

Paint Research
December, 1955

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#97 - SWP

Cards 71 - 75 for Rex 471 SWP Gloss White were set up to require a check on viscosity before the final two gallons of thinner per hundred gallons are added. Information at hand indicates that in most cases the viscosities on the initial check are too low to permit the addition of any, or at best, only a portion of the thinner withheld. In the present form of the card the leaded zinc and oil were increased so that the formula bulks 102 gallons gross without the two gallons of (5027) added after the viscosity check. If the formula would yield satisfactory consistency when revised to the previous form to bulk 102 gallons gross with all thinner in, a saving of 5-1/2¢ per gallon is possible. This plan would call for a check of viscosity before the addition of the last two gallons of thinner but the actual weight per gallon shown would be in proper relation to the theoretical weight of the gross formula.

SWP White and a tint were prepared to determine viscosities when made up on this basis, before and after addition of the final two gallons of thinner.

	Rex 471 Card 75	Rex 471 Revised	Rex 496 Card 53	Rex 496 Revised Tint Base	Rex 496 Revised Tint Base
Characteristics	154 S	158 S	White Base	White Base	White Base
Gross yield - gal.	104.1	101.9	103.5	101.45	101.46
T. Wt. (on gross yield)	14.55	14.59	14.48	14.58	14.69
A. Wt. (on gross yield)	14.64	14.56	14.53	14.60	14.84
Viscosity - #3					
100 gal. basis: Fresh	-	28.4"	-	21"	22.5"
102 " " "	25"	20.2"	20.4"	18"	17.0"
102 " " 24 hr.	-	28.5"	-	24"	22.0"
104 " " Fresh	21"	-	18.0"	-	-
104 " " 24 hr.	24"	-	20.0"	-	-
Oil - gal.	52.4	51.4	51.5	51.4	51.4
Titanium Pigment					
6600 - 1403 dry	50 lb.	50 lb.			
6603 - 2030 "	50 "	50 "			
6680 - 2132 "	175 "	175 "			
6685 - 2140 "			350 lb.		350 lb.
6650 - 2174 "				158 lb.	
6640 - 412 "	325 "	300 "	300 "	300 "	300 "
6622 - 1424 "	100 "	100 "	100 "	100 "	100 "

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The general indications are that viscosities at the time of first check would be too low to encourage the final addition of thinner. Further batches will be made using carefully selected bodied oils to be sure viscosities obtained represent results of standard batches. Attempts will then be made to increase efflux consistency through pigmentation rather than by higher total vehicle consistency.

Jones-Dabney's body control agents RL 80 and 606-Y were evaluated against heat bodied linseed oil (324). SWP Gloss White Rex 471 was used as a straight oil paint, One Coat Repaint White Rex 476 as an oil paint with a small amount of alkyd and Rex 493 SWP Woodland Brown as a semi-alkyd paint. The paints have been in storage for one year. The special agents show a slight advantage in the first two types but are slightly less effective in the third or semi-alkyd type. All of the paints are still in good condition and were well dispersed after two minutes on the Red Devil shaker.

SWP Gloss White Rex 471 - Oil Vehicle

<u>Agent</u>	<u>Fresh</u>	<u>Viscosity - #3 Orifice - Seconds</u>			
		<u>2-1/2 Mo.</u>	<u>6 Mo.</u>	<u>9 Mo.</u>	<u>1 Year</u>
None	22	29	31	26	23.5
0.75% RL 80	36	39	40	39.4	36
1.25% 606-Y	35	39	44	29.6	43
0.075% Bodied Oil (324)	33	27	29.5	43.0	27.5
None	20	30	23	23	22
0.5% RL 80	27	30	26	29	26.6
1.25% 606-Y	25	25	27	28.8	27.6
0.075% Bodied Oil (324)	25	24	25	24.6	24.0

One Coat Repaint White - Rex 476
Oil Vehicle - Some Alkyd

None	20	17	18	18	17.6
0.35% RL 80	28	32	35	28.8	26.0
1.0% 606 Y	34	39	47	44.4	25.0
0.25% Bodied Oil (324)	33	21	23	23.0	22.0

SWP Woodland Brown - Rex 493
Semi-Alkyd Vehicle

None	28	26	29	33.2	27.8
0.4% RL 80	31	30	29	30.2	28
0.6% 606 Y	31	29	29	30.8	27.6
.2% Bodied Oil (324)	33	27	29	-	32

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Resin Research has submitted several safflower oils for evaluation in SWP:

RD 7639 - Safflower 22 G. Body - G.

RD 7640 - As above, bodied to Z_2 - Z_3 .

RD 7641 - Non-break safflower.

RD 7642 - Air blown safflower 22 G.
Body - Z_2 to Z_3 . A.V. - 5.1

RD 7644 - Air blown safflower (non-break).
Body - 54. A.V. - 2.3.

SWP Gloss Whites were made with combinations of the various safflower oils and checked for drying, wrinkling and gloss characteristics. The initial formulations made with 100% safflower varied from poor to good minus in gloss whereas the regular SWP had good gloss characteristics. Drying was improved with higher conjugated safflower oil content, but this was accompanied by wrinkling. When blown safflower oil RD 7642 and (2) raw linseed oil were used as the vehicle, excessive flow resulted. Further work will be required to determine the most desirable combination of oils to use to obtain brushing, flow, gloss and drying properties in the paint.

Panels 20404-20421 C, F, K were prepared during the month, all cedar siding for exposure at Chicago north and south, and Florida and Coffeyville south only. These tests include Rex 471 SWP Gloss White made with MB 5201 special maleic-treated oil and with 68 C 6 dry (18 M leaded zinc). The leaded zinc tests are also extended to Rex 476 SWP One Coat White, Rex 478 Geneva Cream and Rex 474 Chelsea Gray. Details of composition and paint characteristics were presented on page 19 of last month's report.

A second progress report was issued on the exposures of the Titanium Pigment Corporation cooperative series of 1951, panels 15335-72 C, F. The previous progress report was in September, 1952. The present report covers 24 months' exposure at Florida, vertical south, and at Chicago, north and south. Brief identification and results to date are as follows:

Group I. Fume Resisting Whites. Essentially Rex 436 of early 1951. The TiO_2 variations are: all Titanox AA, 50/50% A/AA, 50/50% A/RCHT and 75/25% A/RANC. Normal at Florida, no failure, clean and white. Self-primed a little cleaner and whiter than Rex 450-primed, which seems to be a general trend. The only variation seen on the Chicago tests is a slight yellowness, with slightly more dirt and less erosion, on the Titanox A/RCHT blend.

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Group II. Lead Containing Whites. Essentially Rex 471. Using Titanox A, 50/50% A/AA, 50/50% A/RCHT and 82/18% A/RANC. No film failure at either location (Chicago erosion not yet serious). At Florida this group seems just slightly cleaner than Group I; Chicago tests are not as noticeably so, but tend to bear out this trend in most cases. The 82/18% Titanox A/RANC sample shows incipient erosion at Florida, and a little more than average erosion at Chicago.

Group III. Lead Containing Tints (Based on Rex 465 Colonial Yellow). TiO_2 variations are RANC with Mg silicate and with Ca carbonate, also the same extenders with Titanox RC. As to fading and chalk-masking, the two locations agree almost perfectly. The Titanox RC/20 dry Mg silicate combination is best, RC/566 whitening is poorest, and RANC/20 dry and RANC/566 intermediate. At Chicago, the dirt collection tends to vary in the same way, and there are no other differences. Therefore, the general appearance ratings are in that order. At Florida checking is a serious factor, both RC samples showing much more checking than the RANC samples.

Group IV. Lead Containing Tint (Based on Rex 477 Westchester Gray). Same variations as preceding. In general, the checking at Florida follows the same pattern as in Group III. On the contrary, the pattern of fading of Group III does not show up on the grays, which are all badly chalk-masked, quite dirty and poor in general appearance. The Chicago panels again show the RC/566 blend as undesirable because of a yellow chalkiness. However, the RC/20 blend, good in Group III, is also adversely affected by this same yellow cast, apparently caused by the RC.

Group V. Titanium Pigment Corporation Whites. Mostly orthodox lead-zinc-Mg silicate formulas. Where National's 45 X is mentioned, it replaces all lead. No. 9 and 10 contain no lead.

<u>Florida</u>	<u>Chicago</u>
Guide. (This is Rex 471, all anatase TiO_2 .) Quite clean, scattered light checking.	Clean, moderate erosion. No check or crack on any tests.
1. A-MO/RA. No failure, but adherent chalk; yellowish and dirty.	More eroded, yet also holding slightly more dirt.
2. A-MO/RA-10. Same, also very slight checking.	Slightly less erosion; slightly more dirt.
3. A-168/LO. No failure. Dirty, but less yellow cast.	Reverses Florida trend. Rather on the clean side.

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<u>Florida</u>	<u>Chicago</u>
4. A-168/LQ/45 X. Same	About like 2; tends to be dirty.
5. As 2 but Pb-Zn changes. Serious chalk; no cleaner than 2.	Slightly more erosion, but not particularly less dirt.
6. RCHT/A-MO. Same, but a little cleaner.	Reverses Florida trend. Low in erosion and quite dirty.
7. With 45 X. A little better on both counts, but still inferior to guide.	Same; if anything, slightly dirtier.
8. Increased extender. Still further improvement, but very slight.	A little cleaner; seems like poor opacity.
9. A 168-LO/RA-10. Only slight checking, but very dirty.	Definitely dirty, low in erosion.
10. A-MO/RCHT. Worst checking, also very dirty.	Same (these only slightly dirtier than average).

Group VI. Titanium Pigment Corporation Tints, Gray.

<u>Florida</u>	<u>Chicago</u>
Guide (as Group IV) but T.P.C. primer). Light, scattered checking, bad fade, quite dirty (mostly mildew).	About as in Group IV.
11. 15% RANC/15% 45 X/56% CaCO ₃ /56% ZnO. Same fading. More checking, but a little cleaner.	Tends to reverse Florida trend. A little less fading, but rather dirty.
12. Omitting 45 X. Definitely better color, but more dirt and also more checking.	As Florida, more dirt but better color.
13. 55% RC/54.5% ZnO/12.5% 45 X. Reasonably clean, but bad fading, and worst checking of all.	As Florida, fairly clean but fading quite bad.
14. Adding CaCO ₃ at 45%, RC down to 20%. Better color, but more dirt. Bad checking, but it is mainly "wrinkling," may not harm the film.	As Florida, good color, but most dirt of group. Also most erosion.

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Group VII (Supplementary). Using T.P.Co. Special Primer, 65/35% RC/Mg silicate, no BCWL. Florida tests show a little checking with Rex 471 top coat, not found with Rex 450 (Group I guide). With paint #9 (Group V) same bad dirt and yellow cast but no more checking. With #10, a considerable improvement over the use of Rex 450, less checking and less dirt. Chicago tests do not show these differences, run very similar to the tests using Rex 450.

General Comments

This series shows the checking on tints which has been so noticeable in recent years at Florida. Furthermore, due to the wide variations in checking with the titanium changes, it seems to indicate that the titanium pigment is a major factor, perhaps associated with the extender used in the titanium-calcium form. Titanox RC, which uses calcium sulfate, seems to be particularly bad in this respect and also shows bad fading. Calcium carbonate as extender and 45 X basic silicate white lead seem to reduce checking. 45 X seems to help clean-up, but calcium carbonate appears to have the opposite effect. As stated before, there is a real need for a more chalk-resistant form of titanium dioxide than is currently available for use in tints.

Panels 17682-6 F were examined after 12 months' exposure at Chicago vertical south. These are tests of Rex 471 SWP Gloss White using certain Resin Amine D soaps, all on cedar bevel siding primed with Rex 450 Undercoater. The guide and basic formula is Rex 471, card 66 A. and the variations are: (a) 10 lb. of basic magnesium RAD soap, resinous type; (b) same, semi-fluid type; and (c) same, but the aluminum soap. These materials were prepared by the Resin Research Department, the purpose being to improve flow and gloss properties. No differences in the usual characteristics affected by weathering have shown up at 12 months' Florida exposure, except possibly a little more tendency to chalk with the (c) sample. This is verified by readings on Chicago panels at 8 months. However, there is one very interesting feature, namely the very smooth film and almost complete absence of brush marks. This contributes to a good uniform clean-up. Careful examination shows no incipient film failure so far. We are planning to try these materials with safflower oil.

Panels 17769-80 F, C, were examined after 12 months' exposure at Florida and 14 months at Chicago, vertical south, all on cedar bevel siding primed with Rex 450 Undercoater. The tests include Rex 471 SWP Gloss White regular using 312 dry micronized talc as inert versus the use of 20 dry Mg silicate and of A-100 talc from Blue Star Mines. The latter seems to give a slightly grayish cast, but all are quite closely alike and generally satisfactory. The same comparisons were made in Rex 465 SWP Colonial Yellow. Here A-100 seems to be just slightly more susceptible to fading. Florida

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panels show microscopic checking, but very slight. In Rex 477 SWP Westchester Gray A-100 does not show the fading difference, but on the other hand, shows a little less tendency to check than the others. None of these trends are conclusive at this stage.

Exposures 18184 - 18265 C, F were examined during the month. The series tests several variations on a formula suggested by Mr. J. I. Brooker of du Pont in June, 1952. The fundamental idea was that variations of this formula might be developed into an acceptable low cost "second grade" white and possibly even an all-purpose white, to be tinted as well as used for white. A formula for a low cost tint could be set up on a similar basis. It was suggested that the whites might be susceptible to rutile yellowing. du Pont suggested that low zinc oxide content could be used in conjunction with the slightly alkaline extender, calcium carbonate, to give performance equal to or better than higher zinc oxide paints using magnesium silicate as the extender.

