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FILLER EVALUATION  
August 1968 Progress Report

Lab. Nos. 3243, 3263, 3264, 3265, 3266, 3267,  
3270, 3271, 3272 - Book 228

by  
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Introduction

In the fall of 1967 after finishing a report on limestone beneficiation for a Canadian company (December 1967 Progress Report), it was decided that this engineer would continue this line of work on material found in the western part of North Carolina.

After further investigation of the field of fillers, it was decided that material would have to be high in calcium carbonate, ( $\text{CaCO}_3$ ), and low in magnesium carbonate, ( $\text{MgCO}_3$ ). The material would also have to exhibit a high color reflectance and a low content of other impurities.

Sample Identification

<u>Lab. No.</u>	<u>Identification</u>
3243	Fletcher Quarry
3263	Regal Quarry (white rock)
3264	Regal Quarry (blue rock)
3265	Regal Quarry (terrazzo material)
3266	Murphy Marble Belt
3267	Martin Creek School, Cherokee County
3270	Yadkin County
3271	Yadkin County
3272	Madison County, Walnut Creek

### Procedure

After consulting the available literature, field trips were arranged to several of the closer plants producing calcium carbonate fillers.

From this information, it was determined that the best type of material should meet the following specifications:

Total Carbonates	95.0% (min.)
MgCO <sub>3</sub>	3.0% (max.)
Al <sub>2</sub> O <sub>3</sub>	0.1 - 0.25%
Fe <sub>2</sub> O <sub>3</sub>	0.08 - 0.19%
SiO <sub>2</sub>	0.3 - 0.9%
Dry Brightness	92 - 94%

Particle size requirements were not determined in light of the prior emphases on chemical analyses.

A grinding study was investigated. It was determined that a 1,000-gram charge ground for three and one-half hours in a pebble mill with a 4,000-gram charge of ceramic balls turning at 30 percent of critical speed would reduce the samples to the necessary size. The samples were first jaw crushed to minus one-half inch and roll crushed to minus one-eighth inch before grinding dry in the pebble mill.

Samples of the ground material were sent for analysis, and portions were taken for reflectance measurements.

### Results

The results of the reflectance readings are shown in Table 1 in the appendix. The readings were taken on a Photovolt Reflection Meter with the filters as shown. The readings most closely approaching industrial methods would be those with the green tristimulus filter (a wave length of about 550)\*. All readings are given as a percent of MgO.

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\* Chemistry and Technology of Lime and Limestone, by Robert S. Boynton; Interscience Publishers 1966, p. 471.

The results of the chemical analyses are given in Table 2 of the appendix.

Remarks

This work was carried out in hope of finding a deposit of Western North Carolina marble that could be used in the filler markets. It was hoped that a deposit could be found that would require only fine grinding to meet market specifications.

Examining the results on this basis, it can be seen that some of the material is close to the color specification, i.e., Lab. Nos. 3263, 3265, and 3266. Others have the required low MgO and acid insoluble material, two of the most critical requirements. Unfortunately, these characteristics do not appear simultaneously in any one sample.

Appendix

Table 1

Color Readings

<u>Sample No.</u>	<u>Location</u>	<u>Filter Color</u>			
		<u>Green</u>	<u>Blue</u>	<u>Amber</u>	<u>None</u>
3243	Fletcher	85.0	88.0	89.0	86.0
3263	Regal (white)	92.0	92.0	94.0	90.0
3264	Regal (blue)	82.0	84.0	84.0	82.0
3265	Regal (terrazzo)	90.0	92.5	92.0	90.0
3266	Murphy	91.0	93.0	91.5	88.5
3267	Martin Creek School	67.0	65.0	66.0	67.0
3270	Yadkin County	87.0	87.0	88.0	86.0
3271	Yadkin County	85.0	85.0	86.0	85.0
3272	Madison County	85.0	83.0	86.0	84.0

Table 2 - Chemical Analyses

<u>Sample No.</u>	<u>Acid Insol</u>	<u>SiO<sub>2</sub></u>	<u>Fe<sub>2</sub>O<sub>3</sub></u>	<u>Al<sub>2</sub>O<sub>3</sub></u>	<u>CaO</u>	<u>MgO</u>
3243	0.92	0.70	0.11	0.32	31.0	21.0
3263	4.30	3.70	0.61	1.32	39.4	11.2
3264	1.4	1.00	0.49	0.80	54.0	0.81
3265	0.90	0.70	0.36	0.40	32.2	20.0
3266	30.3	N.D.	0.26	0.80	21.4	14.6
3267	1.8	1.5	0.47	0.64	31.9	18.9
3270	11.1	N.D.	0.12	0.68	47.6	0.96
3271	16.9	N.D.	0.18	0.80	47.1	0.25
3272	17.0	N.D.	0.18	0.16	44.6	0.23
Competitor No. 1	2.20-3.20	1.18-2.80	0.041-0.066	0.16-0.57	52.4-54.7	0.22-0.60
Competitor No. 2	2.30-2.58	1.24-1.90	0.083-0.120	0.16-0.64	54.0-54.4	0.20-0.30
Recommended	-	0.30-0.90	0.080-0.190	0.10-0.25	-	1.36 max.

\* N.D. = Not Determined.

<u>Ign. Loss</u>	<u>Calc.</u>	<u>Calc.</u>	<u>Based on 100% Carbonates</u>	
	<u>CaCO<sub>3</sub></u>	<u>MgCO<sub>3</sub></u>	<u>CaCO<sub>3</sub></u>	<u>MgCO<sub>3</sub></u>
46.3	55.37	46.20	54.50	45.50
43.1	70.37	24.64	74.07	25.93
42.9	96.44	1.78	98.19	1.81
46.8	57.51	44.00	56.65	43.35
32.9	38.22	32.12	54.34	45.66
46.0	56.97	41.58	57.81	42.19
39.2	85.01	2.11	97.58	2.42
36.6	84.12	0.55	99.35	0.65
36.4	78.66	0.51	99.36	0.64
-	93.60-97.68	0.48-1.32	99.5-98.87	0.5-1.33
-	96.44-96.43	0.40-0.66	99.6-99.33	0.4-0.68
-	95.0 min.	-	-	-