



NEW DEVELOPMENTS IN INDUSTRIAL MINERALS

By Z. D. Hora

INTRODUCTION

During the past three years several new centres of production of industrial minerals started to operate in various parts of the province. While some are temporary, rather unsuccessful ventures, other will remain contributors to the British Columbia economy in the years to come.

RED LAKE (MI 921/NE-81)

Since 1984 a devitrified volcanic ash bed from a site approximately 3 kilometres north of the Red Lake school house has been processed into industrial and domestic absorbent. D.E.M. Resource Processors Ltd. is selectively open-pit mining an approximately 5-metre-thick layer of a massive, fine-grained, white to beige coloured, very lightweight rock — 'fuller's earth'. The deposit is part of the Tranquille Formation of the Eocene Kamloops Group (Church, *et al.*, 1983).

According to X-ray diffraction analysis the matrix is a poorly crystalline montmorillonitic mixed layer clay, with quartz, cristobalite, and K-feldspar as minor components. Under the microscope, cells and fragments of diatomaceous earth material comprise up to 25 per cent of the rock. Testing was done on randomly collected, but typical, samples from the quarry.

The material has the following physical properties:

- Density: 0.61 g/cc
- Absorption (ASTM): 111.4 per cent
- Physical strength: 4.8 to 7.9 MPa

The quarry site exposed the following section:

Metres	
1.5-3.0	till
0.9-1.5	devitrified white to beige volcanic ash
0.6-1.2	dark brown and grey clayey layer
3.0	devitrified beige volcanic ash
0 -0.6	devitrified beige volcanic ash with frequent coal fragments and veinlets of jarosite
0.3	coarse, andesitic lapilli tuff
basement	massive, vesicular, fine-grained volcanic rock (andesite ?)

With the exception of the clayey layer all devitrified volcanic ash is mined and processed.

BENSON LAKE (MI 92L-295)

A quarry in white limestone has been developed at a site located approximately 3 kilometres southwest of Benson Lake, near the intersection of the road from Benson Lake to Port Alice and the main logging road system. The International Marble and Stone Co. is producing a white, massive, fine-grained (1 to 2-millimetre) limestone which is processed in the company's Surrey plant into different grades of fillers and extenders.

Randomly collected samples of typical material from the quarry site have the following, average composition:

	Per Cent
CaO	55.1
MgO	2.49
SiO ₂	0.27
Al ₂ O ₃	0.05
Fe ₂ O ₃	<0.09
LOI	43.97
TiO ₂	<0.01
MnO	<0.003

The company reports the brightness of the ground product as 95.5 per cent.

Very little overburden developed in the quarry area; fresh clean rock, uncontaminated by earthy soil, occurs between 0.5 metre to 1.0 metre below the surface. Three aplitic dykes, 30 centimetres, 50 centimetres, and 80 centimetres thick, crosscut the limestone at the quarry site with different directions and varied dips. The limestone beds strike 120 degrees and dip 30 degrees northeast. About one-third of the exposed limestone beds are highly fractured and disintegrate into fragments of less than 0.3 cubic metre; the rest is more massive and blocky.

The white limestone is part of a thick section of generally grey coloured carbonate rocks of the Upper Triassic Quatsino Formation (McCammon, 1968).

BAKER CREEK (MI 93P-003)

Agricultural lime and other crushed and sized limestone products are processed from a new quarry located 80 kilometres south of Chetwynd. Prime Lime and Marble Ltd. started this operation in 1984 at the confluence of the Sukunka River and Baker Creek; the site can be reached by the Sukunka River Forestry Road.

The chemical composition of a crushed and screened sample collected from the stockpile is:

	Per Cent
CaO	55.7
MgO	0.58
SiO ₂	0.98
Al ₂ O ₃	0.30
Fe ₂ O ₃	<0.07
LOI	43.36
TiO ₂	0.02
MnO	0.004

The limestone is very fine grained (0.2 to 0.5 millimetre), massive but highly fractured, and dark grey and brownish grey in colour. The quarry has opened the western limb of a northwest-trending syncline in limestone of the Lower Carboniferous Rundle Group (Stott, 1975).

BONANZA LAKE (MI 92L-280)

A bed of massive, white crystalline limestone was opened during 1983-84 by a 65-metre-long horizontal adit at the north end of Bonanza Lake. The site is on the eastern side of the valley, adjacent to the main logging road. The limestone is fine grained (1 to 2 millimetres), mostly white with occasional greyish streaks and mottled bands. The International Marble and Stone Co. tried to develop the site as a source of white limestone.

Rock exposed in the adit strikes at 80 degrees and dips 20 degrees south. The limestone contains numerous small sills and irregularly distributed lenticular blocks of aplitic rock together with similarly distributed zones of amphibolite. Because of these silicate rock impurities the site was abandoned.

The limestone belongs to the Upper Triassic Quatsino Formation (McCammon, 1968).

