

SULPHIDE DEPOSITS IN TASMANIA SUITABLE  
FOR THE PRODUCTION OF ELEMENTAL SULPHUR.

**A INTRODUCTION:**

Although Tasmania does not contain deposits of native sulphur, it does possess several large sulphide deposits. These are of such a nature that they can be used for the production of elemental sulphur.

Pyrite occurs at the Mount Lyell Mine and also at the Chester Mine. Zinc-lead sulphide ores consisting of an intimate mixture of galena, sphalerite and pyrite occur in the Mount Read and Rosebery districts. Pyrrhotite, pyrite and marcasite containing cassiterite occur at Rension Bell and form large low grade tin deposits which may possibly be used for their sulphur and iron content in the future.

The pyrite from the Mount Lyell and Chester Mines has been exported in considerable quantities for the manufacture of sulphuric acid. The Electrolytic Zinc Company are using concentrated ores from the Read-Rosebery deposits for the production of electrolytic zinc and during the process some of the unoxidised sulphide particles are used to supply dioxide for manufacture of sulphuric acid and then super-phosphate.

**B PYRITIC DEPOSITS:**

**(1) Chester Pyritic Deposit:**

This deposit is situated on the eastern fall of Mount Hershaw,  $7\frac{1}{2}$  miles to the north of the township of Rosebery, in the West Coast district.

Transport facilities are good, the mine being connected by one mile of narrow-gauge tramway with Chester Siding. The latter is situated on the Emu Bay Railway sixty three miles from the seaport of Burnie on the North Coast. This railway also connects the field with the port of Strahan on Macquarie Harbour.

The deposits consist essentially of pyrite with chalcopyrite, galena, sphalerite, hematite and limonite as accessory minerals in schistose and siliceous gangue. The ore body is typically lenticular in form, coinciding in strike and dip with the planes of schistosity of the enclosing rock. The strike varies from  $10^{\circ}$  to  $20^{\circ}$  east of north, the dip is  $60^{\circ}$  to  $65^{\circ}$  in a south-easterly direction. The thickness of the lenses varies from 20 to 280 feet, their horizontal length on the surface at the main workings has been proved to exceed 600 ft. and may be continuous with the south-west workings 1500 feet distant. The extent and value of the ore body has been proved by diamond drilling to a depth of 300 feet below the outcrop.

The ore-body is not homogeneous throughout but contains lenses of varying composition from those with less than 10 per cent sulphur to those with over 30 per cent sulphur.

The estimate of probable ore down to the depth at which drilling has been carried out is 2,800,000 tons containing over 20 per cent sulphur. Below this depth there are large possible reserves.

The reserves of sulphides containing over 35 per cent sulphur form a small proportion of the above but cannot be expressed in figures.

The deposit was worked by the Mount Lyell Mining and Railway Company, the pyrite being shipped to Melbourne for manufacturing sulphuric acid in their superphosphate works. The outcrop was favourably situated for working by open cut and adits and these methods were adopted.

The total quantity of pyrite sent to the sulphuric acid works up to 1913 is given as 36,223 tons with an average of 37.25 per cent sulphur, the total number of units of sulphur being 1,349,412.

## (2) The Mount Lyell Pyritic Deposits:

The Mount Lyell Group of mines is situated in the vicinity of the townships of Queenstown and Gormanston in the West Coast district. Queenstown is connected by railway and road with the port of Strahan on Macquarie Harbour and also by road with Hobart.

The deposits are of two types (a) lens-shaped bodies of pure sulphide ores and (b) mineralised bands of schist.

### (a) Mt. Lyell and South Lyell Ore-bodies.

These two deposits consist almost entirely of pyrite (87% of ore extracted) containing copper, gold and silver values.

The Mount Lyell ore-body was roughly elliptical in section, the length at outcrop being 800 feet and width 200 feet. It was worked from surface by open cut and underground workings down to No. 9 level, a depth of approximately 700 feet.

The copper values were not uniform, being higher on the footwall side of the body. The ore extracted did not include the lower grade copper ore or purer pyrite from the hanging wall portion.

The South Lyell ore-body is generally parallel to the Mt. Lyell body, and is situated 600 to 800 feet to the south-west of the latter. This ore-body did not extend to the surface and was discovered at a depth of approximately 520 feet below the surface during the sinking of South Lyell shaft. It was worked from this shaft and later from the Mount Lyell underground workings, from No. 6 down to No. 10 level. It was of greatest dimensions at No. 8 level, being 540 feet in length and up to 90 feet in width. The mine plans show that it consisted of wide portions at each end with a narrower or unpayable (not extracted) portion between the wider ones.

The estimate of reserves by R.M. Murray, General Manager, at 30th September, 1925, was 1,624,998 tons and only a very small quantity has since been mined so that the reserve may be taken as 1,620,000 tons approximately in the Mount Lyell and South Lyell ore-bodies.

The following approximate analysis may be taken as an average of the whole reserve:-



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Copper	..	0.5 per cent
Iron	..	38.0 " "
Sulphur	..	44.0 " "
Lead	..	1.5 " "
Zinc	..	2.0 " "
Arsenic	..	0.3 " "
Insoluble (including SiO <sub>2</sub> , Al <sub>2</sub> O <sub>3</sub> and Ba SO <sub>4</sub> )		13.7 per cent
Gold	..	0.04 oz. per ton
Silver	..	1.5 " " "

The ore from these mines was smelted in the past by the Mount Lyell Mining and Railway Company for the production of blister copper containing gold and silver. In addition large amounts of pyrite from the Mount Lyell Mine have been exported to Melbourne and utilised in the Company's Sulphuric Acid and Superphosphate plant for the manufacture of these materials, thus taking advantage of the sulphur content of the ore.

