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FOREWORD

With talc now being recognized as a major component of ceramic whiteware bodies and paint formulations and finding increased use in other industries, we have decided, during this our 50th anniversary year, to put in book form our accumulated knowledge of this valuable and versatile raw material.

Although some of the information in this book emphasizes Vanderbilt materials, there is much that is of general interest to those who are concerned with the use of New York State talcs.

R. T. VANDERBILT COMPANY, INC.

June 1, 1966

In addition to the above, many calcium and magnesium bearing minerals may be present in small amounts such as calcite, dolomite, magnesite, brucite, apatite, gypsum, phlogopite, periclase, and hexagonite. Therefore, it is quite evident that these talc deposits may easily contain two or more minerals in greatly varying amounts, depending upon the extent to which the above reactions have taken place. Extreme care in blending is, therefore, essential in producing a satisfactory commercial product.

Mineral Composition of NYTAL 100

Early in the development of the "NYTAL" ore body, samples were submitted to the Department of Geology, Columbia University and they reported the following mineral composition:

Talc	— On the order of one-third
Tremolite	— On the order of one-third
Antigorite	— Less than one-third
Magnesite	— About 5 per cent
Apatite	— Minor constituent
Periclase	— Minor constituent
Brucite	— Minor constituent
Phlogopite	— Minor constituent

At a later date Dolomite, Calcite, Hexagonite, Rhodonite and Gypsum were also found to be present in minor amounts.

Engel states that the zones of commercial talc pinch and swell, and curve in sinuous to complexly folded patterns, as shown in Figure No. 2, but are rudely conformable with adjoining marble layers. The talc zones have a composite strike length of more than five miles, a probable extent down dip in excess of 2,000 feet, and widths of as much as 400 feet. Dips along the talc belts are quite variable, ranging from the horizontal through the vertical, but averaging about 45 degrees to the northwest.

Variations in thickness of the talc belts or of any included zone may be either abrupt or gradual. The belt near Talcville, which contains one producing mine, varies up to 300 feet or more in thickness, averaging perhaps 135 feet thick in the mines. Much of this thickness is commercial talc. A talc belt north of Balmat and southeast and east of Fowler, along which are 2 active mines, varies up to at least 425 feet in thickness, and averages possibly 125 feet, figure 2. In this belt, however, one of several zones of commercial talc 6 to 25 feet thick, or rarely as much as 75 feet thick, are interlayered with impure or discolored non-commercial zones within the belt. Within these two belts are talc reserves sufficient to last several generations at the present rate of production, under resourceful mining methods.

IV PROPERTIES

Composition

Talc has the theoretical formula of

$3MgO$	$4SiO_2$	H_2O
31.7%	63.5%	4.8%

1. Chemical Analyses

NYTAL, being a tremolitic talc, has the average chemical analyses as follows:

PER CENT	NYTAL 99	NYTAL 100	NYTAL 100HR	NYTAL 200	NYTAL 300	NYTAL 400
SiO_2	57.3	56.6	56.6	57.5	56.5	57.5
MgO	28.4	29.4	29.2	28.3	29.0	28.4
CaO	8.0	7.6	8.0	7.2	7.8	6.8
Fe_2O_3	0.3	0.3	0.3	1.5	.2	1.6
Al_2O_3	0.6	0.5	0.5		.7	
MnO	0.3	0.3	0.3	0.3	0.2	0.2
Na_2O	0.3	0.2	—	0.2	—	0.2
Ignition Loss	4.8	5.1	5.1	5.0	5.6	5.3
	100.0	100.0	100.0	100.0	100.0	100.0

General Appearance

1. Raw Ore

As previously stated there are many types of ore blended to produce the usable commercial talc. The two most distinctive types are a hard, grey, massive type mined for the ceramic industry (Figure No. 3) and the soft, shiny, foliated type mined for the paint industry (Figure No. 4).

There is a great difference in the chemical composition of the three major minerals. There is also a vast difference in their physical and pyro-physical properties. Rogers and Kerr[4] give the following description of these three minerals when viewed under the microscope.

