IDA BAY LIMESTONE DEPOSITS

Part I. - General

Location and Access.

Ida Bay forms the south-western extremity of the inlet of Southport. By road it is 65 miles south of Hobart, to which it is connected by the Huon Highway. Past the turnoff to Hythe the main road deteriorates, and beyond Ida Bay it is unsuitable for low slung vehicles. Lune River settlement is the postal centre for the district, and about two miles south of the Lune, on the main road, are installations and staff houses of the Australian Commonwealth Carbide Company. From this point a two foot gauge railway served by diesel locomotives goes out in a westerly direction to the Company's limestone quarries, and in an easterly direction to the Deep Hole loading jetty on the southern side of Southport Inlet where there is an average depth of 30 feet of water.

Previous Work.

References to the geology and mineral resources of the extreme southern part of the State date from very early times, but the first reference to the Ida Bay limestone deposits seems to have been made by Twelvetrees in Geological Survey Bulletin No.20. Among maps illustrating this bulletin is a geological sketch map of Ida Bay Coalfield. On this map limestone is shown as covering an area of the order of 1,000 acres, but boundaries are left indefinite, and in the text the limestone is assumed to cover a square mile. The deposit is discussed as a source of raw material for the manufacture of cement, and results of chemical analyses are given.

Department of Mines publication, Mineral Resources No.7 "The Coal Resources of Tasmania" mentioned the Ida Bay limestone deposits in discussing the general geology of the Catamaran Coalfield. An accompanying map on a scale of 1/80,000 shows an area of limestone much greater than that given on Twelvetrees map.

In 1926 the then Government Geologist, P. B. Nye, reported on "The Limestone Quarries at Ida Bay", giving the results of detailed sampling at different levels of quarry faces.

Geomorphology.

The area is one of strong relief, the variation in altitude being from sea level at Ida Bay, to over 1,700 ft. at the Summit of Sugarloaf.

The principal topographic feature is a spur running out from an inland plateau. To the north and south of the spur are the broad alluvial plains of the Lune and D'Entrecasteaux Rivers, respectively, and their tributaries. Islands of basalt, dolerite and older sediments outcrop through alluvial deposits, more particularly on the plain of the Lune. The spur is the watershed for tributaries flowing north or south to join the main streams.

The crest of the spur is not of even height, but consists of two hills, Sugarloaf and Caves Hill of about 1,700 and 1,400 feet respectively, joined by a saddle rising to 850 feet. Caves Hill is connected to the plateau of the hinterland by a similar saddle of about 1,000 feet in height. These saddles have been formed by back cutting of small streams lowering the height of the spur at favourable points.

Caves Hill is elongated in a lateral, and Sugarloaf in a meridional direction, so that the spur as a whole is T - shaped, with the cross piece of the T forming the extremity. This extremity is the eastern fall of Sugarloaf and is a sharp even slope, with an almost linear extension from north to south, in the manner of an escarpment, but fading out rather rapidly in either direction. At the base of Sugarloaf there is a more gradual and confused slope, diversified by hills of basalt and dolerite, down to the main road.

Geology.

The youngest deposits in the area are recent alluvial accumulations brought down by the rivers, and these are underlain by dolerite and older sediments, which on the plain north of the Sugarloaf appear as low hills rising out of the alluvium. Earlier then these were gravels of tertiary age which form a thick apron on the northern side of Caves Hill.

The Caves Hill - Sugarloaf Spur terminates in the scarplike eastern fall of the Sugarloaf, which is here interpreted as a fault, with the downthrow to the East. The Spur itself is divided into two parts by a meridional fault passing through the saddle between the two hills the downthrow again being to the East.

On the northern side of the Sugarloaf, Ordovician limestone is in contact with Recent alluvium and rises above it in cliffs and steep slopes, to a height of about three hundred feet above the plain. Dolerite overlies the limestone, and persists right to the summit. On the southern side, Permian mudstones intervene between limestone and dolerite. The limestone has an average dip of 15° East and passes under the dolerite on the northern side, and under the southern side of the Sugarloaf, before the eastern escarpment is reached; and as the downthrow of the fault is to the East there are no further outcrops of limestone in this direction.