Paints Tested

1. White. Guide is Rex 471 SWP Gloss White, Card 68 - 100 lb. 1403 dry anatase TiO_2 , 175 lb. 2132 dry RCHT, 250 lb. 312 dry micro-nized talc, the balance co-fumed leaded zinc. Also Rex 473 Tinting White (see Group 2 below) was used as a white.

Test Paints.

Basic formula from du Pont, our batch.

<u>Pounds</u>	<u>Gallons</u>	<u>Material</u>
100	3.08	1403 Ti-Pure FF
50	1.43	2174 " R-610
150	3.20	2295 ZZZ-35 ZnO
850	23.78	566 Camal carb
5	0.58	(5094) Lecithin
	23	(2) Linseed oil, raw
	23	(515) Linseed, bodied
	14	(348) Mineral spirits
	1-3/4	(4230) Drier - Pb
	5/8	(543) " - Mn
	4	(141) Kerosene

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This formula was varied as follows:

1. Using Georgia #10 Marble instead of 566 dry Camelcarb.
 2. Using RCHT as only titanium pigment, with 566, with Georgia #10, and with 20 dry Mg silicate.
 3. Using 170 lb. of 1424 dry leaded zinc, RCHT and 566 dry at 400 lb. each. Also substituting Georgia #10 and 20 dry.
 4. As basic formula, but R-610 the only TiO_2 . Also with #10.
 5. As basic formula, but RC the only titanium pigment, 566 dry reduced. Also using Georgia #10.
 6. As in 4, 566 and R 610, but adding du Pont phenyl mercury oleate at 3.56% Hg. Also using Georgia #10.
2. Basic Tints. Guide is Rex 465 SWP Colonial Yellow (basically same as Rex 473 mentioned above) - 350 lb. titanium pigment as Titanox RC, 200 lb. 512 dry talc, balance co-fumed leaded zinc. This group is tinted with S-W colors, principally BY-40 (ferrite). It is also duplicated as Rex 474 Chelsea Gray.

Test Paints. All the paints of group 1, except the guide and the fungicide tests, are repeated as tints.

3. Supplementary Tints. Guides same as in 2. Tests consist of:

- (a) A repetition of all the paints in 2, both yellow and gray, but using du Pont's Harrison Colors (raw sienna and lamp black).
- (b) A further repetition of yellow only, using J. Lee Smith and Company's raw sienna.

All exposures were prepared in the usual way on cedar bevel siding. The Florida tests have been exposed 6 months, vertical south, the Chicago panels 8 months north and south vertical. The results at this time are as follows, referring to the groups as numbered above:

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1. The main feature observed on the whites at this early stage is the relatively heavy dirt collection of the test paints as compared with the regular Rex 471 guide. This shows up less at Chicago than at Florida, but the results in Florida suggest extreme caution in accepting formulas of the du Pont type on their performance at Wilmington only. Certain trends that seem very obvious on the Florida panels are not borne out by the Chicago panels, the norths being in conflict and the souths tending to be more uniformly like the guide. For instance, Rex 473 seems extremely dirty at Florida but not as bad as certain others at Chicago. As another example of the paints described under 2 and 3 (all using RCHT as the only titanium pigment), Florida results indicate 566 and Georgia #10 closely alike, with 20 dry perhaps a bit more dirty, while Chicago north tests indicate 20 dry as definitely cleanest with 566 and #10 showing bad dirt and yellow cast.

In general, the basic formula with some anatase looks best. 20 dry seems to result in more free chalking than the other extenders. The fungicide used is not effective so far.

2 and 3.

These are somewhat more consistent, with less conflict between Chicago and Florida tests, and certain general conclusions may be drawn:

- a. The yellows made with J. Lee Smith colors seem reddish in cast, the other two sets quite alike.
- b. There is little, if any, choice between the repeat groups made with different tinting colors, as regards dirt and fading.
- c. The only "stand-outs" are the two samples made on the basic formula (with anatase TiO_2). These are definitely poorer than the others in appearance at Florida, mainly because of much worse fading, although they are somewhat cleaner. Nearly all tests agree on 566 as less inclined toward fading than Georgia #10, especially in grays.
- d. Chicago results (north and south agreeing, but not verified by Florida results) indicate slightly freer chalk, better clean-up but more fading with 20 dry than with 566 or #10. A few cases indicate that #10 has more of this free-chalking tendency than 566.
- e. The tints at Chicago, in general, look relatively good because of the moderate fading, but at Florida the dirt (which is largely mildew) spoils the appearance of the majority, although they show good tint-retention.

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Further work was done on the reformulation of SWP to improve brushing and flow characteristics. The most recent work has been done with OKO S 37 linseed and MB 5201, a catalyzed, heat bodied linseed oil that has been reacted with 0.5% maleic anhydride. Satisfactory brushing and flow properties were obtained using 15 gallons of bodied oil, composed of equal parts OKO S 37 and MB 5201, in conjunction with raw linseed as represented by formula 57 SS. An effort will be made to increase the bodied oils to 19 gallons per 100 gallons of paint as represented by paint OJ 65 S to obtain better durability characteristics and lower cost. We have been unable to complete the work on this project due to the local lack of proper equipment necessary to make MB 5201. Data for the test paints are listed in the following table.

SWP Gloss White Formulations

Code	Rex 471	Rex 471	Special Rex 471	Proposed Rex 471
Card or Exp. No.	71	75	OJ 57 SS	OJ 65 S
PVC	35.7%	35.6%	35.8%	34%
Total oil	408#	411#	408#	408#
Bodied oil	19 gals.	14.3 gals.	15 gals.	19 gals.
Zinc Oxide	51.5%	51.5%	55.2%	52.0%
Hiding (CDR Units)	19,800	19,800	19,800	18,450
High Shear	5.7 poises	2.9 poises	1.9 poises	To be reported
Raw Material Costs:				
Pigment	\$102.07	\$104.56	\$101.77	\$97.04
Vehicle	<u>79.05</u>	<u>80.79</u>	<u>80.53</u>	<u>81.76</u>
Total	\$181.12	\$185.15	\$182.30	\$178.80
Differential with card 71	-	+ \$4.03	+ \$1.18	- \$2.32

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A series of house paints was made for exposure tests at Chicago, Miami, Florida; and Coffeyville, Kansas. The paints in this series represent a comparison of Rex 471 Card 71, 75, and the proposed Gloss White 65 S made with 412, 1424 and 68 C 6 as the leaded zincs. The regular Rex 476 One Coat White and the proposed One Coat Tinting Base are included in the series. The one coat paints were shaded to Chelsea Gray Rex 474 and Geneva Cream Rex 478.

<u>Rex</u>	<u>Exp. No.</u>	<u>Leaded Zinc</u>	<u>Viscosity #3</u>	<u>PVC</u>	<u>ZnO</u>	<u>Hiding Units</u>
Rex 471	96 S	412 and 1424	34.5"	35.8%	31.4%	19,800
Card 71	78 S	68 C 6	36.0"	35.6%	32.7%	18,780
Rex 471	79 S	412 and 1424	28.6"	35.4%	31.4%	19,800
Card 75	80 S	68 C 6	30.4"	35.6%	32.6%	18,780
Proposed	65 S	412 and 1424	-	34.0%	31.9%	18,450
Rex 471	81 S	68 C 6	-	34.0%	33.1%	17,515
Special						
Rex 471	57 SS	412 and 1424	29.0"	33.8%	33.2%	19,800
Rex 476	97 S	412	31.2"	34.0%	29.3%	23,920
Card 5	98 S	68 C 6	30.0"	33.8%	30.1%	22,511
One Coat	100 S	412	33.2"	34.0%	32.2%	22,093 +
Rex 474	101 S	68 C 6	33.2"	34.0%	32.2%	22,093 +
Rex 474						
Card 25	115 S	412 and 1424	29.8"	36.5%	29.7%	18,700 +
One Coat	100 S	412	33.2"	34.0%	32.2%	22,093 +
Rex 478	101 S	68 C 6	33.2"	34.0%	32.2%	22,093 +
Rex 478						
Card 19	99 S	412 and 1424	30"	34.3%	29.7%	18,360 +

Chalk washing and dirt collection tests have been prepared for exposure at the Chicago test station. The paints under study differ particularly in the titanium pigment used. In this series variations are obtained by making changes in basic formulations as well as by making intermixes of Rex 471 SWP Gloss White and Rex 473 SWP Tinting White.

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The series is exposed north and south at Chicago. One full fence section is coated with each paint system. Red face brick are mounted under each section on the south exposure face to collect and measure the degree of chalk "run-down" of each paint system. North exposures do not have the brick mountings but two trim color panels are inserted as a part of each test section. The colors are Rex 483 SWP Sagamore Green and Rex 497 SWP Royal Maroon. These are mounted as the sixth and the twelfth boards from the top of each test section. The following variations are included in this chalk washing versus dirt collection study.

Section	Paint Composition		Vehicle
	Pigment		
20099 CS and CN	Rex 17 Lead in Oil		(2)
20100	Rex 471 Pre-war		(2)
20101	Rex 471 Card 71 100# 1405 dry, 175# 2132		(2) (2536)
20102	Rex 471 Card 74 50# 1405, 50# 2030, 175# 2132, 65# 62 C 2	(2) (2536) (4106)	
20103	Rex 471 Card 74, Alt. A. As above, except reduced bodied oil content - high total oil.	(2) (2536)	
20104	Rex 471 ORJ brushing revision, reduced bodied oil. 4# oil level.	" "	
20105	Rex 471 100# 1405, 175# 2132	" "	
20106	Rex 471 100# 2030, 175# 2132	" "	
20107	Rex 471 100# 2030, 175# 2140	" "	
20108	Rex 473 Card 8 350# 2140	" "	
20109	1/1 Intermix Rex 471 (exposure No. 20104/ Rex 473 Card 8	" "	
20110	Rex 436 Card 22 100# 1405, 100# 2030	" "	
20111	Rex 436 50# 1405, 50# 2030, 175# 2132	" "	

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<u>Section</u>	<u>Paint Composition</u>	
	<u>Pigment</u>	<u>Vehicle</u>
20112 CS and CN	Rex 436 50# 1405, 50# 2050, 175# 2132, 65# 62 C 2	(2) (2536)
20113	Rex 436 100# 1405, 100# 2132, 65# 62 C 2	" "
20114	Rex 476 Card 5 One Coat House Paint	
	1405 dry Titanox A	(2) Raw Linseed Oil
	2050 " Titanox AA	(2536) Heat bodied linseed oil
	2132 " Titanox RC BT	(4106) Alkyd varnish
	2140 " Titanox RL	
	62 C 2 Mica	

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Based on the fact that 864 R follows more closely the type of formulation used in the past, we recommended that this revision be sent to all plants, which has been done as Card 75. Formula 864 R is approximately 4.5 cents higher in raw material cost than the previous formula, Rex 471, Card 71. A detailed comparison is presented in the following table.

	<u>Lb./Gal.</u>	<u>Gal.</u>	<u>Lb.</u>	<u>P.V.C.</u>	<u>Raw Material Cost</u>		
		<u>Oil</u>	<u>Oil</u>		<u>Pigment</u>	<u>Vehicle</u>	<u>Total</u>
Rex 471 Card 71	14.71	52.0	407	35.7	\$102.07	\$77.96	\$180.03
Rex 471 Card 74 (Alt. A formula)	14.34	54.0	425	34.2	100.30	84.91	185.21
Rex 471 (864 R proposal)	14.70	52.6	414	35.5	104.36	80.16	184.52

A series of exposures was painted out to compare weathering effects of the new and old exposure locations, panels numbered 20013-20036 C. The series represents 19 systems as indicated below, and for each system there are 8 panels: old farm north and south, new exposure station north and south, and duplicates of each. The systems involved are:

1. Rex 471 SWP Gloss White (a) current stock, card 74, (b) card 49, all anatase TiO_2 , all linseed oil (2) and (310), and (c) formula of 12-5-27, pre-titanium, high oil type. All are tested over Rex 450 SWP Undercoater White, Rex 450 gray and self-primed (9 systems total).
2. Other whites as (a) 3 coats lead-in-oil, (b) old Rex 300 Family Paint, with lithopone, and (c) Rex 473 Tinting White.
3. Tints and colors as Rex 478 SWP Geneva Cream, Rex 465 Colonial Yellow, Rex 418 Ardmore Green and Rex 495 Manor Brown.
4. Clear finishes and stains as (a) OJ 949 R Redwood Stain one coat versus 2 coats, (b) same plus 2 coats Rex 04 Raxpar and (c) same plus 2 coats alkyl blend of 75/25% (4100)/(4105).

During October several miscellaneous series of panels were transferred from the old farm to the new, so that all panels now at the old farm are intended to remain there indefinitely. Considerable time was spent on exposure records and routine readings.

0007-SWP-044207

0007-SWP-000113577

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#97 - SWP

Further work was done on the reformulation of SWP to improve brushing and flow characteristics. An effort has been made to hold the polymerized oil content near 15 gallons per hundred gallons of paint to insure durability. Recent tests indicated that good brushing and flow can be obtained by using OKO S 70 linseed or a combination of OKO S 37 linseed with MB 5201 and raw linseed.

