three support personnel under the control of a Deputy Chief Geologist. A temporary geologist engaged on the specially-funded Mt Read Volcanics Project successfully applied for the position of XRF analyst in the Chemical Laboratory when the MRV Project terminated after June 1992.

REGULATION

There were signs of improvement in the level of exploration, with the number of new exploration licences granted during the year rising to 27 covering 2858 square kilometres, compared to 17 new exploration licences in the previous year covering 456 square kilometres. There was a total of 100 exploration licences covering 5672 square kilometres at the end of 1992/93, a slight drop of 2% on the previous year.

Eighty company exploration reports were assessed and 73 exploration licences and two retention licences were reviewed and renewed. Fifteen retention licences were current at year end.

Three exploration tenders were received for 35 areas advertised under the Exploration Tender Area System, resulting in four new exploration licences.

MT READ VOLCANICS PROJECT

This important project, designed to increase the information available to mineral exploration companies, ran from 1985 to 1992 on specially provided funding. Over that time, \$4.2 million of direct funding was expended from both State and Commonwealth Government sources, and an additional \$1 million was provided from Department of Mines resources. The project and its products, which were described in Bulletin 70, contributed to the high occupancy rate of exploration companies in the Mt Read Belt.

MINERAL RESOURCE MAPPING

During 1992/93 core activities continued using standard Divisional resources. The thirteenth map (The geology of the Mt Jukes–Mt Darwin area) in the Mt Read Volcanics Project 1:25 000 scale geological map series was compiled and published. This map was compiled from work done in the 1991/92 field season.

Field mapping was discontinued in the 1992/93 field season so that explanatory notes covering maps of previous years could be completed. Notes for Maps 2 and 3 and for Map 9 were worked on during the year. The economic geology section of the Macquarie Harbour explanatory notes was written during the year.

A display of Mt Read maps and reports ran for three months in the foyer of the Rosny Park offices.

MINERAL RESOURCE ASSESSMENTS

Advice is provided to Government agencies on the mineral resource implications of land-use planning. An information pamphlet was published on the mineral resources of the North West Forests Area. A critique of the geological and geomorphological criteria for the World Heritage nomination was produced for the North West Forests Area.

COMMODITY STUDIES

Gold

Research on lode gold deposits in northeastern Tasmania is being compiled into maps and reports for the NETGOLD project. These reports are complete for the Mangana and Mathinna areas, and are in progress for the Alberton, Mt Horror and Lisle areas.

Studies on the occurrence and distribution of gold in the Mt Lyell ores and copper concentrates were compiled into two reports.

The database of Tasmanian gold deposits (as part of the MIRLOCH computer database) is essentially complete, with 1270 gold-bearing deposits recorded.

The petrologist represented the Department on a steering committee for archaeological surveys over some of the northeast goldfields.

Limestone

As part of a search for high-grade limestone to replace the Benders Quarry resource at Lune River, an evaluation was carried out at Roberts Hill, Maydena. An eight-hole 638 metre percussion drill programme was carried out on one of the two highest grade areas defined by a systematic chip sampling survey. Assessment of the drilling results, together with chemical analyses of the drill samples, gave an *in situ* limestone resource of 5.5 million tonnes grading 92.9% CaCO₃ and 0.59% Mg.

At year end tenders were invited from companies interested in developing the resource. There were a number of expressions of interest but no firm proposals.

Magnetite

An assessment was made of magnetite resources at Kara and adjacent areas.

Dimension Stone

A report was written in conjunction with the Tasmanian Development Authority as a guide to dimension, ornamental or building stone occurrences within the State. A report was written on the resources of the Coles Bay granite quarry.

PETROLOGY AND SAMPLE TESTING

A total of 2119 samples were received for investigation, of which 718 were non-Geological Survey samples. These samples included 156 for CODES (under an in-kind agreement), 149 for Mines Inspection, and 413 samples for paying customers. Revenue generated was \$21,279, from a wide range of external sources including the Hydro-Electric Commission, Department of Roads and Transport, Department of Primary Industry, Tasmanian Police and various other Government departments; various mining and exploration companies; and miscellaneous businesses and the general public.

Samples studied included geological materials such as clay, mineral concentrates, rocks, soil, sand, and ore samples, and other materials such as asbestos, industrial materials, dust and concrete. Silica-bearing dusts, asbestos, and other environmental hazards are still being submitted; 350 such samples were described, identified or tested.

Departmental studies undertaken included work on limestone from Maydena, basalt from Ulverstone, skarn from the Tenth Legion mine,

various rocks from Glovers Bluff, Mt Read Volcanics samples, and glaucophane-bearing amphibolite from the Savage River–Corinna district.

Mines Inspection work completed included dust analyses from Fingal and other areas, and fibre studies at Tioxide and Comalco. Research into the occurrence of asbestos at Savage River Mines, using XRD, SEM, microprobe and optical microscopy, is almost complete. These studies are valued at about \$4,000.

Considerable petrological work has been undertaken as a part of the Tasmanian alkali-aggregate reactivity research project (TAARRP) in conjunction with the HEC, DRT, the 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 petrologist also revised the gemstone booklet and helped with the compilation of notes for the fossicking areas. He presented a talk on the lead mines and minerals of Tasmania at a national mineralogical symposium in Adelaide.

The MIRLOCH database of mineral deposits in Tasmania now has 2859 entries, covering coal, metallic and industrial minerals, and is being steadily updated. Large parts of the State are now essentially complete in this regard (70 out of 97 geological map quadrangles).

Curatorial work has included the preparation of several displays for the open day, supervision of the rock stores, and updating of the databases.

Petrology Laboratories

The lapidary laboratories prepared 791 standard thin sections, 69 polished thin sections, and 43 miscellaneous sections, making a total throughput of 903 samples.

The technical officer for petrological services processed 775 samples by X-ray diffraction, including 232 quantitative dust analyses, 102 quantitative clay analyses, and 441 routine identifications. He also conducted 178 soil tests, 115 optical asbestos identifications, 21 isotope determinations, eight mineral separations for geochronology, five size analyses and 80 dust membrane preparations, a total of 1182 samples.

The laboratories provided a total of \$78,470 worth of analyses and services, 60% of this being for the Geological Survey, the remainder for Mines Inspection, CODES and other outside users.

GENERAL

The following publications were produced in the course of the year:

- five mineral resource reports
- one 1:25 000 scale MRVP geological map
- one section of a 1:50 000 scale geological map note
- one review report
- one gold report (NETGOLD)
- two gold reports (Mt Lyell)
- five papers in Bulletin 70

A major promotional conference on mineral exploration opportunities was held in the Hobart Sheraton on 17 to 18 September 1992.

The following papers were delivered by Section members at the symposium:

- Gold in Tasmania
- Stratigraphic-facies associations and their relationship to mineralisation in the Mt Read Volcanics
- Geology and Prospectivity of the Arthur Mobile Belt
- Stable isotopes and geochemistry as exploration indicators
- Tasmania Department of Mines programmes – MRVP, NETGOLD and AMB

Briefings on mineral prospectivity were held for Newcrest, Homestake, Western Mining, Aberfoyle, Billiton, Mac Mining, CRA and Mineral Holdings. Two exploration companies, Aztec and Plutonic, were shown over the D'Aguilar Range. Branch members visited the Firetower Prospect near Mole Creek, the South Comet Mine near Dundas, and the Western Red Quarry site near Mt Heemskirk.

A geological inspection was carried out of rock conditions in the HEC Anthony Tunnel.

Submissions were written on mineral research and development for ANZMEC, research in earth science for the Chief Geologists Conference, and for the Richards Review into the Australian Geological Survey Organisation.

Work was carried out on the *Mines (Strategic Prospectivity Zones)* Bill.

Talks were delivered to the Tyenna Regional Economic Development Committee and the Mineral Resource Advisory Panel.

A display for Mining Week was organised at Eastlands Shopping Centre, and associated geological excursions were conducted in the Launceston and Hobart districts for the general public.

Centre for Ore Deposit and Exploration Studies (CODES)

The Division continues to have important linkages with CODES at the University of Tasmania. Funding to the value of \$159,000 was provided to CODES from the State Government through the Division's budget for the purposes of a direct grant, student scholarships and services provided by Mineral Resources Tasmania.

The continuing operation of the Key Centre in Tasmania, close to world-class ore bodies, provides a substantial natural advantage to the State in attracting mineral investment and in developing new and more efficient techniques with which to discover new mines as old mines become exhausted.

Engineering Geology and Groundwater

As at June 1993, the Section was staffed by a Chief Geologist, an acting Senior Geologist, two Project Geologists, a Surveyor and a Senior Field Assistant. One Project Geologist took a redundancy at the end of the year, with the other Project Geologist leaving in July 1993. A Project Geologist from the Regional Geological Mapping Section has continued with an urban mapping project in the Launceston area.

Support Services and the Chemical Laboratory have had a major input into the work of the Section.

Land stability has continued to take up a considerable proportion of the work of the Section, with other major functions being groundwater monitoring, waste disposal sites, groundwater prospects on individual properties, and foundation conditions of various engineering works.

LAND STABILITY

Involvement with the Rosetta landslide has continued, with regular surveys being undertaken to monitor movement and water levels.

Advice has been given at many locations in northwest, north and southern Tasmania on landslide risk of proposed subdivisions, single building blocks, and for lots with existing houses.

A project with the Forestry Commission to produce an inventory and description of landslides in forest areas continued.

Routes proposed by Telecom for optic fibre lines were examined for landslide risk. These routes included the Burnie–Sprent and Boat Harbour–Natone regions.

Batter stability was reported on for new sections of the Bass Highway near Exton at the request of the Department of Roads and Transport.

Stability conditions and erodibility of areas proposed for forest harvesting were examined on the Tasman Peninsula and at Orford for the Forestry Commission, while large landslides in areas associated with forestry operations at Wilmot and Weegen were inspected.

GROUNDWATER

Requests for advice on groundwater prospects on individual properties is an important part of the work of the Section. Information on groundwater use around possible contaminated areas (e.g. petrol stations that have closed and are being considered for redevelopment) has been provided at a number of locations.

The study of groundwater resources in the Devonport–Port Sorell–Sassafras area was published during the year.

Further shallow auger drilling has been undertaken in conjunction with the Department of Primary Industry and Fisheries for their soil salinity project. Piezometers were installed in the Longford–Cressy area and the Coal River Valley.

Monitoring of bores in the Devonport–Port Sorell–Sassafras area has continued, and monitoring of water levels and quality is also continuing in about 34 other bores throughout the State. Continuous water level monitoring devices are being placed on each bore as funds become available. Samples for chemical analysis are collected twice a year.

WASTE DISPOSAL SITE AND POSSIBLE GROUNDWATER POLLUTION

Fifteen refuse waste disposals (both operating and proposed) were examined during the year to assess the possibility of significant groundwater contamination. Dairy effluent disposal and its effect on groundwater quality was examined in the Smithton area, while disposal sites for a chicken abattoir at Murdunna and an abattoir at Legerwood were inspected.

FOUNDATION INVESTIGATIONS

Foundation conditions at reservoir sites at Single Hill and Kingston were examined during the year, while several pipe lines associated with water supply schemes were inspected (e.g. Lake Fenton line, Clarendon Vale inlet pipe). These inspections resulted from requests from the Hobart Regional Water Board.

Foundations of new portions of the Bass Highway were assessed in the Deloraine area at the request of the Department of Roads and Transport.

SURVEYING

Monitoring of landslide movements by survey has continued at a number of locations in northwest, north and southern Tasmania. These areas included Beauty Point, Penguin, Ulverstone, Launceston, Legana, Windermere, Devonport and Rosetta.

Regular surveys have been undertaken of underground coal mining at the Duncan and Blackwood Collieries, and on one occasion at the Stanhope mine. Quarries have been surveyed at Judbury, Coles Bay and Smithton. Points surrounding a loose slab on the face of The Nut at Stanley were surveyed a number of times.

URBAN MAPPING

The joint survey with Launceston local government councils continued and involved the completion of mapping and shallow drilling to collect samples for testing. Compilation of the work is continuing.

Some detailed examinations of specific areas in the Hobart region were undertaken during the year at the request of councils.

An area mainly underlain by Permian rocks between Glenorchy and Kingston has been completely remapped as part of a project to remap the geology of the Hobart area. The project has been discontinued at present as a result of staff reductions and re-organisation of the work of the Division.

CONSTRUCTION MATERIALS

An office study of potential sources of rock or other construction materials suitable for export and occurring in the vicinity of existing large ports has been undertaken. A report on the sand resources in the Hobart area was updated.

EDUCATIONAL ACTIVITIES

Lectures and excursions on engineering geology have again been conducted for engineering students at the University of Tasmania. A geological excursion was conducted for students of the Friends School, and a number of work experience students have spent one or more days within the Section during the year.

Contributions have been made to Whole Farm Planning courses conducted by the Department of Primary Industry and Fisheries at Triabunna and Campbell Town.

GENERAL

During the year the Section dealt with 4675 property transfer searches which deal with land stability and groundwater information.

Supervision of a project to remove a loose slab of rock on The Nut at Stanley, and the building of a bund to catch this and subsequent rock falls, was largely undertaken within the Section.

Laboratory Services

During the year the Chemical and Geochemical Laboratories were combined as Laboratory Services.

The year has been a difficult one because of staff changes occurring as a result of the combination of laboratories and the resignation of both the XRF operator and the graduate chemist specialising in water analysis. A new XRF operator has been appointed but the laboratory is undermanned because of the absence of a specialist technician in wet chemistry.

A total of 1550 samples were prepared and analysed with a distribution as follows:

Water	217 samples
Rocks	248 samples
Minerals and Products	1084 samples

This involved a total of 12,640 chemical determinations.

Most of the work was either in-house or for other government agencies, with only 18% being undertaken for outside clients.

Research activities have been focused on the potential for bacterial leaching at Mt Lyell.

GRAVITY-MAGNETICS

Gravity data acquisition was entirely in western Tasmania under contract to mineral exploration companies. Much of the work was infill in areas of previously sparse coverage, and led to significant revision of existing stations. A portable global positioning system receiver was used in conjunction with a fixed base station to provide position and height control to an accuracy of two metres or better.

Integration and revision of previous gravity data sets has continued, with the existing data on King Island being corrected for height errors and terrain effects. The old data is now consistent with newer data. The MANTLE91 model, used to produce the residual gravity map, is under revision to overcome disparities with the geology of northeast Tasmania. A study of gravity gradients (derivatives) showed unsuspected structural relations in the Que-Hellyer and Fingal areas, with known mineralisation corresponding to gravity linears.

A set of colour-banded composite contour maps of west and northwest Tasmania was prepared for display at the "Tasmania: An Island Of Potential" symposium.

COMPUTING

Use of the mini-computer has remained steady. This system will be relegated to tape handling functions and most processing will be performed on a standard Unix system. As a temporary measure, databases are being converted to run on PCs using a Novell server. New versions of the magnetic data processing and contouring software are being installed. An image processing package has also been purchased.

