Joint Report by Messrs. A. McIntosh Reid and P.B. Nye, Government Geologists, on the Development of the

ROCK AND MINERAL RESOURCES OF TASMANIA

FORWARD

It must be pointed out that practically all the mineral deposits dealt with in the following report are held under Lease from the Crown by private individuals, companies, etc. and, while the object of the report is to show that there are propositions which would come within the scope of the State Development Advisory Board, it is obvious that there would have to be co-operation between the individuals concerned and the State Governmnet. This co-operation would be along the lines of necessary preliminary work by the individuals or companies to test the deposits, and the assurance of continued operations, after the provision by the Government of transport facilities or assistance rendered in other directions.

In addition to the mineral and rock deposits of Tasmania which are being actively worked at the present time, large deposits of certain minerals and rocks are known to occur which are at present not being exploited or only to a small extent comparable with what might be achieved. A large amount of information is available as to the quantity and quality of some of these deposits - hence they are such that they must necessarily be among the first to be considered in any attempt at expansion of the present development of our mineral and rock resources. Such deposits include iron ores, oil shales, building and other stones, coal, and zinc-lead ores. The reasons why these particular deposits are not being exploited as much as they might be, vary of course, with the different deposits. In some cases it is probably the lack of communication and transport facilities which is the cause of these deposits not being properly developed, and any development of these facilities such as the construction of roads, bridges, tramways, railways or other engineering projects, which would enable these deposits to be exploited, would be of great benefit to the State. In other cases, the installation of modern machinery would accelerate the development of the deposits. In different cases again, the preliminary steps to any development should be the carrying out of a series of large experiments in order to determine the most efficient processes to suit the particular mineral or material which it is proposed to treat.

Briefly, some or all of the following items are essential to the development of the mineral and rock resources of Tasmania:-

(1) Provision or improvement of transportation facilities;

(2) Erection of experimental plants for the treatment of minerals, oil-shales, etc;

(3) Installation of modern machinery;

(4) Erection of treatment and smelting plants;

(5) Supply of large quantities of power.

These proposals are such that they would assist in the development of the natural resources of the State, and thereby promote settlement and development of Tasmania, and, as such, they come within the scope ofthe State Development Advisory Board.

IRON ORES

Tasmania possesses large deposits of iron ore of a varied nature in defferent parts of the island. With the exceptions, however, of the chromiferous area of Anderson's Creek, the brown haematites of Brandy Creek, and the high-grade haematites of the Penguin Creek Valley, no commercial use has so far been made of them. The ores from Anderson's Creek and Brandy Creek were smelted locally, but the increasing chromium content of the former interferred with its sales, while a fall in the market discouraged the owners ofthe latter enterprise. The Penguin ores were exported for flux, but more convenient sources on the mainland, and other difficulties caused suspension of operations.

With regard to the other deposits, a small amount of development work has been performed in connection with some of them, but otherwise they have not been exploited. The chief factor which has operated in this direction has been the absence of transport facilities. Not only has this been a drawback in itself, but it has also affected the prospecting and opening up of the deposits and the introduction of capital. Other factors which have operated similarly have been the unfavourable situation as regards fuel and power, and, in some cases, flux also.

Thefirst step in the development of these deposits should be the thorough prospecting and opening up of them in order to determine their actual value (quantity, quality, etc.) and nature. The has been advanced sufficiently in some cases to warrant further steps being taken.

Following the successful opening up of the deposits the provision of transport facilities should be undertaken. It is unlikely that smelting plants would be erected at the mines, but probably at the nearest port, or the ores might be exported to the mainland. There is relatively little difference in the weights of iron ore and the metal, and when it is considered that flux, fuel, and other stores supplies would have to be taken to the smelting plant at the mine, it is evident that it would be preferable to send the ore to the coast and smelt it there. Railways or tramways would be necessary to transport mining machinery, stores, supplies, etc. to the mine and ore from the mine. Additional trams or railways might be required to carry flux from deposits in the vicinity to the smelting plant.

It is thus evident that the development of the iron ore could be greatly assisted by -

(1) Provision of transportation facilities such as harbours, railways or tramways, bridges, roads, etc. Such facilities would also assist in the opening up of any agricultural or pastoral land in the district.

(2) The introduction of large quantities of machinery, etc. for building the railways, bridges, etc.; for equipping the mines; and for erecting the smelting plants.

Both these items are such that they might be considered in the development schemes of the State Development Advisory Board.

