

Paint Research
December, 1951

-12-

#97 - SWP

Extenders

The Kraft Chemical Company of Chicago has submitted five pound samples of Loomis Talc MSK #1 and #2 for inspection.

Chemical Composition	MSK #1	MSK #2
SiO ₂	57.40%	67.00%
MgO	30.60	23.13
MnO	0.46	0.02
CaO	5.82	4.84
Al ₂ O ₃	0.27	0.40
Fe ₂ O ₃	0.27	0.40
Water soluble salts	0.022	0.022
Ignition loss	5.30	3.69
Through 325 mesh	99.75%	99.73%
Oil absorption (Gardner-Coleman)	36.0	44.0
Bulking value	0.04212	0.04212
Brightness (Rutile TiO ₂ as 100)	89.3	89.9

The two Loomis talcs were compared with other magnesium silicates such as 512 dry, 20 dry, 2304 dry and 511 dry on an equal poundage basis in SWP Gloss White - Rex 471, card 65. The paints were ground on the roller mill, and a careful check was made on ease of mixing, grinding time, brushing, flow, gloss, texture, etc. The various laboratory tests indicate that Loomis Talc MSK #1 is similar to 512 dry Nylal 300 and 20 dry International's Asbestine 5 X fine texture, in general characteristics. MSK #1 ground slightly slower than 512 dry or 20 dry but the paint was slightly finer in texture. The gloss properties were also slightly higher on the paint made with MSK #1. The paint made with Loomis Talc MSK #2 was definitely higher in consistency, and appeared to be similar to 511 dry International's Asbestine 5 X in consistency characteristics, but much softer in texture.

0007-SWP-044302

N22074

Paint Research
December, 1951

-15-

#97 - Cont.

Rex 471 Card 65 Batch No.	Inert	Ease of Mixing	Time for Grind	Grind After Reduction	Viscosity at 75° F. on S-W #3 Cup		
					Fresh	O'Nite	11 Days
463 Q	Loomis Talc MSK #1	Std.	18 min. 5.3 sec.	3 H	19.2"	21.6"	34"
464 Q	Loomis Talc MSK #2	Std.	15 min. 57.6 sec.	2-1/2 H	40.8"	47.6"	69.4"
465 Q	312	Std.	16 min. 4.5 sec.	2-1/2 H	22.6"	27.3"	35.6"
466 Q	20	Std.	17 min. 21.4 sec.	2-1/2 H	25"	21.4"	35.9"
467 Q	2304	Hard to mix*	9 min. 22.5 sec.	4 H	58.8"	72.6" + 1/32 cup	87.1" + 1/4 cup
468 Q	311	Std.	21 min. 2.2 sec.	2-1/2 H	50.6"	59.5"	79 + 1/4 cup

*Due to higher consistency of paste.

Batch No.	Inert	Brushing	Flow	Drying		Gloss	Paint Brightness
				Set-to-touch	O'Nite		
463 Q	Loomis Talc MSK #1	Good	Good	5 hr. 55 min.	Good	Good	Slightly gray
464 Q	Loomis Talc MSK #2	Sticky	Poor	5 hr. 35 min.	Good	Fair	Slightly gray
465 Q	312	Good	Fair	5 hr. 30 min.	Good	Good -	Good
466 Q	20	Good	Fair	6 hr. 50 min.	Good	Fair	Gray
467 Q	2304	Very sticky	Poor	5 hr. 35 min.	Good	Fair	Good
468 Q	311	Sticky	Very poor	5 hr. 45 min.	Good	Fair	Very gray

0007-SWP-044303

0007-SWP-000113673

Paint Research
December, 1951

-14-

#97 - Cont.

Bodging Agents

Further tests were conducted to check the reactivity and bodging action of the various metallic soaps that were submitted by the Resin Research Department last month.

RD 0830 - Mg 12, OH stearate
RD 0831 - Basic Mg Rosin Amine D
RD 0835 - Mg Armeen 16 D
RD 0740 - Al Rosin Amine D
RD 0845 - Mg Armeen 2 HT
RD 0846 - Mg Armeen S
RD 0847 - Mg Armeen HT
RD 0852 - Al 12, OH stearate
RD 0853 - Mg Rosin Amine D
RD 0854 - Al Armeen S

In previous work it was found that these agents have little or no reactivity when added to the finished paint. See Monthly Report for November, 1951. As a result of this work it was decided to incorporate the various soaps by grinding them with the pigments. In the initial grinds, we introduced 0.75% of each agent based on the total weight of SWP. The paints were all ground on the laboratory roller mill. By the incorporation of these soaps into the grind, we obtained a definite increase in viscosity with RD 0830, RD 0845 and RD 0847. However, the other agents show little or no reactivity in this particular rex. The three soaps RD 0831, RD 0740 and RD 0853 based on Rosin Amine D improved the flow and gloss properties of SWP. The three soaps RD 0845, RD 0830 and RD 0852 appeared to retard drying slightly.

SWP Gloss White House Paints - Rex 471
Using Various Metallic Soaps

Batch	Agent Tested	Viscosity - #2			Brushing	Flow	Drying			
		Fresh	2 Days	1 Week			Set-to-Touch	0 Nite	Gloss	Grind
496 Q	No agent	19.8"	31"	32.5"	Good	Sl. short	6 hr. 10 min.	Good	Good	4 H
497 Q	RD 0830	38.8"	58" + 1/2 C.	75" + 3/4 C.	Sl. sticky	Short	Over 9-1/2 hr.	Fair -	Poor	0 H (?) Due to soap
498 Q	RD 0831	32.8"	29.6"	29"	Good	Good	7 hr. 30 min.	Good	Very good	4 H
499 Q	RD 0740	23"	24 hr. 27.7"	35.2"	Sl. sticky	Good	6 hr.	Good	Very good	4 H

0007-SWP-044304

0007-SWP-000113674

Paint Research
December, 1951

-15-

#97 - Cont.

SWP Gloss White House Paints - Rex 471
Using Various Metallic Soaps
(Cont.)

Batch	Agent Tested	Viscosity - #3			Brushing	Flow	Drying		
		Fresh	2 Days	1 Week			Set-to-Touch	O'Nite	Gloss Grind
500 Q	RD 0845	48"	(24 hr.) 49.7"	38.7"	Good	Sl.	Over short 9-1/2 hr.	Fair -	Good - 3 H
501 Q	RD 0847	39.2"	(24 hr.) 45.4"	42.4"	Sl. sticky	Sl.	5 hr. short 20 min.	Good -	Fair - 4 H
502 Q	RD 0852	25.7"	(24 hr.) 30.9"	33.8"	Sl. sticky	Sl.	6 hr. short 40 min.	Fair	Fair 4 H
503 Q	RD 0853	32.4"	(24 hr.) 35.4"	32.4"	Sl. sticky	Sl.	7 hr. short 40 min.	Good	Very 3 H

The October Monthly Report, on page 18, described the effects of agents R and R Viscosity Modifier from Ross and Rowe, Inc. and #7077 Bodying Agent from Frank S. Lewis, Inc. on the viscosity of SWP Gloss White. A recheck was made of the viscosities after 80 days' storage. It was found that all consistencies have gradually decreased and even the best are only slightly higher than the guide paint. The order in decreasing efficiency could be as follows, with R and R Viscosity Modifier showing little or no reactivity:

1. (324) Bodied Linseed Oil
2. #7077 Bodying Agent
3. Troykyd
4. R and R Viscosity Modifier

Details of the viscosity records are available to those interested.

Exposures examined during the month include the following series:

1. 10416-55 F, C. Examined after 4 years' exposure vertical south at Florida, and 5 years at Chicago, north and south on cedar bevel siding, primed with Rex 450 Undercoater. A number of marked differences in results due to use of various oils show up at each location, but the correlation between locations is not very good. The brief listing below shows most of the trends; in the case of "dirt and mildew" it includes results in the early stages as well as at 4 - 5 years. The basic formula is Rex 471 SWP Gloss White of 1-22-43 (bodied oil, but 1/2 rutile TiO₂).

0007-SWP-044305

0007-SWP-000113675

Paint Research
December, 1951

-16-

#97 - Cont.

1. 10416-33 F, C. (Cont.)