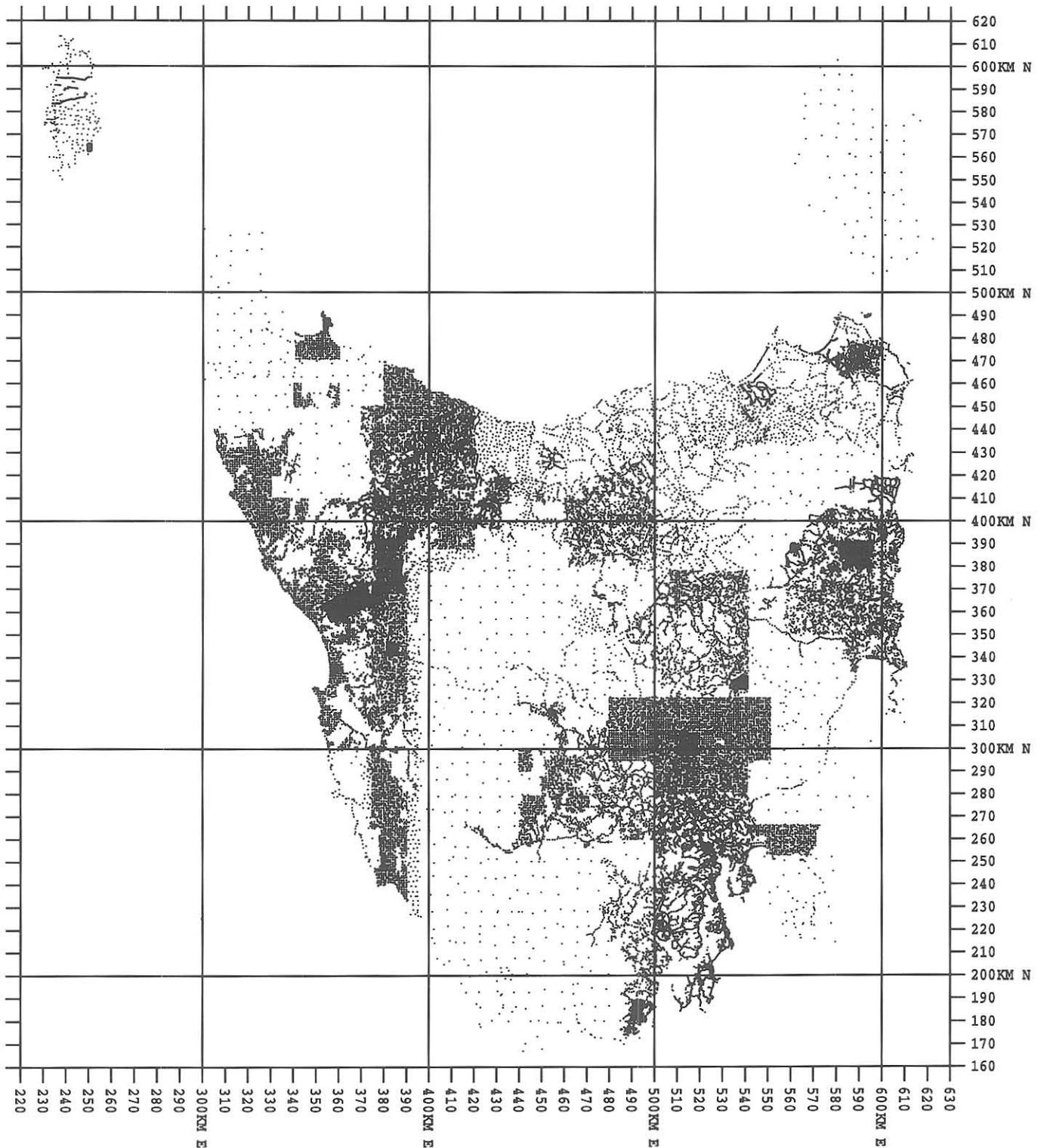
Following the formation of the Department of State Development and Resources, the Electronics Technician has been engaged in developing a suitable computing network and environment for the new Department. A high-speed data link has been established between the Rosny Park and Hobart offices, and a second link provides connections to the State Computer Network and Internet. Some progress has been made towards rationalising computing facilities within the Rosny Park building, but much work remains to be done to standardise hardware and software facilities for all users.

MISCELLANEOUS

Other significant tasks undertaken included:

- Logging of the Smithton geothermal borehole and assistance with data processing and presentation.
- Preparation of gravity and aeromagnetic programmes for the NETGOLD project.
- Discussions on microzonation of the Launceston area for earthquake-induced hazards.
- Discussion of proposed work for the National Soils Conservation Programme using QUESTEM to map soil salinity.
- Support of the CARMS records management system and conversion of ISD records to this system. Installation and testing of the RECFIND records management system for TDA.

DISTRIBUTION OF TASMANIAN GRAVITY STATIONS AS AT 30 JUNE 1993



RED Branch

The progressive transformation after May 1993 of the Geological Survey into the new Resource and Exploration Development (RED) Branch included a reduction of 23 in the number of personnel from 51 to 28. This was achieved through a combination of voluntary redundancy, retirement, and transfer to other branches. Six geologists accepted redundancy, with a resultant reduction of nearly 25% of geological staff.

The Branch has been reorganised and its activities refocussed to make it more effective in increasing the level of private sector mineral exploration in the State.

The main elements of the Geological Survey have been preserved in the new Branch under the control of the State Chief Geologist. These are:

- The Resource Investigation Sections
- Geophysics
- Laboratory Services
- Petrology
- Engineering Geology and Groundwater

The changes introduced include:

- Economic Geology and Regional Mapping have been amalgamated and recast to service the Strategic Prospectivity Zones (SPZs). The two Resource Investigations Sections are based on the Mt Read Volcanics and Rest of State, and each is the responsibility of a Managing Geologist.
- Coal and oil shale investigations have been transferred to the Hydrocarbons and Tenement Management Branch, which also includes Petroleum Geology.
- The Closed File reports administration has also been transferred to the above Branch.
- The Cartography Section has been amalgamated with Lease Drafting to form the Data Management Section which is contained in the Royalty Branch.
- Responsibility for the Library and Publications sections has been transferred to the Royalty Branch.

The charter of the RED Branch is:

- Investigation of areas of most significance to the mineral resource industry particularly, although not exclusively, the SPZs.
- Conversion of all relevant geoscientific and technical data onto the Geographic Information System.
- Promotion of unoccupied areas by targeting Australian and overseas companies with data packages.
- Definition of geoscientific projects to open up new areas of the State for exploration. NETGOLD is the present project; others already being considered are AMB (Arthur Mobile Belt), Midlands, Balfour, Mt Read extension and the Accord seismic project.
- Provision of current, high-quality geoscience information, advice and assistance to mineral explorers.

Investigation of identified mineral resources in conjunction with the Mineral Development Unit.

ADMINISTRATION AND ROYALTY MANAGEMENT

In addition to the management of regimes for royalties and the application of cost recovery models for the determination of fees payable for Divisional services, outputs of the Policy and Royalty Administration Branch include:

- Recording and processing of up-to-date information on the status of mineral tenements (including offshore) and all land tenure which may affect mining activity.
- Provision of geological and exploration information in both map and GIS formats.
- Provision of editorial, publication, and library services.

ROYALTIES

Revenue

Income from royalties for the financial year ended 30 June 1993 amounted to \$5,795,000. This represented an increase of \$607,000 compared to the budget estimate. Given current world commodity prices and the impact of the Mineral Exploration Rebate, the revised budget estimate for 1993/94 is \$4,500,000.

Audit

Commencing with the March 1993 quarter, all production returns were referred to the Mines Inspectorate for validation purposes. Where an Inspector is unable to attest to the correctness of the return he could either arrange for a survey to be undertaken or recommend that a financial audit be carried out.

Commencing on 1 July 1993 Mr John Hitchcock took up the position of Executive Officer (Royalty). John will assume responsibility for the audit of royalty returns, statistics and the preparation of the Division's budget.

All major mining companies were audited during 1992/93 with the exception of Aberfoyle Resources Limited (Hellyer Division).

Policy Review

Coinciding with the drafting of the *Mineral Resources Development Act* a review of royalties payable will be undertaken with the aim of raising the return to a level at least comparable to the Australian average.

Similarly, all fees for services provided by Mineral Resources Tasmania will be reviewed according to cost recovery methodology.

Data Management Group

In line with corporate objectives to assist mineral exploration, the Division has moved from its traditional role as a regional data gatherer to assume a position as an information collator and disseminator. There is also provision for projects, such as NETGOLD, to acquire basic data to promote exploration in specific areas.

Much of the data held by the Division is currently presented on paper, either as reports or printed maps, and is not easily accessed or combined when purchased by exploration companies. This is being overcome by capturing the data in digital form and entering it into a Geographic Information System, which provides for both geographic and conventional database storage. At the same time the aeromagnetic data processing facilities have been upgraded to provide for the production of images and the integration of data sets.

By combining the above technologies and new data acquisition, the basic data required for the initial stages of any mineral exploration programme are readily available in an easily manipulated form. In addition to allowing data sets to be easily amended as new data become available, data provided in digital format allow combination of different data types. For example a query could combine geological, geophysical and tenement data by seeking the location of all areas of Mathinna Beds within 1.5 km of granites that are not held under exploration licence.

Library *Collection*

Despite financial constraints imposed on the library budget the library collection continued to grow. The journal collection was rationalised, with a number of subscriptions being cancelled and other subscriptions being converted from hard copy to microform format. Additions to the library stock were:

	<i>Purchased</i>	<i>Donated</i>
Monographs	44	63
Pamphlets	-	23
Non book items	4	8
Serial titles	2	5

Reference and Information Services

Overall, the use of the library services has remained at a level similar to 1991/92.

Despite the low level of mineral exploration in the State over the last twelve months, there has been an increase of 44%, to 23, in the number of commercial searches of the TASXPLORE database. The number of outside users has also increased by 2% to 640. A significant number of these outside users were post-graduate students from the University of Tasmania.

Other reference services were:

	<i>Number</i>	<i>% change</i>
Reference queries	1940	-1.6
Computer searches	284	-16.9
Loans	770	+30.5
Interlibrary loans	283	-17.4
Open file reports consulted	960	+28.0

Reports relating to the Exploration Tender Area service continue to be available through the library in hard copy and on microfiche.

Technical Services

The library uses the INMAGIC software for the processing, accessioning and retrieval of all library materials. All new monographs and journal issues which deal with a discrete subject area are added to the database, with 423 items being added in 1992/93.

In addition, details of about 200 journals, to which the library subscribes, were added to the National Library's ABN network.

Staff

For the first six months of the year the library was staffed by a librarian and a library assistant. In December the library assistant applied for a temporary transfer to another Government library. The decision was made not to fill the vacant position, and at year end the library staff remained at one librarian.

Publications

The Publications Section continued to provide a wide range of services to the Department. Major geological publications printed during the year were:

- Geological Survey Bulletin 67 — *Geology and Groundwater Resources of the Devonport–Port Sorell–Sassafras Tertiary Basin*, by W. C. Cromer
- Geological Survey Bulletin 68 — *The Quaternary Geology and Glaciation of the King Valley*, by S. J. Fitzsimmons, E. A. Colhoun, G. van de Geer and M. Pollington
- Geological Survey Bulletin 70 — *Tasmania – An Island of Potential – Papers presented at a symposium, September 1992.*
- Geological Survey Explanatory Report — Sheet 41 – St Helens

The explanatory notes for the Macquarie Harbour geological map sheet were being printed at year end.

The *Annual Report of the Director of Mines* was produced and printed. A new edition of the *Mineral Exploration Code of Practice* and an updated edition of *Occurrences of Gemstone Minerals in Tasmania* were produced during the year. Two updates of the List of Publications were produced during the year.

Miscellaneous leaflets and publications produced during the year included:

- Mineral resources in Tasmania's Northwest Forests
- Mining tenements – approval and processing procedures
- Exploration and mining – the landholders position
- Environmental impact information – EL applications and renewals
- Environmental impact information – EL work programmes
- How to Hazchem placard premises storing dangerous goods
- Notes for the Tasmanian Shot-firer (4th edition)
- Safety Bulletin
- Annual Report, Dangerous Goods Inspectorate
- Examination papers for shot-firers and transport drivers
- Health assessment forms and brochures

Reports

The following reports were produced during the year:

- 1992/20 *Notes on the history of mining and exploration at Adamsfield*, by C. A. Bacon [9 March 1993]
- 1992/21 *The Mt Cameron Water Race Board — A history of management*, by G. J. Dickens [20 December 1992]
- 1992/22 *Land classification in Tasmania — A guide for explorers (Revision 1)*, by C. A. Bacon [6 July 1992]
- 1992/23 *Some Tasmanian coal statistics (Revision 2)*, by C. A. Bacon [15 July 1992]
- 1992/24 *Zircon Pb/U age of 520 Ma for a tonalite associated with the Heazlewood Ultramafic/Mafic Complex, western Tasmania*, by D. Kimbrough and A. V. Brown [28 July 1992]
- 1992/25 *Gravity gradients at several Tasmanian sites*, by R. G. Richardson [21 August 1992]

- 1992/26 *Procedures for assessment of exploration licence applications and work programmes: Notes for District Foresters*, by C. A. Bacon [14 October 1992]
- 1992/27 *LINEFILT — A Fortran program for low-pass filtering line-based data*, by R. G. Richardson [1 October 1992]
- 1992/28 *The mineralogy of gold in the Mt Lyell orebodies (a preliminary report)*, by R. S. Bottrill [26 October 1992]
- 1992/29 *The Mangana goldfield and adjacent gold mining areas*, by R. S. Bottrill [13 November 1992]
- 1992/30 *Management of the flora of the Mt Read RAP*, by C. A. Bacon [15 October 1992]
- 1992/31 *Notes on previous mining and exploration activities in the Interview River area (Revision 1)*, by C. A. Bacon [17 October 1992]
- 1992/32 *Surface exploration of the limestone resource at Roberts Hill, Maydena*, by P. K. Wrigley [20 October 1992]
- 1992/33 *Procedures for assessment of mining lease applications: Notes for District Foresters*, by C. A. Bacon [19 October 1992]
- 1992/34 *Contact metamorphism of the Mathinna Beds and the depth of crustal residence during mega-kinking in northeast Tasmania*, by B. D. Goscombe [20 December 1992]
- 1993/01 *Sand resources in the Hobart area (Revision 1)*, by D. J. Sloane and B. D. Weldon [10 February 1993]
- 1993/03 *Evaluation of the limestone resources at Roberts Hill, Maydena*, by P. K. Wrigley [19 March 1993]
- 1993/04 *Review: Geological/geomorphological aspects of the Wilderness Society's September 1992 proposal for a World Heritage Area in the North West Forests*, by N. J. Turner [22 February 1993]
- 1993/05 *COPYALL — A general purpose file copying program written in FORTRAN*, by R. G. Richardson [2 April 1993]
- 1993/06 *Investigations into gas of possible geothermal origin at Smithton*, by P. W. Baillie [27 April 1993]
- 1993/07 *A FORTRAN program development environment for MS-DOS*, by R. G. Richardson [25 May 1993]
- 1993/08 *The palaeomagnetic record of selected Tasmanian rock units*, by G. Delisle, C. Rolf and R. H. Findlay [30 June 1993]
- 1993/09 *Land classification in Tasmania — A guide for explorers (June 1993)*, by C. A. Bacon [7 June 1993]

HYDROCARBONS AND TENEMENT MANAGEMENT

OIL AND GAS EXPLORATION ACTIVITY

Current offshore exploration permits and a retention lease are as shown in the table below. Permit T/23P was surrendered on 23 August 1992 and no new permits have been granted. A renewal has been received for T/18P.

