LT-1 ?

1980

WESTERN MINERALS, INC.

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PETROGRAPHIC SUITE - Metamorphic Rocks of the Littleton Formation, (Lower Devonian), New Hampshire. Re-collected 1979

The specimens in this suite range from slates to sillimanite schists. Garnet, staurolite, andalusite and sillimanite crystals are large and easilly identified by beginning students in metamorphic petrology. Three volcanics facies and a diopside granulite (sillimanite zone) are included.

Although there are many chemical analyses of rocks in the area, most are not located with any precision (a too-common practice) and others are from outcrops which have clearly been modified by subsequent road construction. In addition, weathering has taken its toll on many outcrops described in the classic papers now 35 to 40 years old. Where we are reasonably sure that the analysis from a locality collected is reasonable, it has been included with just such a note.

References

Billings, M.P., 1956, The Geology of New Hampshire, Part II, Bedrock Geology; New Hampshire State Planning and Development Commission. General Reference with extensive bibliography.

Billings, M.P.., and Wilson, R.J.,,Chemical analyses of Rocks and Rock-Minerals; Part XIX Mineral Resources Survey, N.H. Div. of Economic Dev. Analysis numbers from this reference. Original sources given in this book.

Billings, M.P., 1935, Geology of the Littleton and Moosilauke Quadrangles, N.H., N.H. Planning & Dev. Com. 51 p.

-----1937, Regional metamorphism of the Littleton-Moosilauke area, N. H.; G.S.A. Bull. v. 48, p. 463-566. Very important reference.

-----1941, Structure and metamorphism in the Mt. Washington area, N. H.; GSS.A. Bull. v. 52, p. 863-936.

----- and Chapman, R.W., K. Flwler-Billings, and Loomis, F.B., Jr., 1946, Geology of the Mt. Washington Quad., N.H.; G.S.A. Bull. v. 57, p. 261-274.

Chapman, C.A., 1939, Mascoma Quadrangle, New Hampshire; G.S.A. Bull. v. 50, p.127-180.

Kruger, F.C., 1946, Structure and metamorphism of the Bellows Falls Quad., N.H.-Vermont; G.S.A. Bull. v. 57, p. 161-206.

Heald, M.T., 1950, The Geology of the Lovewell Mountain Quad., N.H.; N.H. Planning and Development Commission, 29p.

-----1950, Structure and Petrology of the Lovewell Mountain Quad., N.H., G.S.A. Bull. v. 61, p. 43-89.

Specimen Descriptions and Locations

* 1. Slate, Slate Ledge Quarry, 2.8 mi. W of Littleton at Slate Ledge, just N. of Slate Ledge Road, SE Rec. Littleton Quadrangle. Analyses 8,9 p. 6,7.

* 2. Dense phyllitic slate on access road $\frac{1}{4}$ mi. NE of Junction of Highway 10 and 302, $1\frac{1}{4}$ mi. N. of Littleton. The original outcrop has been cut back by construction of access road to US 302. SE Rec. Littleton Quad. Analysis 14 appears to be reasonable.

3. Amphibolite (Na Volcanics) with large poikilitic hornblende porphyroblasts, 3/4 mi. SE Ammonoosuc River on road from Barrett to Streeter Pond. This was probably a conspicuous outcrop, partly blasted, when road was built. It is all overgrown with moss, but it is there! SE Rec. Littleton Quad.

4. Garnet phyllite, $1\frac{1}{2}$ mi. ESE Lisbon and $\frac{1}{2}$ mi. N of outlet of Pearl Lake, N. Cen. Rec. Moosilauke Quad.

* 5. Garnet staurolite schist approx. $\frac{1}{2}$ mi. N. of Pearl Lake. Analysis 19 p. 8-9 from this general location. N. Cen. Rec. Moosilauke Quad.

6. Staurolite schist with large staurolite crystals, 0.3 mi. SE of dam at NW outlet of Pearl Lake (SW side of lake). Fine fresh road cut. N. Cen. Rec. Moosilauke Quad.

* 7. Sillimanite schist, large sillimanite crystals, largely retrograde to muscovite, elev. 4020 and 100 yds. S of Mt. Washington Toll Road. Analysis 29 p. 10, 11. SE Rec. Mt. Washington Quad.

8. Andalusite schist, large chiastolite crystals, partly retrograde to muscovite. At turn out at about 3000 ft. on Mt. Washington Toll Road. SE Rec. Mt. Washington Quad.