<u>For Bodied Portion Only</u>	<u>Dirt and Mildew</u>	<u>Durability</u>
Linseed "bis" bodied.	Normal	O.K.
Pittsburgh's #200 Selected linseed, both regular and "bis" bodied.	Both normal.	Slightly inferior.
(2325) bodied Dehydrol	Slightly dirty (early).	O.K.
CW (2035) Pittsburgh's Selected Soya, both regular and "bis" bodied.	"Bis" slightly dirty.	Normal or very slightly inferior.
(1275) soya "bis" bodied.	Dirty early, O.K. later.	Slightly inferior in Florida.
Cook's bodied soya (regular process).	Dirty early, O.K. later.	Slightly inferior in Chicago.
<u>For Normal and Bodied Portions</u>		
#200 Oil normal and "bis" bodied.	Slightly to definitely dirty.	O.K.
#200 Oil normal and regular bodied.	Slightly dirty.	O.K. in Chicago, definitely poor in Florida.
CW (2035) Oil normal and "bis" bodied.	Normal to slightly dirty.	O.K.
CW (2035) Oil normal and regular bodied.	Normal to slightly dirty.	Not quite equal to preceding.
(1275) and "bis" bodied linseed.	Slightly dirty, but not early.	Slightly inferior.
(1275) normal and "bis" bodied.	Dirtier early, clean later.	Inferior.
Cook's normal soya and "bis" bodied linseed.	Clean, except very early.	Slightly inferior.
Cook's soya, normal and regular bodied.	Slightly dirty, especially early.	Slightly inferior.
(3017) light Dehydrol and "bis" bodied linseed.	Clean early, slightly dirty later.	O.K.
All oil as (3017).	Similar, even poorer later.	Slightly inferior due to erosion.

0007-SWP-044306

0007-SWP-000113676

Paint Research
December, 1951

-17-

#97 - Cont.

2. 11116-22 F, C. Examined after 48 months' exposure at Florida, vertical south, and 53 months at Chicago, north and south on cedar bevel siding, primed with Rex 450 Undercoater of a light gray shade to emphasize erosion. The tests involve soya oils in Rex 471 SWP Gloss White and also certain old formulas. Brief identification and results:

1. Regular of 6-13-46. All linseed, all TiO_2 as 1403 anatase. Clean and good, except rather excessive erosion at Chicago in third and fourth year.
2. All oil as (1273) soya and bis-bodied soya CV 7027. Slightly dirty in early stages, slightly more erosion than (1) in later stages.
3. All oil as Pittsburgh's soya S. O. #500 (bodied by us). Also same but increased drier content. Both seem somewhat better than 2, in some cases even better than 1.
4. Formulas of 4-8-42, pre-war vehicle, all 1403 dry. Clean, but durability has been inferior to 1, since first year.
5. Formula of 10-13-42, similar but all 2173 dry TiO_2 R 200 rutile type. Durability quite good, in spite of pre-war vehicle, but this seems to be due to slow chalking of 2173, which has resulted in poor clean-up and a definite yellow cast.

3. 13719-25 F, K. C. Examined after 24 months' exposure at Florida and 28 months at Coffeyville, vertical south, and 23 months at Chicago, north and south, as 2-coat self-primed work on white pine bevel siding panels. One sample tests National's 45 X basic silicate white lead in Rex 471 SWP Gloss White, using it at 15 pounds as the only "free lead." Another tests 9 dry basic sulfate white lead substituted for the 120 pounds of 18 dry basic carbonate white lead in the basic (guide) formula. Four other tests carry Tri-Base, a tribasic lead sulfate of very high basicity, at 70, 50, 30 and 15 pounds per 100 gallon formula.

Most panels of this series showed considerable to bad film failure, but still looked relatively good, since the failure was either microscopic or due to moderate warping. Chicago tests showed no significant differences except possible slow clean-up with Tri-Base. Coffeyville tests showed serious deep checking and some light cracking, with the regular best, 45 X and 9 dry not quite as good and the Tri-Base samples ranging from equal to 45 X to very poor. Florida panels show 45 X and the guide as slightly cleanest. Only Tri-Base at the two higher percentages shows significantly more checking and cracking than the guide.

4. 13740-56 F, C. Examined after 2 years' exposure at Florida and Chicago vertical south. This series tests SWP tint formulas (a) containing basic carbonate white lead (regular), (b) eliminating BCWL, and (c) substituting basic silicate white lead (National's 45 X). The (b) and (c) formulas use all 41.4 dry leaded zinc on an equivalent zinc oxide basis rather than part 511 dry leaded zinc as in the regular. A second purpose is the testing of ferrite versus chrome shading bases. The (b) formula is the only one using both types, the others using

0007-SWP-044307

0007-SWP-000113677

Paint Research
December, 1951

-18-

#97 - Cont.

all ferrites. This applies to Colonial and Berkeley Yellow only; the other shades involved are Chelsea Gray, Geneva Cream and Ivory. The panels are regular cedar bevel siding, primed with Rex 450 Undercoater.

At one year, the (b) type formulas seemed to allow more mildew growth at Florida than the formulas with supplementary lead. This phenomenon is not noticeable at 2 years. Also, at 1 year, the ferrite colors were favored over the chromes for tint retention, but at 2 years this is no longer noticeable. The clear differences at 2 years Florida, all considered as of minor significance, are:

- (1) Less chalk rub-off on (b) type.
- (2) Less fading (chalk-rash) and dirt on (b) type, Chelsea Gray only. Also a noticeable microscopic checking in this shade only, slightly less on the regular than others.

Chicago results at one year revealed only very slight differences, none significant. On the Chicago panels at 23 months, there are only two differences noticeable, but they are important because they do not conform to the Florida pattern:

- (1) Chromes much more faded than ferrites.
- (2) Slightly but consistently more fade and less dirt with 45 X samples than with (a) and (b).

5. 15568-80 F, C. These test a number of modified oils as replacements for the 40% of bodied linseed in Rex 471 SWP Gloss White. Examined after 6 months' exposure at Florida, vertical south, and at Chicago, north and south on cedar bevel siding panels, primed with Rex 450 Undercoater. The guide and basic formula for all tests is Rex 471 QJ 488 N using all linseed oil and all titanium as 1403 dry anatase.

Although there were no outstandingly good or poor results in chalking rate and dirt collection, the following notes give some indication of the performance to date. Results equivalent to guide unless specified:

Oil No.	Oil A. V.	Paint Viscosity #3 Orifice		Description	6 Months Results
		Sec.			
RC 6571	3.5	46		Aliphat 16 A - P.E. ester, 20% tung.	Low chalk; clean except mildew in Florida.
6574	10.1	74		Aliphat 16 A - Glyceride, 20% tung.	Chalk varies: rather dirty.
6575	2.7	21		Neofat 19	Chalk varies; dirt normal.
6560	7.2	34		Safflower, 20% tung.	Low chalk; but clean.

0007-SWP-044308

0007-SWP-000113678

Paint Research
December, 1951

-19-

#97 - Cont.		Paint Viscosity		Description	6 Months Results
Oil No.	Oil A. V.	#5 Orifice	Sec.		
EC 6561	5.7	39		Aliphat 16 A, glyceryl ester.	Chalk varies, rather dirty.
6562	3.7	42		Aliphat 16 A, P.E. ester.	Chalk varies, rather dirty.
6570	0.35	16		XN 828 propane refined soya.	Free chalking.
6519	7.2	44		Swift's soya, SO ₂ bodied.	Low chalk, slightly dirty.
6543	8.2	59		(1273) soya, SO ₂ bodied.	Same, but cleaner.
6756	4.7	68		(3019) Dehydrol-styrene, 12-1/2".	Normal.
6773	3.5	64		Same, but 26".	Normal.

0007-SWP-044309

0007-SWP-000113679

Paint Research
November, 1951

-16-

#97 - Cont.

An unrelated test system included in the series was "Sta-Par One Coat Exterior White," from the Siccya Soya Paint Company, of Peoria, Illinois. This was tested over Rex 450 and also as two coats self-primed. It has looked poor throughout the exposures, very dirty due to slow chalking. Furthermore, it showed serious checking for the past year, especially self-primed.

Panels 16599-16415 CS, CN, and Oakland were prepared during the month for exposure south and north vertical at Chicago and south vertical at Oakland. These cover comparisons of Liquid Ozlo C78 W 5 which was suspect as regards durability because of the inclusion of 517 pounds of lithopone in the pigmentation. The variations include (a) regular formula, (b) as (a) but rutile titanium calcium 2132 dry for lithopone, (c) as (b) but oil conservation vehicle, (d) as (b) but rutile titanium calcium 2140 dry for lithopone, (e) as (d) but also 2030 dry TiO_2 for the 1405 dry TiO_2 present, and (f) regular SWP Rex 471 Gloss White, Card 62.