Amoco withdrew from the consortium holding permit T/18P and Maxus Energy Corporation transferred to Maxus Tasmania Incorporated all of its rights, titles, interests and obligations in permit T/24P.

Two exploration wells were drilled by a consortium led by Sagasco Resources Ltd. The wells (King-1, T/18P; and Flinders-1, T/25P) were drilled in the second quarter of 1992/93. King-1 reached a true depth below rotation table of 2223 metres, while Flinders-1 was drilled to 2723 metres TDRT.

No new seismic was shot during the year 1992/93.

Production of a data package to promote exploration interest in the vacant area in the Bass and Durroon Basins has commenced.

Onshore, a large exploration licence EL 1/88 continues to be held by Condor Oil Pty Ltd.

COAL INDUSTRY

The three current coal producers can adequately supply sufficient coal for the domestic market, leaving little incentive for exploration for additional reserves. Coal consumption by local industries continued to decline.

Considerable potential remains for local coal to be eventually used in a coal-fired power station. Research continued on the possibility of washery waste being used in a fluidised bed type station.

REGISTRY

The Registrar, as co-ordinator of the Mining Act review, assisted the Deputy Secretary in preparing a cabinet submission on proposals for a new *Mineral Resources Development Act*.

REGIS, the Mining Tenement Database, was developed during the year, primarily in the area of specialised reports for officers in Economic Geology and Registry. Collection of production and royalty returns is now linked to REGIS, thereby lessening preparation time. To date only a limited number of reports are available from the production and royalty system.

The Section has increased its usage of word processing, spreadsheet and database technology to provide information in a more useful manner and much faster than previously.

During the year officers of the Section visited pits and quarries on a regular basis with officers from the Mines Inspectorate and officers of other agencies.

Court of Mines

Tasmania is divided into four mining districts, each with a Warden of Mines. The wardens, who are magistrates, hear disputes arising under the *Mining Act 1929*. The wardens as at June 1992 were:

- Mr M. R. Hill, Central Mining District and Southwestern Mining District.

AVAILABILITY OF LAND FOR EXPLORATION

- UNAVAILABLE
- ▨ AVAILABLE WITH SPECIAL CONDITIONS APPLIED



Reserved Lands data supplied courtesy of the Forestry Commission

- Mr S. F. Mollard, Northwestern and Western Mining District
- Mr A. G. Shott, North and Northeastern Mining District

Cases referred to the warden during the year consisted of:-

Bona Vista Estate Pty Ltd v Merrywood Coal Co Pty Ltd. Objection to Exploration Licence 21/91. No appearance by objector. Objection dismissed.

Various objectors v RNB Trading Pty Ltd. Objection to Exploration Licence 4/90. One objector ruled to have standing, objection dismissed.

R. M. Davies v Narguun Pty Ltd. Objection to Exploration Licence 21/92. Objection withdrawn.

A. J. Britz v Renison Ltd. Objection to Exploration Licence 42/92. No appearance by objector, objection dismissed.

ENVIRONMENTAL MANAGEMENT

The appraisal and monitoring of mineral exploration programs continued throughout the year at a steady rate. A close liaison is maintained with companies, and on-ground activities are regularly visited by our Environmental Field Officer to ensure these activities are carried out in a responsible manner.

The Section organised a one-day excursion which gave an opportunity to view recent exploration activities. This enabled people to exchange ideas and views on operating methods, leading overall to more environmentally-sound techniques being adopted.

Rehabilitation was carried out on some of the areas targeted last year for work. In the Interview River area a manual cleanup of a site, disturbed by a long history of small-scale mining and exploration, was undertaken jointly with other Government agencies.

In the Anthony valley, just north of the HEC dam site, two excavators were used to rehabilitate approximately 1.5 km of an old exploration track which was visible from the Anthony Road.

Communication with other Government agencies continued to be strengthened by regular meetings and correspondence.

TENEMENT ADMINISTRATION

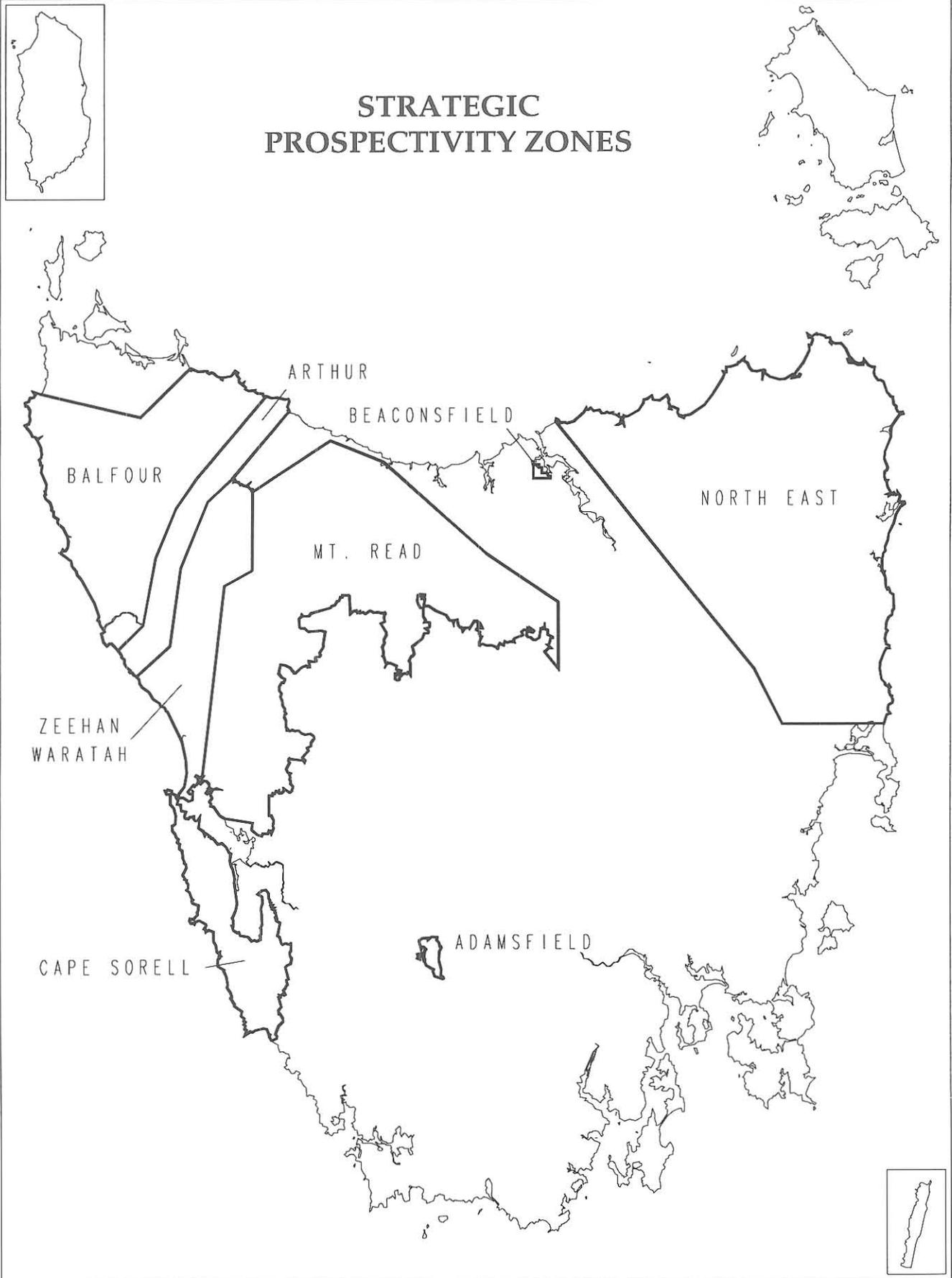
Duties relating to the accessioning and microfilming of company reports, and preparation of statistics on the exploration industry, were transferred to the Hydrocarbons and Tenement Management Branch.

Mineral exploration expenditure decreased by 3% from \$7.4 million in 1991/92 to \$7.2 million. This figure does not include lease drilling for the RENDEEP project, which would increase total expenditure to \$8.2 million, up 11% over the previous year. The number of exploration licences fell from 108 to 100. There was also a decline of 142 square kilometres in the area of such licences to 5672 square kilometres. Exploration drilling increased by 31% to 23 006 metres.

The area of the State covered by exploration licences at the end of June 1993 was:-

<i>Lease type</i>	<i>Area (km²)</i>	<i>% of State</i>
Metallic EL and RL	5 782	8.4
Non-metallic EL and RL	940	1.4
Onshore petroleum EL (pending and granted)	40 897	60.0

STRATEGIC PROSPECTIVITY ZONES



Mining leases cover 841 km² or 1.23% of the State.

The number of exploration tender areas offered was 35, with four tenders resulting in exploration licences.

Companies submitted 80 reports. These were indexed on the Tasexplor database and incorporated in the Division's collection, which now totals 3444 reports. The reports make a valuable contribution to the geological and mineral knowledge of Tasmania. Microfilming of reports continued, and microfiche of all open file reports are available for purchase.

Strategic Prospectivity Zones

Strategic Prospectivity Zones (SPZ) cover 25 200 km² or 37% of the State. The area in each SPZ occupied by mining tenements at the end of June was:

<i>SPZ</i>	<i>Area (km²)</i>	<i>% occupied</i>
Balfour	3912	13
Arthur	1108	25
Zeehan/Waratah	1834	45
Mt Read	7170	28
Beaconsfield	19	100
Adamsfield	74	25
North East	9708	9

Lease Applications

During the year 72 mining lease applications were received, an increase of 15 over the 57 of the previous year. These applications included 37 on Crown Land and 35 on private property.

There are currently 814 mining leases held for various mining products, compared to 807 the previous year.

Number and area of leases and licences applied for during the year to 30 June 1993

<i>Product</i>	<i>Number</i>	<i>Area (ha)</i>
All minerals	6	5345
Coal	1	299
Dolerite	1	2
Dolomite.....	1	18
Granite	1	6
Gravel	16	157
Sand	7	55
Sand and clay	1	34
Sand and gravel	3	231
Shale	1	32
Slate	1	1
Stone	31	209
Zinc	2	32
	<u>72</u>	<u>6421</u>

Number and area of new leases and licences granted during the year to 30 June 1993

<i>Product</i>	<i>Number</i>	<i>Area (ha)</i>
All minerals	4	273
Coal	2	364
Dolerite	1	2
Gravel	20	152
Sand	4	55
Sand and gravel	2	140
Sand and stone	1	13
Shale	2	34
Slate	1	1
Stone	25	284
	<u>62</u>	<u>1318</u>

Total number of leases and licences in force on 30 June 1993

<i>Principal product</i>	<i>Number</i>	<i>Area (ha)</i>	<i>Shuiceheads</i>
All minerals	52	17 613	-
Clay	10	220	-
Coal	13	6 644	-
Copper	5	1 276	-
Dolomite	3	149	-
Easements	53	593	208
Gold	32	1 299	-
Granite	8	46	-
Gravel	151	3 318	-
Gravel and stone	8	569	-
Iron	1	1 959	-
Kaolin	2	373	-
Lead and zinc	4	449	-
Limestone	14	2 335	-
Magnesite, silica and talc ...	1	29	-
Peat	5	772	-
Sand	68	2 041	-
Sand and gravel	29	3 010	-
Sand and stone	10	186	-
Savage River Easements ...	12	2 248	-
Shale	4	39	-
Silica	15	1 497	-
Silver and lead	2	24	-
Slate	6	190	-
Specimens	2	18	-
Stone	233	9 636	-
Tin	45	6 755	-
Wolfram	1	4	-
	<u>796</u>	<u>63 461</u>	<u>208</u>

Total number of all types of prospecting rights held as at 30 June 1993

<i>Mining Tenement</i>	<i>Number</i>	<i>Area</i>
Exploration Licences — All minerals ...	97	5 312 km ²
Non metallic ...	10	288 km ²
Oil ...	2	61 218 km ²
Retention Licences — All minerals ...	13	78 km ²
Non Metallic ...	12	406 km ²
Prospectors Licences	23	523 ha
Miners Rights	5	2 ha
Owners Rights	1	1 200 ha
Permits to explore for Petroleum under <i>Petroleum (Submerged Lands) Act 1967</i>	4	268 blocks
Retention Licence under <i>Petroleum (Submerged Lands) Act 1967</i>	1	9 blocks

MINING HERITAGE

During the year the Premier released a policy on the management of mining heritage which outlines the procedure direct S63(8) of *The Mining Act 1929* (which deals with the disposal of equipment left on mining leases). The policy establishes the formation of the Mining Heritage Committee to consider matters relating to mining heritage.

One heritage matter which came to light during the year involved the removal to Beaconsfield of the Chintock Battery from the Blue Tier. The battery had been sold to a prospector in 1984, and ownership subsequently passed from his estate to the Beaconsfield Museum. The establishment of the Mining Heritage Committee will provide a forum for discussion of such issues in future.

The Committee assessed a proposal to build boardwalks and relocate mining relics to more 'tourist oriented' sites on the Blue Tier and advised the Forestry Commission on an appropriate course of action.

DANGEROUS GOODS INSPECTORATE

The Dangerous Goods inspector's work involves all aspects of the handling of the most hazardous chemicals in our society which have been classified as Dangerous Goods, because their explosivity, flammability, corrosivity or toxicity warrants the special controls of the Dangerous Goods legislation. Inspectors deal with questions of classification of Dangerous Goods, placarding of premises, labelling of packaging, marking of trucks, packaging standards, integrity and siting of storage installations, transport, emergency response planning and investigation of incidents.

The *Dangerous Goods Regulations 1992* requires the inspectorate to approve the construction of dangerous goods installations where the amount of dangerous goods exceeds a specified threshold level. Approval is done on the basis of reviewing submitted plans and a site inspection. Another site inspection is done before commissioning of the installation and before the issue of a Licence To Keep Dangerous Goods. There are about 2,640 sites state-wide, and any significant change in these sites has to be approved. A hard-copy file is kept on each site and includes details of inspection visits. Details of each site are also entered into a computer data base for easy retrieval.

Community expectations regarding the level of Government responsibility in safeguarding the public from toxic, flammable, corrosive or explosive chemicals are best met by the current type of legislation involving an approval/licence system. The public distrusts the chemical, petroleum and gas industries to look after their safety in a completely self-regulatory way. Community attitudes towards the public safety of chemicals are likely to change in the future, when industry initiatives in the health and safety field, such as the "Responsible Care" programme by the Australian Chemical Industry Council and the "Agsafe" programme by the Australian Veterinary and Agricultural Chemical Association, have borne fruit. Meanwhile more Government control is warranted to secure public safety in the chemicals field than is thought necessary in modern occupational health and safety legislation. However opportunities for appropriate self-regulation will be taken up.

The dangerous goods legislation is complementary to the Department's other health and safety legislation. Whereas the emphasis of the *Industrial Safety, Health and Welfare Act* and *Mines Inspection Act* is on occupational health and safety, the emphasis of the *Dangerous Goods Act* is on public safety.

The licensing system has the advantage of enabling the user-pays principle to operate. The incoming revenue for 1992/93 was \$305,000 (65% of total operating budget).

NATIONAL UNIFORMITY AND REGULATORY REFORM OF DANGEROUS GOODS LEGISLATION

Tasmania has been at the forefront of legislative reform in the dangerous goods field, having completely redrafted the regulations in 1990 and then again in 1992 in order to lead the push for nationally uniform standards. Tasmania is one of only two States to have fully adopted the *Australian Code for the Transport of Explosives* and one of three States to implement the National Occupational Health and Safety Commission (NOHSC) guidance note entitled *Storage of Chemicals* regarding hazardous chemicals placarding.