On the northern side of Caves Hill, the base of the limestone is hidden by the Tertiary gravels previously referred to, although elevation subsequent to their deposition has caused deep corrosion by streams which disappear into caves in the limestone. The limestone rises out of the gravel beds in cliffs. which may be of very ancient origin, now being revealed by erosion of later accumulations. Permian mudstones overlie the limestones and compose the remainder of Caves Hill. The limestones appear on the southern side of the hill below the mudstones, and on both sides, dip down under them to the West.

Geological History.

The geological history of the area begins in the Ordovician period with the deposition in clear water, free from sediment, of a great thickness of limestone. Subsequently these deposits, together with any later ones that may have covered them, were elevated above sea level and gently folded into a broad arch. Then they were eroded until only part of the limestone remained, in the form of a hill with a broad, dome-like top and cliffed sides.

After a great interval of time, the area was again submerged in the Permian Period, and may have remained so until the end of the Triassic; resulting in the accumulation of shore line, and relatively shallow water, deposits completely burying the limestone.

During the Jurassic Period, elevation above sea level again occurred, during extensive opeirogenic activity, followed by intrusions of dolerite magma. The dolerite entered along the contact of mudstone with limestone, which marked the ancient land surface formed during the interval between Ordovician and Permian sedimentations. Large blocks of Permian and Triassic mudstones and sandstones were lifted bodily to make room for the intrusive magma.

The erosion which followed this grand emergence has continued to the present day, with only minor fluctuations of level supervening. Thus Tertiary gravels were deposited along the northern side of Caves Hill, only to be eroded when a minor elevation of the land caused streams to corrode their beds. This erosion of Tertiary deposits is proceeding now. The effective result, from the economic aspect, has been the deposition, and preservation from erosion, of the limestone remaining from the Ordovician transgression and the subsequent emergence, and its partial denudation, so as to render it available to quarrying operations at the present day.

PART 2 - THE LIMESTONES.

Petrology.

Ida Bay limestones are tough crystalline rocks of various shades of gray, and similar in appearance to the crystalline Ordovician limestones at Beaconsfield, Flowery Gully, and the equivalents of these in different parts of the State. They tend, on the whole, to be relatively light in colour, but dark and mottled varieties also occur.

Sometimes the rocks are reddish or brownish owing to the development of hydrated oxides of iron.

These iron minerals are often included in recrystallising calcite, so that a particular specimen shows innumerable red or brown specks. The coloured calcite may be peripherally arranged round cores of uncoloured calcite. These peculiarities do not seem to be in any way related to the calcium carbonate content. The chief impurities are graphitic and cherty inclusions, but these are irregularly distributed and do not form laminae as with some Flowery Gully stone.

Ida Bay limestones are well bedded and strongly jointed, but within the rectangular blocks so formed, the stone is massive and tough.

Palaeontology.

Fossil remains are not abundant, as with Permian limestones, but careful examination usually meets with positive results. Organic remains have been rendered difficult to recognise, by recrystallisation of the calcite, particularly on newly fractured surfaces, but weathering and sometimes simple wetting of surfaces brings out organic structures. The following genera have been recognised:-

Archaeocyathinae
Fenestella
Favosites
Tetradium
Tryplasma

as well as various other corals, cephalopods and trilobites.

The lower Palaeozoic Age of the limestones is therefore perfectly well established.

Chemical Analyses.

The numerous analytical results given in the appended table attest to the uniformly high grade of the limestone. Since in no case does the calcium carbonate content fall below 90%, an average grade higher than that figure may be confidently expected. After the acid insoluble residue, the chief impurity is magnesia, which, although it may be objectionable for some purposes, e.g. the manufacture of calcium carbide, is in this small concentration a positive advantage in limestone to be ground for agricultural lime. The other constituents are negligible, being less than 1%.

Microtopography.

The disposition of the deposits is very favourable to quarrying operations. In the erosion of limestones, solution is probably more effective than denudation, and a considerable proportion of meteoric water passes underground via solution channels. In common therefore, with many other deposits, the Ida Bay limestones rise in steep slopes above the other types of country. The vertical jointing of limestone is also very favourable to cliff formation, and cliffs occur in the Ida Bay

deposits. In some instances, as stated above, these cliffs are of ancient origin and have been revealed once again by preferential denudation of less consolidated strata.

