

AR1987_88

REPORT OF THE DIRECTOR OF MINES

1987-88



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TASMANIA

1989

DIRECTOR OF MINES

**REPORT FOR THE YEAR ENDED
30 JUNE 1988**

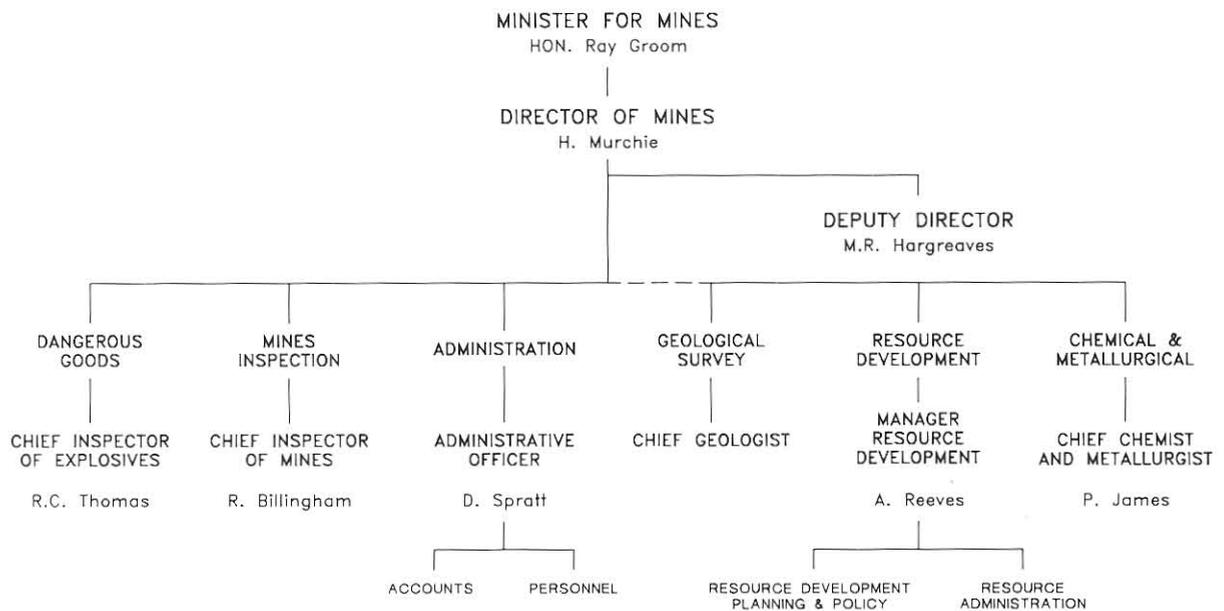
TABLE OF CONTENTS

	<i>Page</i>
REPORT OF THE DIRECTOR OF MINES	5
Overview	5
Review of the year	5
Review of Departmental activities	7
Australian Minerals and Energy Council	9
Value and production of principal minerals	11
Table 1—Value and production of principal minerals	11
Conclusion	12
 REPORTS BY DIVISIONS OF THE DEPARTMENT	 13
Resource Planning and Policy Development	13
Administration	14
Table 2—Staff movements	15
Mines Inspection Division	16
Mines Inspection Branch	16
Drilling Section	20
Mining Industry—Major Operations	21
Mines	21
Works	24
Dangerous Goods Division	26
Geological Survey Division	30
Regional Geological Survey Branch	30
Economic Geology Branch	31
Engineering Geology and Groundwater Branch	34
Petroleum Exploration and Marine Geology Section	35
Table 3—Oil Exploration Permits	36
Geophysics	36
Geological Support Services	37
Geological Atlas mapping program	38
Table 4—List of Unpublished Reports	41
Chemical and Metallurgical Division	43
 STATISTICAL TABLES	 48
Table 5—Employment and accidents	48
Table 6—Certificates of Competency	50
Table 7—Mineral production-Tasmanian sources	51
Table 8—Value of the mineral industry	52
Table 9—Mineral production since 1880	53
Table 10—Imported Ores	54
Table 11—Number and area of Leases and Licences applied for	55
Table 12—Leases and Licences issued	55
Table 13—Total number of Leases and Licences	55
Table 14—Total number of all types of rights	56
Table 15—Dangerous Goods Approvals issued	56
Table 16—Imports of Flammable Liquids	56
Table 17—Imports of Explosives	57
Table 18—Acts administered by the Department	57
Table 19—Staff as at 30 June 1988	57
Table 20—Drilling details, 1987-88	58
Table 21—Type and number of tests	60
 FINANCIAL STATEMENT	 62
 REPORT OF THE MT CAMERON WATER RACE BOARD	 64

DEPARTMENTAL FUNCTIONS

- the administration of the State's mineral lands and the regulation of exploration activities onshore and offshore.
- the regulation of mines and works, and the enforcement of safety and occupational health standards.
- the regulation of the transport, storage and use of dangerous goods.
- the systematic assessment of the geology of the State and the provision of a geological data base.
- the responsible development of the State's mineral and energy resources.
- the provision of chemical and metallurgical research facilities.

DEPARTMENT OF MINES ORGANISATION CHART 1987-88



REPORT OF THE DIRECTOR OF MINES 1987-88

To the Hon. Ray Groom, MHA, Minister for Mines.

Annual Report of the Department of Mines for the year 1987-88 submitted by the Director of Mines, Mr Hugh Murchie.

OVERVIEW

The year was a satisfactory one for the State's mining and metallurgical industry, with a continuing upturn in the contribution made to the Tasmanian economy. Metal prices rose steadily throughout the year, although some of this gain was offset by the rise in the value of the Australian dollar.

The greatest movement was in base metal prices, as reflected by dealings on the London Metal Exchange. In February, the price of aluminium climbed above that of copper and continued rising to record high levels by the end of June. Copper prices surged to an eight year high in November, then dropped back gradually towards the end of the year, but with prices still buoyant. By April zinc prices had climbed to their highest levels for more than thirteen years and continued to rise through to the year end in June. The strength of the base metals market is expected to continue, and this should encourage explorers to intensify their search for the rich base metal deposits for which Tasmania's West Coast mineral province is renowned.

Investment in expansion projects and new technology continues, providing some confidence in the overall future for mining in Tasmania. However, I must sound a warning with regard to the dangers facing the industry and our economic well being.

Exploration is the key to the future. Unless new mines are discovered and developed, existing mines, as a wasting resource, will be unable to provide continued employment or create wealth. There is considerable misinformation being spread publicly regarding exploration.

Although exploration is limited to searching, examining or investigating as defined, attempts are being successfully made to redefine it as development.

The motive is clear—if you are not permitted to find it, there is no way you can mine it. Exploration is not a land use, and yet it is being equated as such in National Estate and World Heritage issues. Tasmania is blessed

with rich mineral resources, which if discovered can be developed in a sensitive manner, for the benefit of all. Such discoveries must be made.

In response to your request, it is proposed to conduct a review of the Mining Act in the coming year. A public review will encourage valuable contributions from all interested parties. Workable and acceptable mining legislation should be achieved through this process.

REVIEW OF THE YEAR

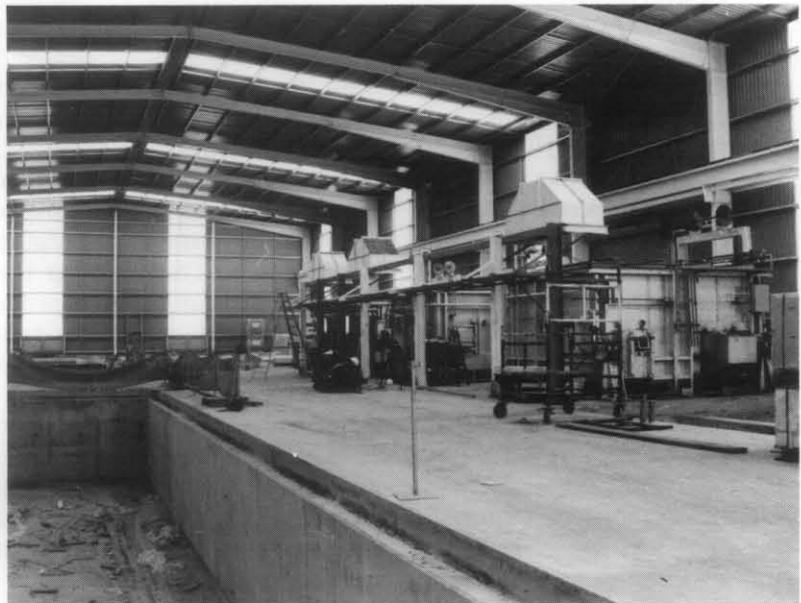
Development of Aberfoyle's new silver/lead/zinc mine at Hellyer proceeded satisfactorily. The Government and Aberfoyle Ltd signed the Hellyer Agreement in August, and the Hellyer Mine Agreement Ratification Act of 1987 was passed by both Houses of Parliament in the Budget Session. The Department of Mines acted as co-ordinator and represented all interested authorities in finalising the agreement. Negotiations were completed in eight months, and the satisfactory outcome for both the company and the State indicates the success of this approach. Aberfoyle agreed to employ local contractors where possible on the construction work and this has also proved to be a success. It has been a challenge for Tasmanian contractors to which they have responded, and gained experience plus a reputation for prompt and effective work. This is a measure of the benefits provided by new mining ventures.

The Emu Bay Railway Co. Ltd is building an 11.5 km spur line to the Hellyer Mill site at a cost of \$8 million. The railway will transport 350 000 tonnes of concentrates annually to the Port of Burnie, where storage and handling facilities are being expanded to cope with the increased traffic. It is the first major new railway construction to take place in the State since the building of the Bell Bay line about 15 years ago.

Aberfoyle continued the excellent work which won them, and their employees, an Achievement Award from the Premier last year. The most significant achievement was the equipping of a 330 metre escape shaft to provide the second egress required by the Mines Inspection Act. This was done over one week-end using pre-fabricated sections, as against normal fabrication which would have taken many weeks. This project has been nominated for an engineering design award.



Construction of an on-site mill to treat up to one million tonnes of ore per annum from the Hellyer Mine commenced during the year, with a projected start-up early in 1989.



Molten metal furnaces in the casting bay at the Southern Aluminium Pty Ltd alloy wheel factory at Bell Bay. Construction of this new plant commenced during the year.



Upgrading of the Temco ferro alloy plant at Bell Bay was completed. This upgrading included the installation of two continuous casting machines in the ferro-manganese plant.

I believe development of this new mine will put on record the value of the mining industry to the Tasmanian economy. The Cleveland Mill continued to produce bulk concentrate from Hellyer ore. Rehabilitation on the old tailings dams proceeded, with the possible success of this project offering new solutions to tailings dam rehabilitation methods.

The other encouraging development is the Renison Goldfields Henty Prospect. Extensive diamond drilling has revealed good gold intersections. Deep drilling intersected 11.0 metres of 56.1 g/t gold and 22 g/t silver between 597 metres and 608 metres, and 3.1 metres of 12.5 g/t gold between 645.9 metres and 649 metres. The explorers will sink a decline to confirm these results with bulk samples. The joint venture partners propose spending \$5 million, and are negotiating details with the Departments of Mines and the Environment for approval to proceed with underground development. This discovery is significant as the first known gold ore body on the West Coast—all previous gold discoveries have been associated with base metals.

The major concern during the year was the future of the Savage River mine. Due to industrial action, mine maintenance was weeks behind schedule, engine faults were giving problems with the truck fleet, abnormally heavy rain silted plant water pumps and closed the mill operation for two weeks, and slips developed on the walls of the open pit. All this resulted in soaring costs which blew out to a loss of several million dollars for the year. It was also known that Japanese steel technology was changing and that iron ore pellets were no longer an attractive feed. The existing sales contract for 45 million tonnes of pellets to the Japanese partners will be completed during 1989, and local management has been working hard to extend the contract and hence the life of the mine. The mine is a major contributor to the economy of the North-West Coast, and has sufficient ore reserves to produce until at least the mid-1990's. The Department of Mines has set up a Task Force of mining engineers and geologists to review ore reserves and the viability of the mining operation, in co-operation with the staff of Savage River Mines.

The Mt Lyell mine continued development work to prepare the 50 and 60 series stopes for production to extend the mine life until 1994. Mine production was severely curtailed when a mass pillar blast failed in May, freezing about 380 000 tonnes of ore. The

problem was solved and full production restored by mid June.

The Renison tin mine struggled to break even during the first half of the year, as the result of the poor world tin price. In March the company announced a voluntary retrenchment scheme to reduce the work force and cut operating costs. The scheme was successful and the mine can look forward to once again becoming competitive on the world tin market.

The Electrolytic Zinc Company continued with its \$100 million modernisation programme at Risdon. The Rosebery mine installed a gold recovery plant at the concentrator to improve fine gold recovery. In June the parent company North Broken Hill Holdings Ltd announced the merger of their silver, lead, zinc operations with those of CRA Ltd, to form Pasminco Ltd. It involved a continuing commitment to modernisation at Risdon and Rosebery, and both should benefit from the expanded marketing facilities, economies of scale, and a wider range of raw materials.

Comalco has commenced an upgrading and modernisation programme at its Bell Bay Smelter. A new anode baking furnace is being constructed to replace the two existing units. A stormwater management system is being installed to further control plant emissions. The \$50 million factory to produce alloy wheels for automobile manufacturers, being built adjacent to the smelter, is a welcome step into down-stream processing. The works safety record showed a marked improvement during the year and is a well deserved achievement following the effort put into safety by both the company and employees.

REVIEW OF DEPARTMENTAL ACTIVITIES

The Departmental structure was altered in December, when Rod Hargreaves assumed responsibility for co-ordinating the activities of the three development divisions of the department. The Geological Survey, Metallurgical and Chemical Laboratory, and Resource Development Division together will pursue the Government's commitment to fully explore the State's mineral resources. Title administration was transferred to the Resource Development Division. Andrew Reeves was promoted to Manager of the expanded Division, which now has responsibility for both policy formulation and administration of the Mining Act. Regular contact is maintained with the Department of Premier and Cabinet, Department of the

Environment, Treasury, the Tasmanian Development Authority, Town and Country Planning, and Local Government.

As part of our drive to provide a better service for mineral explorers, the Government decided to modernise the Department of Mines Laboratory at Launceston. Structural work commenced in December and by June the upgrading was completed. Improvements included:-

- Redesign of the sample handling and processing system.
- Reduced dust and noise in the crushing and grinding sections.
- Additional Atomic Absorption Spectrophotometer capacity.
- Separate water quality laboratory.
- Expanded fire assaying facilities.

The upgrading makes the laboratory more efficient, and also provides a better work environment for our staff. The aim is for the laboratory to become financially self supporting by June 1989.

In August the second edition of our publication *'The Mines and Mineral Resources of Tasmania'* was produced. The first edition was printed in July 1985 and

proved to be popular, encouraging the Department to update and extend the text for the latest reprint. Copies have been supplied to Embassies, especially in the Pacific Region, to Trade Commissioners, International Companies, Austrade, and the Tasmanian Development Authority. Our aim is to attract more exploration activity.

Early in September an Open Day was held at the Department of Mines offices at Rosny Park. It was estimated that over 1200 people attended, with public reaction through comments and correspondence being favourable. The gold panning display, with instruction and active participation, was the highlight. Departmental staff enjoyed explaining their work and I believe it was successful in communicating to the community just what we really do.

The Mines Inspection Branch continues to support Mine Rescue and First Aid Competitions by providing adjudicators for these events. They were also co-sponsors with the Chamber of Mines of a seminar 'Environmental Control in Mines and Mineral Processing Plants', held in Zeehan and Burnie in October. This was the second seminar organised jointly with the Chamber of Mines. Both have been most successful and proved to be an excellent way to get everyone associated with occupational health and safety together. Attendance was good, with over 100 registrations covering the



The Department held a public open day in September. One of the more popular demonstrations was of gold panning, where the public were able to try their hand under the guidance of members of staff.

various subjects presented. The Chief Inspector of Mines meets regularly with the Chamber of Mines for discussions of mutual interest in occupational health and safety. Assistance has been given to TUTA (Trade Union Training Authority) and TTLC (Tasmanian Trades and Labour Council) by lecturing at their training courses for employees safety representatives.

Waste disposal continues to be a problem. The Dangerous Goods Division investigated the proposed waste disposal site at Runnymede for use by the University. It was decided not to proceed with this site, and arrangements were made to ship waste to Victoria for disposal. Advice was given on safe transport and shipping of waste material.

The Drilling Section had a good year, with total drilling a record for the number of drillers involved.

The Engineering Geology Section continued the project of developing a Geodata base for the Hobart area. They advised on the Meander Irrigation Scheme, Bathurst Street Car Park, and the Blackstone Heights Subdivision. Groundwater and landslip surveys were carried out throughout the State.

An Environmental Geology Section was established within the Resource Planning and Policy Development Division under the direction of the Supervising Geologist-Environmental Management. In addition to its established responsibilities for advice and enforcement of environmental conditions on all exploration licences, the section also represents the Department on interdepartmental land-use committees, and provides policy advice on the impact of conservation proposals on mineral exploration and development. Evidence was given to the Lemonthyme and Southern Forests (Helsham) Inquiry. These issues are important for the State's development strategies, and the Department is well able to service the public, industry and Government in this field.

The Petroleum Geologist took part in the *Rig Seismic* cruise organised by the Bureau of Mineral Resources in April. He spent two weeks on board the vessel as a member of the scientific staff on the Project "*Geological Framework and Hydrocarbon Resource Reassessment of the Bass Basin and West Tasmanian Margin*".

The Economic Geology Section was involved in the EZ Rosebery exploration study. They

also gained Government approval for a new core library to be established at Mornington. This will be built over the next two years, and will meet our requirements for at least the next decade. The Chief Geologists Annual Conference was held at the Department in April.

Staff training and performance appraisal continued to be priorities in Department administration. The accountant visited a number of West Coast mines with the Manager Resource Development and established new guidelines for reporting of mineral royalties. The Administrative Officer and the Records Manager developed a computer-based document tracking system. Document tracking is a computer-aided records management system designed to provide effective control over the movement of correspondence through the records system to all divisions of the Department. The system is excellent. All typing is now done by word processors which has greatly improved productivity. The Department was awarded the 1988 Technology and Computer Productivity Silver Award from the National Technology in Government Committee in recognition of our application of computer technology.

AUSTRALIAN MINERALS AND ENERGY COUNCIL (AMEC)

The Council met in September, 1987, in Fremantle, where the Minister for Mines, the Hon. Ray Groom, MHA, represented Tasmania.