0007-SWP-044310

0007-SWP-000113680

Paint Research
November, 1951

-15-

#97 - Cont.

Dallas, T 1598. Very clean at Florida; normal at Chicago.

Los Angeles, P 1408. Normal. Some readings a trifle better.

Newark, N 1598. Slightly dirty at Chicago; rates better at Florida, because of better whiteness. Slight checking.

Cleveland, EA 1428. Normal. Some readings slightly better.

Acme 1 A, #122 - C 858 A. Better in early stages, slightly dirty at 2 years.

Lowe Bros. H.S., #5B-868-328. Averages normal, but somewhat more dirt collection Chicago north, 6 - 18 months.

Martin-Senour 100, M 1488. As Lowe Brothers. Also slight checking.

Lawrence, 32957-55. Cleaner than normal, except seems subject to mildew at Florida. Whiteness is good, but film shows erosion and checking.

Lucas, TG-260, 5F 1618. Clean-up at least normal, but erodes and shows slight checking.

Panels 15496-15505 F, C were examined after 24 months' exposure at Florida, vertical south, and 27 months at Chicago, north and south. All are cedar bevel siding, primed with Rex 450 Undercoater. The following oil tests showed no film failure and had appearance characteristics equivalent to the Rex 471 SWP Gloss White, 100% linseed, used as guide, except for the few minor differences specified:

1. Samples of (3516) 80/20% soya/chinawood bodied oil, from Oakland, Cleveland and Chicago production lots, with the exception that the Oakland sample seemed to have a slight edge in clean-up in some cases.
2. CVR-979 a (3516) special made by the solvent process.
3. (48) bodied linseed oil. (These three used with the usual amount of (2) raw linseed oil.)
4. Archer-Daniels-Midland #65-1 chinawood-soya as only oil.
5. CVR-985 bodied safflower used with CW (2656) raw safflower.

Samples 4 and 5 showed up slightly cleaner than the others on most panels.

0007-SWP-044311

0007-SWP-000113681

Paint Research
November, 1951

-14-

#97 - SWP

The Resin Research Department has submitted the bodying agents listed below for evaluation in an oil base and alkyd base house paint.

RD 0830 - Mg 12, OH stearate
RD 0831 - Basic Mg Rosin Amine D
RD 0835 - Mg Armeen 16 D
RD 0840 - Al Rosin Amine D
RD 0845 - Mg Armeen 2 HT
RD 0848 - Mg Armeen S
RD 0847 - Mg Armeen HT
RD 0852 - Al 12, OH stearate
RD 0853 - Mg Rosin Amine D
RD 0854 - Al Armeen S

These agents have no bodying effect in SWP Gloss White Rex 471, card 65 when used to the extent of 0.14%, 0.25% and 0.42%. The same agents will be evaluated in SWP Manor Brown using the long oil alkyd (4106) as the vehicle.

Panels 11646-55 F, C were retired after 36 months at Florida, vertical south and 49 months at Chicago, north and south, cedar bevel siding. The test covers the use of seven samples of blown soya oil from the Vegetable Products Research Laboratory, as replacements for the bodied linseed in Rex 471 SWP Gloss White of 2-18-47, card 45. Other regular formulas, using (3516) soya-chinawood, are included for reference.

Results, including consideration of a previous report, were contradictory in that the Florida panels showed some of the blown soya oils as inferior in durability, while the Chicago panels showed none poorer than the guides and a few slightly better. The differences in physical characteristics of these oils (numbered AVM-1, -4, -5, -6, -7, -8 and -9) were listed as very slight, all acid values being 2.2 or less. There was a slight to definite trend toward more dirt with these special oils. We feel that the emphasis should be on the generally satisfactory durability of these oils, although none should be considered as superior.

Exposures 13450-61 F, C were examined after 24 months at Florida, vertical south, and 28 months at Chicago, north and south. These represent samples of Rex 471 SWP Gloss White or corresponding first quality outside white, from each factory listed below, all applied on cedar bevel siding, using Rex 450 Undercoater. We feel that the results are of interest, although it is to be understood that one exposure series of one sample each does not offer a valid comparison of the various factories' production. All ratings up to the present time are considered below.

Chicago, Rex 471 C 3368 F and C 1398. Normal. No film failure, not particularly clean or dirty at either location.

Oakland, 01338 B. Same.

0007-SWP-044312

0007-SWP-000113682

Paint Research
October, 1951

-15-

#97 - SWP

The Resin Research Department submitted the following vehicles for evaluation in house paint formulations.

- RD 0533 Vinyl ethers of linseed alcohols.
Body - Z₂ - Z₃. A. V. - 0. Color 11 - 12. Solids - 100%.
- RD 0528 Methacrylic esters of fish alcohols.
Body - Z₄ - Z₅. A. V. 9.25. Color 11 - 12. Solids - 100%.
- RD 0528 Chinawood fatty acid ester of soya alcohols.
Body - Z₁ +. A. V. - 4. Color - 15 - 14. Solids - 100%.

House paints were made using 40% of the oil as RD 0533, RD 0528 and RD 0528 in conjunction with 60% (2) raw linseed oil. The experimental paints were compared with SWP Rex 471, Card 85 for brushing, flow, gloss and drying characteristics. The three vehicles appeared to be definitely inferior in drying and gloss characteristics as compared with a heat bodied oil such as (S10). RD 0528 and RD 0528 appeared to have a false body that washed out when pigmented, as indicated by the following data:

SWP Gloss Whites

Batch	Vehicle Tested	Viscosity-#3		Brushing	Flow	Drying Properties		
		Fresh	O'Nite			Set	O'Nite	Gloss
341 Q	RD 0533 40% of oil	30.5"	26.8"	Good	Short	12 hr. 15 min.	Very soft	Rather low
351 Q	RD 0528 40% of oil	16.6"	19.4"	Good, but too thin	"	9 hr. 10 min.	Soft	Rather low
340 Q	RD 0528 40% of oil	18.2"	17.6"	"	"	9 hr.	"	Good
525 Q	(S10) 40% of oil	27.8"	37.6"	Good(-)	Good(-)	6 hr.	Good	Good

The Resin Research Department also submitted RC 8028, an ester of Maleic Anhydride and linseed alcohols. This sample was used for the total vehicle solids in SWP. Paint made with this ester was very lumpy and rubbery in nature and the liquid appeared to be gelling on the surface of the can, which would indicate that it is very unstable.

0007-SWP-044313

0007-SWP-000113683

Paint Research
October, 1961

-16-

#97 - Cont.

Panels 18251-80 CS, CN were prepared for exposure. The paints include some whites which could not be included in the large scale tests on the special fence at Chicago. Also tests of various SWP Tinting Whites shaded to Chelsea Gray Rex 474 and Colonial Yellow Rex 465. One top coat over Rex 450 Undercoater on bevel siding, Chicago south and north vertical.

Panels 18356-76 CS, CN were prepared for exposure to cover all the exterior house paint undercoaters and top coats used in the 1961 house test program. Cedar bevel siding was used and exposures are at Chicago south and north vertical.

A test was completed at 125rd Street and Cicero Avenue, on a parsonage of the Alsip Reformed Church. This was a 2-story square frame house, well-located and practically unshaded. Built in early 1947, the house showed no signs of general neglect, but looked very bad because of rusty nail-heads and corner plates, considerable peeling and general erosion and cracking. The siding is redwood. The walls were insulated, and it was felt that this was the main cause of the rusting and peeling, and that more trouble was to be expected. Having reached an understanding on this point, it was decided that the most useful procedure would be to "uniform" the house at this time with regular Rex 450 SWP Undercoater - 471 SWP Gloss White and try out various methods of coping with blistering and peeling if and when it develops. A coat of Kromik primer was put on the corner-plates, after wire-brushing, but no particular pains were taken with the nail-heads. Moisture meter readings were taken, with only a very few spots found to be over 12%, except that the north side showed 17 - 22%. Besides the regular Rex 450, C 811 B and Rex 471, C 1101 (used in all house tests this year) two special Rex 471's were tried as more or less short term dirt collection tests on the east side:

RB 3281 R - Basic silicate white lead and 1424 dry.

RB 3502 - Using high basicity leaded zinc.

