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MEMORANDUM REPORT NO. M-670

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BACKGROUND ON SOYA PE OIL IN HOUSE PAINT

INTRODUCTION:

This report covers house tests, field experience and durability studies of free chalking outside white house paint made with soya PE oil. Soya PE oil offers improvements in tints and Two-Purpose White as covered in Memorandum Report No. M-669. This is a separate report because the material covered is not directly applicable to the tints and Two-Purpose House Paint. However, the experience with soya PE in free chalking house paint is extensive and does supplement our knowledge of soya PE vehicles. Report No. M-669 is issued simultaneously with this report.

SUMMARY & CONCLUSIONS:

Soya PE oil was one of the vehicles studied in the 1947, 1948, and 1949 house tests.

5300 gallons of soya PE oil, #40 Outside white (301-882) were produced and sold in a trial marketing program in 1949 and 1950 (per Release Letter No. 1187). The Sales Department kept a record of 62 houses which were painted with 301-882. These houses are being reviewed. There have been no adverse comments on 301-882 soya PE #40 from customers.

Some difficulty was encountered with the gloss and flashing of soya PE paints when made in the plant but this difficulty was cleared up by reducing the pigment volume 2%.

A total of eight exposure studies have been exposed over the past six years.

N35488

Soya PE oil and linseed are equivalent for resistance to flaking and checking, cleanliness and mildew resistance on red cedar in Delaware. Soya PE is slightly better for flaking and cracking over yellow pine in Texas. Although early exposures in #40 Outside White formulas showed that soya PE is better in cleanliness, subsequent exposures and field tests did not show any difference. Soya PE free-chalking paints may erode faster than comparable linseed oil paints although quantitative data on erosion is not available.

Can stability of three batches of 301-882 has been determined. Two batches are good at 109 KU and 125 KU at 18 months; whereas, one batch is higher at 140 KU but is not livered. Settling is normal at 14 months.

DETAILS:

House Tests

Laboratory supervised

The laboratory conducted house tests on soya PE oil in 1947, 1948 and 1949. Of these, three 1948 tests and fifteen 1949 tests were active in the spring of 1953 when they were inspected and subsequently reported in Memorandum Report M-628, dated 8/25/53. Soya PE is equal to linseed in cleanliness and is better than 301-756 prewar #40 and equal to 301-864 (lead zinc oxide plus 20% soya oil) in film integrity. Differences in cleanliness of soya PE and linseed oil paints are not significant as shown by the following data. Cleanliness is rated by photographic standards on a 1-10 scale.

1948 house tests	Difference is 0.07 ± 0.3 (not significant)
1949 house tests	Difference is 0.02 ± 0.11 (not significant)

Customers' houses known to use 301-882

The Sales representatives in Youngstown, Ohio; Miami and New Orleans collected the names and addresses of customers who were known to have painted with 301-882 in 1949 and 1950 and of other customers who were known to have painted with 301-875 in the summer of 1949. The houses in Youngstown were inspected in the fall of 1950 but the results were inconclusive at that time. There has been no further followup because: 1) The price of linseed oil dropped from 29¢ in 1949 to 19¢ in 1950. The corresponding costs of soya oil were 15¢ in 1949 and 16¢ in 1950. The premium paid for linseed oil fell from 14¢ to 3¢ in one year.

2) It was felt that test fence evidence was adequate to show that soya PE is no poorer than linseed in dirt collection.

3) There are not enough houses or good control houses to pick up small differences in cleanliness.

However, it may be wise to inspect the houses again.

PRODUCTION EXPERIENCE:

In August of 1949 four full size batches of 301-882 were made. Although laboratory batches had shown satisfactory gloss at 32% pigment volume the first plant batch at 32% pigment volume was low in gloss and was subsequently dumped and reworked. By adjusting the pigment volume to 30% the gloss was corrected. The remaining batches were made at 30% pigment volume and were satisfactory for gloss. It was first thought that low gloss was inherent in plant produced soya PE but this did not prove to be the case.

EXPOSURE EVIDENCE AND STABILITY:

Results from exposure studies are discussed under each weathering property.