> "*TALC* occurs in coarse to fine platy or fibrous aggregates. Talc greatly resembles muscovite (mica) and pyrophyllite. It may be necessary to make a chemical test in order to prove the identity of talc."
>
> "***Tremolite*** occurs in long prismatic crystals and columnar to fibrous aggregates. Asbesti-

RAW ORES

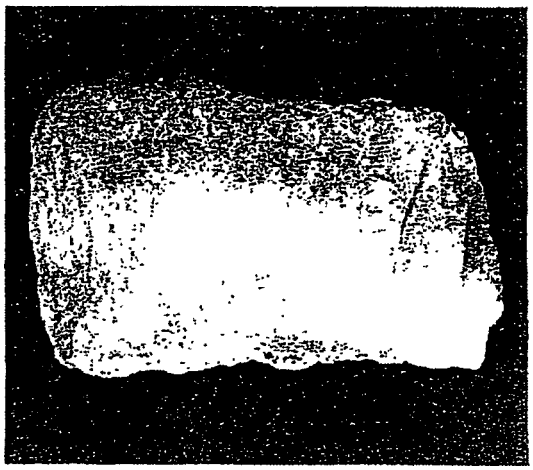

Figure 3—Hard Ore

Figure 4—Soft Ore

form varieties are common. Tremolite has the same general appearance as wollastonite."

Antigorite occurs in anhedral crystals or aggregates of fibrolamellar structure. It often occurs as pseudomorphs after pyroxene, olivine, etc."

A wide variation in the unctuousness of these minerals has proven to be the physical property hardest to control and one of the most important as it greatly affects both pressing and casting properties of ceramic bodies.

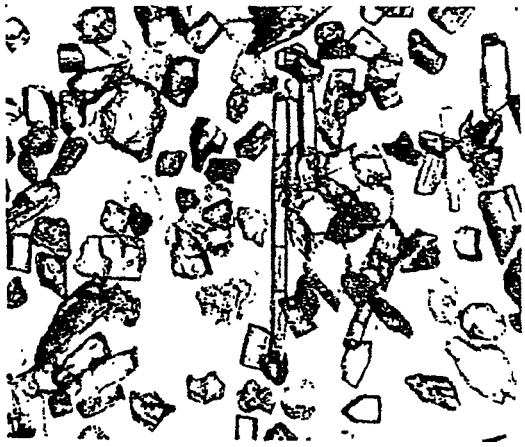

Figure 5—Nytal 99

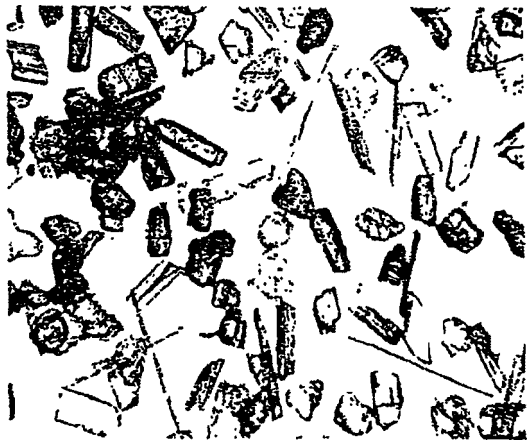

Figure 6—Nytal 100

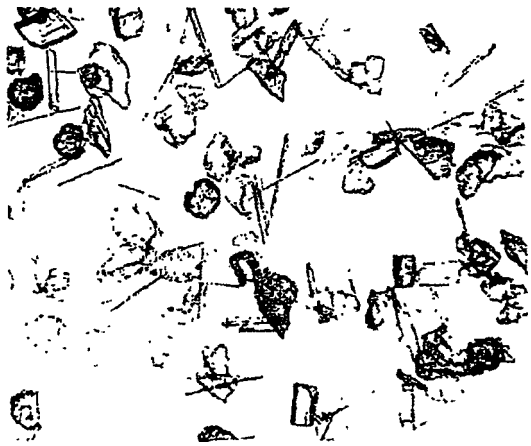

Figure 7—Nytal 300