* 9. Banded injection gneiss, 0.8 mi. S of Mt. Washington Toll Road on Highway 16. Highway construction has cut back the original outcrop, somewhat, and produced a series of magnificent cuts. Analysis 40 p. 12-13 from S end of cut fits the description. SW Rec. Gorham Quad.

10. Mica staurolite schist, 1 3/4 mi. NW of Sugar Hill. Staurolite found only in pelitic layers, absent in quartz-rich lauers. N. Cen. Moosilauke Quad.

11. Mica schist, 3/4 mi. W of Akworth. New, shallow road cut, fine fresh rock. Bellows Falls Quad. N. Cen. Rec.

12. Migmatitic biotite gneiss with quartz-feldspar pods, road cut highway 10, SW of and opposite Wright Hill and just N of Trout Brook. SW Rec. Lovewell Q.

13. Porphyroblastic gneiss, Dakin Hill member, just E of junction of Highway 10 and 123, about 1 mi. S of Marlow. See par. 2 p. 54, M. T. Heald paper. He describes outcrop just S of the junction which is low, massive and uncollectable. W Cen. Rec. Lovewell Mtn. Quad.

14. Synkinimatically deformed gneiss with augen-like feldspar ribbons, SW side of Gustin Pond, W. Cen. Red. Lovelwell Mtn. Quad.

15, Dark banded biotite gneiss, roadcut on Highway 10 about ½ mi. S. of Gee Mill, E base of Marlow Hill, W. Cen. Rec. Lovewell Mtn. Quad.

16. Amphibolite, 0.2 mi. E of South Hemlock Road on Sunshine Camp Road, (Toltec Camp on Topog. Map) N. Cen. Rec. Bellows Falls Quad.

Foliated quartzitic mica schist, Hubbard Hill member, roadcut 3/4 mi. E of

17. Foliated quartzitic mica schist, Hubbard Hill member, roadcut 3/4 mi. E. of E. Lempster. See Fig. 1, M. T. Heald papqr. N. Cen. Rec. Lovewell Mtn. Quad.

18. Sillimanite-bearing biotite schist, coarse sillimanite, somewhat altered to muscovite, and muscovite pseudomorphs after staurolite (?) 0.1 mi. N of Gee Mill on highway 10, about 50 yds. N of section in Table 3, p. 50, M.T. Heald paper. W. Cen. Rec. Lovewell Mtn. Quad.

19. Diopside granulite, S end of section described by M. T. Heald, just N of Gee Mill, W. Cen Rec. Lovewell Mtn. Quad.

20. Quartzitic mica schist on highway 10, ½ mi. S of Marlow Junction, W. Cen. Rec. Lovewell Mtn. Quad.

21. Andalusite (coarse crystals) schist, approx. 1 mi. N of Rochester, on Rt. 11, N.H.

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Chemical Analyses.

Specimen No.	1	1	2	5	7	9
SiO_2	58.14	58.92	65.03	62.44	56.23	63.76
TiO_2	.65	.93	.80	1.04	1.11	.99
Al_2O_3	21.00	18.55	16.52	21.29	23.15	15.96
Fe_2O_3	.33	.94	1.69	.93	1.17	.69
FeO	6.32	6.63	4.36	2.71	6.94	6.80
MgO	3.41	3.24	2.45	1.25	2.21	2.72
MnO	.06	.08	.02	.08	.12	.19
CaO	.32	.48	.10	1.00	.26	.58
Na_2O	1.10	1.49	.16	2.58	1.14	1.31
K_2O	3.85	3.74	4.26	4.01	4.53	3.88
H_2O+	4.47	3.90	3.71	2.35	2.75	2.36
H_2O-		.11	.17	.09	.09	.08
P_2O_5		.14	.09	.18	.18	.10
S	.09	.17	.03	.03	.02	.08
CO_2		.25	.03	.03	.01	.14
BaO			.05	.08	n.d	
F						.10
Cl	.04					
C			.31	.09		
	99.78	99.51	99.79	100.18	99.90	99.69

1. ✗Analyses 8 and 9. p.6 - 7
2. ✗Analysis 14. p.6 - 7. Reasonable new outcrop.
5. ✗Analysis 19. p. 8 - 9 Reasonable new outcrop.
7. ✗Analysis 29. p. 10-11.
9. ✗Analysis 40. p. 12-13. Reasonable new outcrop.

✗ Billings, M.P. & Wilson, R.J.