BOWRON RIVER (MI 93H-073)

Medium to coarse-grained limestone was processed at Bowron River during the summer of 1983 into agricultural-grade soil conditioner. The material came from the face of the cliff east of the Giscome logging road, 32 kilometres south of its intersection with Highway 16 at Purden Lake. Light to dark grey marble with a grain size between 3 and 5 millimetres and no apparent impurities was mined and processed by Western Lime and Marble Inc. The chemical composition of a sample taken from the 0.5-centimetre-size stockpile is as follows:

	Per Cent
CaO	46.8
MgO	7.6
SiO ₂	0.34
Al ₂ O ₃	0.08
Fe ₂ O ₃	0.11
LOI	44.6

The bluff is part of a major northwest-trending belt of limestone that belongs to the Lower Cambrian Mural Formation (Campbell *et al.*, 1973).

GRAND FORKS (MI 82E/SE-036)

A small dolomite quarry has been active since 1983 on the northern side of Highway 3 approximately 5 kilometres east of Grand Forks. Ground dolomite for agricultural applications and crushed rock for landscaping and other similar uses are being produced by VTS Quarry Ltd.

The rock is a medium-grained dolomite (2 to 4 millimetres) with phlogopite, diopside, spinel, and serpentinite as common impurities. The rock colour is yellowish, greenish, and brownish white.

A sample of approximately 1 kilogram of 1 to 2-centimetre chips collected from the stockpile has the following chemical composition:

	Per Cent
CaO	31.2
MgO	20.52
SiO ₂	3.94
Al ₂ O ₃	0.67
Fe ₂ O ₃	0.48
LOI	42.59

The dolomite forms two parallel lenses with thickness varying from 10 to 30 metres. They strike east-west with a vertical dip. The dolomite is part of the Proterozoic Grand Forks Gneiss Series (Gunter, 1984).

LOST CREEK (MI 82F/SW-307)

White, fine-grained (1 millimetre) crystalline limestone of a sugary texture, which is mottled in places by a slightly yellow colour, is mined underground on the western side of Lost Creek, 3 kilometres north of Highway 3 between Salmo and Creston.

The mine was opened in 1982 by the International Marble and Stone Co. as a horizontal adit in a massive limestone band. Here, the limestone strikes 60 degrees and dips 45 degrees southeast. The end part of the 60-metre-long adit intersects zones light grey in

colour and others with dark grey streaks. The mined rock is trucked to Sirdar, where it is ground into a variety of industrial limestone products. The composition of typical fragments collected from the freshly opened face is as follows:

	Per Cent
CaO	52.8
MgO	0.82
SiO ₂	1.31
Al ₂ O ₃	1.29
Fe ₂ O ₃	0.15
LOI	43.25
TiO ₂	0.02
MnO	0.055

The company reports the brightness of the ground product as 94.85 per cent.

The limestone is within the Reeves Member of the Cambrian Laib Formation (Fyles and Hewlett, 1959).

REDROCKY CREEK (MI 93J-015)

Dark grey to buff oolitic limestone, in places partially recrystallized, was processed into agricultural soil conditioner during 1983. On the site of a small, old quarry, Tri-Lime Resources Ltd. started a new operation to provide agricultural lime for the north-eastern part of British Columbia and adjacent agricultural areas in Alberta. The material comprises fine to medium-grained (1 to 3-millimetre) oolitic limestone and contains, in places, a matrix of brown-weathering cement. The chemical composition of a 1.5-kilogram sample taken from the 1.5-centimetre-sized stockpile is:

	Per Cent
CaO	54.9
MgO	0.76
SiO ₂	2.36
Al ₂ O ₃	0.29
Fe ₂ O ₃	0.31
LOI	42.92
TiO ₂	<0.01
MnO	<0.014

The limestone forms an elliptical bluff approximately 750 metres long and up to 250 metres wide. The rock is massive and is part of the Upper Ordovician to Middle Silurian Sandpile Group (McCammon, 1969).

REFERENCES

- Campbell, R. B., Mountjoy, E. W. and Young, F. G. (1973): Geology of McBride Map-Area, British Columbia, *Geol. Surv., Canada*, Paper 72-35.
- Church, B. N., Ewing, T. E., and Hora, Z. D. (1983): Volcanology, Structure, Coal and Mineral Resources of Early Tertiary Outliers in South-Central British Columbia, *G.A.C. Fieldtrip Guidebook*, Trip 1.
- Fyles, J. T. and Hewlett, C. G. (1959): Stratigraphy and Structure of the Salmo Lead-Zinc Area, *B.C. Ministry of Energy, Mines & Pet. Res.*, Bull. 41.
- Gunter, R. (1984): Geology of the VTS Quarry Group, *B.C. Ministry of Energy, Mines & Pet. Res.*, Assessment Report 13 176.
- McCammon, J. W. (1968): Limestone Deposits at the North End of Vancouver Island, *Minister of Mines, B.C.*, Ann. Rept., 1968, pp. 312-318.
- McCammon, J. W. (1969): Redrocky Creek Quarry, *B.C. Ministry of Energy, Mines & Pet. Res.*, GEM, 1969, p. 395.
- Stott, D. F. (1975): Dawson Creek (93P) Map-Area, British Columbia, *Geol. Surv., Canada*, Open File 286.