(b) North Lyell, Lyell Comstock, Crown Lyell and West Lyell Ore Bodies:

These bodies generally consist of bornite, chalcopyrite and pyrite disseminated in schist. They are now being mined and treated by the Mount Lyell Mining and Railway Company for their copper content. The concentration of the ores includes flotation and a pyrite product is obtained. This product is now being exported to Melbourne for the manufacture of sulphuric acid etc. The quantity of pyrite concentrate thus utilised in 1938 amounted to 50,277 tons.

(3) Renison Bell Low-grade Tin-bearing Pyritic Deposits

Renison Bell is situated in the West Coast district and is connected by railway with the port of Burnie in a distance of 78 miles and also with the port of Strahan on Macquarie Harbour, 37½ miles.

Numerous pyritic lodes occur in the vicinity of Renison Bell. These lodes consist of pyrrhotite, pyrite and marcasite. They carry a small content of tin and have been regarded as low-grade tin deposits.

The reserves are not known with accuracy, but are large and exceed 1,000,000 tons with a sulphur content of approximately 35 per cent.

A limited amount of attention has been paid to these deposits as a source of sulphur, and about 1932 some 500 tons of ore were mined and shipped for use in sulphuric acid manufacture.

Mining tenements are held by various Companies under lease from the Crown.

(4) The Read-Rosebery Zinc Lead Sulphide Deposits:

These deposits occur in an area embracing Mt. Read and the township of Rosebery in the west coast district of the State.

The Emu Bay Railway from Burnie ( a seaport on the North Coast) to Zeehan passes through Rosebery ( 71 miles from Burnie). A road four miles in length connects Williamsford with Rosebery. Williamsford is also connected by the North East Dundas Tramway (two feet gauge) from Zeehan. The latter is connected by the Government Railway with Strahan on Macquarie Harbour.

The ore-bodies are massive sulphide lodes consisting of a fine grained admixture of zinc-blende, pyrite and galena with minor quantities of carbonates and quartz as gangue minerals. The ore is usually banded and the boundary between ore and country rock is sharp.

The lode at Rosebery Mine is a tabular body extending over a linear distance of 4000 feet and comprises four ore shoots. The two largest shoots average 20 feet in width.

At Mount Read there are a number of separate lenticular ore-bodies in the Hercules and Mount Read mines.

The average zinc-lead sulphide ore has the following mineralogical composition:-

Zinc blende	..	..	35.2	per cent
Pyrite	..	..	31.0	" "
Galena	..	..	7.3	" "
Quartz	..	..	7.8	" "
Silicate of Alumina	..		6.7	" "
Calcite, Ankerite & Dolomite			3.2	" "
Barite	..	..	2.5	" "
Chalcopyrite	..	..	0.9	" "
Rhodochrosite	..	..	2.2	" "
Tertrahedrite & Bournonite			0.2 to 0.4	per cent
Silver	..	..	8.5	oz. per ton
Gold	..	..	2.12	dwt. per ton
Arsenopyrite	..	..	0.7	per cent
Orthoclase & Albite	..		1.6	" "



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Although a great part of the ore-bodies contains 80% sulphides, yet on the average they contain approximately 76% sulphide and 24% gangue. The chemical composition of the average zinc lead sulphide ore is:-

Sulphur	.. ..	28.7 per cent
Zinc		21.3 " "
Iron		16.9 " "
Silica		9.5 " "
Lead		6.4 " "
Alumina		6.1 " "
Copper		0.5 " "
Magnesia		0.5 " "
Lime		0.3 " "
Silver		8.5 oz. per ton
Gold		2.12 dwt. per ton.

At June 1939 the known and probable ore reserves were estimated at 1,500,000 tons.

The Electrolytic Zinc Company of Australasia Ltd. operate the mines and the galena and zinc blende are recovered separately, after fine grinding, by a flotation process. The mill tailings consisting largely of pyrite are pumped to a residue dam and are not utilised for the sulphur content. Approximately 90,000 tons of residues, averaging 23.6% sulphur, have accumulated to date. It is estimated that a like amount will be available each year in the future from which by a light additional treatment a pyrite concentrate could be obtained.

The argentiferous galena is shipped overseas. The zinc concentrates (18,791 tons assaying 33.1% sulphur for year ended June, 1939) are roasted at Zeehan and the calcined material (17,475 tons assaying 7.7% sulphur for year ended June, 1939) shipped to Risdon, where part of the sulphur content is utilised in the manufacture of sulphuric acid and subsequently superphosphate.

The sulphur dioxide from the Zeehan process is not utilised and nearly 5,000 tons of potential sulphur is wasted annually.

In addition to the zinc concentrates calcined, 36,317 tons were held in reserve during the 12 months ending June, 1939.

(c) Sulphur Reserves:

The following summary indicates the potential reserves of sulphur contained in the ores of the mines discussed in this report which at the present is not being utilised. In addition possible reserves are comprised in pyritic ores of small mines at various localities in the State.

		<u>Sulphur in tons</u>
Chester	..	560,000
Mt. Lyell & South Lyell	..	712,800
Renison Bell	..	350,000
Read-Rosebery	..	375,538
Total:		<u>1,998,338</u>

F. BLAKE  
ACTING GOVERNMENT GEOLOGIST.

Mines Department,  
HOBART.

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