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A NEW HOWLITE OCCURRENCE IN SONORA, MEXICO

W. N. McAnulty, Sr.* and J. M. Hoffer*

RESUMEN

La especie mineral Howlita $Ca_2B_5SiO_6(OH)_5$ se presenta en vetas discordantes y lentes concordantes, en depósitos lacustres del Terciario de la localidad Mesa del Alamo, a unos 15 Km al E de Magdalena, Son., México. La Howlita es microgranular y compacta. Su diagrama de difracción demuestra estrecha analogía con el de la tarjeta 10-410 de la ASTM. Un análisis térmico diferencial presenta las temperaturas inicial y mínima de su mayor endoterma a unos 500° y 565°C, respectivamente.

ABSTRACT

Howlite $Ca_2B_5SiO_6(OH)_5$ occurs in discordant veins and concordant lenses in laccustrine deposits of Tertiary age at a locality on Mesa del Alamo, approximately 9 miles east of Magdalena, Sonora, Mexico.

The howlite is fine-grained and massive. Its x-ray diffraction pattern shows close similarity to ASTM Powder Diffraction card 10-410 A differential thermal analysis shows initial and trough termperatures of the majos endotherm of approximately 500° and 565° C, respectively.

*Professors of Geology, The University of Texas at El Paso

INTRODUCTION

Investigation of a reported "colemanite" deposit on Mesa del Alamo, approximately 9 miles east of Magdalena, Sonora, Mexico (fig. 1), by W. N. McAnulty, Sr. in 1967, led to the discovery of several small but interesting occurrences of howlite. Because of the lack of time, only one small outcrop was examined, and the areal extent and the thickness of the laccustrine beds in which the howlite occurs in unknown. No other boron mineral were seen in the area, but as howlite occurs in environments in which commercial deposits of borates are found, perhaps prospecting, geologic study, and exploration would result in discovery of economic concentrations of borates in the Mesa del Alamo district.

GEOLOGY

The howlite occurs in Tertiary lake deposits in the form of short, narrow (1 to 3 inches), en echelon veins normal to the bedding, in thin lenses (1 to 6 inches thick) along bedding planes., and in a vein 3 to 6 feet wide in a fault zone. The lake beds are exposed over a distance of about 200 feet in the bottom and sides of an arroyo where the arroyo cuts across and exposes the upper part of a small buried anticline (figs. 2 and 3). The upper part of the anticline involving the laccustrine deposits in truncated and overlain by 20 $\pm$ feet of coarse conglomerate. A northeast-trending normal fault of small displacement cuts the wets limb of the anticline. The laccustrine desposits are composed of thin-bedded, dirty gray, friable, tuffaceous, fine-grained sandstone and siltstone.

DETERMINATIVE MINERALOGY

The howlite is fine-grained and massive with minor small veinlets of iron oxides and clay. Samples were selected for X-ray, spectographic, and DTA analyses.

A qualitative optical spectrographic analysis indicates the presence of abundant Ca and B, moderate Si, and minor Al (E. Darnell, personal communication, 1969). The formula of howlite, $Ca_2B_5SiO_6(OH)_5$, contains no aluminum and its occurrence in the sample is probably due to a small amount of substitution in the silicon site or more likely, from inclusions of minor vein clay materials in the sample.

The results of an X-ray diffractometer pattern are shown in table I. The Mexican howlite pattern was compared to card 10-410 in the ASTM Powder Diffraction File. The two patterns show good agreement athough the strongest line on the howlite ASTM card occurs at 6.2 Å whereas on the Mexican howlite it is at 3.07 Å with the 6.09 Å reflection showing on intensity of 80.

A differential thermal analysis pattern for howlite (fig. 4) was obtained through courtesy of C.E. Locke, of the R.L. Stone Co., Austin, Texas. Three endothermic peaks are visible, a major endotherm between 500 and 600° C and two smaller ones between 650 and 750° C. In addition, an exothermic peak occurs at approximately 800° C indicating a complete breakdown of the howlite structure. The small broad inflections at points A and B are reproducible (Locke, personal communication, 1967).