The Director – Dangerous Goods Inspectorate is a member of the Senior Officers Group of Dangerous Goods (SOG-DG), which has been directed by the Australian Labor Ministers Conference (MOLAC) to make the legislation dealing with dangerous goods uniform. The SOG-DG recommended that NOHSC establish an Expert Working

Group to develop a national standard for the storage and handling of dangerous goods. The draft standard will be completed in early 1994.

The National Road Transport Commission (NRTC) has been established as an independent federal statutory authority to develop nationally uniform road transport legislation. Officers from the Dangerous Goods Inspectorate have been involved in consultations with the NRTC to draft a new *Road Transport Reform (Dangerous Goods) Bill 1993*. This Bill will be passed by the Commonwealth Parliament and will regulate the transport of dangerous goods in the Australian Capital Territory. In due course, this legislation will be adopted by the States in full as template legislation.

It is intended to call up the Draft National Standard for the Control of Major Hazardous Facilities as regulation under the *Dangerous Goods Act*.

Much time and effort has been spent by dedicated Government and industry representatives throughout Australia in adopting the sound principles contained in the complex texts of the *UN Committee of Experts, Recommendations on Dangerous Goods* into national codes and standards adopted by reference in State legislation. The successful culmination of this work means that Tasmanian dangerous goods legislation can be maintained and fine-tuned in a cost-effective manner through active participation in the various Sub-Committees of the National Advisory Committee on the Transport of Dangerous Goods (ACTDG) and relevant Standards Association of Australia (SAA) standing committees. On 1 April 1993 the new fifth edition of the ADG Code became enforceable law.

The principles contained in international and national codes and standards, as embodied or adopted by reference in the Tasmanian *Dangerous Goods Regulations*, achieve:-

- harmonisation with international codes and standards formulated by internationally recognised expert panels and committees on dangerous goods; and
- uniformity with other State and Territory legislation.

The Inspectorate is represented on the following interstate standing committees:

- Advisory Committee on the Transport of Dangerous Goods
- Advisory Committee on the Transport of Dangerous Goods – Competent Authorities Sub-Committee
- Advisory Committee on the Transport of Dangerous Goods – Drafting Sub-Committee
- Advisory Committee on the Transport of Dangerous Goods – Explosives Drafting Sub-Committee
- Dangerous Goods Consultative Committee of the NRTC
- Australasian Conference of Chief Inspectors of Explosives
- Australian Liquid Petroleum Gas Association – Working Committee
- MOLAC Senior Officers Group (Dangerous Goods)
- Standards Association of Australia – CE/5 Committee on Explosives
- Standards Association of Australia – CH/9 Committee on Chemicals
- Standards Association of Australia – ME/15 Working Committee on LP Gas

- Standards Association of Australia – ME/17 Working Committee on Flammable and Combustible Liquids
- NOHSC Workplace Hazardous Substances Regulation implementation working party
- ALPGA committee – Develop uniform national code for Automotive LP Gas

STAFF

Dr Peter Drygala started work on 11 February 1993 as new Chief Inspector of Dangerous Goods to replace Eric Lake who resigned in October 1992. Jim Hillhouse was the interim caretaker Chief Inspector.

David Wildmore resigned during January 1993 and the position was subsequently abolished as part of Government's efforts to down size the Department.

The Inspectorate recognises the importance of professional self-development and this year, as well as seminars, the following courses were undertaken:

- (a) Two staff members are in the second year of a three-year, part time, Associate Diploma of Emergency Management at the University of Tasmania. This is a unique new course in Australia and the English-speaking world. The aim of the course is to increase the skills and knowledge of people with an interest in Emergency Management. The three course components are Emergency Management Planning, Emergency Operations Management, and Recovery and Restoration.
- (b) Five-day Accident Investigation Course conducted by the Forestry Commission
- (c) Two-day Computer Course — Introduction to Microsoft Word for Windows
- (d) Five-day Hazard Analysis Course at Mt Macedon, Victoria

An important exercise in ensuring uniformity of policy and to obtain feedback from everyone on their particular area of expertise has been three two-day and two one-day Inspectors Conferences. These serve as a debriefing for sub-programme group leaders and technical experts reporting back from working groups and interstate standards meetings.

EDUCATIONAL SERVICES TO INDUSTRY

The Inspectorate provides an education and advisory service to industry. This service, as well as the field inspections, allows the Inspectorate to liaise and develop a rapport with industry.

The following programmes were given:—

- Development and participation in the Bulk Driver Courses on Dangerous Goods given by the Tasmanian Transport Industry Skills Centre in conjunction with the National Road Transport Industry Training Committee.
- Presentation of four four-day shot-firer courses and examinations.
- Participation in the Agricultural and Veterinary Chemicals Association training courses.
- Seminars to the Tasmania Fire Service on Hazchem Placarding.
- Seminars as guest speakers at the Safety Institute of Australia.
- Miscellaneous seminars to various industries.

HAZCHEM PLACARDING

Hazchem Placarding implementation in accordance with the 1992 regulations has been the single biggest new programme initiative this year and will be completed by 1 January 1994. A new, user-friendly guidance note has been published by the Inspectorate and this has been a valuable education tool.

The purpose of placarding is to ensure that in the event of fire or spillage involving dangerous goods, emergency responders combating the incident will have sufficient information to act in the appropriate manner.

The new regulations require that all premises, except service stations, where the quantity of dangerous goods exceeds the Placarding Exemption Limit, display certain notices to explain the presence of dangerous goods. The placarding is in harmony with the marking system already in use on trucks transporting Dangerous goods.

INTRASTATE COMMITTEES

The Inspectorate takes part in the following Tasmanian Committees:-

- The Hazardous Substances Management Committee
- The Southern Regional Counter Disaster Planning Group
- The Selfs Point Mutual Aid Emergency Planning Committee
- The Pesticide Disposal Working Party

NEW INITIATIVES FOR 1993/94

As a result of the co-location of the Dangerous Goods, Mines, and Industry Services Division inspectorates at Rosny Park, and in order to attain improved efficiencies in the service delivery of the three inspectorates, all chemical health and safety issues will be dealt with by a new branch of Chemical Safety. The new branch will comprise the Dangerous Goods and Occupational Hygiene sections. All members of the new branch will endeavour to assess and control all chemical hazards, i.e. flammability, explosivity, corrosivity and toxicity. Dangerous Goods Inspectors will extend their vigilance to the occupational use of chemicals as outlined in the new national *Control of Workplace Hazardous Substances* regulations.

While the Dangerous Goods Inspectorate will be confined to chemical safety matters, the Occupational Hygiene Section is not just about chemical hazards. The generally accepted definition is as follows:

“Occupational Hygiene is that science and art devoted to the anticipation, recognition, evaluation and control of environmental factors and stresses arising in or from the workplace which may cause sickness, impaired health and well being, or significant discomfort and inefficiency among workers, their families or members of the community at large.”

This very broad definition encompasses, but is not limited to, physical hazards such as radiation of any kind, noise, and ergonomic problems such as manual handling problems. Less commonly the occupational hygienist is asked to tackle biological hazards such as airborne natural contaminants like fungal spores or cotton dust.

The new branch will be working closely with ISD and will take a leading role in the implementation of the following priority NOHSC issues:—

1. Storage and handling of dangerous goods standard;
2. Standard for the control of major hazardous facilities;
3. Control of Workplace Hazardous Substances standard;
4. Noise;
5. Manual handling.

The Chemical Safety branch's primary function will be to provide advisory and regulatory services to our clients. The small size of the inspectorate will mean that there will be little time for paid consultancy work. This will represent an important opportunity for private consultants to step in, particularly in the monitoring of airborne contaminants. The demands that the pending national *Control of Workplace Hazardous Substances Regulations* will place on the new branch for educational programmes to industry will be large.

The Dangerous Goods Inspectorate will take the lead and work with the Road Transport Industry Training Board to develop both a national course for drivers of vehicles conveying explosives and a course on the warehousing of dangerous goods.

In conclusion, the branch philosophy is to advise, assist, encourage and educate our clients to maintain or achieve a high level of safety in Tasmania.

We endeavour to seek rapport with our clients in order to develop mutual trust, respect and co-operation, and we therefore consider prosecutions only as a very last resort.

Industry will be encouraged to self-regulate, whilst at the same time receive our technical and statutory support and guidance.

Incidents — 1992/93

CLASS 1

- 1: DATE: 9 September 1992
LOCATION: Avoca
DANGEROUS GOODS INVOLVED:
Fireworks — Class 1.3G/1.4G

Fireworks were stolen from a tin shed located at the rear of a general store. The theft was witnessed by at least nine people. The fireworks were let off the following Tuesday evening.

- 2: DATE: 21 November 1992
LOCATION: Tullah
DANGEROUS GOODS INVOLVED:
Fireworks — Class 1.4

During a birthday party, a man decided to light seven sparklers, three blue and four green illuminating types, and place them on a cake for special effects.

After bunching all seven firmly in his hand and igniting them simultaneously, a fierce flame was produced which took less than one second to burn the entire length of the sparklers. This resulted in the person receiving severe burns to his right index finger and thumb.

Subsequent tests of various sparklers confirmed that simultaneous ignition when bunched increased the burning rate considerably.

3: DATE **16 December 1992**
LOCATION: Turners Marsh
DANGEROUS GOODS INVOLVED:
Emulite — Class 1.1D

Inadequate guarding and signalling of a forest blast site allowed trail bike riders access to the site undetected. The father and son were riding along the bush track when the father noticed a trail of smoke rising from the side of the track. They stopped to investigate and the father saw an empty box marked 'explosives'. The pair immediately took cover on the other side of the track, and shortly after the explosives went off. Fortunately the people were not seriously injured.

CLASS 2

1: DATE: **7 July 1992**
LOCATION: Strahan
DANGEROUS GOODS INVOLVED:
LPG (Propane) — Class 2.1

An LPG pipeline was fractured by a falling tree limb. The resulting leak was immediately isolated at the tank and repaired.

2: DATE: **15 August 1992**
LOCATION: Hobart
DANGEROUS GOODS INVOLVED:
Acetylene — Class 2.1

Employees noticed a small flame on the surface of an 'E' size acetylene cylinder, which was part of an oxy/acetylene set. Closer examination revealed that gas was leaking from a welded seam. Subsequent investigations by CIG determined that, over a period of several years, continual wear on the welded section had exposed porosity in the weld metal.

3: DATE: **24 November 1992**
LOCATION: Rosny Esplanade
DANGEROUS GOODS INVOLVED:
Oxygen and acetylene — Class 2.2/5.1 and 2.1

After completing work with an oxy/acetylene set (both 'E' size), a worker stated that he closed the regulators and left the area to use a grinding wheel approximately four metres away. Upon completing this work, he walked past the cylinders and did not notice anything unusual. Approximately ten minutes later, the site engineer also walked past the cylinders and noticed flame 'shooting' 1.5 m into the air. The flame was coming from the top of the cylinder set. He immediately yelled a warning to the workers in the area who fled and sought protective shelter. Within four minutes the oxygen cylinder exploded. The explosion threw the acetylene cylinder over 150 m into the bay. Shrapnel from the oxygen cylinder was thrown as far as 200 m from the site of the explosion. Water police recovered the acetylene cylinder.

4: DATE: **27 November 1992**
LOCATION: St Helens
DANGEROUS GOODS INVOLVED:
LPG (Propane) — Class 2.1

As a driveway attendant was preparing to dispense LP gas to a vehicle, the 1983 brass swivel that connects the hose to the ZVG1 gun failed, causing the hose to separate from the gun. The pressure from the

escaping gas caused the hose to flail around which damaged the customer's car, as well as minor damage to the flowmeter. The attendant isolated the line and power supply with the help of another attendant.

5: DATE: 22 February 1993
LOCATION: Burnie
DANGEROUS GOODS INVOLVED:
LPG (Propane) — Class 2.1

During preparation of a site for construction of a building, the operator of an excavator failed to establish the location of an underground LP gas (vapour) line. The pipework was damaged by the bucket. The tank supply valve was used to isolate the gas.

6: DATE: 25 March 1993
LOCATION: Rocherlea
DANGEROUS GOODS INVOLVED:
LPG (Propane) — Class 2.1

A section of pipework supplying LP gas to a boiler had been relocated during extensions to a bakery. The gas line to the unit was disconnected in order to purge it of air. An attempt to re-light the boiler resulted in a fireball from which the gas-fitter received second degree burns. Incorrect purging procedures had caused the problem.

7: DATE: 28 March 1993
LOCATION: Mount Nelson
DANGEROUS GOODS INVOLVED:
LPG (Propane) — Class 2.1

Three cylinders (two 45 kg and one 9 kg) were damaged when a house was destroyed by fire. Both of the 45 kg cylinders flared off. The Tasmania Fire Service reported that the PRV of one of the cylinders was facing the building. One of these cylinders showed metal fatigue due to direct flame impingement and a crack was found in the shell. The 9 kg cylinder, which was adjacent to the house and connected to a BBQ, had vented off.

CLASS 3

1: DATE: 15 July 1992
LOCATION: Bellerive
DANGEROUS GOODS INVOLVED:
Diesel — Class 3.3

A spill occurred when a dispenser coupling worked loose as a result of vibration. The dispenser was located on a wharf. Approximately 1000 litres of diesel was lost before the leak was detected.

2: DATE: 9 October 1992
LOCATION: Wynyard
DANGEROUS GOODS INVOLVED:
Petrol — Class 3.1

The Tasmania Fire Service advised the Dangerous Goods Inspectorate of what appeared to be an excessive release of vapour coming from a previously abandoned underground petrol tank. The vapour was emanating from an opening in the concrete pump base. Closer examination revealed that a live electric single-phase cable was arcing and subsequently boiling the steady ingress of water. The PVC cover of the cable was also melting.

3: DATE: 23 November 1992
LOCATION: Glenorchy
DANGEROUS GOODS INVOLVED:
Diesel — Class 3.3

Five hundred litres of diesel was spilt when a supply hose split releasing product. The incident occurred over a weekend, and the tank isolation valve had not been closed. The supply to the nozzle was by gravity feed.

4: DATE: 2 June 1993
LOCATION: Oatlands
DANGEROUS GOODS INVOLVED:
Diesel — Class 3.3

A total of 850 litres of diesel was spilt after a portable tank was overfilled. The operator left to do another job and forgot about the filling operation. The portable tank was being filled by gravity feed from an overhead tank.

5: DATE: 6 May 1993
LOCATION: Western Junction Airport
DANGEROUS GOODS INVOLVED:
Petrol — Class 3.1

An underground tank exploded when employees, unaware of the tanks' existence, cut through its vent pipe with an angle grinder. Two employees were hurled into a nearby cyclone mesh fence but did not sustain any significant injuries. The force of the explosion lifted the ground and 50 mm thick bitumen cover approximately 450 mm above the surrounding ground level extending over an area of about 3 × 2.5 metres.

Excavation of the tank revealed that the explosion had caused the ends to separate from the main body of the tank, which had essentially remained in its previous shape. Rust in the tank indicated that it had contained water about 200 mm deep for a considerable time. The smell of vapour remained in the tank.