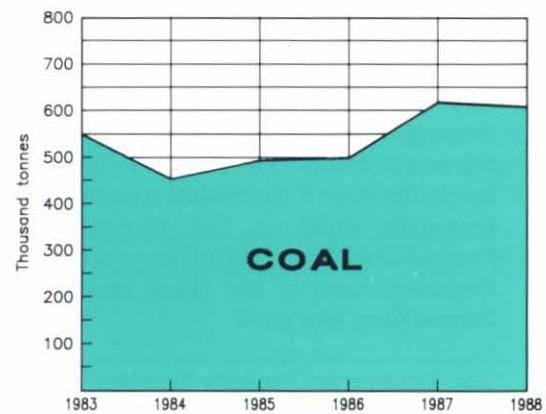
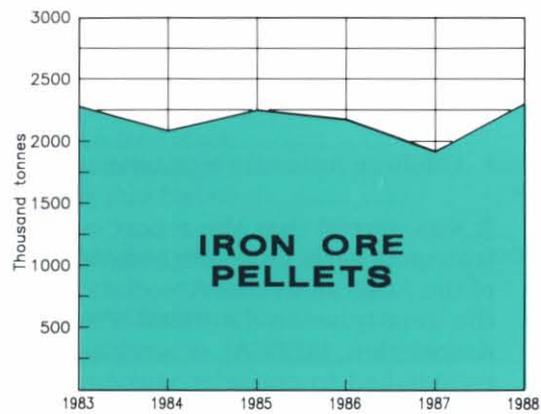
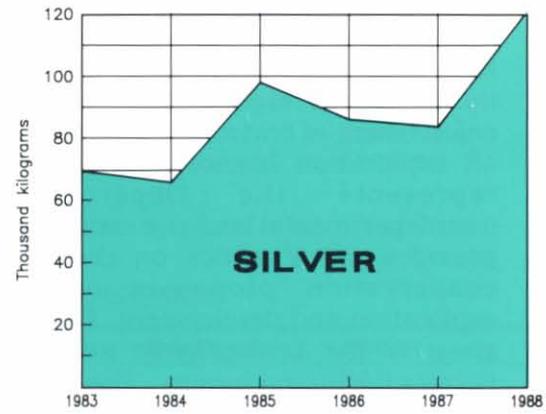
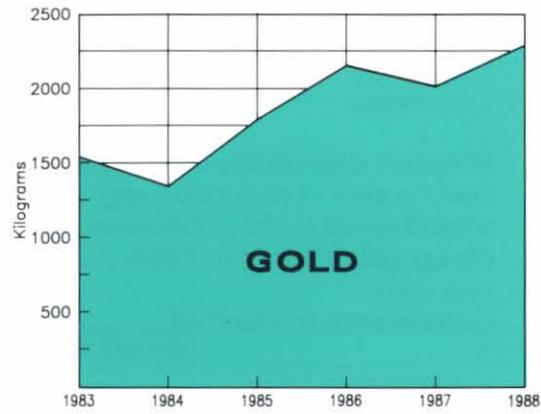
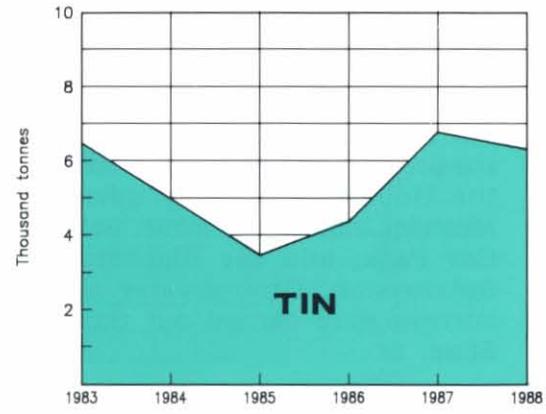
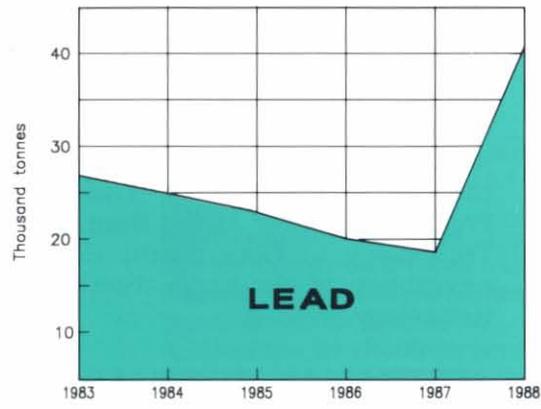
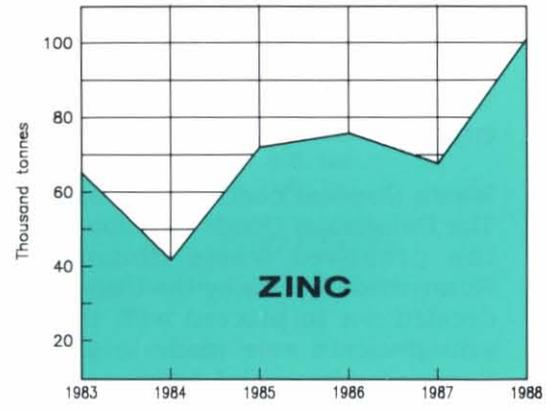
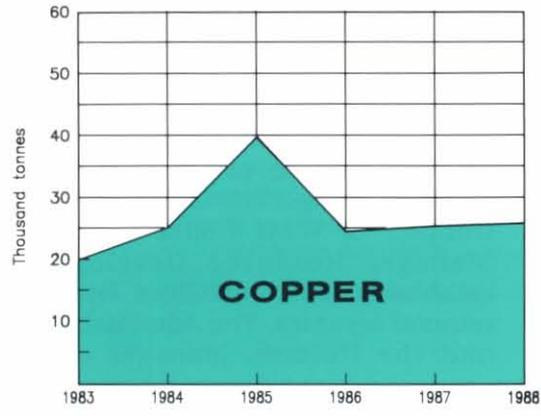
Ministers discussed progress on the "Energy 2000" review of national energy policy, which should result in the publication of a national energy policy paper in 1988.

Reports were received on:

- Alternative fuels
- Downstream minerals processing
- Offshore petroleum legislation
- Gemstone processing
- Offshore minerals legislation

It was agreed that the report on alternative transport fuels be published. At the request of the Australian Gas Association (AGA) and the Australasian Liquefied Petroleum Gas Association (ALPGA) a working party was established to consider standardising State LPG legislation.

PRODUCTION OF PRINCIPAL MINERALS



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Table 1**VALUE AND PRODUCTION OF PRINCIPAL MINERALS**

<i>Commodity</i>	<i>Quantity</i>	<i>Value (\$M)</i>
Copper (tonnes)	25 636	76.29
Gold (kg)	2 260	41.26
Iron Ore Pellets (tonnes)	2 260 068	72.47
Lead (tonnes)	42 267	38.70
Silver (kg)	120 723	36.30
Tin (tonnes)	6 226	48.59
Tungsten as tungstic oxide (tonnes)	1 478	10.90
Zinc (tonnes)	101 226	115.61
Coal (tonnes)	608 700	-

In May the Council met in Adelaide where the Premier and Minister for Energy, the Hon. Robin Gray, MHA, represented Tasmania.

Arrangements for Council meetings were discussed, and it was agreed that future meetings would be chaired by the host Minister.

The Commonwealth submitted papers on the following issues:

- The review of LPG marketing and processing arrangements.
- Resource Rent Tax—revenue sharing with States and the Northern Territory.
- Petroleum (Submerged Lands) Act—proposal for retention of fees for special projects.
- Transport costs and competitiveness in the mineral sector.

It was agreed to set up a working party to prepare a full assessment of recent and prospective studies related to shipping and waterfront issues and their implications for the mineral industry.

Other matters discussed included:

- Commonwealth/State co-operation on mineral development.
- Role of public sector in minerals trade.
- National energy policy paper.
- New Zealand minerals and energy developments.

Both the Premier and the Minister for Mines again stressed their concern at the activities

of the Australian Heritage Commission and the resulting decline in mining and forestry development.

VALUE AND PRODUCTION OF PRINCIPAL MINERALS

The value of production from Tasmanian sourced minerals was \$504.87 million, an increase of 29.1% over the previous year.

Production from imported ores at \$655.13 million was an increase of 13.87%, while the total value of the Tasmanian mineral industry for the year surpassed the billion dollar level at \$1 159 million, which represents an overall increase of 20% over last year.

CONCLUSION

George Jobson retired from the Department on the grounds of ill health in September. He was unable to make a good recovery and died in April 1988. He gave 25 years service, 22 of them as Senior Inspector of Explosives. He was closely involved with the changes that took place over the last two decades in the dangerous goods field.

John Furst retired as Senior Chemist at the Metallurgical and Chemical Laboratory in April after 24 years with the Department. I wish him a long and happy retirement and record my appreciation of his service.

The year 1987–88 has been notable for the large turnover in exploration licences. This was due to the introduction of time limits to these licences in 1982. Staff from the Resource Development Planning and Policy Division, together with the Economic Geology Section, successfully processed all tenders and applications. Their efforts are appreciated and I wish to record the valuable

contribution they have made to our new exploration initiatives. I am confident that this work, together with the Mt Read Volcanics Project, will result in new developments being undertaken in the future.

I am grateful for the dedication of my staff and acknowledge that the results we have achieved in the past year would not have been possible without their total commitment.

HUGH MURCHIE, Director Of Mines

REPORTS BY DIVISIONS OF THE DEPARTMENT OF MINES

RESOURCE, PLANNING AND POLICY DEVELOPMENT DIVISION

The Division grew in size and broadened its scope this year by absorbing the Resources Administration Branch, including the offices of the Registrar and the Drafting Office. More efficient implementation of Departmental policy is achievable by combining the administration of the Mining Act with the Department's policy development arm. Andrew Reeves was promoted to manage the Division.

The Hellyer Agreement was signed by the Treasurer, Minister for Mines, and Aberfoyle Resources Limited in August 1987 and ratified by Act of Parliament during the Budget Session. The Agreement covers all aspects of the development and operation of the Hellyer Project and includes comprehensive and detailed formulation of a special royalty agreement. Negotiation was co-ordinated by officers of the Division and the 'one-stop-shop' approach to obtaining the necessary approvals facilitated the speedy development of this important project without prejudice to the State's interest. Further assistance was given to the Hellyer Project in organising the establishment of a Crown lease for the Emu Bay Railway's spur line into the Hellyer mill site.

The issue of exploration licences on private land and the role of the Warden's Court came under scrutiny during the year when applications for licences in the vicinity of Hobart aroused a great deal of public comment. Certain new procedures have been implemented to improve communication with the public, and provide information concerning the applicant's proposed work programme.

An Environmental Geology Section has been established within the Division. The Supervising Geologist-Environmental Management chairs the interdepartmental working group on exploration in conservation areas, whereby approvals are obtained for field programmes. The Metals Exploration activity at Adamsfield occupied much of this Section's resources, as the exploration licence lies within the Lemonthyme and Southern Forests (Helsham) Inquiry area. Under Commonwealth legislation, exploration activity during the term of the

inquiry required the approval of the Commonwealth, and it is a tribute to the diligence and professionalism of this section that the Commonwealth endorsed the programme approved by the working group without undue delay.

David Jennings (Supervising Geologist-Environmental Management) and Peter Baillie (Petroleum Geologist) gave evidence to the Helsham Inquiry on the geology and geomorphology of the area. It is regrettable that the terms of reference for the inquiry precluded considerations of the impact of World Heritage nomination on the mining industry, even though the brief of the inquiry specifically included consideration of the impact of nomination on the economics of the forest industry.

A great deal of effort was required by the Division during the year to manage the Exploration Tender Area system, under which ground released from exploration licences is made available for competitive application for new leases and licences. Negotiations were held with a number of companies to define conditions under which ground could be retained under existing licences, notwithstanding that the licences were due for total relinquishment under Departmental guidelines introduced in 1982. A number of retention licences were issued during the year, the first such issue under the amendments to the Mining Act which took effect on 1 January 1987.

The royalty system applicable to leases of metallic minerals was reviewed during the year. New regulations were proclaimed to take effect on 1 July 1988, and removed the option of paying royalty on the basis of either proceeds or profits. The new regulation now assesses royalty at a rate of 5 per cent of profits less than 20 per cent of sales, plus 10 per cent of profits in excess of 20 per cent of sales.

A review of tenement fees was completed during the year and new fees came into effect on 1 July 1988. Substantial increases were made to the rents payable on mining leases.

An officer attended the Working Group on Commonwealth-State co-operation on

mineral development, and the Division provided input to other AMEC working groups on offshore minerals legislation, down-stream processing, natural gas supply and demand, and domestic shipping of mineral products.

The Division hosted a number of visitors during the year, the more important being a fact-finding mission from the Korean Mining Promotion Corporation conducted in co-operation with the Tasmanian Development Authority, and a familiarisation visit by the Liberal Party Resources Committee.

During the year the Division published two editions of the *Mines News* newsletter and the updated version of *The Mines and Mineral Resources of Tasmania*.

The new Departmental letterhead and lion logo was put into service. A submission by the Division to the Technology in Government Committee gained the Technology and Computer Productivity Silver State Award (1988) for the Department.

In addition the Division applied to the Commissioner of Taxation for recognition of the Department as an Approved Research Institute. The application was successful and approval will allow the Department to undertake funded research on behalf of the private sector, for which taxation concessions are available to the sponsor.

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, in the Court of Mines. The Wardens are:

Mr R. B. Chen, North-Western Mining District;

Mr M. A. Hannon, Central Mining District and South-Western Mining District;

Mr K. N. Dockray, North-Eastern Mining District.

Cases heard during the year consisted of:

J. P. Reynolds v S. P. Morley. Application for forfeiture of lease 12M/83. Application withdrawn prior to hearing.

Robbins Island Pty Ltd v Butlers (No. 27) Pty Ltd. Objection to exploration licence application 2/87. Objection dismissed.

N. McCoy v Milstern Beecroft Pty Ltd. Application for forfeiture of lease 12M/58. Lease forfeited.

Various objectors v Pasadena Projects Pty Ltd, Betoota Pty Ltd and Echelon Pty Ltd. Objection to exploration licence application 23/87. Objections dismissed.

D. Bell v New Holland Mining. Objection to exploration licence application 28/87. Objection dismissed.

Various objectors v Bach Holdings Pty Ltd and Raegun (No. 43) Pty Ltd. Objection to exploration licence applications 39/87, 40/87, 41/87 and 43/87. Hearing adjourned *sine die*.

Various objectors v Cyprus Minerals Aust. Co.. Objection to exploration licence application 37/87. Objections dismissed.

W. and A. H. Hummell v Kingstream Res. NL. Objection to exploration licence application 56/87. Objection dismissed.

Various objectors v Electrolytic Zinc Co. of Aust. Ltd. Objection to exploration licence application 96/87. Objections dismissed.

Various objectors v M. H. Barnstable. Objection to lease application 1304 P/M. Objections dismissed.

Various objectors v Shell Co. of Aust. Ltd. Objection to exploration licence application 50/87. Objections dismissed.

H. Pirzl and M. Westbrook v M. Graham, P. Reicher and A. Griffin. Application for forfeiture of leases 18M/83 and 26M/83. Leases forfeited.

B. A. Farquhar v Hellyer Mining and Exploration Pty Ltd. Objection to retention licence applications 8715 and 8723. Objections withdrawn.

Various objectors v The Readymix Group. Objections to exploration licence applications 108/87, 109/87 and 110/87. Objections dismissed.

Renison Ltd v CSR Ltd. Objection to exploration licence application 97/87. Objection withdrawn.

ADMINISTRATION DIVISION

The loss of the Division's only computer programmer has slowed the move towards greater utilisation of available computing power. Prior to his departure a number of enhancements were added to the Records Section's document tracking system, and a number of information processing applications were developed for the Dangerous Goods Section.

The Department was fortunate to gain the services of an Outposted Statistical Consultant from the Australian Bureau of Statistics for approximately six months. In co-operation with Departmental officers, problems associated with the gathering and compilation of statistics and the processing of lease and licence applications were identified, and work is continuing to design and implement an information management system in this area.

PERSONNEL AND MANAGEMENT SERVICES

The Records Section is continuing to develop expertise with the Document Tracking System and planning is in progress to convert to a new filing medium during the 1988-89 financial year, involving colour-coding and future introduction of bar coding.

Word processing is now well accepted in the Department, and the Word Processor Operators are providing an efficient and

effective service, despite a reduction in numbers and a general increase in the workload.

Staff development remains a high profile activity and, based on information gained from the performance appraisal system, a Spring programme of development courses has been formulated in conjunction with the Training and Development Division of the Department of Public Administration. The sessions are to cover a diversity of topics from time and stress management to professional liability, and computer usage and application development.

FINANCE

The Department completed the year within authorised expenditure limits, and action commenced during the year to convert to on-line Central Finance System processing. As mentioned above the loss of the Department's only computer programmer has inhibited further development of the system to make use of the information available. It is anticipated that this problem will be overcome during 1988-89 with the appointment of an analyst/programmer.

During the year a review was carried out on mining lease production returns and royalty payments, and resulted in a significant increase in royalty receipts.

Table 2
STAFF MOVEMENTS

<i>Name</i>	<i>Position</i>	<i>Remarks</i>	<i>Date</i>
J. Shipp.....	Mining Engineer	Appointment	3. 8.87
G. Jobson	Senior Inspector of Explosives	Retirement	2. 9.87
C. A. Meech	Drafting Officer	Promotion	17. 9.87
G. Archer	Drafting Officer	Appointment	1.10.87
W. E. Briggs	Personnel Officer	Promotion	29.10.87
R. A. Pickett	Senior Inspector of Explosives	Promotion	12.11.87
H. Murchie	Director of Mines	Reclassification	16.11.87
M. R. Hargreaves	Deputy Director of Mines	Reclassification	16.11.87
A. J. Reeves	Manager-Resource Development	Promotion	10.12.87
C. A. Bacon	Geologist	Promotion	7. 1.88
R. S. Bottrill	Geologist	Promotion	7. 1.88
M. Geeves	Executive Officer	Transfer	7. 1.88
A. M. Burn	Typist	Resignation	13. 1.88
P. L. James	Chief Chemist and Metallurgist	Promotion	1. 2.88
M. D. Frith	Chemist	Promotion	5. 2.88
D. J. Jennings	Supervising Geologist	Promotion	18. 2.88
J. Howie	Typist	Appointment	25. 2.88
P. W. Baillie	Petroleum Geologist	Promotion	3. 3.88
K. Gafar	Clerk	Transfer	23. 3.88
D. B. Seymour	Geologist	Promotion	24. 3.88
M. J. Robertson	Inspector of Explosives	Appointment	24. 3.88
C. R. Calver	Geologist	Promotion	31. 3.88
J. Furst	Senior Chemist	Retirement	6. 4.88
R. S. Schier	Driller	Resignation	21. 4.88
J. M. Richardson	Clerk	Promotion	12. 5.88
P. J. Springer	Clerk	Promotion	12. 5.88
S. M. Forsyth	Project Geologist	Promotion	26. 5.88
M. P. McClenaghan	Senior Geologist	Promotion	26. 5.88
D. J. Sloane	Project Geologist	Promotion	26. 5.88
B. D. Weldon	Project Geologist	Promotion	26. 5.88
R. C. Donaldson	Project Geologist	Promotion	26. 5.88
G. R. Green	Project Geologist	Promotion	26. 5.88
R. L. Langridge	Executive Officer	Promotion	2. 6.88
J. G. Hitchcock	Senior Clerk	Promotion	2. 6.88
A. J. Law	Clerk	Promotion	2. 6.88
P. N. Hopkins	Registrar of Mines	Resignation	3. 6.88
S. G. Bennett	Manager-Records	Promotion	9. 6.88
A. E. Taylor	Word Processor Supervisor	Promotion	16. 6.88
L. D. Doran	Word Processor Operator	Promotion	16. 6.88
J. Howie	Word Processor Operator	Promotion	16. 6.88

MINES INSPECTION DIVISION

The Division has responsibility for monitoring a safe and healthy working environment on mines and works, and for the provision of an efficient drilling service for the Geological Survey and other Government agencies.

Promotion of safety in the industry remained a prime function of the Inspection Branch and with this in mind, contact between the inspectorate and the workforce was encouraged and extended. Atmospheric monitoring by the Branch increased, with improved working conditions resulting in some cases. Despite a marginal improvement in overall accident statistics, regrettably five fatal accidents occurred during the year, making 1987-88 the worst year since 1982.

The Drilling Section had a highly successful year, with excellent productivity and low drilling costs.

STAFFING

The Division was staffed by six mining engineers, mechanical and electrical engineers, two industrial chemists, a drilling superintendent, and ten drilling crew.

MINES INSPECTION BRANCH

GENERAL

The Inspection Branch is charged with administration of the Mines Inspection Act 1968 and its attendant regulations. Assistance is supplied to other Divisions of the Department in administering the Dangerous Goods Act, the Mining Act, and the Petroleum (Submerged Lands) Act. Some officers are appointed as authorised officers under the Environment Protection Act and the Industrial Safety, Health and Welfare Act to assist the Departments of the Environment and Labour and Industry respectively in administering those Acts as they apply to mines, works and underground operations of the Hydro-Electric Commission.

By regulation, and routine and special inspections, the Branch ensures that safe and healthy working practices are established and maintained in mines, quarries and works. Plans and proposals for the operation of mines and mining equipment are examined and approvals issued as appropriate. During the year, a total of 693 field day inspections were carried

out and 60 certificates of competency issued (Table 6). Complaints from the public concerning blasting operations and illegal mining were investigated.

The Branch maintained good relations with the Department of the Environment and the Commissioner for Town and Country Planning, and was involved in consultation for new town-planning schemes.

Staff development continued, and officers attended Legal Procedures courses operated by the Tasmania Police and several management courses run by the Department of Public Administration.

REPRESENTATION ON OUTSIDE ORGANISATIONS

The Branch was represented on several committees including:

- Tasmanian Dams Safety Committee
- Silicon Development Advisory Committee
- Interdepartmental Occupational Health Committee
- Chamber of Mines Occupational Health Committee

The Silicon Development Advisory Committee, through the Silicon Development Act, co-ordinated the successful approval of the silicon smelter at Electrona which was commissioned in July. It is believed that similar Acts of Parliament will be used in future to co-ordinate major industrial developments in Tasmania.

The Branch was also represented on two Standards Association of Australia committees; ME/18 Mining Equipment and EL/33 Electrical Equipment for Surface Mines and Processing Plant. Meetings of both committees were attended.

EMPLOYEES SAFETY REPRESENTATIVES

Following the introduction of the Mines Inspection (Employees Safety Representatives) Regulations, 1987, allowing for the election of safety representatives, encouragement was given to such elections or the establishment of safety committees. Discussions were held by the inspectorate with management and employees of the

major mines and works to determine the most effective way of electing representatives or establishing safety committees. As a result some 28 representatives were duly elected and safety committees approved on some mines.

Training of representatives and committee members was carried out by the Trade Union Training Authority or the Tasmanian Trades and Labour Council, with Mines Inspectorate involvement consisting of lecturing on aspects of occupational health, legislation and dangerous goods.