Allen (1957) reports one major endotherm for howlite with the initial temperature occurring at 450 and 460° C and the trough termperature of 525 to 540° C. The Mexican howlite shows initial and trough temperature of the major endotherm at approximately 500 and 565° C, respectively. Variations in the temprerature at which endothermic reactions commence and culminate are tracable to crystal size (Allen, 1957). Allen's sample material was in the -50 +200 mesh range, whereas ours was -115 +250 mesh.

Howlite, Tick Canyon, California		2. Howlite, Mesa del Alamo, Mexico	
d(A)	Intensity (est.)	d(A)	Intensity (diffractome
12.4	40	12.0	30
6.2	100	6.09	80
5.24	5	- -	- -
4.95	5	- -	- -
4.65	5	- -	- -
4.35	30	4.35	20
4.13	40	4.08	90
3.90	80	3.85	30
3.78	5	- -	- -
3.647	5	- -	- -
3.099	90	3.07	100
3.017	30	2.993	20
2.93	40	2.915	70
2.86	5	2.835	15
2.79	10	2.765	10
2.74	10	2.716	10
2.66	20	2.642	10
2.58	10	2.563	20
2.52	10	2.503	20
2.45	40	2.459	50
2.35	5	2.327	5
2.29	5	2.280	5
2.25	5	- -	- -
2.18	5	2.176	5
2.16	5	2.150	25
2.069	50	2.053	50
2.036	70	2.026	25
2.010	20	2.004	30
1.975	30	1.968	20
1.927	30	1.915	20
1.895	20	1.889	10
1.859	10	1.854	5
1.841	5	1.835	5
1.794	50	1.786	25
1.764	20	1.761	20
1.647	10	1.649	5
1.530	5	1.523	5
1.496	10	1.491	15
plus 7 weak lines		plus 6 weak lines	

Table I.

X-ray diffraction patterns of howlite. 1-Howlite from Tick Canyon, California; Cu radiation, Ni filter, from Murdoch, 1957 (ASTM card No. 10-410), 2-Howlite from Mesa del Alamo, Mexico, Cu radiation, Ni filter, 35 KV, 18 ma.

References Cited

Allen, R.D., 1957, Differential Thermoanalysis of Selected Borate Minerals, Geological Survey Bull. No. 1036-K, p. 193-208.