CLASS 4

1: DATE: 22 July 1992
LOCATION: Waratah Highway, Waratah
DANGEROUS GOODS INVOLVED:
Sodium hydrosulphite — Class 4.2

Two 25 kg packages of sodium hydrosulphite were lost from a vehicle when a pallet on which they were stacked collapsed. It took two days to find the lost packages, which were intact.

CLASS 8

1: DATE: 22 September 1992
LOCATION: Dodges Ferry
DANGEROUS GOODS INVOLVED:
Titanium tetrachloride — Class 8

A 200 litre drum of titanium tetrachloride was left at a refuse site. The product was recovered and transported to a 'safe' site and correctly disposed of in a joint exercise between three agencies.

2: DATE: 1 July 1993
LOCATION: Launceston
DANGEROUS GOODS INVOLVED:
Mix of nitric acid and ethanol — Class 8 and 3

A solution of nitric acid and methylated spirits exploded whilst being transported in the cabin of a utility. The driver required hospitalisation.

The product is commonly known as 'Nital' and is used as an etchant for metallographic testing. Apparently the person who had mixed the solution had been doing so for about three years. He was informed that the proportions for mixing this solution should be 4:1 methylated spirits to concentrated nitric acid (70%). In this particular case the proportion of nitric acid had been much higher and this fact contributed to the explosion.

3: DATE: 18 September 1993
LOCATION: Devonport
DANGEROUS GOODS INVOLVED:
Flammable liquids, liquid fertilizer and corrosives
— Class 3.1, 6.1 and 8

A liquid spill was detected in a shipping container at the Devonport wharf. The product was treated as dangerous goods but was later identified to be liquid fertiliser.

MIXED CLASSES

1: DATE: 31 August 1993
LOCATION: Riverside
DANGEROUS GOODS INVOLVED:
Flammable liquids & pesticides —
Class 3.1 and 6.1(b)

A fire destroyed a storage shed located on a golf course. The shed contained flammable liquids and several low-toxicity pesticides, which were consumed in the fire.

2: DATE: 14 February 1993
Location: Nugent
DANGEROUS GOODS INVOLVED:
Acetylene, LP Gas and Calcium Carbide — Class 2.1 (flammable gas) and 4.3 (dangerous when wet)

A small workshop and adjacent storage shed were destroyed by fire. The cause of the fire was not confirmed, however electric arc welding was conducted in the shed some 45 minutes prior to the fire. Upon examination it was determined that the safety relief devices on all gas cylinders had operated as designed.

*Licences, permits and approvals
issued for the import, manufacture,
storage, use and sale of
dangerous goods, 1992/93*

	1992/93	1991/92
Licences to keep flammable liquids and dangerous goods	2639	2537
Licences to sell explosives and safety cartridges	140	148
Private magazine licences	72	263
Import explosives licences	27	29
Convey explosives licences	14	16
Manufacture explosives licences	6	2
To sell fireworks licences	1	10
Manufacture dangerous goods licences	3	6
Import dangerous goods licences	16	15
Gas suppliers licences	66	56
Applications for shot-firers permits	88	153
Applications for fireworks displays	59	
Landing permits (fireworks)	11	(52)
Landing permits (explosives)	59	(
Applications for plan approvals	400	318

*Imports of flammable liquids,
1992/93*

<i>Product (tonnes)</i>	<i>Bell Bay</i>	<i>Burnie</i>	<i>Devonport</i>	<i>Hobart</i>	<i>Total (tonnes) 1992/93</i>	<i>Total (tonnes) 1991/92</i>
Aviation Gasoline	2 852	-	-	-	2 852	500
LP Gas	6 341	-	17 830	13 296	37 467	36 972
Unleaded Petrol	16 090	12 287	31 559	57 517	117 453	101 977
Super Petrol	30 034	22 236	55 975	104 233	212 478	232 189
Kerosene — Aviation - Jet	5 645	-	-	10 540	16 185	25 368
Kerosene — Lighting & Power	3 635	-	-	570	4 205	-
Bitumen Feed Stock	-	-	-	21 336	21 336	19 228
AGO and Distillate	43 006	31 631	53 645	91 297	219 579	210 169
Heating and Fuel Oil	20 338	24 243	13 441	6 145	64 167	71 188
Total (tonnes)	127 941	90 397	172 450	304 934	695 722	697 591
Number of Tankers	18	6	33	39	96	108

*Imports of explosives,
1992/93*

<i>Product (cartons)</i>	<i>Bell Bay</i>	<i>Stanley</i>	<i>Burnie</i>	<i>Total 1992/93</i>	<i>Total 1991/92</i>
Blasting Explosives 1.1D	1 632	2 163	15 458	19 253	33 347
Detonators 1.1B	-	185	6 062	6 247	2 985
Total cartons	1 632	2 348	21 520	25 550	36 332
Ammonium Nitrate (tonnes)	-	600	300	900	1 468
Number of Shipments	31	5	27	63	61

There were no imports for Hobart

MINES INSPECTION

During the year under review, the Mines Inspection Branch had responsibility for:-

- monitoring working environments on mines and mineral processing works to ensure the health and safety of employees.
- assisting with the processing and monitoring of mining leases.
- provision of an efficient drilling service for the Geological Survey and other Government agencies.

The drilling services were progressively scaled down from the beginning of the year and finally closed down in December. All drilling equipment was subsequently sold at auction.

Mines Inspectorate

GENERAL

At the beginning of the year the Mines Inspection Branch was staffed by four mining engineers, a mechanical engineer, an electrical engineer, two industrial chemists and two technical officers.

During the year the Chief Inspector of Mines, Mr T. E. Evans, retired and the responsibilities and authority of the Chief Inspector of Mines were delegated to the newly appointed Director of Mines, Mr M. W. D. Ayre.

A mining engineer was engaged as Senior Mining Engineer (Development) and an inspection role was accorded him. The Chief Chemist and Metallurgist was transferred to the Inspectorate and appointed as an inspector of mines with principal responsibility for inspecting mineral processing works. In addition, the mechanical engineer, the electrical engineer, the two industrial chemists and the two technical officers were appointed as inspectors of mines.

Resulting from Government restructuring, the Occupational Health and Safety Branch of Industry Services Division has been amalgamated with Mineral Resources Tasmania (previously the Department of Mines) under the auspices of the new Department of Development and Resources. It is intended that the functions and legislation of the three inspectorate arms of the Department (Mines Inspectorate, Dangerous Goods and OH & S Branch of Industry Services Division) be rationalised in the long term.

FUNCTIONS OF THE MINES INSPECTORATE

The Inspectorate has responsibility for the administration of the *Mines Inspection Act 1968* and attendant regulations. Assistance is given in the application of the *Dangerous Goods Act*, the *Mining Act* and the *Environment Protection Act*.

Through the application of regulations, and routine and special inspections, the Inspectorate has ensured that safe and healthy work practices have been maintained in mines, quarries and works.

The tendency on major mines and mineral processing plants is increasingly towards self regulation, resulting from a greater awareness by management and employees of their responsibilities regarding the welfare of others. This duty of care has given rise to a review of management safety systems and a greater involvement of employees in ensuring safe and healthy work practices.

With the increase in self regulation, the focus of the Mines Inspectorate will in future be directed towards carrying out safety and health audits rather than routine inspections. Acceleration of the implementation of self regulatory controls will be encouraged through discussion with management and other employees, attendance at safety committee meetings, and participation in safety training courses. Management safety systems will be audited.

The Inspectorate examines plans and proposals for the operation of mines and equipment and issues approvals as appropriate. This includes examination of submissions for approval for use underground of diesel engines and applications for approval of mine winders, cranes and lifting equipment. Consideration for approval is also given to tailings dam designs, certain mine project proposals, and new construction projects.

MINE MANAGERS CERTIFICATES OF COMPETENCY

The following Mine Managers Certificates of Competency were issued by the Board of Examiners in accordance with the provisions of the Mines Inspection Regulations.

<i>No.</i>	<i>Name</i>	<i>Mine</i>
342/92	Clive Thompson	Mt Lyell
343/92	Colin Edward Langdon	Mt Lyell
344/93	Mark Laing	Hellyer
345/93	Robert Edward Usher	Mt Lyell
346/93	Sean Anthony Pearce	Pasminco
R16-93 (Restricted)	Rupert Murray Fraser White	HEC

NATIONAL UNIFORMITY

As a result of disparities between the legislation of the various States, Northern Territory and New Zealand it was decided three years ago by the Chief Inspector of Mines Conference that there was a need for a performance-based national code of practice acceptable to industry and employee representative groups which would provide a base for uniform legislation.

Consequently a *Draft National Code for Mining and the Extractive Industry* (other than coal mines) was produced and widely circulated for appraisal. The response was generally highly critical. The draft code was considered to be too prescriptive and therefore not a code. In addition, some minor issues were covered in far too much detail, while certain major issues were not considered in enough detail.

At the July 1993 ANZMEC meeting it was proposed that a handbook for safe mining practices be produced. The intention is that the handbook be drafted in a non-prescriptive style for use by managers and employees of all mines as a reference document. The handbook will be supported by a series of guidelines and codes of practice, which will provide information on health and safety matters in greater detail.

ANZMEC has approved the use of a consultant to produce the handbook under the direction of the Department of Minerals and Energy of Western Australia. Mineral Resources Tasmania has agreed to provide \$5000 towards the funding of the project. Completion of a final draft of the handbook for approval by ANZMEC is anticipated by the end of April 1994.

SAFETY PERFORMANCE AND ACCIDENTS

The lost-time injury frequency rate (used as an indicator to compare safety performances between operations and against previous performances), having improved for all mines, quarries and works only marginally over the previous three years, improved substantially during the year under review. Improvement was realised for all sectors, and the weighted average, at 41 lost time injuries per million hours exposure, was comparable with the national average for mines in 1991/92.

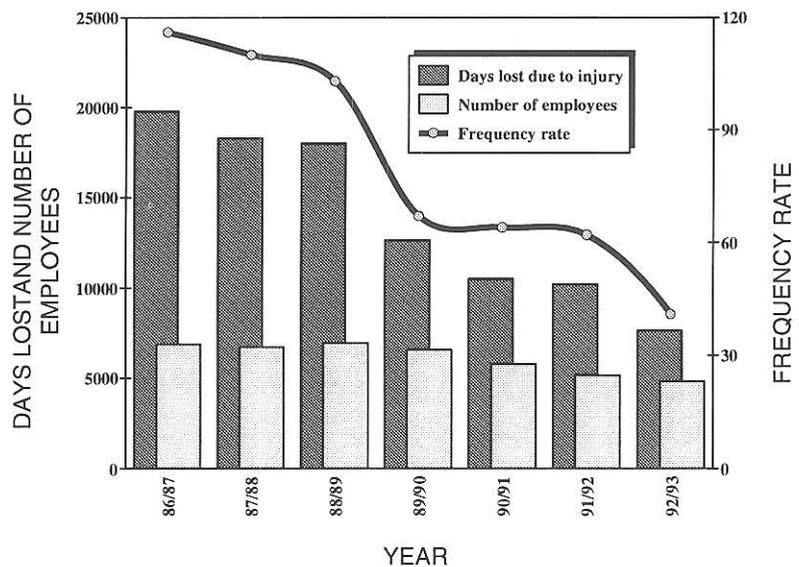
Nearly 75% of all operations realised an improvement in safety performance. These improvements have been attributed to a trend in the

devolution of responsibility for safety from management through the ranks to the shop floor, and employees are increasingly becoming involved in the management of safety at their workplace. In addition there has been a greater focus on management systems which have an orientation towards safety.

For as long as the drive towards excellence in achievement continues, there will be an improvement in safety performance. The frequency rate for 1992/93 was two-thirds of that for the previous year. Hopefully this improvement will be repeated in 1993/94 and a frequency rate of less than 30 will be realised.

Special Achievement Awards

*Accident statistics,
1986 – 1993*



During March, Tioxide Australia Pty Ltd achieved 500 lost-time injury free days and, in the same month, Renison Tin Division celebrated 365 lost-time injury free days.

In recognition of these two excellent performances, the Premier, on separate occasions, presented Special Achievement Awards to the respective employees during visits to the two sites.

Occupational Health and Safety Seminar

The 1992 Chamber of Mines/Mineral Resources Tasmania OH & S Seminar was held at the Albert Hall in Launceston on 17 and 18 September. Attendance, at 160, was the highest to date. The mining industry and other industries were well represented by a balanced mix of members of management and safety representatives.

During the course of the Seminar, the Intermine Safety Competition awards for 1991/92 were presented by the Minister for Mines to:

- Tioxide — for the major contribution to mining industry safety
- Renison Tin — as the safest underground mine
- Goliath Cement — as the safest large surface operation
- Tonganah Clay — as the safest small surface operation

Mine Rescue Competition

The 1992 Mine Rescue Competition was held at Cornwall Coal near Fingal. Tasmanian mines were collectively represented by seven teams. In addition, a team from the Woodlawn Mine, in southern New South Wales, and a team representing the Hydro-Electric Commission participated.

The events which make up the competition are practical exercises and theory in Mine Rescue, First Aid and Fire Fighting. The competition differed from those of previous years in that the mine rescue practical exercise was carried out in one of the mines.

The winners of the sponsored trophies were:

- Fire fighting — Pasminco Mining, Rosebery
- Mine rescue — Cornwall Coal (Red Team)
- First Aid — Woodlawn
- Overall — Cornwall Coal (Red Team)

The Cornwall Coal (Blue Team) was placed second overall while Renison Tin (A Team) filled third place.

SERIOUS ACCIDENTS

Caught In

- An acting supervisor was pinned in the cab of a utility when it was crushed by a 40-tonne truck in an underground turning bay. He sustained a dislocated shoulder, lacerations to his face and chest injuries.
- An underground driller's assistant suffered severe lacerations to a hand when it was jammed between the drilling head and a bracket.
- A fitter sliced the pad off a finger whilst replacing a pump barrel on surface, which kept him off work for almost two months.

Rock Fall

- An underground operator sustained three broken ribs when knocked sideways into a fork-lift truck by a falling rock.
- A miner suffered multiple injuries when struck on the back by a falling rock.
- A rock, loosened from the back when being drilled for stripping purposes, deflected off the airleg machine and pinned the contract miner to the floor. He sustained severe back and internal injuries.

Fall

- An underground worker slipped and fell on a plat whilst walking towards the cage. He fractured an ankle.

Struck By

- A contract diamond driller required surgery to remove hydraulic fluid from a finger which was penetrated by the fluid under high pressure from a pinhole leak in the hydraulic hose.
- A fitter was struck in the face when the lifting hook of a crane broke while under load. He suffered a fractured nose and cheek bone.