WORKING ENVIRONMENT SEMINAR

A seminar entitled '*Environmental Control in Mines and Works*' was presented in October 1987 for the benefit of employees in the industry involved with ensuring a safe and healthy working environment. Tony Christianson, a mining engineer in the Burnie office, chaired the organising committee of Chamber of Mines appointees. The main seminar topics, 'Underground Ventilation', 'General Ventilation', 'Noise, Dust and Gases', and 'Harmful Substances' were presented over four days in Zeehan and Burnie.

A total of 29 papers was presented by authors from private industry, safety equipment suppliers, consultants, and the Western Australia and Tasmania Departments of Mines. The Tasmanian Department members presented five papers.

The seminar proved successful in bringing together ventilation and occupational health practitioners in the mining industry, and was generally well received by the 115 participants.

OCCUPATIONAL HEALTH SURVEYS

Occupational health surveys of major works and mine concentrators continued through the year to assess real and potential dangers to the health of employees. The surveys, carried out by the industrial chemists, have proved to be extremely lengthy due to the size and complexity of plant operations.

It is already apparent that the work done by the industrial chemists, both in conducting the surveys and in sampling environments, is helping to highlight potentially dangerous working atmospheres. In several cases work practices and equipment have been modified to reduce the danger as a result of their work.

It is pleasing to note the increased effort by employers to conduct both environmental and biological monitoring.

The Department of Mines X-ray diffractometer upgrading was completed and the instrument was calibrated for determining α -quartz in both Departmental and company dust samples.

An attempt was made to establish a computer data bank for storage and retrieval of atmospheric sampling results. Because of the complexity of the sampling, it was decided that the benefits obtained from computerisation were outweighed by the cost of assembling the data in the required form. The attempt was discontinued. Mines and works continued to provide raw data to the inspectorate in the manner most suited to each mine.

MINES RESCUE TEAMS

There was a gratifying resurgence of interest in mine rescue teams and competitions during the year, spurred on by the Burnie inspectorate.

A competition for colliery rescue teams was held in July to select a team to represent the Cornwall Coal Company at an interstate competition in New South Wales. Competitions for the metalliferous mine rescue teams were held on the West Coast, for which the Branch provided adjudicators.

It is unfortunate that there is not more general interest in participation in rescue teams by mining employees, as the existence of the teams is essential to overall mine safety. Too often there is reliance on single dedicated individuals in the industry.

LEASE INSPECTIONS AND REHABILITATION

Lease applications are inspected in conjunction with the Department of the Environment to determine rehabilitation bonds. Routine inspections follow the development of progressive rehabilitation of gravel pits, sand pits and alluvial workings, and the co-operation of some of the smaller operators is pleasing.

Joint annual visits are made to major mines by the Inspectorate and the Department of the Environment to observe the progress of rehabilitation and to establish programmes. Major works have been carried out with apparent success at Cleveland Tin and the Electrolytic Zinc Company of Australasia.

At Cleveland Tin underground and surface mining operations were cleared up, dumps levelled and seeded, and the tailings dams were covered with heavy media floats and clay prior to seeding. It is too early to determine the success or failure of the tailings dam rehabilitation, and much will now depend on nature.

The Electrolytic Zinc Company, at its West Coast mines, has carried out considerable clean up and rehabilitation at the Hercules mine, including removal of all buildings and the haulage. All residences have been removed from Williamsford and the sites levelled. At Rosebery an old tailings dam has been partially reclaimed and converted into a sports field.

This joint approach to rehabilitation problems is considered successful.

PROFESSIONAL CONFERENCES AND SEMINARS ATTENDED

M. W. Pickering, industrial chemist in the Burnie office, attended a three month occupational health course run by Worksafe Australia and the University of Sydney. Included in the course was attendance at the 12th International Occupational Health Congress.

J. M. Hillhouse, electrical engineer, presented a paper at the Darling Downs IAE Mine Power Systems and Safety Symposium.

W. C. Hodgson, mechanical engineer, attended the conference of mechanical inspectors of mines from each State. This was the first conference of its type to share mechanical engineering knowledge amongst the inspectorates.

Other conferences attended by officers included the AIMM Underground Operators Conference and the Australian Institute of Occupational Hygienists Annual Conference.

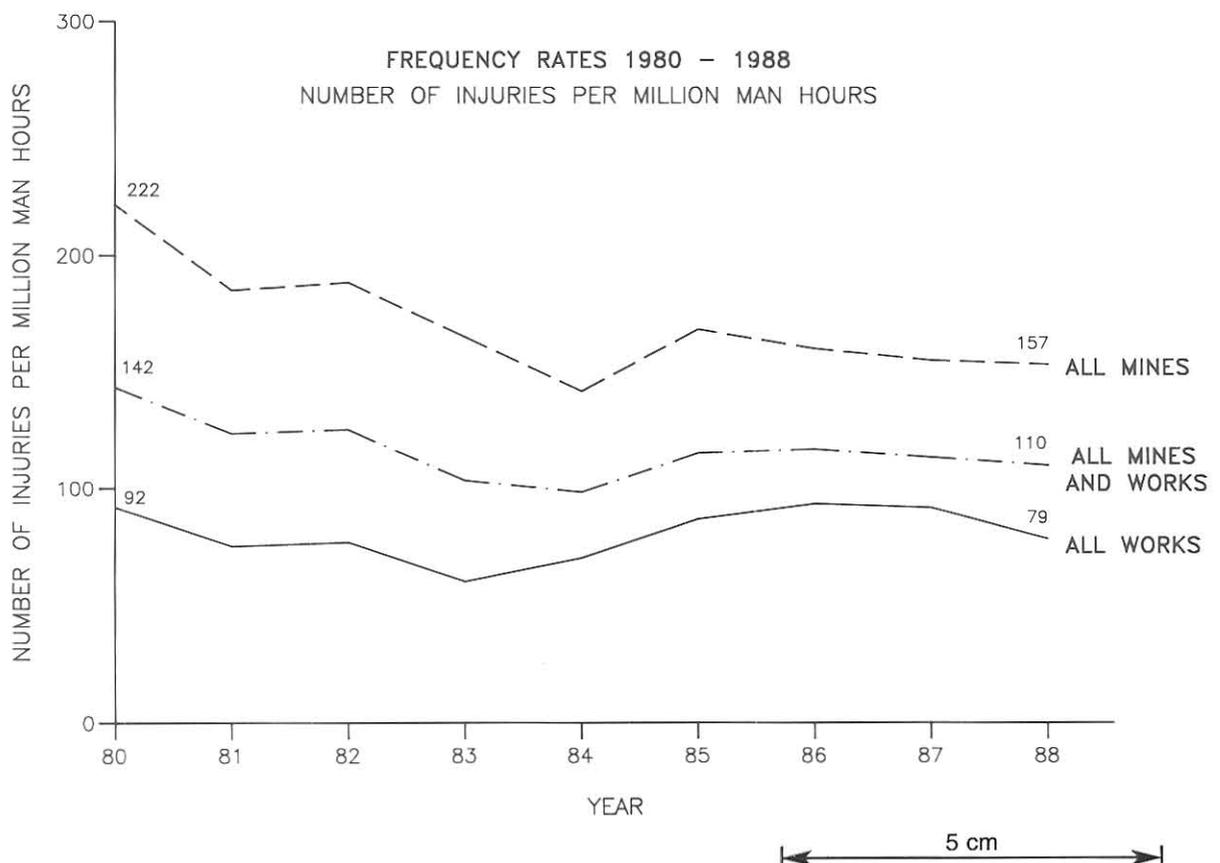
SAFETY AND ACCIDENT STATISTICS

The 1987-88 accident statistics for the mining industry are presented in Table 5.

The number of lost-time accidents decreased by 131, from 1522 in 1986-87 to 1391, and the number of days lost due to accidents decreased by 1499. These reductions were marginally more than the reduction in number of employees and give no reason for joy. In fact, the reductions largely reflect improvements achieved at Comalco. The consistently good accident record at Tioxide was maintained.

Accidents of one to three days lost accounted for 39% of total accidents, those of four to ten days a further 35%, and those over ten days 26%.

The number of accidents sustained by persons working underground was 434, or 31% of the total. Underground employees



constitute only about 760 persons, i.e. 11% of the workforce.

The most disturbing aspect of the industry's safety record for the year was the number of fatal accidents. Five persons died in separate mining accidents throughout the State, making 1987-88 the worst year for fatal accidents since 1982. Prior to October 1987 there had been no fatalities in the industry for over three years.

Fatal Accidents

- R. L. Adams, of EZ Risdon, received fatal crush injuries to the head when he was trapped by the waste heat boiler's moving poker mechanism on the No. 6 fluid bed roaster.
- J. T. Williams, of Brambles Holdings, died from extensive haemorrhaging from multiple injuries received when a front end loader in which he was a passenger overturned in a quarry.
- A. Kopcalic, a miner at Que River, died underground when the loader he was driving fell 30 metres into an open stope.
- K. Donaghue, a miner at Mt Lyell, died underground in a fall of ground when he was barring down the backs of a decline.
- A. T. O'Grady, a contract employee at Tioxide, suffered a fatal embolism when engaged in diving operations on an effluent pipe off-shore.

Non-fatal Accidents

The following is a brief description of the more serious non-fatal accidents that occurred:

Falling objects—a shovel operator in an open cut was knocked unconscious when a tree trunk fell on to the shovel cab; a rock drill machine operator suffered multiple injuries in a rock fall; a miner received fractured bones in his foot when unloading raise bore rods from a loader bucket.

Falls—an operator suffered fractures to a cervical vertebra when he fell from an open-cut haul truck; a young boy suffered multiple injuries when he fell through a floor in a disused mine mill; an operator suffered a fractured arm, burns and lacerations when he fell from a metal tapping launder; a quarry operator fractured his leg when he fell whilst walking down a pile of rocks.

Machinery—an underground air-track operator was crushed between the rig and the side wall; a coal miner suffered a broken leg when struck by a continuous miner; an underground platelayer was severely bruised when dragged by a hose which fouled him and a passing train.

Electrical—two workers were injured when one fell from a ladder as a result of an electric shock received when changing a light bulb; a processing plant operator received facial burns when an electrical plug exploded when the power was turned on.

Explosives—a miner suffered multiple lacerations as a result of drilling into a misfire which exploded.

DRILLING SECTION

Drilling operations throughout the State were carried out by four crews compared with five crews in 1986-87. Despite the reduction in crews the total metreage drilled increased and costs per metre drilled were reduced significantly. The exceptionally successful year was brought about by good productivity from all rigs, especially the Warman 1000 multi-purpose drill.

Three notable contracts were successfully undertaken. The Warman 1000 was hired by Savage River Mines for ore reserve evaluation. Highly productive bench drilling contributed 807 metres of output. The Tasmania Gold Mine at Beaconsfield hired a Keystone churn drill to install 15-inch diameter oil well casing through their shaft blockage. The Keystone was again used at the Electrolytic Zinc Company's Risdon works to install a dewatering system in their jarosite stockpile area.

Drilling for the Department of Main Roads totalled 1023 metres. The main projects were for the Scamander and Pieman River bridges at Scamander and Corinna, and for the Bass Highway at Prospect, Hadspen, Penguin and Burnie. Smaller projects were undertaken for the DMR and other organisations.

Stratigraphic and diamond drilling was carried out near Guildford, where three holes were drilled for the Mount Read sub-basalt drilling programme; at Bonneys Plains near Avoca; and at Knocklofty, Hobart. Chromite and platinum mineralisation were tested at Melba Flats, and the relationship of silica flour and its basement was investigated near Corinna.

Groundwater drilling included a survey in the Sheffield area; a survey of fracturing dolerite in the south of the State to increase groundwater flows; and water boring in the south, principally near Dodges Ferry. A programme was commenced in the north-east at Branxholm and Legerwood, combining water boring for landowners with subsequent deepening and testing of bores for geological information.

Drilling programmes for the year are summarised as follows

	<i>metres</i>
Major contracts	1183
Site investigation	1483
Stratigraphic drilling	2691
Groundwater drilling	4054
Total	<u>9411</u>

A full drilling summary is given in Table 20

MINING INDUSTRY—MAJOR OPERATIONS

MINES

Aberfoyle Resources Limited (Hellyer Division)

Agreement on the terms of a mineral lease on the basis of a one million tonnes per annum ore production rate was reached and signed by the Minister for Mines and Aberfoyle in August 1987. A decision by the Aberfoyle Board of Directors to proceed on this basis was made in October 1987.

Construction of an on-site mill of this capacity commenced, and progress at year end was on target for a projected start-up early in 1989.

A railway line to connect the new mill with the Emu Bay Railway's Burnie-Melba Flats line was under construction, and a direct road from the mill site to the Cradle Mountain link road was completed.

Construction of a tailings disposal dam commenced.

Various types of front-end loaders and stope drill rigs have been investigated for suitability for underground production. Two 55-tonne trucks for underground haulage were ordered prior to year end.



The Warman 1000 drill was used to drill 34 holes at the Savage River iron ore mine on an ore evaluation programme.

Stope mining commenced during the year and accounted for approximately 50% of the 217 027 tonnes of ore mined. The remaining 50% produced was realised from ore development.

Bulk concentrate production at the Luina mill amounted to 72 670 tonnes at 33.6% Zn, 16% Pb, 381 g/t Ag, and 1.5 g/t Au.

Site rehabilitation at Luina continued with the preparation of No. 2 tailings dam for revegetation.

Beaconsfield Operations Pty Ltd, Beaconsfield

Shaft recovery and installation of steel set supports in the Hart Shaft of the old Tasmania Gold Mine continued slowly during the year. The water level was maintained between 61 and 59 metres below the shaft collar.

The intentions are to clear the shaft blockage between 56 and 92 metres and then de-water the mine to gain access to the old workings at depth.

Cornwall Coal Company N.L., Fingal

Run-of-mine production for the year totalled 608 700 tonnes, with the output of washed coal totalling 404 800 tonnes. The washed coal stockpile at Fingal increased by approximately 34 000 tonnes.

With the manning level reduced by 25, production from the Duncan Colliery at 270 500 tonnes for the year was 100 300 tonnes less than for last year. Output per man shift however increased to 20.3 tonnes from 18.2 tonnes. Pillar extraction on the retreat continued to take place in the northern section of the mine but with only limited success. Quite severe and widespread pillar stressing occurred in conjunction with the mining, and the percentage extraction consequently was not high. Development of the southern panel continued until Christmas, when it was completed. Mining conditions in this panel continued to be very difficult. After Christmas, development of the south-easterly headings began again and each was advanced a further 280 metres before the year ended. Improvements in both coal quality and roof conditions occurred over the last 100 metres.

Blackwood Colliery established another record by producing 280 600 tonnes from underground over the year. Forty-two men were employed and operations were carried out on three shifts per day. Output per man shift increased to 30.5 tonnes from 28.7 tonnes during 1986-87. Retreat development of panels east and west of the main headings continued to be undertaken, followed by pillar extraction.

Removal of overburden continued from the Blackwood West Open Cut, and 57 600 tonnes of coal were removed from the Blue Upper and Blue Lower seams over the year.

Capital expenditure amounted to approximately \$537,000. Major changes were effected to the rejects disposal system. A second dam was established and a slimes pumping system was installed at the washery. All slime is now pumped directly to the new dam, and the use of road tankers for slime disposal was discontinued. Vehicles for surface and for underground use were also purchased.

Electrolytic Zinc Company, West Coast Mines

Mill throughput at 806 265 tonnes of ore was some 13 600 tonnes less than for 1986-87.

	<i>Concentrate tonnes</i>	<i>Zinc tonnes</i>	<i>Lead tonnes</i>	<i>Copper tonnes</i>	<i>Silver kg</i>	<i>Gold kg</i>
Zinc concentrates	150 816	79 480	5 429	452	13 347	207
Copper concentrates	32 701	3 466	11 184	3 358	68 679	1 364
Lead concentrates	30 453	3 776	18 911	134	19 624	90
Total	213 970	86 722	35 524	3 944	101 650	1 661



Unloading ore from the Que River mine at the Electrolytic Zinc Company's Rosebery mine.

Ore purchased from Que River amounted to 302 663 tonnes.

Base metal head grades were similar to 1986-87 but higher precious metal head grades were realised. A gravity gold plant, consisting of spiral classifiers and concentrating tables, was commissioned during the year which increased gold recovery by an estimated two percentage points. The lead/gold concentrate from this plant was blended into the copper concentrates.

Details of concentrates produced are given below.

A Resources Exploration Team was created to further investigate possible extensions to ore bodies. A total of 6409 metres of diamond drilling was carried out, including drilling on the South Hercules site.

**Golconda Management Limited,
Beaconsfield**

Treatment of tailings from the old Tasmania Mine was completed, and the treatment water was processed in the cyanide recovery plant to remove cyanide and the remaining gold. Drainage and recontouring of the storage dams began as part of the rehabilitation programme.

King Island Scheelite

The market for scheelite improved during the year and as a result the budgets set at the beginning of the year for underground production and mill throughput were exceeded by 12.5% and 23% respectively. The permanent workforce was increased from 83 to 96.

Despite a lower mill head grade (1.25% WO₃ as against 1.30% WO₃ for 1986-87), concentrate production at 1490 tonnes was 26% higher than 1986-87. The demand for gravity scheelite was stronger than for low molybdenum artificial scheelite, and increased production of gravity concentrates resulted in substantial cost savings.

Prices realised during the latter half of the year were not greatly affected by the strengthening of the Australian dollar because of forward selling.

A rehabilitation programme of surface areas commenced in the abandoned Bold Head area.

**The Mount Lyell Mining and Railway Co.
Ltd, Queenstown**

Following the decision by the Company in the previous year to extend mining operations into the 50 and 60-Series of stopes, there has been intense activity to develop the necessary access to these areas.

This development has been carried out from the Prince Lyell Shaft and the main decline. In addition the construction of a new underground crusher at 18-level near the shaft is well underway.

Through the year 2979 metres of development and 762 metres of raise boring were carried out.

Mine production, still all from the 40-Series of stopes, totalled 1.51 million tonnes.

Tonnes milled were 1.50 million tonnes at a grade of 1.55% copper. Production from this

was 21 638 tonnes of copper, 511.5 kilograms of gold, and 2 761.5 kilograms of silver, all in concentrate form.

A new section of the mill was constructed in the year to recover fine pyrite for sale.

Capital expenditure for the year was \$4.76 million.

**Que River Mining, Aberfoyle Resources
Limited, Que River**

Ore hoisted was 307 000 tonnes, which were hauled by road to the EZ concentrator at Rosebery. The grade of the ore hauled was 0.4% Cu, 7.8% Pb, 13.5% Zn, 232 g/t Ag and 4.1 g/t Au.

Stopping operations utilising waste backfilling of mined-out voids continued successfully. Underground development continued, and 911 metres of advance were achieved.

Industrial disputes showed an improvement on the previous year and resulted in the loss of 4.5 production days.

Capital expenditure was \$0.9 million. Main areas of expenditure and improvement were in environmental control and rehabilitation.

A programme of very deep diamond drilling was commenced with the aim of exploring the Que River rock sequences at depth.

Renison Limited, Renison Bell

Production did not quite match the level of last year. The tonnages mined and treated, at 816 848 tonnes and 827 879 tonnes respectively, were the second highest ever achieved by Renison. The quantity of tin contained in the concentrate produced amounted to 6222 tonnes.

Time lost due to industrial disputation was again significant at 5.9%, and unrest in the mine was again the principal cause.

Instances of hydrogen sulphide emission in the concentrator were few and of relatively minor significance. Three emissions were detected in the leach plant, each associated with an unusual circumstance and none serious. One general evacuation took place when the gas was emitted from some old process pipework which was being dismantled. Nobody reported feeling any ill effects from the gas.

Capital expenditure for the year was \$4.3 million.

Savage River Mines, Savage River

Negotiations between the mine and representatives of the Japanese co-partners concerning an extension of the existing contract beyond the expiry date in 1989 continued throughout the year. As at year-end, no decision had been handed down.

When compared with the previous year, all material movement increased by 31% to nearly 18.5 million tonnes—an all time record for the mine. While crude iron ore production increased by 53%, the increase in concentrates to 2.3 million tonnes reflected an improvement of only 23%. This was mainly due to a much lower magnetics recovery factor.

An infill percussion drilling programme to better define the ore to be mined during the 1988-89 year was carried out in both open cuts. Contractors and the Department of Mines drilled a total of 4017 metres. No other exploration work was carried out as a feasibility study into the extension of the mine was being evaluated.

Slope failures occurred in the western wall at the north end of the Central Deposit, and in the eastern wall of the Northern Deposit. Both areas were rehabilitated by bulldozing the slopes.

Tasmania Mines N.L., Kara

The concentrator constructed in the previous year ran well, although the depressed scheelite market resulted in reduced operating hours. A total of 113 000 tonnes of ore at 0.75% WO₃ was treated to produce 511 tonnes of concentrates containing 352 tonnes of tungstic oxide.