MB-5201 is a Sherwin-Williams development starting with raw linseed oil, SO₂ catalyzed, heat bodied, and reacted with 0.5% maleic anhydride to a viscosity of 55.2 seconds and an acid number of 9.2, then treated with one-tenth the amount of drier used in SWP based on the oil (0.0326% lead and 0.0013% manganese, as naphthenates), and finally air-blown at 175° F. to a viscosity (Gardner-Holdt at 77° F.) of 3 minutes and 48 seconds. Acid number 9.1. Color (Gardner 1935) - 10 to 11.

The Cleveland Technical Service Department has submitted four quarts of SWP production dated A 2755, A 2793, A 2823 and A 2863, made on the Alternate A formula card 74, for our inspection. The four samples were compared with four samples of SWP production made at Chicago on the proposed revision QJ 864 R (in production at Chicago only). The paints listed below were checked for viscosity, brushing, flow, color, high shear value and gloss characteristics. The Chicago production has slightly better leveling, color and initial gloss whereas the Cleveland production has very slightly less pull under the brush as indicated by the high shear readings. Brushing tests also indicated Cleveland production has a slight edge in ease of application but this difference is small. The Cleveland production appears a little short in flow and the brush has a tendency to cut through the film. Test data for the above batches appear in the following table.

Rex 471	Viscosity #5 Cup	Brushing	Flow	Color	High Shear	Gloss
	10-27-53				Poise 11-2-53	
A 2823	28.2"	7	Sl. short	Sl. yellow	2.95	Sl. lower than Chicago production
A 2755	28.6"	7	"	"	2.72	"
A 2863	28.8"	7	"	"	2.72	"
A 2793	27.4"	7	"	"	2.70	"
C 2805 B	26.0"	6	OK	Sl. blue	3.05	Good
C 2813	27.0"	6	OK	" "	3.01	"
C 2855	28.4"	6	OK	" "	2.80	"
C 2823	28.6"	7	OK	" "	3.08	"

0007-SWP-044208

0007-SWP-000113578

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#97 - Cont.

SWP Gloss White - Rex 471

Agent	Viscosity					Settling	
	Fresh	1 Wk.	2.5 Mo.	6 Mo.	9 Mo.	6 Mo.	9 Mo.
None	22	36	29	31	26	2.5°	-
0.75% RL-80	36	55	39	40	39	5.5°	5°
1.25% 806-Y	35	48	39	44	30	7.5°	2°
0.075% (324)	35	36	27	29	43	3°	4°
None	20	26	21	23	23	2.5°	2.5°
0.5% RL 80	27	38	30	29	29	5°	4.5°
1.25% 806-Y	25	31	25	27	29	4.5°	5°
0.075% (324)	25	32	24	25	25	5°	2°

One Coat Repaint White - Rex 476

None	20	19	17	18	18	1°	2.5°
0.35% RL-80	29	39	32	35	29	8°	5.5°
1.0% 806-Y	34	44	39	47	44	15.5°	12°
0.25% (324)	33	26	21	23	23	5°	5°

SWP Woodland Brown - Rex 493

None	28	28	26	29	33	0.5°	0.5°
0.4% RL 80	31	31	30	29	30	1.5°	1.5°
0.6% RL 80	31	32	29	29	31	5°	1.5°
0.2% (324)	35	32	27	29	-	2°	-

No explanation can be offered at this time to explain those instances where 9 months readings are lower than at six months. This will be watched closely in further tests.

A concentrated effort was made during the past month to transfer panels from the old farm to the new U.S. 30 Test Station and mounting them on the fence. As of October 1, practically all routine panels have been moved, but some are not yet exposed, and quite a number of panels requiring special handling remain at the old location.

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0007-SWP-000113579

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#87 - Cont.

Pigment Variations

Rex 473 SWP Tinting White

<u>Paint No.</u>		<u>Titanium Pigment</u>	<u>Vehicle</u>
RB 4444	Card 8	Z140	Rex 473 vehicle
RB 4445	"	Z140	No Super Ad-It
RB 4446		Z140	One Coat vehicle
RB 4447		Z140 + mica	" " "

Intermix White - no other pigment than given below (low PVC)

RB 4448	Z174 Non-chalking rutile TiO_2	Oil - alkyd
RB 4449	Z174 + mica	" "
RB 4450	Z174 + mica and lead	" "

The above paints are being exposed Chicago south and north, Miami south, and Coffeyville south.

Bodging Agents

Jones Dabney bodging agents Syntex RL 80 and Syntex 606-Y maintain more consistent bodging action than (324) bodied linseed oil. Behavior of these agents was compared with (324) in SWP Gloss White Rex 471, One Coat Repaint White Rex 476 and SWP Woodland Brown Rex 493. These paints were selected to provide straight oil, the alkyd modified oil one coat vehicle, and semi alkyd-oil type vehicles as used in deep and trim colors.

Syntex RL 80 performs best in the straight oil type vehicle, yielding bodging action which was still effective after nine months' storage. It is also effective in the alkyd modified oil system. Syntex 606-Y produced excessive body in the alkyd modified oil system and appears doubly objectionable due to the presence of hard settling in this paint. This is indicated by the 15° deflection registered on the Torque Consistency Meter. This specimen contained a tough, firmly settled cake that was difficult to disperse by stirring but dispersed satisfactorily in five minutes on the Red Devil shaker. Test data are recorded in the following table. Viscosity data are given in seconds on the No. 3 S-W cup.

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#97 - Cont.

Exposure panels have been completed on series 19159-233 CS, CM, F and K. This series studies the possibilities of compromising Rex 471, Rex 456 and Rex 475 to produce a more universal paint suitable for use both as a white and as a tint base. The value of Super Ad-It as a fungicide is also being studied. The major difference between Rex 471 SWP Gloss White and Rex 475 SWP Tinting White is the titanium pigment used. This series studies a variety of titanium blends and substitutions in the hope that adequate clean-up may be obtained on whites without excessive fading and chalk masking when the same paints are used as tints. Rex 456 SWP Fume Resisting White is also being studied along these same lines.

Pigment variations being studied in this series are listed below as variations from the basic rex number. Each pigment variation is treated in five different manners for exposure. Series A exposes all paints in white. Series B is also exposed as white except that each paint is treated with 0.5 gallon of Super Ad-It per 100 gallons for protection against mildew. In Series C all paints are shaded to Rex 465 Colonial Yellow. Series D is similar to Series C except that each paint contains Super Ad-It. Series E exposes all paints shaded to Rex 477 SWP Westchester Gray.

Pigment Variations

Rex 471 SWP Gloss White

<u>Paint No.</u>		<u>Titanium Pigment</u>	<u>Vehicle</u>
RB 4435	Card 71	2152 Titanox RCHT 1405 Titanox A	Rex 471 vehicle
RB 4436		2152 - 1405	One Coat H.P. veh.
RB 4437		2152-1405-2030 Titanox AA	" " "
RB 4438		2152-1405-2030 + mica	" " "
RB 4439		2140 Titanox RC-1405- 2030 + mica	" " "

Rex 456 SWP Fume Resisting White

RB 4440	Card 22	1403 - 2030	Rex 456 vehicle
RB 4441		1403-2030 + mica	" "
RB 4442		2030 + mica	" "
RB 4443		2152-2030-1403 + mica	" "

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0007-SWP-000113581

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#97 - SWP

SWP Gloss White Production (Card 74)
Cont.

SWP Rex 471	Gallons	Viscosity Paint Test #3 Orifice	A. Wt.	Extender	Gals. Thinner Added/ 100 Gal.	High Shear Poises	Brush- ing
C 2463 A	2000	25-1/2 sec.	14.87	3/4 512 1/4 62A18	+ 1-5/4	2.70	Good
C 2473	2000	28 sec.	15.12	512	- 1-1/2	3.00	Good
C 2513	2000	25 sec.	14.81	1/2 512 1/2 62A18	0	2.70	Good
C 2523	2000	28 sec.	14.76	1/2 512 1/2 62A18	+ 1	2.90	Good
C 2523 A	2000	27 sec.	-	1/2 512 1/2 62A18	+ 1-1/2	3.00	Good
C 2543	2000	28 sec.	14.72	1/2 512 1/2 62A18	0	3.20	Fair

SWP Production (Modified S-W Vehicle)
(Formula QJ 864 R)

C 2623	2000	25 sec.	14.52	512	0	2.7	Good
C 2653	2000	28 sec.	14.60	512	+ 1/2	2.6	Good

At the Trade Sales Technical Board Meeting held in Chicago on August 12 and 13, it was agreed that the Paint Research Department would send all members of the committee one gallon of SWP Gloss White made on formula 864 R. This sample was sent along with one gallon of SWP made on the Rex 471 formula card 74 to be compared for brushing, flow, gloss, etc. Both paints had a high shear reading in poises of 2.7 at the time of manufacture.

0007-SWP-044212

0007-SWP-000113582

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#97 - SWP

Work was continued on the reformulation of SWP to improve brushing and flow characteristics. Various oils are being investigated, such as Norlin L 70, OKO S 70 linseed, OKO M57 linseed, MB 5201 (Vegetable Products Research). Properties of these oils are listed below:

Norlin L-70 (Cargill, Inc.)

Acid number	5 - 9 (on solids)
Color	8 - 11
Viscosity	X - Z (G-H)
Oil content	70% linseed
Thinner	Mineral spirits

MB 5201

A Sherwin-Williams extracted raw linseed oil, SO₂ catalyzed, heat-bodied, and reacted with 0.5% of maleic anhydride to a viscosity of 85.2 seconds and an acid number of 9.2. It has been treated with one-tenth the amount of driers used in SWP based on the oil (0.0525% lead and 0.0013% manganese) and finally air blown at 175° F. to a viscosity of 3 minutes and 48 seconds (G-H at 77° F.). Color (Gardner) is 10-11.

Experimental paints were formulated with 10 gallons of Norlin L 70, MB 5201 and OKO S 70, respectively, in conjunction with (798) and (2). The experimental paints have good brushing and flow properties. Further work with the idea of increasing the polymerized oil content in favor of a slightly lower PVC is in progress.

During September the Chicago factory has manufactured Rex 471 on formula card 74. Production made on this card was slightly low in viscosity and it was found necessary to use 62 A 18 as part of the inert to obtain satisfactory viscosity. Test data for plant batches of SWP as made on card 74 are listed in the following table:

SWP Gloss White Production (Card 74)

SWP		Viscosity			Gals.		
Rex 471	Gallons	Paint Test	A. Wt.	Extender	Thinner	High	Brush-
		#3 Orifice			Added/	Shear	ing
					100 Gal.	Poises	
C 2393	1500	26 sec.	14.93	5L2	+ 2/3	2.65	Good
C 2443 A	1500	27 "	14.67	1/2 5L2 1/2 62A18	- 1/3	2.80	Good

(Cont.)

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0007-SWP-000113583

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#97 - SWP

The Oakland Technical Service Laboratory submitted several samples of SWP formulated with non-break and/or alkali safflower oil with various amounts of Rheotol and Bentone 54 added to improve flow, gloss and gloss retention. They have been quite concerned with the rapid loss of gloss of the various safflower formulations as compared with the linseed paints. However, identical paints applied at Chicago do not show linseed to be superior to safflower in gloss retention but the initial gloss on the linseed is slightly higher. The paints submitted by Oakland were applied as 0.005 inch draw-downs on plate glass. The films were checked for initial gloss after drying for 24 hours and after drying in the constant temperature room for 11 days. The data below represent the initial gloss readings and the gloss after 11 days as determined by Oakland and by Paint Research on identical paints.

Gloss Readings (80° Photovolt)

Paint Sample	Oakland	Oakland	Paint Research	
	Fresh	11 Days	Fresh	11 Days
FAL-107-10 (100% Non-Break Safflower)	81 - 82	55	75	52
FAL-107-12 As above, but 5# (49 A 8)* 2# 82 Y 4**	80 - 85	58	82	60
FAL-107-13 As above, but 100% alkali refined safflower	84	55	84	55
FAL-107-14 As above, but 6# (49 A 8) 2# 82 Y 4	84	55	80	47
FAL-107-15 As above, but 6# (49 A 8) 4# 82 Y 4	85	51	82	55
Rex 471 Y 635 Card 70 100% linseed	80 - 81	75	84	57

*(49 A 8) - Rheotol
**82 Y 4 - Bentone 54

Work will be continued by Paint Research on the reformulation of SWP from safflower oil.

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Quart samples of SWP plant production made with and without two pounds Bentone 34 were sent to all factory superintendents last month to be evaluated for brushing and flow properties. In general, quite favorable reports have been received from the various plants on the brushing properties of the SWP made with two pounds Bentone 34 per 100 gallons. Seven investigators have reported favorably on the Bentone 34 addition and two have reported only slight improvement in brushing with some question regarding the increase in raw material cost.

Examination of ten Kensington production batches of Rex 471 Gloss White made recently on Card 71 showed satisfactory uniformity of efflux viscosity but somewhat sticky brushing properties. Recent work on the re-formulation of SWP for improved brushing properties has indicated that a definite improvement can be made in brushing by the use of Bentone 34 and the vehicle of 476 One Coat White.