*Mining industry lost time
accident statistics,
1992/93*

<i>Employer</i>	<i>Manhours Exposure</i>	<i>No. of Injuries</i>	<i>Days Lost</i>	<i>No. of Employees</i>	<i>Frequency Rate</i>	<i>Incidence Rate (%)</i>	<i>Mean Duration</i>	<i>Severity Rate</i>
Aberfoyle–Hellyer	538 934	33	328	278	61	12	9.9	609
Mt Lyell	952 562	34	611	427	36	8	18.0	64
Pasminco Rosebery	570 802	9	173	304	16	3	19.2	303
Renison	635 437	0	0	256	0	0	0	0
Savage River	445 798	48	1 076	210	108	23	22.4	2 414
Tasmania Mines	57 676	1	9	25	17	4	9.0	156
<i>All Mines</i>	3 225 629	129	2 231	1 514	40	9	17.3	692
Comalco	1 569 451	134	2049	892	85	15	15.3	1 306
Goliath Cement	454 493	7	85	216	15	3	12.1	187
Mole Creek	45 093	3	140	22	67	14	46.7	3 105
Pasminco-EZ Risdon	2 175 889	45	1 787	1 139	21	4	39.7	821
Port Latta	172 225	11	46	79	64	14	4.2	267
TEMCO	649 645	24	558	367	37	7	23.3	859
Tioxide Aust.	468 152	1	10	249	2	0	10.0	21
Ceramics	157 594	17	518	81	108	21	30.5	3 287
<i>All Works</i>	5 692 542	242	5 193	3 045	43	8	21.5	912
Cornwall Coal	181 791	6	31	117	33	5	5.2	171
Merrywood Colliery	26 827	2	51	13	75	1	25.5	1 901
Tasmania Coal	5 930	0	0	0	0	0	0	0
<i>All Collieries</i>	214 548	8	82	130	37	6	10.3	382
<i>All Quarries</i>	290 530	12	175	143	41	8	14.6	602
Totals	9 398 829	387	7 647	4 818	41	8	19.8	814
HEC Anthony	171 346	10	75	160	58	6	7.5	438

DEFINITIONS

FREQUENCY RATE

This is the number of lost-time injuries in the year, related to a million work-hour unit, as follows:

Lost Time Frequency Rate = Number of lost-time injuries × 1,000,000 / Work-hours exposure

INCIDENCE RATE

This is the number of lost-time injuries × 100 / Number of employees

MEAN DURATION RATE

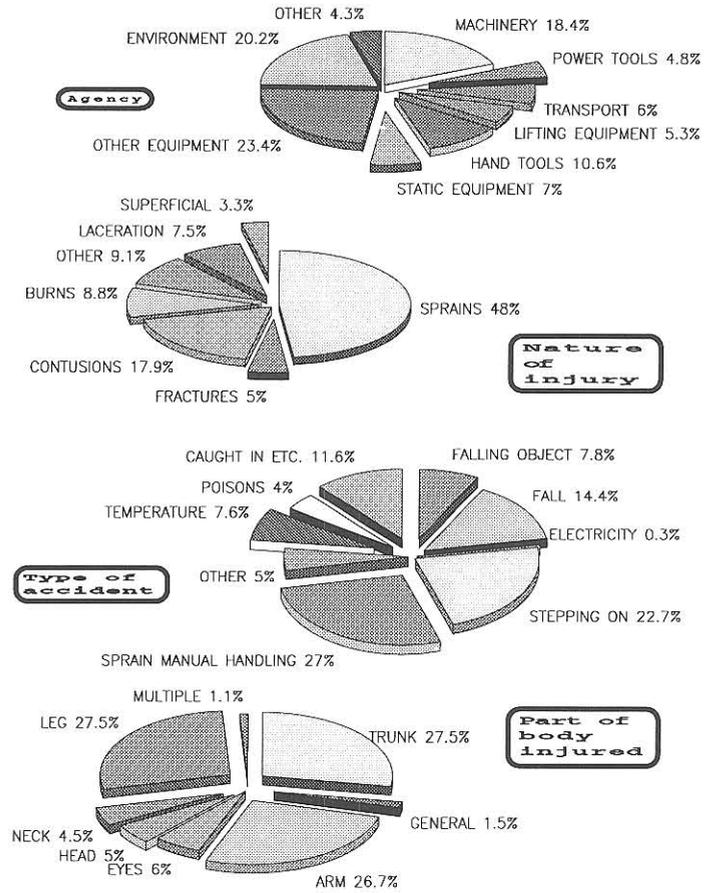
This is the time lost per lost-time injury, as follows:

Mean Duration = Days (shifts) lost / Number of lost-time injuries

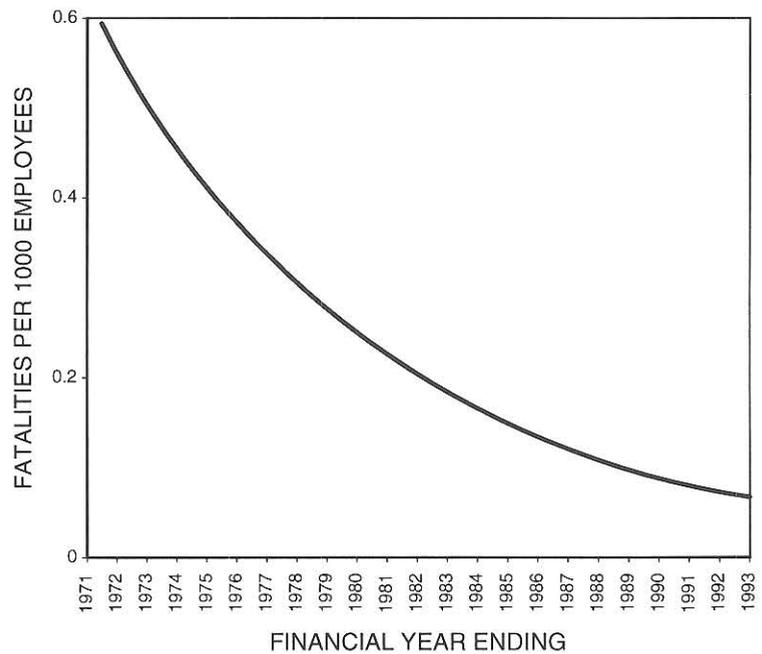
SEVERITY RATE

Severity rate = Days (shifts) lost × 1,000,000 / Work-hours exposure

*Mining injury classification,
1992/93 (AS1885 – 1976)*



*Fatality rate improvements in
the mining industry,
1970/71 to 1992/93*



5 cm

Electricity

- ❑ A 17 year old youth received burns to 50% of his body when he came into contact with a 44 kV conductor at a mine pump station whilst he was climbing along a security fence in order to jump into the river.
- ❑ An electrician was burnt on the face and hands when a partly dismantled moulded case circuit breaker flashed over.

Heat

- ❑ Whilst removing a coupling from a furnace line, a build-up of steam blew off the coupling burning the worker on the forearm.

There were no fatal accidents in 1992/93.

DRILLING SECTION

The following drilling programmes were completed:

- ❑ The geothermal drill hole near Smithton was extended from 364 to 494 metres in NQ, where the hole was stopped in poor ground conditions and left to stabilise for geothermal testing.
- ❑ At Langloh a water supply hole was drilled 50 m into the abandoned coal mine and reamed to 250 mm.
- ❑ Seven down-hole hammer holes (590 m in total) were drilled at Risbys Basin near Maydena for a limestone investigation.

The drilling crew which remained at the start of the year was disbanded following the completion of the latter program, following which the drilling and allied equipment was sold at auction.

The Tasmanian Government's first involvement in drilling was in 1882, when two diamond drills were imported from the Pennsylvania Diamond Drilling Company. In the following year G. Thureau, Inspector of Mines, reported to Parliament that "The two Diamond Drills have during the year bored a total distance of 2,248 feet and 4 inches, and the work was performed in a very satisfactory manner". Operations were at Back Creek Lefroy and Mangana.

MECHANICAL INSPECTION

The following Certificates Of Competency were issued:

Mine Winder Drivers	2
Stationary Engine Drivers	0
Crane Drivers	47
Total all classes	49

A total of 77 approvals were issued for the use of diesel engines underground, 66 for underground mines and 11 for Hydro-Electric Commission tunnelling.

Mine winder, crane and lifting equipment approvals and rejections were issued in the following categories:

Winders	1
Bridge cranes	3
Jib cranes	1
Monorail hoists	14
Vehicle mounted hoists	1
Lifting attachments	1
Lifts	1
Attachments for fork trucks	1
Special purpose equipment	7
Designs rejected	7

Vehicles and machinery

There are ongoing problems with the unsatisfactory condition of contractors cranes. Most of the operations that hire in cranes have no knowledge of how to check contractors cranes (particularly now that annual DLI certification is a thing of the past). Operations are being encouraged to get the crane driver to sign a statement as to the cranes condition.

Accidents and incidents investigated

- The investigation into a fatal surface trucking accident, which occurred in the previous year, was completed and the inquest attended.
- A small explosion occurred at a mineral processing plant when solvent fumes in an air receiver were ignited by a vacuum cleaner. A mechanical tradesman received superficial burns and shock. The solvent, which would not normally represent a hazard, had a very low flammability range at very low concentrations. The incident was not reasonably foreseeable and no breach of regulations occurred. A Hazardous Incident report was issued.
- An incident involving exposure of contractors to sulphur dioxide was investigated. Although dangerous exposure did not occur, better controls were needed to overcome the risk associated with panic reactions to perceived dangers.
- An incident, in which a cage was wound into the jib of a crane that was being used for maintenance in the adjacent skip compartment, was investigated. The incident was clearly due to bad work practices.
- The hoist rope on a contractors mobile crane broke and allowed the load to fall. Nobody was injured because good working practices were in use. The rope broke due to incorrect reeving.

- ❑ Goodyear L2 17.52 × 5 tyres were reported as bursting on a regular basis. This problem is being investigated, and it appears that a batch of weak tyres were made about five years ago. The problem is that some of these tyres are in circulation as retreads.

ELECTRICAL INSPECTION

Safety incidents

- ❑ A serious shock to the driver of a crane occurred when he attempted to reset the rope limit by hand. Injury was not permanent.
- ❑ Dust fires and explosions continued to be troublesome. The ignition source was not always clear, but flames, sparks, hot surfaces and static electricity were possible causes. Meticulous cleaning is necessary with combustible dusts, as well as eliminating ignition sources.
- ❑ The value of properly functioning electrical protection was shown by two cases of damage to high voltage reeling cables. In one, an 11 kV cable to a wharf crane was cut by a loader bucket. In another, a 1000 volt cable was damaged by the coal loader it was feeding. In each case the supply tripped on earth leakage, with earth fault current limited to 5 amps, with only minor arcing.
- ❑ A 3.3 kV cable in a mine was hit by a vehicle, resulting in a cable joint 15 metres away exploding. Two 3.3 kV cables were damaged by blasting. No injuries were sustained in either case.
- ❑ A PCB-filled capacitor at a shaft fan was found to be leaking and was removed for disposal.

Equipment approvals

The use of the following equipment was approved during the year.

- ❑ ICI radar-type blast monitor
- ❑ ICI-Stinger 10/50/100 exploder range: approved after modifications.
- ❑ Toyota 2.5 tonne fork-lift truck was approved for hired use in hazardous areas.

Investigations

A proposal was prepared for a Fingal Valley coal-fired power station, with R. Friend and B. McBride of the Development Division. National Grid Management rules give scope for private generation.

Legislation and Standards

A new SAA committee is preparing a standard for 12/24 V wiring of mobile equipment for mines.

Several meetings were held with Worksafe Australia and the Industry Services Division on National Uniformity, and on merging the Industry Services Division, Mines and Dangerous Goods inspectorates.

The following were reviewed, and comment sent in most cases:

- ❑ Worksafe Australia drafts:
 - Banned chemicals.
 - Remote control of mining machines.
 - Major hazardous facilities.

- Dangerous Goods storage and handling.
- Plant.
- International Electrotechnical Commission drafts:
 - O/H of non-mining Ex equipment.
 - Revision of AS2430 Hazardous Areas.

Training

- An Employee Safety Representatives training course by Kirwan and Associates was approved to MIR 1910 and talks were given at two courses.
- A TUTA ESR course was addressed in July 1992.
- A SAA/IEAust seminar on hazardous areas was attended.

Seven Tasmanian Significant Incident Reports were prepared to draft stage at end of June, for national distribution.

METALLURGICAL INSPECTION

Significant incidents investigated during the year were:

- a fire in a coarse zinc dust plant, in which no one was hurt.
- a wharf labourer lost the top of two fingers when lifting a ship mooring line off a bollard.
- a painter received a broken toe when run over by a fork lift.
- an operator fell up to his thighs into weak acid when a board he was standing on broke.

Safety audits were carried out during the year at Temco, Comalco, Pasminco Metals-EZ, Tioxide and IMP Silica. Currie River Mining at Lefroy, the Forester Gold Mine and the Lazenby-Doran sand plant at South Arm were also visited. Dangerous goods audits were carried out at two plants.

An acid mist problem at one plant has required a considerable number of inspections and meetings on the subject.

Several significant new engineering projects were inspected. These included:

- a new acid plant
- a new nitrogen plant
- a new hydrogen peroxide plant
- a trial monorail for moving metal
- refurbishment of a green carbon plant and an upgrade in the environment.
- a new trial crust breaker.
- conversion of a furnace from ferrosilicon to ferromanganese.

INDUSTRIAL CHEMIST INSPECTIONS

A total of 48 inspections and surveys were conducted by the Occupational Health Unit during the year. Twelve of these assessments were comprehensive monitoring programmes. The surveys of note, including the contaminants, were:

- Pasmaenco Metals-EZ, Risdon — acid mist.
- Hellyer — total dust and lead.
- Pasmaenco Mining, Rosebery — total dust, respirable dust, lead and quartz.
- Comalco, Bell Bay — fluorides, synthetic mineral fibre, sulphur dioxide and benzene soluble fractions.
- Mole Creek Limestone — total dust, noise and blasting vibration.
- Savage River Mines, Savage River — asbestos.
- Tioxide Australia, Heybridge — asbestos.
- Cornwall Coal Co NL, Fingal — respirable dust and α -quartz.

The mines have been advised and/or directed to implement control measures to reduce exposure to the above contaminants where appropriate.

The Unit monitored and assisted with the supervision concerning the disposal of broken and weathered asbestos cement sheeting at an old mine site.

Mineral Resources Tasmania's Occupational Health Unit underwent a structural change towards the end of the year when it was transferred to the Dangerous Goods Inspectorate. The unit still provides a service for the Mines Inspectorate. Its functions and tasks have yet to be completely resolved.

The Unit assisted with the drafting, presentation and implementation of the medical surveillance programme for mine employees. Trial schedules were introduced at Comalco, Pasmaenco Metals-EZ Risdon and Pasmaenco Mining Rosebery. Responsibility for the project has been transferred to the Metallurgical Engineer.

In December 1992, the International Agency for Research in Cancer (IARC) stated that there was sufficient evidence that the occupational exposure to strong non-organic mists containing sulphuric acid was carcinogenic, Group I. Subsequently the National Occupational Health and Safety Commission will review the current exposure standard for sulphuric acid. This affects industries such as Pasmaenco Metals-EZ, Tioxide, Renison, Mt Lyell, aluminates, water treatment plants and battery manufacturers.

The Unit has included, as part of its functions, the National Occupational Health and Safety Commission's workplace hazardous substances and the national uniformity and regulatory reform process.

REVIEW OF MINERAL
SECTOR OPERATIONS
1992/93

MAJOR MINES

Base Metals

ABERFOYLE RESOURCES LTD
(HELLYER DIVISION)

Mining

A total of 1.31 million tonnes of ore at 13.1% Zn, 7.1% Pb and 167 g/t Ag was mined from underground sources. Ore extraction was from sub-level open stopes and by pillar recovery against cemented aggregate fill or under a caving hangingwall.

A total of 3498 metre advance was achieved in development headings. This included extensions of the decline and incline systems.

