

TR6-10-15

# WOLLASTONITE AT LIMESTONE CREEK NEAR HAMPSHIRE

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## INTRODUCTION

At the request of Mr. A. Pearson of Ulverstone an examination of the wollastonite deposits at Limestone Creek was made to determine their extent and grade. Field work was carried out between 14th November and 7th December, 1960.

## LOCATION

The main wollastonite deposit occurs on the eastern margin of Limestone Creek, half a mile south of the Upper Natone road bridge over Limestone Creek, about  $1\frac{1}{2}$  miles east of Hampshire Railway Station. Access to the area is most easily gained by following the walking track along Limestone Creek southwards from the Upper Natone road bridge.

## GEOLOGY

The rocks of the Limestone Creek area consist of fine alternating bands of calcium silicate rocks containing wollastonite as a prominent constituent, recrystallized limestone and quartzite ranging in thickness from 2 inches to 3 feet and dipping towards the west at  $10^{\circ}$ - $15^{\circ}$ . The strike varies from  $165^{\circ}$  to  $195^{\circ}$ .

Calc-silicate rocks were formed by the metamorphism of impure Ordovician limestone by the granite of Devonian age though Tertiary basalt flows and Recent alluvium have now obscured the actual contact. The outcrop in Limestone Creek represents a roof pendant, limited in depth by the underlying granite and in lateral extent by the overlying basalt. A NE-SW fault forms the northern limit of the deposit and has downthrown the northern block bringing basalt to creek level.

The area is covered by basalt scree and soil ranging in thickness from 1 to 6 feet, which conceals most of the underlying rocks. However, exposures in cliffs give sections up to 23 feet in height and numerous small outcrops are to be seen in the creek.

## MINERALOGY

Thin sections of rocks from several localities in the area were cut and examined. The following minerals were noted.

- Quartz.
- Wollastonite.
- Calcite.
- Pyrrhotite.
- Plagioclase.
- Diopside.

Quartz and wollastonite are the dominant minerals, forming 80 per cent of the rock in some cases. The proportion of pyrrhotite varies between 5 per cent and 10 per cent. The quantity of plagioclase, calcite and diopside is always small, usually less than 5 per cent.

Wollastonite grainsize varies considerably from locality to locality; some crystals occur up to  $\frac{1}{2}$  inch in length but a more common grainsize is about  $\frac{1}{50}$  inch.

#### GRADE AND SIZE OF DEPOSIT

Detailed examination and comprehensive sampling of all the exposures were undertaken and the results of these investigations are shown in the accompanying table. It can be seen that the grade of wollastonite varies considerably from band to band, but the average grade of the deposit was found to be 30 per cent wollastonite. However, this may be increased to 37 per cent wollastonite by rejecting the chert bands which can be readily distinguished by their dark colour and fine black banding.

The amount of wollastonite available in the area was calculated to be approximately 1,000,000 tons. This is assuming the deposit would be quarried from creek level to the level of the basalt flow and no overburden of basalt removed.

#### RECOMMENDATIONS

One of the critical factors is the grade of wollastonite commercially acceptable. Here the grade can be increased to a maximum of 37 per cent by selective quarrying. Another important factor is the quantity of iron acceptable as an impurity, as many bands contain up to 10 per cent pyrrhotite.

It is suggested that area I (see figure 2) would be the best location for quarrying. Access to this area would be from the Hampshire Upper Natone road.

#### REFERENCES

- HUGHES, T. D., 1950—Limestone at Hampshire. *Tas. Dept. Mines, Rep.* (unpublished).  
 REID, A. M., 1924—Hampshire Mineral Area. *Tas. Dept. Mines, Rep.* (unpublished).  
 THOMAS, D. A. AND HENDERSON, Q. J., 1943—Wollastonite at Hampshire. *Tas. Dept. Mines, Rep.* (unpublished).

