Chapter 16

MINING

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The economy of Tasmania, past, present and future, is inevitably tied to its rich mineral resources. The State retrieves a share of riches from the ground greatly out of proportion to what could be expected from an area the size of Tasmania. Tasmania's area, including smaller islands, is approximately 68330 square kilometres, 0.9 per cent of the total area of Australia and in 1983–84 the value of minerals produced in Tasmania was 2.1 per cent of the Australian total. For more than a century the Tasmanian mining industry has contributed billions of dollars to the State's economy and stimulated many of the State's developments.

16.1 GEOLOGY OF TASMANIA

The geological history of Tasmania spans about 1000 million years and includes diverse periods of widespread volcanic activity, deep sea sedimentation, continental shelf sedimentation, granite intrusion and major folding and faulting action. Eventually there developed a region extremely rich in mineral resources.

Most of the geological action took place between about 1000 to 350 million years ago. It was during these early periods that most of Tasmania's major mineral resources formed.

16.1.1 Proterozoic Era

(about 1000 to 600 million years ago)

The earliest rocks were formed in western Tasmania where sandstone and mudstone collected in ancient shallow seas. At about 800 million years ago, a period of intense folding and metamorphism caused recrystallisation of the sedimentary rocks by a combination of heat and pressure to form much harder quartzite and schist. These 'metamorphosed rocks' extend from Port Davey north to the Central Highlands, and their resistance to erosion has given rise to much of the rugged terrain in south-west Tasmania.

Meanwhile, sandstone and mudstone continued to accumulate in shallow seas in western Tasmania. During a brief episode of basaltic volcanism large deposits of iron formed on the sea floor, including the magnetite deposits at Savage River.

Late in the Proterozoic, about 700 million years ago, there occurred a second period of folding and uplift followed locally by granite intrusion.

16.1.2 Cambrian Period

(600 to 500 million years ago)

In the early part of the Cambrian Period there developed large elongate basins that collected sediment shed from the older pre-Cambrian regions. These basins filled with sandstone, mudstone, limestone-dolomite and basaltic volcanic rocks. During a pause in the sedimentation cycle, serpentinised ultramafic rocks were upthrust from deep within the Earth's crust into the Cambrian sediments. Small but significant deposits of copper, nickel, osmiridium, chromium and asbestos occur in the serpentinites.

During the Middle Cambrian, a chain of volcanoes formed along the coastline of the largest sedimentary basin, flanking the central core of Late Proterozoic metamorphosed rocks. The ensuing pile of submarine and terrestrial lava flows and volcanic ash, known as the Mt Read Volcanics, contains economically important deposits of a number of minerals. These minerals include zinc, lead, copper, gold and silver at Rosebery, Hercules, Que River and Hellyer, and copper, gold and silver at Mt Lyell.

16.1.3 Ordovician to Early Devonian Periods

(500 to 390 million years ago)

Thick deposits of conglomerate collected on the edge of widespread shallow seas in which also accumulated sandstone, mudstone and limestone. The conglomerate now forms most of the peaks of the West Coast Range, including Mt Owen, Mt Lyell, Mt Murchison and Mt Roland. The limestone contains small deposits of lead and zinc, and is an important source of lime.

16.1.4 Middle and Late Devonian Periods

(about 390 to 330 million years ago)

A vigorous period of widespread folding and uplift was followed by granite intrusion into the folded sediments and volcanic rocks of the Early Palaeozoic, and the Proterozoic rocks. These intrusions produced mobilisation of metals and minerals within the molten granite bodies and resulted in the formation of numerous mineral deposits. These deposits include the large renowned tin deposits at Renison, Cleveland and Mt Bischoff; the tungsten (scheelite) deposits at King Island and Hampshire; the tin-tungsten (wolframite) vein deposits at Rossarden, Storys Creek and in the Forth Valley at Moina and Oakleigh Creek; the gold reefs at Beaconsfield and in the Mathinna-Mangana region; and the rich silver, lead and zinc mines at Zeehan, Tullah and Magnet.

16.1.5 Late Carboniferous to Triassic Periods

(about 300 to 200 million years ago)

A period of widespread glaciation preceded the development of large inland basins in which sediment collected at a time when there was rapid evolution and spread of biological and botanical forms. Plant and 'animal' life began to flourish and their remains commonly became trapped in the sedimentary layers and formed source materials for coal, oil and gas. Thus oil shale occurs in the Mersey Valley and there are numerous deposits of coal, though mainly in the Fingal Valley.

