

#97 - SWP 471

At the November meeting of the Trade Sales Technical Board, the Paint Research Department was assigned the job of revising SWP Westchester Gray - Rex 477. It was reported that the dark gray was showing more brush marks and flashing than the other tints. In the reformulation of this rex the oil content was increased to four pounds, and eight gallons (798) blown linseed oil were introduced, together with 1/2 gallon Rheotol and 1/8 gallon Troykyd to improve the flow, gloss and body characteristics. The suggested formula is based on 1411 dry 25/75 leaded zinc in place of 412 dry 35/65 leaded zinc, which results in a higher zinc oxide content for better mildew resistance. The same raw material cost as the regular formula was maintained by decreasing the poundage of TiO_2 , since the hiding properties are higher than required for a dark gray. No titanium calcium pigment was introduced as exposure tests have indicated bad fading (due to adherent chalk) in gray tints formulated with this pigment.

Several laboratory batches of SWP Gloss White bodied with Troykyd were checked for seeding tendencies after three months' storage. We found no indications of seeding at this point. It was reported that additions of Troykyd promoted a definite amount of seeding in the proposed new line of higher bodied oil colors. The house paint samples will be held for further storage and re-examined at some later date.

During Mr. Van Loo's visit to the Pacific Coast he discussed certain changes that might be made in Liquid Ozlo C 78 W 3 to improve the quality and reduce the cost. A few batches were made incorporating such ideas and a copy of the formulations were sent to Mr. R. G. Landis for his inspection.

Formulation 639 P is identical with regular C78 W 3, card No. 2, except for the replacement of lithopone 461 H dry by titanium calcium 2132 dry. Formula 640 P has the same pigmentation as 639 P but the vehicle is revised to an oil conservation type.

	Regular S-W Liquid Ozlo Card No. 2	Special S-W Liquid Ozlo Batch 639 P	Special S-W Liquid Ozlo Batch 640 P
Raw Material Cost	\$195.42	\$186.10	\$197.32
PVC	37.8%	37.8%	36.5%
Hiding - Holley Units	17,362	17,349	17,349
ZnO Content	30.4%	33.2%	33.2%
Stormer Viscosity	86 KU	87 KU	87 KU
Brushing	Very good	Very good	Slightly more feel than regular.
Gloss	Good	Good -	Very good

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In the two revisions 639 P and 640 P, the titanium dioxide is introduced as free chalking anatase 1403 dry, as in the case of the present formula. It may be better to use a slower chalking type of TiO_2 , such as Ti-Pure Y or Titanox AA in the cleaner areas on the Pacific Coast to decrease erosion. We have included in our own tests at Chicago and Florida variations using Ti-Cal R 60 or Titanox RC as the titanium calcium, although this combination with Titanox AA might retard the development of chalk too much. However, Titanox RC should be used in the tint bases. Obviously, at the moment replacement of lithopone by titanium calcium is not in keeping with current pigment availability, but the move should be made as soon as conditions permit.

Resin Research submitted two linseed-latex vehicles, RC 7482 and RC 7483 for test in SWP. Both oils contain approximately 11% of Dow Latex 744 dispersed in air blown alkali refined linseed.

	<u>RC 7482</u>	<u>RC 7483</u>
Resin	Dow Latex 744	Dow Latex 744
Oil	Air blown (44)	Air blown (44)
Body	47"	60"
Weight per Gal.	8.40	8.43
A. V.	Approx. 1.5	Approx. 1.5
Color	Not clear	Not clear
Solids	100%	100%

The Dow brochure on Latex 744 indicated that a dispersion can be made with air blown oils. However, paints made with RC 7482 and RC 7483 were low in gloss and slower in drying than SWP. The paint made with 40% RC 7483 as the bodied oil showed a definite break in the film due to incompatibility with other vehicle components. The paint made with RC 7482 appears to be more compatible than RC 7483. It will be exposed this spring in SWP at Chicago and Florida.

Batch	Characteristics	<u>Viscosity #3</u>		Brush	Flow	Gloss	<u>Drying</u>	
		Fresh	O'Nite				Set	O'Nite
573 P	Rex 471 - using (2) and (310) linseed vehicle	27"	31"	Good	Good	Good	7 Hr. 10 Min.	Good
574 P	Using RC 7482 for (310)	40"	47"	Good	Good + Fair		8 Hr.	Good
575 P	Using RC 7483 for (310)	35"	39"	Good	Much too high	Poor	9 Hr. 20 Min.	Good

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Panels 15210-27 CS, CN and F were prepared for exposure south and north vertical at Chicago and south vertical in Florida. The group compares SWP Gloss White Rex 471 and SWP Fume Resisting White Rex 436 against Pittsburgh's Titonic White 1-54, self-primed and with each top coat over both SWP Undercoater Rex 450 and Pittsburgh's White Primer 1-201. As special tests the paints were also applied as single coats. Supplementing this group, Rockford Paint Manufacturing Company's "Rockcote #794-BT (Breather Type)" was exposed in the same manner. This paint is said to "allow the moisture vapor to pass through the paint film rather than to peel it from the surface."

House paint exposures examined during the month include the following series:

1. Exposures 7195-7208 F, C were examined after a full 6 years' exposure at Florida, vertical south, and 64 months at Chicago south. The purpose was to evaluate three micas as to their effect on durability in Rex 471 SWP Gloss White of 1-22-43. The micas used included 1779 dry, a water-ground mica from English Mica Company which had a 12% residue on a 325-mesh screen; 2264 dry Alsibronz #12, which was supposed to be finer, 98% on 325-mesh, but which we have reason to believe was actually very close to the 1779 sample in fineness; and CW 1581, Mineralite 3 X, a dry-ground mica probably finer than the others, but differing mainly in that it is a powder rather than a flake mica. Each mica was used at 3, 5, 7 and 10%, replacing 20 dry magnesium silicate. Pittsburgh's Sunproof White formula, a batch made up by us using 3% 1779 dry and Lehigh 635 leaded zinc (mechanical blend), was also tested. All were on cedar bevel siding over Rex 450 Undercoater.

The results at both locations were surprisingly good for such long exposure. At Florida, where the typical failure is checking followed by cracking, the mica tests showed definitely better films than the regular guide without mica. It was difficult to choose among the three micas, but 2264 seemed slightly best, and the 7 and 10% levels seemed preferable. At Chicago, there was serious erosion, followed by cracking, but it was difficult to find a trend due to type or even quantity of mica. In many cases, the film failure with mica was definitely greater than without. Mica seemed to have little effect on dirt collection at either location. The Pittsburgh sample looked relatively good at Chicago, especially on early clean-up, but at Florida it was relatively dirty (possibly mildew) and checked seriously.

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2. Exposures 10364-6 F, C were examined after 48 months' exposure at Florida vertical south, and Chicago north and south, all on cedar bevel siding primed with Rex 450 Undercoater shaded gray. The guide and basic formula is Rex 471 SWP Gloss White of 9-15-45, using 50/50% 1405 anatase/2175 rutile titanium oxides and 20 F magnesium silicate as extender. The tests cover two special extenders, 2201 dry Metro-Nite HXXX and Micro-Nite. Micro-Nite is the same as Metro-Nite except that it is very finely ground, about 20 to 25 microns or only 0.25% retained on a 400-mesh screen.

The Florida panels all looked relatively good, except that rutile yellowing seemed to show up more on the guide than on the tests. Metro-Nite, and to a less extent Micro-Nite, showed somewhat more checking and erosion than 20 F. The past record showed both specials as more free chalking and slightly cleaner. The Chicago panels showed nothing as of 48 months, all being practically eroded away to the gray primer. The past record showed a trend toward most free chalking but not necessarily least dirt on the guide, and favoring Metro-Nite slightly over Micro-Nite as to self-cleaning. In general both extenders seem satisfactory but not particularly good.

3. Exposures 10618-26 F were examined after 36 months at Florida, vertical south. All panels were cedar bevel siding primed with Rex 450 SWP Undercoater shaded gray. The tests were substitutions of hempseed oil and Kelvitol for the raw and bodied linseed of regular Rex 471 SWP Gloss White of 1-19-45, as follows:

CVR-126 bodied hempseed oil used with (2) raw linseed, also with AV-1001 alkali refined hempseed to give a 100% hempseed vehicle.

AV-1001 plus (510) bodied linseed.

AV-1000 raw hempseed plus (510).

Kelvitol, a "catalyzed linseed oil" from Spencer-Kellogg, used with (2).

Florida tests showed all the above special vehicles as equivalent to the regular 100% linseed in durability and appearance. The 100% hempseed vehicle happened to be on a board of inferior quality, but the failure actually was less on the test section than on the guide. Clean-up was uniformly good on all tests. Chicago results (south exposure only) at nearly four years agree very closely with the Florida results, the only possible exception being a trend toward erosion with Kelvitol.

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3. Cont.

A supplementary test covers the use of Kelvitol in Rex 462 SWP Cream of early 1945, with the regular formula as guide. Here the Kelvitol seems satisfactory, but a little better in clean-up at the expense of greater fading.

4. Panels 13802-3 F were reported on after 12 months' exposure at Florida vertical south, with comment on Chicago panels north and south at 9 months. The test involved regular Rex 471 SWP Gloss White, card 51, all linseed vehicle, tested against the same formula with two petroleum drying oils substituted for the raw and bodied linseed. These were #126-90 and #126-88 from the Sinclair Refining Company Research and Development Department at Harvey, Illinois. Neither oil was heat bodied. Both paints were applied over regular Rex 450 Undercoater on cedar bevel siding panels.

The paint containing these oils was very slow in through-drying but otherwise quite similar to the regular in characteristics observed in the laboratory. On exposure considerable checking and some cracking developed at both locations as against none for the regular. Considering all locations, results on gloss and dirt retention were indeterminate but the special was no more than slightly inferior. The tests will continue on exposure. As of the present our opinion is that the oils leave much to be desired in the way of drying and durability but they seem considerably more durable than several petroleum drying oils tested in the past.

5. Panels 14300-30 F were examined at 12 months' Florida exposure vertical south, cedar bevel siding panels primed with Rex 450 Undercoater shaded gray. Various proprietary and other special oils were tested, the basic formula being Rex 471 SWP Gloss White, card 57. Identification of oils tested:

AV 1100, AV 1101, AV 1141 - P.E. Soya Esters made with sodium catalyst, from Dr. Hunn.

AVM 51 - P.E. Soya Esters made with barium catalyst.

Ardol - Archer-Daniels-Midland modified soya. Regular and RC 4176 bodied by us.

ASV #4 - A.D.M. modified soya. Regular and RC 4178 bodied by us.

75-5 - A.D.M. linseed cyclopentadiene copolymer.
Supplied both at Y and Z₃ body.

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5. Cont.

Var - A.D.M. soya-linseed copolymer oil. Z₃ as bodied oil,
#70 as light.

Driscy - Spencer-Kallogg soya, supplied at A and Z₂ bodies.

Aliphat 17 B Ester R3C4206 - General Mills.

Aliphat 17 B Ester R3C4597 - " "

The oils were tested as follows: (a) as bodied oil portion (40%) of regular formula; (b) at 100% of binder; (c) at 40 or 50% in a 36% PVC special leadless-zincless formula using only 2030 semi-nonchalking titanium and CW 2747 Nytal 500 512 dry; and (d) same as (c) but PVC cut to 30%. It should be noted that not all of the oils were tested in all four categories, also that in some cases oils of normal body were used for the bodied oil portions.

Only a few brief general statements are warranted at the present stage:

- (1) Regular formula tests, both (a) and (b), showed surprisingly little variation in dirt, chalking and gloss. ADM 75-5, Var and ASV #4 tend to check.
- (2) Leadless-zincless formulas all unsatisfactory, the checking in most cases being actually cissing. No particular difference due to PVC change.
- (3) The reason for using the leadless-zincless formulas was to determine whether one or more of these special oils might give good results comparable to those claimed by du Pont in which "special soya-linseed vehicles" were used. They suggested that such vehicles might have a hardening effect similar to that of zinc, and copper and iron staining would be eliminated. In a supplementary part of this series, certain of the leadless-zincless paints were tested against the regular formulas on panels carrying copper and iron pieces (6 months, Chicago), and the few differences in staining found so far are slightly in favor of the regular.

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The present SWP tints were reviewed to see what reduction could be made in titanium pigment content. For Rexes 478, 496, 485, 458 and 459 the four tint base variations listed below were submitted for Cleveland's consideration.

Batch	Titanium Used	Pigment	Costs		Hiding Holley Units
			Vehicle	Total	
OJ 596 P	Card No. 11 Rex 478 157 pounds 2174 dry	\$113.24	\$75.72	\$188.96	17,892
OJ 598 P	306 pounds 2140 dry for 137 pounds 2174	103.71	75.72	179.43	17,884
OJ 597 P	113 pounds 2174 dry (10% less hiding)	107.89	75.72	183.61	18,068
OJ 598 P	Same as 596 P but 8 gallons (798) and (5027) for (348)	103.71	76.89	180.60	17,884

In the case of Chelsea and Westchester Grays we have not proposed the use of rutile titanium calcium as our exposure tests show bad fading due to a retention of chalk. The Westchester Gray was formulated with 25/75 co-fumed leaded zinc in place of 55/85 leaded zinc so as to increase the zinc oxide content for better mildew resistance.

SWP Chelsea Gray - Rex 474

Batch	Titanium Used	Pigment	Raw Material Cost	
			Vehicle	Total
OJ 600 P	Rex 474 - Card 13 157 pounds 2174 dry	\$113.24	\$76.70	\$189.94
OJ 602 P	113 pounds 2174 dry (10% less hiding)	\$107.88	76.70	184.58

SWP Westchester Gray - Rex 477

OJ 603 P	Rex 477 - Card 13 85 pounds 2174 dry	\$83.92	\$77.41	\$161.33
OJ 606 P	70 pounds 2174 dry (10% less hiding) 8 gals. (796) and (5027) for (348)	80.24	78.59	158.83

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This work indicates that the use of eight gallons of lightly blown linseed (798) and Hi Flash Mineral Spirits (5027) for (548) regular mineral spirits improves the gloss, flow and wet edge time. We believe the improved performance obtained by this replacement would warrant the slightly higher cost.

Due to the predicted shortage of naphthenate driers, an investigation has been under way to check the comparative performance of tallate and naphthenate lead driers in SWP. Approximately three years ago a series of paints were prepared to check the granulation tendencies of lead naphthenates such as (4090) and (4230) and lead tallate (2213) in the pre-war and bodied oil formulations for SWP. The paints were placed in storage for 40 months at approximately 85° F. and they were then examined for granulation. As indicated by the data, the tallate lead drier exhibited less seeding throughout the paste of the bodied oil formulation, whereas the pre-war SWP was completely seeded and granulated when the tallate drier was used. Previous experience had shown that tallates have a tendency to granulate more than naphthenates but evidently these tendencies are greatly reduced in the bodied oil formulation due to the bodied oil and the higher dilution with thinners.

Granulation Tests on SWP Gloss White
Bodied Oil Formulation of 6-13-46
Granulation Tendencies

Batch	Driers	6 Mo.	12 Mo.	20 Mo.	31 Mo.	40 Mo.
OJ 913 K	(4230) (543)	O.K.	O.K.	Slight*	Slight*	Trace of seeding, vehicle crust.
OJ 914 K	(4090) (543)	O.K.	Very slight	Slight*	Slight*	Slight seeding, vehicle crust, small seeding throughout paste.
OJ 915 K	(2213) (543)	O.K.	Pigment crust	Pigment crust*	Definite pigment crust*	Definite pigment crust, very fine seeding.

*Small amount of soap formation on surface of pigment.

(4230) Lead Naphthenate (10% metal)
(543) Manganese Linoleate (1.2% metal)
(4090) Lead Naphthenate (24% metal)
(2213) Lead Tallate (16% metal)

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Granulation Tests on SWP Gloss White
Pre-War Formulation of 4-8-42
Granulation Tendencies

Batch	Driers	6 Mo.	12 Mo.	20 Mo.	31 Mo.	40 Mo.
OJ 916 K	(4230) (543)	O.K.	O.K.	O.K.	O.K.	O.K.
OJ 917 K	(4090) (543)	O.K.	O.K.	O.K.	O.K.	O.K.
OJ 918 K	(2215) (543)	Very slight	Bad	Very bad	V. V. bad	Completely seeded

The Resin Research Department has submitted two P.E. esters of linseed and soya fatty acids for exposure tests in SWP. These oils were compared with P.E. Soya Ester AV 1101 and bodied linseed (310). The various paints are to be exposed at Chicago and Florida for durability characteristics.