The open pit ran well, with operations being trimmed to suit mill feed requirements. Overburden removed totalled 82 800 tonnes, and 102 400 tonnes of ore were hauled to the stockpile.

Magnetite sales were encouraging, and could prove advantageous for the future if a regular market can be secured.

WORKS

Comalco, Bell Bay

Production was 124 000 tonnes of aluminium blocks, ingots, billets and granules from 232 000 tonnes of alumina imported from the Gladstone refinery in

Queensland. Main areas of activity at the works are manufacturing of carbon products, smelting of alumina, and metal alloying and casting. The alumina is melted in the pot lines by the Hall-Herault process to produce aluminium, which is then alloyed and cast into the required sizes and shapes. The furnaces draw some 240 megawatts of power from the State grid on a continuous basis.

The smelter operated at full capacity throughout the year, with a workforce of 1100.

A major \$70 million capital expenditure programme to construct a new baking furnace area began in February. Completion date is expected to be September 1989.



With the building framework complete, work is progressing steadily on construction of the No. 3 carbon baking furnace at Comalco's Bell Bay smelter.

Electrolytic Zinc Company, Risdon

Production of zinc and its alloys totalled 186 570 tonnes, utilising sulphide concentrates from Rosebery in Tasmania and Broken Hill and Elura in New South Wales. Concentrates are roasted in fluid bed roasters to produce zinc oxide calcine, which is dissolved by sulphuric acid to produce zinc sulphate solution for electrolysis. Zinc deposited on aluminium cathodes is mechanically stripped, melted down, and then alloyed and cast to customers' requirements.

The integrated plant produces sulphuric acid by the contact acid process, ammonia in the Haber process, hydrogen by electrolysis of water, and nitrogen from the fractional distillation of liquid air. The main by-products are cadmium metal, cobalt oxide and sulphuric acid. The latter is also used in the superphosphate plant, which converts Christmas Island phosphate rock into

granulated fertiliser for the Tasmanian market. Electricity requirement is approximately 110 megawatts on a continuous basis.

The Strong Acid Leach Plant, the first of the new plants associated with the modernisation programme, was successfully commissioned. Further additional modern plants will progressively come on stream over the next two years. Capital expenditure for 1987-88 was \$29.6 million.

Goliath Portland Cement Co. Ltd., Railton

Cement production was 448 000 tonnes for the Tasmanian, mainland and overseas markets. Raw material used included 629 000 tonnes of limestone and 42 000 tonnes of clay from the Company's quarry adjacent to the works, as well as coal from Cornwall Coal at Fingal.

Major items of capital expenditure included the purchase of a Terex loader for quarrying operations, and the construction of roller-compacted concrete roadways. Further plant improvements included the conversion of the bulk cement silo weighbridge to load cell operation, the installation of a new air compressor to improve discharge rates at the Derwent Park terminal, and upgrading of the fog room in the laboratory to improve quality control in concrete testing.

Pioneer Silicon Industries, Electrona

The Company commissioned an electric arc furnace in July 1987 in a pre-existing furnace building operated formerly by the Electrona Carbide Industries.

Raw silica from northern Tasmanian sources is mixed with woodchips, metallurgical coal and petroleum coke, and subjected to a reducing arc in the furnace. A baghouse collects flue particulates, and a crushing and screening plant prepares the metal for packaging.

Planned throughput of silica and woodchips is 20 000 tonnes of each per annum, and the electricity requirement is approximately 14 mW.

Production of silicon metal totalled 7529 tonnes in the year. A tap hole fume collection system was commissioned at the end of June

1988 to reduce dust load in the furnace building.

Tasmanian Electro-Metallurgical Company, Bell Bay

Ferro alloys produced in the four furnaces included 56 000 tonnes of ferro-manganese; 58 000 tonnes of silico manganese; 19 000 tonnes of ferro-silicon; and 218 000 tonnes of sinter for export. Raw materials included manganese ore from Groote Eylandt; iron ore, quartz, coal and coke from New South Wales; and woodchips, limestone, dolomite, quartzite, and iron ore from Tasmania.

Since the recent \$67 million upgrade, the plant is one of the most modern of its type in the world, and produces all of Australia's requirement for high carbon ferromanganese, silico-manganese and ferro-silicon. Total power requirement when all furnaces are in operation is 84 megawatts, and 435 persons are employed.

Capital expenditure for the year was \$11 million.



The top of a ferro-silicon furnace, showing raw material feed shoots, at Temco's Bell Bay smelter.

Tioxide Australia Pty Ltd, Heybridge

Titanium dioxide pigment is produced by the sulphate process from ilmenite imported from Western Australia. Production and sales were in line with the company's targets.

Capital expenditure was \$11.5 million. Plant expansion was a major feature of the expenditure, and was well on the way to completion by the end of the year. Other improvements were in the areas of upgraded process equipment, improved product quality, and better noise and dust suppression.

DANGEROUS GOODS DIVISION

DANGEROUS GOODS ACT 1976

There were no amendments or additions to the Dangerous Goods Act, 1976, during the year. Amendments to the Dangerous Goods Regulations were tabled during the year to come into effect on 1 July 1988. The amended regulations provide for increasing fees in respect of inspections, permits, applications and licences.

STAFF

The Division experienced shortages of staff during the year due to retirements, sickness and annual leave. Although the essential duties of the Division were maintained, such shortages affect the role as educator and adviser. These shortages will continue into 1988-89 due to impending retirements and, consequently, will affect the scope and quality of the service given by the Division. The Division has maintained its training programme for all inspectors so that demands on time and services can be adequately catered for in the future.

The number of field inspections covering the import, export, storage, handling, use and sale of dangerous goods fell from 2856 in 1986-87 to 2726 in 1987-88.

GENERAL

All imports in bulk of Classes 1, 2.1, 3.1 and 3.2 dangerous goods through the ports of Burnie, Devonport, Hobart and Launceston, were supervised by inspectors of the Division. Details of the imports are included in Tables 15, 16 and 17.

Enquiries and appeals for assistance in the disposal or the destruction of dangerous goods of all classes continue to increase. The requests originate from other State Government agencies, industry, primary producers, and the general public.

Explosives have been collected on thirteen different occasions for destruction, and gas bottles were made safe prior to disposal. Assistance was given to the Antarctic Division on the disposal of waste returned from Antarctic stations.

The Department of Agriculture was assisted by officers of the Division in the collection, packaging and export of agricultural chemicals no longer considered desirable for use.

Assistance was also given to the University of Tasmania in the packaging, transport and export of hazardous chemical waste.

The Department spent some time in investigating sites suitable for the disposal of hazardous wastes generated by schools, hospitals, the University, and other Government agencies. The selected site was objected to by public opinion, with the result that this Department has no access in the southern area to a site to destroy explosives, flammable liquids, corrosives and other chemicals that present little danger to the environment.

Consequently officers of this Division have been instructed not to collect hazardous material for disposal or destruction which cannot be properly disposed of at the premises at which they have been kept. Any request for assistance, other than the destruction of explosives, is to be forwarded to the Department of the Environment for advice.

It is hoped that a national strategy for the effective disposal and destruction of hazardous waste can be developed and put in place before the probability of events catch up with the decision makers.

A consignment of explosives with a defective wax wrapper was repacked at the Dilston magazines by the manufacturers.

Assistance was given to the Tasmanian Development Authority and the consultants preparing the feasibility study for an oil refinery.

The year saw the initial production, for export, of essential oils at four centres. Fennel, parsley, pyrethrum and peppermint are, at present, the main crop varieties for oil extraction. It is probable that such essential oils will be classified as a Class 3 flammable liquid, and will require special treatment in extraction, transport and packaging. The Division will be watching developments in this area with interest, and will assist where possible.

The Burnie office of the Division assisted the contractors deepening the shipping berths at Burnie, and the project was completed without incident.

Lectures were given to trade union seminars, country fire brigades, and primary schools on

the transport, labelling, packaging and use of dangerous goods.

Councils requested advice and monitoring of sewerage works for the presence of toxic gases, and this assistance is continuing.

The fireworks season saw an improvement in public behaviour, with the levels of complaint and injury from fireworks down from the previous year. However, three people sustained injuries at two big public fireworks displays earlier in the year in Hobart. In future the operators of public displays will be requested to provide adequate crowd control on land and on the water.

The Department appreciates the community service given by television station TVT6 in presenting "*Safety with Fireworks*". Thanks are also extended to Tasmania Police, Tasmania Fire Services, and the Department of Health for their assistance in helping the firework season be an enjoyable and safer community occasion.

Members of the Division served on the following committees and groups during the year:

- Chief Inspectors of Explosives Conference
- Australian Transport Advisory Council's Competent Authorities Sub-Committee
- Australian Minerals and Energy Council—Working Party on uniform State LPG legislation
- Standards Association of Australia ME/17 Flammable and Combustible Liquids
- Standards Association of Australia ME/15 Liquefied Petroleum Gases
- Hazardous Substances Management Committee
- Southern Regional Disaster Planning Group
- Working party for the recovery of organo-pesticides

INCIDENTS

Fifty-nine complaints and incidents involving dangerous goods were investigated. The more important events are listed according to their class.

Class 1 Explosives

One hundred and sixty-two electric detonators were stolen from Forestry Commission magazines. The detonators were recovered and the thief prosecuted.

Six sticks of gelignite were found in a vehicle purchased from a Government department. Enquiries failed to establish how the explosives were overlooked. The explosives were seized for destruction and the safety officer of the department will be ensuring that such an incident will not be repeated.

A person injured his hand when exploding a detonator in a public place. This person was a contractor and held N.S.W., Queensland and Tasmanian shotfirers permits.

Eight detonators were found in a container of refracting bricks imported from the mainland. The Police Bomb Squad took the necessary action to destroy the detonators.

A shotfirer had his permit suspended for not taking adequate precautions to prevent fly-rock from blasting operations.

Explosives were recovered from under a car. A bomb attempt was suspected but police enquiries have not substantiated this conclusion.

Two persons were injured when hit by a fireworks shell which failed to explode during the public fireworks display celebrating the Tall Ships Race.

At the Royal Hobart Regatta public fireworks display a teenager, on one of the pleasure boats moored offshore, suffered burns from a falling firework.

Class 2.1 Flammable Gases

An LPG explosion in a caravan was caused by the carelessness of the occupier. He turned the stove appliance tap on first and then went outside and turned on the bottle valve. He then had a chat before re-entering the caravan to ignite the stove burners. He suffered singeing of body hair, and shock.

A gas leak at an LPG installation, suspected cause vandalism, resulted in a fire. The cylinder cover had been left unsecured. As a result instructions were given to replace all plastic POL sealing plugs in the unused liquid withdrawal valves, with brass (Allen key) plugs, and all domes on 190 kg cylinders are to be locked.

There was an LPG explosion in a new caravan when a stove appliance was lit. The compliance data plate was attached to the chassis of the caravan, which had been manufactured in Victoria. On examination a flexible hose connection to the stove cook-top appeared to be cross-threaded, and the hose was bent at 90° to allow connection to the stove. The hose also passed through two sections of plywood, with no grommets provided. The installation did not comply with the Installation Code AG601, and this Department now views compliance plates with some suspicion.

The LPG vaporiser on a large industrial installation became overheated when the supply of LPG to the system started to fall off. The thermocouples to prevent this happening were found lying on the ground. It was not possible to establish how this happened but human failure appears to be the most likely cause. Before re-starting the system the vaporisers were pressure tested. Other safety measures were taken to preserve the integrity of the system.

Whilst working on an LPG installation a gasfitter failed to isolate the LPG from the supply or to purge LPG from the gas pipes. He cut through a gas pipe line and leaking gas was ignited by the pilot flame on another installation. The fire was dealt with by the local Fire Brigade.

Class 2.2 Non-flammable Compressed Gases

A large cryogenic ISO tank containing eight tonnes of argon was found to be venting to the atmosphere from the relief valve and a side pipe. As the tank was in the open it was allowed to continue venting until the 'bursting disc' could be replaced. The Fire Brigade attended the incident.

A 5 kg bottle of CO₂ was delivered from the filling station to a store reception area. The bottle had no transit plugs fitted, and before delivery had been left in the sun. The bursting disc failed and the bottle took off like a rocket, hit the ceiling, bounced back on to the counter, deflected on to one of the walls and then zoomed through a shut window, travelled another 10 metres on to a lawn and spun around until the gas in the bottle was exhausted. Luckily nobody was injured, and the filling and delivery practices have been reviewed and amended.

Class 3 Flammable Liquids

A tanker conveying petroleum products rolled down a bank when the road collapsed on a soft shoulder. The driver shut off the electrics and, although there was a loss of 500 litres of petrol over four hours before recovery, there was no fire.

Fire destroyed a workshop engaged in re-packing flammable liquids in smaller containers. The workshop was destroyed but the bulk storage tanks were not affected. No cause has been established for the incident.

When delivering petroleum product to a service station, the tanker driver had cause to leave the forecourt without shutting off the pumps. Consequently, an overfill occurred and petroleum product entered the drains. The Fire Brigade was called to deal with a potentially dangerous situation. The driver was subsequently dealt with by the Department of Mines for failing to take every precaution to prevent the loss of dangerous goods.

A road tanker conveying petroleum products, including two drums of unleaded petrol and three gas cylinders, failed to take a right hand bend and rolled over into a paddock. The driver of the tanker was killed. Although there was some leakage of petrol the actions of the recovery team prevented a fire.

There were two incidents involving spills of petroleum products during discharge to shore installations. The spills were contained within the bunds and the products were recovered. Both incidents were the result of faulty dipping procedures.

A fire occurred at a service station when a campervan was being refuelled. Vapour from the fuelling operation was ignited by the pilot flame on a refrigerator in the campervan. There were no serious injuries.

A driver delivering petroleum to an above-ground tank at a petroleum depot failed to physically check the contents of his truck or of the tank. A spill of 1800 litres of petrol occurred. Action by the Fire Brigade prevented a fire, and most of the product was recovered. The driver of the vehicle and the operator of the depot were dealt with by officers of the Dangerous Goods Branch.

Class 5.1 Oxidising Agents

At a transport depot during a particularly hot day some drums of hydrogen peroxide started venting. On one of the drums the vent

cover was faulty and the drum started to bulge. The situation was contained by cooling the drums with a water spray. The situation was not dangerous, as the drums were sited in their own area away from any other flammable or combustible material.

Class 8 Corrosives

A consignment of cyclopropane carbonyl chloride arrived at a Hobart Airport depot. After being unloaded, the depot staff noted fumes from the package. The Airport Fire Brigade moved the container into the open and called the local Fire Brigade and the Department of Mines. On opening the package one of the bottles was found to be broken and the contents absorbed by the vermiculite packing. The good bottles were recovered, repacked and forwarded to the consignee. The staff at the depot and Fire Brigade staff were sent to hospital for a precautionary check. A full report was forwarded to all the relevant organisations.

There was a spill of chromic acid at an electroplating works. The spill was contained within the works area. A check was carried out by the Department of the Environment on the area adjacent to the premises.

In general the Department's staff is faced with an increasing number of spillage incidents involving dieselene being stored on its own. Licences are not required for the storage of dieselene alone on a premises but the conditions of storage still have to comply with the provisions of AS1940.

The movements of Class 8 Corrosives in bulk and in packages is increasing as industry expands. Although transport of these substances has to comply with the Australian Code for the Transport of Dangerous Goods, the licensing of premises storing these substances should now be considered as a measure to improve the safe handling and storage of dangerous goods.

GEOLOGICAL SURVEY DIVISION

During the year the Division has initiated several changes in its own activities, and has been affected by changes in Departmental policy. These have included:-

- Continuing development of our computer-assisted drafting system, which is now producing the bulk of black and white work for publications, has enabled us to greatly increase colour map production. During the last two years we have gone from two colour maps (or 30 colour separations) to seven colour or part-colour maps (or 120+ colour separations).
- The radical changes in Exploration Licence conditions have led to extensive areas being made available for application by competitive tender. The fact that the tenders, which are usually detailed and therefore voluminous, have been assessed and processed expeditiously is of great credit to Dr David Duncan and the Economic Geology Branch. This credit is reinforced by their contribution to the Mt Read Project and the continuation of their normal work.
- We have been concerned by the increase in the volume of public enquiries on groundwater, foundation design and other engineering geology topics over the last several years. The requirement to service these requests has reduced the resources available to complete more regionally-based groundwater resource and geological hazard assessments. Therefore, during the year, we introduced industry-level consulting charges, so enabling private consultants to take up more of the work, and carefully scheduled the personal resources available for this activity. In this way, we hope to control our mix of engineering geology activity and maintain regional studies at a higher and more responsible rate.

In addition to the Division's systematic work we were also involved in:

- Continuation of the Mt Read Volcanics Project
- Continuation of the Geodata mapping project in the Hobart metropolitan area.
- Contributions to the Bicentennial volumes 'The Geology and Ore Deposits of Tasmania' and 'Mines and Mineral Resources of Australia' with the Geological

Society of Australia and the Australasian Institute of Mining and Metallurgy respectively.

I would like to compliment all members of the Division on their contribution to increased effectiveness of our various activities.

REGIONAL GEOLOGICAL SURVEY BRANCH

The Branch operated throughout the financial year with a reduced staff of nine geologists. Consequently regional systematic and multi-purpose mapping continued at 75% of the former rate of production. The reduction of staff numbers by two diminished our expertise in the fields of metamorphic/structural geology and stratigraphy of the younger sedimentary rocks. All projects, apart from systematic palaeontology, will be published as 1:50 000 map sheets of the Geological Atlas series. Laboratory studies, supporting the mapping, will be published in Explanatory Notes.

Project Macquarie—mapping has been completed and results are to be published as a 1:50 000 map sheet, which will show Precambrian sequences, with five deformational events, thrust over Mt Read volcanic correlates. Fault-bounded units of the volcanic and other units have been delineated, and the complicated characteristics of the faults indicated.

Project Corinna—about 70% of the quadrangle has been mapped. Mapping of the enclosing metamorphic rocks of the massive sulphide-oxide deposits of Savage River is nearing completion, and the granitic rocks of the region will be investigated next year.

Project Point Hibbs—tracks required for future summer field seasons have been cut in the heavily-forested regions. Mapping started from helicopter camps. The rock-types encountered are of dominantly clastic sedimentary sequences, although units of felsic volcanic rocks and ultramafic bodies have been delimited. Structures associated with possibly major fault zones occur, and will require special attention in future mapping.

Project Trowutta—about 25% of the quadrangle has now been mapped. A sequence of pyritic mudstone and quartzite has been followed from close to one

geologically similar to the copper-tin mineralisation at Balfour. Similar but structurally more complicated sequences have been found further east.

Project Styx—mapping commenced in this quadrangle and about 8% of the area has been mapped. A unit, which is host to several small prospects developed on sulphide-bearing hydrothermal veins, has been investigated, together with a succession of mafic pillow lavas and chert associated with ultramafic rocks.

Project Dover—about 50% of the region has been mapped. The rocks encountered in the heavily-forested areas of South Bruny Island are of the extensively faulted but flat-lying Carboniferous-Triassic sedimentary rocks, which have been irregularly intruded by Jurassic dolerite. The Adventure Bay coal measures have been traced in a number of localities, and a younger horizon has been found with a number of the characteristics of coal-bearing strata elsewhere.

Projects Snow Hill, Woolnorth and Alberton—regional mapping continued in these quadrangles.

Explanatory Notes are being compiled for Smithton, Pedder and Lake River Quadrangles.

The Palaeontologist is working on the systematic and taxonomic description of Late Palaeozoic brachiopods and determining time constraints on a number of rock units. Similarly, time constraints of economically notable units of the Triassic and Tertiary have been determined using palynofloras.

During the year a field excursion was held on the previously published Lyell 1:50 000 sheet. Some thirty people attended, with most participants being from exploration companies and consultant groups. Many participants have since passed very favourable comments on the meeting and the map sheet.

Other projects in which Branch geologists participated include the Australian Bicentennial Tasman Fold Belt System map and explanatory volume, which are nearing completion, and the lithosphere transect study of the International Lithosphere Program.

ECONOMIC GEOLOGY BRANCH

Current Branch strength remains at ten with a supervising geologist, two senior geologists,

a geochemist, four geologists (including an administrative geologist), and two technicians. A vacant geological position is still unfilled due to Department staffing restrictions.

REGULATION

Regulation of the mineral exploration industry continued to take an ever increasing proportion of Branch member's time. Numbers of Exploration Licences (146) and reports (155) are running at record levels. Exploration programmes and reports are assessed and serviced by the Branch, as are Retention Licence applications (13).

Under the Exempt Tender Area (ETA) system, 44 areas were advertised, 23 of which attracted tenders, and 33 new Exploration Licences were awarded. The assessments of tenders were carried out in the Branch.

MT READ VOLCANICS PROJECT

More than half of branch resources have been employed on this specially funded study. In addition, ten temporary employees are fully committed to this project. They comprise three geologists, one analyst, one file/input clerk, two draftsmen, two field assistants, and one clerical assistant.