16.1.6 Jurassic and Cretaceous Periods

(about 200 to 65 million years ago)

During the Jurassic Period enormous volumes of dolerite intruded along faults and weaknesses from deep within the Earth. The dolerite spread laterally as it neared the surface and formed thick, flat-lying sheets, remnants of which cap many mountains (Mt Wellington, Ben Lomond, Cradle Mountain), but form an almost impenetrable blanket over much of the economically important Palaeozoic and Proterozoic rock formations, such as the coal measures in the Fingal Valley.

The dolerite intrusion heralded the breakup of the Gondwanaland megacontinent and the separation of Australia and Antarctica. In the Early Cretaceous (about 120 million years ago), fault-bounded troughs developed between mainland Australia and Tasmania. The troughs filled rapidly with sediments and trapped much of the abundant 'animal' life, forming the oil and gas deposits in Bass Strait.

In the Middle Cretaceous, high-level syenite dyke swarms intruded in the Cygnet area, carrying small amounts of gold.

16.1.7 Tertiary Period

(65 to 2 million years ago)

One of the last events in the geological evolution of Tasmania was the formation of elongate troughs, such as the Tamar Valley, which were filled with freshwater lake deposits of clay, sand and gravel.

Erosion of the older rocks during this period produced extensive deposits of alluvial tin and gold, particularly in north-east Tasmania.

Late in the Tertiary Period, another widespread episode of volcanic activity produced voluminous basalt lava flows that filled the troughs and old river valleys. The basalt also blankets much of the mineral prospective older rock formations, but has given rise to the rich pastures on the North-West Coast.

Late geological activities formed Tasmania as we find it now. Weathering and erosion have produced the present day landscape and uncovered many mineral deposits.

16.2 EXPLORATION

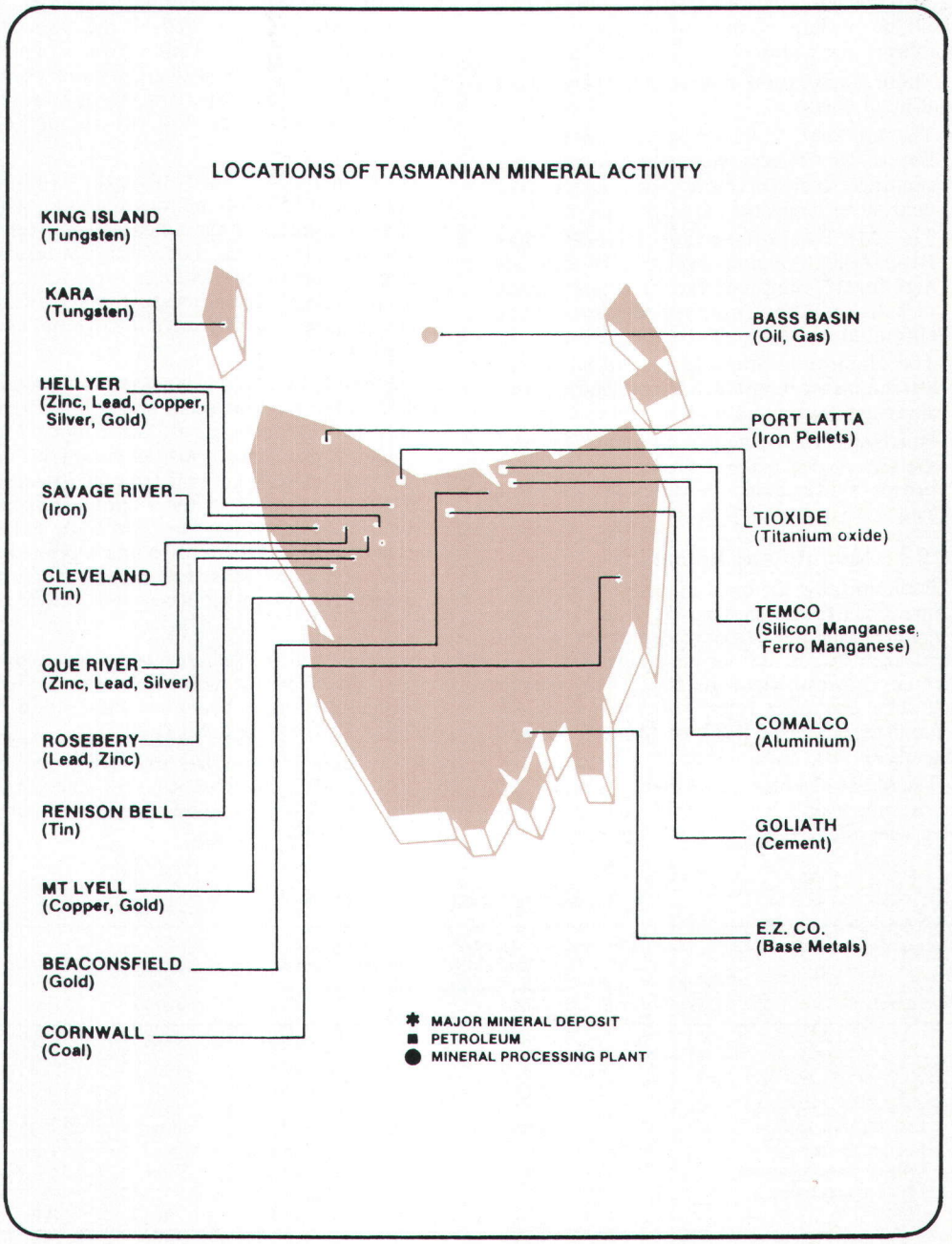
Mining involves a continuous depletion of a non-renewable resource. Therefore continued intensive mineral exploration and the discovery and development of new ore deposits are vital for the continuation of stable mining and minerals processing industries.