<u>Date Passed</u>	<u>Stamping</u>	<u>Wt./Gal.</u>	<u>Viscosity No. 3 Passed</u>	<u>7/23</u>	<u>High Shear Poises</u>
7-7-53	1883 A	14.77	28"	27"	3.70
7-8	1883	14.72	27	27.6	3.78
7-8	1893	14.78	30	30	3.75
7-9	1893 A	14.72	30	30	3.50
7-10	1903	14.66	28	28.8	3.20
7-10	1883 B	14.65	29	29	3.55
7-13	1913	14.67	29	30	3.58
7-14	1943	14.59	28	29	3.68
7-15	1953 A	14.61	30	29.6	3.48
7-15	1963 A	14.62	29	36.4	4.15

Exposure series 18820-65 G, F, K was prepared during the month, all 2-coat work on cedar bevel siding primed with Rex 450 Undercoater of matching shade. Part of the series is also exposed as two coats self-primed on repaint wood. Exposures are at Chicago, Florida and Coffeyville. The purpose of the series is to study an SWP intermix white versus SWP Tinting White to improve gloss and color retention and appearance in general. The major change tried in this series is the use of a low PVC tint base

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in which essentially the entire pigment is 2174 dry Ti-Pure R 610 and the vehicle about half alkyd. Other variations are:

1. Use of 7% mica (to prevent film checking).
2. Use of fungicides, at 7¢ and 14¢ cost per gallon:
 - (a) Super Ad-It.
 - (b) Dowicide 6.
 - (c) Phenyl mercury oleate.

Only Super Ad-It is tried in the low PVC type.

Exposure series 18886 - 18912 C, F, K was prepared during the month, a cooperative series with New Jersey Zinc Company. The purpose is to repeat a previous test of their XX-601 zinc oxide, an acicular zinc oxide. It is compared with New Jersey XX-503 and Azo ZZZ-35, as well as 412 dry co-fumed leaded zinc (regular). The basic formulas are: (a) Rex 471 SWP Gloss White, Card 86, all zinc oxide in the 412 dry being replaced, (b) Rex 456 SWP Fume Resisting White and (c) New Jersey Zinc's submitted paints. In the latter case, one formula based on Ti-Pure H610 is used as a finish coat, while one based on Ti-Pure Y CR is used as primer only. Exposures are to be at Chicago, Florida and Coffeyville, vertical south.

Exposures examined during the month include 15318-21 C and F, evaluating Persolite 4-PVR, an expanded perlite in Rex 471 SWP Gloss White. The panels are cedar bevel siding, primed with gray Rex 460 Undercoater, to emphasize erosion. Exposed 24 months at Florida and slightly longer at Chicago, vertical north and south. The Persolite replaces 20 L magnesium silicate at 275 pounds, and also at 252 pounds (equal volume).

The Florida panels are marred by hail damage, so that no complete comparison of durabilities is possible. The Persolite seems very slightly poorer in clean-up, but the noteworthy thing is that it seems to reduce surface flaking very greatly. Surface flaking is the cause of poor appearance on many Florida tests, and this is the first time a single pigment change has shown such a clear-cut effect. The only significant difference found on the Chicago tests is a tendency toward greater dirt with Persolite. It is noted that there is slightly greater erosion with equal volume than with equal weight of Persolite.

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#97 - SWP

Work was continued on the reformulation of SWP to improve brushing and flow characteristics. The best brushing properties were obtained with paints formulated with a modified SWP vehicle based on less bodied oil than the regular formula, and a modified one coat house paint vehicle similar to Rex 476. Formulas listed below were submitted for consideration at the Trade Sales Technical Board meeting on August 12.

SWP Revisions for Better Brushing

	Gal. Oil/100	Raw Material Cost			Increase Cost per 100 Gal.	High Shear Poises
		Pigment	Vehicle	Total		
SWP Gloss White Rex 471 Card 71	52	\$101.56	\$73.85	\$175.19	-	5.60
SWP Gloss White Batch 864 R (Modified S-W vehicle)	52.6	103.63	73.79	177.42	+ \$2.20	2.72
SWP Gloss White Batch 865 R (One Coat vehicle)	57.4	103.63	81.38	185.01	+ \$9.80	2.62

The Vegetable Products Research Laboratory submitted two bodied oils MB 2810 and MB 2806 to be evaluated for brushing properties in SWP. Paints were made using 10 gallons of these oils in conjunction with (798) and (2) as the oil portion of the formula.

MB-2810 is an OKO S 70 oil that has been heat bodied and reacted with 0.25% maleic anhydride, then treated with driers and finally air blown.

Viscosity G-H 77° F. 3 minutes 50 sec.
Acid Value 4.2
Color 11 minus

MB-2806 Similar to MB 2810 but the starting oil is extracted raw linseed oil.

Viscosity G-H 77° F. 3 minutes 48 sec.
Acid Value 8.1
Color 10 +

The experimental paints made with MB 2810 are slightly lower in viscosity as determined with the No. 3 cup and also show somewhat lower high shear values than paints made with MB 2806. However, both developments are somewhat deficient in flow, and other oils will be made similar to MB 2806 by the Vegetable Products Research Laboratory with 0.5% maleic anhydride to provide the flow desired.

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Experimental SWP Gloss Whites

Batch No.	Gallons Oil	Viscosity - #3 Cup			Brushing	Flow	High Shear Poises
		Fresh	24 Hr.	4 Days			
OJ 858 R	10 gal. MB 2806	29"	34.2"	52"	Good	Good	2.72
	15 " (798)						
	28-1/2 gal. (2)						
OJ 794 R	10 gal. MB 2810	26.4"	27.4"	(10 days) 24.2"	Good	Good	2.18
	9 " (798)						
	32-1/2 gal. (2)						

Construction work on the new U.S. 50 exposure station was rushed to essential completion by the end of August. Only second-coat painting and a few incidentals were left to do as of September 1. The 45° steel fences were moved and the metal panels transferred. Approval has been secured for three additional steel fences. The two new-type wooden fences belonging to Auxiliaries Research and the one belonging to Martin-Senour were moved and set up, and the panels are being replaced.

Transfer of our regular siding test panels is under way, with emphasis on presenting a well-balanced display on the fences nearest the road. On September 3, the new building was first used for the painting of test panels.

Exposure series 18982-98 C, K, F was prepared during the month. It consists of a supplement to New Jersey Zinc Company co-operative series listed last month. Various zinc oxides are tested in Rex 456 SWP Fume Resisting White.

Exposure series 18959-54 CS, CN, F, K was prepared to test Rex 471 SWP Gloss White with and without mica, both dry-ground and water-ground. Also Rex 476 SWP One Coat White testing 412 dry leaded zinc against 68 C 6, the new Ozlo 18 M leaded zinc.

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b. Titanium pigment 100 lb. of 1405 and 175 lb. of 2132 dry RHT.

1, 2, and 3 as in (a), but in the case of 2 and 3, the 2132 remains constant, 25% of the 1405 only being replaced.

The panels are cedar bevel siding, primed with Rex 450 Undercoater shaded gray to emphasize erosion. The exposure time for both Florida south vertical and Chicago north and south panels is one year. The Florida panels at 12 months show no differences whatever except that the all 1405 paint looks very slightly cleaner than any other. Routine reports at 4 to 6 months showed the (b) type definitely dirtier than (a), with 2174 responsible for a noticeable increase in dirt in each type. The Chicago panels at 12 months look essentially alike on the south. On the north there is also actually little variation in dirt, but all containing either 2174 or 2132 look slightly yellow and less bright than the 1405 samples. At 5 months and 6 months, the differences were likewise surprisingly slight, with 2174 plus 2132 the only samples even approaching a serious dirt condition. There is no evidence so far that mica is affecting the erosion rate, since erosion is still very slight.

Panels 18785-8 C, E, F, were prepared and exposed during the month at Chicago north and south and at Florida and Coffeyville, vertical south. All are cedar bevel siding primed with Rex 450 Undercoater of matching color. The purpose of the series is to try to reduce the amount of checking in SWP tints, often observed on Florida exposures, by the use of 7% mica. The paints tested are:

OJ 412 R and 414 R, cards 20 and 18, respectively, of
Rex 474 Chelsea Gray and Rex 478 Geneva Green,
versus OJ 415 R and 415 R, the same plus 7% mica.

OJ 410 R, card 69 of Rex 471 SWP Gloss White, versus
OJ 411 R, the same with 7% mica.

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0007-SWP-000113589

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Panels 16916-27 F, C were examined during the month. These represent a comparison of Martin-Senour's Rex 3000 second quality Outside White (with Rex 3015 second quality Undercoater) against: (a) Rex 350-Rex 300, their regular Undercoater-Monarch White and (b) Rex 450-Rex 471, our SWP Undercoater-Gloss White. Supplementary panels compare our Rex 459 Berkely Yellow and Rex 474 Chelsea Gray against their Rex 3000 shaded to match. All panels are cedar bevel siding, with priming as indicated above. Florida tests have been exposed 12 months, vertical south, and Chicago panels 15 months north and south. All panels continue on test. The Florida panels showed surprisingly little change in the whites at one year. The second quality White was only slightly more dirty than the two regulars. Probably at least as much of this appearance was due to mildew as to actual dirt, but this seemed immaterial as all were relatively good. The Rex 3000 shaded, however, looked bad because of serious chalk-marking. All tints showed some microscopic checking. The Chicago panels show almost exactly the same performance. At 2 and 6 months, the dirt collection on Rex 3000 was no greater than on the others, and even at one year it is only slightly greater.

Two series of exposures testing siliconated oils in Rex 471 SWP Gloss White were studied during the month. Both series of tests are on cedar bevel siding primed with Rex 450 Undercoater, exposed at Florida vertical south, and at Chicago north and south. Both use regular Rex 450-Rex 471 as guide. Series 16166-70 tests three samples with the binder 20% siliconated oil by the Resin Research Department made using Silicone Oil C supplied by Plaskon. All are identical except that the drier content is reduced by two stages, because of trouble with wrinkling on drying and to reduce the driers in proportion to the Silicone Oil C used. These specials, at approximately 1-1/2 years' exposure, show fair to good appearance, despite a tendency toward dirt, but the Florida tests show serious microscopic checking. Series 17396-17400 tests Silicone Oil C as made up by Resin Research into three different bodied oils to replace the (510) bodied linseed in Rex 471. These are rather complex synthetic blends and need not be enumerated because of the generally equivalent performance up to one year. The reason that these oils are more satisfactory than those of the other series might be the fact that they are used for only part instead of all of the binder.

Panels 16907-15 F, C were examined during the month. The tests are all in Rex 471 SWP Gloss White, as follows:

- a. TiO_2 all 1405 anatase titanium, as guide.
 1. Variation with 7% mica.
 2. Variation with 25% 2174 dry Ti-Pure R-610.
 3. Variation with both mica and R-610.

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Formula, Tint Base

Results, Yellow Tests

Results, Gray Tests

RB 5682, regular. 325 lb. of Z140 dry, 200 lb. of 512 dry, 440 lb. of 412 dry leaded zinc.

Chicago. Satisfactory.

Chicago. Satisfactory.

Florida. Fair, but rather dirty.

Florida. Considerable chalk mask fading.

RB 5684, Z140 reduced to 40 lb., Z174 at 125 lb., 550 lb. 512.

Chicago. Satisfactory.

Chicago. More fading, slight yellow cast, dirty.

Florida. A trifle less fading, but slightly more dirt.

Florida, about as RB 5682.

RB 5685, Special 50% TiO₂, as RB 5682, but 115 lb. 566 dry added to replace inert.

Chicago. Same as RB 5682 now, but fading started more rapidly.

Chicago. Serious fading, chalk with a slightly yellow cast, also rather dirty.

Florida. Essentially as RB 5682.

Florida. Seems best, but guide indicates some doubt.

RB 5681, Special TiO₂, inert is all 512.

Chicago. As preceding.

Chicago. As preceding.

Florida. As preceding.

Florida. Excessive chalk-mask fading.

RB 5680, Special TiO₂, inert is all 566.

Chicago. As preceding, except that early color retention was good, not poor.

Chicago. As preceding, possibly slightly worse fading.

Florida. Worst fading, slightly cleaner; but margins very slight.

Florida. As preceding, excessive fading.

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0007-SWP-000113591

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two methods on repaint panels, since the durability of the alkyd type over a chalky zinc-containing surface was in question. The supplementary series 17952-7 F, C is less complex, covering only the unshaded bases mentioned above, plus Rex 471 SWP Gloss White as a control, and only on new wood, Rex 450-primed. Florida exposures were examined at 6 months, vertical south, Chicago very recently at 9 months, north and south.

The results so far are very striking and practically all differences are in favor of the new type base. The gloss retention has been excellent whereas the Rex 473 and Rex 471 have gone almost entirely flat. In the "pinks" at all 3 levels the fading is much less with the special, in some cases practically nil. There has been considerable mildew growth at Florida, and so far the results are about as might be predicted, most growth on the special with no fungicide, intermediate on Rex 473 and Rex 471 and considerably reduced on the special with Super Ad-It. However, as emphasized on Chicago north panels and especially the whites, dirt other than mildew is a problem, and neither Rex 473 nor the special compares with Rex 471 for clean-up. Rutile yellowing is prominent on the special white. No film failure has shown up so far. All panels continue on test.

Exposures 16874-89 F, C were examined during the month, the purpose being to test Titanium Pigment Corporation's rutile-calcium 50% TiO_2 pigment, recently offered to the trade, as a replacement for the rutile titaniums in Rex 471 SWP Gloss White and Rex 473 SWP Tinting White (shaded to Colonial Yellow and to Westchester Gray). The regular TiO_2 's involved are 1405 dry anatase and 2132 dry RCHT in Rex 471, and 2140 dry Titanox RC in Rex 473. Further, in Rex 471 the calcium carbonate lost by the change from 2132 dry to the special pigment is made up both by increasing the 512 dry magnesium silicate and by adding 566 dry Micro-Valva. In the tints, this is carried somewhat further, as indicated below. All panels are cedar bevel siding, primed with Rex 450 Undercoater. Florida panels have been exposed 12 months, vertical south, and Chicago panels 15 months, north and south. At the present time, there is no choice in the whites at any location. At 6 - 8 months Chicago (but at no other time or location) the 50% special pigment seemed to show up slightly dirtier, with a possible tendency to be a little cleaner with all silicate than with part 566 dry. The tints show somewhat more significant differences, which may be outlined as follows:

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MB-2800 ADM-OKO S-70, catalyzed heat-bodied and reacted with 0.25% maleic anhydride.

