LIMESTONE ON MARIA ISLAND

LOCATION & ACCESS:

Maria Island lies off the east coast of Tasmania, its southern extremity, Cape Peron, being nearly opposite Cape Bernier and about three miles therefrom, while Cape Boulanger, the most northerly point, lies a little South of East from Orford, about nine miles away.

A motor vessel of 50 tons burden, running a weekly service, preserves a direct connection with Hobart. The Island may also be reached via Triabunna which has a regular bus service to Hobart, but then special arrangements must be made for the crossing from Spring Bay.

PREVIOUS WORK:

In 1891 A. Montgomery reported on "The Hydraulic Limestone of Maria Island". His attention was confined to the area in the extreme north westerly part of the Island north of the Darlington Settlement, and more particularly to the limestone cliffs in Half Moon Bay, of which he gives a geological section.

R.M. Johnstone refers to Maria Island in his "Geology of Tasmania" and in 1900 published "Further Notes on the 'Permo-Carboniferous' Cliffs at Darlington, Maria Island". This account deals chiefly with the palaeontology topographical and geological features of the Island and analyses are given of cements made from the limestone.

Maria Island is briefly mentioned in the "Coal Resources of Tasmania" and a geological map of the Island is given as part of the geological map of the Triabunna - Buckland Coalfield by H.G.W. Keid.

TOPOGRAPHY:

Maria Island has a maximum length of about 15 miles from Cape Boulanger to Cape Peron, and a maximum width of 10 miles from Long Point on the western coast to Ragged Head on the eastern.

The Island consists of two parts, formerly two islands, but now tied together by a sand spit. South Maria Island is much the smaller, but is structurally similar, its western coast being entirely of dolerite hills, the slopes of which descend into the water unbroken by any coastal plain; its eastern coast is rugged and composed of granite while sedimentary rocks are to be found in the interior.

North Maria Island, with which this report is concerned, has a range of mountains rising about 2000 feet, close to its eastern coast and descending in steep slopes and precipices to sea level there. The mountain range descends to the West in long interfluvial ridges into a region of jumbled topography with a maximum elevation of about 600 feet. The south western portion of the North Island is a broad plain bearing alluvial deposits and diversified with sandhills. The eastern coast is composed of innumerable little bays with prominent headlands and backed by cliffs. Some have minute sandy beaches and there are small streams with waterfalls. The western coast is more open with long sandy beaches between rocky headlands. Half-Moon Bay

which forms the north coast of the Island is a long arc of limestone cliffs.

Streams flowing down from the mountains to the western coast have cut steep sided valleys with interfluves, as mentioned above, but on entering the region of jumbled topography, change direction rather abruptly and reach the coast via water gaps between steep sided hills.

GEOLOGY:

The mountain range including Mount Maria (2,300') and the Bishop and Clerk (2,100') consists of a great thickness of dolerite overlying sandstone above mudstone and limestone. This dolerite is the remnant of a sill formerly having a much wider extension. The sandstone is similar to the Triassic Sandstones found elsewhere in the State. The mudstones and limestones contain numerous fossil remains which establish their age as Permian.

Along much of the eastern and northern coast the flat lying Permian rocks emerge as cliffs, sheer above the sea; to the west they are cut off just as sharply by dolerite. This contact forms a long straight line, offset at one point, and is due to a major longitudinal fault with a cross-fault. Jurassic dolerite occurs west of the major fault and in some places are sandstone remnants, both overlain and underlain by dolerite, demonstrating the sill-like nature of the intrusion. A similar phenomenon may be observed at the base of the dolerite on the Bishop and Clerk, where there are smaller sills separated by beds of Triassic sandstone. This evidence favours a downthrow of 1,700' to the west along the major fault line.

Curious evidence of recent movement along this fault line exists. The streams flowing westward from the slopes of the mountains, have cut fairly broad sub-mature valleys, and just before they pass from limestone on to dolerite, have deposited alluvial flats into which they are now entrenched a few feet. These flats are similar to the ones now existing where these streams enter the sea, except for the absence of sandhills. Either these flats were at the original mouths of the streams or movement along the fault temporarily dammed their waters. In both cases it is necessary to postulate a small recent uplift of the down faulted side.

Eastwards from the major fault line, the Permian sedimentary rocks extend under the dolerite capping of the Mount Maria Range to the northern part of the eastern coast. The south eastern coast has a selvage of granite. About a quarter of a mile south of Four Mile Creek, Silurian quartzites outcrop and form the southern boundary of the Permian rocks.

THE LIMESTONES:

The Permian sequence may be divided into a calcareous, an argillaceous and an arenaceous facies, according as to whether the particular strata are composed principally of limestone, mudstone or sandstone. The calcareous facies is the lowest and is succeeded by the argillaceous and the arenaceous in that order. Into this pile of horizontal strata deep valleys have been cut by the streams flowing westward from the Mount Maria Range of mountains, namely Bernacchi, Counsel and Four Mile Creeks. Thus these three streams, and their numerous

tributaries, have exposed the basal limestone beds in the bottoms of their valleys, as shown in the map herewith.

The various components of the calcareous facies are best exposed in Half Moon Bay on the northern coast of the Island, just east of Cape Boulanger. A diagram of this exposure is contained in both Montgomery's and Johnston's reports. However, the succession at this exposure is not necessarily repeated elsewhere, because beds may thin out and disappear along the strike and other beds take their place.

