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MEMORANDUM REPORT NO. M-542

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EXTENDERS IN FLAT WALL PAINT

INTRODUCTION

This work comprised the evaluation of various extenders as substitutes for the Johns-Manville diatomaceous earth (Celite 281) in the new Improved Town and Country Flat and new deep tint flats. These flats are described in Release Letters #1172-D and #1423. This work was performed under Project P-5073, Class C, and was prompted by the unavailability of Celite 281.

SUMMARY AND CONCLUSIONS

The Great Lakes Carbon Company's Dicalite WB-5 (diatomaceous earth) appeared to be a direct substitute for Celite 281 in both types of products.

The use of the National Lead Company's Lorite (a natural mineral composed of diatomite and calcium carbonate) seemed to give a direct finished product match to its Celite 281 counterpart in the deep tint; however, in the Town and Country Flat White, it gave an acceptable product but it was not a direct product match because of a very slightly higher sheen.

Wollastonite (calcium meta silicate), a recently promoted material, did not appear of interest because of film appearance and grit.

Incomplete evidence showed that the Great Lakes Carbon Company's Dicalite L-2 was promising and that Dicalite L-1 was not.

Celite 266 (W-165) appears to be promising as an alternate raw material substitute for Celite 281 in the new deep tints; because of its poor color, it could not be considered in the white formulation.

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This evaluation involved formulations based on regular and low odor mineral spirits and vehicles.

ACTION TAKEN OR RECOMMENDED

It is suggested that the Dicalite WB-5 extender be considered as an alternate source of supply for Celite 281; however, it should be pointed out that this material was a special sample and not a commercial item. Additional information on the suitability of Dicalite L-2 as direct product substitute should be gathered.

The use of Celite 266 (W-165) should be considered as an alternate raw material for Celite 281 in the new deep tints.

The formulations employing the Lorite extender should be considered as emergency replacements.

EXPERIMENTAL DETAILS

The various extenders were evaluated in the high PVC-"Ti-Cal" formula and also in the Pigments Department's titanium dioxide-extender formula against the Celite 281 as a control.

The overall evaluation program encompassed regular and low odor mineral spirits systems, production evaluation and practical room tests.

The optimum formulations are shown in the breakdown below; a complete breakdown of all formulations is shown in Table I at the end of this report.

<u>Color</u>	<u>Code</u>	<u>Solvent</u>	<u>Type</u>	<u>Extender</u>	<u>Remarks</u>
White	P-621-U-31598	Reg. Min. Spirits	High PVC-"Ti-Cal"	Lorite	sl. higher sheen
White	P-621-U-39116	" " "	"	Dicalite WB-5	satisfactory
White	P-621-U-39177	Low Odor Min. Spirits	"	Lorite	sl. higher sheen
White	P-621-U-39157	" " " "	"	Dicalite WB-5	satisfactory
Deep Tint	P-621-U-31588	Reg. Min. Spirits	TiO ₂ -Ext.	Lorite	satisfactory
Deep Tint	P-621-U-39118	" " "	" "	Dicalite WB-5	"
Deep Tint	P-621-U-39159	Low Odor Min. Spirits	" "	"	"
Deep Tint	P-621-U-45412	" " " "	" "	Lorite	"
Deep Tint	P-621-U-39147-L-1	Reg. Min. Spirits	" "	Celite 266	"

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Satisfactory production batches on a low odor basis were manufactured with the Dicalite WB-5 extender and the Lorite extender for both types of flat wall paint. However, as stated before, the Lorite extender in the high PVC-"Ti-Cal" formula does give slightly higher, but not objectionable, sheen.

The various aspects of the development are discussed in the following paragraphs:

The physical property characteristics of the Lorite (KW-5078) and Dicalite WB-5 (KW-5079) formulations were comparable to Celite 281 for both types of formulas; that is, the application, color, color holdout, film appearance and stability were equal, except for a slightly higher sheen in the case of the Lorite in the high PVC-"Ti-Cal" formula.

In the deep tint TiO_2 -extender formula, the Celite 266 (W-165) version was also equal in physical property characteristics.

The method of substituting or replacing the Celite 281 in both types of formulas with these various extenders - Dicalite WB-5, Dicalite L-1, Dicalite L-2, Wollastonite P-1 and P-4 and the Celite 266 was a direct pound-for-pound substitution. In the case of the Lorite, for the high PVC-"Ti-Cal" white type formula, the volume of calcium carbonate (W-90) and Celite 281 (W-99) was replaced by an equal volume of Lorite; another replacement was half by weight of the previously stated volume of Lorite plus additional calcium carbonate to maintain the same PVC. For the titanium dioxide-extender deep tint formula, the diatomaceous earth content of the Lorite replaced the Celite 281 and the PVC of the paint was maintained the same by adjusting the calcium carbonate (W-90).