Early exploration was undertaken by generations of prospectors who roamed the rugged terrain in western and north-eastern Tasmania for over a century to discover the rich rewards of Mt Bischoff (tin), Savage River (iron), Zeehan (silver/lead/zinc), Mt Lyell (copper/gold/silver), Renison Bell (tin), Magnet (silver/lead/zinc), Rosebery (zinc/lead/, silver/copper), Hercules (zinc/lead/silver), Tullah (silver/lead/zinc) and Cleveland (tin/copper) in western Tasmania, and Storys Creek/Aberfoyle (tin/tungsten), Blue Tier (tin) and Briseis (tin) in eastern Tasmania.

More recently, modern techniques have been used by numerous mineral exploration companies, both large and small, to successfully locate additional ore bodies at Mt Lyell and the rich Que River zinc/lead/copper/silver/gold deposits at Que River (1973–74) and at Hellyer (1983).

Although the more mineralised regions of the State, such as the Queenstown-Zeehan-Rosebery area in western Tasmania, have been extensively explored on the surface, much of Tasmania remains relatively unexplored and the search for 'blind' mineral deposits is still in its infancy.

Mineral exploration today is aimed primarily at discovering 'blind' ore bodies that are concealed either by superficial overburden or overlying rocks that have not been removed by erosion.


LOCATIONS OF TASMANIAN MINERAL ACTIVITY
KING ISLAND
(Tungsten)
KARA
(Tungsten)
HELLYER
(Zinc, Lead, Copper,
Silver, Gold)
SAVAGE RIVER
(Iron)
CLEVELAND
(Tin)
QUE RIVER
(Zinc, Lead, Silver)
ROSEBERY
(Lead, Zinc)
RENISON BELL
(Tin)
MT LYELL
(Copper, Gold)
BEACONSFIELD
(Gold)
CORNWALL
(Coal)
BASS BASIN
(Oil, Gas)
PORT LATTA
(Iron Pellets)
TIOXIDE
(Titanium oxide)
TEMCO
(Silicon Manganese,
Ferro Manganese)
COMALCO
(Aluminium)
GOLIATH
(Cement)
E.Z. CO.
(Base Metals)
MAJOR MINERAL DEPOSIT
PETROLEUM
MINERAL PROCESSING PLANT

Modern mineral exploration programs demand a combination of many geological, geophysical and geochemical techniques and applications and may take five, ten or even fifteen years to come to fruition. Only a very small proportion of mineral exploration programs are successful.

Major exploration interests are centred on four main areas.

- The Mt Read Volcanics region from Elliott Bay to Que River, where the prospects are excitingly high for more zinc/lead/copper/gold/silver deposits.
- The Mt Bischoff-Savage River-Pieman River-Zeehan region, where prospects are high for tin, tungsten, lead, zinc, silver, gold, nickel, osmiridium, iron, copper, asbestos and chromium.
- The Hampshire-Sheffield region, where the attractions are tungsten, tin, zinc, lead, copper, silver, gold, iron and molybdenum.
- North-eastern Tasmania, bounded by Scamander-Avoca-Lefroy, which has long been prospected for gold, tin, tungsten, silver and lead.