	RC 7463	RC 7470
Oil	Soy Fatty Acids	Linseed Fatty Acids
(348) reduction	Infinite	Infinite
Body	55"	55"
Cure	93"	-
Wt./Gal.	8.19	8.12
A. V.	3.3	3.8
Color	9	16
Solids	100%	100%

Brushing of the paints made with the regular linseed vehicle and with P.E. Soya Ester AV 1101 were good, and very good with the Resin Research esters. The first two showed good flow properties but the latter two were short. Gloss was good with the regular linseed vehicle, very slightly low with P.E. ester AV 1101, and slightly low with the Resin Research esters. Other characteristics follow:

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Properties of SWP Gloss Whites

Batch	Characteristics	Wt./Gal.	<u>Viscosity</u> #3 SW at 75° F.		<u>Drying</u>	
			Fresh	O'Nite	Set-to-Touch	O'Nite
OJ 541 P	Rex 471, using (2), (S10). RRB TiO ₂ Test Formula.	14.36	25"	42"	6 hr.	Good
OJ 542 P	Using (2), AV 1101 - P.E. Soya Ester	14.33	25"	34"	6 hr. 5 min.	Good +
OJ 545 P	Using (2), RC 7483 P.E. Ester of Soy Fatty Acids and Benzoic Acid	14.33	16"	21"	6 hr. 30 min.	Good +
OJ 544 P	Using (2), RC 7470 P.E. Ester of Linseed Fatty Acids and Benzoic Acid	14.33	16"	19.8"	8 hr. 15 min.	Good

A number of series of exposures were returned and examined during the month, among which were the following:

1. Two series of outdoor exposures on clear finishes were examined during the month. Series I, 14414-29 F, C was exposed six months at Florida and eight months at Chicago, 45° south, maple and white pine panels. Series II, 14795-14819 F, C was exposed three months at Florida and 3-1/2 months at Chicago, vertical south, bevel siding panels of cedar and yellow pine. The Resin Research Department and Varnish-Resin Laboratory cooperated in planning the series. Space does not permit the presentation of full details of composition or of results, especially since the majority of tests are not far enough advanced for definite conclusions on durability. In the following digest, it may be assumed that there is no difference in behavior due to the different woods or exposure locations unless specifically stated.

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Series I. 6 and 8 months' exposure at 45°, 3-coat self-primed work.

- A. Alkyds. Using a 75/25% (4100)/(4103) basic alkyd blend and testing fungicides Nuodex 72, Nuodex 136, Cunilate #40, Cunilate #40 A and copper phenolate. These all showed good gloss retention and only moderate discoloration. Mildew and dirt were at a minimum, considering the 45° exposure. Although none showed normal checking or cracking, all showed a serious tendency to peel away from the edges of the white pine and maple panels, or from wood cracks. Copper phenolate was unsatisfactory because of the green color.
- B. Rexpar. Regular Rex 04, a 42 gallon tung-linseed-phenolic varnish, showed fair gloss and color and no failure, but some mildew at Florida. Blends of 100 gallons of Rexpar and 14 gallons of raw linseed (2) or boiled linseed (310), exposed for three months only, look good.
- C. Other Rexes. 03401 Phenolic (also plus Nuodex 72) was fair in color and gave good protection but lost gloss rapidly and was the only test to show typical checking. Rex 031 Floor Seal checked and cracked badly and gave little protection. It became very dark, partly due to dirt. A 50/50 blend with (2) was somewhat better, but definitely not satisfactory. Rex 11110 Shingle Stain built up no film on the wood and gave no protection. Cabinet Exterior Finish, using (2325), (2985)A and (2841)G showed good gloss and film integrity, but was only fair in color and quite susceptible to dirt and mildew.

Series II. 3 and 3-1/2 months' exposure, vertical 2-coat self-primed work, unless specified.

- A. Good gloss, fair to good color, essentially no film failure, little dirt:

P.E. phthalate - X 565 - (1273) varnish
Ether resin-Isolene-soya varnish
Linseed-Epon varnish
Rex 04 Rexpar
(3952)A Phenolic varnish
Rex 021 Lin-X Clear Gloss (slightly below others
in gloss and color).

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B. Good except for appearance, as indicated:

75/25% (4100)/(4103), also plus Nuodex. Gloss good, seems dark on yellow pine (see Series I).

Rex 044 Log Cabin Finish, with Floor Seal as primer. Low in gloss, rather dirty.

Boydell's Log Cabin Finish with Fungicide Sealer. Clean, but color and gloss only fair.

Lucas V 12 Varnish self-primed, also over Lucas Sealer. Gloss fair to good, color fair, rather dirty.

03401 Phenolic, also plus Nuodex 72. Gloss and color slightly off, slightly dirty.

(4106) long oil alkyl. Color rather dark, mildew at both locations.

C. Good in all respects, except tendency to peel at edges and at wood cracks:

Ether resin-Isolene varnish.

Ether resin-soya fatty acids (also with Nuodex 72).

Ether resin-Isolene-soya varnish.

Styrene-linseed (some panels O.K., no peel; includes a sample with Nuodex 72).

Styrene-Aliphatic varnish.

D. Poor drying and gloss, bad mildew.

Raw linseed (2) plus drier and bodied linseed (310) plus drier. These are clearly poorest of the series of dirt and mildew, with (310) in general a little better than (2). Both were made up with double the normal quantity of drier.

(See also last month's report.)

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2. A special study was made of cooperative exposure tests carried out with the Titanium Pigment Corporation, consisting of their panels exposed vertical south and north at Sayville, Long Island, and ours (numbered 10693-10754) exposed at Chicago north and south, and Florida and Coffeyville south. Except for the Florida panels at 48 months, the time was approximately 52 months. Paints were made by T. P. and by S-W and panels were prepared and exposed so as to evaluate the effects of:
 - a. Geographical location, also north versus south exposure.
 - b. Titanium pigment changes, mainly rutile versus anatase and titanium-calcium versus "pure" TiO_2 pigments. Both whites and Colonial Yellows were tested, our formulas being based on Rex 471 and Rex 465 and theirs quite similar except for some less orthodox types.
 - c. Pre-war (high oil) versus bodied oil vehicles.
 - d. Self-priming versus undercoaters, which were with and without zinc oxide.
 - e. White pine versus western red cedar.

The Sayville panels were shipped to Chicago, and after all panels were very carefully rated, two discussion meetings were held:
(a) with representatives of Titanium Pigment Corporation, and
(b) with representatives of several institutional laboratory groups. Many suggestions from these two meetings were incorporated into a full final report. Several important conclusions relative to each of the above items were reached. This report is to be circulated soon to most laboratories and plant superintendents. We expect to be able to fill requests for copies from anyone interested who does not receive one.

3. Exposures 12018-38 F, C were examined after 30 months at Florida, vertical south, and 32 months at Chicago, north and south. All are on cedar bevel siding, primed with Rex 450 Undercoater. All test paints are based on the Rex 471 SWP Gloss White formula of 4-25-47, all linseed vehicle and all 1403 anatase titanium oxide, which is used as a guide. Florida tests were of little value in this case because all tests vary with the guides in dirt and chalking, indicating that weathering conditions were not normal. Chicago tests seemed to show bona fide differences, but they were rather slight.

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3. (Cont.)

The following variations of (3316), 80/20% soya/chinawood, make up the bulk of the test, being used as the usual 19 gallons or 40% of bodied oil:

Regular (3316) made with heat bodied (1273) soya and (140) CWO versus same made from Pittsburgh's SO-500 soya.

(3316) made with kettle bodied soya (1273) and tung oil (140) as against same using kettle bodied SO-500.

(3316) made with SO₂-CO₂ bodied (1273) and kettle-bodied (140) versus SO₂-CO₂ bodied SO-500.

(3316) made with (1273) heat bodied, (140) added and blown with SO₂-CO₂ versus same but starting with SO-500.

The above tests are all used with 60% (2) raw linseed oil. Also the regular (3316) and the (3316) based on SO-500 are tested in a formula with 10% of light SO-500 replacing part of the (2). Results to this point, depending mainly on Chicago exposures, showed all tests as somewhat more dirty than the guide. Some also show more erosion. It is impossible to discover a trend for or against the use of SO-500.

The following additional tests showed a tendency toward dirt: (2325) bodied Dehydrol (also erosion), (48), 50/30/20 type used at 40% with 30% SO-500 and 30% (2) and also used at 30% with (2325) and the usual 60% of (2), and (2351) blown soya.

Other bodied oils were not equal to the guide, but still better than many of the above: (2351) used at 3 parts with one part each of Dehydrol and bodied CWO and four parts blown soya plus one part bodied CWO.

60/40% AVM-13/AVM-14 P.E. soya esters and similar oils coded AVM-15/AVM-16 looked especially good at Florida, but only average at Chicago. Finally, a test of du Pont's #40 Outside White known to contain "38% processed soya," gave indeterminate results, looking dirty and yellow in cast at Florida, but equal to the average at Chicago.

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4. Panels 13496-13505 F, C were examined after 12 months at Florida, vertical south, and 13 months at Chicago, north and south. Several special oils were tested in Rex 471 SWP Gloss White of late 1947, all over Rex 450 Undercoater on cedar bevel siding. A 100% linseed regular formula as guide showed up as slightly dirtier at Florida than the other S-W vehicles, which were:

- a. (3316) 50/50/20% linseed/soya/chinawood bodied oil, samples of Chicago, Cleveland and Oakland production being used at 19 gallons with the usual 29-3/8 gallons of (2) raw linseed.
- b. CVR-979, 80/20% soya/chinawood oil made by the solvent process, used in the same way.
- c. CVR-985, bodied safflower oil used at 19 gallons with 29-3/8 gallons of CW (2656) raw safflower. This was noticeably cleaner than any others at one year.

ADM #65-1 chinawood-soya used as only oil at 48-3/8 gallons, looked about the same as the S-W (3316) samples. An additional paint, Sta-Par One Coat Exterior Finish White, from the Siccya Soya Paint Company, Peoria, Illinois, looked very bad because of excessive dirt. The vehicle is described as "catalyzed soya bean oil 75%, thinners and driers 25%."

Chicago results show the Sta-Par as outstandingly dirty, also checking on the self-primed test. Differences among the others are slight. The guide does not seem dirtier than (3316), as at Florida, while the safflower sample, though clean, is not outstandingly so.

5. Exposures 13683-13702 F and 13968-85 F were examined recently after 12 months' exposure at Florida, vertical south. The two series are identical except that the former was painted in cool weather and the latter in warm weather. At the present stage, we notice some differences, but not definitely attributable to the difference in painting conditions. The tests include regular 100% linseed formulas of Rex 471 SWP Gloss White, Rex 459 Berkeley Yellow and Rex 472 Chelsea Gray against the following vehicle variations:

- AV-1123 bodied P.E. soya ester for (310), also Drisoy, D-F body.
- AV-1100 light P.E. soya ester plus AV-1123, or 100% P.E. soya.
- Drisoy Z₂ plus D-F, or 100% Drisoy.

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5. (Cont.)

Briefly, Florida results showed very few differences, and all tests were quite satisfactory. The special tints seemed a little less faded than the regulars (guides). In the case of the older "cool weather series," we had Chicago north and south readings up to 17 months, and these seemed to show some trends; however, all tests were still satisfactory except for serious dirt on the tints on north exposure. There was a trend toward more dirt on the 100% special formulas in white, but in the tints the opposite seemed to be true. This was not verified by the rather sketchy 9-month readings available on the other series. 100% P.E. soya ester seemed to be more faded in the Yellows than 100% Driscoy, but less faded in the Grays. The former seemed a little cleaner. The Rex 471 tests showed no differences up to 9 months.

6. Series 13719-25 F, C were examined after 12 months' exposure at Florida, vertical south and 14 months at Chicago, north and south. These tests are actually a sub-group put out to correct an error in series 12078-12120, testing lead pigment reactivity. All are 2-coat self-primed work on white pine bevel siding. The guide formula is Rex 471 SWP Gloss White using the regular 120 pounds of 18 dry BCWL, while one of the tests uses 9 dry basic sulfate. The latter seemed to show slightly more failure at Florida, but not at Chicago. The special tests, with results to date, are as follows:

- (a) Using 15 pounds of National Lead Company's 45 X basic silicate white lead. Fully equal to guide, both locations.
- (b) Using 70 pounds of National's Tri-Base, a hydrous tribasic lead sulfate of very high basicity with about 67% available basic lead oxide. At Florida this shows bad checking and cracking, also has a definite yellow cast and is dirty. At Chicago it is similar to the guide except for slightly more free chalking.
- (c) Using 50 pounds of Tri-Base - Florida, slightly better than 70 pounds, but definitely not satisfactory. Essentially same as preceding at Chicago.
- (d) Using 30 pounds of Tri-Base - Florida, only slightly more failure than guide. Chicago, equal to guide.
- (e) Using 15 pounds of Tri-Base - Essentially equal to guide at both locations.

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0007-SWP-000113740

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#97 - SWP 471

A report has been prepared on R. R. Bruhm's visit to the du Pont, Titanium Pigment, and National Lead exposure farms and is being distributed herewith.

One point of considerable interest was shown on the National Lead Company's exposures. Using four proprietary paints of undisclosed origin they abused each in a similar manner in the manner of application. In every case where a drier addition was made the material showed inter-coat peeling. This might serve as a lead on complaints of this type of failure.

Reference was made in the June report to an investigation of two small kettle batches of (310) bodied linseed oil in SWP. (310) Lot 68 is made using an SO₂ blow while Lot 69 is heat bodied without catalyst. Laboratory and plant batches of SWP Gloss White were made with each oil. The tests have indicated that the two oils are identical in general performance. It was reported last month that Lot 68 (blown with SO₂) produced slightly higher viscosity in SWP than Lot 69. However, factory batches of SWP made with these oils are almost identical in all respects. We can see no reason for not using an SO₂ blow for (310) based on our tests to date.

Factory Batch	Bodied Oil	Viscosity - #5 Orifice			Wt./Gal.	
		Fresh	24 Hr.	11 Days	T.	A.
Rex 471 - C 1940 B	Lot 69	28"	29-1/2"	35-1/2"	14.26	14.38
Rex 471 - C 1940 C	Lot 68	26"	30"	35"	14.26	14.25

Brushing - Very good. Flow - Good. Drying - Good.

The Varnish-Resin Laboratory has submitted gallon samples of two small kettle batches of safflower made without SO₂ and bodied to 50 and 52 seconds. These oils produced much lower viscosities than Lot 1 (59" body) or Lot 2 (54" body SO₂ blown) referred to in the June report. The Varnish Department will also cook an additional small kettle batch using an SO₂ blow to determine the minimum time required to body this type of oil.

Laboratory batches of SWP made with the 50 and 52 second oils compared as follows for viscosity:

Batch	Bodied Safflower	Raw Oil	Viscosity - #3		
			Fresh	24 Hr.	4 Days
OJ 518 P	50"	(2)	26"	28.2"	30"
OJ 347 P	52"	(2)	20.4"	-	27"

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The batch of 52 second oil will be used in the preparation of exposure paints for house tests in Chicago and Cleveland.

Some customer complaints on thin body of SWP have been reported by the Sales Department. An examination by the Chicago Technical Service Department of retained samples of Kensington production of SWP Gloss White made and passed from 3 to 12 months ago shows a rather consistent tendency to thin in the package. In recent months Kensington batches are passed at somewhat higher consistencies than standard to allow for some thinning. A general review of production of Rex 471 at the several plants drawn from Trade Sales Quality Control Laboratory reports shows that less than 20% go thin, about 40% hold within standard limits, and about 40% increase in consistency. An examination of 38 Paint Research Rex 471 laboratory batches of Rex 471 made from a half year to a year ago, using a wide variety of oils, pigments, extenders, etc., shows 31 holding viscosity well, 3 showed definite thinning and 4 showed definite increase in body.