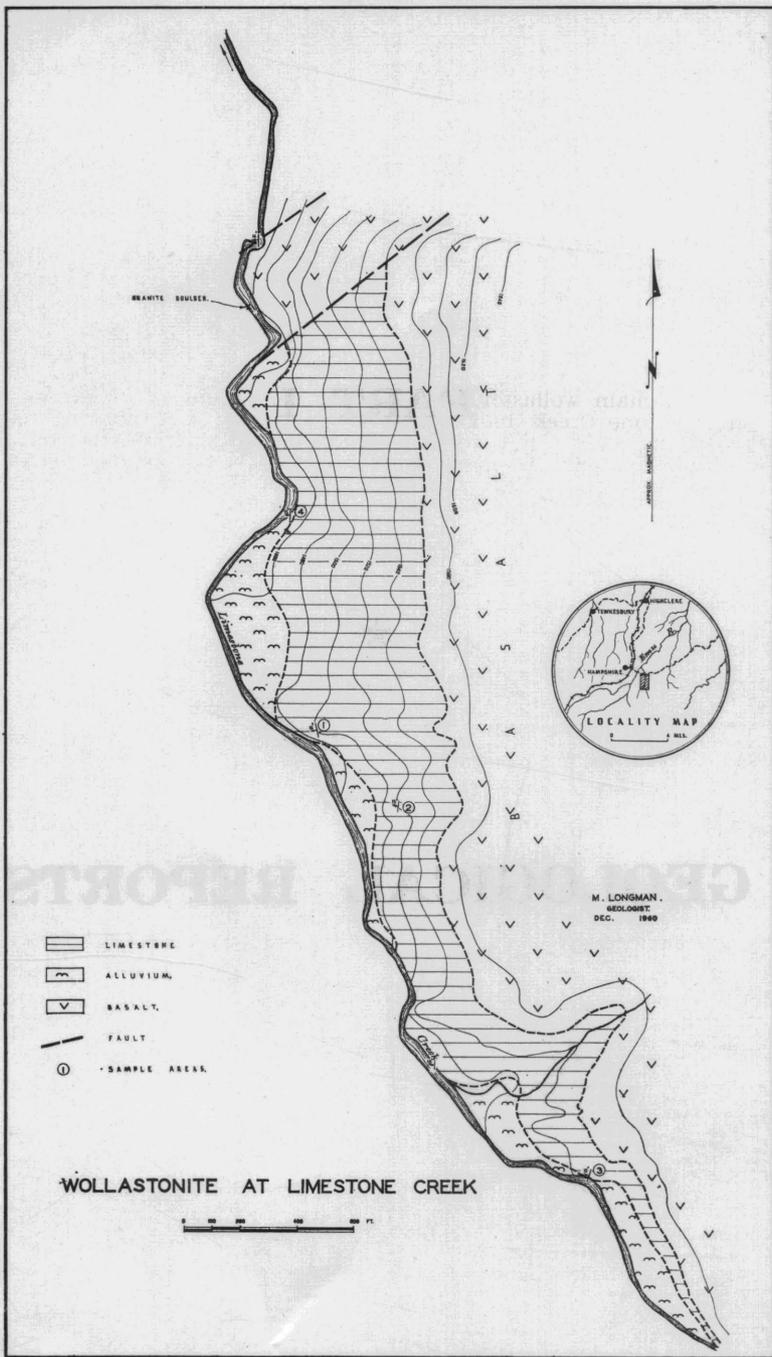
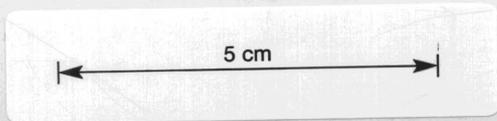


FIGURE 2.



Reg. No.	Acid Insol.	Ign. Loss	CaO	MgO	R <sub>2</sub> O <sub>3</sub>	CaCO <sub>3</sub>	CaSiO <sub>3</sub>	Footage	
<b>AREA 1.</b>									
1605	72.9	1.3	17.4	0.2	7.2	2.4	32.7	0' - 1' 9"	Hornfels containing wollastonite.
6	86.6	0.6	3.5	0.3	8.1	1.1	5.6	1' 9"- 3' 0"	Banded chert
7	61.9	4.1	27.1	0.6	5.4	7.6	45.6	3' 0"- 3' 9"	Hornfels composed dominantly of wollastonite.
.....	.....	.....	.....	.....	.....	.....	.....	3' 9"- 4' 0"	No sample. Badly weathered limestone.
8	73.7	1.4	17.9	0.6	6.2	2.6	33.6	4' 0"- 5' 2"	Hornfels with wollastonite
9	81.2	0.7	7.3	0.3	9.9	1.3	13.4	5' 2"- 5' 6"	Banded chert.
10	13.4	34.8	49.0	0.5	1.6	64.3	9.8	5' 6"- 5' 8"	Limestone (impure)
1	55.6	6.1	33.2	0.6	4.5	11.3	53.1	5' 8"- 7' 6"	Hornfels with small lenses of limestone.
2	82.1	1.1	3.4	1.5	11.6	2.0	4.3	7' 6"- 8' 6"	Banded chert.
3	67.4	2.5	23.7	0.4	5.5	4.6	42.6	8' 6"-10' 0"	Hornfels composed dominantly of wollastonite.
4	77.7	1.0	13.4	0.5	7.0	1.9	25.3	10' 0"-12' 6"	Hornfels containing wollastonite.
5	83.5	1.2	8.3	0.4	7.0	2.2	14.2	12' 6"-13' 9"	Alternating bands of chert containing wollastonite.
6	54.0	8.8	32.6	0.7	3.0	16.3	44.5	13' 9"-17' 0"	Alternating bands of hornfels, chert and limestone.
7	77.4	0.7	14.2	0.1	6.6	1.3	27.7	17' 0"-18' 0"	Chert bands containing wollastonite (poorly bedded).
8	48.0	13.7	32.4	0.3	4.6	25.3	31.3	18' 0"-18' 9"	Limestone and wollastonite hornfels.
9	78.3	1.5	11.8	0.3	7.3	2.8	20.6	18' 9"-19' 3"	Alternating bands of chert and hornfels.
20	25.4	27.2	44.5	0.3	2.1	50.2	20.8	19' 3"-22' 3"	Limestone and wollastonite hornfels.