A test was completed on a new garage at 18615 Gottschalk Ave., Homewood, Illinois. This site was chosen because of the accessibility and the open south and east exposures. Regular Rex 450 Undercoater, C 811 B was applied on all sides. Regular Rex 471, C 1101, Card 65, 175 pounds of 2132 dry Titanox RC HT was applied on part of the east side only. RB 3482, all 1405 anatase TiO_2 was applied on the entire north and west (front) and one section of the south. In approximately 4-foot vertical sections on the south the following paints were applied, in addition to RB 3482:

0007-SWP-044314

0007-SWP-000113684

Paint Research
October, 1951

-17-

#97 - Cont.

- RB 5474 - 18% of 2174 non-chalking rutile TiO_2
- RB 5475 - 22% of 2174
- RB 5477 - 28% of 2174
- RB 5478 - 30% of 2174 (also on part of east side)

Red bricks were arranged at the bottom of each section on the south, to check the chalk wash-down. Though slightly different in brushing characteristics and drying, the paints were very closely alike in appearance after one week.

A house test was completed at 10511 Christina Street, Chicago on a house which had been used for test purposes twice before. Because of (a) peeling above a porch roof and (b) the building of a substantial addition, the owner wished to repaint the entire house although we would not have recommended it for another year. Rex 450 Undercoater, C 811 B regular, was used on all parts, and all except the north side was finished with Rex 471 SWP Gloss White, C 1101 regular. On the north side, the following dirt collection tests were applied, along with C 1101 as a control:

- RB 5275 - Card 49, 1405 TiO_2 -BCML-loaded zinc as 511 and 414.
- RB 5278 - Card 57, 1405 - no BCML - loaded zinc as 412 only.

The painting was done by the owner, and he reported no appreciable differences in application or appearance of the test paints.

Paints 12151-12217 F, C were reported on after 36 months' exposure at Florida and 48 months at Chicago, vertical south, all white pine bevel siding. Both series contained both Rex 450-primed and 2-coat self-primed work. The paints tested were all Rex 471 SWP Gloss White of 8-15-48 (all-linseed vehicle), comparing six materials submitted by the former Varnish Research group as plasticizers. 5%, 10% and 15% of each of the following alkyd type resins were incorporated into the formula, with corresponding reduction in both raw and bodied oil volume:

0007-SWP-044315

0007-SWP-000113685

Paint Research
October, 1961

-18-

#87 - Cont.

- A. Made with glycerine, 5 parts, plus dibasic acid, 2 parts and (44), 4 parts.
CVR 814, succinic; CVR 811, adipic; CVR 809, sebacic.
- B. Made with glycol, 5 parts, plus 5 parts acid and 1 part (44).
CVR 828, succinic; CVR 830, adipic.

Also CVR 851 same as CVR 830, but lower concentration,
2 parts glycol to 2 parts acid.

In general, there were few, if any, results of importance to the house paint formulator. Being on an inferior wood and exposed 3 and 3-1/2 years, there was considerable failure, but after allowances were made, no trend could be seen either with respect to composition or concentration. Test sections were almost without exception the same in appearance and film integrity as the guides.

A special test of .005" draw-downs on glass was put on 60° south exposure at Chicago and examined for 4 months (March through June). Some cases showed increases of toughness and elasticity at the highest percentage of plasticizer. Although some films (particularly with glycol) became tougher than the regular, several became very brittle, and none seemed to be particularly more "elastic" than the regular.

Bodying Agents

In connection with the investigation of bodying agents for SWP, the agents listed below were evaluated as viscosity modifiers for oil based paints:

R and R 449 Viscosity Modifier, from Ross and Rowe, Inc.

#7077 Bodying Agent, from Frank S. Lewis, Inc.

The latter agent is identical with the X-151 Enamel Thickener used at the Gibbore plant. The two agents were compared with Troykyd and (324) bodied linseed oil for reactivity and stability of body when used in SWP Gloss White.

The various test paints have been in storage for a period of approximately two weeks. During this period they have been checked for viscosity at the periods indicated by the data listed below. In general all paints bodied with these agents have a tendency to decrease in viscosity over a period of only 12 days. From the standpoint of reactivity, 7077 Bodying Agent and (324) were quite similar. The R and R 449 agent from Ross and Rowe, Inc. did not have any bodying action in this formulation.

0007-SWP-044316

0007-SWP-000113686

Paint Research
October, 1961

-19-

#97 - Cont.

Bodying Agents in SWP Gloss White

Batch No.	Agent Used	Amount of Agent	Fresh	Viscosity - No. 3 Orifice, S-W Cup					
				0 Nite	2 Days	5 Days	12 Days	22 Days	
246 Q	(348)	50 oz. SWP 1/2 oz. (348)		21.2"	21.8"	21.6"	20.4"	19.8"	22.4"
247 Q	(324)	50 oz. SWP 1/2 oz. (324) Solution ¹		34.2"	50.6"	28.6"	28.2"	26.1"	27.2"
248 Q	Troykyd	50 oz. SWP 1/2 oz. Troykyd Solution ²		27"	27.6"	26.2"	25"	24"	26.4"
249 Q	R and R 449 Viscosity Modifier	50 oz. SWP 1/2 oz. R and R 449 Solutions ³		25.2"	24.1"	25.6"	21.5"	22.6"	22.4"
250 Q	#7077 Body- ing Agent	50 oz. SWP 1/2 oz. #7077 Bodying Sol. ⁴		50.4"	50.9"	27.6"	26.2"	26.6"	22.8"
251 Q	(348)	50 oz. SWP 1 oz. (348)		19.5"	20.8"	19.2"	18"	18.5"	20"
252 Q	(324)	50 oz. SWP 1 oz. (324) Solution ¹		40.2"	35.4"	36.6"	35"	30.6"	35"
253 Q	Troykyd	50 oz. SWP 1 oz. Troykyd Solution ²		51.5"	51.8"	51"	47.4"	27.8"	28.6"
(Cont.)									
1	10 oz. (348)	2	10 oz. (348)	3	10 oz. (348)	4	10 oz. (348)		
1 oz. (324)		1 oz. Troykyd		1 oz. R and R 449		1 oz. #7077 Bodying			
				Viscosity Modifier		Agent			

(Cont.)

1 10 oz. (348)
1 oz. (324)
2 10 oz. (348)
1 oz. Troykyd
3 10 oz. (348)
1 oz. R and R 449
Viscosity Modifier
4 10 oz. (348)
1 oz. #7077 Bodying
Agent

0007-SWP-044317

0007-SWP-000113687

Paint Research
October, 1951

-20-

Bodying Agents in SMP Gloss White
(Cont.)

Batch No.	Agent Used	Amount of Agent	Viscosity - No. 5 Office, S-M Cup				
			Fresh	0 White	2 Days	5 Days	12 Days
254 Q	R and R 449 Viscosity Modifier	50 oz. SMP 1 oz. R and R 449 Solution ³	22.4"	24"	25.2"	26"	22.6"
255 Q	#7077 Bodying Agent	50 oz. SMP 1 oz. #7077 Bodying Sol. ³	39.8"	37.9"	34.8"	31.7"	28.6"
256 Q	(348)	50 oz. SMP 1-1/2 oz. (348)	19"	19.4"	18.2"	18.6"	17.6"
257 Q	(324)	50 oz. SMP 1-1/2 oz. (324) Solution ¹	42" + 1/8 cup	43" + 1/8 cup	39.6"	37.2"	30.8" + 1/16 cup
258 Q	Troykd	50 oz. SMP 1-1/2 oz. Troykd Solution ³	34"	36"	32.8"	30"	27"
259 Q	R and R 449 Viscosity Modifier	50 oz. SMP 1-1/2 oz. R and R 449 Solution ³	24"	25.2"	24"	22.2"	21"
260 Q	#7077 Bodying Agent	50 oz. SMP 1-1/2 oz. #7077 Bodying Sol. ⁴	41"	45.5"	35"	30.8" + 1/16 cup	34"
1	10 oz. (348) 1 oz. (324)	2	10 oz. (348) 1 oz. Troykd	3	10 oz. (348) 1 oz. R and R 449 Visc. Mod.	4	10 oz. (348) 1 oz. #7077 Bodying Agent

0007-SWP-044318

0007-SWP-000113688

Paint Research
September, 1961

-20-

#97 - Cont.