All the known iron ore deposits of Tasmania were investigated by Messrs. W.H. Twelvetrees and A. McIntosh Reid in 1919, and the reports thereon are included in the Geological Survey publication "The Iron Ore Deposits of Tasmania" (G.S. Mineral Resources No. 6).

The following table gives a conservative estimate of the reserves existing in the different deposits at that date:-

Blythe River			17,000,000	tons
Dial Range and Penguin			700,000	"
Long Plains (Rio Tinto)			20,000,000	"
Zeehan District				
Tenth Legion	1,900,000	tons		
Reynolds & Davern	160,000	"		
Section 1812/H	800,000	"		
Davern's Prospect	850,000	"		
			3,710,000	"
Beaconsfield and Anderson's Creek			1,300,000	"
			42,710,000	tons

In addition, deposits are known to occur at Nelson River in the north-west, Rocky River and Paradise in the Long Plain district, and at Hampshire, and while large reserves undoubtedly exist, they have not been sufficiently developed and investigated to enable the reserves to be expressed in figures.

The Long Plain and Blythe River deposits contain the largest reserves, and are therefore to be regarded as the most important ones. It is stated that developmental work has proved much larger reserves to occur at the Tenth Legion, but this has not been officially verified. Enormous reserves are also reported to occur at Hampshire, but this deposit has not been examined.

Blythe River Deposits

These deposits are situated on the Blythe River, which is a north-flowing stream entering the sea 5 miles east of the port of Burnie. The location of the deposits is between 6 and 7 miles from the mouth of the river.

The deposit consists of one long main lode with several shorter parallel ones. The main lode is exposed along a length of 140 chains, but gaps occur in this distance. The width varies from 30 feet to 150 feet. The estimate of 17,000,000 tons is based upon ahorizontal lode length of 90 chains, and average widths and heights above river level for separate sections, 50% being deducted for waste rock. The average width is slightly less than 100 feet, and the outcrop of the lode rises to 500 feet above river level, the reserves being calculated down to this level only.

The ore consists of haematite with a small amount of limonite, but no magnetite. The quality varies considerably in different parts of the lode. The highest grade material has an iron content up to 69% and a silica content as low as 1.2%, but the average grade is, of course, lower in iron and higher in silica than these figures. The silica content is the only detrimental feature of the ore, and this occurs at portions of the lode only. Some of the silicious ore assays as low as 44% iron and as high as 31% silica.

Thus, while high-grade iron ore undoubtedly occurs in large quantities, similar quantities of low-grade silicious ore also exist. The deposits require thorough investigation to determine the grade of the ore throughout, and as to how far selection of the higher grade material could be effected without much extra expense.

Transport facilities would have to be provided to the deposits if they were being operated. A tram or railway of from 6 to 7 miles in length would require to be constructed to the mouth of the Blythe River to convey the ore to the Government North-West Coast line, or to smelters if such are erected at thar locality.

Long Plain, Rocky River and Paradise River

The fact that the Long Plain, Rocky River, and Paradise River ironfields are comparatively difficult of access is the main reason why the deposits have not received more attention. As most of the large mines in Australia are far removed from the seaboard, and not more favourably situated, this disadvantage is more apparent than real. The natural outlet for the product of these mines is through Corinna, a small settlement on the bank of the Pieman River. The Pieman at Corinna is a magnificent stream, 450 feet wide and 40 feet deep, with a tidal rise of 5 feet. At this point the banks slope so steeply that vessels can be moored alongside. A little higher upstream the river widens considerably, providing a splendid swinging basin for vessels of large size. The entrance, 11 miles from Corinna, is very broad with a large accumulation of sand on the south side. This sandbar extends to three rocks which lie right in the fairway, half a mile beyond the entrance. It has been suggested that the removal of these rocks would create a strong scour on the bar, but it is doubtful whether any lasting benefit would result unless a breakwater were constructed on the south side. Small vessels have been safely navigated to this port for many years.

All the deposits named are now held under lease from the Crown, and an endeavour is being made to interest investors in the Rocky River and Paradise River bodies. Before the industry can be established the necessary improvements to the harbour must be made. The Paradise and Rocky River deposits are not far distant, and although the country is rough, six to eight miles of tramway only are necessary to connect with the navigable waters of the Pieman.

The Rio Tinto deposits occur on the valley sides of the Savage River, another tributary of the Pieman, about 20 miles away. They consist of a number of large disconnected lenticular bodies of magnetite with subordinate amounts of haematite. The length of the largest lens is 2000 feet, and the width over 400 feet along the dip, and are 40 to 60 feet wide. The estimate of 20,000,000 tons is calculated to a depth of 300 feet only, but the Savage River has exposed some of these lodes to a depth of 700 feet.