16.2.1 Mount Read Volcanics

Economically, the most important geological formation in Tasmania is the Mt Read Volcanics. The 10–15 km-wide belt of volcanic rock extends north from Elliott Bay on the south-west coast through Queenstown to Que River. The volcanic belt then continues further to the north-east, around the northern flank of Mt Roland, and extends almost to Deloraine.

The Mt Read Volcanics formation is renowned for its numerous copper, lead, zinc, gold and silver deposits, some of which are among the largest of their type in the world. These deposits include the massive polymetallic ore bodies at Rosebery, Hercules and Que River, the recently discovered Hellyer deposit in the north of the belt, and the large disseminated copper ore bodies at Mt Lyell. In 1982–83 the associated mines produced over $150 million worth of metal concentrates, and it is easy to understand why the Mt Read Volcanics retains its status as one of the most prospective geological formations in Australia.

The ore deposits formed during the Cambrian Period, about 550–500 millions year ago, when volcanoes dominated the landscape in what is now western Tasmania. The volcanism resulted in extensive lava flows and explosive eruptions which produced volcanic ash that was carried by wind and water, and deposited in saltwater lakes or shallow seas.

During breaks in the volcanic activity, fractures formed in the volcanic rocks above hot magma chambers. Hot water, gases, and copper, lead, zinc, gold, silver and iron particles passed through these fractures to mix with the cold seawater. This mixing resulted in the sulphide minerals pyrite (FeS_2), chalcopyrite ($CuFeS_2$), galena (PbS) and sphalerite (FeZnS) being deposited on the bed of shallow seas. Examples include the Rosebery, Hercules, Que River and Hellyer ore bodies.

Not all volcanic fluids reached the sea floor, and in this case the sulphide minerals were deposited in veins or disseminations within the volcanic pile, such as at Mt Lyell.

Subsequent erosion has exposed some ore bodies (e.g. Mt Lyell, Rosebery) but others occur at considerable depths below the surface, such as the 'blind' Hellyer deposit.

16.1 Mining Operations, Tasmania

Operation	*Establishments in operation at end of year*	*Average annual employment (including working proprietors)*			*Wages and salaries*	*Turnover*
		Males	*Females*	*Persons*		
	No.	*No.*	*No.*	*No.*	*$'000*	*$'000*
1981–82	63	4 305	227	4 532	90 963	352 039
1982–83	55	3 648	189	3 837	85 531	388 390
1983–84 —						
Metallic minerals (*a*)	18	3 061	158	3 219	75 002	317 323
Coal	1	n.p.	n.p.	n.p.	n.p.	n.p.
Construction materials	24	141	11	152	2 210	18 518
Other non-metallic minerals	11	n.p.	n.p.	n.p.	n.p.	n.p.
Total	54	3 425	179	3 604	82 727	353 855

(*a*) Small tin producers with a sales value of under $20 000 have not been included.

16.2 Metallic Mineral Production, Tasmania

Mineral	*Unit*	*1979–80*	*1982–83*	*1983–84*
Copper concentrate	tonnes	64 791	68 446	90 755
Copper-tin concentrate	tonnes	2 239	1 955	1 618
Gold, other than from concentrate	kg	1	—	—
Iron ore pellets	tonnes	2 187 304	2 294 344	2 102 617
Iron oxide	tonnes	15 946	n.p.	n.p.
Lead concentrate	tonnes	18 629	36 737	34 309
Lead-copper concentrate	tonnes	24 185	24 969	20 835
Molybdenum concentrate	tonnes	66	79	24
Tin concentrate	tonnes	13 552	12 815	9 452
Tungsten concentrate —				
Scheelite concentrate	tonnes	3 629	2 110	1 646
Wolfram concentrate	tonnes	177	5	—
Zinc concentrate	tonnes	131 645	150 552	131 006
Value of Metallic Minerals Produced (a)				
Total metallic minerals	($'000)	303 643	299 443	235 407

(*a*) Selling value at the mine.

16.3 MINERAL PRODUCTION

Tasmanian mining, in common with other sectors of the economy, has experienced a downward trend in recent years as a result of a general world recession. The value of minerals produced from Tasmanian mines in 1983–84 was $275 million, a decrease of 19 per cent from 1982–83, and the lowest recorded since 1978–79. The industry's contribution to the State economy (value added) also declined by 19 per cent from 1982–83 to 1983–84 to a total of $167 million. The decrease was attributable mainly to increases in freight and cartage costs and the reduction in sales prices for some metallic minerals. Employment in the Tasmanian mining industry has continued to decline, with an overall fall of 20 per cent since 1981–82.