In repainting these panels for continued exposure, (a) 1 coat of Rex 471 was applied to the 1-coat job, (b) spot-priming of bare areas plus one coat of Rex 471 was used on the 2-coat panels and (c) spot-priming plus Rex 450 and Rex 471, a thorough re-painting job, was done on the 3-coat panels. Thus, we continue to have a display showing unpainted wood against paint jobs which might be called very thorough, normal and bare minimum. Although the display cannot be removed from the fence, photos are available.

0007-SWP-044319

0007-SWP-000113689

Paint Research
September, 1961

-19-

#97 - Cont.

Panels 11151-8 C were examined after 4-1/2 years' exposure, vertical south, at Chicago. These were Douglas Fir plywood panels, mounted as most of our plywood tests, two 11 x 17 x 5/8" panels on a frame with the edges covered partly by moulding and partly by caulking. The material tested is "Premite," a semi-paste formula developed at Oakland in 1946 for use on plywood exteriors of prefabricated structures. The formula is essentially 358 pounds of 412 leaded zinc, 222 pounds of Surfex, 80 pounds of 2050 titanium and 109 pounds of 638 asbestos fiber in a linseed vehicle. Green, yellow, rust and gray shades were tested. Application was by brush, with a deep stipple effect, and by roller coater, also quite rough. The material was applied over CH 3285 Prefab Primer, with and without OV-579 Kam Wood Sealer.

In general, the systems looked considerably better at three to four years than the average of the main plywood test series using SWP and other systems. This might be expected because of the heavy build of film, but apparently the asbestos fiber imparted a resiliency which almost eliminated the usual film cracking. Serious cracks showed up at 2-1/2 to 3 years, but they were apparently long, deep cracks due to stresses in the wood and did not multiply or progress to serious film flaking. There seemed to be no differences due to the use of a clear sealer.

Panels 11634-9 C were examined during the month. These consist of 12 panels on permanent exposure vertical south at the Chicago farm, testing (a) one coat only of Rex 471 regular of late 1946, (b) regular Rex 450-Rex 471 and (c) Rex 450-450-471. These 1, 2 and 3-coat systems were put on the left half of cedar, yellow pine, white pine and Douglas Fir bevel siding panels, the right half in each case being left unpainted. The exposure time to date is slightly over four years. The unpainted sections showed serious wood erosion or "corduroy effect" on the cedar panels, starting at about one year, and about the same on yellow pine but the wood is in much worse condition because of warping and cracking. White pine and fir boards are about like the yellow pine except showing noticeably less wood erosion. The one coat job was almost entirely eroded away, and considerable of the above wood failures had shown up. The 2-coat job was considerably better, especially on cedar, because erosion had not penetrated to the wood. The 3-coat job showed some cracking on the pines but looked good except on close inspection.

0007-SWP-044320

0007-SWP-000113690

Paint Research
September, 1961

-18-

#97 - Cont.

16171-9 C, F. A comparison of regular SWP tint base, the former Paintercraft Tinting White, and a special tint base made by the Cleveland Technical Service Department for Mr. Holton. The last named contains 577 dry Plaster of Paris. Each was tinted to the shade of SWP Colonial Yellow, Plymouth Green and Westchester Gray. Exposures will be south vertical in Chicago and Florida.

16240-2 CS, CN and F. Testing Clay Black MR-107 from E. S. Dickerson, Jr., Merchantville, N. Y., as a possible replacement of the black pigment and part of the inert of SWP gray or black paints. For exposure south and north vertical Chicago and south vertical Florida.

A house test was completed at 107 Detroit Street, Calumet City, Illinois. This was a repaint job after only two years' exposure of a previous test on a new house. Rusting of nail heads was the main reason for requiring a repaint job. The painting was done by the owner, and used regular Rex 450 Undercoater throughout, plus Rex 471 SWP Gloss White as follows:

C 1101, regular, card #65, titanium content as 62.5% 2132 dry RCHT/
37.5% 1403 anatase TiO_2 .

RB 5457, all 1403 anatase TiO_2 .

RB 5458, using 1403/2174, R 610 titanium at 80/20%.

A house test was completed at 4224 Towle Avenue, Hammond, Indiana. This house is a small frame bungalow presumed to be in a considerably dirtier location than our usual test houses, but otherwise well situated for a test. Because of the probable dirt collection feature, we used a finish coat comparison only, with all primer regular Rex 450 Undercoater. For the finish coat, Rex 471 SWP Gloss White was tested as follows:

C 1101, regular, card #65, titanium content as 62.5% 2132 dry
Titamox RC RT/37.5% 1403 dry anatase TiO_2 .

RB 5277 R, card #64, 1403 anatase/2132 at 2 parts to 1.

RB 5278 R, Lowe Brothers pigmentation, roughly 50% 2132 dry, 10% 1403.

0007-SWP-044321

0007-SWP-000113691

Paint Research
September, 1961

-17-

#97 - SWP (formerly "SWP 471")

The Vegetable Products Research Laboratory submitted a gallon of linseed oil AVM-85, produced by the mixed solvent extraction method, for test in SWP. The solvent extracted oil was compared with regular stock (2) raw linseed oil. Test batches of SWP made with each oil were compared for brushing, flow, drying, etc. (See Monthly Report for March, 1961.)

The original paints were placed in storage last spring and were examined after six months of storage. The sample of SWP made with regular (2) raw linseed oil obtained from the factory had excellent package condition whereas the paint made with the mixed solvent extracted oil had hard settling on the bottom of the can. Tests are being held in storage to check granulation tendencies. Exposure panels 16180-5 CS, CN and F were prepared to test durability and general performance. Chicago south and north vertical and Florida south vertical. The oils tested in this group include regular (2) raw linseed oil from Kensington stock, AVM-85 mentioned above, a special (510) AV 1187 heat bodied oil made from unrefrigerated and unbleached (44) and a (510) control made from the same lot of original oil as AV 1187 but after refrigeration and bleaching of the (44).

Other panels prepared for exposure during the month include the following:

16158-65 CS, CN, F, new and repaint. A test of Laminar, rubber grade ground oyster shells, offered by the Laminar Calcium Corporation. Laminar and 2307 AA mica are compared as 7% of the total pigment in SWP Gloss White. The paints are applied as two coat work (over SWP 450 Undercoater) on new cedar panels and one coat over weathered panels. Exposures south and north vertical Chicago and south vertical Florida.

16166-70 CS, CN and F. Tests of 20% siliconated oils RC 8877 (body E) and RC 8879 (body 54 sec.), prepared from Flakson's Silicone C, an ethoxy silicone as the vehicle in SWP Rex 471. The experimental paints were rather short in flow, had better drying properties than regular SWP but showed a tendency to wrinkle with standard quantities of driers. Exposures will be south and north vertical at Chicago and south vertical in Florida.

0007-SWP-044322

0007-SWP-000113692

August Research
August, 1951

-18-

#97 - SWP 471

Resin Research submitted a sample of Magnesium Rosin Amine B RC 9255 for comparison with heat bodied linseed oil (324) and Troykyd as bodying agents in house paints. RC 9255 is ineffective, but it should be pointed out that when (324) or Troykyd is added to the finished batch of Rex 471 initial viscosities are high but much of the increment is lost in less than a month's storage.

Gibbsboro has reported in their May-June 1951 Technical Service Report that increase in flow and gloss of house paints due to additions of Rheotol are only temporary. We rechecked the flow properties of SWP induced by Rheotol both when added to the grind and when added to the thin-down. Additions of Rheotol amounted to 1/4, 1/2 and 1% by volume. When the Rheotol is added to the thin-down there is a very definite increase in flow. However, over a period of two weeks the flow gradually decreased so that only minor improvement could then be detected in the 1/4 and 1/2% additions. The batches made with the Rheotol in the grind showed somewhat less initial flow but the flow has not decreased to the same extent as when the agent is added to the thin-down. Further brush-outs will be made after more extended storage.

Panels 16046-16115 CS, CN and F were prepared for exposure. This is a cooperative series arranged with the du Pont Pigment Division and include paints from both S-W and du Pont which will be compared for performance on their exposure site and ours. The S-W paints consist principally of studies of various titanium pigments in lead-containing and lead-free white house paints and in lead-containing Colonial Yellow and Gray tints. The tints also compare magnesium silicate and calcium carbonate extenders. The du Pont paints include similar conventional formulations, also calcium carbonate in whites and their Stain Resistant Ti-Pure FF-magnesium silicate white. Their tints also include lead-free formulations. Full details will be given in subsequent progress reports as exposure results develop.