The ore contains up to 69% iron, but the average grade will not exceed 65%. The only impurities likely to prove detrimental are sulphides, but these are restricted to certain portions of the deposits.

The natural outlet for this deposit is through Corinna. This would entail the construction of a 25 mile railway along the east bank of the Savage River from the Rio Tinto Mines to Corinna.

Hampshire Deposits

The Hampshire deposits of magnetite ore which, it is reported, are only 8 miles from Hampshire railway station and 28 from the well-equipped seaport of Burnie, have not been examined by officers of the Department. It is reported that the deposit extends a distance of 70 chains and is from 3 to 7 chains in width. The favourable position of this deposit in relation to lines of transport, and the high quality of the ore, make it particularly attractive to investors.

Zeehan Deposits

These deposits occur in a small area at the foot of Mt. Agnew, to the west of Zeehan. They consist of a number of lenticular bodies of magnetite. Individual analyses show over 70% iron, but the average grade would be below this figure. The reserves are based on depths of 150 to 200 feet only. The largest lens has a length of 1400 feet and width of 50 feet.

This district is fairly well situated as regards transportation, but additional facilities would be required. The Emu Bay railway passes through Zeehan, about 7 miles to the east of the deposits, and thus communication could be made with the port of Strahan. The head of the Comstock tram from Zeehan is one mile from the deposits, and the extension to South Heemskirk passes a similar distance to the south. As Strahan would probably be used as the shipping centre, an alternative southerly route from the mines to the vicinity of Malanna might be worthy of investigation.

OIL-SHALES

Tasmanite has been found only in the northern portion of the island. The known deposits are situated in two widely separated fields associated with cannel coals and kerosene shales. The more important is that extending from Latrobe to Quamby Bluff. Along this belt 27 miles in length, tasmanite has been proved to extend 14 miles, and in the section intervening Quamby Bluff and Kimberley it probably occurs as well. Outliers of

the main body occur at Beulah and Nook on the west side, and Paramatta on the east. Aside from the known deposits it is condidered likely that tasmanite will be found in the neighbouring areas. All these areas are well served by roads and railways which converge upon Devonport, the chief shipping centre of the North Coast districts.

The facilities for the development of the oil-shale industry provided here are not present at the Oonah field, which is situated 26 miles from Wynyard, and accessible only by roads of very heavy grades.

A recent estimate of the oil-shale reserves of Tasmania is:-

	Tons
Latrobe-Railton-Kimberley area	30,000,000
Beulah area	3,000,000
Quamby Bluff area	3,000,000
Nook area	800,000
Oonah	6,000,000
	42,800,000

In addition there is a very large possible reserve in areas not yet investigated.

Although much experimental work has been done in Tasmania by companies operating at Latrobe, it cannot be said that the problems connected with the distilling of the shale have been satisfactorily solved. The distillation of the shales should represent one of the most important industries of Tasmania, and hence the solution of the problem is one of national importance.

Recent modern practice in different countries of the world suggests that two of the main factors in the successful distillation of the tasmanite shale are:-

(1) A continuous retort.
(2) Obtaining of two fractions only, viz., a light benzine or gasoline fraction, and a heavy fuel oil fraction.

In addition to the oil obtained the residues are valuable for agricultural purposes, and are considered suitable for cement manufacture, being a clay substitute, and are said to contain a fair percentage of potassium salts.

The erection of experimental plants for the purpose of finally solving this problem would be a most important work, and it is suggested that this might be arranged by co-operative effort on the part of the Government and the interested companies.

ZINC-LEAD SULPHIDE ORES

Considerable quantities of these ores exist in the Read-Rosebery district but they are not being utilised to advantage at the present time. These deposits are held by Electrolytic Zinc Company of Australasia Limited, who are now erecting an experimental plant to treat the ores. Thus, the development of these ores is being undertaken, but any assistance by the State to the Company, if desired by

the latter, which would accelerate the full utilisation of the deposits would be of great benefit to the State.

The estimate of reserves in 1919 was:-

	Tons
Proved	1,680,000
Probable	915,000
Possible	large

Since the above date, developmental work has probably increased these figures.