It was suggested that the stability of our laboratory batches may come from the fact they are not subjected to the relatively high temperatures encountered in production. The first approach was to make a single batch of Rex 471 and store it under three conditions: (1) room temperature (75 - 85° F.), (2) 140° for 24 hours, balance at room temperature, (3) stored at 140°. The viscosity records to date are as follows:

SWP Gloss White (Regular Card No. 61)

Sample	Storage Temperature	Fresh	Viscosity - #5 Orifice			
			24 Hr.	3 Days	8 Days	30 Days
281 P	75° - 85° F.	26.2"	41.0"	53"	54.2"	45"
281 PX	First 24 hours at 140° F. Balance of time at 75° - 85° F.	26.2"	41.2"	53"	-	44.8"
281 PX-2	At 140° for 30 days.	26.2"	-	40.6"	25.0"	34.0"

The rapid early increase of all the batches followed by the rapid thinning up to 8 days of 281 PX-2 suggested that heat might cause the thinning action by promoting wetting. The subsequent increase suggests soap formation. Further work will be done after temperature charts have been run on mixers, ground paste, and thinning tanks in the plant.

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It is possible that some of the thin bodied paints on which customer complaints are received are batches which when fresh have a high, puffy consistency which might soon disappear through wetting on standing. If such batches were thinned immediately to pass them within standard limits of viscosity, subsequent wetting might reduce the body further to unsatisfactory levels. A study is being made to determine whether an accelerated test can be run on production batches of SWP to predict the final viscosity and thus possibly avoid unnecessary initial additions. Tests will also be made incorporating agents such as Acto 450, Nuade, lecithin, SP 1505, etc., to obtain better initial wetting. We will also do further work on puffing agents, including Troykyd OW 640, Stymer 1000 and a copolymer RC 6480-II from Resin Research.

Comparative gloss readings on a number of laboratory and plant batches are listed in the chart below, including Devco 547 Outside White, du Pont #40 White and P.P.G. Titanic O. W. House Paint. The gloss readings below would indicate that some increase in gloss could be obtained on factory production by increasing the grind from 2 H to 3 H.

60° Photovolt Gloss Readings - House Paints

<u>Laboratory Batches</u>	<u>Applied in Lab.</u>		<u>Applied</u>	<u>Grind</u>
	<u>Brush-Out</u>	<u>.003" Draw-Down</u>	<u>Outdoors</u> <u>Brush</u>	
SWP Gloss White Card 61 (OJ 145 P)	70	71	-	-
One Coat House Paint White CH 4697 (OJ 286 P)	85	85	79	4 H
SWP Gloss White Card 61 (OJ 146 P)	60	74	64	3 H
SWP Gloss White Using 4-3/4# oil (OJ 289 P)	79	87	-	-
SWP Gloss White Using 4# oil (OJ 288 P)	74	78	-	-
SWP Gloss White Card 61 (OJ 287 P) Using 3-3/4# oil	56	76	61	3 H
SWP Gloss White Card 61 (OJ 303 P)	71	79	-	3 H
SWP Gloss White Sp. (OJ 172 P) 15 gals. (310) - 33-1/2 gals. (798)	76	61	-	-
Lowe Bros. House Paint (OJ 302 P)	72	81	-	4 H

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60° Photovolt Gloss Readings - House Paints

<u>Production Samples</u>	<u>Applied in Lab.</u>		<u>Applied</u>	<u>Grind</u>
	<u>Brush-Out</u>	<u>.003" Draw-Down</u>	<u>Outdoors</u> <u>Brush</u>	
SWP Gloss White Rex 471 - C 50 A	-	40	-	2 H
SWP Gloss White Rex 471 - C 60 A	-	62	-	1-1/2 H
SWP Gloss White Rex 471 - C 100 C	-	52	-	1-1/2 H
SWP Gloss White Rex 471 - C 180	-	50	-	2 H
Devco 547 Outside White	74	71	-	4-1/2 H
du Pont #40 White	41	38	-	0 H
P.P.G. Titanic O.W. House Paint	46	49	-	0 H

The Rockford Paint Manufacturing Company, of Rockford, Illinois is advertising a new paint called B-T House Paint (Breather Type) which they claim corrects peeling problems. We have made a preliminary examination of this paint and further work will be done to check their claims. The label analysis shown for this paint is as follows:

Pigment - 64% Vehicle - 36%

Pigment consists of:

33% Carbonate White Lead
30% Titanox - barium base
17% Magnesium Silicate
20% Diatomaceous Silica

Vehicle consists of:

32% Raw Linseed Oil
8% Treated Linseed Oil
60% Reinforcing Vehicle

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We have calculated an approximate formula based on the analysis and the paint solids of 85.1% as determined by this laboratory. The following relationship exists compared with SWP:

	No. 794 B-T House Paint	SWP Gloss White Rex 471
P.V.C.	43.2%	36%
C.P.V.C.	51.5%	57.2%
Excess Oil	8.3%	21.2%

The Rockford paint is somewhat more sticky in brushing than SWP, which indicates a higher bodied oil. It dries to a low, very non-uniform sheen. The sample will be exposed at Chicago and Florida for durability characteristics.

A sample of ISCO Trinity Superfine Talc #325 mesh talc was compared with magnesium silicate - 20 dry (Lot 6-27) and Nyltal 300 - 312 dry in SWP. The Trinity Superfine Talc and 312 dry produced higher gloss and better flow than 20 dry. The grinding rate for ISCO Trinity Talc was slower than for the other two inerts but this probably could be improved by adjusting paste consistency. All paints were ground at the same mill adjustment. The overnight viscosity of the Nyltal 300 batch is abnormally high as compared with 20 dry.

Properties of SWP Gloss Whites

Batch	Characteristics	Viscosity #3		Grind	Brush	Flow	Gloss	Grinding Rate
		Fresh	O'Nite					
322 P	20 Dry Lot 6-27 Res. .19% O. A. - 32.2 Car No. 52180	24.2"	25"	2 H	Std. (Good)	Short	Sl. lower than std.	9' 3"
323 P	ISCO Trinity Superfine Talc 325 Mesh Res.-1.05 O. A.-37.2	29"	25.2"	2 H	"	Std. (Good)	Std. (Good)	10' 27"
324 P	312 Dry O. A. - 36.9 Res. - .05%	23.8"	30"	2 H	"	"	"	8' 15"

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Panels 12078 - 12120 C, F, K were examined after 27 months at Chicago north and south vertical and Coffeyville south, and 24 months at Florida, south. The plan of the series was to cover various lead pigments in Rex 471 SWP Gloss White, with special interest in the possibility of using lower poundages of some of those having a high PbO content (reactivity), such as the basic silicates and National Lead Company's Tri-Base. In addition to the 1947 regular formula with 12% 18 dry Basic Carbonate White Lead and a Ti-Sil type with no free lead pigment, the following are tested: (a) 18 dry at 9, 7, 5, 3 and 1-1/2%; (b) 9 dry Basic Silicate White Lead, same percentages; (c) National's #333 and #111 carbonates, Tri-Base and basic silicate white lead at 7, 5, 3 and 1-1/2%; (d) Eagle-Picher's basic silicate, same percentages. All are tested as 2-coat self-primed work on white pine bevel siding, and one sample (7% lead level) of each material is tested over Rex 450 Undercoater.

We expect to repeat these tests. Two conditions have reduced the expected value considerably: (a) the use of white pine as the only wood has resulted in variations which make analysis difficult, and (b) Tri-Base was left out of the self-primed tests due to an error in preparation; 12% 9 dry and 1-1/2% National basic silicate were also involved.

Florida tests show generally good durability. There are variations in clean-up and surface flaking, but guide variations make the trends questionable. Coffeyville tests show considerable failure, but wide variations in the condition of the guides. This series in particular inclines us to the conclusion that the use of a "critical" wood is not practical. The white pine was used as the result of a definite suggestion by Mr. D. W. Robertson, of Titanium Pigment Corporation, that such a "critical" wood, having only fair paint-holding properties, was necessary for a proper study of behavior where differences might be expected to be small. Chicago results show a fair range of failure due to erosion, but there are few definite trends. If all three locations are considered, there are many conflicting results, but three possible trends may be mentioned:

- a. Definitely better durability due to the use of Rex 450.
- b. Slightly better durability, but more dirt collection, with increasing lead content. No answer to the question of using lower percentages of the more reactive special pigments.
- c. Slightly poorer durability with Eagle-Picher basic silicate, possibly also with Tri-Base (incomplete tests).

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- OJ 181 P - Raw Linseed Oil + Drier
- OJ 182 P - Bodied Linseed Oil + Drier
- OJ 165 P - 75% (4100) + 25% (4105) + 1% Nuodex 72
Drier - added
- OJ 166 P - Same as above but no Nuodex 72
Drier - added
- OJ 167 P - 05401 (Phenolic) + 1% Nuodex 72
(Oil length - 33 gals.)
- OJ 168 P - 05401 Phenolic Varnish - (2966)A
(Oil length - 33 gals.)
- OJ 169 P - Rexpar (Rex 04) - (2965)A Stock Sample
(Linseed-Tung-Phenolic - 42 gal. oil length)
- OJ 147 P - (4106) - (Linseed-Soya-P.E. Alkyd)
Drier added
- OJ 148 P - (3952)A - Linseed-Tung-Phenolic
(Oil length 25 gals.)
Drier - added
- OJ 149 P - Rex 021 (4110) + Drier) - Lin-I Clear Gloss
Stock Sample
- OJ 170 P - Lucas Fungicide Seal VL 1159 (2 parts V 12
(1 part (348)
- OJ 171 P - Lucas V-12 Varnish

Considerable damage to the cedar panels on north exposure at the Chicago farm resulted from a hail-storm, and three 50-foot vertical fences were damaged by lightning during two separate electrical storms.

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OJ 150 P - P.E.-Phthalate-X 565-Soya Varnish
RC 4217 Body - U-V Cure - 8" A. V. - 2.8
Solids - 50% Solvent (25% Mineral Spirits
(25% V. M. and P. Naphtha)

OJ 151 P - Linseed-Epon 1004 Ester
CTV 7282 Body (?) Cure - 5.2" A. V. - 2 Solids - 50%
Solvent - 50% xylene

OJ 152 P - Ether Resin Varnish - CV 4010 #3, Isoline Fatty Acids
RC 2577 0.1% Co Drier Body - U Cure - 6 A. V. - 4.7
Color 10-11 Solids - 50% Solvent - 50% High
Solvency Naphtha

OJ 153 P - Ether Resin Varnish - RC 5088 (Repeat of RC 2585)
CV 4010 #1 - Soya F. A. Body - P Cure - 14
A. V. - 2.8 Color - 12 Solids - 50%
Solvent - 50% xylene 0.1% Co. drier in cook

OJ 154 P - As above + 1% Nuodex 72 on total weight

OJ 155 P - Ether Resin Varnish RC 4989 Body - K Cure - 20
A. V. - 8.7 Color 5-6 Solids - 50% Solvent (348)
0.1% Co. drier in cook

OJ 156 P Rex 051 - S-W Floor Seal Oil

OJ 157 P Rex 044 - Clear Log Cabin Exterior Finish

OJ 158 P Rex 031 + 1% Nuodex 72 on total weight

OJ 159 P Rex 044 + 1% Nuodex 72 on total weight

OJ 160 P Boydiell Bros. Log Cabin Fungicide Seal

OJ 161 P Boydiell Bros. Log Cabin Finish Coat

OJ 162 P RC 5409 (Styrene-Linseed varnish)
Body J-K Cure - 10 A. V. - 16.6 Color - 7 + Solids 50%

OJ 163 P RC 5409 + 1% Nuodex 72 on total weight

OJ 164 P RC 5416 - (Styrene-Aliphat 16A-CWO)
Body - T Cure - 6 A. V. - 12 Color 4-5 Solids - 50%
Solvent - (1257). Part of solvent is unreacted styrene.

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in durability, linseed versus soya, at both locations, the increased quantities of soya showing no marked differences. In the cases where variations showed up, they tended to favor the soya formula. Laboratory tests on the paint samples after 5-1/4 years warm storage showed bad galling and granulation, with no particular choice.

Exposures 15005-19 F, C were examined after 18 months at Florida, vertical south, and 21 months at Chicago, north and south, all cedar bevel siding panels primed with Rex 450 Undercoater shaded gray. The purpose is to test polyallyl esters of linseed and soya oils and of soya fatty acids in Rex 471 SWP Gloss White and in Rex 495 SWP Woodland Brown. Due to the complexity of the amounts of the special liquids used, full details cannot be presented here. Part of this complexity is due to the fact that the amounts of some of these special resins, which were prepared by the Resin Research Department, had to be changed because of poor drying and wrinkling tendencies. In Rex 471, there is quite a complete coverage of the three resins plus (798) non-break linseed oil, (48) bodied linseed and (48) 50/50/20 type, but no samples use the resins at 100% vehicle solids. In Rex 495, the linseed and soya esters are tested at 100% and with (2) linseed-(48) 50/50/20.

There is no failure except very slight erosion on the whites at Chicago. Variations in dirt and chalking of the whites are relatively slight at both locations (including regular guides). Florida tests on the Browns show a result difficult to explain: the two samples (linseed and soya) using only part polyallyl esters are good in color but dirty due to mildew and lack of chalking, the 100% special vehicles are intermediate and the guides, in spite of using 89 dry cuprous oxide, which the others do not carry, are chalky, clean and seriously faded. At Chicago, the results we would expect due to 89 dry are evident; the guides are glossy and good in color. The specials show chalkiness, low gloss and serious fading.

Clear Exterior Finishes for Wood

Panels 14796 - 819 C, F were prepared for exposure. These represent exposures of clear finishes, two coat work on cedar and yellow pine siding panels, and include a number of varnishes from Varnish-Resin and Resin Research against Raxpar as the guide. The finishes include the following:

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0007-SWP-000113750

Commonwealth Red (Box 54) Using 5% and 10% Durez 14994 and 50800

Batch	Characteristics	Viscosity		Brush	Flow	Gloss	Set-to-Touch	Drying		Remarks
		Fresh	O'Hite					24 Hr.	Tack	
258 P	Commonwealth Red Card 27	75 KU	78 KU (Stormar)	G (+)	V. G.	Std.	55 Min.	Good		Std.
259 P	As 258 P but 5% Durez 14994 for (1275)	75 KU	78 KU	"	"	"	50 Min.	G (+)		Bad tack for 48 Hrs.
260 P	As 259 P but 10% replacement	69 KU	75 KU	"	"	"	45 Min.	V. G.		
261 P	As 259 P but 5% Durez 50800	70 KU	74 KU	"	"	"	60 Min.	G (+)		
262 P	As 260 P but 10% Durez 50800	67 KU	73 KU	"	"	"	55 Min.	V. G.		

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SWP Gloss White (Box 47), Card 61) Using 5% and 10% Durez 14994 and 50800

Batch	Characteristics	Viscosity		Brush	Flow	Gloss	Set-to-Touch	Drying		Remarks
		Fresh	O'Hite					24 Hr.	Tack	
263 P	SWP Gloss White Card 61	21.0"	21.6"	Good	V. G.	Std.	5 hr. 30 min.	Good	Slight	Std.
264 P	As 263 P but 5% Durez 14994	22.0"	22.2"	"	"	Sl. lower	8 " 20 "	"	Cons.	
265 P	As 264 P but 10% Durez 14994	21.4"	22.0"	"	"	"	8 " 50 "	"	Cons. (+)	
266 P	As 264 P but 5% Durez 50800	22.0"	22.4"	"	"	"	7 " 5 "	"	Cons.	
267 P	As 265 P but 10% Durez 50800	22.2"	22.6"	"	"	"	8 " 20 "	"	Cons. (+)	

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0007-SWP-000113751

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Laboratory batches of SWP made from these oils compared as follows:

Batch	Oil Under Test	Viscosity - #3		Brushing	Flow	Gloss	Drying
		Fresh	12 Days				
250 P	(310)	29.2"	46"	Good*	Sl. short	Good	Good
248 P	CV 928 Lot 1	48"	49"	Good*	" "	Very good	Good
246 P	CV 928 Lot 2	42"	55" + 5/8 cup	Good*	" "	Very good	Good

*When reduced with 1/4 to 1/2 pint (348) per gallon.

Due to the high initial body of the laboratory batches made with CV 928, we have requested a lower bodied oil for future work.

Fast Dry Exterior House Paint

Our West Coast plants have been interested in obtaining a fast dry exterior house paint to combat flatting during poor weather conditions. In connection with this problem we have investigated Durez' 50800 and 14994 liquid resins as replacements for part of the oil in Rex 471 SWP Gloss White and Rex 54 Commonwealth Barn Red. Durez 50800 is a resin obtained as a by-product from the manufacture of two other Durez resins. It is 100% solids and may be considered 50% resin and 50% oil. Durez 14994 is similar to 50800 except that it is not as dark in color and the odor is somewhat improved.