A test was completed during the month on a new garage at 18615 Gottschalk Avenue. The garage, of fir drop siding, was primed with regular Rex 450 Underwater and finished with several samples of Rex 471 SWP Gloss White using various amounts of rutile titanium. The specific purpose was to have a test parallel to the special fence test at the exposure farm on which the wash-down of chalk is observable by the use of red bricks below each section. The following Rex 471 samples were used:

C 1101 stock	- card #65, using 175 pounds of 2132 Titanox RC-HT
RB 3482	- all 1403 anatase Ti-Pure FF.
RB 3474	- 18% of 2174, R-610 rutile.
RB 3475	- 30% " " " "
RB 3476	- 22% " " " "
RB 3477	- 26% " " " "

0007-SWP-044323

0007-SWP-000113693

Paint Research
August, 1951

-17-

#97 - Cont.

These paints arranged on the south side of the building in order of increasing R-610 content, with the full anatase sample on most of the other sides, and the 30% R-610 sample on the east as well as south.

Panels 11611-28 F, C were examined after 5 years at Florida and 4 years at Chicago, vertical south, all cedar bevel siding primed with Rex 450 Undercoater. The Florida group had been delayed on account of two previous special studies of the panels. The series tests various zinc oxides in Rex 471 S/P Gloss White on a mechanical mix basis at 32% of pigment weight (regular percentage), 21% and 10%. At each level a sample using 412 co-fumed leaded zinc as the only source of zinc oxide is also tested. The zinc oxides used are XI-592, XI-50, XI-503 and Azo ZZZ-33 at each level and St. Joseph's #48 and #17 at the 32% level only.

So many points of interest have come up in the history of this series that space permits mention of only the most important:

- (a) At approximately one year, the mildew growth was interesting in that the co-fumed samples at all zinc oxide levels showed less than the mechanical mixes, in spite of a lower total reactivity. Auxiliaries Research has inquired further into this.
- (b) At about two years, there were no great differences in film durability, but the lower levels of mechanical mixes were slightly poorest.
- (c) At the end of the exposures, these differences were considerably greater, except that at Chicago, where erosion predominates, practically all samples were equally poor. St. Joseph's materials, however, do seem to resist this erosive tendency surprisingly well.
- (d) Checking and cracking tendencies at Florida (end of exposures) showed:
 - 1. Better durability at lower zinc levels.
 - 2. Better durability with co-fumed, but with a decreasing margin at the lower levels.
 - 3. Unexpectedly poor results with Azo ZZZ-33, the other regularly used materials being quite similar. We have usually had comparatively good results with ZZZ-33, but this is not the only test to show the reverse. XI-503 was possibly the best of the others.
 - 4. Very poor results due to both St. Joseph materials.

0007-SWP-044324

0007-SWP-000113694

Paint Research
August, 1951

-16-

#97 - Cont.

Panels 12954-83 F, C were examined after 30 months' exposure at Florida and 36 months at Chicago, vertical south, all cedar bevel siding panels primed with Rex 450 Undercoater. These are tests covering zinc oxides from the St. Joseph Lead Company in Rex 471 SWP Gloss White, Rex 456 SWP Fume Resistant White (leadless) and Rex 472 SWP Mildew Resistant Treated White. In Rex 471 and Rex 472, the basic test formulas are on a mechanical mix lead-zinc basis, and in the case of Rex 471 and Rex 456, both normal and low zinc oxide levels were used. The zinc oxides tested, besides Azo ZZZ-33 as a control material, are St. Joseph's Green Label #42 plus three experimental pigments based on it. These contain 0.01%, 0.20% and 0.34% (called low, medium and high) of chlorine deposited on the particle surfaces in the form of zinc chloride. Unusual mildew resistant effectiveness and durability were claimed.

Space does not permit the complete presentation of the interesting results noted in the early stages and at the present (all tests are being retired). In general, the Chicago panels showed no important trends until late in the exposure period, when all the St. Joseph materials, including Green Label #42, showed much more serious checking and cracking than ZZZ-33 and the co-fumed guide samples, but considerably less tendency to erode.

The most interesting results were seen at 12 and 18 months on the Florida tests. The low zinc oxide groups showed heavy mildew, and there was a definite tendency toward less mildew growth with increasing Cl content on the special samples. The series as a whole showed this tendency, roughly speaking, but on the other hand the earliest signs of checking appeared on the St. Joseph samples (including #42). A rather surprising result as this failure progressed (18 months) was a very good showing of #42 and the Cl-treated samples in the Rex 456 group (highest ZnO content at 87%, no lead). At the end of 30 months Florida, however, these samples, with the possible exception of #42, had failed considerably and the co-fumed Rex 471 and Rex 471 guides were the only really satisfactory paints. The best final showing of the St. Joseph materials was in the Rex 456 low zinc content group; in fact, this group turned out to be the best in all-around durability.

0007-SWP-044325

0007-SWP-000113695

Paint Research
July, 1951

-18-

497 - SWP 471

A series of paints were prepared to evaluate the tint retention, gloss retention and durability characteristics of the last three P.C. SWP Tinting White C78 W4 (now Rex 473) revisions. The paints are shaded to Colonial Yellow and Chelsea Gray. Panels are to be exposed at Chicago and Florida.

A series of panels numbered 16014-17 were prepared during the month for exposure at Chicago, Coffeyville and Miami. This is a long range series numbering 160 panels in all for comparisons of lead-in-oil versus SWP two coat and three coat systems. The woods used were cedar and Douglas Fir bevel siding. The panels are prepared in 5 sets of duplicates for each paint so that one pair of each can be retired at the end of each year. In this way we will obtain a valuable set of comparisons of the performance of lead-in-oil versus ready mixed paint at 1, 2, 3, 4 and 5 years for exhibition purposes. They can be used to combat promotion of lead-in-oil.

Panels 10273-5 C were retired recently after 5 years exposure at Chicago, vertical south. These are 8 x 24" white pine boards, primed with Rex 450 Undercoater shaded gray and finished with (a) Rex 471 SWP Gloss White using all 1403 anatase titanium oxide, (b) Rex 471 using 50/50% 1403/1273 rutile and (c) Pittsburgh's 1-54V Titania White. We had available also the results of exposure for shorter periods at Florida and at Chicago on regular cedar siding. The (a) and (b) comparison resulted about as would be expected, the 100% anatase being cleaner and whiter than the blend, but subject to more erosion. The Pittsburgh sample was even cleaner and whiter than (a) throughout the tests, but its durability record was not as good. It showed serious erosion and cracking sooner, and was flaking off very badly as it approached 5 years, although the test board was of slightly better quality than the others.

Exterior Clear Varnishes

Considerable time was devoted to the preparation of clear varnish exposure panels. The varnishes included in this series represent a variety of alkyds, phenolics, ether resin varnishes, silicoated alkyds etc., and some stains. A few extenders and pigments were introduced into a limited number of varnishes to determine whether any benefits will be obtained from the reinforcing action of such solids. Such agents as colloidal hydrated iron, Green Gold, mica, Santocel and colored extenders were introduced for this purpose.

0007-SWP-044326

0007-SWP-000113696

Paint Research
July, 1951

-17-

#97 - Cont.

Panels 12947-53 C were retired at the end of 33 months exposure, vertical south at Chicago. These tests included several types of coatings intended to preserve the natural appearance of cedar siding as well as to protect it from weathering effects. Though rather limited in scope, the materials most commonly used (other than clear varnishes) are tested. The results indicate that these materials, though not subject to the adhesion troubles encountered with clear varnishes, are still far from satisfactory in appearance and protection.

A brief digest of materials and results:

- Bare cedar wood -- Grain-raising and bleaching in 2 or 3 months. Light cracks at 1 year, gradually increasing to serious cracks.
- Crescote Oil -- Good for about 1 year, though spotty in color. After 18 months, increasing grain-raising and wood erosion.
- OJ 104M, OJ 106M and OJ 104MA -- linseed oil plus Macdex Cobalt and copper fungicide, plus Dowicide 6 and without fungicide. Color spottiness rather similar to crescote. After 1 year, none were significantly better than the bare wood in durability.
- Rex 498 SWP Shingle Stein, reduced -- fair up to 1 year, fairly uniform dark color. Cracking and flaking progressed rapidly during second and third year. Final appearance poor, but protection of wood still reasonably good.
- Rex 496 SWP Manor Brown, over Rex 450 Undercoater -- No failure.