Viscosity (G-H 77° F.) 73.5 sec.

Acid Value 5.4

Drier added - 0.526% Pb + 0.013% Mn

SWP Gloss White made with MB 2792 and MB 2793 as the total oil replacement are low in viscosity and short in flow. MB 2793 gave slightly excessive flow and somewhat sticky brushing. MB 2800 was introduced as 40% of the oil, which is a replacement for 19 gallons of bodied oil in the SWP formulation. SWP made with MB 2800 was too high in body for proper application characteristics. Further tests are to be made with MB 2800 in conjunction with blown linseed (798) and (2) raw linseed to obtain lower body and better brushing. Actual test data appear in the following table:

SWP Gloss White Using Processed Linseed Oils

Paint	Oils Used	Viscosity - #3					Gloss on 0.003 inch Draw-Downs
		Fresh	1 Day	22 Days	Brush	Flow	
759 R	51-1/2 gal. MB 2792	16"	16"	15"	Too thin	Short	Fair -
760 R	51-1/2 gal. MB 2793	22"	22.2"	18.6"	Too thin	Short	Fair -
761 R	51-1/2 gal. MB 2796	50"	28"	22"	Slightly sticky	Slightly high	Good
767 R	19 gal. MB 2800 32-1/2 gal. (2)	81"	-	-	Very sticky	Good	Good
708 R	29-1/4 gal. (25-G-9) 32-1/2 gal. (2)	26.4"	52.8"	55.4"	Good -	Good -	Good -

Exposures 17887-17913F, C and 17932-5 F,C were examined and reported. These tests compare regular Rex 475 Tinting White with a new development (tentatively called Internix White) using no zinc and no extender, but only 2174 dry Ti-Pure R-810, Bentone 54 and Normasol, with a 60/40% linseed/(4106) alkyd vehicle. Because of the absence of zinc oxide, it was felt that a fungicide would be necessary, therefore each sample of the internix white is paralleled by another containing one gallon of Super Ad-It per 100 gallons.

In the basic series 17887-17913 F, C, the paints are all "pinks" made by 1:32, 1:16 and 1:4 mixtures of Rex 460 Winthrop Red (an iron oxide type) with Rex 475 or the special internix white. They are tested on new cedar bevel siding, both over Rex 450 Undercoater and self-primed; and also by the same

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Settling Ratings - 6 Months
(Cont.)

	<u>Displacement</u> <u>Angle</u>	<u>Probe Test</u>
Rex 493 No agent	1/2°	No feel, very small bead, flows off.
Rex 493 .4% RL 80	1-1/2°	Like .25% (324).
Rex 493 .6% RL 80	5°	Like .25% (324).
Rex 493 .25% (324)	2°	Slight feel, very soft full bead, flows.

The above materials were all dispersible by stirring and all were penetrated by the falling spatula. They would rate from 7 to 9 by the 414.42 rating system.

The preferred positions of the agent-free and bodied oil treated compositions over those containing the Syntex bodying agents is more pointedly indicated in the angle of distortion column than in the probe test ratings.

Processed Linseed Oil for SWP

The Vegetable Products Research Laboratory has submitted four linseed oils processed as indicated for test in SWP.

MB-2792	SO ₂ bleached and catalyzed straight heat-bodied extracted raw linseed oil.	
	Viscosity (G-H 77° F.)	2.2 sec.
	Acid Number	3.5
	Color (Gardner 1933)	5 +
MB-2795	SO ₂ bleached and catalyzed straight heat-bodied extracted raw linseed oil.	
	Viscosity	3.6 sec.
	Acid Number	5.6
	Color	5 +
MB-2796	SO ₂ bleached and catalyzed heat-bodied extracted raw linseed oil reacted with 0.25% maleic anhydride.	
	Viscosity (G-H 77° F.)	4.2 sec.
	Acid Value	5.3
	Color	6

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When the spatula has fallen through the settled paste by its own weight or by applied pressure, a bracket mounting a protractor and spring blade indicator ($1/4" \times 5"$ in length) is clamped to it. The turntable is set in motion rotating the entire assembly until the spring blade indicator engages a stop. This tends to arrest the rotation of the spatula, bringing it to a complete stop when the force applied through the arresting spring is sufficient to overcome the yield force of the settled paste. Spring displacement reaches a maximum at this point, indicating by direct proportion the consistency or firmness of the settled paste. Displacement is observed in degrees on the protractor scale. Spring blade indicators are interchangeable so the range of the device is broadened by the use of blades of varying stiffness. These may be calibrated to convert degrees of displacement to force.

From a limited number of applications of this device, it is apparent that it provides greater sensitivity and precision in rating settling than is obtainable by the spatula probing method. Ratings can be made by application of this device without disturbing the settled state of the specimen materially. This suggests the possibility of making continuous consecutive ratings and tracings of settling performance from a single sample.

The above series of paint compositions was rated twice with a time lapse of four days between ratings. The relative positions of the separate items in the series remained the same in both ratings, but the values from the second rating ran consistently lower than those established the first time. It is felt that this discrepancy will not prevail when elapsed time between inspections is extended to greater periods.

<u>Settling Ratings - 6 Months</u>			
		<u>Displacement</u>	<u>Probe Test</u>
		<u>Angle</u>	
Rex 471	No agent	$2-1/2^\circ$	Slight feel, large bead, flows, no structure.
Rex 471	.75% RL 80	5°	Slight feel, large bead, flows, slight structure.
Rex 471	1.25% 606 Y	$4-1/2^\circ$	Slight feel, large bead, flows, structure.
Rex 471	.075% (524)	$3-1/2^\circ$	Slight feel, large bead, flows, no structure.
Rex 476	No agent	1°	Slight feel, small bead, flows.
Rex 476	.35% RL 80	8°	Slight feel, very large bead, flows, structure.
Rex 476	1.0% 606 Y	$15-1/2^\circ$	Considerable feel, very large firm bead, considerable structure.
Rex 476	.25% (524)	5°	Slight feel, large bead, flows, no structure.

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Body control studies show Jones-Dabney Syntex RL 80, Syntex 606 Y, and bodied oil (524) maintaining bodying effects in oil type paint systems after a six month aging period. Syntex RL 80 is most stable in a straight oil system, while bodied oil (524) is most effective in oil types having a slight alkyd modification. Viscosity data are reported in the following table:

SWP Gloss White Rex 471
Oil Vehicle

Viscosity in Seconds on S-W No. 3 Cup

<u>Agent</u>	<u>24 Hours</u>	<u>7 Days</u>	<u>6 Months</u>
None	25	26	25
.75% RL-80	33	38	29
1.25% 606 Y	30	31	27
.075% (524)	24	32	25

One Coat Repaint White Rex 476
Oil Vehicle, Same Alkyd

None	20	19	18
.35% RL-80	31	39	35
1.0% 606 Y	45	44	23
.25% (524)	26	26	47

Woodland Brown Rex 493
Semi-Alkyd Vehicle

None	28	28	29
.4% RL 80	31	31	29
.6% RL 80	31	32	29
.2% (524)	33	32	29

The settled state of these materials was evaluated by application of the newly designed Torque Consistency Meter. This comprises a mechanically activated turntable which revolves at a rate of approximately 1 R.P.M. The table accommodates pint or quart containers in which the firmness of settled pastes is first evaluated by dropping a flat end spatula (5-1/2" x 15/16" blade) through a slotted guide bushing into the settled paste. The guide bushing supports the spatula vertically as it falls freely into the paste, impelled by its own weight. The bushing rides freely in a horizontal plane and rotates on a race centered in its support, which is carried by the rim of the container. This provides for free rotation of the spatula independent of the container.

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The panels are all cedar bevel siding, except that at Chicago, south only, a series is also tested on repaint panels. Time of exposure is 8 months Chicago, north and south vertical, and 8 months Florida, south vertical. Results are as follows:

- (a) Exterior Flats. In the whites, Armstrong's seems to have a slight edge over Dutch Kraft (From Grand Rapids Paint and Enamel Co.), with only very slight incipient cracking on each. The Chicago panels rate S-W Flat-Tone White as equally good, even cleaner on the south. However, in Florida the Flat-Tone is very badly mildewed. None are anywhere near as clean as Rex 471 (guide). Chalk on the flats seems to wash off very easily, as there is some evidence of erosion and no heavy rub-off on the cloth. The three corresponding greens all show excessive fading, compared with essentially none for the S-W guides. So far, Armstrong's Pine Needle Green, due to its deep original color, looks much better than Dutch Kraft Chartreuse (yellow seems unstable), and Flat-Tone Spring Green, the lightest, is very heavily masked with white chalk.
- (b) No particular choice on the specials using RAD soaps, all of which seem very smooth but have a tendency to sag. Clean and about equivalent to the regular guides.
- (c) Enterprise Wonder White seems to hold gloss a little longer than Rex 471, but this was more than offset by dirt collection and serious mildew at Florida.
- (d) Protexa-Wall, if its rough texture is disregarded, looks clean and good at Chicago south, both new and repaint wood. However, chalking is practically nil, and the Chicago north panel looks quite dirty. The Florida panel shows quite heavy mildew. An unsightly stain or bleeding effect along the grain (also to a less extent at Chicago north) not only spoils appearance but indicates serious weak spots in the film.

Note on Protexa-Wall: Has been promoted as a finish for exterior wood by the Krylon Corporation, Paterson, N. J. It seems to be an acrylic base material of high inert content and almost mastic consistency and film thickness. It is recommended for spray application, one coat only, with a very coarse nozzle. It is usually sold as a contract job including application.

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Some differences in gloss retention were noted in the early stages, but nothing of practical significance. Variation in chalk rub-off at 12 months Florida was not great and followed the pattern of the Chicago tests outlined below. The same is true in general of both dirt collection and fading, the Chicago tests being a little more sharp in most differences.

- (a) No other Rex 471's as clean and white as 1405, but T1 Pure LW nearly as good. FF/RCHT noticeably dirty; slightly better with LW added.
- (b) 1405 sample cleanest; FF/R 110 Z clean on south but not on north. FF/AA (both anatase) seems slightly more dirty. Other blends fairly clean; all RCHT definitely most dirty.
- (c) All quite dirty, but R 110 Z cleaner than R 610 and RC. Chalk rate even on R 110 Z seems low enough so far to avoid excessive wash-down, but none are clean and white enough to be acceptable as whites, up to one year.
- (d) Little, if any, cleaner than the Rex 475 tests in (c). If considered as suggestions for the problem of excessive wash-down (onto bricks, dark trim paints, etc.), both Rex 475 and the (d) samples fall short, at least during the first year, because of dirt collection.
- (e) In the tints, the regular with RC is best in all respects so far, R 610 fades slightly more and R 110 Z develops far too much chalk-mask fading.

Exposures 17712-25 F, C were examined during the month, a series of four groups of unrelated tests briefly outlined as:

- (a) Two competitive white and green flat paints presented to the trade for exterior use, compared with S-W Flat-Tone and regular SWP controls.
- (b) Rex 471 SWP Gloss White made with 10 pounds of basic Rosin Amine D soaps of magnesium and aluminum as surface active agents.
- (c) A sample of Enterprise Wonder White #452.
- (d) A sample of Protexa-Wall, a special heavy coating described below.

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Mica Tests in SWP

The Franklin Mineral Products Company has submitted the following samples of coated, water ground micas for evaluation in latex formulations, house paints, enamels and varnishes.

No. 51	Almibronz	(Stearate Coated)
No. 32	"	"
No. 50	"	(Silicone Treated)
No. 45	"	(Resin Coated)

These pigments will be evaluated in several paint products. House paints were made for exposure test using 7% of the pigment as treated mica with 62-C-2 4 I mica from Mineralite Sales Corp. as the regular material. The resin coated mica was ground directly in the bodied oil and also added as a dry pigment in the usual manner.

Exposures 16702-26 F, C were studied during the month. The paint systems tested are:

- a. Rex 471 SWP Gloss White, with all 1405 dry FF anatase titanium, versus Ti-Pure LW and blends of FF/RCHT semi-nonchalking rutile calcium (regular) and FF/RCHT/LW.
- b. Rex 456 SWP Fume Resisting White, with all FF, versus blends of FF/AA, FF/RCHT, FF/R 610 non-chalking rutile TiO_2 , FF/R 110 Z chloride process rutile TiO_2 , and versus all RCHT.
- c. Rex 475 SWP Tinting White, with all RC rutile titanium non-chalking (regular), versus all R 610 and all R 110 Z. (These exposed as whites).
- d. Blends of 50/50 Rex 471 with FF/Rex 475 with RC; 50/50 same but Rex 475 with R 610; same but Rex 475 with R 110 Z.
- e. Rex 465 SWP Colonial Yellow and Rex 477 SWP Westchester Gray, comparing in each the regular with RC versus tests using R 610 and R 110 Z; in other words, the same paints as in (c) above but tinted.

The panels are all cedar bevel siding, primed with Rex 450 SWP Undercoater of matching shade. Exposed 12 months at Florida, vertical south, and 13 months at Chicago, north and south.