FLAKING, CRACKING AND CHECKING:

During the exposures of the following studies in Delaware no incidents of flaking, cracking or checking occurred.

<u>Series</u>	<u>Age</u>	<u>Exposure</u>	<u>Comments</u>
9560	5 years	SV Delaware	No failure
9900	5 years	NV, SV, + 45 Delaware	No failure
10820	4 years	" " " "	No failure
10816	4 years	" "	No failure
11591	29 months	SV Delaware	No failure
12268	26 months	SV Delaware	No failure
10562	22 months	SV Delaware	No failure

CLEANLINESS AND MILDEW RESISTANCE:

Cleanliness is rated by comparison with photograph standards which are graduated on 0-10 scale with 10 = perfect.

<u>Series</u>	<u>Age</u>	<u>Linseed</u>	<u>Soya PE</u>
9900	28 mos. Del. NV	8.1 $\pm$ 1.1	8.0 $\pm$ 1.1
10820	4 years Del. NV	Soya PE paints appear cleaner than linseed oil controls,	
11591	17 mos. FNV	6.5 $\pm$ 1.0	7.2 $\pm$ 1.0
12268	23 mos. FNV	7.86 $\pm$ 0.31	7.56 $\pm$ 0.31
10562	FNV, 21 mos.	8.37 $\pm$ 0.4	8.36 $\pm$ 0.4

$\pm$ values are 95% reliability limits

MOISTURE BLISTERING:

Exposure Series 10821, 10817 and 9901 study moisture blistering only. The tests were run during the 1948-49, 1949-50 and 1950-51 seasons. Blistering tests were run on Series 10821 during the 1949-50 and 1950-51 seasons. Thus, in four comparisons covering three seasons the soya PE paint was tested against standard linseed oil paints. In all three studies the soya PE paint was equal to the linseed oil control.

EROSION:

Conclusions on erosion should not be made yet because #10816 is the only series listed below in which film thickness is controlled. Although first signs of bare wood are showing, we should wait for six months or a year when erosion is advanced before drawing definite conclusions. However, in the other studies soya PE consistently erodes to bare wood earlier, and, to be able to make allowances in any future free chalking soya PE formulas, we are exposing a small study of TiPure R-610/ TiPure T ladders in series 13600 to determine what level of TiPure R-610 is needed to obtain chalking equal to 301-918 #40 Outside White.

<u>Series</u>	<u>Age</u>	<u>Coats</u>	<u>Status of Soya PE Paint</u>
10816 NV & SV	4 years	2	First evidence of bare wood is showing.
10820 45'S. Del	4 years	3	Slight erosion reported.
9560 45'S. Del	5 years	3	Soya PE shows more advanced erosion than linseed.
NV Del.	5 years	3	First evidence of bare wood is showing.
SV Del.	5 years	3	First evidence of bare wood is showing.

Linseed controls show no erosion failure except series 9560 at 45°S. in Delaware.

DURABILITY ON YELLOW PINE IN TEXAS:

On yellow pine panels in Texas soya PE appears to be better than linseed oil consistently, although the advantage is small.

<u>Series</u>	<u>Age</u>	<u>Comment</u>
9560	24 months	Soya PE paint is slightly better than 301-756.
9900	34 months	Soya PE paint is better (95% reliability) than 301-756.
10820	24 months	Soya PE paint is very slightly better than 301-864.
10816	39 months	Soya PE paint is slightly better than 301-875
12268	24 months	Soya PE paint is slightly better than 301-756
10562	29 months	Soya PE paint is slightly better than 301-864
	301-875	80/20 LO/soya zinc oxide formula
	301-756	Prewar #40
	301-864	80/20 LO/soya leaded zinc #40 O. W.

PACKAGE STABILITY:

<u>Batch</u>	<u>Initial Viscosity</u>	<u>12 Months Viscosity</u>	<u>18 Months Viscosity</u>	<u>Comment</u>
866047	94 KU	105 KU	140+ KU	
846570	93	102	109	
884817	96	110	125	#6 settling * at 14 months

* #6 settling is soft and does not drain off a spatula rapidly.

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1/27/54