COAL

The coal reserves of Tasmania as calculated by the Geological Survey on present economic conditions are 134,398,000 tons. The reserves, calculated on the basis of the scheme adopted by the International Geological Congress are:-

Actual	124,980,000
Probable	123,031,000

The reserves in the fields at present being worked amount to probably no more than 70,000,000 tons. This leaves 64,000,000 tons in fields which could perhaps be developed, if assisted by the provision of transport facilities. Of these fields, the most important are Fingal and Dalmayne. Fingal is well situated as regards transportation and very little would be required in that respect. With Dalmayne, however, transport facilities are essential and the provision of these is being attempted by the East Coast Development Company who are constructing the East Coast railway. If the Company desired it, assistance would perhaps enable the more speedy opening up of the Dalmayne and other East Coast fields.

A way in which a greater utilisation of Tasmanian coal could be effected is in the installation of powdered coal appliances. The Tasmanian coals are such that by utilising them in the powdered form, economies to the extent of approximately 25% could be obtained. The use of Tasmanian coal in this form on railways, in manufacturing industries would result in larger quantities of local coal being used in place of imported coal.

BUILDING & ORNAMENTAL STONES, GRINDSTONES &C.

1. Sandstones

Enormous quantities of sandstones suitable for building and other purposes occur in Tasmania. These sandstones belong to the Ross series of the Trias-Jura system, and are largely developed in the eastern, midland and south-eastern portions of Tasmania.

Grindstones: These sandstones are specially adapted for the manufacture of grindstones. Ross is the centre of this industry and large numbers of grindstones up to 6 feet in diameter are exported to the mainland.

Ornamental and Monumental: These sandstones are largely used throughout Tasmania for the manufacture of headstones, sidestones, etc. for erecting in cemeteries.

Building Stones: In former times enormous quantities of the sandstones were used in the construction of buildings, bridges, etc. The number of houses and other buildings in Hobart and Launceston and right throughout the Midlands and south-eastern portion of Tasmania illustrate the popularity of the stones for this purpose. The fine bridges at Ross, Richmond, Pontville, etc. are good examples of the use of the stone for constructional purposes.

These stones are thus greatly favoured for many purposes. The Ross stones form one of the best grindstone materials in the world. For building and decorative purposes all colours, including white, grey, yellow, brown, pink, and variegated can be obtained, and the ease with which it can be worked makes it very useful for ornamental purposes. In all the quarries operated up to the present, only hand methods of mining and dressing are employed. With the introduction of modern methods of mining or quarrying and the installation of dressing and cutting machinery, a great advance should be made in the utilisation of these stones. An export trade is already established with grindstones and this could be increased, and probably export trade established for the stones for building and ornamental purposes.

2. Granites

Granite outcrops at numerous localities in Tasmania, but has not, up till the present, been quarried or dressed. All granite used in Tasmania is imported from the mainland and European countries.

Numerous varieties occur and there should be no reason why granite should not be quarried and dressed for local use, and possibly for export purposes also.

Perhaps the most suitable locality for the commencement of such an industry would be Scottsdale. The granite here is a black and white type, is close to the railway, and in suitable positions for quarrying.

Red and pink granites are known to occur at Heemskirk and Gladstone, but better means of communication would be required in order to develop these deposits.

With the introduction of modern cutting and dressing machinery, a valuable industry might be developed.

Apart from the above definite propositions, there are numerous other deposits and districts which require investigation. The south-western portion of Tasmania and parts of the West and North-west Coasts are but little explored and prospected. Exploration and geological surveys of such districts might lead to the location of valuable deposits.

Deposits - e.g. the alluvial tin of the North-east Coast - also require investigation. These tin deposits have been worked at various points along the course of the old Ringarooma Valley. Investigation may reveal the deposits at intermediate places along the valley.

With the exception of that at George's Bay, no examination or investigation has been conducted in connection with the clay deposits of the island, and officially little or nothing is known about them. An examination of these deposits might result in the location of clays suitable for china, porcelain, pottery, bricks, tiles, earthenware, etc.

HYDRO-ELECTRIC POWER

A very important factor in the future development of Tasmania will be the availability of large amounts of hydro-electric power. Large amounts of cheap power are required in many modern metallurgical processes, e.g. iron, zinc, copper, carbide, etc. Thus with this great advantage, the advertising of Tasmania as a site for the establishment of metallurgical works should be thoroughly carried out. Not only should this be done with a view of treating Tasmanian ores, but also those from other states. The establishment of the Electrolytic Zinc Works at Risdon presents a splendid example of the development of Tasmania which is possible in the above directions.

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HOBART,
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