Milling

The concentrator throughput for the year was 1.29 million tonnes. Concentrate production was:

- Zinc concentrate — 198 306 tonnes @ 50.2% Zn, 3.6% Pb
- Bulk concentrate — 65 143 tonnes @ 34.7% Zn, 13.6% Pb, 210 g/t Ag
- Lead concentrate — 60 700 tonnes @ 60.3% Pb, 6.1% Zn, 655 g/t Ag
- Copper/silver concentrate — 6889 tonnes @ 5041 g/t Ag, 11.2 % Cu

Exploration and Reserves

A diamond-drill hole was drilled adjacent to the Tailings Dam Fault in the vicinity of minor base metal mineralisation exposed during construction of the tailings dam. The Mixed Sequence volcanics, which relate to the Hellyer ore position, were intersected at a much shallower depth than anticipated. Mineralisation was insignificant.

A total of 1827 metres was drilled, both from underground to resolve complex ore geometry and to determine in situ rock stress, and from surface to test ground conditions for a proposed decline.

Ore reserves, as at 30 June 1993, were calculated as 10.2 million tonnes of ore containing 0.3% Cu, 5.9% Pb, 12.0% Zn, 140 g/t Ag and 2.1 g/t Au.

Employment

As at 30 June 1993 the workforce totalled 244. Eight production days were lost underground and one in the mill through labour disputes.

Capital Expenditure

Capital expenditure for the year totalled \$4.47 million. An amount of \$1.90 million was spent on major metallurgical improvements, \$0.87 million on underground development, and the balance on other capital works.

PASMINCO MINING – ROSEBERY

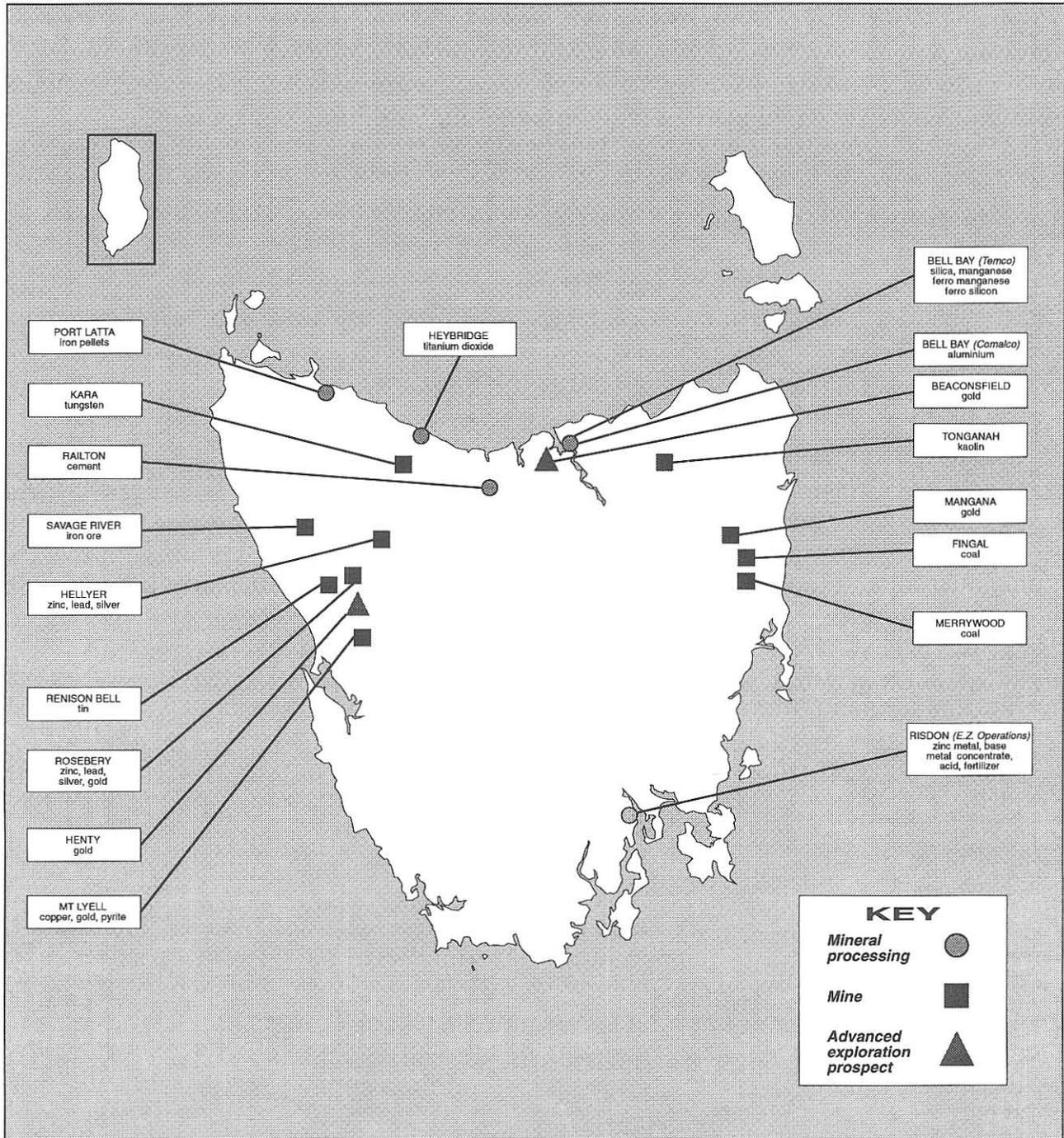
Mining

A total of 559 049 tonnes of ore at 9.1% Zn was mined. This compares with a planned production of 600 210 tonnes at 10.7 % Zn. The shortfall was mainly attributable to a delayed commissioning of 'J' lens stopes. As a partial offset, more ore was mined from stopes in 'H' lens, which resulted in the lower headgrade.

A total of 2994 metres of development was achieved against a target of 3434 metres.

Tasmania

Major Mining and Mineral Processing Operations



*Value of the
Tasmanian mineral industry*

<i>Year ended Commodity</i>	<i>Unit</i>	<i>30 June 1993 Total Quantity</i>	<i>30 June 1992 Total Quantity</i>
METALLIC MINERALS			
Cadmium	(tonne)	209	238.38
Cobalt oxide	(tonne)	0	0
Copper	(tonne)	28 395	27 292
Gold	(kilogram)	1 404	1 714
Iron ore pellets	(tonne)	1 458 909	1 451 585
Iron (in magnetite)	(tonne)	150 094	123 552
Lead	(tonne)	66 459	73 853
Molybdenum	(tonne)	0	0
Pyrite	(tonne)	94 484	80 229
Silicon (metallic or as alloy)	(tonne)	296	1 603
Silver	(kilogram)	95 332	104 156
Tin	(tonne)	6 760	5 729
Tungsten as tungstic oxide	(tonne)	142	229
Zinc	(tonne)	233 837	210 853
Value of metallic minerals		\$348 168 965	\$388 779 563
NON-METALLIC AND FUEL MINERALS			
Clay-			
Cement	(tonne)	24 567	88 400
Brick	(tonne)	60 968	59 652
Other	(tonne)	14 507	38 054
Kaolin	(tonne)	22 059	29 758
Dolomite (tonne)			
		20 815	49 323
Limestone-			
Agricultural	(tonne)	72 078	99 947
Cement	(tonne)	679 469	772 758
Chemical and metallurgical	(tonne)	25 205	16 124
Other	(tonne)	57 865	39 212
Sulphuric acid	(mono tonne)	352 498	243 865
Coal (run of mine)	(tonne)	494 873	486 797
Coal (washed)	(tonne)	250 736	300 101
Peat	(m ³)	4 864	3 821
Value of non-metallic and fuel minerals		\$32 766 542	\$40 926 987
CONSTRUCTION MATERIALS			
Building stone-			
Freestone	(tonne)	1 600	1 424
Granite	(tonne)	162	381
Other	(tonne)	209	352
Crushed and broken stone-			
Basalt	(tonne)	903 037	983 206
Dolerite	(tonne)	1 468 895	971 653
Limestone	(tonne)	49 399	52 256
Sandstone	(tonne)	14 775	5 424
Other	(tonne)	96 979	136 603
Gravel	(tonne)	46 815	32 586
Sand	(tonne)	495 278	448 108
Other road materials	(tonne)	1 134 570	1 174 859
Value of construction materials		\$26 896 931	\$22 251 171
TOTAL VALUE WITH AUSTRALIAN METAL PRICES			
		\$407 832 438	\$451 196 032
METALLURGICAL PRODUCTION FROM OTHER THAN TASMANIAN ORES			
Aluminium)		
Aluminium sulphate)		
Cadmium)		
Cobalt oxide)		
Ferro-manganese)		
Ferro-silicon)	\$616 908 492	\$645 196 032
Silico-manganese)		
Sinter))		
Superphosphate)		
Titanium dioxide)		
Zinc)		
VALUE OF MINING AND METALLURGICAL PRODUCTION		\$1 024 740 930	\$1 097 153 753
REPORTED AVERAGE NUMBER OF EMPLOYEES¹		5086	5512

(1) Not all operators report full details

The Southern Upcast Airway Project was approved and work related to the establishment of a 600 metre deep, four metre diameter shaft between the surface and 19 level was commenced.

Commissioning of the 17 level pump station to pump unsettled water directly to surface was completed. Pump stations were commissioned on 19 and 20 levels to improve water handling facilities below 17 level.

Milling

Ore treated totalled 562 228 tonnes, of which 536 576 tonnes originated from the Rosebery mine. The balance (25 652 tonnes) was trucked from Mintech's South Comet Mine.

The mill headgrade reported at 9.22% Zn, 2.93% Pb, 0.46% Cu, 89.6 g/t Ag and 1.94 g/t Au. The previous year's headgrade was 11.12% Zn, 3.56% Pb, 0.51% Cu, 96 g/t Ag and 2.5 g/t Au.

Concentrate production for the year was:

- Zinc Concentrate — 84 471 tonnes at 53.98% Zn
- Lead Concentrate — 17 484 tonnes at 66.79% Pb, 1292 g/t Ag
- Copper Concentrate — 5824 tonnes at 25.40% Cu, 7.80% Pb, 2242 g/t Ag, 58.49 g/t Au

In addition, 325.86 kg of gold doré containing 70.7% Au and 19.6% Ag was produced in the gold plant.

Exploration

A total of 33 447 metres of diamond drilling was carried out. Of this 29 710 metres was drilled from underground sites.

Three intersections of the recently identified 'K' lens in the north of the mine were effected by a surface rig. The intersects averaged 20% Zn over 20 metres and added 0.8 million tonnes to the inferred resources.

A hole drilled at 1100 metres N intersected a new lens ('P' lens) 350 metres below 19 level. The intersect averaged 20% Zn over 13 metres.

Ore Reserves

Ore reserves as at 30 June 1993 were:

	<i>tonnes (million)</i>	<i>Pb (%)</i>	<i>Zn (%)</i>	<i>Cu (%)</i>	<i>Ag (g/t)</i>	<i>Au (g/t)</i>
Proved	1.8	3.5	9.8	0.42	117	2.6
Probable	2.7	3.8	12.1	0.50	164	2.4
Total	4.5	7	11.2	0.47	145	2.5

The ore reserve is part of a resource of 8.3 million tonnes.

Personnel

At year end 293 people were directly employed by the mine.

A major blood lead survey of all employees and members of the Rosebery community was carried out by the Menzies Centre. A Safety Audit Commissioner was appointed to co-ordinate site safety audits.

No production days were lost through industrial action.

Copper

THE MOUNT LYELL MINING AND RAILWAY CO LTD

The company celebrated its centenary on 29 March 1993.

Mining

Mine production was 1 740 802 tonnes at 1.59% copper. All but 15 153 tonnes were hoisted via the Prince Lyell shaft. This was an improvement over the previous year and slightly above budget. A total of 966 000 tonnes of ore was extracted from the 60 series and the remainder from 50 Series. Prince Lyell pillars 65, 511, 64 and 66 were blasted during the year.

Mine development totalled 4038 metres comprising 3668 metres of driving, 337 metres of raise boring and 33 metres of rising. Fourteen of the development miners terminated their employment with the company in May to form a partnership, Lyell Development Contractors, and have contracted to complete the remaining mine development. They are working a 12-hour continuous roster. The 60 Series decline reached the 300 metres sub level. A 289 metre decline by-pass was mined because of decline failure near the 40 Series haulage, when the adjacent 513 and 552 former stopes failed.

Milling

The concentrator operated 293 days and treated 1 729 272 tonnes of ore producing 95 115 tonnes of copper concentrate and 94 484 tonnes of pyrite concentrate. Copper concentrate contained 25 528 tonnes of copper, 496 058 grams of gold and 3 256 844 grams of silver. Fine grinding, improved grade and the high proportion of stope ore resulted in improved metallurgical performance. Decreasing employee numbers required the use of contract labour. Operator training was completed and certification was formalised during the year.

Capital Expenditure

Capital expenditure totalled \$3.2 million, with the largest item being a swingstock for the underground crusher.

Ore Reserves

Ore reserves at 30 June 1993 were 3.34 million tonnes of proven ore at 1.71% Cu, 0.49 g/t Au, 3.1 g/t Ag.

Employment

The average number of employees for the year was 423.

Iron Ore

SAVAGE RIVER MINES

The feasibility study into extending mine life to the year 2000 was not approved. However the continuing steady demand for Company's product has led to a likely extension of life to early 1997 through a waste stripping programme in the North Pit.

The iron-ore market remains depressed, and contract negotiation resulted in a further 11% reduction in the price of pellets from April 1993. Demand from Australian and Asian markets has remained firm and pellet production has been maintained at 1.5 million tonnes/year.

Production for the year came from all three pits. The Central Pit is nearing completion and production to 1997 will be mainly from the North Pit, augmented by South Lens. Production for the year was:

All material mined	9 028 899 tonnes
Rock to waste	4 845 840 tonnes
Crude ore	4 183 059 tonnes
Concentrate produced	1 514 794 tonnes
Pellets produced	1 458 909 tonnes
Pellets shipped	1 347 319 tonnes
Concentrate and chip sales	83 458 tonnes

The failure of the western wall of the Central Pit was reactivated but has not seriously threatened completion of the pit to planned depth. The slope dewatering program has continued. Some problems have been encountered in maintaining berms at the final trim line on the eastern wall of the North Pit, and small diameter pre-split holes are being trialled to improve the final wall.

There was no exploration drilling carried out during the year. Capital expenditure was related to waste stripping, vehicle replacement and pumping equipment. Work continued on plant corrosion control and mine site rehabilitation.

Workforce numbers were reduced from 308 to 289 through natural attrition and a voluntary redundancy program.

TASMANIA MINES LTD — KARA MINE

A total of 286 627 tonnes of ore and tailings were treated at the mill including 1000 tonnes from the new Kara No.2 deposit.

Production was 284 tonnes of scheelite @ 43.3% WO₃ and 40.83 tonnes of scheelite @ 73.23% WO₃, plus 163 319 tonnes of magnetite concentrate.

Tin

RENISON LIMITED, RENISON BELL

Significant progress was made at Renison despite record low levels in the price of tin. A year of consolidation has occurred, building on the '91 Survival Plan.

Employment has stabilised at 257, up seven from the previous year. Accident prevention has been a major success for the company and employees, with no lost-time accidents being sustained by company employees during the financial year.

Mining

Ore mined underground totalled 560 163 tonnes at a grade of 1.57% Sn. The concentrator treated 564 915 tonnes of ore yielding 12 352 tonnes of concentrate at a grade of 54.5% Sn (contained tin was 7732 tonnes).