Average grade 31.5%. Grade rejecting chert bands 34.1%.

Reg No.	Acid Insol.	Ign. Loss	CaO	MgO	R <sub>2</sub> O <sub>3</sub>	CaCO <sub>3</sub>	CaSiO <sub>2</sub>	Footage	
<b>AREA 2.</b>									
1699	61.7	2.4	31.7	0.4	2.9	4.4	60.0	0'- 3' 2"	Wollastonite hornfels.
1700	82.3	1.1	6.3	0.3	9.3	2.0	10.2	3' 2"- 3' 5"	Banded chert.
1	59.7	2.6	34.0	0.4	3.2	4.8	64.8	3' 5"- 4' 1"	Wollastonite hornfels.
2	84.0	0.9	8.2	0.3	6.0	1.7	14.8	4' 1"- 4' 3"	Banded chert.
3	50.4	10.8	35.9	0.3	2.2	20.0	46.3	4' 3"- 5'10"	Wollastonite hornfels with limestone lenses.
4	79.9	1.0	2.7	2.2	13.2	1.9	2.9	5'10"- 6'10"	Banded chert.
5	21.0	30.2	46.2	0.4	1.4	56.0	18.8	6'10"- 8' 0"	Limestone with wollastonite hornfels.
6	78.3	1.1	6.4	1.2	12.0	2.0	10.4	8' 0"-8' 6"	Banded chert.
Average grade 42.5%. Grade rejecting chert bands 52.0%.									
<b>AREA 3.</b>									
1712	79.5	0.6	6.6	0.4	13.2	1.1	12.1	0'- 3' 0"	Banded chert containing wol- lastonite.
3	77.3	0.9	8.9	0.5	12.5	1.7	16.3	3' 0"- 6' 0"	Banded chert containing wol- lastonite.
4	74.9	0.7	12.6	0.4	11.4	1.3	24.5	6' 0"- 9' 0"	Banded chert containing wol- lastonite.
Average grade 17.6%.									
<b>AREA 4.</b>									
1696	61.3	3.7	30.5	0.2	3.8	6.8	53.9	0'- 1' 8"	Wollastonite hornfels with limestone lenses.
7	85.7	0.5	5.0	0.3	7.8	0.9	9.2	1' 8"- 2' 1"	Chert bands.
8	66.5	2.6	26.9	0.3	2.9	4.8	49.0	2' 1"- 3' 7"	Wollastonite hornfels with limestone lenses.
Average grade 46.5%. Grade rejecting chert bands 52%.									

Reg No.	Acid Insol.	Ign. Loss	CaO	MgO	R <sub>2</sub> O <sub>3</sub>	CaCO <sub>3</sub>	CaSiO <sub>3</sub>	Footage	
<b>Isolated Outcrops.</b>									
1693	74.9	0.7	17.5	0.4	6.1	1.3	30.4	0'- 3' 0"	Wollastonite hornfels.
4	47.6	20.4	20.1	7.0	4.2	{ 24.5CaCO <sub>3</sub> 14.2MgCO <sub>3</sub> }	6.7	0'- 3' 0"	Siliceous Dolomite.
5	66.4	0.4	22.2	0.3	10.0	0.8	45.1	0'- 3' 0"	Hornfels containg bladed wollastonite.
1707	64.9	1.2	25.3	0.4	7.5	2.2	49.6	0'- 1' 6"	Wollastonite hornfels.
8	68.0	0.2	23.6	0.2	7.8	0.4	48.2	0'- 1' 6"	Wollastonite hornfels.
9	74.0	1.2	13.8	0.6	9.5	2.2	25.6	1' 6"- 2' 6"	Hornfels containing wollastonite.
10	71.9	1.2	17.8	0.7	8.7	2.2	34.5	0'- 1' 6"	Wollastonite hornfels.
11	79.3	0.6	9.9	0.8	8.8	1.1	16.9	0'- 3' 0"	Chert containing wollastonite.
1715	69.5	3.6	20.1	0.3	5.7	6.7	32.4	0'- 4' 6"	Wollastonite hornfels with limestone lenses.

Average grade 30.2%. Grade rejecting dolomite 34.0%.

Average grade of deposit 30.3% wollastonite.

Average grade rejecting chert bands and dolomite 37.2%.

Tonnage of wollastonite available = 1,000,000 (approx.).