Mineral Resource Mapping

The mapping team, supervised by Dr Keith Corbett, continues to produce 1:25 000 scale geological maps of the most prospective parts of the Mt Read Volcanics belt. The map sheets produced to date are:

1. Mt Charter-Hellyer area: P. Komysan, 1986
2. Rosebery-Mt Block area: K. D. Corbett and A. W. McNeill, 1986
3. Henty River-Mt Read area: K. D. Corbett, 1986
4. Mt Murchison area: A. W. McNeill, 1987
5. Tyndall Range area: K. D. Corbett and J. C. Jackson, 1987
6. Compilation map—Hellyer to South Darwin: K. D. Corbett and A. W. McNeill, 1988.
7. Back Peak-Cradle Mountain Link Road: M. J. Vicary and J. Pemberton, 1988

8. Mt Cattley–Mt Tor area: J. Pemberton and M. J. Vicary, 1988.

Two new areas were mapped in the 1987–88 field season, covering the region north and east of the Hellyer mine. These maps will be produced in November 1988 as Maps 7 and 8. Further work in 1988–89 will cover the area from Black Bluff to Moina and Lorinna.

The first of the geological reports arising from the mapping, on the Hellyer–Mt Charter area, has been written and should be published in 1989.

Isotope and Alteration Studies

Work continued on the investigation of alteration zones at Hercules, Hellyer, Boco, Mount Cattley and the King River Tunnel. An extra dimension to the study has been added with the employment of Dr J. Taheri, who has brought the Department's fluid inclusion equipment into operation. Dr Taheri has commenced investigation of complex gold mineralisation in the Sterling Valley area. Work was commissioned, by the Electrolytic Zinc Company, on oxygen isotope alteration effects and a preliminary report has been presented.

Two 1:50 000 metallic mineral deposit maps of the Ulverstone and Cethana areas have been produced in full colour. Two other sheets (Elliott Bay and Loongana) are being compiled.

Four branch geologists produced a 1:500 000 Mineral Deposits and Metallogenic Map of the State. This map replaces two previous maps produced in 1967 at 1:1 000 000 scale, and provides additional information on the style and orientation of mineralisation.

Geochemistry

The major activity of this section has been directed towards the development of the Huminex geochemical exploration system. It is anticipated that this system, which is based on the organic matter in soils and river waters, will yield new regional and detailed information on metal dispersion. Trial surveys using the technique for base metals have been successfully applied in several areas of western and north-western Tasmania. A patent application to cover the technique is currently being processed. Improvement in the recognition of anomalous values in a data set has been achieved by the introduction of statistical methods based on the analysis of populations revealed in probability plots of the data.

In the laboratory, investigations have been aimed at achieving very low detection limits for a number of metals by use of solvent extraction and carbon furnace atomic absorption spectrophotometry. The Huminex soil system now works with copper, lead, zinc, gold and silver. Work is proceeding with the intention of including arsenic, antimony, bismuth and tin in the system. A carbon analyser has been brought into service to improve results for the determination of carbon in soils and waters, which gives a measure of the organic content. To date some 1500 samples have been processed with this equipment.

Special Studies

The MRV Project continued to fund the Australian Mineral Industry Research Association (AMIRA) project being carried out in the Geology Department, University of Tasmania. The three-year project has been



Further maps were published in the Mt Read Volcanics series during the year. Senior Geologist Keith Corbett (centre) and geologists John Pemberton and Michael Vicary inspect a completed map of the Mt Cattley–Mt Tor area.

successfully concluded, and has produced new information on the distribution of gold and silver in the volcanogenic sulphide deposits and associated rocks of western Tasmania.

Technical Data Bases

The objective of this project is to make available to industry computerised data bases of information relevant to mineral exploration in the State.

TASXPLORE: the data base of company unpublished exploration reports is now fully operational and available to the public. Microfiche of all open file reports are now available for purchase.

DOMINFO: initial specification and design commenced for a data base of all Departmental publications.

Sub-basalt Drilling Project

The stratigraphic drilling programme to determine the nature of Palaeozoic basement beneath Tertiary basalt in the Waratah-Hellyer-St Valentines Peak region of north-west Tasmania continued, with the drilling of a further three holes amounting to 1331 metres of drilling. Ten holes have now been completed, totalling some 3872 metres of drilling, and have provided important information about the prospectivity of the basement formations in the region. The 680 km² exempt area on which most of the holes were drilled will now be returned to the Mining Act for allocation by tender to mineral exploration companies.

COMMODITY STUDIES

Gold

A paper summarising alluvial gold deposits in Tasmania was produced. The data base of Tasmanian gold deposits (on MIRLOCH) is nearing completion, with 840 gold-bearing deposits recorded. Specific investigations included reconnaissance surveys at Lake Chisholm, Edith Creek and the King River dam site. Studies are continuing on the gold distribution in Mt Lyell ores and concentrates, and have been completed on the Henty Prospect mineralisation and the King River Delta mineralogy.

Plans are in hand to carry out an integrated study of gold occurrence in North-East Tasmania involving geological, geophysical, and geochemical techniques.

Industrial Minerals

A series of reports is now being produced on the full range of the State's industrial minerals. Commodities already reported on include silica, ochre, graphite, slate and talc. Beach sand, clay and carbonates will be covered in the coming year.

A 47 metre deep drill hole was completed to investigate the geology of a silica flour deposit at Corinna. Reports were written on some gravel deposits on King Island, and a dolomite quarry near Smithton.

The completed construction materials register has been transferred to the Engineering Geology Branch.

Coal

Production of the coal resources bulletin has been delayed due to a work overload in the Publications Branch. It is now scheduled for the first half of the coming year.

Petrographic studies have been completed for joint projects on Permian coal and coal from the Bass Strait oil drilling.

A major project has been started on correlation of coal seams using petrographic techniques and maceral analysis.

The Department continued to contribute to the roof stability study being conducted by Australian Coal Industry Research Laboratories at Duncan and Blackwood Collieries.

Others

As a result of staff restrictions and the inputs required for the MRV Project, the silver-lead-zinc and the tin-tungsten studies have been lowered in priority. A bulletin on alluvial tin is planned for the coming year.

An excursion to tin and tungsten areas around Tasmania was provided for geologists Tan Yunjin and Zhou Weining of the Research Institute of Geology for Mineral Resources, Guilin, China.

In recognition of the Department's role in conducting such visits over a number of years, geologist Nic Turner was included in a Bureau of Mineral Resources party which visited tungsten mines in Jiangxi Province in southern China, and which attended the 4th International Symposium of IGCP Project 220 in Guilin.

Plans are now being made to have a Chinese geologist from the Institute work on a suitable tungsten project for a six month period in the coming year.

PETROLOGY

Samples were received for investigation from a wide range of external sources, including the HEC; DMR; Department of the Environment; Health Services; Lands, Parks and Wildlife; Tasmanian Museum; the Government Analyst; mining and exploration companies; consulting geologists; and the general public. Samples studied included asbestos, basalt, dust, clay, gems, soil, sand, industrial minerals, metallurgical products and ore samples.

Reports are in press on heavy-mineral-rich beach sands and wollastonite occurrences in Tasmania. A large number of rocks have been described for the Mt Read Volcanics data base. Curatorial work has included the upgrading of data bases for rock samples, drill logs, and drill core.

Following the successful upgrade of the X-ray diffraction (XRD) equipment, 149 dust analyses were processed from industrial and mine sources. An order has been placed for a new X-ray generator to bring the equipment up to its full design capacity. The technical officer also carried out 324 X-ray analyses, 37 asbestos identifications, and 83 isotope analyses.

GENERAL

The following publications were produced during the year:-

- 19 unpublished reports
- 2 mineral resource reports
- 2 MRVP geological map sheets 1:25 000 scale
- 1 MRVP geological compilation 1:100 000 scale
- 2 MRVP mineral deposits maps 1:50 000 scale
- 1 State mineral deposit map 1:500 000 scale

Contributions were prepared for the economic geology components of the Huntley, St Valentines and Interlaken explanatory notes.

Core storage capacity continues to be critical at the Mornington complex. However, progress has been made with Cabinet-approved plans for additional storage to be made available close to the existing facility at Mornington. The existing premises will be modified and added to, so that core can be accepted in the coming year. This will relieve the burden on exploration companies of storing significant core, and ensure that such valuable core will be available for consultation and testing by future explorers and Department workers.

Two Indonesian geologists, Syahrir Andimangga and Didi Sudana, from the Geological Research and Development Centre, Bandung were included in geological mapping parties during the summer field season. The training scheme, which has operated for several years, is funded by the Australian International Development Assistance Programme and co-ordinated by the Bureau of Mineral Resources, Canberra.

Two conferences were attended by Branch representatives—the Pacific Rim Conference at the Gold Coast; and the Bicentennial Gold Conference in Melbourne—to get information on gold deposits and exploration techniques relevant to Tasmania.

Resource information was prepared for several planning schemes and management plans throughout the year.

ENGINEERING GEOLOGY AND GROUNDWATER BRANCH

The Branch consisted of a supervising geologist, two senior geologists, three geologists, a surveyor, and a Geodata officer. A research student was attached for a time.

GROUNDWATER

Regional groundwater surveys have continued, mainly in the Sheffield area, as drilling plant has been available. This activity has not attracted a high priority. The groundwater resource in the East Devonport and Barrington areas has been monitored and records now extend over five years.

The Groundwater Act is not yet fully operational but an Advisory Committee has been appointed and regulations are in a late stage of drafting. One geologist attended the AWRC Groundwater School.

A detailed study of salinity layering at Seven Mile Beach has been made by a research student of the University, under Branch

supervision. A salt water drainage scheme has been designed and executed in an orchard at Legana, and a number of contract bores have been installed in the North-East.

An officer attended a workshop on Groundwater Allocation and gave a paper on the State's arrangements.

SLOPE STABILITY

The Search service has continued and has been simplified to increase efficiency. The Fourth International Field Workshop and Conference on Landslides (ANZslide) was held in August under the management of the Branch. Landslide examinations of new subdivisions for Councils and landowners have continued, and several active slides have been equipped with recorders to enable better watch to be kept.

A visitor to the Branch was Dr Bob Schuster of the United States Geological Survey. He gave a seminar and a talk to interested persons in the Branch and at the University.

WASTE DISPOSAL

Waste disposal sites have been examined for Councils in conjunction with the Department of the Environment. Landfills at Lauderdale and Vermont Road have been equipped with monitoring boreholes, and records are being made of leachate movement. These studies are to be extended to other sites, and fluorimetric tracing methods are now available for this. A number of oil spill disposal sites have been investigated.

GEOGRAPHIC INFORMATION SYSTEMS

Geodata mapping in the Greater Hobart area has continued, and the Branch has been responsible for geological input into the Coal River Pilot Study. This pilot GIS will serve as a model for larger projects, and the Branch is at the foundation of the Departmental effort in this field.

FOUNDATION STUDIES

The Meander Irrigation Channel has been mapped, drilled, sampled, and the soils and their permeabilities determined. A study has been made of damage to the foundations of the Tasmanian State Institute of Technology campus at Launceston, and site investigations have been made for two multi-storey car parks. The Department Core Store floor loadings were measured, and vibration measurements made on a house close to the railway at Spreyton.

Extensive foundation and stability studies were made of the Blackstone Heights subdivision, in an area with complex weathering conditions.

OPERATIONAL GUIDES

A contribution was made to the Forestry Operations Code, and a skeleton draft of a Soil Conservation Bill was written.

TEACHING SERVICES

A course for engineers was again given at the University of Tasmania, and for survey students at the Hobart Technical College. The Branch made a contribution to the Bicentennial volume of the Geological Society, and gave a course on rural geology to a Whole Farm Planning School. Schools used our facilities for work experience on several occasions, and Branch officers availed themselves of the management courses provided by the Department of Public Administration.

ADMINISTRATION

The Branch now has an Action Plan to cover the next two years activities. The proportion of enquiry work to applied research has been set at 30% to 70%, and a commercial scale of charges has been set up.

PETROLEUM EXPLORATION AND MARINE GEOLOGY SECTION

GENERAL

The Section is responsible for technical and policy aspects of petroleum exploration in Tasmanian offshore and onshore areas, and in addition to providing technical advice concerning administration of the relevant Acts, performs reviews and conducts research projects relating to the geological evolution and prospectivity of the offshore and onshore sedimentary basins. The Section is staffed by the Petroleum Geologist, and receives specialist input from other Departmental officers as required.

The Petroleum Geologist participated in the geological sampling leg of BMR Project 9131-13 (Geological Framework and Hydrocarbon Resource Reassessment of the Bass Basin and West Tasmanian Margin), and spent two weeks aboard 'Rig Seismic' as a member of the scientific staff.

The acquisition of a Macintosh SE micro-computer (to be used for data storage

Table 3

OFFSHORE PETROLEUM EXPLORATION PERMITS

<i>Title</i>	<i>Holder</i>	<i>Blocks</i>	<i>Expires</i>
T/14P	Amoco Aust. Petroleum Co. and others	25	24.08.92
T/15P	Weaver Oil and Gas Corp. Aust and Dorchester International Inc.	136	26.05.92
T/18P	Amoco Aust. Petroleum Co. and others	59	24.08.92
T/22P	Amoco Aust. Petroleum Co. and others	52	03.09.90

and analysis, in particular, well-log data) will greatly increase the efficiency of the Section.

OFFSHORE

Current offshore exploration permits are shown in Table 3; exploration continued at the low levels of the previous year. A single seismic survey by Bridge Oil Limited (Bridge Bass 88 Survey: T/15P) acquired 611 line kilometres of new data in the Boobyalla sub-basin (Bass Basin).

Acreage held under permit was slightly reduced on that of 1986-87 due to the revocation of the Tilana Location and the subsequent surrender of five blocks in T/14P: the Declaration of Location over the Yolla discovery was renewed for a further two years. Renewals were completed for T/14P and T/18P.

Single work-programme tenders were received for each of two areas made available on the west Tasmanian continental margin in 1987. One tender was subsequently withdrawn and the other was rejected on technical and financial grounds. An area in the southern part of the Gippsland Basin was released in the Second 1987 Bidding Round, but attracted little industry interest and no bids were received.

ONSHORE

Conga Oil Limited continued their exploration activities throughout south-eastern Tasmania, and report encouraging results in their search for Ordovician-sourced hydrocarbons beneath the flat-lying rocks of the Tasmania Basin.

A paper on land-use issues and effects on Australian petroleum exploration was completed for the AMEC sub-committee on Onshore Petroleum Exploration.

GEOPHYSICS

GRAVITY-MAGNETICS

Gravity data acquisition continued in the West Coast (865 stations), Burnie (463 stations) and Sorell (23 stations) areas. A 1:500 000 Bouguer anomaly map of the State has been printed and 1:250 000 dyeline maps are also available. As part of the Mt Read Volcanics Project interpretation reports have been released covering the granites of west and north-west Tasmania; the Precambrian and lower Palaeozoic structural relationships of west and north-west Tasmania; and a formulation of the regional gravity field for use in calculating residuals. An unpublished report providing an interpretation of the major structures of the Smithton area was also issued.

PHYSICAL PROPERTIES

A total of 393 bulk samples have now been collected and measurements of physical properties made on all but ten. All sampling sites have been tested for natural radioactivity, and petrological descriptions of samples are continuing. Software for storage and retrieval of basic physical property data from drill-core and hand specimen measurements is complete, and data entry has commenced.

BOREHOLE LOGGING

Borehole logging has continued to be in high demand. Logging versatility has improved with the purchase of a heavy-duty winch, combined density/caliper tool, neutron tool, and magnetic susceptibility tool. The system is being continuously upgraded to improve its reliability and to fill the needs of users.

COMPUTING

Usage of the mini-computer has increased steadily throughout the year, with all



The acquisition of gravity data for the Mt Read Volcanics Project continued during the year, using a helicopter to gain access to more remote regions. Field assistants John Wright and Ben Payne take a gravity reading in the Norfolk Range area of the West Coast.

micro-computers in the Department having either direct or indirect links for the transfer of data. A data base has been written for the Tasmanian rock catalogue, and the drill-log, drill-core and mineral exploration report indexes have been updated. The purchase of a laser printer has allowed high-quality reproduction of reports, and a printer buffer is being used to allow the micro-computers direct access to this printer. It is planned to purchase a second buffer to allow sharing of plotting resources among the computers.

ELECTRONICS

On-going installation, maintenance and replay of the Unidata data loggers has continued. The extensometer installation at the Duncan mine was removed several months after all signs of roof collapse ceased. There are currently eight Unidata installations in operation. A portable micro-computer has been purchased and programmed to allow data logger replay, data display, and reloading in the field.

Training in maintenance of the GBC atomic absorption spectrophotometer was undertaken and maintenance of this equipment, the design and construction of a pair of synchronised clocks, and routine equipment repair were the other major activities during the year.

MISCELLANEOUS

The geophysical chapter for the Bicentennial volume on the geology and ore deposits of Tasmania was completed. A major experimental seismic reflection survey, with promising results, was performed on Bruny Island for Conga Oil. Interpretation and documentation of the Mt Read Volcanics Signature Studies Project is nearing completion.

A general shortage of field assistance throughout the Department has substantially retarded the Section's data acquisition programme. As an example, the number of gravity stations acquired this year (1351) is over 1100 less than the number acquired last year.

GEOLOGICAL SUPPORT SERVICES

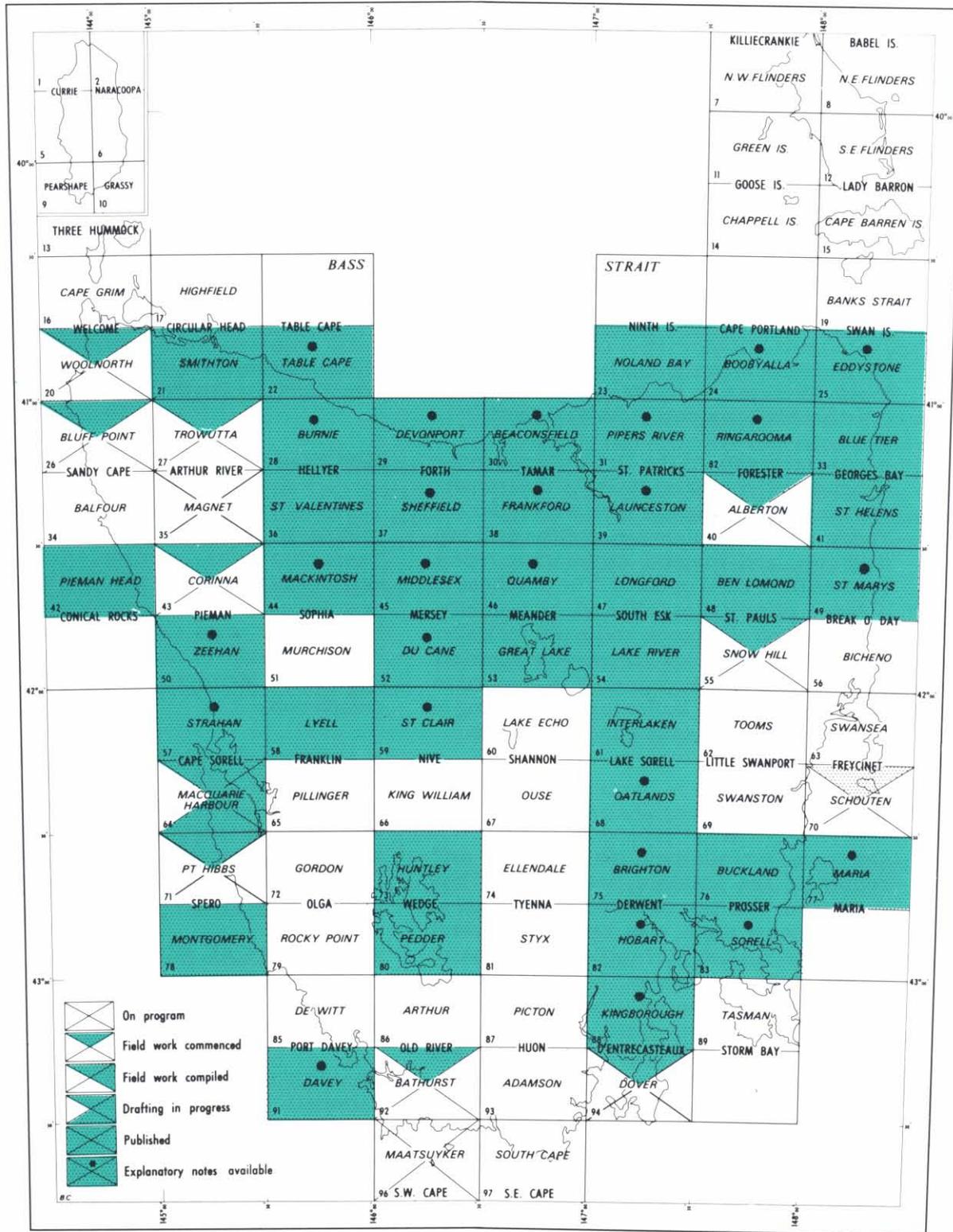
FIELD ASSISTANCE

The Branch consisted of one senior, one laboratory technician, and five field assistants at 1 July 1987.