The two resins were introduced in SWP Gloss White (Rex 471, card 61) and Commonwealth Barn Red (Rex 54, card 27) to the extent of 5% and 10% for an equal amount of oil. We were not particularly impressed by Durez' claims or the results on drying and gloss as reported in the data below. We found both resins to be rather poor in odor, although Durez 14994 was somewhat better in color and odor than Durez 50800.

The paints will be exposed at Chicago to determine durability characteristics.

0007-SWP-044382

0007-SWP-000113752

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197 - SWP 471

The Varnish Department has prepared two small kettle batches of (510) for test in SWP. Lot 68 was made using an SO₂ blow while Lot 69 is heat bodied without catalyst.

	<u>Lot 68</u>	<u>Lot 69</u>
Body	58	54
A. V.	8.2	9.5
Color	7	10
Catalyst	SO ₂	None

Two batches of SWP made with these oils compared as follows for brushing, flow, drying, etc.

Batch	Bodied Oil	<u>Viscosity - #3</u>		Brushing	Flow	Gloss	<u>Drying</u>	
		Fresh	O'Nite				Set	O'Nite
OJ 285 P	Lot 68	50"	51"	Sl. sticky OK	Very good	Good	6 Hrs.	Good
OJ 284 P	Lot 69	25.4"	41"	Standard	Very good	Good	6 Hrs. 50 min.	Good

Arrangements were made with the factory to manufacture plant batches of SWP under identical conditions. These will be reported on at a later date.

The Varnish-Resin Laboratory has prepared two lots of CV 928, bodied safflower oil, for test in SWP.

	<u>Lot 1</u>	<u>Lot 2</u>
Body	59"	54"
Sp. Gr.	.961	.948
Color	11	7
A.V. (Solids)	8.5	9.9
N.V.M.	100	100
Remarks	Using glycerol for A. V.	SO ₂ blown

0007-SWP-044383

0007-SWP-000113753

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#97 - SWP 471

In previous reports on work to predict the eventual viscosity of batches of SWP having initial high and puffy consistency it was stated that Anhydron, magnesium perchlorate, was quite efficient in reducing viscosities. It was suggested to us that Anhydrons be tried on heavy bodied batches of Semi-Lustre White and Commonwealth Barn Red. It was found that Anhydron was not effective in these instances. Thus, it would appear that the effect of water on critical pigment volume concentration is not involved in these cases as it is in SWP.

Storage tests of batches of SWP Gloss White to which additions of Troykyd were made to increase viscosity have now aged for nine weeks. Viscosities seem to be quite well stabilized, as shown in the following data:

Troykyd by Volume	Viscosities - #3 Orifice			
	At Once	2 Weeks	7 Weeks	9 Weeks
0 %	24.6"	24.6"	24"	24"
0.1	32	32	30	30.2
0.2	42	38	33	32.8
0.3	48	38	34	34
0.4	40" + 1/8 cup	41	38	35.8
0.5	50" + 1/8 cup	47	40	40
0.6	Too heavy	50	45	42
0.85	" "	50" + 1/4 cup	48" + 1/16 cup	48
1.7	" "	Too heavy	50" + 3/8 cup	50" + 1/4 cup
2.5	" "	" "	Too heavy	Too heavy
3.4	" "	" "	" "	" "
4.2	" "	" "	" "	" "
5.1	" "	" "	" "	" "

The Resin Research Department has submitted several bodied oils for exposure tests in SWP. The oils, at approximately Z₂ - Z₃ body, except as shown, are used at 40% of the total binder, replacing bodied linseed. The oils include:

- RC 6548 (1278) soya.
- RC 6519 Swift's propane refined soya XN 828.
- RC 6580 Safflower, modified 20% with tung.
- RC 6561 Glyceryl ester of Aliphat 16 A.
- RC 6574 Glyceryl ester of Aliphat 16 A, 20% tung.
- RC 6582 P.E. ester of Aliphat 18 A.
- RC 6571 P.E. ester of Aliphat 18 A, 20% tung.
- RC 6575 Neophat 19.
- RC 6756 Styrene - dehydrated castor. Viscosity 12 min. 35 sec.
- RC 6773 Styrene - dehydrated castor. Viscosity 25 min. 50 sec.

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0007-SWP-000113754

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Paints made on a formula similar to card 62, Rex-471, except with no rutile calcium, had the following characteristics:

Data on Test Paint as Exposed

Batch QJ No.	Bodied Oil	<u>Viscosities #3</u>		Brush	Flow	Gloss	Drying
		Fresh	O'Nite				
488 P	(310) linseed	26"	34"	Good	Good +	Good	6 hr. Good O'nite
420 P	Using RC 6543	50"	59"	Sl. sticky	Short	Fair	8 hr. 30 min. Good
419 P	Using RC 6519	38"	44"	Sl. sticky	Short	Good -	9 hr. 40 min. Good
489 P	Using RC 6560	28"	34.2"	Good	Very good	Very good	5 hr. 55 min. Good
490 P	Using RC 6561	50"	39"	Good	Good	Good	7 hr. Good
450 P	Using RC 6574	44"	74"	Sl. sticky	Short	Good -	8 hr. 5 min. Good +
491 P	Using RC 6562	34"	42"	Good	Good	Good +	7 hr. Good
449 P	Using RC 6572	37"	46"	Sl. sticky	Short	Good +	10 hr. 5 min. Good +
451 P	Using RC 6573	25"	21"	Good	Short	Fair	9 hr. 55 min. Good
421 P	Using RC 6756	65"	68"	Sticky	Short	Poor	6 hr. 25 min. Good +
422 P	Using RC 6773	55"	64"	Sticky	Short	Fair	6 hr. 55 min. Good +

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#97 - Cont.

Work on the changes of the elastic constants of house paint films which occur during weathering is being continued.

New samples of Pittsburgh's Titanic White 1-54 and their primer 1-201 were obtained for exposures against the SWP 450 - 471 system and Rex 456 SWP Fume Resisting White. The paints will be applied as single coats, the top coats as two coats both self-primed and over each of the primers.

Experimental paints were prepared to test safflower oil, both unbodied and bodied to Z_2 - Z_3 , in SWP Gloss White, Colonial Yellow and Westchester Gray. Substitutions were for bodied oil portions only and as total replacements of all the linseed oil in the regular formulas. These paints supplement previous series.

Exposures prepared during the month include the following:

14901-11 CN. North only, Chicago vertical. These supplement the special high iodine value oil tests described on pages 16 and 17 of the September report, which at that time were placed on south exposure.

14961-15025 CS, CN and F. These are the "pink" SWP tint series described on page 15 of the September report.

15024-37 CS, CN. These are panel exposures of the paints used in the 1950 house tests.

15038-41 C, F. These are exposures to determine whether SO_2 used as the catalyst in the preparation of the bodied oil will cause any discoloration in SWP Gloss White.

A house test was conducted at 703 Bruce Street, Flossmoor, Illinois. This is a house on which we have had Rex 471 SWP Gloss White tests before. The latest was in 1946, but due to increasing amounts of blistering and peeling each year, considerable areas of the walls have been scraped off and repainted since 1946. The current test job was to be just one coat of regular Rex 471, but considerable areas had to be burned, scraped and spot-primed. We are interested in this house much more as a test under bad moisture conditions than as a test of any particular paint. A number of small ventilating louvres have been installed in the walls, with some good results so far, but there was evidence during this painting that an extremely bad condensation condition still exists, as wet blisters formed in some spots within a few days. In the future, we will probably have the opportunity of observing the effectiveness of a more extensive program of ventilating the walls, either by the small louvres or by a more drastic method. The painting has always been done by professionals. The spreading rate this time was slightly low, at 472 sq. ft. per gallon.

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A house test was completed at 12733 - 12737 Wallace Street, Chicago, Illinois. This test actually comprised two houses side by side on quite spacious lots, both being 2-story houses 15 years old and in excellent structural condition. One house (the Harris house) had been painted with Scotch Laddie lead-in-oil five years before; it showed the characteristic dirtiness, but it seemed that the alligotoring was not as deep and rough as is often seen on lead-in-oil jobs. The other house (the Lindberg house) had been painted with SWP Gloss White, also five years ago, and looked much cleaner and whiter all around. The house previously painted with lead-in-oil was primed with Rex 450 Undercoater OJ 336 P and finished with Rex 471 SWP Gloss White OJ 336 P, both carrying 100% safflower oil. The former SWP house was primed with regular Rex 450 and finished with Rex 471 OJ 336 P, 100% linseed. A small area on the south side of each house was finished with OJ 334 P, a 40% safflower formula, to serve as a basis for comparison.

On this test, no difference in gloss could be detected (on the two special areas) in about three days. The job was done by professionals, but they were inclined to stretch out the paint. Consequently, the former lead-in-oil house (safflower test), with its dirtier and rougher surface, looked relatively poor when the prime coat was on, and was not quite equal to the other in general smoothness of the finish coat. The painters claimed the safflower primer brushed more easily than the regular Rex 450, but we have reason to prefer the "little choice" opinion of the painters on the Homewood church job mentioned below. The spreading rates were as follows, the last item being rather questionable because of the restricted area:

Rex 450 - Regular, 520 sq.ft./gal. - Safflower, 465 sq.ft./gal.

Rex 471 - Linseed, 495 " - Safflower, 532 "

Rex 471 - 40% safflower, 400 sq.ft./gal. (same for each house).

A house test was completed at 18202 Dixie Highway, Homewood, Illinois, consisting of a 2-1/2 story church parish house and a 1-story nursery school building on the same lot. This job was done by a sizable and competent crew of professional painters. Some flat spots showed up on the final coat in certain areas, which may possibly be due to rather rapid recoating considering the season. The main building tests regular Rex 471 SWP Gloss White, 100% linseed, against OJ 334 P, a batch using 40% safflower oil, both over regular Rex 450 Undercoater. The smaller building also has regular Rex 450 - regular Rex 471, but against it is Rex 450 - Rex 471, both made with 100% safflower oil. The painters

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expressed no definite choice as to brushing qualities. The safflower areas showed a very slight edge in gloss, but there was no choice in whiteness or general appearance on the finished job. One thing that was noticed was a marked slowness of drying of the safflower primer over night. However, this seemed to be of no serious consequence, as by the end of 24 hours it was fully as dry as the regular. The spreading rates were:

Regular Rex 450	404 sq.ft./gal.
Rex 450, 100% safflower	350 "
Regular Rex 471	440 "
Rex 471, 100% safflower	420 "
Rex 471, 40% safflower	431 "

A supplementary test was made on the gutters and downspouts of the main building, which were new galvanized iron. Four priming systems were tried:

1. Regular Galvite #67.
2. GS 2449, a special Gripclad primer in ready-to-use form.
3. E41 A 4, regular Gripclad primer, requiring reduction on the job.
4. The painters' system of a vinegar rinse, followed by regular Rex 450.

The first three were recoated with Rex 450 before a final coat of Rex 471 was applied over all.

Because of unusual current interest, we are presenting a general account of results to date on exterior clear varnish exposure series 14414-29 F, C, at six months Florida and eight months Chicago, 45° south on maple and white pine panels. It is expected that next month considerably more information will be presented, as a later series is to be examined and possibly a combined report with full details will be available. Following is a digest of the most important results at present (all tests two coats self-primed, no reduction):

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<u>OJ No.</u>	<u>Material</u>	<u>Gloss</u>	<u>Darkening</u>	<u>Failure</u>
68 N	75/25% (4100)/(4103) alkyd.	Good	Considerable to bad.	None, but see below.
54 N	68 N plus 1% Nuodex 72.	Good	"	"
91 N	As 68 N but extra drier.	Good	"	"
69 N	05401 Phenolic, (2966)A.	Egg-shell	Bad, at Florida; alight at Chgo.	Bad checking and mildew.
70 N	68 N plus Nuodex 72.	"	"	"
71 N	Rex 051 Floor Seal, (2946)EA	Flat	Bad	Bad checking, cracking, extreme mildew.
72 N	50/50 Rex 051/(2)	Flat	Very bad.	"
73 N	Rex 04 Rexpar, (2985)A	Fair to good	Slight to considerable.	None, but rather serious mildew.
73 NX	Rex 04 plus 14 gals. (310)/100*	Fair	"	"
90 N	Rex 04 plus 14 gals. (2)/100	Fair	"	"
-	Rex 11110 Shingle Stain.	Flat	Very bad	No film. Extreme mildew.
523 N	**-(2325)-(2966)A-(2841)G	Egg-shell	Bad at Florida; alight at Chgo.	None, but serious mildew.
179 N	Alkyd as 68 N plus Cumilate #40	Good	Slight to considerable.	None, but see below.
180 N	Alkyd as 68 N plus Cumilate #40 A	Good	Considerable	"

(Cont.)

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0007-SWP-000113759

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#97 - Cont.

<u>OJ No.</u>	<u>Material</u>	<u>Gloss</u>	<u>Darkening</u>	<u>Failure</u>
181 N	Alkyd as 68 N plus Cu Phenolate.	Good	Considerable, green.	None, but see below.
182 N	Alkyd as 68 N plus Nuodex 136	Good	Considerable to bad.	"

*A sample containing equal parts of (310) and Rex 04 (by error)
showed bad mildew and darkening.

**Made up to approximate Pontiac Varnish Company's "Log Spar."

The alkyds must be watched carefully as there seems to be
some tendency to peel from the edges.

0007-SWP-044390

0007-SWP-000113760

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#97 - SWP 471

As an adjunct to the work described under Project 12 on blistering and peeling we are starting basic research work to determine the type and quantity of the stresses and strains which are set up in applied and weathering house paint films. These strains are associated at least in part with the shrinkage which occurs in films as a result of the processes occurring during aging, and with expansions and contractions resulting both in the film and substrate due to temperature and moisture fluctuations. This work will also be correlated with adhesion and toughness measurements.

There is increased interest in tint retention of pastel house paints because of the spread of color mixing. Tests conducted in cooperation with Martin-Senour showed that the "pink" range was most vulnerable and therefore work was started with this group. For the purpose of this test three depths of each tint were made with each pigment selected, using SWP Tinting White C78 W 4. The depths approximated the Martin-Senour Nu-Hue red color standards of the 4th, 6th and 7th levels. Exposures will be made south and north vertical in Chicago and south vertical in Florida.

The pigments being evaluated include:

26 dry	Burnt Sienna
54 "	Indian Red Oxide
134 "	Venetian Red Oxide
182 "	Persian Red Oxide
214 "	Light Red Oxide
1762 "	Cadmium Red, Light
1795 "	Cadmium Red, Medium
10132 "	Alizarine Maroon Lake
10189 "	Toluidine Red Toner B
10369 "	Permanse Orange Toner
10396 "	Toluidine Red Toner, Light
10397 "	Solfast Scarlet
12084 "	Chrome Orange, Dark
D 2799	Solfast Scarlet, Light
	Harmon Thio Fast Red MV 6606
	Harmon Thio Fast Pink MV 6652
	Harmon Indo Violet B 4000
	Minnesota Mining Krox Oxide 102 L
	du Pont Platinum Violet BP 176
	English Vermilion
	Harmon Thio Indigo Maroon

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0007-SWP-000113761

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#97 - Cont.

The August report gave data on the effects on viscosity of additions of Troykyd to low viscosity batches of SWP. These tests have now aged for 7 weeks and viscosities show a tendency to thin out although they still remain definitely higher than the original sample. For convenience in reviewing the data, earlier viscosity readings are repeated.

SWP Rex 471

by Volume

Viscosities - #3 Orifice

<u>Troykyd</u>	<u>At Once</u>	<u>2 Weeks</u>	<u>7 Weeks</u>
0 %	24.6"	24.6"	24"
0.1	32	32	30
0.2	42	36	33
0.3	48	38	34
0.4	40" + 1/8 cup	41	36
0.5	50" + 1/8 cup	47	40
0.6	Too heavy	50	43
0.85	" "	50" + 1/4 cup	46" + 1/16 cup
1.7	" "	Too heavy	50" + 5/8 cup
2.5	" "	" "	Too heavy
3.4	" "	" "	" "
4.2	" "	" "	" "
5.1	" "	" "	" "

Mention was also made in the August report of the comparative effects of the additions of (324) heavy bodied linseed oil and Troykyd, respectively, to the same thin bodied batch of SWP. Viscosities up to one month show the same tendency to thin out, although again they remain above the initial viscosity.