These topographic features, common to limestones, are accentuated more on the northern than the southern side of the Caves Hill - Sugarloaf Spur. However, steep slopes with light overburden are the general rule on both sides, although the heavy growth makes appraisal of quarrying potentialities a difficult task on the southern side of the Spur. In connection with overburden, it should be noted that swallow holes, and solution channels filled with sediment, often replace the more normal type of overburden.

Other features of interest are large sink holes, caves and subterranean water-courses, any of which might affect the desirability of a particular locality as the scene of quarrying operations, and affect the extraction of stone. Some streams enter the limestones at the base of cliffs on the northern side of the Spur, and at elevated places on the southern side, to become subterranean channels, which have not been observed to reappear at the surface.

Mineral Leases and Quarries.

At the present time the Australian Commonwealth Carbide Company hold, as current or prospective leases, all the limestone deposits on the northern side of the Caves Hill - Sugarloaf Spur, except for two small separated areas shown on the geological map, and a reserve of 40 acres. On these leases four quarries have been opened, and one of these is in productive operation. The other three have been producers, but limestone is not now being taken from them.

A narrow gauge railway line traverses the leases and terminates at the quarry on 8461/M. This is the largest and first opened quarry, and was originally served by a tram line that is now abandoned. Later quarries were opened on 8828/M and 9717/M, when the railway line had progressed that far from its starting point at Ida Bay. Subsequently the line was continued to the original quarry. The latest quarry to be opened is just below and a little to the west of the saddle between Sugarloaf and Caves Hill. A road has been built up to it, and stone is brought down by truck to the loading bin on the railway line.

Four leases were taken up for limestone on the southern side of the Spur, and have since been allowed to lapse. Of these one was in dolerite country where no limestone outcrop is now visible, the other three were each, in part, on the limestone area delineated on the southern side of the Spur. No limestone appears to have been taken from any of these leases. Access to them could have been gained either over the saddle from the northern side of the spur or by a tramway from Leprena, now collapsed and overgrown.

At the present time, to gain access to the limestone area on the southern side of the Caves Hill - Sugarloaf Spur, the best approach would appear to be from the main road at the most southerly point shown on the map, herewith. This was the site of an old sawmill, and the remains of a tram line can be followed in for nearly three quarters of a mile. At a distance of about a mile and a half is the old tramway from Leprena, and a further distance of about a mile would bring one to the limestone. A road along this route would bring one to the limestone. A road along this route would have an easy grade, but would require a fair amount of clearing and would have to cross some soft places.

Conclusion.

The effects of the information gained in this investigation have been to reduce considerably the probable area of limestone, and give it a more definite outline. It has also demonstrated that Sugarloaf, formerly referred to as a "limestone mountain" consists principally of dolerite with limestone only at its base. The ordovician limestones, in fact, do not rise to any great altitude, and this is more consistent with their type of occurrence met with elsewhere, and with their place as a basal formation beneath the Permo-Triassic sequence in the south eastern part of the State.

On the economic side, it has been demonstrated that workable deposits of limestone exist on the southern side of the Caves Hill - Sugarloaf Spur within a distance of three miles from the road to Leprena, and that these deposits are of approximately the same grade as those on the northern side of the Spur.

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16.10.51

Reg. No.	Map Ref.	Acid Insol.	S.	Fe_2O_3	Al_2O_3	MgO	CaO	$CaCO_3$(calc)
646/51	1	5.8	0.1	0.4	tr.	1.2	50.7	90.5
647/51	2	5.7	0.1	0.3	0.1	0.8	51.6	92.2
648/51	3	1.0	0.1	0.2	0.1	0.6	54.6	97.5
649/51	4	3.1	0.1	0.2	0.1	0.9	53.1	94.8
650/51	5	3.5	0.1	0.3	0.2	0.7	52.9	94.5
651/51	6	3.2	0.1	0.4	0.1	1.6	52.0	93.0