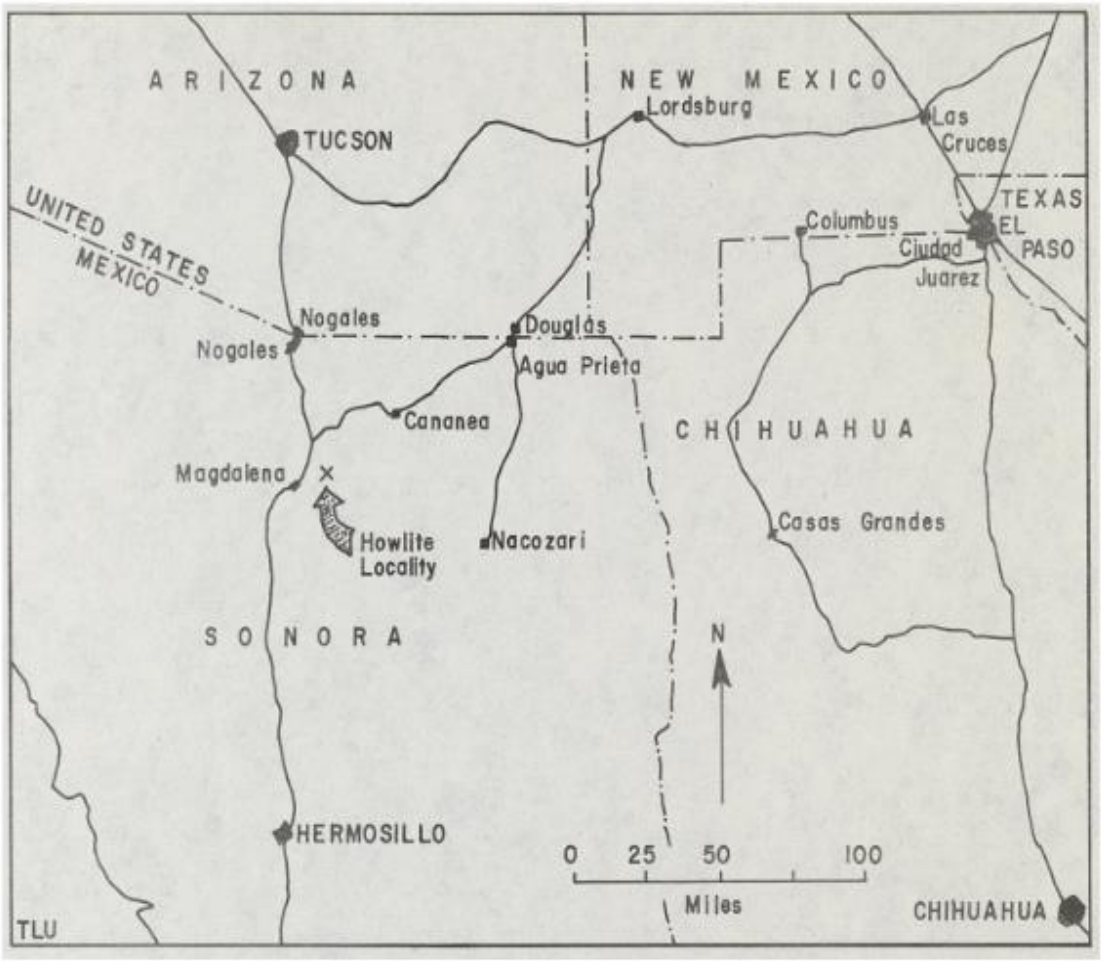
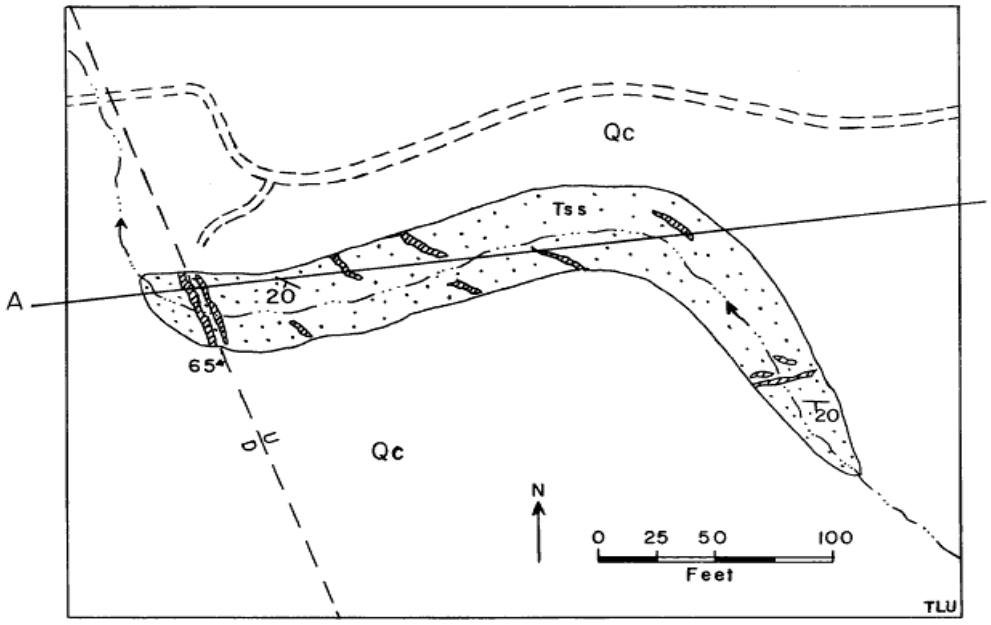