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Inert Evaluation in SWP Gloss White Rex 471

Inert Tested (Paints 682 B-700 B)	Grind at Same Mill Adjustment	Viscosities No. 3 Orifice - S-W Cup			Brushing	Flow	Gloss
		Fresh	24 Hr.	9 Days			
687 R Sierra No. 139 Talc	2-3/4 H	27"	42.4"	38"	Slightly sticky	Short	Good -
				5 Days			
699 R 5490 Talc	4 H	51"	44"	45"	Slightly sticky	Very short	Good -
700 R RC 500 Talc	0 H	26.2"	36"	34"	Slightly sticky	Slightly short	Fair -

SWP Brushability Tests

Quart samples of SWP production made with and without Bentone 34 were sent to all factory superintendents to be evaluated for brushing and flow properties. Various tests run on laboratory and plant batches of SWP showed that two pounds of Bentone 34 per 100 gallons produced paint with improved brushing properties. The use of two pounds Bentone 34 would increase the cost of SWP about 1-1/4¢ per gallon. There is some question whether the improvement in ease of brushing would warrant the increase in raw material cost.

The paints were checked on the high shear viscometer as well as by brush application with a four inch brush on Kem-Glo paper and over cedar siding primed with SWP 450 Undercoater. The following results were obtained.

	<u>Brushing</u>	<u>Flow</u>	<u>Viscosity #3 Cup</u>	<u>Poises at 10,000 sec.⁻¹</u>
Rex 471, C 1253	Slightly sticky	Good -	29.0"	3.55
Rex 471, C 1053	Good	Good	29.0"	2.71

The higher shear reading indicates stickier brushing.

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Inert Tests in SWP

The Eastern Magnesia Talc Company and the Sierra Talc and Clay Company have submitted the following talcs for test in SWP Gloss White.

5490 Talc - Eastern Magnesia Talc Co.
RC 500 Talc - " " " "
Mistron MSC Talc - Sierra Talc and Clay Co.
Trinity Superfine Talc - Sierra Talc and Clay Co.
Sierra No. 139-V Talc " " " "
Sierra No. 139 Talc " " " "

These talcs were compared with Nyltal 500 5L2 dry and 599 SF magnesium silicate 2304 dry for viscosity, brushing, flow and gloss characteristics. Trinity Superfine Talc produces consistency similar to Nyltal 500 but the gloss it produces is somewhat lower. Sierra No. 139 and 139-V are similar in all characteristics. When compared with Nyltal 500 in SWP, both inerts produced higher viscosities with less apparent flow than Nyltal 500. Mistron MSC Talc gave somewhat higher consistency than Sierra 139 or 139-V but not sufficiently high to be used as an alternate for 2304 dry. The 5490 Talc from Eastern Magnesia Talc and Sierra No. 139 and 139-V may be used in conjunction with 5L2 dry to obtain higher viscosities if our factories encounter low consistencies with 5L2 dry, providing costs are not too high. The RC 500 Talc appeared to be very hard to grind and discolored badly when ground on a three roll mill. Test data are summarized in the following table:

Inert Evaluation in SWP Gloss White Rex 471

Inert Tested (Paints 682 R-700 R)	Grind at Same Mill Adjustment	Viscosities No. 3 Orifice - S-W Cup			Brushing	Flow	Gloss
		Fresh	24 Hr.	9 Days			
682 R Nyltal 500 - 5L2 Dry	2-1/2 H	22"	30"	29"	Slightly sticky	Good -	Good
683 R Mistron MSC Talc	2-1/2 H	30"	45"	55.6"	Sticky	Very short	Good -
684 R Sierra No. 139-V Talc	2-1/2 H	28"	45"	40"	Slightly sticky	Short	Good
685 R Trinity Superfine Talc	2 H	24.8"	31"	28"	Slightly sticky	Good -	Fair +
686 R - 599 SF Mag- nesium silicate 2304 dry	2-1/2 H	35.0"	55"	77.8"	Very sticky	Very short	Fair

(Cont.)

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The panels are cedar bevel siding, primed with Rex 450 Undercoater. The Florida panels have been exposed 12 months, vertical south, and the Chicago panels the same, north and south. Although the Florida panels, according to routine reports, showed slightly greater dirt collection due to these oils at certain stages during the first year, there is essentially no choice at present except for a slightly better sheen due to the special oils. The Chicago panels also show essentially no differences, although a very slight trend toward better gloss retention and more dirt due to the specials is discernible.

Panels 18502-25 CS, CN, F were prepared during the month for exposure on cedar bevel siding at Chicago north and south vertical and Florida south. These panels represent repeats of certain parts of the 1951 du Pont Cooperative Exposure Series 16046-16115. Florida exposures of this original series had raised some doubt as to whether Group 2 of this series was actually primed as intended; we could find nothing in the record to indicate an error, but decided to repeat the one group to be sure.

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During the first year Pittsburgh's oil sample was one of the best in clean-up in Rex 471, while SO₂-treated soya was alighty on the dirty side. In Rex 478 there was some checking in the early stages, with bis-bodied soya and Pittsburgh's showing the least; at one year SO-500 seemed noticeably advanced in fading, but at 2 years there was no choice.

In the final results the three treated soyas, especially the bis soya, seem poorer than the soya/CWO and the Pittsburgh oil in durability of Rex 471 at Chicago. However, the soya/CWO does not show up as well at Florida and bis soya looks satisfactory. Final results on the tints at Chicago show no appreciable failure and only minor differences in appearance. At Florida, the tints show no final differences and very little film failure.

Panels 14855-80 C, F, were examined during the month. The tests involve a comparison of Persolite P-IVB as extender in Rex 471 SWP Gloss White and Rex 465 Colonial Yellow, both at equal volume and at equal weight, as compared with the regular magnesium silicate.

The panels are all cedar bevel siding primed with Rex 450 Undercoater of contrasting shade. The Florida panels have been exposed 24 months, vertical south, and the Chicago panels 28 months, north and south. As of the present exposure time, we see no particular differences in performance of the Florida panels, and the routine reports, though not entirely self-consistent, tend to bear this out for the earlier stages.

Chicago results, usually more reliable, indicate:

- (1) In Rex 471, Persolite at equal volume shows more erosion, while at equal weight it is the same as the regular.
- (2) In the tints, both Persolite samples rate poorer because of excessive fading, although they do show less dirt. Further, the dirt does not seem to be partly mildew, as is the case with the regular.

Panels 15850-4 F, C were examined during the month. They involve a comparison of the following oils in Rex 471 SWP Gloss White:

1. RC 8105 - SO₂ bodied soya, with trace of Epon resin.
2. RC 8104 - Same, but no Epon. Besides this special test at 3-1/2 pounds per gallon (total oil), a regular formula uses RC 8105 at 4 pounds per gallon which is parallel to the regular guide paint.

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All panels are 2-coat work using Rex 450 Undercoater on cedar bevel siding. Florida panels have been exposed six months, vertical south, and Chicago panels 7 months, north and south. The whites show a striking contrast between the Rex 471 and the other two formulations. The Rex 471 is much cleaner at both locations, due to more free chalking. Rex 473 is holding more dirt than du Pont's. The tints show the sharpest contrast in the three regular formulas. Rex 473 shows the best tint-retention, but the most dirt. du Pont's is nearly as good in color and possibly a little cleaner, while Rex 471 is outstandingly clean but shows very bad fading (chalk-mask) for such a short period. The blends show surprisingly little difference at Florida, where dirt and mildew are prevailing factors. When the Chicago panels are considered, the performance is about what would be expected, the 75/25 Rex 471/473 performing much like Rex 471, the 25/75 mix vice-versa and the 50/50 sample intermediate.

Exposures 12914-20 F, C and 13223-58 F, C were studied recently. The purpose was to compare the oils listed below as replacements for the 19 gallons of (48) bodied linseed oil in Rex 471 SWP Gloss White of 2-9-48 (all 1403 anatase TiO_2) and in Rex 478 SWP Geneva Cream of 7-31-47. In addition, Rex 471 of 1-22-43 (earliest bodied oil type, R-200 TiO_2) and 10-31-45 (using an R 200/1403 blend) are tested. The first series, 12914-20, was prepared during warm weather at 82 - 88° F., while the other series was prepared later on at 45 - 60° F. Identical paints were used, and the possible effect of the different drying conditions was one of the major original concerns. All panels are cedar bevel siding primed with Rex 450 Undercoater of contrasting shade. All Florida panels have been exposed 3 years, vertical south. The Chicago panels of the 12914 group have been exposed 4 years, north and south, and the 13223 group 3-1/2 years.

- (a) Warm weather vs. cool weather painting. At the final stage, no choice is possible. Briefly, the earlier results showed various differences (with only fair correlation between Chicago and Florida). The general conclusion for the first 2 years was that the cool weather painting showed certain disadvantages but not enough to indicate that any of the formulas involved was unsuitable for cool weather use.

- (b) The oils involved are:

RB 8474 (old No. CV-7027) - Bis soya, air blown.
RB 8471 (old No. CV-7028) - SO_2 -treated soya.
RB 8472 (old No. CV-7029) - Catalyst-bodied soya.
RB 8473 (old No. CVR-584) - 80/20% (1273) soya/(140) CMO.
RB 8477 (old No. CVR-570) - Pittsburgh's SO-500 soya.

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Brushing and High Shear Readings
on Exterior House Paint Formulations

Batch Size	Material	Viscosity #3	Formula	Brushing	Poises at 10,000 sec. ⁻¹
2000 gal.	Rex 471 - C 755	30.4"	Card 70	Too sticky	3.40
" "	Rex 471 - C 775	29.8"	" "	Good	3.05
" "	Rex 471 - C 865	30.2"	" "	Sl. sticky	3.15
" "	Rex 471 - C 855	30"	" "	Too sticky	3.25
500 gal.	Rex 471 - C 755 A	28.6"	As above + 2# Bentone 54	Good	2.70
2000 gal.	Rex 471 - C 1043	26.0"	"	Good	2.52
2000 "	Rex 471 - C 1055	29.0"	"	Good	2.71
2000 "	Rex 471 - C 855 A	30.2"	"	Sl. sticky	3.10
Lab. batch	Rex 471 - OJ 639 R	30.2"	2# Bentone 54 3.89# oil/gal.	Good	5.20
" "	Rex 471 - OJ 542 R	28.9"	Rex 476 vehicle	Good	2.80

Panels 17751-68 F, C were examined during the month. The purpose was to compare the following six paints as whites, or as shaded to Rex 465 Colonial Yellow and Rex 474 Chelsea Gray:

1. Rex 471 SWP Gloss White, card 66. 175/100 lb. 2132 RCHT/1405 anatase TiO_2 . As white and tint.
2. Rex 473 SWP Tinting White, card 2. All TiO_2 as 2140, RC. Used both ways.
3. 25/75% 471/473 blend (used in tints only).
4. 50/50% " " (" " " ").
5. 75/25% " " (" " " ").
6. du Pont Two Purpose Outside White. Used both ways.

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Experimental batches of SWP Gloss White were made with MB 2777, MB 2775, and MB 2781. The MB 2784 was not tested due to poor stability of the incorporated driers. Work has been under way for several months in connection with the reformulation of SWP for better brushing characteristics. The above oils were used for the total oil in the formulation. The paints were checked for consistency, brushing, flow, gloss and drying characteristics.

Paints made with these oils were no better than those containing the regular vehicle when brushed at the standard viscosity. The experimental paint made with MB 2781 was too low in viscosity but brushed very easily. At a standard viscosity it was similar to MB 2777 and MB 2775. Test data are recorded in the following table:

Processed Oil in SWP Rex 471

Paint No.	OJ 662 R	OJ 663 R	OJ 664 R	OJ 665 R
Vehicle Tested	Regular vehicle with (2) and (2538)	100% MB 2777	100% MB 2775	100% MB 2781
Viscosity - S-W Cup #3 Orifice				
Fresh	27.6 sec.	27.0 sec.	26.0 sec.	17.0 sec.
24 Hr.	30.2 "	30.0 "	29.6 "	-
6 days	31.0 "	25.0 "	27.0 "	12.0 sec.
Brushing	Sl. sticky	Sl. sticky	Sl. sticky	Very good
Flow	Short	Short	Fair +	Good
Gloss	Fair	Fair -	Good	Good
Drying	Good	Good +	Good	Good +

Further work was done on the reformulation of SWP to improve brushing characteristics. Laboratory batches as well as plant production have indicated that Bentone 54 improves the brushing properties of the present formulation of Rex 471. Brushing and high shear readings on production batches of SWP made with and without Bentone 54 are listed below. We have included two special Rex 471 revisions; (a) paint 639 R based on 3.89 pounds of oil per gallon, (b) paint 542 R using the Rex 476 One Coat House Paint vehicle.

0007-SWP-044236

0007-SWP-000113606

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#97 - SWP

The Vegetable Products Research Laboratory has submitted four processed oils for test in SWP:

MB-2777: Heat bodied, extracted raw linseed oil, SO₂ bleached and catalyzed. Blown for one hour with steam (230° F.) at an oil temperature of 300° F., on the down-heat.

Viscosity (G-H at 77° F.) 6.2 sec.
Acid No. 5.0
Color (Gardner, 1953) 5 +

MB-2775: Straight heat bodied, extracted raw linseed oil, SO₂ bleached and catalyzed. This oil was prepared to serve as a reference base in comparisons with MB-2777. It received no steam blowing and was polymerized with SO₂ throughout at a temperature of 580° F.