The Renison North Decline advance is continuing to provide future access to Rendeep ore zones, and the 1650 hangingwall drive is required as a drilling horizon for this project. Underground primary development amounted to 1960 metres, and a further 567 metres were advanced under contract. Rising, mainly for ventilation developments, totalled 288 metres. Stripping of the 7A intake rise and equipping for conversion to a major new up-cast exhaust system for the North Bassett area effected significant ventilation improvements for the northern end of the mine.

Exploration

Diamond drilling totalled 30 583 metres, half of which was from the 1650 level, proving up additional resources below 600 metres below surface. Planning included designs for a shaft system to 600 metres to reduce overall ore transport costs. It is hoped that approval will be given for this program to proceed.

Ore Reserves

Ore reserves at 1 January 1993 were:

- Proved ore — 2.2 million tonnes at 1.55% Sn.
- Probable ore — 3.0 million tonnes at 1.38% Sn.

The Rendeep resource has not yet been published.

Processing

In April 1993 the processing plant changed to a continuous seven-day week operation in an effort to improve productivity, efficiency and product quality.

A major improvement at the concentrator has been the installation of Kelsey Jigs, which have given the ability to produce equivalent final product concentrates without the use of the acid leach process. The leach plant was subsequently closed.

Tailings Dam A was covered with tin flotation tailings to act as a barrier against oxidation of sulphides and as a plant growth medium. In time this should reduce acidic drainage and improve water quality in seepage. Revegetation trials were established on the tailings. Extensive clean up of the anti-pollution dam surrounds was carried out as part of the continuing improvement program for this area.

Coal

THE CORNWALL COAL COMPANY NL, FINGAL

The Cornwall Coal Company operates underground mines and an open cut at Blackwood near Cornwall; the Duncan underground mine at Fingal; and a washery near Fingal. The mines produced 371 004 tonnes of raw coal, with washed coal amounting to 250 736 tonnes, a reduction over the previous year. The company employs 107 following restructuring of the work force.

Blackwood

Pillar extraction at Blackwood No. 1 was completed in December and the mine was subsequently closed. Raw coal production totalled 127 518 tonnes. Development continued at Blackwood No. 2, advancing about two kilometres from the portal. Three major faults have been crossed. Production of raw coal from Blackwood No. 2 totalled 71 962 tonnes, with a further 10 473 tonnes of raw coal being produced from an open cut.

Duncan

Pillar extraction produced 161 051 tonnes of raw coal. The area currently being mined has a seam 3–3.3 metres thick, which is the thickest in the southern area of the mine. Breaker line supports were introduced into the operation during the latter half of the year in an effort to increase output and improve ground control during retreat, and reduce the requirement for mine timber.

A change in face ventilation from brattice to auxiliary fans has improved face ventilation, permitting changes in drivage procedures and thereby improving productivity.

Improvements in cleaning finer size fractions of coal has enabled customers to use a greater proportion of fines, giving a better recovery from raw coal produced.

MINERAL PROCESSING OPERATIONS

MERRYWOOD COAL COMPANY PTY LTD, ROYAL GEORGE

The Merrywood Coal Company works an open-cut mine utilising in situ coal left by the former underground mine which closed in 1963. Sales of coal were 51 200 tonnes from 60 300 tonnes mined. A total of 330 000 cubic metres of overburden was moved, which included stripping of an initial area east of Merrywood Creek remote from historic workings. Employment was twelve full time on site and two full time and two part time at the company's Launceston workshop. Six full-time drivers are employed by the road transport contractor. The company has undergone a staff retraining program during the year funded in part by the Federal Government.

TASMANIA COAL COMPANY

This company operates the Huntsman Colliery, a small open-cut coal mine on the south face of the Nicholas Range. Sales totalled approximately 6000 tonnes.

COMALCO ALUMINIUM (BELL BAY) LIMITED, BELL BAY

A total of 228 692 tonnes of alumina were shipped to Bell Bay and 119 279 tonnes of aluminium were produced. Other raw materials used were coke, furnace oil, pitch, aluminium fluorite and eryolite.

A total of 863 people were employed as at 30 June 1993.

Capital expenditure for the year was \$7.9 million. Expenditure was on the following projects:

- Potline automation
- Green carbon process control
- Metal products offices
- Power supply automation
- General hazard removal and safety improvement
- Vehicle replacement

GOLIATH PORTLAND CEMENT CO, RAILTON

Major modifications to upgrade the works to the most modern and technically advanced standards in Australia in order to be internationally competitive were completed during the period under review. The works is now capable of producing 930 000 tonnes of clinker per year.

A total of 750 000 tonnes of overburden was removed from the new quarry site and 15 000 tonnes from the existing operating quarry.

Clinker production for the year under review was down to 385 808 tonnes due to a four month delay in production to facilitate the installation of new plant and equipment.

IMP SILICA, HEYBRIDGE

Index Minerals Processors (IMP Silica) operated with five people for the year. The high quality silica produced was sold mainly to the Japanese market for the production of optical glass.

There was no capital expenditure for the year.

PASMINCO METALS - EZ, RISDON

A new record production level of 211 351 tonnes of marketable zinc metal was achieved. Zinc concentrate roasted was 429 796 tonnes. The production of cadmium was 353 tonnes, lead residue 33 760 tonnes, copper sulphate 1915 tonnes, and sulphuric acid 355 517 tonnes. The fertiliser plant produced 69 600 tonnes of superphosphate. The number of employees at year end was 1125.

Capital expenditure for the year was \$24.2 million, which was expended mainly on the completion of the No. 5 acid plant. Other projects included the installation of a hydrogen peroxide plant and the continued demolition of old plant.

TASMANIA ELECTRO-METALLURGICAL COMPANY, BELL BAY

Alloy production for the year amounted to 74 878 tonnes of ferromanganese, 72 010 tonnes of silico-manganese, and 8652 tonnes of ferrosilicon. Sinter production for the year amounted to 227 474 tonnes (export) and 28 773 tonnes (premium).

Raw materials consumed amounted to:

- manganese ore (Groote Eylandt) — 315 117 tonnes
- iron ore (Whyalla) — 16 267 tonnes
- coal (Peko, NSW) — 31 606 tonnes
- coke (NSW, SA) — 29 956 tonnes
- coke breeze (NSW) — 24 933 tonnes
- dolomite (Ardrossan, SA) — 11 184 tonnes
- dolomite (Smithton) — 14 538 tonnes
- quartz (Maydena) — 774 tonnes
- quartz (Beaconsfield) — 51 518 tonnes
- limestone (Flowery Gully) — 14 623 tonnes
- woodchips — 5827 tonnes
- iron ore pellets (Savage River) — 2730 tonnes
- magnesite — 1274 tonnes

There were 350 employees at year end.

Capital expenditure for the year was \$14 million, with the conversion of the No. 5 furnace from the manufacture of ferrosilicon to silico-manganese costing about \$13 million. A new workshop and office complex cost \$1 million.

Construction of the joint George Town Council/Temco wastewater facility was completed in June 1993 with site drainage works. Startup and wetlands construction will be in 1994.

TIOXIDE AUSTRALIA PTY LTD, HEYBRIDGE

Tioxide Australia operated with an average of 249 people for the year, producing titanium oxide pigment from imported ilmenite. The capital expenditure for the year was \$180,000, which was spent on packing machine replacement, safety items and environmental control.

Rehabilitation of two redundant slimes dams on company land continued. No. 1 dam has been revegetated and rehabilitation is virtually complete. About 80% of the surface of No. 2 dam has been covered with waste lime and coal ash.

QUARRIES

TONGANAH CLAY MINE (APPM), SCOTTSDALE

Sales, at 30 700 tonnes, were well below the budget of 39 000 tonnes. Clay mined was 206 291 tonnes obtained from the Nos. 4 and 5 pits. A total of 148 000 tonnes of overburden and waste was removed.

Capital expenditure was only \$11,000 on new pumps. Expenditure on rehabilitation and land restoration was \$74,000 for land filling, recontouring and tree planting.

BEAMS BROTHERS PTY LTD, FLOWERY GULLY

This company produced 40 551 tonnes of aglime, 17 274 tonnes of fluxstone, 5944 tonnes of scalpings, 8878 tonnes of 5 mm, 25 mm and 50 mm crushed rock, 4815 tonnes of ironstone for road base, and 7.110 kg of burnt lime.

There was no major capital expenditure. However work commenced on a new hopper for the primary crusher, and 'stop and go' lights were installed at the jaw crusher plant.

CIRCULAR HEAD DOLOMITE AND TRADING CO

Production for the year was 34 796 tonnes of crushed dolomite and 18 232 tonnes of dolomite screenings.

BENDERS QUARRY, LUNE RIVER

Benders Quarry was shut down by the Commonwealth Government. Rehabilitation of the site by the National Parks and Wildlife Service followed closure.

INDUSTRIAL SANDS, EAGLE POINT

Production by this company totalled 30 000 tonnes of sand.

STORNOWAY-HEWITT, BEAUTY POINT

This company produced 100 000 tonnes of sand. Capital expenditure totalled \$20,000 for a new conveyor. Approximately six hectares of land restoration was completed during the year.

STORNOWAY GRAVEL

Production totalled 150 000 tonnes of road base material. Capital expenditure was \$50,000 for a mobile screen.

BRAMBLES EQUIPMENT QUARRIES

Production from Brambles' various quarries was:

<i>Quarry</i>	<i>Base and Sub-base Production</i>	<i>Screenings</i>
Talisker	13 000 t (base)	105 000 t
Western Junction	226,000 t (base, sub-base)	68 000 t
Biralee	3500 m ³ (sub-base) 6000 m ³ (base)	-
Ridgley	90 000 t (base, sub-base)	75 000 t

No Capital Expenditure was outlaid during the period under review.

TASMANIAN GOLD INDUSTRY

PIONEER, FLAGSTAFF GULLY

Pioneer Flagstaff Gully have commenced a haul road into the upper section of the deposit to the designs specified in the revised Environmental Management Plan.

LAZENBY ACI, SOUTH ARM

Lazenby ACI have installed a magnetic separator to remove spinel minerals from the glass sand.

During the year under review, declared gold production was from two sources:

- Pasminco Mining-Rosebery; 230 kilograms in doré, 340 kilograms in copper concentrate
- Mount Lyell Mining and Railway Co Ltd; 496 kilograms in copper concentrate

Of significance was the reaching of an agreement between joint venture partners, Renison Goldfields Consolidated Ltd and Little River Goldfields NL, on the conversion of Little River's interest in the Henty resource to a 10% gross royalty, enabling Renison Goldfields to proceed with the project.

HENTY GOLD PROJECT

The project is based on the Zone 96 indicated resource of 506 000 tonnes at 26.9 g/t of gold. It is estimated that development of a 110 000 tonne/year operation will cost \$53 million, with production commencing in mid 1996.

During the year work continued on mine design. The orebody will be accessed via a 3.1 metre diameter drilled sub-vertical shaft, 440 metres in depth, with levels at 2265 m RL and 2125 m RL to allow close-spaced drilling of the orebody before mine layout is finalised.

Work commenced in May 1993 on the upgrading of surface roads and the construction of water settlement ponds to allow dewatering of the existing decline to proceed. The shaft will be accessed by development off the decline. Tenders have been called for in order that this development may commence in October 1993. Drilling of the shaft pilot hole was in progress at year end and is expected to be completed prior to the start of development.

Studies were carried out to establish environmental base lines for future control.

NORTHEAST TASMANIA

An increased gold price towards the end of the year fostered renewed interest in the northeast of the State.

Beaconsfield Gold NL

At year end the water level in the shaft had risen to within 125 metres of the shaft collar. Arrangements have been made to commence pumping when the water rises to a level of 110 metres below the shaft collar, possibly in January 1994.

Preparations have been made to commence a five month surface exploration drilling program early in July 1993. This program will be carried out to test an extension of the Tasmania Reef at depth.

Curries River Mining, Lefroy

Attempts to recover gold by re-treating material previously treated by BPV Mining have been carried out on a small scale. No gold was recovered during the year under review.

Condor Oil Investments Pty Ltd

Access roads to the adits of the Mercury Mine, Long Struggle Mine and the Mount Victoria Mine were constructed to enable sampling to be carried out in the old workings.

Linton/Gold Reward Mine, Forester

A small pilot plant was constructed and bulk sampling of the mineralised outcrop commenced in the latter half of the period under review.

Mineral production from Tasmanian sources since 1880
Quantity of production as at 30 June 1993

<i>Commodity</i>	<i>Unit</i>	<i>Quantity in Current Year</i>	<i>Total Quantity</i>
METALLIC MINERALS			
Antimony	(tonne)	-	3
Bismuth	(kilogram)	-	110 080
Cadmium	(tonne)	209	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)	28 395	1 105 331
Crocoite	(kilogram)	100	1 453
Gold	(kilogram)	1 404	125 287
Ilmenite	(tonne)	-	558
Iron ore pellets	(tonne)	1 458 909	51 854 944
Iron in iron oxide (including hematite, limonite and magnetite)	(tonne)	150 094	1 209 366
Lead (from 1919)	(tonne)	66 459	1 080 291
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)	94 484	1 803 844
Rutile	(tonne)	-	1
Rutile (concentrates)	(tonne)	-	40 027
Scheelite (concentrates)	(tonne)	-	57 261
Silica for silicon alloy production	(tonne)	296	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)	95 322	3 566 510
Tin	(tonne)	6 760	307 690
Tungsten (as tungstic oxide)	(tonne)	142	35 215
Zinc	(tonne)	233 837	3 009 856
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)	100 042	4 533 965
Dolomite	(tonne)	20 815	414 143
Graphite	(tonne)	-	41
Kaolin	(tonne)	22 059	509 362
Limestone—			
Agricultural and other	(tonne)	129 943	2 733 049
Carbide	(tonne)	-	1 081 509
Cement	(tonne)	679 469	19 262 539
Chemical and metallurgical	(tonne)	25 205	6 235 314
Ochre	(tonne)	-	2 949
Pebbles (from 1957)	(tonne)	-	31 757
Sulphuric acid	(mono tonne)	352 498	5 916 784
Sand (moulding)	(tonne)	-	1 442
Silica	(tonne)	-	701 248
Talc	(tonne)	-	338

Mineral production from Tasmanian sources since 1880
Quantity of production as at 30 June 1993 (continued)

<i>Commodity</i>	<i>Unit</i>	<i>Quantity in Current Year</i>	<i>Total Quantity</i>
FUEL MINERALS			
Coal (run of mine)	(tonne)	494 873	18 312 285
Shale	(tonne)	-	42 239
Peat	(m ³)	4 864	31 234
CONSTRUCTION MATERIALS			
Building stone—			
Freestone	(tonne)	1 600	32 580
Granite	(tonne)	162	133 329
Other stone	(tonne)	209	38 729
Crushed and broken stone (from 1958)—			
Basalt	(tonne)	903 037	18 604 154
Dolerite	(tonne)	1 468 895	31 191 171
Limestone	(tonne)	49 399	1 171 645
Sandstone	(tonne)	14 775	298 979
Other	(tonne)	96 979	11 199 515
Gravel (from 1958)	(tonne)	46 815	48 311 910
Sand (from 1958)	(tonne)	495 278	9 526 095
Other road-making material	(tonne)	1 134 570	12 865 305

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TASMANIA
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