The Wollastonite P-1 grade (KW-5093) extender gave a slightly higher sheen in the high PVC-"Ti-Cal" type of formula and in the case of the TiO_2 -extender type of formula a fibrous texture. We could not detect any difference in the laboratory between the Wollastonite P-1 and P-4 grades and, inasmuch as the P-1 grade was cheaper and commercially available, it was selected for the production evaluation batches of each type of flat wall paint. The production batches showed excessive large size agglomerates or grit.

Several other diatomaceous earth extenders, the Dicalites L-1 (DS-24111) and L-2 (DS-24258), were examined in this study, but not enough sample was available for a comprehensive evaluation. However, it may be stated that the Dicalite L-2 appears promising.

The cost of these extender substitution formulations was approximately the same as the Celite 281 control.

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Table I shows a listing of the various extenders and their characteristics in both types of flat wall paint and for both types of solvents.

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TABLE I
PROPERTIES OF FLAT WALL PAINTS USING VARIOUS EXTENDERS

<u>Color</u>	<u>Code</u>	<u>Solvent System</u>	<u>Type of Formula</u>	<u>Extender</u>	<u>Viscosity Storrmer</u>		<u>Remarks</u>
					<u>Shelf Age</u>	<u>Oven Age</u>	
White	P-621-U-31572-I-1	Reg. Min. Spts.	High PVC-"Ti-Cal"	Dicalite L-1	105	6 mos.	Poor Appearance
"	P-621-U-31574	"	"	Dicalite L-2	90	"	Promising RX
"	P-621-U-31598	"	"	Lorite	104	5-3/4 mos.	Promising RX. Slight Sheen.
"	P-621-U-31596	"	"	Lorite	101	"	Ropy
"	P-621-U-39105	"	"	Cellite 281	98	5-1/2 mos.	Control RX
"	P-621-U-39116	"	"	Dicalite WB-5	101	5 mos.	Promising RX
"	P-621-U-39151	"	"	Wollastonite P-4	92	4-1/2 mos.	Gritty & Sandy. Sl. Sheen
"	P-621-U-39153	"	"	Wollastonite P-1	102	"	Gritty & Sandy. Sl. Sheen
"	P-621-U-39157	Low Odor	"	Dicalite WB-5	138	"	Promising RX
"	P-621-U-39177	Min. Spirits	"	Lorite	114	3-3/4 mos.	Promising RX
"	P-621-U-39179	"	"	Wollastonite P-1	101	"	Gritty & Sandy. Sl. Sheen
"	P-621-U-39181	"	"	Cellite 281	122	"	Control RX
"	P-621-U-39157 B# P-484130	"	"	Dicalite WB-5	116	2-1/2 mos.	Production Batch
"	P-621-U-39177 B# P-4799	"	"	Lorite	92	2 mos.	Satisfactory
"		"	"				Production Batch Satisfactory

Color	Code	Solvent System	Reg. Min.	Spts. TiO_2 -Ext.	Type of Formula	Extender	Shelf Age	Viscosity	Sterner Oven Age	Remarks
Deep Tint	P-621-U-31576	"	"	"	"	Dicalite I-1	95	6 mos.		Poor Appearance
"	P-621-U-31588	"	"	"	"	Lorite	101	6 mos.	96	2 1/2 mos. Sl. Ropy
"	621-803 Lab. Batch	"	"	"	"	Celite 281	122	6-1/4 mos.	83	5 mos. Control RX
"	P-621-U-39118	"	"	"	"	Dicalite WB-5	98	6-1/4 mos.	80	2 mos. Promising RX
"	P-621-U-39145	"	"	"	"	Lorite	99	5-3/4 mos.		Promising RX
"	P-621-U-39155	"	"	"	"	Wollastonite P-1	104	"	89	5-3/4 mos. Gritty
"	P-621-U-39147-L-1	"	"	"	"	W-165	96	"	69	2 mos. Promising RX
"	P-621-U-39149	"	"	"	"	Wollastonite P-4	103	"	70	5-3/4 mos.
"	P-621-U-39159	low Odor Min. Spirits	"	"	"	Dicalite WB-5	108	4-1/4 mos.	85	5-3/4 mos. Sags
"	P-621-U-45414	"	"	"	"	Wollastonite P-1	135	3 mos.	87	3 mos. Gritty
"	P-621-U-45412	"	"	"	"	Lorite	128	3 mos.		Promising RX
"	P-621-U-45406	"	"	"	"	Wollastonite P-1	132	"		Gritty
"	P-621-U-39187	"	"	"	"	Lorite	108	3-1/2 mos.		Sags
"	P-621-U-39183	"	"	"	"	Celite 281	108	"	89	3-1/2 mos. Control RX
"	P-621-U-39159	"	"	"	"	Dicalite WB-5		2-1/2 mos.	87	2-1/2 mos. Production Batch Sags
"	B# P-484131	"	"	"	"	Lorite	100	1-1/2 mos.		Production Batch Satisfactory
"	P-621-U-445412	"	"	"	"					
"	B# P-464818	"	"	"	"					

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