16.3.1 Metallic Minerals

Metallic mineral production in Tasmania has fluctuated over recent years but for 1983–84 the figures show a significant decline in the production of most minerals.

16.3.2 Fuel Minerals (Coal)

Coal is the only fuel mineral mined in Tasmania. There are known deposits of coal throughout much of Tasmania but the most important are those located in the Fingal Valley in the north-east.

16.3 Production of Coal, Tasmania

Year	*Production (tonnes)*	*Value (a) ($'000)*
1979–80	221 240	4 030
1982–83	320 349	12 713
1983–84	275 716	11 357

(*a*) Selling value at the mine.

16.3.3 Construction Materials

The production of construction materials is the section of the minerals industry which has the greatest personal impact on the people of the State. Buildings, roads and most services depend on the production of construction materials while control of costs depends on their being produced locally. The Goliath Portland Cement Company at Railton, not only supplies the domestic demand but exports through Devonport to the mainland.

16.3.4 Non-metallic (excluding fuel) Minerals

The quarrying of limestone is the earliest recorded activity in the field of non-metallic mineral mining in the State. Limestone production peaked at 822 779 tonnes in 1981–82 but has declined markedly in the last two years.

16.4 Production of Construction Materials (a), Tasmania (tonnes)

Mineral	*1982–83*	*1983–84*
Dimension stone	2 359	813
Crushed and broken stone	2 014 769	2 023 292
Gravel (*b*)	1 157 320	1 165 486
Sand	490 570	449 514
Other	61 667	48 425
Value of Construction Materials Produced (c) ($'000)		
Total construction materials	19 803	21 873

(*a*) Excludes quantities quarried by Government or semi-government authorities (e.g. HEC, Department of Main Roads, etc.) but includes quantities quarried by local government authorities for road material.
(*b*) Mainly decomposed rock for road material.
(*c*) Selling value at the mine.

16.5 Production of Non-metallic (excluding Fuel) Minerals, Tasmania (tonnes)

Mineral	*1982–83*	*1983–84*
Clays and shale —		
Brick	102 290	139 720
Other	62 248	62 730
Dolomite	17 755	22 334
Limestone (*a*)	791 346	606 971
Peat moss	890	620
Pebbles	n.p.	n.p.
Silica	38 191	41 919
Value of Non-metallic (excluding Fuel) Minerals Produced (b) ($'000)		
Total non-metallic minerals	6 580	6 596

(*a*) Excludes quantities used directly as a building or road material.
(*b*) Selling value at the mine.

16.4 MINERAL PROCESSING INDUSTRIES

Tasmania's ability to produce low-cost power from hydro-electric development has led to the establishment of metallurgical treatment plants to treat both local and imported ores. Major mining companies operating within the State include:

- *King Island Scheelite* mines and processes scheelite ore to the concentrate stage and produces artificial scheelite and molybdenum concentrates at its leaching plant.
- *Renison Goldfields Consolidated Limited (Mt Lyell)* produces copper in the form of concentrates from ore largely mined underground and hauled to the surface by a major diesel trucking operation.
- *Renison Goldfields Consolidated Limited (Renison)* is the largest tin mine in Australia and the world's largest producer of tin metal in concentrates from a hard rock underground mining operation.
- *Savage River Mines* produces high-grade iron ore pellets which are sold to Japanese steel mills.
- *Comalco Aluminium (Bell Bay) Ltd* is an aluminium smelter and refinery producing: rolling block, extrusion billet, foundry ingot, bus bar (horizontally cast), sows, T-ingot and granules. Comalco Aluminium Powder, an associated company, produces aluminium powder, aluminium paste and high alloy briquettes.
- *Electrolytic Zinc Company of A/Asia Ltd* produces zinc and zinc alloys as well as cadmium, sulphuric acid, superphosphate and aluminium sulphate at its Risdon factory. Silver-lead-zinc-copper-gold ore is mined at the company's mines at Rosebery.
  Note: See earlier editions of the *Tasmanian Year Book* which contain comprehensive descriptions and special articles of Tasmanian mining companies.

16.5 MINING 1985

1985 was a year of fluctuating fortunes for the Tasmanian mining industry. Depressed metal prices, financial problems and the need to remain competitive resulted in many retrenchments at a number of large companies throughout the State. However, exploration provided several valuable finds.