Viscosity (G-H at 77° F.) 6 sec.
Acid No. 5.0
Color 5 +

MB-2781: Heat bodied, extracted raw linseed oil, SO₂ bleached and catalyzed to a heat bodied viscosity of 2.0 seconds. The bodied product was then air blown at 175° F. in the presence of driers, to a viscosity of 2.5 seconds.

Viscosity (G-H at 77° F.) 2.5 sec.
Acid No. 5.0
Color 11 -

MB-2784: Heat bodied, extracted raw linseed oil, SO₂ bleached and catalyzed to a heat bodied viscosity of 5.2 seconds. The heat polymerized product was then air blown in the same manner as MB-2781 to a viscosity of 5.5 seconds.

Viscosity (G-H at 77° F.) 3.5 sec.
Acid No. 4.8
Color 12 -

0007-SWP-044237

0007-SWP-000113607

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#97 - SWP

Work was continued on the evaluation of two heat bodied oils based on raw linseed oil. Oils of this type were submitted by J. T. Schaeffer, of the Newark Varnish Department, and by the Cleveland Technical Service Department. It is hoped that they will prove more economical in SWP than the parallel regular linseed oil (510). The characteristics of the oils under test are as follows:

<u>Oil</u>	<u>Viscosity</u>	<u>A. V.</u>	<u>Color</u>	<u>Sp. Gr.</u>
(510) Chicago Production	57-1/2" G-H	7.9	6-7	0.956
AVD 2536 (Cleveland)	62" G-H	9.5	9	0.960
NL 37 (Newark)	52" G-H	8.4	7-8	0.957

Experimental paints made with these oils were checked for brushing, flow, viscosity, color and drying. In general we found all paints slightly sticky in brushing and slightly short in flow, being similar to regular production in this respect. From the standpoint of color, only minor differences could be detected. The paints made with AVD 2536 and NL 37 appeared very slightly blue in color as compared with very slightly yellow for the (510) paint. AVD 2536 appeared to be slightly superior to NL 37 in flow and drying characteristics. However, NL 37 is rated slightly better in color than AVD 2536. If this type of oil is to be used in SWP it is suggested that the color be 9 or better for house paint usage. Odor may be a characteristic requiring further consideration.

The Oakland Laboratory has reported rapid loss of gloss as well as low gloss and poor flow on SWP made from safflower oil. Our laboratory work has indicated that a definite improvement in flow can be obtained by the use of 0.25% Rheotol based on the total weight of paint. We have been unable to detect the rapid loss in gloss on safflower oil paints reported by Oakland. Our test panels painted with safflower and linseed oil paints show no differences in gloss retention over a period of 30 days. The safflower oil paints are initially lower in flow and gloss than regular SWP but both paints have maintained the same differential in these characteristics over a period of 30 days. The safflower paints show less yellowing than the linseed oil paints in the absence of sunlight.

Consistency Control with Amines

Amines were investigated as possible agents for the control of house paint consistency. Stepwise additions of triethylamine and morpholine were made to batches of SWP Rex 471 Gloss White which showed excessive increase in consistency. Observations were made over a period of four months to determine the extent of any changes. The data in the following table are representative of the consistency changes occurring during the period of observation.

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Rex 471 Batch	Agent Used	Add per 100 Gals.	Consistency in Sec. on No. 3 S-W Cup			
			Original	24 Hr.	3 Weeks	4 Mo.
A	-	-	45	45	44	41
A	TEA	0.2 Gal.	45	37	37	35
A	TEA	0.4 "	45	35	36	33
A	TEA	0.6 "	45	32	33	30
B	-	-	45	45	46	43
B	MOR	0.2 Gal.	45	41	41	38
B	MOR	0.4 "	45	38	39	37
B	MOR	0.6 "	45	35	36	33
C	ETH	1.2 "	45	36	36	31

TEA - Triethylamine

MOR - Morpholine

ETH - Alcohol (1891)

Amines added to Rex 471 at the time of manufacture produce similar lowering of consistency when both normal and high acid (10.0) vehicles are used. Although an appreciable consistency change occurs shortly after addition, amines must be used cautiously until their action is better understood. Since amines are known to reduce livering, a peptizing as well as neutralizing action may occur. Odor is a limiting factor since an undesirable amine odor can be detected if more than one quart is added to 100 gallons of paint. Due to combination with fatty acid, larger amounts can be used with high acid vehicles. If the amine is added to the oil before mixing in the pigments, reaction between basic pigments and fatty acids can be controlled. As indicated in the above table, one quart is sufficient to produce a useful change. Comparison with the control demonstrates that the decrease does not become excessive with age. No change in drying time was noted. The fact that addition of alcohol produces a decrease in consistency designates water as a possible source of trouble. More work is necessary to determine the advisability of adding an amine as general practice at the time of house paint manufacture.

0007-SWP-044239

0007-SWP-000113609

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Blistering of SWP Rex 477 Westchester Gray

A complaint was received via the Oakland laboratory with reference to blistering of a batch of SWP Westchester Gray dated 0151. An investigation has been under way to check the blistering tendencies of this product as compared with SWP Gloss White Rex 471 and SWP Manor Brown Rex 495. The test paints were brushed on wet and dry cedar siding panels as one coat work. The panels were placed in an open drying oven for one hour under a bank of heating lamps that produced a temperature of 140° to 150° F. on the surface of the panels. A second set of panels was subjected to the same treatment for a period of 16 hours at 100° F.

The initial tests show that the sample of Westchester Gray Rex 477, 0151 from Oakland, blisters definitely more than the other paints in the series. However, other Westchester Gray paints made on the active formulations are quite good in blister resistance as compared with the other paints under test. Blistering tendencies are bad on all paints applied to wet panels (25 to 30% moisture content).

We have no explanation for the differences in blistering tendencies of these paints. However, all paint using part kerosene as thinner exhibited less blistering than the paints reduced with mineral spirits, except for the Oakland sample. Results are summarized in the following table.

<u>Sample</u>	<u>Material</u>	<u>Thinner Used</u>	<u>Blistering Dry Panel</u>	<u>Visible Wet Panel</u>
Oakland	Rex 477, 0151	Mineral Spirits Kerosene	Bad	Very bad
388 R	Rex 477, Card 15	High Flash M.S. Kerosene	Trace	Bad
389 R	Rex 477, Card 15	Mineral Spirits only	Daf.	Bad
390 R	Rex 477, Card 15 (Alt. A)	Mineral Spirits Kerosene	Trace	Very bad
391 R	" "	Mineral Spirits only	Bad	Very bad
392 R	Rex 471, Card 68	Mineral Spirits Kerosene	Slight +	Bad
393 R	Rex 495, Card 15	Mineral Spirits	Bad	Bad
394 R	Rex 495, Card 16	Mineral Spirits	Cons.	Very bad

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0007-SWP-000113610

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The second set of panels exposed at 100° F. for 16 hours showed no correlation between blistering and composition of the paints. Other test panels were prepared to determine the effect of various amounts of anti-skinning agent on blistering. Westchester Gray Rex 477, Card 15 and Manor Brown Rex 495, Card 16 were made with 0.5 to 5 gallons of (5028)/100 gallons of paint. The degree of blistering and drying characteristics are reported in the following table. These tests in general would indicate that 1 to 1.5 gallons (5028) have a tendency to decrease the blistering tendencies of the two formulations.

Blistering Tests on Westchester Gray - Rex 477
and Manor Brown - Rex 495

Sample No.	Anti-skinning Agent	Drying Set-to-Touch	Blistering After 16 Hr. at 120° F.			
			Wet Panel 28-30% H ₂ O		Dry Panel 7-8% H ₂ O	
Batch	(5028) per 100 Gals.		Applied Over Shellac	Applied Over New Wood	Applied Over Shellac	Applied Over New Wood
Rex 477						
Card 15						
514 R	None	3 hr. 50 min.	V.V. bad	V.V. bad	V. bad	V. bad
515 R	1/2 gal.	3 " 50 "	V.V. bad	V.V. bad	Bad +	Bad +
516 R	1 gal.	3 " 45 "	Definite	Slight +	Definite*	V. slight
517 R	1-1/2 gal.	4 " 50 "	Bad**	Definite	"	Definite
Rex 495						
Card 16						
519 R	None	3 hr.	V. bad	V. bad	Slight	Slight +
520 R	1 gal.	3 hr. 20 min.	Bad	Slight +	Trace	V. slight
521 R	2 gals.	4 hr. 10 min.	Slight +	Bad	"	Trace
522 R	3 gals.	4 hr. 20 min.	Slight	Slight +	V. slight	"

*Poor draw-down, non-uniform film.

**Bad blistering (local area).

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0007-SWP-000113611

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Exposure series examined during the month include the following:

1. Exposures 12510-44 C, K, F were examined and a final report written on the following locations: Chicago north and south, 4-1/2 years; Coffeyville south, 4-1/2 years; Florida south, 5 years. All are cedar bevel siding primed with Rex 450 Undercoater. Both Rex 471 SWP Gloss White and SWP Tint Base Gray and Colonial Yellow are used as the basis for a series of tests covering the substitution of 414 dry 12/88 leaded zinc and National Lead Company's 45 X basic silicate white lead for 412 dry 35/65 leaded zinc. Part of the program also includes the replacement of the supplementary 18 dry basic carbonate white lead as well as the 412 dry.

The test was carried out in cooperation with National Lead Company. The series is much too complex to allow the presentation of details in this brief account, but a little further explanation of the basic plan seems necessary. The substitutions mentioned above were made in the whites according to three methods:

- Method A. Zinc oxide replacement by equal poundage, lead replacement by equal volume. (This is National's recommendation; it is the only method used in the tints).
- Method B. Maintain a 35/65 lead/zinc ratio, replacement on total volume.
- Method C. Same as B but replacement on a poundage basis, adjusting volume with extender.

In the whites, and less extensively in the tints, there are two other important variations: (a) reduction of the zinc oxide content from 30% to 25% and to 20%; (b) use of a mechanical blend instead of a co-fumed leaded zinc.

Subject to several variations and minor contradictions among the several locations, certain general trends were:

1. Performance of 414-45 X, Method A, substantially equal to that of the regular 412-18 dry.
2. Some indication of inferiority when the substitution is extended to include 18 dry.
3. Both B and C methods seem slightly inferior to A; C seems slightly inferior to B.

(Cont.)

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4. Definite inferiority due to dropping of zinc oxide level; but 414-45 I blends (all method A) seem the same with relation to the 412 type as at 30%.
 5. Use of mechanical-mix not satisfactorily covered. Generally quite good at high zinc oxide level, surprisingly poor at reduced levels.
 6. Performance in tints generally good; more variation with location than with any other factor.
2. Series 15182-9 F, C and 15259-46 F, C, were reported after 48 months' exposure at Chicago, vertical north and south, with Florida south exposures retired at 56 months also considered. The purpose of the two parallel series was to compare cool versus warm weather painting. Regular Rex 471 SWP Gloss White and Rex 465 SWP Colonial Yellow made with 100% linseed oil, (2) and (310), were compared with:
- (a) CV-49 as bodied oil, the total binder 80% linseed, 12% soya, 8% CWO.
 - (b) (3516) as bodied oil, the total binder 80% linseed, 52% soya, 8% CWO.

All panels were cedar bevel siding, primed with Rex 450 Undercoater. There are many variations which show up in a full study of past readings, but it is very difficult to find any trends which are consistently verified at all locations and times of examination. No differences between the "cool weather" and "warm weather" groups seem bona fide. Both (3516) and CV-49 showed up in quite a number of instances as slightly poorer in dirt retention than the regular, with (3516) the poorer of the two. Both were slightly but consistently more advanced in fading. In durability the choice was even less clear; both seemed a little more eroded at Chicago and CV-49 showed checking in Rex 465 at Florida. While these differences in performance are all slight and not conclusive in themselves, they may be indicative of a general undesirability of soya-chinawood blends if used as a higher proportion of the binder.

0007-SWP-044243

0007-SWP-000113613

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#97 - SWP

The Cleveland Technical Service Department reported that some plants were reporting low viscosities on their SWP production. They requested that we review our exposures on talcs and submit any experimental data that would be helpful in judging the possible merits of the inerts examined. Several laboratory batches of SWP were made with combinations of regular inerts as well as with some experimentals that appeared to be satisfactory in durability.

As indicated by the data, our laboratory batches attain sufficient viscosity using 512 dry Nylal 500 which is not the case at all plants. Except for RC 500 Talc, the other single regular extenders produced satisfactory viscosities, with Fibrene materials slightly on the low side. In all the other cases where higher consistency extenders were used in conjunction with 512 dry, viscosities tend to become rather high from a satisfactory brushing standpoint. Obviously, it becomes rather difficult to contribute ideas on how to develop satisfactory viscosities for our other plants reporting low values for production batches.

SWP Gloss White Card 70 - Inert Tests

Batch	Inert	Viscosity - #5			Grind	Gloss	Brush	Flow
		Fresh	24 Hr.	6 Days				
552 RR	250# 512 dry	22.6"	30"	35"	3 H	Good	Good -	Good -
553 RR	250# 20 dry	22"	28"	31.4"	2-1/2	Good	Good -	Good -
554 RR	250# 6250 dry	22.8"	28"	32"	2-1/2	Good	Good -	Good -
555 RR	250# Fibrene C 400	25.2"	26"	27"	2-1/2	Fair	Good -	Good -
556 RR	250# Fibrene C 500	25"	26"	26"	3	Fair +	Good -	Good -
557 RR	250# RC 500 Talc	51"	-	37"	2-1/2	Poor	Good -	Fair -
558 RR	150# 512 dry	30"	-	5 Days	3	Good	Good -	Poor
	100# 513 dry			36"				
559 RR	150# 512 dry	26"	-	36.4"	3	Good	Good -	Poor
	100# 2304 dry							
560 RR	150# 512 dry	27"	-	35"	3-1/4	Good	Good -	Poor
	100# 1989 dry							

(Cont.)