Figure 1: Index map showing howlite locality

Figure 2: Geologic sketch map-Howlite occurrence



Qc Conglomerate

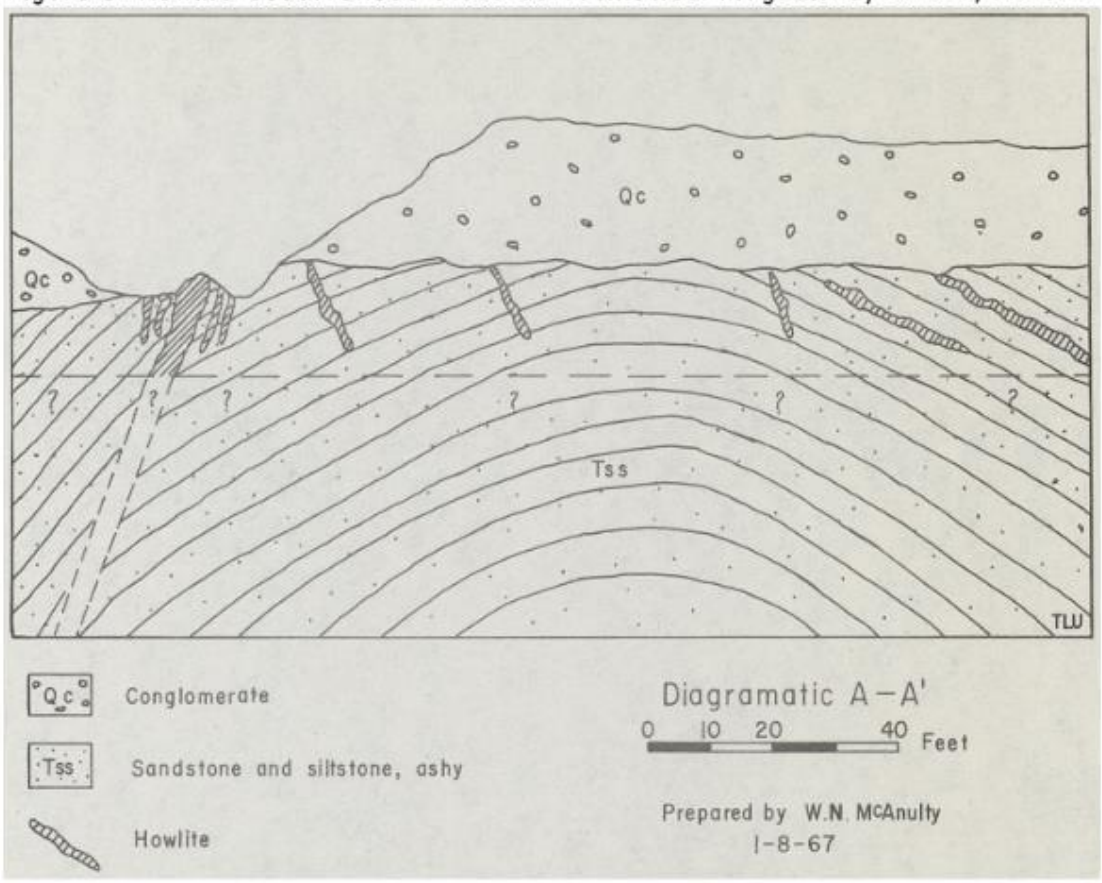
Tss Sandstone and siltstone

Howlite

Mesa del Alamo
9 miles east Magdalena, Son.