Viscosities - #3 Orifice

<u>Agent Used</u>	<u>Fresh</u>	<u>Over Night</u>	<u>1 Month</u>
Rex 471 - 1/4 gal./100 gals. - (324)	38"	37.8"	33.4"
" " - Troykyd	36"	35.6"	32.1"

Panels 14901-11 CS were prepared for exposure using house paints containing oils of high iodine value in connection with the dirt collection studies of SWP. The paints were applied as two coat work on cedar siding panels using SWP 450 Undercoater for the first coat. The panels are mounted on a south vertical exposure fence constructed with a special overhanging eave to emphasize dirt collection. The north vertical counterparts will be painted as soon as possible. Due to delays

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in procuring the various oils originally intended for this series, it was decided to expose paints made from those oils that were now available before the weather becomes too cool for painting. The following Rex 471 SWP Gloss White (card 62) variations were included in the present series.

Number	Total Oil per Gal.	Unbodied or Low Bodied Oil Portion	Bodied Oil Portion
OJ 431 P	4-3/4 lbs.	(2) Raw linseed	(510) Bodied linseed
OJ 416 P	4 "	" "	" " "
RB 2924	3-3/4 "	" "	CV 926 Reduced bodied linseed
OJ 414 P	4	Perilla oil	RC 6558 Bodied perilla
OJ 415 P	4	Safflower oil	CV 928 Bodied safflower
OJ 430 P	4	P.P.G. #200 Selected Soya	RC 6572 Bodied #200 oil
OJ 417 P	4	AVM 63 - P.E. Soya Ester	AVM 64 P.E. Soya Ester
OJ 418 P	4	Polymerol L (acetone extracted linseed)	Polymerol L
OJ 459 P	4	Re-esterified refrigerated fatty acids to re- move saturates (OJG)	Re-esterified refrigerated fatty acids to re- move saturates (OJG)

The special series of paints mentioned on page 20 of the August report were painted on a Chicago exposure fence during the month and assigned the numbers 14863-14900 CS, CN. These paints carry various titanium pigments to study chalking, washing and dirt collection. The paints were applied on the special south vertical fence with overhanging eave and on conventional panels for north exposure. For detail on the pigments used, see the August report.

Panels 14923-52 CS, CN and F were prepared for exposure during the month. These represent repeat paintings in good weather of an earlier series of special bodied soya-tung oil combinations in SWP White and tints which were painted in cool weather.

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#87 - Cont.

About a year ago experimental variations of SWP Gloss White were made to compare the performance of manganese driers such as (4231), (545) and Nuodex 6% manganese, when introduced on an equal metal basis in SWP. The regular amount of lead drier (4250) was used in all the paints. These paints were made on the card 55 formulation using (3321) P.E. Soya esters for the bodied oil portion of the formula.

After a period of one year's storage, the paints were examined and were found to be in good condition. No sample showed any manganese float or color difference. The only noticeable variation was the slightly faster set-to-touch time for the paint made with Nuodex 6% manganese drier. The paints made with (3321), with (545) or Harshev manganese drier produced less gloss after one year of storage than those made with (310) bodied linseed regardless of type of manganese drier used. The lower gloss and loss of flow is a matter of concern when (3321) is used.

Properties of Various
Manganese Driers in SWP

Batch	OJ 207 N	OJ 208 N	OJ 209 N
Characteristics	Rex 471 - Card 55 5/8 gal. (545)	As 207 N but 1/8 gal. Nuodex 6% Mn	As 207 N but 3/8 gal. (4231)
Wt./Gal.	14.26	14.28	14.24
Viscosity - Fresh	20"	19.8"	19.6"
2 Weeks	21.6	23.2	22.3
3 Months	20.8	22.2	21.8
6 Months	23.0	28.4	27.4
1 Year	27.2	30.0	28.6
Brush - Fresh	Good	Good	Good
1 Year	"	"	"
Flow - Fresh	Good	Good	Good
1 Year	Short	Short	Short
Gloss - Fresh	Good	Good	Good
1 Year	Low	Low	Low
Set-to-Touch	Fresh -	-	-
2 Weeks	7 Hr.	7 Hr. 30 Min.	8 Hr.
3 Mo.	7 Hr. 10 Min.	7 " 40 "	8 Hr. 15 Min.
6 Mo.	7 " 10 "	6 " 20 "	7 " 15 "
1 Year	7 " 10 "	5 " 55 "	6 " 50 "

Cont.

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#97 - Cont.

Properties of Various
Manganese Driers in SWP

Batch	OJ 207 N	OJ 208 N	OJ 209 N
Characteristics	Rex 471 - Card 55 5/8 gal. (543)	As 207 N but 1/8 gal. Nuodex 8% Mn	As 207 N but 3/8 gal. (4251)
Over) - Fresh	Good	Good	Good
Night) 2 Weeks	"	"	"
Dry) 3 Months	"	"	"
6 Months	"	"	"
1 Year	"	"	"
Package Condition	Soft paste; 1 Year mixes in easily.	Soft paste; mixes in easily.	Soft paste; mixes in easily.
Granulation - 1 Yr.	None	None	None

Properties of Various
Driers in SWP

Batch	OJ 419 N	OJ 420 N	OJ 421 N	OJ 422 N
Character- istics	Rex 471 - Card 55 (510) and (543)	As 419 N but (5521) and (543)	As 419 N but Harshaw Mn and (510)	As 420 N but Harshaw Mn and (3321)
Wt./Gal.	14.27	14.33	14.30	14.54
Viscosity				
Fresh	25"	24.2"	29.0"	25"
1 Week	30	25.8	31.6	26.4
3 Months	30	25.0	29.0	26.8
6 Months	31.2	25.6	30.6	25.8
1 Year	32.2	25.4	29.2	25.0
Brush - Fresh	Good	Good	Good	Good
1 Year	"	"	"	"
Flow - Fresh	Good	Good	Good	Good
1 Year	Good (-)	Short	Good (-)	Short
Gloss - Fresh	Good	Good	Good	Good
1 Year	Good (-)	Def. low	Good (-)	Def. low

(Cont.)

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#97 - Cont.

Properties of Various
Driers in SWP

Batch	OJ 419 N	OJ 420 N	OJ 421 N	OJ 422 N
Character- istics	Rex 471 - Card 55 (310) and (543)	As 419 N but (3321) and (543)	As 419 N but Harshaw Mn and (310)	As 420 N but Harshaw Mn and (3321)
Set-to-Touch				
Fresh	-	-	-	-
1 Week	7 Hr.	6 Hr. 50 Min.	6 Hr. 30 Min.	6 Hr. 30 Min.
3 Months	7 Hr. 35 Min.	7 " 20 "	6 " 45 "	6 " 25 "
6 Months	7 " 20 "	7 " 10 "	6 " 50 "	6 " 30 "
1 Year	8 " 20 "	7 " -	7 Hr. -	6 " 55 "
Over) - Fresh	Good	Good	Good	Good
Night) 1 Week	"	"	"	"
Dry) 3 Mo.	"	"	"	"
6 Mo.	"	"	"	"
1 Yr.	"	"	"	"
Package Con- dition - 1 Yr.	Firm paste; mixes in easily.	Soft paste; mixes in easily.	Firm paste; mixes in easily.	Soft paste; mixes in easily.
Granulation				
1 Yr.	None	None	None	None

Upon R. T. Vanderbilt's recommendations, a few tests were carried out to compare their Nyltal 300 - 312 dry with 20 dry - magnesium silicate with respect to general performance, after being ground in with the other pigments and/or added without grinding to the thin-down liquid, to determine if a satisfactory paint could be made by such a procedure. The mixed-in inerts produced a paint with a coarser texture and lower initial gloss. However, after 18 months' storage all paints were equally low in gloss. The samples were fairly easy to mix and showed no bad settling after 18 months' storage.

Chart follows.

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0007-SWP-000113766

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Batch	OJ 867 M	OJ 868 M	OJ 869 M	OJ 870 M
Character- istics	Rex 471 - Card 52 Std. with 20 Dry	As 867 M but 512 Dry for 20 Dry	As 867 M but 20 dry mixed in thin-down	As 869 M but 512 dry for 20 dry mixed in thin-down
Wt./Gal.	14.71	14.62	14.67	14.70
Grind	1 H	2-1/2 H	0 H	2 H
Viscosity				
Fresh	42"	27"	33.6"	28.4"
Over Night	47	30	38.2	29.2
18 Mo.	61	39	41.4	32.2
Brush				
Fresh	Sl. sticky	Good	Good	Good
18 Mo.	Sl. sticky	Sl. sticky	Good (-)	Sl. sticky
Flow - Fresh	Std.	Sl. short	Short	Short
18 Mo.	Short	Sl. short	Short	Sl. short
Gloss - Fresh	Good	Good	Low	Sl. low
18 Mo.	Low	Low	Low	Low
Package Condition				
6 Months	. . . Soft Paste - Excellent Condition			
18 "	Firm paste - but mixes in fairly easily with no lumps.			
Granulation				
6 Months	None	None	None	None
18 "	"	"	Trace	Trace

The following paints were made and shipped to Cleveland for house painting tests:

2 gallons	SWP Rex 478 Geneva Cream Regular	- OJ 395 P
13 "	Special Rex 478 Geneva Cream	- OJ 396 P
1 "	SWP Chelsea Gray Regular	- OJ 437 P
8 "	Special SWP Chelsea Gray	- OJ 438 P

The special tints are made with 40% bodied and 60% unbodied safflower oil.

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0007-SWP-000113767

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Panels 13740-56 F were examined after 12 months' exposure at Chicago and Florida, vertical south, regular cedar siding primed with Rex 450 Undercoater. The primary purpose was to compare the regular formula of SWP Tint Base, carrying 70 pounds of 18 dry basic carbonate white lead against a formula carrying no free lead and one using National's 45 X basic silicate white lead. The substitution in the latter case was on a volume basis, and the zinc oxide content was kept constant in all cases. Five regular SWP shades were tested. The Chicago tests showed essentially no differences traceable to these changes. The Florida tests showed a very marked tendency toward less mildew growth with carbonate than without. The mildew growth was generally heavy, and the variation from guide to guide, unfortunately, was serious, but the carbonate sample showed less mildew in every shade. 45 X and the carbonate sample seemed very closely alike.

A secondary test compared ferrites (regular) tinting colors against chromes, often used in the past. This was checked only in SWP Colonial Yellow and Berkely Yellow. The chromes showed much more fading in Colonial Yellow at both locations, and slightly more in Berkely Yellow.

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0007-SWP-000113768

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#97 - SWP 471

The July report mentioned that in a review of retained samples of SWP Gloss White - Rex 471 it was found that approximately 20% of the samples tested were too low in body. It was thought that these low bodied paints might originally have been high bodied batches which were reduced to standard viscosity and then, over a period of weeks, thinned out due to various causes. It is believed that a remedy for this action would be to pass these high bodied paints knowing that they would reach standard viscosity in a few weeks. In order to be sure the paint will reach standard viscosity, a quick laboratory test is needed to reduce the body to its ultimate viscosity in a matter of 1 or 2 hours.

In devising this test, early work showed that heat would do a good job but the time involved was too great.

Heavy Bodied SWP Held at 180° for

0 Hrs. - 55" + 5/8 cup	24 Hrs. - 51"	68 Hrs. - 35"
5 " - 55" + 5/8 cup	48 " - 30"	112 " - 35"
16 " - 54"	64 " - 29"	

It can be seen that the lowest point reached, at 29", took over 2-1/2 days.

Various wetting agents were then tested in an attempt to shorten the length of time, but none of the agents tested were successful to any great degree.

<u>Agent Used</u>	<u>Amount Used</u>	<u>Viscosities of Heavy Bodied SWP</u>
None	0%	55" + 3/8 cup
R. T. Vanderbilt Pflumer SP 1505	0.5%	50"
"	1.0%	47"
"	2.0%	44"
"	5.0%	40" + 5/8 cup
Midcontinent Chemical Midwet 33 C	1.0%	50" + 3/8 cup
"	2.0%	50" + 3/8 cup
Polyethylene Glycol	1.0%	55" + 3/16 cup

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0007-SWP-000113769

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Numerous other wetting agents were tried but none gave results that could be relied upon.

It was finally decided that the main cause of the high body probably is water. The heat tests run earlier would substantiate this theory. The following additional tests were run using dehydrating materials:

Heavy Bodied SWP	55" + 3/8 cup
When agitated with the addition of magnesium perchlorate for 15 minutes.	35"
When agitated with the addition of calcium chloride for one hour.	37"
When agitated for one hour.	55" + 3/8 cup
When agitated with the addition of other chlorides.	55" + 3/8 cup

This approach shows considerable promise. Additional tests will be run in an attempt to devise a specific accurate test for use in the test laboratories.

Laboratory batches of SWP were made to compare the effect on consistency of grinding in agents such as Acto 450 (4081), Nuade (4066) and lecithin (5094). The laboratory batches compare as follows for viscosity at the end of three weeks' storage:

Batch	Agent	Fresh	Viscosity - #3 Orifice			
			O'Nite	1 Week	2 Weeks	3 Weeks
OJ 341 P	None	21"	29"	40"	39"	38"
OJ 342 P	6% Lecithin (5094)	25"	30"	34"	32"	30"
OJ 343 P	6# Acto 450 (4081)	29"	34"	40"	36"	34"
OJ 344 P	6# Nuade (4066)	27"	38"	48"	45"	42"
OJ 345 P	3# Nuade (4066)	25"	29"	40"	39"	37"

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Troykyd - OW 640 was added to a low consistency batch of SWP Gloss White to see if it could be used safely as a puffing agent with Rex 471 to correct thin batches. The data below show that Troykyd does increase the body and viscosities are fairly stable at least up to two weeks. They will be rechecked after six weeks. Flow was not affected materially up to 0.4% addition of Troykyd, above 0.4% flow was reduced. When the body of the batch of SWP at 24.6" viscosity was increased to 38" by the addition of 1/4 gallon (324) per 100 gallons of paint to 38", brushing became very slightly sticky. When brought to 38" by the addition of 1/4 gallon Troykyd, brushing was not affected.

Batch	% By Volume Troykyd	Viscosity - #5 Orifice	
		At Once	14 Days
SWP - Rex 471	0%	24.6"	24.6"
	0.1%	32"	32"
	0.2%	42"	36"
	0.3%	48"	38"
	0.4%	40" + 1/8 cup	41"
	0.5%	50" + 1/4 cup	47"
	0.6%	Too heavy	50"
	0.85%	" "	50" + 1/4 cup
	1.7%	" "	Too heavy
	2.5%	" "	" "
	3.4%	" "	" "
	4.2%	" "	" "
	5.1%	" "	" "

Pflammer SP 1505 was submitted by the R. T. Vanderbilt Company as a flow agent. A batch of SWP Gloss White was selected which was puffy and high in offlux viscosity. As shown in the data which follows, SP 1505 had an initial thinning effect but after 24 hours the body had reverted practically to that of the untreated sample. Brush-outs made of the various paints indicated that additions of 1/2 to 3/4 gallons of SP 1505 to 100 gallons of the paint produce definite improvement in flow. Excessive additions detract from drying. Approximately 1/2 to 1% by volume seems to be the optimum addition.

Chart follows.