0007-SWP-044244

0007-SWP-000113614

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#97 - Cont.

SWP Gloss White Card 70 - Inert Tests

Batch	Inert	Viscosity - #3			Grind	Gloss	Brush	Flow
		Fresh	24 Hr.	5 Days				
561 RR	150# 512 dry 100# 549 Exp.	45"	-	58"	2-3/4 H	Good -	Fair	Poor
562 RR	250# 512 dry 2# 62 Y 4	25.4"	-	56"	2-3/4	High	Very good	Very good
563 RR	250# 512 dry 4# 62 Y 4	27.6"	-	55.6"	3 H	Good +	Good	Good -

In addition to the work reported last month on the heat bodied oils AVD 2556 and NL 57 (based on raw linseed oil), we have compared samples of Newark and Chicago SWP production made with this type of oil for general characteristics. The Newark production of Rex 471 using (25-A-14) as a replacement for (510) is similar in brushing, flow, color, etc. to Chicago production made with (25-C-9). These two oils are both made from raw linseed but (25-C-9) is reduced to 70% solids. The regular SWP production made with (25B) appears slightly less yellow than paints made with (25-A-14) or (25-C-9). We do not believe the staining tendencies due to (25-A-14) or (25-C-9) are objectionable. We are concerned about the odors of these oils and a careful check should be made if they are to be used permanently in SWP production.

The Vegetable Products Research Laboratory has submitted several processed oils for evaluation of brushing characteristics in SWP. The characteristics of these oils are as follows:

Product	Nature of Processing	Viscosity	Acid No.	Color
		Seconds G-H at 77° F.		
MB-2751	Straight heat-bodied	4.0	5.5	6 -
MB-2754	Heat bodied plus 1% maleic anhydride	4.5	8.5	7 +
MB-2755	Straight heat bodied	6.0	4.8	5 +
MB-2752	Heat bodied-air blown without driers	6.2	5.0	9 -
MB-2758	Heat bodied-air blown in the presence of driers	6.2	5.3	15 -

(Cont.)

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0007-SWP-000113615

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#87 - Cont.

Product	Nature of Processing	Viscosity	Acid No.	Color Gardner 1933
		Seconds G-H at 77° F.		
MB-2756	Straight heat bodied	8.2	5.0	6 -
MB-2748	Heat bodied-air blown without driers	8.6	5.1	8 +

The oils as submitted gave no improvement in brushing properties but in most cases the samples have very good flow characteristics. MB 2754 and MB 2756 are poor in drying properties. No further tests will be conducted with these oils as our prime interest was in brushing properties.

SWP Rex 471 Card 70 Using Processed Oils

Batch	Bodied Oil	Viscosity - #5		Brushing	Flow	Gloss	Reflect- ance	Drying O'Nite
		Fresh	O'Nite					
564 R	(2558)	28.2"	35"	Good -	Fair - Good		84.1	O.K.
565 R	MB 2751	20"	25.5"	Good	Fair	Good	83.6	O.K.
566 R	MB 2754	20"	25"	Good -	Excess- ive (sags)	-	-	Wet
567 R	MB 2755	19.8"	31"	Good -	Good	High	84.5	O.K.
568 R	MB 2752	19"	30.2"	Sticky	Very good	High	84	O.K.
569 R	MB 2758	23"	30"	Sticky	Very good	High	84.4	O.K.
570 R	MB 2756	30"	35"	Good -	Excess- ive (sags)	-	-	Wet
571 R	MB 2748	27.8"	31"	Very sticky	Too high (sags)	High	83.4	O.K.

After observing the extreme flow induced in a special soya oil based SWP Gloss White type paint formulation by the addition of a small percentage of Rheotol 49 A B we wondered what effect this material would have on a puffy type paint composition such as one containing chromic oxide green 478 dry, Hansa yellow, or phthalocyanine blue pigmentation. A special oil paint having poor leveling qualities was prepared for this study using the following formula:

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0007-SWP-000113616

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550 pounds	Nytal 500	512 dry
100 "	Titanium dioxide	2174 "
400 "	Leaded Zinc	412 "
120 "	Chromic oxide	478 "
54-1/4 gal.	Raw linseed oil	(2)
26-3/4 "	Reduced bodied linseed oil	(2558)
1-1/4 "	Lead naphthenate	(4250)
.9 "	Manganese naphthenate	(4251)
10 "	Mineral spirits	(548)

Varying amounts of Rheotol and other agents were added to aliquot parts of this material, and viscosity and brush marking characteristics were observed as recorded below:

Agent Added by Volume	Viscosity - #5 Orifice		Brush Marking
	Fresh	4 Days	
1/2% Rheotol	27*	29*	Considerable
1/4% "	28	28.5	Bad
1/8% "	29	31	Bad
1% (4081)	28.5	30	Bad
1/2% (4081)	33	34	Very bad
2% (2235)	35	37	Slight
1% (2235)	31	32	Bad
3% (798)	25	26	Very bad
1-1/2% (798)	27	28	Very bad
1/8% Triethylamine	26	28	Moderate
2% Bentone 54/100 gal.	28	30	Moderate
Control	29	30	Bad

Rheotol 49 A 8
Acto 450 (4081)
Calcium Octoate (2235)
Non-break linseed oil (798)

It will be observed that there is no correlation between viscosity and leveling in this series. The sample containing 2% calcium octoate has the highest viscosity and delivers the least brush marking. Non-break linseed oil treated specimens show the lowest viscosity and are among those showing the most pronounced brush marking. The data suggests that leveling is associated with the thixotropic quality or yield value of a paint system rather than viscosity or flow as rated on the standard inclined plate.

Since Rheotol did not produce as much flow as was anticipated, the presence of water in the paint is suspected. Further work will be done on paints using dried pigments.

0007-SWP-044247

0007-SWP-000113617

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#97 - SWP

Several laboratory batches of SWP Gloss White were made with the oils NL 36 and NL 37 prepared by J. T. Schaeffer, of the Newark Varnish Department. These oils were made from raw linseed oil. It is hoped that they will prove more economical than the parallel regular linseed oils (798) and (510). The characteristics of the various oils tested are as follows:

<u>Oil Sample</u>	<u>Body</u>	<u>Color</u>	<u>Acid No.</u>	<u>Iodine No.</u>
(2) stock, raw linseed	-	10-11	2.1	180.6
(798) Chicago, lightly blown linseed	C	10	4.0	-
NL 36, special (798)	B-C	8-9	3.5	-
(510) Chicago	Z ₂ -Z ₃	6-7	-	-
NL 37, special (510)	Z ₂	7-8	8.4	-

The test paints were checked for brushing, flow, color and viscosity. All paints were somewhat high in viscosity except the batch made with Chicago (510) and regular (2). The test paints appeared to be slightly short in flow and slightly sticky in brushing. From the standpoint of color, only a very slight staining effect due to the NL 37 could be detected. It is considered advisable to produce one or two factory batches of SWP with NL 36 and NL 37 to check the staining properties of these oils. If production batches of SWP made with these oils are equivalent in color to our test paints, we are of the opinion that these oils could be used without any noticeable decrease in the quality of the SWP line.

The Oakland plant has submitted samples of non-break safflower oil (15 Y 5) and the safflower oil version of (2538) coded (25 Y 8) for inspection and test in SWP. Laboratory work has indicated that (15 Y 5) and (25 Y 8) yield paints which are shorter in flow than similar oils made from linseed. It is quite evident that any SWP production made with safflower oil should be fortified with 10 gallons of the safflower oil version of (798). The addition of approximately 0.25% Rheotol (49 A 8) may be necessary to obtain satisfactory flow. Oakland has reported that safflower oil paints drop in gloss faster than linseed paints. Further study will be made by this department of the use of safflower oil in SWP from the standpoint of flow and gloss retention properties.

Exposure series examined during the month include the following:

0007-SWP-044248

0007-SWP-000113618

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1. 12802-65 C. 50 months' exposure at Chicago. Parallel panels exposed in Florida were retired after 56 months. The paints are based on various alkyd vehicles, using three types of pigmentation; (a) as SWP Repaint White with all 1403 anatase TiO_2 and mica, (b) a high PVC (56%) pigmentation with TiO_2 , leaded zinc and BCWL, no extender, and (c) a low PVC (21%) pigmentation similar in type to (b). Panels were prepared using the test paints over Rex 450 Undercoater, self-primed, and as one and two coats on weathered SWP surfaces. Details of vehicle compositions and exposure results are too complex to be presented here, but are available on request. The results vary more with pigmentation than with vehicle, with (a) best, (b) poorest and (c) poor except on multiple repaints. Some exposure results are good but must be accepted with caution because of previous trouble with alkyd house paints over zinc-containing repaint surfaces.
2. 16158-16165 F, C. One year exposure at Florida, vertical south, and at Chicago, north and south, on cedar bevel siding. One part of the series was new wood with Rex 450 Undercoater as primer, another was one coat of the test paints over a weathered Rex 450-Rex 471 SWP Gloss White system. Regular Rex 471, card 62 is tested against specials containing (a) 70% 2807 dry mica replacing part of the 20 dry magnesium silicate and (b) Laminar used in the same manner. Laminar is a rubber grade ground oyster shell inert similar in particle size and shape to the AA mica. Laminar Calcium Corporation is the producer. The several exposure comparisons show no significant variations from standard performance. Laminar seems to be normal in chalking, gloss retention and dirt collection. A slight tendency toward greater erosion at Florida than mica or the regular is counteracted by an opposite indication at Chicago.
3. 16166-70 F, C. One year at Florida vertical south and at Chicago north and south, on cedar bevel siding primed with Rex 450 Undercoater. These panels test regular Rex 471 SWP Gloss White, card 62, with substitution of a 20% siliconated linseed oil for both the (2) and (310) raw and bodied linseed. The Silicone Oil C used came from Plaskon (Libbey-Owens-Ford) and was made up by the Resin Research Department into oils RC 8877 and RC 8879 of suitable body. Since these RC oils dried with serious wrinkling under ultraviolet light, two extra paint batches were made up with drier content reduced by approximately 10% and 20%. The Florida specials show considerable microscopic checking, but there is some question at this stage as to whether this is normal checking or an effect of the wrinkling tendency. However, the reduced-drier samples show no improvement in this respect. There is no film failure at Chicago, but the specials are clearly poor in chalking and clean-up. The reduced-drier samples are again a disappointment, not even as clean as the high-drier special. The dirt tendency is more or less verified by the Florida tests.

0007-SWP-044249

0007-SWP-000113619

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4. 16171-95 C. The purpose of this series was to compare regular SWP Tint Base, Paintercraft Tinting White and a special tint base formulated for Mr. Holton by Cleveland Technical Service. Rex 465 Colonial Yellow, Rex 474 Westchester Gray and Rex 458 Plymouth Green are the three shades involved. The vehicle of the SWP Tint Base, all linseed oil, is used for all three paints. Pigmentations vary as follows:

Material	SWP	Paintercraft	Special
1424 dry	Lead zinc	200 lb.	
412 dry	Lead zinc	440	450
2174 dry	R-610 TiO ₂	137	100
2140 dry	RC Titanium-Calcium	50	
18 dry	BC white lead		100
20 dry	Magnesium silicate	325	100
377 dry	Half-hydrate CaSO ₄		100
45 dry	Bihydrate CaSO ₄		118

All panels are cedar bevel siding primed with white Rex 450 Undercoater. They have been exposed 12 months at Florida and 15 months at Chicago, vertical south. Florida panels indicate that the SWP Tint Base is somewhat the best of the three in all respects, with the main differences in appearance being the dirt and water-spotting effect on Paintercraft and a slight fading tendency on both this and the special. However, a more important result, though not affecting appearance, is a serious microscopic checking on the Holton formula. Chicago results do not show this or any other failure, and according to Chicago panels it is the Holton formula, rather than the Paintercraft, which is slightly inferior in clean-up.

5. 16180-5 F, C. Cedar bevel siding panels primed with Rex 450 Undercoater, and exposed one year at Florida vertical south and at Chicago north and south. The test is in two parts: (a) regular (2) raw linseed oil in Rex 471 SWP Gloss White against AVM-65, normal body linseed extracted by the mixed solvent process at the Vegetable Products Research Laboratory, and (b) regular (510) against a special (510) made from the same batch of (44) except that in the latter case the bodying was done before the (44) was refrigerated or bleached. Except for a few very slight differences in dirt, of moderate duration, these paints at all locations have been very closely alike. This is what would be expected, especially since all substitutions are for either raw or bodied oil, not both.

0007-SWP-044250

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Paint Research
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#97 - Cont.

Panels 18184-265 CS, CN and F were prepared during the month for exposure south and north vertical in Chicago and south vertical in Florida. The paints are based on du Pont's suggestions of low zinc oxide-calcium carbonate pigmentations, using 2/3 Ti-Pure FF TiO_2 and 1/3 R 610 in what might be an all purpose white, and all R 610 TiO_2 in a tint base. Camelcarb and Georgia Marble's No. 10 White are compared as calcium carbonates. Tints include Colonial Yellow and Chelsea Gray.

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