A total of 1353 thin sections and 468 polished sections were completed and added to the Department's collection. The laboratory technician and one field assistant were employed approximately 90% of the year in the laboratory; a majority of the work was

GEOLOGICAL ATLAS MAPPING PROGRAMME

1:50 000 and 1:63 360 scales



associated with the Mt Read Volcanics Project.

Groundwater and landslip monitoring was carried out in the Launceston, Tamar, and North-West regions. Piezometers were installed in the Smithton, Beauty Point and Legana areas to measure possible groundwater contamination. Sand spears were installed in the Coles Bay and Schouten Island areas for the Department of Lands, Parks and Wildlife, and a regional investigation was completed in the Swanwick area.

A total of 1351 gravity readings were taken in the regional program and added to the State grid (865 West Coast, 463 North-West, 23 Sorell).

Well logging was carried out in the Primrose Sands, Dulcot, Leslie Vale, Bonneys Plains, Waratah, Lewisham, Cambridge, and Legerwood areas, and all holes associated with the Waratah program were surveyed

CARTOGRAPHIC DRAFTING

1:50 000 Geological Atlas series

Ben Lomond—drafted and printed
Montgomery—drafted and printed
Macquarie Harbour—drafting commenced

1:63 360 Geological Atlas series

Hobart—this sheet was reprinted using a four colour process produced by a Laser scanning technique.

Mt Read Volcanics Project 1:25 000 geological maps

Mt Murchison—drafted and printed
Tyndall Range—drafted and printed

A 1:100 000 scale compilation map of the Mt Read area was drafted and printed.

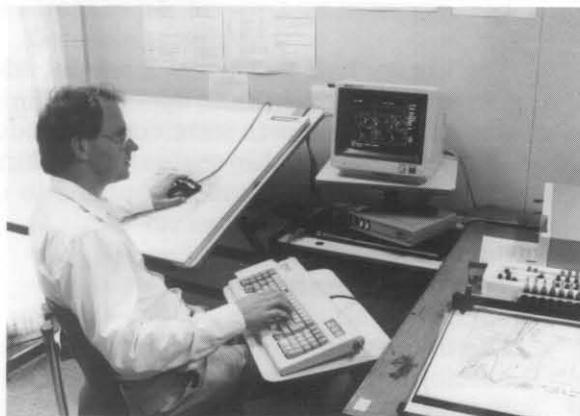
1:50 000 Mineral Deposit maps

Cethana—drafted and printed
Ulverstone—drafted and printed
Elliott Bay—drafting commenced

The Mineral Deposits and Metallogenic Map of the State, at 1:500 000 scale, was drafted and printed.

Our computer-aided drafting system (CAD), set up in the previous financial year, has continued to be of great benefit to this Department. Most of the ninety or so black

and white diagrams drafted for bulletins and unpublished reports were produced using the CAD system.



Cartographer John Ladaniwskyj drawing a geological plan on the Computer-Aided Drafting system. This equipment now produces the bulk of non-colour plans and diagrams for the Geological Survey.

LIBRARY

There was no change in the library staff during the year. The library assistant, Sandra Eiszele, was appointed permanently to the position which she had previously occupied in a temporary capacity.

Collection

It became necessary to cancel the subscriptions to five journals during the year due to the increased costs of these subscriptions and the low rate of exchange of the Australian dollar.

Additions to the library stock were 47 monographs, 47 microforms, and eight journal titles, many acquired as a result of the gifts and exchange program.

Reference And Information

During the year, 842 items (excluding the journals circulated regularly) were borrowed by staff.

Of the 2036 reference queries received by the library during the year, 1342 were readily answerable, while 694 involved literature searches. In addition, 27 computerised literature searches were undertaken.

The most interesting development has been the establishment of the TASXPLORE data base for unpublished company exploration reports. This will enhance our open-file report service to consultant and company geologists, a key group of outside users.

TASXPLORE will be followed by DOMINFO, a data base of Department of Mines unpublished reports. The data bases are being created by Department of Mines staff.

The library had 822 users from outside the Department, and 2009 open file Company and offshore reports were consulted during the year. Microfiche copies of Exploration Licence reports were also supplied to users when available.

Technical Services

The library staff continued to accession and catalogue library materials. In addition library staff undertook the bibliographic indexing and later checked the indexing of 155 exploration reports received during the year. The indexes of the closed file petroleum exploration data were also updated.

PUBLICATIONS

The following publications were printed during the year:

Report of the Director of Mines for 1986-1987

Mines News issues 21 and 22

1:50 000 Explanatory Report—St Marys, by N. J. Turner and C. R. Calver.

The Mines and Mineral Resources of Tasmania (2nd ed.)

Several new leaflets were produced, including:

Exploration Licences—the Landholders Position

List of Publications, May 1988

Launceston Laboratory—Price List of Services

The excursion guidebook for the ANZslide conference, and papers for the Environmental Control in Mines Symposium were produced in co-operation with staff of other sections of the Department.

Publications in progress include 1:50 000 Explanatory Reports for Huntley, Interlaken and St Valentines, Bulletin 63 (Landslides and Land Use Planning), Bulletin 64 (Coal Resources of Tasmania), and Bulletin 65 (Stratigraphy, Sedimentology and Structural

Setting of the Cambrian Sticht Range Formation, Western Tasmania).

Mt Read Volcanics Project

The following consultants reports were issued:

Interpretation of the north Tasmania aeromagnetic survey, by J. Bishop, 1987

Granites of west and north-west Tasmania. Provisional interpretation. 1. The Tor Granite, by D. E. Leaman, 1988.

Granites of west and north-west Tasmania. Provisional interpretation. 2. The Pieman Granite, by D. E. Leaman, 1988.

Granites of west and north-west Tasmania. Provisional interpretation. 3. The Grandfathers Granite, by D. E. Leaman, 1988.

Granites of west and north-west Tasmania. Provisional interpretation. 4. The Timbertops Granite, by D. E. Leaman, 1988.

Granites of west and north-west Tasmania. Provisional interpretation. 5. The Elliott Bay Granite, by D. E. Leaman, 1988.

Granites of west and north-west Tasmania. Provisional interpretation. 6. The Darwin Granite, by D. E. Leaman, 1988.

Granites of west and north-west Tasmania. Provisional interpretation. 7. The Murchison Granite, by D. E. Leaman, 1988.

Granites of west and north-west Tasmania. Provisional interpretation. 8. The Dove Granite, by D. E. Leaman, 1988.

Granites of west and north-west Tasmania. Provisional interpretation. 9. The Dolcoath Granite, by D. E. Leaman, 1988.

Granites of west and north-west Tasmania. Provisional interpretation. 10. The Beulah Granite, by D. E. Leaman, 1988.

Granites of west and north-west Tasmania. Provisional interpretation. 11. The Housetop Granite, by D. E. Leaman, 1988.

Granites of west and north-west Tasmania. Provisional interpretation. 12. The Three

Hummock Granite, by D. E. Leaman, 1988.

Granites of west and north-west Tasmania. Provisional interpretation. 13. The Meredith Granite, by D. E. Leaman, 1988.

Granites of west and north-west Tasmania. Provisional interpretation. 14. The Heemskirk Granite, by D. E. Leaman, 1988.

Granites of west and north-west Tasmania. Provisional interpretation. 15. The Pine Hill Granite, by D. E. Leaman, 1988.

Granites of west and north-west Tasmania. Summation report, by D. E. Leaman, 1988.

Explanatory notes for geological maps 2 and 4 are in preparation.

Computing

Several programs were written to enable better control of laser printer output, including a program to translate text to PostScript.

Data bases

Descriptions of over 3000 colour slides were put on computer file to enable easier retrieval.

E. L. Martin continued to serve on the ARID Advisory Council, the Government Geoscience Database Policy Advisory Committee, and AESIS Advisory Committee. Meetings of these bodies were held in Canberra on 21-22 July 1987.

Photography

Photographs were taken of mining and mineral processing operations at Electrona, Beaconsfield and several West Coast mines. Gravity surveys on the West Coast and a seismic relection survey on Bruny Island were also photographed. Limited photographic services were provided to staff members when necessary.

Unpublished Reports

Unpublished Reports issued during the year are listed in Table 4.

Table 4

LIST OF UNPUBLISHED REPORTS 1987-88

<i>No.</i>	<i>Title</i>	<i>Author</i>	<i>Author</i>
1987/05	The revised Mineral Industry Unpublished Report Data Sheet	P. K. Wrigley	28.10.87
1987/08	Prospecting for heavy minerals in the Fingal Valley.	V. M. Threader	13.10.87
1987/11	Burnie area gravity tie stations.	R. G. Richardson	
		M. J. Dix	24. 3.88
1987/32	Field manual for the Unidata 6003 portable data logger. . .	R. J. Sedgman	13. 7.87
1987/33	Coal samples from Macquarie Harbour and the wreck of the 'Litherland'.	C. A. Bacon	14. 7.87
1987/34	Offshore well data held by the Tasmania Department of Mines (Revision 4).	P. W. Baillie	27. 8.87
1987/35	Silica deposits in the Hastings Caves-Lune River area.	V.M.Threader	
		C. A. Bacon	26. 8.87
1987/36	Mineralogy of TEMCO remelt slag.	R. S. Bottrill	17. 8.87
1987/37	Range charts of Bass Basin palynomorphs.	R. P. Morgan	17. 8.87
1987/38	Completion report: Sub-basalt Drilling Project Hole 1.	P. W. Baillie	19. 8.87
1987/39	Interpretation of a gravity survey in Smithton area, north-western Tasmania.	R. G. Richardson	26. 8.87
1987/40	Completion report: Sub-basalt Drilling Project Hole 2.	P. W. Baillie	15. 9.87
1987/41	Spear bore installation at the South Arm School.	W. L. Matthews	16. 9.87
1987/42	Groundwater prospects at the Stanley Golf Club.	W. L. Matthews	17. 9.87
1987/43	Examination of Pleasant Hills Subdivision Phase II.	B. D. Weldon	24. 9.87
1987/44	Progress report on the Sub-basalt Drilling Project.	P. W. Baillie	29. 9.87
1987/45	Operations report-1986/87 Mt Read gravity survey.	R. G. Richardson	30. 9.87
1987/46	Mineralogy of heavy-mineral rich sands, Naracoopa.	R. S. Bottrill	8.10.87
1987/47	Stability assessment of a proposed subdivision at Orana Place, Riverside.	D. J. Sloane	14.10.87
1987/49	Heavy mineral concentrates from Safety Cove.	R. S. Bottrill	27.10.87
1987/50	Pump testing a water bore in Triassic rocks at Cambridge.	W. L. Matthews	27.10.87
1987/51	SLIPCIRC—a GW-BASIC program for Bishop's simplified slip circle stability analysis on an IBM compatible micro-computer.	B. D. Weldon	27.10.87

Table 4

LIST OF UNPUBLISHED REPORTS 1987-88

<i>No.</i>	<i>Title</i>	<i>Author</i>	<i>Date</i>
1987/52	Mineralogy of lead shot, Taroona Shot Tower.	R. S. Bottrill	28.10.87
1987/53	An experimental seismic reflection survey on Bruny Island.	R. G. Richardson	28.10.87
1987/54	Diamond and churn drilling in the Dans Rivulet valley. . .	V. M. Threader	29.10.87
1987/55	Pump tests on water bores at Cygnet.	W. L. Matthews	9.11.87
1987/56	The potential effect of forestry operations on slope stability and springs in the Mt Clark-Mt Koonya area.	D. J. Sloane	12.11.87
1987/57	Determination of concentration, and evaluation of, airborne dust: Analysis of quartz by X-ray diffraction. . .	R. S. Bottrill	18.11.87
1987/58	Slope stability in an area of the Douglas-Apsley State Forest.	D. J. Sloane	18.11.87
1987/59	Palynology of an outcrop sample from the Lower Pieman Dam Road, western Tasmania.	R. P. Morgan	18.11.87
1987/60	Geology in relation to forest practices.	D. J. Sloane B. D. Weldon	18.11.87
1987/61	Completion report: Sub-basalt Drilling Project Hole 4. . . .	P. W. Baillie	23.11.87
1987/62	Density and susceptibility of some rock samples from the Cape Sorell and Rocky Cape areas.	R. G. Richardson	24.11.87
1987/63	A proposed drill hole at Miners Ridge, near Queenstown. . .	J. L. Everard	2.12.87
1987/64	A dolomite quarry near Smithton.	C. A. Bacon D. J. Jennings	1.12.87
1987/65	Gravel on King Island.	C. A. Bacon	14. 3.88
1987/66	CARS—A computer assisted records system (Revision 5). . .	R. G. Richardson	22.12.87
1988/01	Review of structural implications of geophysical data, Sorell Peninsula, western Tasmania.	D. E. Leaman	15. 1.88
1988/02	Review of stratigraphic-structural implications of geophysical data, Lynchford area, western Tasmania. . .	D. E. Leaman	18. 1.88
1988/04	Heavy mineral concentrates from Safety Cove (Revision 1).	R. S. Bottrill	10. 2.88
1988/05	Palynology of Tertiary sediments from Windermere Drill Holes 1 and 3.	P. M. Wells	19. 2.88
1988/06	Completion report: Sub-basalt Drilling Project Hole 6. . . .	P. W. Baillie G. R. Green	8. 3.88
1988/07	Completion report: Sub-basalt Drilling Project Hole 9. . . .	P. W. Baillie G. R. Green	8. 3.88
1988/08	Tasmania gravity interpretation: Revised mantle model. . .	D. E. Leaman	30. 3.88
1988/09	Evaluation of a proposed quarry extension at East Ridgely.	B. D. Weldon	11. 4.88
1988/10	Significant structural relationships between some rock units associated with the Mt Read volcanic belt.	E. Williams	12. 5.88
1988/11	Operations report—1987/88 helicopter gravity survey. . . .	R. G. Richardson	18. 5.88
1988/13	TASROK—a computer-based catalogue for Tasmanian rocks (Revision 1)	R. G. Richardson	19. 5.88
1988/14	CORLIB—a core data index (Revision 1).	R. G. Richardson	22. 6.88
1988/15	DORIS—a drill log record information system (Revision 2).	R. G. Richardson	22. 6.88
1988/16	Hardcopy plotting on the Geological Survey mini-computer (Revision 4).	R. G. Richardson	15. 6.88
1988/17	Field manual for the operation of the density/caliper tool.	R. J. Sedgman	20. 6.88
1988/18	Field manual for the operation of the neutron tool.	R. J. Sedgman	20. 6.88
1988/19	Examination of Pleasant Hills Subdivision Stage III.	B. D. Weldon	23. 6.88

CHEMICAL AND METALLURGICAL DIVISION

A high level of activity in both branches of the Division has been maintained over the past year, although a decline of 10% in the total number of determinations was experienced.

The decline can be attributed to:

- A lessening of exploration activity by some of the smaller companies as a result of the October 1987 stock market adjustment. Some programmes already commenced and others planned were either suspended or cancelled. Several hundred samples remain on the laboratory site in a suspended situation awaiting instruction to proceed.
- A reduction in intake of samples for rock analyses from the Geological Survey Division. This has resulted in a significant drop in the number of determinations by X-ray fluorescence spectrometry.

This reduction was also compounded by the fact that the spectrometer has been plagued by intermittent technical problems which have proved very difficult to isolate by our consultants and ourselves. This has affected output, and a backlog of determinations has carried over to next year.

The problems have been resolved and the instrument is now capable of full production. A total of 47 individual companies used the laboratory services during the year.

A significant volume of work was carried out for the Geological Survey, Mines Inspection, and Resource Development Divisions. In addition to this, other Government agencies and Local Government authorities have made use of the services available, and a large number of various and diverse determinations, identifications and examinations were carried out for the general public.

Issues of Miners Rights and Prospectors Licences continued to be a significant part of business conducted from this office. Frequent enquiries regarding mining lease areas and Tamar Valley landslip zones have also been dealt with.

Metallurgical operations have increased markedly. A feature of the year's work has been the remarkable increase in the number of metallurgical tests undertaken, particularly in the early part of the year. The increase amounted to 283%, and relates to a

trend of submitting very large exploration samples. Such samples require the use of metallurgical equipment for concentration of elements of interest prior to assay, whereby determination limits can be as low as a few parts per billion.

A large number of exploration samples requiring heavy liquid separation were processed.

The number of samples registered in 1987-88 was 4437, a decrease of 23%. There was a significant drop in the number of mill survey samples from Tasmania Mines.

The total number of determinations made, including metallurgical tests, was 28,075 a decrease of 9.8% over the previous year. The drop in the number of determinations is accounted for by a 40% reduction in XRF output for reasons outlined previously. The drop in chemical section output has been offset by a large increase in the number of metallurgical tests done.

Gold assay numbers have remained relatively stable (1105/1011), although the signs are that these will increase dramatically in the coming year.

There has been a significant increase in platinum assays done (173/15), reflecting involvement in a research project for recovery of this metal.

Tungsten assays show a decrease of about 30%, reflecting a decrease in sample numbers from the Kara scheelite plant. We continue to monitor mill performance by way of daily and weekly samples but no full scale mill survey work has been done.

Environmental and bore water analyses continue to be a major part of our work. There was an increase of 11% in the number of waters received for analysis compared with the preceding year.

Laboratory revenue from outside sources was \$76,445 a decrease of 4% over the previous year.

Income from the Miscellaneous Account amounted to \$18,670. This account comprises income from sales of Prospectors Licences, Miners Rights, Geological Survey maps, explanatory notes, magazine fees, renewal of licences etc. Miscellaneous

Account revenue has not been previously included in this report.

The value of work performed for other Divisions of the Department, Local Government and other Government agencies was \$35,812. Value of this work last year was an estimated \$70,000.

This difference is attributable to:

- Receipt of 80 less samples for rock analysis from the Geological Survey Division.
- Restricted output from the XRF spectrometer. The value of this work will carry through to the coming year.

Senior Chemist John Furst retired during the year. One of our analytical chemists, Richard Roby, has been appointed to take his place.

Two new laboratory assistants were engaged during the year. They have accepted training in the various tasks required and now fulfil a major role in the sample preparation area, which was previously often strained beyond capacity.

Certainly the most significant feature of the year reviewed was the decision by the Government to make funds available for the modernisation of the laboratory. Structural work commenced in December and by June the modernisation was virtually complete.

The improvements comprise:

- Redesign of the sample handling, and crushing and grinding (sample preparation) section.
- Modification of the old ceramic test area to provide a specialised water laboratory.
- Isolation of the fire assaying area from the crushing and grinding sections.
- Improved dust and fume elimination ducting systems.
- Purchase of a new furnace to expand fire assaying facilities.
- Additional Atomic Absorption Spectrophotometer capacity.

This has provided a much better working environment for our staff and, very importantly, makes the laboratory more efficient and able to provide a better service for mineral explorers. We are now able to undertake more work and offer shorter turn around times to our clients, whilst continuing to maintain our tradition for work of the highest quality.

Some interruption to production inevitably occurred in this transition period. Our staff is to be congratulated on their patience, and



A new furnace has been installed in the fire assaying section. Laboratory Assistant Michael Spratt checks the pots in the furnace prior to pouring into moulds, for eventual separation of precious metals.



Laboratory Assistant Trevor Philpott splits a sample in the sample preparation area. Improvements to the Launceston Laboratory included a redesign of this area.

their assistance and co-operation with the various contractors engaged in the work.

An active policy of maintaining contact with the mining industry and industry in general is being pursued to make better known the range and quality of service available.

In conclusion it can be fairly stated that little ground has been lost since the giant leap forward achieved in 1986-87, and the laboratory is poised for a period of unprecedented activity in the coming years.

Following are the classification of type of sample received, analytical methods used, and types and numbers of test undertaken.

TYPE OF SAMPLE RECEIVED

Type	Number	
	1987-88	1986-87
Water	1732	1566
Industrial Liquor	52	47
Metal or alloy	10	27
Metallurgical product	1825	2593
Rock or mineral	1334	1278
Miscellaneous		237
Total	4953	5748

Note: The format of reporting in this table has been changed from previous years. It now shows total samples received in the chemical laboratory, including those of internal origin. It does not relate to numbers in the sample register.

The miscellaneous category has been deleted, as samples generally fit into the categories named.

TYPE OF ANALYTICAL METHOD USED

Type	1987-88	1986-87
Atomic absorption (AAS)	6 769	6 176
X-ray fluorescence (XRF)	10 788	16 271
Fire assay	793	658
Miscellaneous	7 285	7 403
Total	25 635	30 508

TYPE AND NUMBER OF TESTS

Type	1987-88	1986-87
Quantitative	25 593	30 498
Qualitative	42	10
Metallurgical	2440	637
Total	28 075	31 145

Note: This table has been abbreviated over those shown in the past. Determinations of elements, radicals etc. are shown in the statistical tables.