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SWP Gloss White + Pflaumer SP 1505

Batch	% by Volume SP 1505	At Once	Viscosity - #3 Orifice		7 Days
			Over Night		
SWP 471	0%	55" + 1/16 cup	55" + 1/16 cup	55" + 1/16 cup	
"	0.1%	42"	52" + 1/16 cup	"	
"	0.2%	35"	51" +	"	
"	0.3%	31"	52"	"	
"	0.4%	31"	49"	"	
"	0.8%	29"	49"	55 + sec.	
"	1.3%	27"	55"	55 + "	
"	1.7%	27"	54"	55 + "	
"	2.1%	27"	55"	56 + "	
"	3.4%	25"	57"	55 + "	
"	4.2%	26"	58"	56"	
"	6.4%	27"	51" + 1/16 cup	56"	
"	8.5%	29"	55" + 1/16 cup	45"	

Test fence #12 at the Chicago Exposure Farm has been modified with an eighteen inch eave at the top and a course of red face brick at the bottom. It is hoped that this will make it possible to check dirt collection and washing on various SWP paints made using different TiO₂ systems. The fence is divided into eighteen vertical sections, each three feet in width, extending from the top to the bottom of the fence. Dirt collection (especially under the eaves), chalking, and chalk run-off (especially on the bricks) will be checked at regular intervals. The complete series of paints will also be exposed on conventional panels facing north. The paint systems include the following titanium oxides and formula variations:

Paint No.	TiO ₂ Variations*	Formula
RB 2916	1403	SWP Gloss White
2918	1403/2030, 50/50 blend	Rex 471 4.00# Oil/Gal.
2920	1403/2132, 75/25 blend	"
2921	1403/2132, 50/50 blend	"
2936	1403/Unitane CR 340, 75/25 blend	"
2923	1403/2174, 82/18 blend	"
2933	1403/1004, 82/18 blend	"
2934	1403/Unitane CR 340, 82/18 blend	"
2922	1403/2174, 75/25 blend	"

(Cont.)

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<u>Paint No.</u>	<u>TiO₂ Variations*</u>	<u>Formula</u>
RB 2924	1405	Rex 471 3.75# Oil/Gal.
2925	1405/2050, 50/50 blend	"
2926	1405/2132, 50/50 blend	"
2927	1405/2174, 82/18 blend	"
		SWP Fume Resisting White
2929	1405/2030, 50/50 blend	Rex 456
2930	2030	"
2931	1405/2132, 50/50 blend	"
2932	1405/2174, 75/25 blend	"
Lead in Oil None		

*1405 - free chalking anatase TiO₂.
2030 - semi-chalking anatase TiO₂.
2174 - non-chalking rutile TiO₂.
2132 - rutile titanium calcium.

Some tests were made of the dirt collection of regular Rex 471 SWP Gloss White during the initial drying period. The purpose was to compare the dirt and gloss on panels painted in dry weather as against damp weather, as a check on a similar test by du Pont in which much more dirt was collected during the damp weather drying of their paint. The tests were painted outdoors and exposed south on primed panels. The contrast was perhaps not great enough, as the damp weather in the one case lasted only about six hours after painting. At three days there was very little difference in dirt collection. However, the gloss of the panels painted in damp weather was only 14 (60° glossmeter), while the others were normal at 41.

Laboratory batches of SWP Gloss White and Rex 450 SWP Undercoater were made with the following thinner combinations and the paints were checked for general performance.

SWP Rex 450

- (a) 4 gallons kerosene (141) - 26 gallons mineral spirits (348)
- (b) 4 gallons (141) - 26 gallons Hi Flash Mineral Spirits (5027)
- (c) 30 gallons (5027)

SWP Rex 471

- (a) 4 gallons (141) - 19-3/4 gallons (348)
- (b) 4 gallons (141) - 19-3/4 gallons (5027)
- (c) 23 gallons (5027)

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The paints made with the (b) thinner combinations showed the least amount of lapping after 50 minutes. Other characteristics such as brushing, flow, drying and gloss were identical with regular SWP Gloss White or 450 Undercoater made with the thinner combinations as in (a). We would suggest that (348) be replaced by (5027) for an improvement in wet edge time of these mixes.

Paints were made for house painting tests at Cleveland and Chicago using 80% raw linseed and 40% bodied safflower, as well as 100% safflower. Sufficient paints were sent to Cleveland to paint 11 test houses in that area.

Panels 14853-60 C and CN, K and F were prepared for exposure south and north vertical at Chicago and south vertical at Coffeyville and Miami. The paints were SWP Gloss White and Colonial Yellow comparing the regular formulas with magnesium silicate 20 dry and paints made using Persolite P-IVR as the extender, replacing 20 dry both at equal weight and equal volume. Persolite P-IVR is sold by the Persolite Sales Company, and is milled and classified perlite, about 80% SiO_2 and 15% Al_2O_3 .

Exposure series examined during the month include the following:

1. Panels 9958-10025 CS, CN, F, K were retired recently after 4 years at Florida vertical south, 4-1/2 years at Coffeyville vertical south, and 4-1/2 years at Chicago both north and south. These are cooperative exposures on which full information was exchanged with the F and F Division of the du Pont Company. The original plan was to study the effects of (a) basic carbonate versus basic sulfate white lead and (b) rutile versus anatase titanium in Outside White. Each contributed several paints, exposed by both groups at several locations.

Our paints consisted of 7 variations of Rex 471 SWP Gloss White made on a pre-war vehicle basis and 7 parallel bodied oil formulas. One pair carried 50% 412 dry leaded zinc, 35% extender and 15% Ti-Pure FF (Ti-Sil formula) while the others covered all the possible variations of (a) white lead at 14% of either BCWL or BSWL and 7% of each, and (b) titanium at 15% of either FF or R 200 rutile and 7.5% of each. The majority, therefore, carried 46.5% of 412 dry and 24.5% of extender. The 7 du Pont samples were more generalized, ranging from 24% to 57% of oil binder. Two were very similar to ours at high versus low oil content, and another was a high oil type with no free white lead. Two were high in rutile TiO_2 (20%), but still based on leaded zinc, and the remaining two were based on about 35% zinc oxide with high rutile and extender content and no lead.

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Our main conclusions are:

- (a) Greatest erosion at Chicago, but Coffeyville panels about equally bad due to checking and cracking. Florida tests, in general, look fairly good.
- (b) Best films are the du Pont high rutile formulas, but these have been poor in appearance throughout the exposure because of dirt and yellow cast.
- (c) Little choice in dirt at any time due to white lead changes, only little less dirt due to bodied oil as against pre-war; but even 7% of rutile titanium has shown serious dirt and yellow cast.
- (d) Little difference in our formulas due to lead changes, but the R-200 definitely increases durability.
- (e) Their lead-free (high rutile) formulas surprisingly good in durability, but in their more orthodox formulas the omission of lead (as against 17%, no rutile TiO_2 being used) resulted in a definitely poorer film.

The conclusions of the du Pont people from their exposures have been sent to us in the form of a tabulation estimating the effective life of each paint in months. Briefly, these figures show very much the same results as ours, with little choice as to location, partly because of a lack of directly comparable conditions. Their letter states that, although there is a slight difference in durability in favor of the use of white lead, they would conclude that it is "not necessary for durability." Their results definitely favor rutile for durability, but the poor appearance is not stressed.

- 2. Exposures 10781-9 CW were examined after 48 months at Chicago, vertical south on white pine bevel siding. This is the earliest of three series which are being reported on this month, covering variations in film thickness of Rex 471 SWP Gloss White. The others, 11229-58 F, C and 11984-98 F, C gave considerably more satisfactory results. In this series, the Rex 471 was applied as primer with the following reductions: 1 pint of (2) linseed oil, 1 pint of (1294) turpentine, 1 pint of each; 2 pints (2), 2 pints (1294), 2 pints of each; 3 pints (2) plus 1 pint (1294); and 7 pints (2) plus 1 pint (1294). This was followed by a coat of Rex 471 full body. The result was a series of films varying from 3.9 down to 2.8 mils in calculated film thickness, a definitely unsatisfactory "spread."

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At 48 months, the results are not very valuable, due to the poor uniformity of the wood and the lack of suitable film thickness variations. The lowest film thicknesses show much more cracking and erosion than those near normal, and at least the series indicates that the use of excessive reduction of the first coat on self-primed work on low-grade wood is likely to give very poor results. It is impossible to estimate from this series of tests what a safe reduction might be.

3. Exposures 11229 - 58 F, C, CD were examined after 36 months at Florida, vertical south, and 42 months at Chicago, the latter being on Douglas fir panels as well as cedar bevel siding. Regular formulas of Rex 450 Undercoater and Rex 471 SWP Gloss White (bodied oil, all 1403 titanium) were tested at various film thicknesses achieved by the addition of thinner to each coat. The total film thickness may be listed approximately as follows, the first item representing a guide on the left 1/3 of each panel:

No reduction	3.5 to 4.0 mils, about 580 sq.ft./gal.
1/2 pint turpentine	3.0 to 3.4 " " 650 " "
1 " "	2.8 to 3.2 " " 680 " "
2 " "	2.4 to 2.7 " " 710 " "
3 " "	2.1 to 2.4 " " 750 " "

Very consistent results were obtained at both locations. The erosion, even at Florida was strikingly worse on the panels of low film thickness. The amount of cracking increased with the decrease of thickness, although very likely at Chicago this was more or less a consequence of the erosion. The Chicago panels range from less than considerable erosion and cracking to extreme failure, practically no film left. The films at about 3.0 mils show up poorly in some cases as against those approaching 4.0 mils, while all films appreciably less than 3.0 mils are definitely poor in durability.

We have photographs of this series and think that they would be of interest as a general exhibit of poor painting practices.

4. Exposures 11984 - 96 F, C were examined after 24 months at Florida, vertical south, and 30 months at Chicago. In this series the attempt was to study the effect of varying spreading rates as follows:
- (a) CH 4697 One Coat House Paint White, with 50/50% 1403 anatase/2030 semi-nonchalking titanium oxides at 250, 350, 550 and 750 sq. ft. per gallon.
 - (b) Same, but CH 4697 made with no lead titanate and all 1403 dry.

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(c) Rex 471 SWP Gloss White, at 400, 500, 700 and 1000 sq.ft./gal.

One coat only was used, except for a regular Rex 450 - Rex 471 guide on the left 1/3 of each panel. The technique of testing was to use regular weathered panels and apply the paint as nearly as possible to the required spreading rates, without the addition of volatile. Error was less than 5%.

Florida results were disappointing, because the guides showed that the panels had not had equal weathering. The CH 4697 with lead titanate and 2030 did not show chocking as was found on the other sample, but the latter looked better because it stays cleaner. Rex 471 showed some clear signs of greater failure due to thinner films, but the trend was not consistent in any of the groups.

The Chicago panels showed up much better, largely because of greater erosion tendencies and the use of a gray substrate. The show-through due to erosion increased from approximately alight to bad or very bad in each of the three groups. Rex 471 did not stand up as well at the near-normal spreading rates as the One Coat House Paint, but the latter was rather dirty, especially with lead titanate. For durability purposes, lead titanate and 2030 seem preferable to 1403 only.

5. Exposures 13361-9 F, C were examined after 12 months at Florida, vertical south, and 16 months at Chicago, north and south. All are cedar bevel siding, primed with Rex 450 Undercoater, all prepared and dried at relatively low temperatures. Rex 471 SWP Gloss White of 2/9/48 is the basic formula (and guide) used to test Myvoil #2, a refined soybean oil from Distillation Products Company, and other soybean oils as part of the bodied oil portion. Variations are as follows:

- (a) 50/50/20% linseed/Myvoil/CWO versus same made with (1273) soya. No choice, both good, clean at all locations.
- (b) 80/20% Myvoil/CWO versus same made with (1273), also regular (3516) which is equivalent. All entirely satisfactory, but slightly more dirt with (1273) at Chicago north.
- (c) 90/10% (1273)/CWO. Equivalent to (a) and (b) in general, but possible trend toward erosion at Chicago.
- (d) 75/25% (1273)/(2325) Dehydrol. Very nearly identical with (c) in performance at all locations.

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0007-SWP-000113777

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6. Exposures 13450 - 61 F, C were examined after 12 months at Florida, vertical south, and 14 months at Chicago both north and south. These are samples of Rex 471 SWP Gloss White from various factories, also the top quality outside whites from the other institutional plants. A brief summary of results is as follows:

A. <u>Rex 471</u>	C 3568 F, Chicago	P 1048, Los Angeles
	C 1398 "	N 1598, Newark
	O 1338 B, Oakland	EA 1428, Cleveland
	T 1598, Dallas	

There are variations, but not a single case of a trend verified by all three locations. Chicago south, no choice. Chicago north, EA 1428 slightly dirtiest, P 1408 slightly cleanest, also least yellow cast. Florida, O 1338 B and T 1598 possibly cleaner than others.

B. Institutional

Acme 1-A #122-C-858 A
Lowe Bros. #328, 3-B-868-528
Martin-Senour #100, 100 M - 1488
Lawrence #35, 32937 - 35
Lucas T.G., TG 280 - 5 F 1618

Some sharp differences. Chicago, both north and south, shows Acme, Lowe Brothers and Martin-Senour still holding a little gloss, which is not true of any others in the entire group. Also, Martin-Senour is definitely low in chalk rub-off, and (north only) Martin-Senour, Lowe Brothers and Lucas are definitely dirtier than the average. Lawrence is almost a stand-out for cleanness and lack of yellow cast. In the cleaner Florida exposure location, all test sections are very nearly the same in dirt collection as their guides (Rex 471, C 3568 F).

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0007-SWP-000113778

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#97 - SWP 471

A sample of Persolite P-1VR (ground aluminum silicate spheres) supplied us by Persolite Sales Company was compared with magnesium silicate 20 dry as an inert in SWP Gloss White. Paints will also be made on the Colonial Yellow formulation and exposed at Chicago, Miami, and Coffeyville this spring.

The Persolite P-1VR was introduced at equal volume and at equal pounds with that of 20 dry. Both Persolite paints were better in flow and higher in gloss than that made with 20 dry. These improved characteristics may be due in part to the finer grind. However, this feature will be checked when the Colonial Yellow paints are prepared.

Batch	Inert	Grind	Brush	Flow	Gloss	Drying	Viscosity #5	
						0'Nite	Fresh	10 Days
32 P	20 dry	1-1/2 H	Good	Good(-)	Good (-)	Good	30"	45"
33 P	Persolite eq. vol.	3-1/2 H	Good	Very good	Very good	Good	24"	27"
36 P	Persolite eq. pd.	3 H	Good	Very good	Very good	Good	32"	35.2"

Panels 14891-705 GS, GN and K were prepared during the month for exposure south and north vertical at Chicago and south vertical at Coffeyville. The paints were SWP white and tints safflower and linseed oils, both raw and bodied, in SWP. See page 27, February Report of Investigations for details.

The following series of exposures were examined and reported during the month.

1. Panels 10351-60 F, G. 56 months at Florida and 59 months at Chicago, vertical south. This series is based on Rax 471 SWP Gloss White of 1-19-45, and tests the extenders listed below. Failure at both locations has been very slight for 3 years weathering, with Royal Talc and Oolitic calcium carbonate somewhat above average. The following list gives a brief statement on appearance at Chicago and Florida.

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#97 - SWP 471

<u>Material</u>	<u>Florida</u>	<u>Chicago</u>
20 L, guide Mg. Silicate	Normal dirt and chalk.	Normal dirt, slight yellow cast.
Asbestol Filler	Noticeably more dirt, also more chalk.	Slightly more of each.
Talc #162	Very slightly less dirt.	Cleaner and whiter, one of best.
Fibrene C	Definitely more dirt. One of poorest.	Cleaner and whiter, definitely good.
Warm Springs Talc	Noticeably more dirt, rather poor.	Cleaner and whiter, definitely good.
Oolitic Calcium Carbonate	As guide, but smoother film, looks good.	As guide, but slightly more dirty and yellow.
Cook's Sno-Float	Ditto, or slightly better.	Ditto
Velvatone	Very slightly more dirt.	Normal dirt, quite good whiteness.
Royal Talc	Only slight dirt, one of best.	Ditto

2. Panels 10416-35 F, C. 36 months' exposure at Florida, vertical south, and 48 months at Chicago, north and south. These are cedar bevel siding panels primed with Rex 450 Undercoater tinted gray. The tests cover the following substitutions of oils in Rex 471 SWP Gloss White of 10-4-43, bodied oil type, 50/50 rutile anatase titanium:

For Bodied Portion Only

Linseed "bis" bodied.

Pittsburgh's #200 Selected linseed,
both regular and "bis" bodied.

(2325) bodied Dehydrol.

CW (2035) Pittsburgh's Selected Soya,
both regular and "bis" bodied.

(1273) soya "bis" bodied.

Cook's bodied soya (regular process).

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For Normal and Bodied Portions

#200 Oil normal and "bis" bodied.
#200 Oil normal and regular bodied.
CW (2035) Oil normal and "bis" bodied.
CW (2035) Oil normal and regular bodied.
(1273) and "bis" bodied linseed.
(1273) normal and "bis" bodied.
Cook's normal soya and "bis" bodied linseed.
Cook's soya, normal and regular bodied.
(3017) light Dehydrol and "bis" bodied linseed.
All oil as (3017).