0007-SWP-044327

0007-SWP-000113697

Paint Research
June, 1961

-17-

#97 - Cont.

Panels 13553-6 F, C were examined after 24 months' exposure at Florida, vertical south, and 34 months at Chicago, north and south. The tests are essentially a comparison of two paints only, on the same board (cedar bevel siding): Rex 471 SWP Gloss White, regular, made with (2) raw and (810) bodied linseed oils and the same made with Comophor oil raw and bodied. The Comophor oil was reported on from England in the August, 1948 issue of Chemical and Engineering News, and a sample was obtained from Lewis Berger and Sons. The paints were tried over Rex 450 Undercoat White and also shaded gray to emphasize erosion. In the latter case at Florida there is a very slight advantage for the regular, which may be due to slightly greater erosion of the special, but on the white primer panel the special looks fully as good as the regular, with no film failure in any case. The Chicago panels show no differences of any significance. Erosion is still only slight.

0007-SWP-044328

0007-SWP-000113698

Paint Research
June, 1961

-16-

#27 - SWP 471

Two of the cooperative paint exposure series - those with St. Joseph Lead Company and Titanium Pigment Corporation - were finished during the month. The paints for the du Pont cooperative series are all ready and the painting of the panels will begin in July. A general description of the various series was given on pages 16 and 17 of the April report. Tests with the St. Joseph Lead Company were designed to compare their zinc oxides with those manufactured by other producers. The Titanium Pigment Corporation and du Pont series are directed toward comparisons of exposure locations and titanium pigment comparisons. The panel numbers for the St. Joseph series are 15934 - 58 C, K and F and for the TPC series 15935 - 72 CS, CN and F.

Mr. Fasig and Mr. Van Lee made their annual inspection of the du Pont Pigment Division exposures at Wilmington, Delaware and of Titanium Pigment and National Lead (basic silicate exposures only) at Skyville, New York. A report will be prepared and circulated.

Panels 12306-29 F were examined and retired after three years' exposure at Florida, vertical south, cedar bevel siding panels primed with Rex 450 Undercoater. The tests cover styrenated oils used in Rex 471 SWP Gloss White of 7-29-47. The special oils used, mostly from Resin Research, are: (a) 40% with 60% (798) - (5316) soya-CWO (for general comparison), 50/50 linseed/styrene, CWO/soya/styrene, Pentek resin/soya/styrene, glycerol resin/soya/styrene and Isoline/styrene; (b) at 50% with (798) - linseed/styrene, Isoline/linseed/styrene and Dow X 358 linseed/styrene; (c) also a CWO/linseed/styrene at only 25% with (798) and Dow's X 357-40 castor/styrene at 45%.

Since these paints all have at least 50% (798) blown linseed oil in the binder, it is not a particularly harsh test of styrene as such. All Florida tests are satisfactory in both clean-up and durability. We feel that the use of these vehicles could be recommended, although none are noticeably superior to the regular. Minor variations from the average are:

- a. Linseed/(5316) at 60/40%, rather dirty.
- b. RB 6876, a CWO/soya/styrene, definitely clean.
- c. RB 5585, an Isoline/linseed/styrene, definitely clean.
- d. CW (2253), using linseed (44)/styrene, slight checking tendency.

Chicago panels, north and south, are not being retired, but were examined recently at 38 months. The tests in general look good, including many of the self-primed panels. Pentek-soya and glycerol resin-soya samples seem slightly best all around, while CWO-soya and CWO-linseed are very clean, though eroding. Dow's X 357-40 and CW (2253) seem definitely on the poor side, mainly due to erosion.

0007-SWP-044329

0007-SWP-000113699

Paint Research
May, 1961

-18-

#27 - SWP 471

The Plaskon Division of Libbey-Owens-Ford Glass Company submitted two samples of 20% siliconated linseed oil for evaluation. One sample had an R body and the other a W body. The two oils were first compared with linseed oils (510) and (785) for drying characteristics using 20% less drier with the siliconated oils than with (510) and (785). In the initial drying tests, we introduced the same percentage of lead and manganese drier as used in SWP based on the weight of oil. The siliconated oils had a tendency to surface dry and wrinkled badly on drying over night.

Drying of Clear Oil Films
(.005 inch run on Recorder)

	<u>Set-to-touch</u>	<u>Over night</u>
OJ 956 P (510) plus drier	2 hr. 10 min.	Good
OJ 957 P (785) plus drier	6 " 10 "	Good
OJ 958 P 20% Siliconated linseed, body R, plus driers.	2 " 50 "	Good*
OJ 959 P 20% Siliconated linseed, body W, plus driers.	2 " 10 "	Good*

*Badly wrinkled film.

The Resin Research Department prepared a 20% siliconated linseed oil using Plaskon Silicone C and alkali refined linseed (44), submitted as RC 8877. This oil and Plaskon's 20% siliconated linseed, body R, were compared with (510) and (785) as in the above test except that we used only lead tellate drier with the siliconated oils. The object was to eliminate the wrinkling encountered in the initial tests.

With only lead drier present, the siliconated oils did not wrinkle upon drying but the set-to-touch time was extended and the over night drying on RC 8877 was somewhat inferior to the Plaskon 20% siliconated linseed, body R, and (510) which contained both lead and manganese drier.

(Cont.)

0007-SWP-044330

0007-SWP-000113700

Paint Research
May, 1961

-17-

#97 - Cont.

Clear Oil Films

			<u>Drying</u>	
			<u>Set-to-touch</u>	<u>Over Night</u>
OJ 956 P	100 cc (510) 3-3/8 cc (901) 1-1/4 cc (545)		3 hr. 55 min.	Good
OJ 957 P	100 cc (785) 3-3/8 cc (901) 1-1/4 cc (545)		5 " 55 "	Good (-)
OJ 978 P	100 cc RC 8877 3 cc (901)		7 " 10 "	Good (-)
OJ 984 P	100 cc 20% Siliconated linseed, body R 3 cc (901)		8 " 50 "	Good

Three pigmented paints were made and compared for drying based on the following oil and drier combinations:

Pigmented Paint

		<u>Drying</u>	
<u>Oils</u>	<u>Driers</u>	<u>Set-to-touch</u>	<u>Over Night</u>
OJ 979 P (510) (2)	(901) (545)	4 hr. 45 min.	Good
OJ 980 P RC 8877	(901)*	12 " 45 "	Slightly soft
OJ 982 P RC 8877	(901)** (545)**	3 " 50 "	Good

*20% less (901) than 979 P.

**20% less (901) and (545) than in 979 P.

Paints 982 P and 979 P showed about the same drop in gloss after being exposed to ultraviolet light and heat for a period of several hours. Work is being continued on this problem. It is our plan to expose experimental paints made with these oils this spring.

0007-SWP-044331

0007-SWP-000113701

Paint Research
May, 1961

-18-

#97 - Cont.

Panel 15650-4 CS, CN and F were prepared for exposure during the month, the exposures to be south and north vertical at Chicago and south vertical at Miami. The paints are variations of SWP Gloss White to evaluate the durability of two SC₂ bodied soya oils RC 8103 and RC 8104. A small amount of Epon resin was used in RC 8103, but none in RC 8104. Viscosities were Z₂ for RC 8103 and Z₃ for RC 8104. The oils were used in a special SWP formula at 3-1/2 pounds of oil per gallon but RC 8103 was also compared with (510) bodied linseed in regular SWP at four pounds of oil per gallon. The soya paints had good flow, gloss and drying properties but were stickier in brushing.

Panel 11521-9 F, C were examined after 36 months' exposure at Florida, vertical south, and 47 months at Chicago, north and south. These are cedar bevel siding primed with Rex 450 Undercoater, and carrying regular Rex 471 SWP Gloss White of 8-13-46, 100% 1403 anatase titanium oxide, as the guide paint. The following titaniums are compared in this Rex 471 formula:

(a) At 50% with 50% 1403 dry

2173 Ti-Pure R-800
2269 Titanox RA-10-MO
2030 T Titanox AA

(b) At 25% with 75% 1403 dry

2147 Titanox A-24 (semi-nonchalking)
2228 Ti-Pure R-110 (" " ")
2229 Ti-Pure R-510 (" " ")
2174 Ti-Pure R-810 (full non-chalking)

All details of past examinations would be necessary to evaluate this series fully, and to do justice to its value. One of the most general findings has been that these semi- and full non-chalking titanium pigments may be expected to give satisfactory appearance in Rex 471 when blended with at least 50% of 1403 dry. 2030 dry blends look clean and white at all locations, although the blend has not minimized erosion at Chicago (relative to 100% 1403) as much as might be expected from the fact that 2030 is used at 50%. A rather surprising result is with 2174 at Chicago. It looks best of the group at 4 years, largely because of its slow chalking and low erosion, and furthermore a check of all past ratings at Chicago shows that it never was noticeably more dirty than the

0007-SWP-044332

0007-SWP-000113702

Paint Research
May, 1961

-19-

#97 - Cont.

average. 1405/2229 also looks good, although eroding quite seriously. 2173 seems generally poorest, partly because of its record of yellowness, but also largely because of serious film failure, both erosion and cracking. Other blends have been quite consistently alike - slightly less erosion and other film failure than the guide, but having a slight disadvantage due to dirtiness in the earlier stages.