RESEARCH INVESTIGATIONS (PUBLISHED OR IN PROGRESS)

Type	Number
Gold	2
Gold/platinum	1
Platinum	1
Tin	1
Tungsten	2
Lead/bismuth-assay methods	1
Wollastonite	1
Chromite/foundry sand	1
Laboratory manual (NATA)	1
Total	11



Chemist John Lethborg analysing water samples in the new water laboratory at Launceston.

SUMMARY OF INVESTIGATIONS

GOLD

R876—Director of Mines, Hellyer sulphide tailings

Work on this project is proceeding intermittently. Sizing analyses show no particular gold concentration in any fraction. Cyanidation of raw sulphide and roasted sulphides has not shown any significant gold recovery. Further tests are planned for next year as time becomes available.

R884—Lefroy tailing dumps: BVP Mining

An investigation covering flotation testing, cyanidation of products, and determination of nature of gold mineralisation. The project was abandoned as the sample proved to have negligible gold and sulphur contents.

GOLD/PLATINUM

R885—Cann Creek and Arthur River magnesite: Mineral Holdings

Traces of platinum and gold have been recorded in the material. A laboratory investigation was undertaken to confirm these reported results. It was proved that minute but measurable quantities of gold and platinum were present, and some concentration was achieved. Methods used

were froth flotation, gravity concentration, and magnetic separation.

PLATINUM

R891—Kaas Prospect, Orange N.S.W.: Lachlan Resources N.S.W.

N. Moony, consultant for the company, is undertaking test work on platinum recovery with assistance from laboratory staff. A large number of platinum assays have been generated by the work.

TIN

R888—Anchor mine, Blue Tier: Spectrum Resources N.Z.

Test work and feasibility studies were done on samples from this prospect. Studies involved recovery of tin, silver and base metal sulphides. High recovery of tin was obtained. The company is going ahead with a commercial operation. It is planned that we should monitor the plant when it comes into operation.

CHROMITE/FOUNDRY SAND

R892—Timron Mining: Corinna chromite

A chromite concentrate was produced and assessed as being a suitable foundry sand material. Johns Perry Castings require a

large amount of concentrate for trials in their foundry. Chromite sand is currently imported from South Africa. It is hoped that a Tasmanian product will be able to replace this import to Tasmania.

WOLLASTONITE

R886-Tasmania Mines

A quantity of high grade wollastonite concentrate was produced by grinding, froth flotation and magnetic separation from samples from the deposit on the Company's lease area. Market evaluation of the concentrate is being undertaken by the company.

TUNGSTEN

R870-Tasmania Mines, consultancy

This project entails our ongoing involvement with the metallurgical operations of this company at the Kara Mill.

R889-Tasmania Mines, sulphide removal from concentrate

Laboratory investigations have shown that it is possible to reduce lead, copper, bismuth

and sulphur from scheelite concentrates by grinding and froth flotation. Work is continuing and a successful outcome is envisaged. Scheelite with a very low content of the above elements can apparently command a ready sale and premium price in Japan.

LEAD/BISMUTH

R890-Director of Mines. Assaying methods—determination on scheelite concentrate

An 'in-house' investigation of various assay methods for the above was undertaken, stemming from differences between our results and those from another laboratory. An exhaustive programme of tests of methods and standards proved that our results were correct, as were the methods chosen here to produce the original results.

LABORATORY MANUAL

R887-Chief Chemist and Metallurgist/NATA

A condition of our NATA registration is the preparation of a laboratory methods manual. This is in progress.

STATISTICAL TABLES

Table 5

EMPLOYMENT AND ACCIDENT STATISTICS 1987-88
(IN ACCORDANCE WITH AUSTRALIAN STANDARD AS1885)

<i>Employer</i>	<i>Man Hours Exposure</i>	<i>No. of Injuries</i>	<i>Freq. Rate</i>	<i>Days Lost</i>	<i>Incidence Rate (%)</i>	<i>Mean Duration</i>	<i>No. of Empl.</i>
Aberfoyle—Hellyer	374 201	35	94	415	21	11.9	166
APPM Tonganah	34 827	2	57	4	8	2.0	24
Beaconsfield	29 200	7	240	57	47	8.1	15
EZ Rosebery	1 048 358	244	233	4206	43	17.2	571
Golconda	32 825	2	61	24	12	11.8	17
King Island Scheelite ..	162 875	3	18	23	3	7.7	92
Mount Lyell	1 105 426	143	129	1474	26	10.3	543
Que River	194 558	19	98	535	16	28.2	122
Renison	874 508	210	240	3123	43	14.9	486
Savage River	901 769	89	99	789	20	8.9	438
Tasmania Mines	48 440	1	21	6	5	6.0	20
All Mines	4 806 987	755	157	10 656	30	14.1	2494
Comalco	1 946 521	72	37	945	37	13.1	1021
EZ Risdon	2 662 784	330	124	3584	22	10.9	1494
Goliath Cement	419 605	27	64	471	12	17.4	228
Mole Creek	37 710	2	53	179	10	89.5	20
Pioneer Silicon	137 167	19	139	205	30	10.8	64
Port Latta	334 057	14	42	200	8	14.3	177
Temco	877 739	78	89	755	17	9.7	451
Tioxide Aust.	906 249	19	21	114	4	6.0	483
Ceramics	155 804	26	167	246	35	9.5	75
All Works	7 477 636	587	79	6699	15	11.4	4013
Collieries	236 502	45	190	749	32	16.6	139
Quarries	174 756	4	23	178	4	44.5	94
TOTALS	12 695 881	1391	110	18 282	21	13.1	6740

DEFINITIONS

FREQUENCY RATE

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

Lost time injury frequency rate = Number of lost-time injuries × 1 000 000/Manhours exposure

INCIDENT RATE

This is the number of lost-time injuries per employee during the year, as follows:

Lost-time injury incidence rate = Number of lost-time injuries × 100/Number of employees

MEAN DURATION

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

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

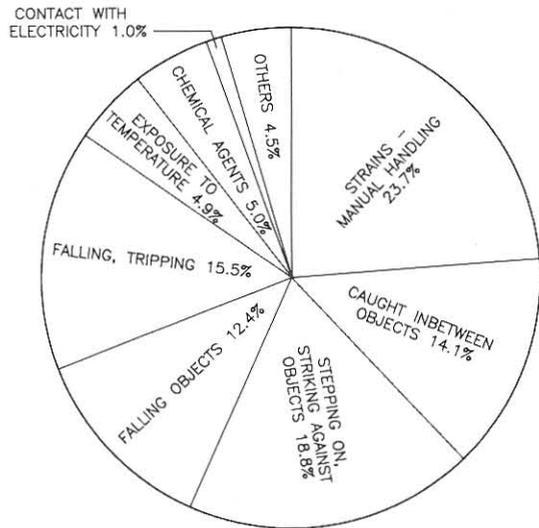
Accidents of 1-3 working days lost time = 39% of accidents

Accidents of 4-10 working days lost time = 35% of accidents

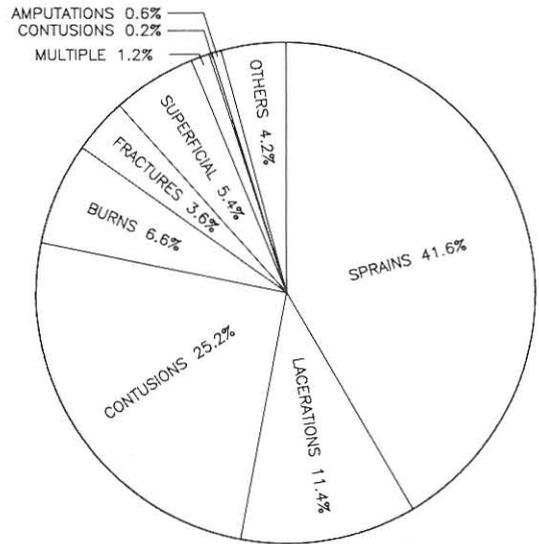
Accidents of over 10 working days lost time = 26% of accidents

MINE INJURY CLASSIFICATION, 1987-88

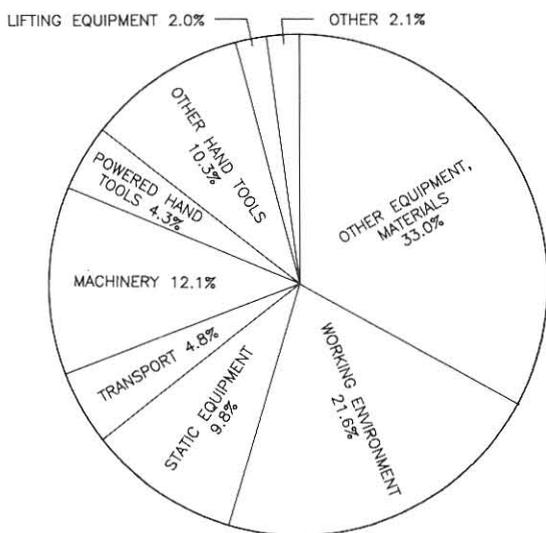
(Australian Standard AS1885)



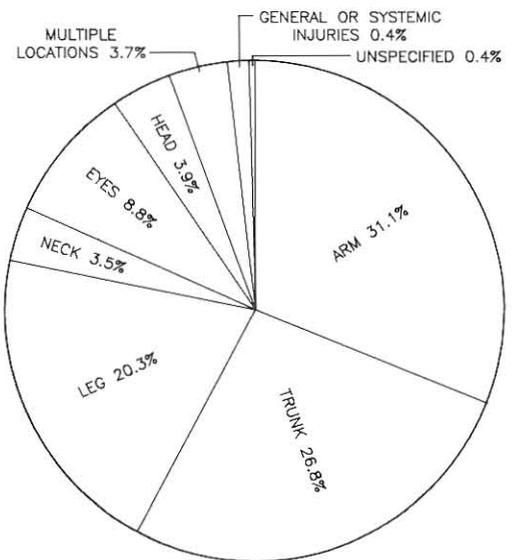
Type of Accident



Nature of Injury



Agency



Part of Body Injured

5 cm

Table 6**CERTIFICATES OF COMPETENCY**

The following Certificates of Competency were issued by the Board of Examiners in accordance with the Mines Inspection Act 1968:

MINE MANAGERS CERTIFICATES

<i>Certificate Number</i>	<i>Name</i>	<i>Date</i>	<i>Mine</i>
<i>Metalliferous</i>			
309/87	Anthony Robert Thomas	10.7.87	E.Z. Rosebery
310/87	Paul John Edward Harper	10.8.87	Renison
311/88	Duncan James Barrell	4.2.88	Que River
312/88	Patrick Henry McMullen	3.5.88	Mt Lyell
313/88	Matthew Damian Gill	16.5.88	Mt Lyell
<i>Restricted</i>			
R7-87	Francis William Lannen	10. 8.87	Hellyer
R8-88	Frederick Staples	23. 3.88	Renison
R9-88	Richard James Wright	10. 5.88	Mt Lyell

Unrestricted certificates were issued following written examinations in legal knowledge and examination *viva voce*.

In addition 51 crane drivers' and one winder driver's Certificates of Competency were issued.

Table 7
MINERAL PRODUCTION FOR THE YEAR 1987-1988 FROM TASMANIAN SOURCES

	<i>Golconda</i>	<i>Cornwall Coal Co.</i>	<i>E. Z. of Aust.(1)</i>	<i>King Is. Scheelite</i>	<i>Mt Lyell</i>	<i>Hellyer</i>	<i>Renison Ltd</i>	<i>Savage Riv. Mines</i>	<i>Pioneer Silicon Ind.</i>	<i>Tasmania Mines</i>	<i>Small Producers</i>
Cadmium (tonnes)	138	...	...	...	...	...	...	...	...
Cobalt oxide (tonnes)	3.6	...	...	...	...	...	...	...	...
Copper (tonnes)	3 744	...	21 638	254	...	...	...	...	...
Gold (kg)	81	...	1 661	...	512	...	...	...	...	...	6
Iron ore pellets (tonnes)	2 260 068	...	...	...
Lead (tonnes)	35 424	...	...	6 843	...	...	...	...	...
Manganese dioxide . . . (tonnes)	120	...	...	...	...	...	...	...	...
Molybdenum (tonnes)	10	...	...	...	...	...	...	...
Silicon (tonnes)	7 528	...	...	...
Silver (kg)	101 650	...	2 761	16 312	...	...	...	...	...
Sulphuric acid . . (mono tonnes)	86 821	...	...	...	...	...	...	...	...
Tin (tonnes)	6 222	...	...	...	4
Tungsten (tonnes)	1 126	...	...	...	...	...	352	...
Zinc (tonnes)	86 722	...	...	14 504	...	...	...	...	...
Coal (tonnes)	...	608 700	...	...	...	...	...	...	...	...	...
Peat (m ³)	5 979

(1) Includes production from Que River Mines

Table 8

VALUE OF THE MINERAL INDUSTRY

Year ended Commodity	Unit	30 June 1987 Total Quantity (1)	30 June 1988 Total Quantity
METALLIC MINERALS			
Cadmium	(tonne)	161	138
Cobalt oxide	(tonne)	11	3.6
Copper	(tonne)	25 112	25 636
Crocoite	(specimens only)	-	-
Gold	(kilogram)	2 079	2 260
Iron ore pellets	(tonne)	1 840 200	2 260 068
Iron oxide	(tonne)	-	27 985
Lead	(tonne)	19 306	42 267
Manganese dioxide	(tonne)	116	120
Molybdenum	(tonne)	18	10
Silica for silicon alloy	(tonne)	26 969	78 824
Silicon	(tonne)	-	7 528
Silver	(kilogram)	83 109	120 723
Sulphuric acid	(mono tonne)	67 113	86 821
Tin	(tonne)	6 864	6 226
Tungsten as tungstic oxide	(tonne)	1 190	1 478
Zinc	(tonne)	68 077	101 226
Value of metallic minerals		\$347 945 871	\$460 446 752
NON-METALLIC AND FUEL MINERALS			
Clay-			
Brick	(tonne)	119 160	37 022
Other	(tonne)	32 539	53 184
Dolomite	(tonne)	11 464	11 714
Kaolin	(tonne)	29 387	7 643
Limestone-			
Agricultural	(tonne)	65 964	55 282
Cement	(tonne)	539 146	593 204
Chemical and metallurgical	(tonne)	118 978	102 404
Other	(tonne)	22 178	39 886
Pebbles	(tonne)	1 160	Nil
Coal	(tonne)	622 635	608 700
Peat	(m ³)	-	5 979
Value of non-metallic and fuel minerals		\$25 105 544	\$26 874 142
CONSTRUCTION MATERIALS			
Building stone-			
Freestone	(tonne)	1 130	226
Granite	(tonne)	455	925
Other	(tonne)	8 760	2 083
Crushed and broken stone-			
Basalt	(tonne)	658 270	807 674
Dolerite	(tonne)	819 280	575 922
Limestone	(tonne)	15 834	15 856
Sandstone	(tonne)	63 672	174
Other	(tonne)	119 903	71 144
Gravel	(tonne)	637 330	167 623
Sand	(tonne)	341 551	433 091
Other road materials	(tonne)	44 138	509 106
Value of construction materials		\$18 083 603	\$17 526 959
TOTAL VALUE WITH AUSTRALIAN METAL PRICES			
		\$391 135 018	\$504 867 853
METALLURGICAL PRODUCTION FROM OTHER THAN TASMANIAN ORES			
Aluminium)		
Aluminium sulphate)		
Cadmium)		
Cobalt oxide)		
Ferro-manganese)		
Ferro-silicon .....	)	\$575 319 542	\$655 130 838
Silico-manganese)		
Sinter)		
Superphosphate)		
Titanium dioxide)		
Zinc)		
VALUE OF MINING AND METALLURGICAL PRODUCTION		\$966 454 560	\$1 159 998 691
REPORTED AVERAGE NUMBER OF EMPLOYEES (2) ..		6 915	6 689

(1) Figures adjusted during 1987-88 year (2) Not all operators report full details

Table 9

MINERAL PRODUCTION FROM TASMANIAN SOURCES SINCE 1880
 QUANTITY OF PRODUCTION AS AT 30 JUNE 1988

<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)	138	4 302
Chromite	(tonne)	-	2 687
Cobalt oxide	(tonne)	3.6	162.7
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)	25 636	983 030
Crocoite	(specimens only)	-	-
Gold	(kilogram)	2 260	116 797
Ilmenite	(tonne)	-	558
Iron ore pellets	(tonne)	2 260 068	42 899 687
Iron oxide (including hematite, limonite and magnetite) ..	(tonne)	27 985	374 211
Lead (from 1919)	(tonne)	42 267	762 430
Manganese	(tonne)	-	1
Manganese dioxide (from 1957)	(tonne)	120	13 386
Mercury	(kilogram)	-	7 697
Molybdenum	(tonne)	10	136
Monazite	(tonne)	-	34
Nickel	(tonne)	-	237
Osmiridium	(kilogram)	-	881
Pyrite (to 1971)	(tonne)	-	2 124 070
Pyrite (from 1972)	(tonne)	64 453	1 524 975
Rutile	(tonne)	-	1
Rutile (concentrates)	(tonne)	-	40 027
Scheelite (concentrates)	(tonne)	-	57 261
Silica for silicon alloy production	(tonne)	78 824	555 008
Silicon	(tonne)	7 528	7 528
Silver-lead ore to 1918 (now shown under Silver and Lead)	(tonne)	-	1 101 295
Silver (from 1919)	(kilogram)	120 723	2 866 823
Sulphuric acid	(monotonne)	86 821	5 015 851
Tin	(tonne)	6 226	275 091
Tungsten (as tungstic oxide)	(tonne)	1 478	30 679
Zinc	(tonne)	101 226	2 071 348
Zinc sulphate (from 1957)	(tonne)	1 055	4 306
Zircon (concentrates)	(tonne)	-	39 001
NON-METALLIC MINERALS			
Asbestos	(tonne)	-	4 044
Barite	(tonne)	-	2 240
Clay (from 1958)	(tonne)	90 206	3 902 788
Dolomite	(tonne)	11 714	236 269
Graphite	(tonne)	-	41
Kaolin	(tonne)	7 643	338 042
Limestone-			
Agricultural and other	(tonne)	55 282	2 032 045
Carbide	(tonne)	-	1 081 509
Cement	(tonne)	593 204	15 645 254
Chemical and metallurgical	(tonne)	102 404	5 935 728
Ochre	(tonne)	-	2 949
Pebbles (from 1957)	(tonne)	-	31 757
Sand (moulding)	(tonne)	-	864
Silica	(tonne)	164 643	701 168
Talc	(tonne)	-	338

Table 9

MINERAL PRODUCTION FROM TASMANIAN SOURCES SINCE 1880
QUANTITY OF PRODUCTION AS AT 30 JUNE 1988 (continued)

<i>Commodity</i>	<i>Unit</i>	<i>Quantity in Current Year</i>	<i>Total Quantity</i>
FUEL MINERALS			
Coal	(tonne)	608 700	15 568 478
Shale	(tonne)	-	42 239
Peat	(m ³)	5 979	19 355
CONSTRUCTION MATERIALS			
Building stone-			
Freestone	(tonne)	226	28 783
Granite	(tonne)	925	131 673
Other stone	(tonne)	2 083	37 151
Crushed and broken stone (from 1958)-			
Basalt	(tonne)	807 674	13 665 135
Dolerite	(tonne)	575 922	25 451 704
Limestone	(tonne)	15 856	885 675
Sandstone	(tonne)	174	271 191
Other	(tonne)	71 144	10 494 219
Gravel (from 1958)	(tonne)	167 623	47 999 973
Sand (from 1958)	(tonne)	433 091	7 139 930
Other road-making material	(tonne)	509 106	7 369 969

Table 10

IMPORTED ORES

<i>Company</i>	<i>Product (tonnes)</i>				
	<i>Alumina</i>	<i>Lead-zinc concentrate</i>	<i>Ilmenite</i>	<i>Manganese ore</i>	<i>Phosphate rock</i>
Comalco (Bell Bay)	232 389	...	...	...	...
E.Z. Company .....	...	309 433	...	...	26 255
Tioxide Australia .....	...	...	72 220	...	...
TEMCO .....	...	...	...	320 508	...