There are some variations in the results on these tests, and some of them are particularly interesting because they tend to contradict the findings of a recent report (8519-79 series, date March 20, 1950) that #200 selected linseed gives poor results when bodied. However, the failure on these panels at present is not serious considering the length of exposure, and no final conclusions are justified. All the samples look good, with no cases of excessive dirt. The few cases of slightly greater failure or dirt than normal do not indicate trends; there seems to be no definite "break" in results between (a) "bis" and regular bodying, (b) S-W and other oils, (c) full or partial substitution, or (d) soya, linseed and castor.

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3. Panels 10810-7 F, C. 50 months' exposure at Florida, vertical south, and 55 months at Chicago, north and south. These are cedar bevel siding panels primed with Rex 450 Undercoater. In an attempt to correct consistency and durability difficulties encountered with Lesamite extender (calcium carbonate), it was used at equal oil requirements as related to 20 L dry magnesium silicate (actually 20 F in the guide paint used) as well as at equal volume, and at a compromise between the two. The tests include Lesamite at 56, 40 and 44% p.v.c. in Rex 471 and Rex 465 SWP White and Colonial Yellow of early 1946. Florida results show Lesamite as generally satisfactory as compared to 20 F, but there are some inconsistencies. The higher contents of Lesamite (and higher p.v.c.'s) show more checking in the whites, but quite the reverse in the tints. Mildew growth apparently is not decreased, as would be expected, by the higher carbonate content. Rather outstanding general trends on the Chicago exposures is that of much poorer appearance of Lesamite in Rex 471 due to dirt and yellow cast, and the same poor clean-up in Rex 465 but counteracted by definitely less fading than the guide.

4. Panels 12305-29 F, C. Two years' exposure at Florida, vertical south, and at Chicago, north and south, on cedar bevel siding. Each test is painted out over Rex 450 Undercoater and also as two coat self-primed work. The tests compare various styrenated oils against a guide of 100% linseed, in Rex 471 SWP Gloss White of 7-28-47. It should be noted that the series is not a particularly harsh test of styrene as such, because each binder carries at least 50% of (798) non-break linseed oil, which had to be used to obtain reasonable body and flow. Briefly, the results show the styrenated oil paints to be entirely satisfactory, with very few differences in dirt collection and quite close equivalence to the guide paint in each case.

Special oils, mostly from Resin Research, are: (a) 40% with 60% (798) - (3518) soya-CWO (for general comparison), 50/50 linseed/styrene, CWO/soya/styrene, Pantek resin/soya/styrene, glycerol resin/soya/styrene and Isoline/styrene; (b) at 50% with (798) - linseed/styrene, Isoline/linseed/styrene and Dow X 356 linseed/styrene; (c) also a CWO/linseed/styrene at only 25% with (798) and Dow's X 357-40 castor/styrene at 45%. The glycerol-resin and Isoline-styrene samples are the only ones to show a consistent trend toward slightly greater dirt collection. A few cases of microscopic checking on self-primed work are not considered significant at two years, but may fit into a pattern in the future.

0007-SWP-044412

0007-SWP-000113782

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5. Panels 15277-90 F and 15277-94 CS, CN, plus panel 15360. 12 months at Florida, vertical south, and 16 months at Chicago, both north and south. Details of both the purpose and the results are too lengthy to include here, but will be found in the report dated April 17, 1950. A brief summary may be listed under three general purposes. All tests are on cedar bevel siding.

- (a) Rex 471 SWP Gloss White of 4-19-48, laboratory batch using all 1405 anatase titanium and 100% linseed oil, was compared with purchased samples of Pittsburgh's Titanic White and Devco's #547 Outside White. The latter was used both over Rex 450 Undercoater and over Devco's Primer, Rex 471 was used over both, and Pittsburgh's over Rex 450 only. There was no film failure in any case. Devco's and Rex 471 differ quite sharply, yet rate very nearly the same in general appearance; the Devco's seems to be slower in chalking and collects more dirt and mildew (Florida), but is a very white film as against the noticeable yellowness of SWP. Pittsburgh's is intermediate, a little more like Devco's than like Rex 471.
- (b) We had several label analyses of Devco's #547, and wanted to determine what material they might be using as "titanium calcium" at about 53%. We tried straight 1405 (1271 dry not being available), straight 2132 Titanox RC-HT, and a blend of 66/228 pounds, respectively, with a vehicle the same as our Rex 471 (above). Even the 1405 sample, with their pigmentation, was quite slow to chalk and definitely dirty. The blend and the straight 2132 were progressively less chalky and more dirty, but all showed the characteristic good whiteness. Recco Paris Whiting used with 1405 performed very much the same as the regular 20 L.
- (c) Devco's One Coat House Paint White, purchased, was tested against our CH 4697 both with and without lead titanate, as one coat on repaint wood, moderately weathered. Though ours again showed a slight yellow cast, especially with lead titanate, Devco's rated definitely poorer because of dirt.

6. Panels 15378-92 F. C. 12 months' exposure at Florida, vertical south, and 14 months at Chicago, north and south. These are cedar bevel siding panels, primed with Rex 450 Undercoater, prepared under cool weather conditions, 40° - 50° F. The tests may be considered as two groups, but in both two formulas are tested, Rex 471 SWP Gloss White of 4-19/48 and Rex 465 Colonial Yellow of 4-21-48. Space permits only a very brief summary of composition and results:

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- (a) The guide paints (both groups), listed as (E10) bodied linseed oil samples, gave indications of an error in the paints actually used; however, it is felt that this would not affect the validity of the test sections. (3316) 80/20% soya/chinawood gives an appearance about average for the series, clean and white, and a sample with 1128 dry litharge seems even cleaner, but one with 1128 but without SO₂ blow is rather dirty. (3316) plus (2325) Dehydrol and (3316) plus (4106) alkyl are slightly dirty.
- (b) All other tests are based on RB 9646, a 65/35% blend of (1273) soya and (140) chinawood, and all are very much alike in results so far, clean and good in color. RB 9646 is tested untreated and with the following additives:

0.1% and 0.05% of zinc (metallic).

0.1% and 0.05% of Vultac #2 (aromatic disulfide).

0.05% and 0.025% of Thiocide.

0007-SWP-044414

0007-SWP-000113784

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#97 - SWP 471

The Varnish-Resin Laboratory has submitted two bodied linseed (310)'s, Lot 62 made by the standard procedure for (310) and Lot 3 special made using SO₂ as a catalyst for the bodying operation.

	<u>Lot No. 62</u>	<u>Special Lot 3</u>
Body	53"	57"
Spec. Gravity	.963	.960
Color	8	7
Acid Value	9.6	9.9
Clarity	Complete	Complete
Catalyst	None	SO ₂

Laboratory batches of SWP Gloss White were made, using each oil for the bodied oil portion of the formula. The finished paints were checked for general performance such as brushing, flow, gloss, drying, etc. The two oils were found to be quite similar in performance characteristics. Arrangements were made with Mr. Gram to manufacture factory batches of SWP with each oil as a further check on their performance characteristics.

Laboratory Batches

Batch No.	Oil Under Test	Magnesium Silicate	Viscosity - #5 Orifice			
			Fresh	0'Nite	5 Days	23 Days
OJ 116 P	(310) Lot 62	20 dry	21.4"	28.6"	44.6"	58"
OJ 117 P	(310) Sp. Lot 3	20 dry	25"	30"	53"	46"
					<u>4 days</u>	<u>17 days</u>
OJ 145 P	(310) Lot 62	312 dry	19"	26"	26.2"	25.8"
OJ 146 P	(310) Sp. Lot 3	312 dry	20"	27.2"	28"	29"

(Cont.)

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Laboratory Batches
(Cont.)

Batch No.	Brush	Flow	Gloss	Drying	
				Set	O'Nite
OJ 116 P	V.G.	G	G	5 hr. 30 min.	V. G.
OJ 117 P	V. G.	G	G	5 " 5 "	V. G.
OJ 145 P	V. G.	G	G	-	V. G.
OJ 146 P	V. G.	G	G	-	V. G.

The Varnish-Resin Laboratory has submitted a gallon sample of CV 928, Lot 3, bodied safflower oil for evaluation in SWP.

CV 928 - Lot 3

A. V. - 10.5

Body - 64"

Color - 10 - 11

When CV 928 is used to replace (310) of 55 seconds body and 9.6 acid value in regular SWP Gloss White the paint has more than the normal viscosity. This was also true when in addition the raw linseed (2) was replaced by unbodied safflower CW (3093). This may be due to the higher acid value and body of the CV 928. Therefore, we have recommended that another batch of safflower oil be bodied to within regular (310) limits of viscosity and preferably in the vicinity of 55 seconds.

OJ No.	Oil Binder	Wt. per Gal.	Viscosity - #3 Orifice		
			Fresh	O'Nite	7 Days
177 P	(60% (2) (40% (310)	14.26	24"	32"	32"
178 P	(60% (2) (40% CV 928	14.26	33"	47.0"	49"
179 P	(60% CW (3093) (40% CV 928	14.26	34.4"	47.4"	50.2"

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Panels 14759 - 43 CS, CN and K were prepared for exposure south and north vertical at Chicago and south vertical at Coffeyville, Kansas. The paints compare various bodied oils in SWP, including regular linseed (510), (48) which is 50% linseed/50% soya/20% tung, CTV 7389 which is 50% linseed/30% soya/20% Dehydrol G, and CTV 7390 which is 50% linseed/30% soya/20% 70" Dehydrol.

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5. Panels 10361-3 F, C were examined after 36 months' exposure at Florida and 48 months at Chicago, vertical south, all cedar bevel siding. These are tests of Rax 300 Family Paint White, 2-coat self-primed work. The regular formula of 9-28-44, using 270 pounds of 2152 Titanox RC HT, was altered to use Titanox RC HT-X, full substitution, because of the easy-grinding characteristics of the latter. A blend of RC HT-X with 50% 1271 dry anatase titanium-calcium was also tried. The final results are of interest mainly because of the unusually good durability for a second-grade paint. There is essentially no failure at either location. However, the Florida panels have looked bad in the past due to dirt and mildew, and even at 36 months are chalking much too slowly for good clean-up. The Chicago panels suffered even more from lack of chalking, and are heavily mildewed. The RC HT-X and RC HT seem equivalent, with 1271 causing a slightly greater chalking tendency.

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- (b) Dehydrol (5017) used for (2), for (48) and for both. Similar to porilla, but definitely less of the micro-failure in tints, possibly more early dirt.
- (c) Dehydrol (2525) for all (48). As (5017), even better in some respects.
- (d) Maleic-treated linseed (2527) for all (48). Dirty and slight checking tendency at Florida, but a somewhat better record at Chicago.

Quite a large number of tests were also included to cover the use of #200 oil in Rex 450 Undercoater, as replacement for (2), for (48) and for both, and as used under top coats of both formula types, with and without the #200 oil. The Rex 450 changes, even involving bodied #200, had no marked effects.

2. Panels 9094-9101 F, C, Cof. were examined after approximately four years' exposure vertical south at Florida, Coffeyville and Chicago (only 39 months). A "lead sulfate-lead carbonate ladder" makes up the test, which is based on a Rex 471 SWP Gloss White using 16-1/2 gallons of (48) bodied oil and a 50/50 rutile/anatase TiO₂ blend. The ladder involves only the supplementary lead, running from 0% BCWL/14% BSWL to 14% BCWL/0% BSWL in 2% steps. The panels are cedar bevel siding, primed with Rex 450 Undercoater shaded gray. There are no significant trends in either the final results or the early exposure history. Certain minor variations in the Coffeyville series might possibly be interpreted as favoring BSWL slightly. Also the records of the first year at Florida show some signs of earlier chalking and less dirt due to BCWL. Quite a few instances have been found in other exposure series which show differences attributable to BCWL versus BSWL, so that we have come to expect a little more dirt with BSWL and possibly slightly inferior durability. However, these test panels seem normal and dependable, and seem to show that the two materials can give almost identical results even with three different locations involved.

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#97 - SWP 471

Exposures examined and reported during the month include the following:

1. Panels 8518-79 F, CS, CN were examined at 48 months' exposure at Florida, vertical south, and 60 months at Chicago, north and south. All are cedar bevel siding, primed with Rex 450 Undercoater of matching shade. The main test is of Pittsburgh's #200 Extracted Linseed Oil. Space does not permit mention of all details of formulation and the accompanying results, but the main group may be summarized very briefly as follows (reference is to #200 oil, as supplied, except where specified as "bodied," which was done here):
 - (a) Pre-war, high oil type formulas. For 25, 50 and 100% of (2) raw linseed oil in Rex 471 SWP Gloss White and Rex 375 Colonial Yellow. About same as regular throughout, good appearance, slight early dirt tendency. Microscopic checking at Florida.
 - (b) Bodied oil type formulas:
 - (1) For 50 and 100% of (2). Satisfactory, as in (a).
 - (2) For 50 and 100% of (48), all bodied #200 oil. Bad surface flaking, general failure.
 - (3) For 100% of both (2) and (48). Also bad, indicating that the oil in bodied form is definitely unsatisfactory.

As a brief general summary of all the above tests, it may be said that there were many minor differences, especially in early dirt collection, but considering the relatively good general results at four and five years, we cannot criticize #200 oil adversely, except that when bodied it gives poor results.

A number of other oils, tested also in both pre-war and bodied oil white and tints, can only be listed here with brief notes, the general observation of many minor variations in results also holding true of these:

- (a) Ferilla (3) for (2). Very clean and bright now, slightly dirty in the early stages, good durability but subject to microscopic checking at Florida.

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conditions. The tints are much more dirty than the whites at both locations, the cause at Florida being largely mildew. Chalking is just beginning at Florida, but is far enough along to cause incipient self-cleaning at Chicago. Florida shows (5516) as dirtiest, but Chicago tests are all very much alike, with (5516) not especially dirty in the past. The higher soya samples have a better record of gloss retention, and there is some evidence of less fading, but neither of these trends are as noticeable as the dirt collection.

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all tests uniformly good at two years, with variations so slight that no definite choice was possible. Some, but not all, of the tests showed early dirt collection in excess of the guide paint (first 8 months), but there was no correlation with the soya-CWO content. The good results with these tests are more or less nullified by two facts: (a) chinawood oil is no longer in a price range which would make it a desirable substitute for linseed, and (b) we have a large number of tests on soya in Rex 471, many of which show certain disadvantages.

Chicago results, briefly, confirm the general trend of good durability for these oils. The minor differences in dirt, as in the case of the Florida tests, do not add up to a trend with regard to the percentages of the special oils used.

3. Exposure series 15162-9 and 13239-46 were examined after approximately one year exposure at Florida, vertical south, and Chicago, north and south, all cedar bevel siding panels primed with regular Rex 450 Undercoater of matching shade. The finish coat tests are:

Rex 471 SWP Gloss White of April, 1948 using (510) linseed bodied oil at 40% of vehicle solids by volume.

Same, but using CV 49, a reduced 80/80/20 linseed/soya/chinawood (48). This results in a binder of 80/12/8% linseed/soya/CWO.

Same, but using (3516), an 80/20 soya/CWO blend, resulting in 80/38/8% linseed/soya/CWO binder.

Same oil contents in three samples of Rex 465 SWP Colonial Yellow.

The point of particular interest in this test is the soya content; although the (3516) formula has been used in production, we have never felt quite safe in going that high in soya content. Series 15162-9 was prepared in warm weather, 13239-46 in late October, using identical paint samples.

The actual times of exposure referred to at present vary from 9 months for 13239-46 at Chicago to 16 months for the same at Florida, but in the following comment the entire history of each group of test panels is taken into consideration. Rex 471 looks good and quite clean at all locations, with a slight trend toward more dirt and slower clean-up due to (3516). There is no evidence of differences due to the painting

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Panels 14609-15 CS, CN and F were prepared for exposure at Chicago, south and north vertical, and south vertical in Florida. They compare magnesium silicate 20 dry, Nylal 300 and Nylal 400 in SWP Gloss White. See page 25, January report for details.