Prepared by W.N. McAnulty
1-8-67

Figure 3: Howlite occurrences-Mesa del Alamo near Magdalena, Sonora, México



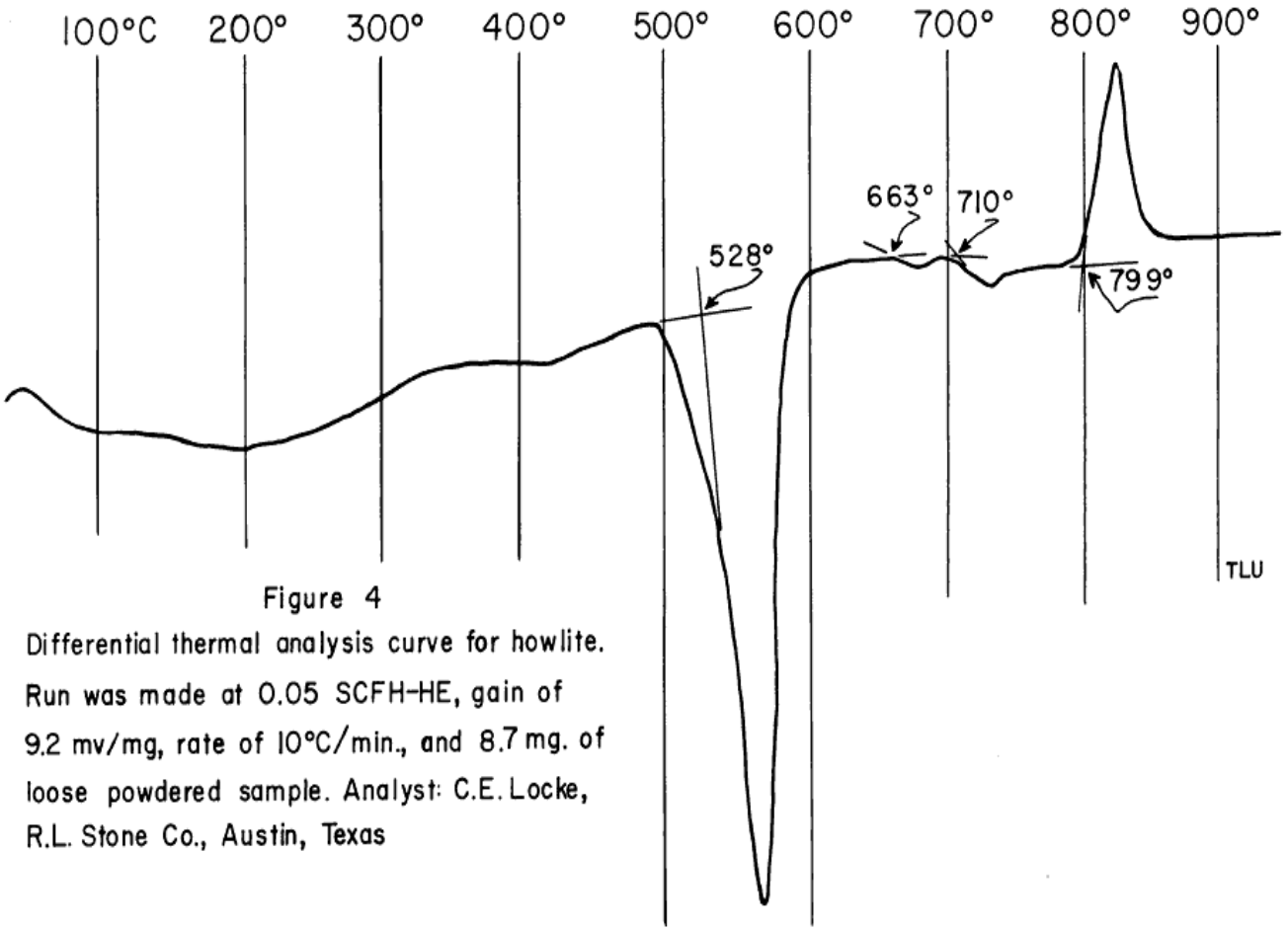


Figure 4

Differential thermal analysis curve for howlite. Run was made at 0.05 SCFH-HE, gain of 9.2 mv/mg, rate of 10°C/min., and 8.7 mg. of loose powdered sample. Analyst: C.E. Locke, R.L. Stone Co., Austin, Texas