Table 11

NUMBER AND AREA OF LEASES AND LICENCES APPLIED FOR
DURING THE YEAR TO 30 JUNE 1988

<i>Leases and Licences</i>	<i>Number</i>	<i>Area (ha)</i>	<i>Sluicheads</i>
Coal and peat	5	827	-
Gold	18	1 204	-
Minerals	40	3 092	-
Sand and gravel	44	1 678	-
Stone	41	1 253	-
Tin	1	50	-
Easements	5	44	-
Water	2	-	3
	156	8 148	3

Table 12

NUMBER AND AREA OF NEW LEASES AND LICENCES ISSUED
DURING THE YEAR TO 30 JUNE 1988

<i>Leases and Licences</i>	<i>Number</i>	<i>Area (ha)</i>	<i>Sluicheads</i>
Coal and peat	1	29	-
Gold	6	641	-
Minerals	11	2 297	-
Sand and gravel.....	22	713	-
Stone	22	270	-
Tin	-	-	-
Easements	1	1	-
Water	-	-	-
	63	3 951	-

Table 13

TOTAL NUMBER OF LEASES AND LICENCES IN FORCE ON 30
JUNE 1988

<i>Leases and Licences</i>	<i>Number</i>	<i>Area (ha)</i>	<i>Sluicheads</i>
Bauxite	5	183	-
Clay	17	340	-
Coal	11	5 724	-
Copper	6	1 294	-
Crocoite.....	1	4	-
Dolomite.....	4	126	-
Gemstones	4	67	-
Gold	82	4 817	-
Granite	4	12	-
Iron ore	12	3 528	-
Kaolin.....	1	340	-
Limestone	10	1 243	-
Marble	1	8	-
Minerals	44	8 337	-
Osmiridium	1	20	-
Peat	2	172	-
Sand and gravel	182	9 384	-
Silica	13	827	-
Slate	1	84	-
Stone	202	9 357	-
Silver, lead and zinc	16	895	-
Tin	284	13 895	-
Wolfram and tin	7	144	-
Water	73	-	649
Easements	85	1 697	-
	1 068	62 498	649

Table 14TOTAL NUMBER OF ALL TYPES OF PROSPECTING RIGHTS HELD
AS AT 30 JUNE 1988

<i>Mining Tenement</i>	<i>Number</i>	<i>Area</i>
Exploration Licences.....	146	17 497 km ²
Retention Licences	13	160 km ²
Prospectors Licences	38	811 ha
Miners Rights	26	6.5 ha
Owners Rights	3	190 ha
Permits to explore for Petroleum under Petroleum Act 1967	4	272 blocks

Table 15LICENCES, PERMITS AND APPROVALS ISSUED FOR THE IMPORT,
MANUFACTURE, STORAGE, USE AND SALE OF DANGEROUS
GOODS

Licences to keep flammable liquids and dangerous goods	2 473
Licences to sell explosives and safety cartridges	169
Private magazine licences	101
Import explosives licences	31
Convey explosives licences	18
Manufacture explosives licences	1
To sell fireworks licences	308
Applications for shotfirers permits	72
Applications for plan approvals	363
Landing permits	69
Manufacture dangerous goods licences	7
Import of other dangerous goods licences	17
Gas suppliers licences	2
Exemptions	-

Table 16

IMPORTS OF FLAMMABLE LIQUIDS

<i>Product (tonnes)</i>	<i>Bell Bay</i>	<i>Burnie</i>	<i>Devonport</i>	<i>Hobart</i>	<i>Total</i>
Aviation gasoline	-	-	-	4 740	4 740
LP gas	5 160	-	13 911	7 582	26 653
Unleaded petrol	7 049	9 352	11 974	17 872	46 247
Super petrol	36 323	21 853	76 301	144 952	279 429
Kerosene-					
Aviation-Jet	10 642	-	-	15 612	26 254
Lighting and power	4 000	-	-	-	4 000
Bitumen feed stock	-	-	-	25 390	25 390
AGO and distillate	44 088	27 430	60 445	73 521	205 484
Heating and fuel oil	13 507	12 700	20 541	7 836	54 584
Total (tonnes) per port	120 769	71 335	183 172	297 505	672 781
Number of tankerships	24	9	32	30	95

Table 17

IMPORTS OF EXPLOSIVES AND EXPLOSIVE-GRADE AMMONIUM NITRATE

Product	Hobart	Burnie	Currie	Queenstown	Smithton	Total
Ammonium nitrate (tonnes)	-	4 505	-	-	-	4 505
<i>Cartons</i>						
Explosives Class 1.1D -	-	45 271	119	14	14	45 418
Detonating fuse Class 1.1D -	-	1 427	4	-	-	1 431
Detonators Class 1.1B	-	3 775	68	-	-	3 843
Total (cartons)	-	50 473	191	14	14	50 692
Propellants 1.1C (kg)	-	-	-	-	-	-
Propellants 1.3C (kg)	33	-	-	-	-	33
Number of shipments	2	43	10	1	1	57

No explosives were imported through Wynyard or Devonport. A total of 4 293 cartons of fireworks of Class 1.3G, 1.4G and 1.4S were imported through the ports of Hobart, Burnie and Bell Bay in twelve separate shipments.

NB: No imports into Devonport or Wynyard in 1987-88.

Table 18

ACTS ADMINISTERED BY DEPARTMENT OF MINES

Aid to Mining Act 1927
 Coastal and Other Waters (Application of State Laws) Act 1982
 Dangerous Goods Act 1976
 Department of Mines (Investigations) Act 1972
 Director of Mines Act 1951
 Gas Franchises Act 1973
 Groundwater Act 1985
 Iron Ore (Savage River) Agreement Act 1965
 Mineral Resources Act 1951
 Mines Inspection 1968
 Mining Acts 1929 and 1958
 Mount Cameron Water-Race Act 1926
 Mount Read and Rosebery Mines Limited Leases Act 1916
 Petroleum (Submerged Lands) Acts 1967, 1982

Table 19

STAFF ESTABLISHMENT AS AT 30 JUNE 1988

Administration	27
Mines Inspection	21
Dangerous Goods	9
Geological Survey	47
Chemical & Metallurgical	12
R.D. and P.P.	10
Others	11
Total	138

Table 20

DRILLING DETAILS 1987-88

<i>Location</i>	<i>Purpose</i>	<i>Drill</i>	<i>No. of Holes</i>	<i>Total depth (m)</i>
DIAMOND/AUGER DRILLING				
Hobart	Site investigation	Gemco A	2	10.8
Ross	Stratigraphic investigation	Gemco A	2	17
Prospect Vale	Road foundations	Gemco A	3	29.4
Pateena Road, Prospect	Road foundations	Gemco A	10	104.7
Mornington	Road foundations	Gemco A	1	22
Corinna	Bridge foundations	Gemco 210D	3	113.4
Corinna	Silica flour investigation	Gemco 210D	1	47.9
Penguin-Howth	Road foundations	Gemco 210D	9	184.5
Scamander	Bridge foundations	Gemco 210D	11	128.5
Bathurst Street, Hobart	Site investigation	Gemco 210D	5	51.2
Kingston	Road foundations	Gemco 210D	3	21.6
Kings Meadows	Road foundations	Gemco 210D	3	35.5
Beaconsfield	Landslip investigation	Gemco 210D	1	114.7
TSIT	Site investigation	Gemco 210D	6	28.1
Claremont	Road foundations	Gemco 210D	8	86.1
Burnie	Road foundations	Gemco 210D	6	144.6
Hadspen	Road foundations	Gemco 210D	6	78.8
Taroona	Landslip investigation	Gemco 210D	1	24.7
Boyer	Site investigation	Gemco 210D	3	71.1
Bell Bay	Site investigation	Gemco 210D	10	52.9
Eaglehawk Neck	Landslip investigation	Gemco 210D	2	23.5
Mt Field	Road foundations	Gemco 210D	3	20.1
Runnymede	Road foundations	Gemco 210D	3	22.5
	Sub-total		102	1433.6
DIAMOND DRILLING				
Guildford	Sub-basalt investigation	Longyear 44 No. 1	1	359
Bonneys Plains	Stratigraphic investigation	Longyear 44 No. 1	1	692.9
Mt Knocklofty	Stratigraphic investigation	Longyear 44 No. 2	1	298
Guildford	Sub-basalt investigation	Longyear 44 No. 2	2	975
Ridgley	Quarry investigation	Longyear 44 No. 2	3	100.7
Melba Flats	Chromite/platinum invest.	Longyear 44 No. 2	2	295.5
Rosny Park	Demonstration	Warman 1000	1	5.9
Hobart Domain	Road foundations	Warman 1000	1	8
	Sub-total		12	2735
CHURN DRILLING				
Beaconsfield	Driving 15 inch casing	Keystone No. 1	1	98.5
Risdon	Waterbore, casing installation	Keystone No. 1	26	277.1
Seven Mile Beach	Groundwater survey	Keystone No. 1	1	10
	Sub-total		28	385.6

Table 20

DRILLING DETAILS 1987-88—continued

<i>Location</i>	<i>Purpose</i>	<i>Drill</i>	<i>No. of Holes</i>	<i>Total depth (m)</i>
ROTARY/DOWN HOLE HAMMER DRILLING				
Melrose	Groundwater survey	Mayhew 1000	1	63
Staverton	Groundwater survey	Mayhew 1000	3	93
Gowrie Park	Groundwater survey	Mayhew 1000	2	68.5
Paradise	Groundwater survey	Mayhew 1000	1	16.5
Sheffield	Groundwater survey	Mayhew 1000	1	33
Erriba	Groundwater survey	Mayhew 1000	4	268
Wilmot	Groundwater survey	Mayhew 1000	3	155
Mowbray	Site investigation	Mayhew 1000	1	6
Tea Tree	Waterbore	Warman 1000	2	66
Hopevale	Waterbore	Warman 1000	3	168
Cambridge	Waterbore	Warman 1000	4	222
Sorell	Waterbore	Warman 1000	8	228
Primrose Sands	Fractured dolerite survey	Warman 1000	1	60
Kingston	Waterbore	Warman 1000	1	78
Howden	Waterbore	Warman 1000	1	72
Dulcot	Fractured dolerite survey	Warman 1000	1	96
Sandfly	Fractured dolerite survey	Warman 1000	1	97
Cradoc	Fractured dolerite survey	Warman 1000	2	126
Cradoc	Waterbore	Warman 1000	1	107
Dodges Ferry	Waterbore	Warman 1000	26	1326
Orielton	Waterbore	Warman 1000	1	30
Orielton	Fractured dolerite survey	Warman 1000	1	30
Savage River	Ore reserve investigation	Warman 1000	34	807
Elliott	Waterbore	Warman 1000	1	60
Lewisham	Fractured dolerite survey	Warman 1000	1	80
Campania	Fractured dolerite survey	Warman 1000	2	158
Branxholm	Water bore/groundwater survey	Warman 1000	3	168
Legerwood	Water bore/groundwater survey	Warman 1000	3	175
	Sub-total		113	4 857
	Total		255	9 411.2

Table 21

**TYPE AND NUMBER OF TESTS,
CHEMICAL AND METALLURGICAL DIVISION**

I. QUANTITATIVE

A. Elements

Aluminium (Al)	176
Aluminium (Al ₂ O ₃)	302
Antimony	169
Arsenic	687
Barium	175
Bismuth	403
Cadmium	780
Calcium (Ca)	181
Calcium (CaO)	225
Carbon	140
Cerium	305
Chlorine	635
Chromium	296
Cobalt	274
Copper	1 070
Cyanide	22
Fluorine	720
Gallium	202
Gold	1 005
Indium	-
Iridium	22
Iron (Fe)	871
Iron (FeO)	169
Iron (Fe ₂ O ₃)	315
Lanthanum	292
Lead	1 491
Magnesium	482
Manganese (MnO)	213
Manganese (Mn)	667
Mercury	418
Molybdenum	230
Neodymium	292
Nickel	194
Niobium	163
Nitrogen (as Ammonium)	319
Phosphorous (P)	114
Phosphorous (P ₂ O ₅)	218
Platinum	173
Potassium (K)	168
Potassium (K ₂ O)	205
Rubidium	171
Scandium	158
Selenium	-
Silicon (SiO ₂)	242
Silver	252
Sodium (Na)	186
Sodium (Na ₂ O)	206
Strontium	160
Sulphur (S)	327
Sulphur (as Sulphide)	33
Sulphur (SO ₃)	99
Sulphur (SO ₄)	754
Tantalum	94
Thallium	8
Thorium	224
Tin	397
Titanium	221
Tungsten	1 376
Uranium	221
Vanadium	170
Yttrium	158
Zinc	1 094
Zirconium	163

21 497

Table 21

TYPE AND NUMBER OF TESTS, CHEMICAL AND METALLURGICAL DIVISION—continued

B. Miscellaneous—Waters			
Conductivity	470		
Dissolved solids	400		
Suspended solids	752		
Turbidity	315		
pH	876		
Acidity			
Alkalinity	172		
Permanent hardness	172		
Temporary hardness	172		
Dissolved oxygen	48		
Carbonate	191		
Bicarbonate	172		
Hydroxyl ion	8		
Silica	14		
Combined oxygen demand	21	<u>3 783</u>	
C. Industrial Liquors			
Acid acceptance	4		
Acid titration	4		
Cleaner concentration	4		
Deoxidiser	7		
Reaction products	4		
Carbonate	4		
Chloride	5		
Sulphate	7		
Aluminium	4		
Copper	4		
Zinc	4		
Cadmium	4		
Mercury	4		
Sulphuric Acid	16		
Free Cr ₂ O ₃	16		
Total Cr	13		
Free Cyanide	4		
Total Cyanide	8		
Sodium Hydroxide	8	<u>124</u>	
D. Other			
Combined water	124		
Fusion point	1		
Silt Density (Soil)	1		
Loss on Ignition	49		
Acid Insoluble	2		
Ash (Coal)	12	<u>189</u>	<u>25 593</u>
II. QUALITATIVE		<u>42</u>	<u>25 635</u>
III. METALLURGICAL			
Sizing	80		
Magnetic Separation	184		
Panning	30		
Cyanidation	8		
Screening	879		
Jigging	155		
Tabling	141		
Gold Smelting	7		
Specific Gravity	65		
Flotation	2		
Roasting	1		
Cycloning	31		
Spiral Concentration	67		
Heavy Liquid Separation	739		
Compositing	1		
Cyclosizing	21		
Viscosity	1		
Corduroy washing	26		
Settling tests	2	<u>2 440</u>	
Total			<u>28 075</u>

FINANCIAL STATEMENT

SUMMARY OF EXPENDITURE FOR THE YEAR ENDED 30 JUNE 1988

	1985-86	1986-87	1987-88
	\$'000	\$'000	\$'000
CONSOLIDATED FUND—			
DIVISION 41—			
RECURRENT SERVICES—			
AGENCY RESOURCE SUMMARY—			
<i>Administration—</i>			
Salaries and payments related to salaries	762	778	841
Administrative expenses	268	262	280
Other expenditure	-	-	-
	1 030	1 040	1 121
<i>Mines Inspection—</i>			
Salaries and payments related to salaries	718	676	695
Administrative expenses	137	169	174
Other expenditure	252	213	207
	1 107	1 058	1 076
<i>Geological Survey—</i>			
Salaries and payments related to salaries	1 483	1 496	1 366
Administrative expenses	291	328	374
Other expenditure	79	77	103
	1 853	1 901	1 843
<i>Chemistry and Metallurgy—</i>			
Salaries and payments related to salaries	387	343	372
Administrative expenses	42	48	34
Other expenditure	26	31	28
	455	422	434
<i>Resource Development, Planning and Policy—</i>			
Salaries and payments related to salaries	205	219	236
Administrative expenses	16	30	29
Other expenditure*	-	*344	*350
	221	593	615
<i>Petroleum Exploration—</i>			
Salaries and payments related to salaries	8	42	38
Administrative expenses	4	18	15
Other expenditure	-	-	-
	12	60	53
<i>Dangerous Goods Inspection—</i>			
Salaries and payments related to salaries	200	262	252
Administrative expenses	40	52	43
Other expenditure	-	-	-
	240	314	295
Total Consolidated Fund Expenditure	4 918	5 388	5 437
CONSOLIDATED FUND—			
WORKS AND SERVICES—			
<i>Agency Resource Summary—</i>			
Administration	-	17	1
Mines Inspection	32	129	93
Geological Survey	221	156	256
Chemistry and Metallurgical	47	33	114
Resource Development, Planning and Policy	-	-	9
Petroleum Resources	-	-	5
Dangerous Goods	-	-	13
Total Works and Services Expenditure	300	335	491
<i>Trust Fund—</i>			
In accordance with the provisions of the <i>Public Account Act</i>			
1957—			
<i>National Soil Conservation Programme—</i>			
Salaries and payments related to salaries	21	13	-
Other expenditure	4	1	-
	25	14	-

FINANCIAL STATEMENT

SUMMARY OF EXPENDITURE FOR THE YEAR ENDED 30 JUNE 1988—*continued*

	1985-86	1986-87	1987-88
	\$'000	\$'000	\$'000
<i>Deposit Account—</i>			
Deposits refunded	35	3	11
	<u>35</u>	<u>3</u>	<u>11</u>
<i>Community Employment Programme—</i>			
Salaries and payments related to salaries	27	-	-
	<u>27</u>	<u>-</u>	<u>-</u>
<i>Gordon River Power Development—Mt Read Volcanics—</i>			
Salaries and payments	227	314	356
Other expenditure	1 089	504	204
	<u>1 316</u>	<u>818</u>	<u>560</u>
<i>Mining Trust Fund—</i>			
Aid to Mining Loans	-	35	-
	<u>-</u>	<u>35</u>	<u>-</u>
<i>Mt Cameron Water Race Suspense Account—</i>			
Salaries and payments	-	-	-
Other Expenditure	-	-	-
	<u>-</u>	<u>-</u>	<u>-</u>
<i>Ringarooma and Cascade Water Suspense Account—</i>			
Interest on Loan	2	2	-
	<u>2</u>	<u>2</u>	<u>-</u>
<i>Forfeited Performance Deposits Account—</i>			
Restoration	2	-	3
	<u>2</u>	<u>-</u>	<u>3</u>
<i>Small Tin Miners Assistance Scheme—</i>			
Subsidy payments	-	6	4
	<u>-</u>	<u>6</u>	<u>4</u>
 TOTAL TRUST FUND EXPENDITURE	 <u>1 407</u>	 <u>878</u>	 <u>578</u>
 TOTAL EXPENDITURE FROM ALL SOURCES	 <u>6 625</u>	 <u>6 601</u>	 <u>6 506</u>

SUMMARY OF REVENUE FOR THE YEAR ENDED 30 JUNE 1988

	1985-86	1986-87	1987-88
	\$'000	\$'000	\$'000
<i>CONSOLIDATED FUND—</i>			
<i>Public works and services—</i>			
Drill hire	140	223	121
Survey fees	2	1	1
Geological services	48	50	59
	<u>190</u>	<u>274</u>	<u>181</u>
<i>Lease Rentals and Fees—</i>			
Lease Rents under the Mining Act	161	169	165
Fees under Petroleum (Submerged Lands) Act	50	3	6
Sale of maps and publications	14	18	14
Other fees under the Mining Act	175	277	302
	<u>400</u>	<u>467</u>	<u>487</u>
<i>Territorial Revenue—</i>			
Royalty on iron ore pellets	372	317	306
Sale of Government property	8	1	1
Storage of explosives and flammable liquids	85	100	124
<i>Mineral royalties—</i>			
Metallics	985	1 163	2 558
Sand and gravel	150	162	184
	<u>1 600</u>	<u>1 743</u>	<u>3 173</u>

FINANCIAL STATEMENT

SUMMARY OF REVENUE FOR THE YEAR ENDED 30 JUNE 1988—*continued*

	1985-86	1986-87	1987-88
	\$'000	\$'000	\$'000
Other sources—			
Miscellaneous	39	12	-
	39	12	-
Total Revenue from Consolidated Fund	2 229	2 496	3 841
Consolidated Fund—Works and Services—			
Repayments	48	31	-
Total Revenue from Works and Services	48	31	-
Trust Fund—			
Deposit Account	67	30	80
	67	30	80
Mining Trust Fund—			
Loan Repayments	23	22	19
	23	22	19
Mt Cameron Water Race Suspense Account—			
Sale of water	-	-	-
	-	-	-
Forfeited Performance Deposit Account -	-	-	3
TOTAL REVENUE FROM TRUST FUNDS	90	52	102
TOTAL REVENUE FROM ALL SOURCES	2 367	2 579	3 943

* Funds transferred to Gordon River Power Development Fund:
1986-87—\$344 000
1987-88—\$350 000

REPORT OF THE MOUNT CAMERON WATER RACE BOARD FOR THE YEAR ENDED 30 JUNE 1988

As forecast in last year's report the Mount Cameron Water Race Board was reconstituted to maintain the viability of the Race.

To minimise costs and utilise the Race, a contract of supply has been entered into with Mr B. A. Farquhar of Scottsdale to supply up to 85% of the capacity of the Race for irrigation purposes in payment for which Mr Farquhar maintains the waterway.

A new Board has been appointed with the Director of Mines, Mr H. Murchie, as Chairman and Messrs B. A. Farquhar and T. Green as members.

H. Murchie, *Chairman*
B. A. Farquhar, *Member*
T. J. Green, *Member*



Beaconsfield Gold Mines Limited continued work on rehabilitating the Hart Shaft of the old Tasmania Gold Mine at Beaconsfield, with the aim of dewatering the mine and undertaking further exploration development.