The year began with a program to retrench 100 workers from the Mt Lyell mine at Queenstown. However, the State Department of Mines optimistically predicted a new and vigorous stage of mineral exploration in Tasmania based on interest expressed by some of Australia's biggest exploration companies in the 800 square kilometres of land offered for exploration licence tenders in 1985.

In February the Commonwealth Government rejected a State Government request of $5 million needed to delay closure of the Mt Lyell copper mine, and prevent the immediate retrenchment of a further 100 workers. Instead the Hydro-Electric Commission bought Renison's Lake Margaret power scheme for $5 million thus providing finance to remain operational.

To present a higher public profile the mining industry created the Tasmanian Chamber of Mines. In part a result of the conservation movement, the new Chamber represented 26

organisations active in the discovery, development, servicing and processing of mineral resources and coal in the State.

Two historic pieces of mining equipment, a 6.5 kilometre aerial ropeway and a tram haulway, were shut down and partially dismantled at the E.Z. Company at Rosebery.

Opposition by the Kingborough Council to a proposed $34 million silicon plant at Electrona near Kingston began with the Council rezoning the Electrona area from general industrial to light industrial in an attempt to stop the project.

The discovery of Bass Strait oil due north of Burnie prompted Amoco to bring a second drilling rig into their exploration program.

An industrial dispute at Comalco was settled relatively quickly after the aluminium company began shutting down its furnaces, and threatened a total plant shutdown.

A NSW mining company planned a start to gold mining operations at Lefroy by the end of the year.

The Comalco aluminium smelter at Bell Bay began trimming its workforce with a view to slashing 130 jobs over 12 months.

The Electrolytic Zinc Company at Risdon commissioned a new granulation plant to improve the physical quality of superphosphate.

EZ Industries Ltd faced union resistance to proposed retrenchments brought about by a depressed market. Comalco joined EZ in slashing more jobs; 100 jobs in six months from Comalco and 300 from EZ were planned.

16.5.1 And the Future?

West Coast

Work has started on one of the biggest mineral discoveries in Tasmania this century.

The Hellyer ore deposit on the West Coast is being described as one of the world's richest ore deposits.

The Minister for Mines, Mr Roger Groom, officially launched work on the huge project when he detonated an explosive charge to start work on a $3 million tunnel to reach the deposit.

Zinc, lead, copper, gold and silver have been identified in the deposit, which lies in rugged country about 60 kilometres south of Burnie.

Aberfoyle, which is developing the site believes the mine will have a life of at least 20 years and will employ about 300 people.

In officially opening work on the mine Mr Groom said the ramifications in economic terms were quite enormous.

The venture would do much for direct employment and the spin-off benefits of mining activity also would act as a great stimulus to the general economy.

He noted that Aberfoyle believed the Hellyer deposit could be followed by further major discoveries in Tasmania.

The Hellyer venture is being jointly undertaken by Aberfoyle, which has a 90 per cent interest, and the Melbourne-based Paringa Mining and Exploration Company, which has a 10 per cent interest.

A number of government initiatives have been announced for the West Coast of Tasmania. $2 million has been allocated to the mining industry for sophisticated mineral exploration of the West Coast.

The Minister for Mines, Mr Roger Groom, said prospects were high that the mineral exploration on the West Coast would result in the discovery of new mines to take over from Mt Lyell after 1989.

Sophisticated mineral exploration techniques, using advanced aerial magnetic and geochemical methods, would be used to search the Mt Read volcanic region. These same techniques were used in the discovery of the Hellyer deposit.

'The program represents an acceleration of the work already being done by private companies ' said Mr Groom.

'This way we can get a new mine into operation more quickly and offer a replacement for Mt Lyell.'

Slate Mining

Due to the recent popularity of slate tiling for home decorating there has been a notable resurgence of slate mining in the State.

Tourist Mine

Plans are underway to turn the Mt Lyell mine at Queenstown into a tourist mine.

This unique attraction is expected to create about 30 new jobs, and will be the only such tourist attraction in Australia where underground mining operations can be viewed.

Tourists will be able to take a battery-powered train from Queenstown along a two-kilometre track to the smelter carpark for above-ground mining displays. A track will then take them underground along a three-kilometre tunnel, where a bus will complete the final journey further underground past working machinery.

The final concept for the museum would depend on engineering studies that have to be undertaken.

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