Further exposures occur in the quarries opened by the National Portland Cement Company and earlier exploiters of the limestone deposits. However, these quarries are all at no great distance from the cliffs at Half Moon Bay. One quarry is actually on the coast at the foot of the cliffs at their lowest point, and operated principally in what has been called the Pachydomus Zone, after the name of a very prominent fossil bivalve of which the strata there are largely composed. The other quarries lie on the slopes of the valley of Bernacchi Creek or of a northern tributary of the same the headwaters of which have been cut off by the advance of the sea into Half Moon Bay. These quarries being close to the cliffs also suffer from the same defect in limestone quality which may be noted there, that is partings and occasional beds of mudstone or shale.

Limestone is also available towards the head of Bernacchi Creek, where there is a dam, and along the opposite side of the valley. On crossing the interfluve considerable deposits may be observed in the valley of Counsel Creek, particularly along its northern side. Similar limestones may be seen at the head of Four Mile Creek, but here the topographic relief is not so strong and suitable places for quarrying are less frequent. The most favourable topography for quarrying exists in the valley of Counsel Creek just east of the major fault line. Here steep slopes of limestone rise sharply above a small alluvial flat. A little further upstream, limestone spurs formed by tributaries of the main stream form almost equally favourable sites. Limestone from these places gave somewhat more favourable assays than that from the old quarries north of Bernacchi Creek, as may be seen in the appended table. A partly formed track and road runs out from the site of the cement works to within little more than 20 chains of where samples 7, 8 and 9 were taken. This particular locality does not seem to have been prospected for limestone, although signs of activity could be seen further up towards the headwaters of Counsel Creek in the vicinity of sample 10. Pits and costeans had also been excavated on the ridge south of Four Mile Creek. But here greater transport difficulties would be experienced and the site, as previously mentioned, is not particularly suited to quarrying operations. The quality of the Maria Island limestones is similar to that of Permian limestones elsewhere in the State and some specimens resemble very closely the limestones near Gray in the St. Marys district. Better class Permian limestones contain about 80% carbonate of lime and there is ample supply of this type of stone on Maria Island. The principal defect of Permian limestones is the occurrence in them of mudstones and shale, but these deleterious beds lens out along the strike and by careful selection suitable quarrying sites free from mudstone and shale may be obtained. The abovementioned sites on the north bank of Counsel Creek are those most favourable for limestone prospecting.

The alluvial flats in the beds of the creeks where they cross the major fault line may hold supplies of clay. There are old clay pits in the upper alluvial flat of Bernacchi Creek, and Counsel and Four Mile Creek and other minor streams seem to be similar in all respects. Clay used in the manufacture of cement on Maria Island was brought from a pit on the coast at Bloodstone Point. Further supplies exist in this locality, but suitable material may exist in more convenient places. The mudstone itself may also when ground, provide suitable material.

CONCLUSION:

There is, or course, no reason to doubt that suitable materials exist on Maria Island for the manufacture of Portland Cement, because good quality cement was previously produced there in large quantity, and inspection shows that enormous supplies similar to those previously obtained yet remain. The old quarries, however, seem to have produced a fairly large proportion of waste and efforts, apparently, had been made by the National Portland Cement Company to obtain a higher grade limestone. These effotts were discontinued and the works were closed, because of lack of a market, not through depletion of raw materials or manufacture of an inferior product. The analytical results tabulated herewith give reason to believe that a better grade limestone, relatively free from mudstone, is obtainable on the northern side of Counsel Creek. Localities numbered 7, 8 and 9 are all readily accessible and the topography is ideal for quarrying.

G. Everard

GEOLOGIST

References:

Montgomery, A.,	Report on the Hydraulic Limestones of Maria Is. Secretary for Mines Report 1890.
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Keid, H.G.W.,	Coal Resources of Tasmania, Dept. of Mines, Mineral Resources No. 7 - Section on Maria Island and Map -1922
Nye, P.B. & Reid, A.M.,	Quality of cement manufacture by National Portland Cement Co. Maria Island, Typed Report 1924.
Nye, P.B.	Further tests of cement manufactured by National Portland Cement Company, Maria Island Typed Report 1924.

Map Ref.	Lab No.	Locality	Acid Insoluble	Fe_2O_3	Al_2O_3	CaO	MgO	S	P_2O_5	$CaCO_3$ calculated
7	974/51	Counsel Creek	12.4	0.7	0.5	47.6	0.8	Tr.	Tr.	85.0
8	975/51	E. Spur Counsel Creek	17.6	0.6	0.7	43.7	0.9	Tr.	Tr.	78.0
9	976/51	Middle Spur, Counsel Ck.	13.8	0.5	0.5	46.8	0.8	Tr.	Tr.	83.5
10	977/51	Old Lease Counsel Creek	21.1	0.7	0.7	42.5	0.6	Tr.	Tr.	75.9
14	978/51	Middle Spur, Darlington	19.4	0.8	1.2	42.0	1.0	.11	.12	75.0
15	979/51	Fossil Cliffs	25.7	1.2	1.5	39.1	0.8	.24	.1	69.8
16	980/51	N. Quarry Darlington	21.8	0.9	1.0	41.0	0.9	.12	Tr.	73.2
17	981/51	Middle Quarry, Darlington	22.4	0.9	1.0	41.8	1.0	Tr.	.14	74.6