The following groups of exposure panels were examined during the month:

1. Panels 11545 - 55 F, C were examined after 24 months at Florida, vertical south and 28 months at Chicago, both north and south. The top coats are Rex 471 SWP Gloss Whites testing AVM-1 and AVM-4 through AVM-9, blown soya oils from the Vegetable Products Research Laboratory. The guide paint is an all-linseed formula, and one test paint carries (3515), which is 80 soya/20 chinawood. The Rex 450 Undercoater used on most test systems has a (3515)-(1273) soya vehicle. One of the AVM oils is 100% solids, the others are 70%. They vary in body, color and acid value (very slightly, all about 2); all are used at 40% of total oil, which we considered a maximum amount practicable for good clean-up.

There are slight differences in dirt collection in the past, but most data points to the same tentative conclusion as the present Florida results, namely that all the soyas tend to be slightly more dirty than the linseed guides. There is some microscopic checking and cracking at Florida, but only one sample is obviously poor. This is AVM-6, which is the highest bodied of the special oils, darkest in color, but one of several having an acid value of less than 2. In general, these oils appear to be satisfactory up to two years but not equal to linseed in either appearance or durability.

2. Exposures 11997 - 12008 F were examined after 24 months at Florida, vertical south, and a report issued with notes on Chicago panels, north and south, at 28 months. All are cedar bevel siding panels, primed with regular Rex 450 Undercoater, and testing a series of bodied chinawood-soya oil blends prepared in early 1947 when chinawood oil was relatively cheap and readily available. Rex 471 SWP Gloss White of 4-25-47 is the basic and guide formula, using 19 gallons of (48) then bodied linseed and 29-5/8 gallons of (2) raw linseed.

The test formulas use two oil blends at 50/50% (140) chinawood/(1273) soya and two at 33/67% (140)/(1273), one sample of each type being cooked to a body of about 50 seconds, the other to about 20 seconds. These were made into paints of varying oil compositions. The lighter bodied oils were used at (roughly) 5 to 1 with (2), equal parts, and all test oil, the heavier ones were used at the same proportion as regular (48), and at 25-3/4 and 28 gallons as against 19. Florida results showed

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Batch	Color	Gloss	Drying	
			Set-to-Touch	O'Nite
OJ 886 N	Characteristic	Good	6 hr. 50 min.	Good
OJ 887 N	Slightly more yellow than OJ 886 N	Slightly lower than OJ 886 N	8 hr. -	"
OJ 888 N	"	"	4 hr. -	"
OJ 889 N	"	Very slightly lower than OJ 886 N	5 hr. -	"

The Resin Research Department has prepared a sample of bodied safflower RC 4266 for test in SWP. Paints were made using 40% of the oil as RC 4266, (510) and CV 49. An additional paint was also made using 40% RC 4266 and 60% raw safflower.

RC 4266

Body - 54

A. V. - 8.9

Color - 4 +

The above paints compared as follows.

Batch	Character-istics	Viscosity #5		Brush	Flow	Color	Gloss	Drying	
		Fresh	O'Nite					Set-to-Touch	O'Nite
OJ 891N	SWP Gloss White Card 80 Using CV 49	29.6"	36.8"	Character-istic		Good	Char-acter-istic	7 hr. 50 min.	Good
OJ 892N	Using (510)	24.6"	30.4"	"	"	"	"	5 hr.	"
OJ 893N	Using (2) and RC 4266 Bodied Safflower	30.8"	47.0"	Sl. sticky	Sl. short	"	Sl. low	7 hr. 35 min.	"
OJ 894N	Using raw safflower and RC 4266	38.0"	46.2"	"	"	"	"	6 hr. 10 min.	"

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The Varnish-Resin Laboratory has submitted two special (48) bodied oils based on the use of Dehydrol G and AV 1058 (70 seconds dehydrated castor oil) as replacements for the chinawood content in (48).

	<u>CTV 7389</u>	<u>CTV 7090</u>
Oils	(50% (44), 50% (1275) (20% Dehydrol G)	(50% (44), 50% (1275) (20% AV 1058)
Body	56-1/2"	58"
A. V.	10	7.6
Color	5 - 6	5 - 6
Solids	100%	100%

The two special (48)'s were quite similar to linseed (510) in general performance but all paints were somewhat short in flow. The initial viscosities were slightly low and all paints showed a considerable increase in viscosity after 24 hours' storage. The paints are to be checked for further increases in viscosity after two or three weeks' storage. In the following chart CV 49 is reduced (48).

Batch	Characteristics	Viscosity #5 Orifice		Brush	Flow
		Fresh	0'Nite		
OJ 886 N	SWP Gloss White Formula 11-18-49 Using CV 49	38.2"	45.4"	Good -	Good
OJ 887 N	Using (510)	25.2"	45.4"	Good	Fair - (Short)
OJ 888 N	Using CTV 7389	25.2"	46.0"	Good	Fair - (Short)
OJ 889 N	Using CTV 7590	24.6"	39.0"	Good	Fair (Sl. short)

Note: Batch 887 N made with (510) is somewhat shorter in flow than usual when made with all linseed oil.

(Cont.)

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#97 - SW 471

By invitation from the Forest Service, U. S. Department of Agriculture, M. Van Loo attended a meeting in Washington, D. C. January 30, 31, and February 1 as a member of a group representing the National Paint, Varnish and Lacquer Association. This group met with certain government officials and specification writers, representatives from the Forest Service, Forest Products Laboratory, insurance companies, farmer cooperatives, etc. The purpose of the meeting was to discuss whether a system of classification of house and barn paints could be set up to serve the purpose advocated by the U. S. Department of Agriculture. A limited number of copies of our own presentation (but without exhibits) are available to those especially interested. We stated that a system of classification such as set up by Dr. Browne in Technical Bulletin No. 804 was confusing, impractical, technically unsound, obsolete, misleading, and restrictive on future research and improvement. "Coatings," issue of February 8, 1950 summed up the meeting as follows:

"Despite the fact that all except the government representatives agreed that the paint classification system was obsolete, impracticable and technically inaccurate, the Chairman announced that he would recommend immediate revision of Technical Bulletin 804, with subsequent revision from time to time, publication and distribution of explanatory material and continuation of their classification of specific paints upon request by any one at any time.

"The action was denounced by President Battley as bureaucratic. It was evident that the government representatives had come to the meeting with minds already made up on the subject. The whole matter will be brought to the attention of the Secretary of Agriculture pointing out the fact that the conference was not conducted in accordance with our understanding."

Resin Research prepared RC 4235 bodied safflower seed oil for test in SWP. It had a body of 88" ($Z_2 - Z_3$), acid value of 15 and color 7. It was used to replace (48) it produced paint which was much too high in viscosity, probably because of both the viscosity and acid value of the oil.

Resin Research also prepared two linseed-styrene copolymers RC 4787 and RC 4790 for evaluation in SWP. These materials are similar in composition but higher in solids than the linseed-styrene copolymer CV 4586 used in the new Exterior Mill Primer E80 W C12. House paints formulated with 40% of the binder as RC 4787 and/or RC 4790 were very heavy in body and low in gloss. Apparently this type of vehicle is not suitable for use with conventional paint pigmentations.

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Paints were prepared for exposure in which magnesium silicates 20 dry and 312 dry (Nytal 300) were compared with Nytal 400 in SWP Gloss White. Two sets of paints were made, with the first group showing unusually low viscosities and the second unusually high viscosities. This appeared to be due to differences in the CV 49, the reduced (48) used. It was rather surprising that the grinding rates were almost identical, which might not be true in long factory runs.

Batch	Inert Used		Grind	Grinding Rate	Viscosity #3		Brush	Flow	Gloss
	Dry No.	O.A.			Fresh	6 Days			
767 N	20 dry	30.3	2 H	2' - 20"	50.4"	52.6"	Sl. sticky	G -	G
768 N	312 dry	42.0	2 H	2' - 27"	51.4"	42.2"	Sl. + Short sticky	G -	
769 N	Nytal 400	—	2 H	2' - 42"	Too hvy	Too hvy	Very sticky	Very short	G

The following groups of house paint exposures were examined during the months

1. 8050-7 F. 48 months Florida, vertical south. Report combined with series 7544-51 CS and CN, 57 months exposure, south and north vertical Chicago. To test theories of Titanium Pigment Corporation regarding low PVC's and neutralized oil vehicles, using S-W or Lowe Brothers vehicles. Conclusions as follows:

- A. A normal PVC (25%) formula based on 52.5% zinc oxide, 27-1/2% lead and 1% R-200 rutile titanium using Lowe Brothers V-10, V-791 and V-55 loaded oils shows results about the same in general as those of a sample using S-W (518) blown oil for V-791 (25 gallons). Both are satisfactory, but the one with V-791 has been noticeably more dirty.
- B. High PVC formulas tested have a similar formula, but slightly lower zinc and only 22% lead. In one sample, the three loaded oils are combined with (2) linseed and (548) mineral spirits to give a vehicle of 89.7% NVM. By increasing extender and decreasing thinner, the same PVC (35%) is maintained with a 78.4% NVM in the vehicle. The former (low NVM) seems poorer in clean-up and shows a slightly poorer film.

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- C. The low PVC tests (22%) use increased active pigments, basically 8% zinc oxide, 50% lead and 25% titanium. The only Lowe Brothers oil used is V-35, at about 12 gallons. The basic vehicle uses 4-1/4 gallons of (215), 10 each of (519) and (520) and 27-3/4 gallons of (2), and 40 pounds of magnesium silicate is used with this formula. This sample is inferior to the two variations tested with it, as it has a heavy sigmoid check pattern at Florida, while the others show only moderate erosion. These are made by eliminating the extender and, in one case, the (519), in the other, both (519) and (215). In general, these low PVC's did remarkably well for about two years at Florida and three years Chicago, but at three and four years, with weathering becoming more harsh, they begin to look definitely inferior. In some cases, the difference is still only in erosion and still rather slight.
2. Panels 8693-8705 F, C. 4 years Florida, south vertical and 45 months Chicago, north and south vertical. Rex 471 SWP Gloss White of 10-4-45, bodied oil type with 50/50 rutile/anatase titaniums and a PVC of 38.7% was used as the control, with experimental paints tested running from 25% to 50% PVC in 1% steps. The main change was a gradual decrease in (2) linseed oil as the PVC was increased, but the lower steps required a slightly lowered 20 L magnesium silicate content to maintain good brushing, with a moderate cumulative increase in thinner. (48) bodied oil was maintained at 19 gallons, which is the amount in use at present.
- There is a very consistent pattern of equivalence throughout the history at all locations. The final appearance of all is about the same at each location, not particularly good at Chicago because of the erosion and show-through of the gray primer, but generally satisfactory. At one time there seemed to be a slight trend toward greater dirt at low PVC, but chalking rates soon evened up and equivalence was the general rule. The logical conclusion would appear to be that holding (48) at 19 gallons as a constant counteracted the tendency of the film to be weakened by under-pigmentation.
3. Exposures 13225-36 F, C. 12 months Florida, vertical south, and 13-1/2 months Chicago, North and south vertical. Rex 471 SWP Gloss White of 2-9-48 using all 1403 anatase titanium and Rex 478 SWP Geneva Cream of 7-31-47, varied by using various soybean oils to replace the 19 gallons of (48). A Rex 471 sample using 2269 dry Titanox RA-10-40 rutile titanium is used as a guide for the whites. A special sample tests a paint using 1403/2269, equal parts, with all linseed vehicle. The series was prepared and exposed in November, 1948; it is actually a duplicate of series 12914-29 F, C

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(see November, 1949 monthly report), which was put out in hot summer weather. The oils tested are:

- RB 8474 - Bis soya, air-blown (old number, CV-7027)
- RB 8471 - SO₂-treated soya (" " CV-7028)
- RB 8472 - Catalyst-bodied soya(" " CV-7029)
- RB 8473 - 80/20% (1275) soya/(140) CWO, bodied (old number CVR-584)
- RB 8477 - Pittsburgh's 80-500 selected soya, bodied (old no. CVR-570)

All white tests at Florida look good, clean and white, but the guide paint is slightly gray in appearance, only partially due to greater dirt collection. Chalking is slight, with practically no differences. The tints show essentially no chalk, and the guide, the RB 8474 paint and the Pittsburgh sample show higher gloss than the others. Pittsburgh's sample seems a little more faded than the others. Dirt, mostly mildew, is worse on all the test tints than on the guide, except that Pittsburgh is about the same. RB 8474 seems to show the most dirt.

Chicago tests in the white look equally clean at 14-1/2 months, but the guide (2269 dry) is dirtier, and in the first 8 months the all-1405 sample looked cleanest, the soyas somewhat dirty. All soyas showed somewhat more early gloss than the linseeds, but equal chalking. Pittsburgh's seemed a little cleaner in the early stages than the experimentals. RB 8474 seems very "thin"; partly due to erosion. All soya tints at 14-1/2 months are definitely more faded and dirty than the guide.

4. Exposure series 1954-71 was examined after exactly 6 months exposure, June 8 to December 8, 1949, identical panels being exposed at five locations, as follows:

Miami, Florida
Coffeyville, Kansas
Wickenburg, Arizona
Chicago, south
Chicago, north (house paint type only)

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The purpose was to test the behavior of various representative finishes under the varied climatic conditions represented. The idea originated with letters soliciting exposure business at Wickenburg, Arizona, for which location a claim of "90% of possible" sunshine (as against 85% for Miami) was made. Though realizing that dampness, frost and many other factors are also important in exposure testing, we decided to give this location a trial, emphasizing (a) possible advantages for rapid weathering of certain types of finishes and (b) the display value of a group of varied formulas tested at these different locations.

A complete report with graphs and tabulations of results was mimeographed and distributed, and some copies are still available. Due to the fact that all materials tested are regular formulas, whose behavior is generally understood, only the highlights of differences due to location need be presented here. The panels were prepared by the various departments of the Chicago plant especially interested, using their best procedure for preparation in each case. Following are the materials tested, with a brief digest of results:

Group A. House Paints. On cedar bevel siding, vertical exposure.

1. Rex 471 SWP Gloss White, both self-primed and with Rex 450 Undercoater.
2. Rex 436 Fume Resisting (leadless) White, ditto.
3. CH 4697 One Coat House Paint White, over Rex 450.
4. Rex 45000 Kem Bulletin White, two coats self-primed.
5. Rex 500 Family Paint (old lithopone type), 2 coats self-primed.
6. Rex 19 Lead-in-oil, 3 coats as per label.

No film failures in any case. The majority show only traces of chalking, with the greatest amount, #6 at Miami, only "alight." Gloss on #1 and #2 (most important for our purposes) is the same (eggshell) at Miami, Coffeyville and Wickenburg, somewhat less at Chicago. Florida set very poor due to mildew; Wickenburg characterized by clearness, but Coffeyville nearly as clean.

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Group B. Metal Protective and Automotive.
Steel panels, 45° south exposure.

1. Rex 27398, C 3097 Metalastic Gray over
Rex 16174, C 2747 Kromik Primer.
2. Carclad Vinyl system, top coat F44 A C8, gray.
3. F65 W 1 Kem Lustral White and F65 G 27 Green,
both as one coat and with E61 A 1 Primer.
4. F2 M 3 Ruby Maroon Kem Transport Enamel and
F1 A 99 Ford Birch Gray, with E67 R C3 Primer.
5. Opex Lacquer System, Light Gray and Maroon,
LIA 99 (F) and L2 M 3 top coats.

Except for No. 1, an oleoresinous formula, these finishes show relatively slight loss of gloss and very little chalking. Rather surprisingly, Wickenburg tests show the least loss of gloss of the four locations, although averaging very similar to Coffeyville or Chicago. Miami shows greatest loss of gloss, part of which may be due to heavy mildew and dirt. Automotive laboratory men who examined the panels, emphasizing their routine procedure of polishing a strip on each, pronounced the Florida panels definitely most informative for their purposes. Wickenburg panels were very clean, with less natural fading and less color change after polishing than the Florida set. This conclusion carries over to the non-automotive finishes, in a general way.

Group C. Clear Varnishes.

On 8 x 12 x 3/8" maple, 45° south exposure.

1. Rex 27398, C 1159. Rexpar, short tung oil phenolic,
5 spray coats.
2. V6 W 4, C 129 Kem Finishing Clear, medium soya-
linseed P. E. alkyl; ditto.

Comparisons of the locations are not conclusive in this case, mainly because the Florida panels were so heavy with mildew that gloss and color evaluations were difficult. Gloss was surprisingly good at Wickenburg, and darkening of both the film and the wood was noticeably greater than at the other locations. Light checking or crazing of the Rexpar was the only case of film failure in the entire series.

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