Series 11530-5 and 11742-53 CS, CW were examined after approximately 4 years' exposure at Chicago, vertical north and south, all cedar bevel siding panels. These tests were for the purpose of determining the effect of the detergents listed below on the chalking rate and general self-cleaning properties of Rex 471 SWP Gloss White. The Oil Research Laboratory had suggested that the detergents might be helpful. Series 11530-5 was prepared first, using Rex 471 made with anatase titanium, and the other series was put out later using the same Rex 471 formula, but with 2147 semi-nonchalking and 2174 full nonchalking titaniums substituted to increase inherent dirt collection tendencies. In each case the Rex 450 Undercoater used contained the same amount of detergent as the corresponding top coat. Each panel carried a guide consisting of the corresponding system without detergent.

The detergents used, on a paint weight basis, were:

- 1.0% Tween #81 from Atlas Powder Company.
- 2.0% Triton X-100 from Rohm and Haas Company.
- 2.0% Emulphor DUT, CW (2538) from General Dyestuff.
- 5.0% Zinc oleate from Oil Research (not used in 11530-5 series).
- 8.0% Zinc salt of asaleic acid, same.

These panels were watched quite closely in the early stages, a green blank panel having been placed under each to catch the wash-down of chalk. No appreciable wash-down occurred on any tests. No variations from normal chalking and clean-up were ever noticed, except that the samples using chalk-retardant titaniums chalked more slowly and remained dirty, as would be expected. The only indication that any detergent had any effect was in the case of zinc asaleate. Tests containing this agent became very rough in texture. This was not noticed until after two years. It seems that this might have been due to a slow agglomeration of pigment particles.

0007-SWP-044333

0007-SWP-000113703

Paint Research
April, 1951

-16-

#37 - SWP 471

The 1951 house test program is to be devoted to "problem" exposures, particularly blistering and peeling, dirt collection, etc. Paints to be employed in house tests will include the following systems:

Undercoaters

Rex 450 - Card 34 Standard undercoater.

RB 5272 1/2 zinc oxide - basic silicate white lead - TiO_2 .

RB 5273 Zincless - basic silicate white lead - TiO_2 .

RB 5274 Zincless - basic carbonate white lead - TiO_2 .

- Zincless - basic carbonate white lead - TiO_2
(Varnish vehicle.)

- Zincless - basic carbonate white lead - titanium
calcium. (Varnish vehicle.)

White top coat tests

Rex 471 - Card 49 SWP Gloss White

" " - Card 57 "

" " - Card 64 "

" " - Card 65 "

" " Lowe Brothers pigmentation - SWP Gloss White

TiO_2 blend, anatase - 1405 dry/2030 dry Titanox A/Titanox AA

TiO_2 blend - 82 anatase/18 rutile 1405/2174 Titanox A/Ti Pure R 610

High basicity leaded zinc oxide

Tint tests

Rutile titanium-magnesium silicate

Rutile titanium calcium-magnesium silicate

Rutile titanium-calcium carbonate

High basicity leaded zinc

Cooperative exposure tests have been arranged with the St. Joseph Lead Company, the Titanium Pigment Corporation and the Pigment Division of du Pont. Tests with the St. Joseph Lead Company are directed to evaluate their zinc oxide pigments in comparison with those offered by other producers. Included in the series are these zinc oxide pigments:

0007-SWP-044334

0007-SWP-000113704

Paint Research
April, 1961

-17-

#97 - Cont.

American Zinc Sales Company

Azo ZZZ-55
Azo ZZZ-56

New Jersey Zinc Company

XX-592
XX-50
XX-505

St. Joseph Lead Company

Green Label #17
Green Label #40
Green Label #42

Paints as well as test results are being exchanged.

Tests with Titanium Pigment Corporation and the du Pont Pigment Division are directed to point up differences in test results due to exposure location. A series of white and tint tests is being arranged with each company. In the whites we are studying titanium pigment selection for leadless and lead-containing house paint formulas. The tint tests are being made in both gray and Colonial Yellow shades. These compare pure rutile titanium with rutile titanium calcium pigments, and magnesium silicates with calcium carbonates.

Work continued on the reformulation of SWP Westchester Gray. Two formulations were developed using OKO M 17 and OKO M 37 vacuum bodied linseed oils from Archer-Daniels-Midland Company. Samples of each paint were sent to Cleveland for their inspection and approval. By the use of vacuum bodied oils we were able to decrease the poundage of inert in the regular formula from 380 pounds to 250 and 150 pounds, respectively, depending on the body of the oil used. Panels 15461-71 CS, CN and F were prepared for exposure at Chicago south and north vertical and at Miami south vertical to cover the SWP Westchester Gray formulations devised during this study.

Panels 15568-80 CS, CN and F were also prepared during the month for exposure south and north vertical at Chicago and south vertical at Miami. The tests are of bodied oil replacements for (310) bodied linseed in SWP. The special oils include bodied oils based on the following compositions: a 20% tung oil modified Aliphat 16A-P.E. ester, a 20% tung oil modified Aliphat 16A glyceride, Neofat 19, a 20% tung/80% safflower oil, a straight Aliphat 16A glyceryl ester, a P.E. Aliphat 16A

0007-SWP-044335

0007-SWP-000113705

Paint Research
April, 1951

-18-

#97 - Cont.

ester, propane refined soya oil M 828, Swift's soya, SO₂ catalyzed soya, and two styrenated Dehydrol oils.

Exposure series examined and reported during the month included the following:

1. 12472-87 F, CS and CW. Routine readings noted on corresponding Coffeyville panels, all at two years' exposure. Regular Rex 471 SWP Gloss White, using 100% 1403 anatase titanium dioxide and 100% linseed oil served as the guide and basic formula for the white tests, with a comparable control formula for SWP Tint Base shaded to Colonial Yellow and Slate. One test formula used 19 gallons of (5316), 80/20% soya/chinawood bodied oil, and the other 100% AVM-14 and AVM-15 P.E. Soya Esters, light and bodied. A previous report at one year indicated that the P.E. Soya tests were at least as clean as the regular, while (5316) showed some tendency toward excessive dirt. At two years, in general, all tests are within a satisfactory range in all respects, but P.E. Soya looks consistently better than (5316), and in some cases better than the regular. There is no really serious failure, but in a few cases (5316) shows signs of appreciably more checking than the regular, while all indications on the P.E. soya tests are on the better side. Dirt and color ratings at two years are almost identical for all paints at any given location.
2. 14359-67 F, C. Examined after 12 months' exposure at Florida, vertical south, and at Chicago, north and south. Rex 471 SWP Gloss White using part 2132 dry RC HT titanium calcium, all linseed vehicle, is the guide paint and basic formula. The test paints include:
 - (a) 100% P.E. Soya Ester as bodied oil versus AVM-51, which is the same oil but made with barium instead of sodium catalyst.
 - (b) (48) #1, 80/80/20% linseed/soya/(5017) castor versus (48) #2, in which (5017) is replaced by (2525) heavy Dehydrol, versus CV 49 linseed/soya/chinawood. The first two are repeated, a factory batch of each oil against a laboratory batch.

0007-SWP-044336

0007-SWP-000113706

Paint Research
April, 1951

-18-

#97 - Cont.

Florida panels were recalled because Dr. Sieplein had reported appreciable checking on some tests, but this proved to be extremely slight and the same on guides as on test sections. All Florida tests were normal except that CV 49 and, to a less extent, (48) #2 laboratory batch showed more mildew than their guides. The Chicago tests looked more informative at first glance but it was noted that all cases of serious dirt showed guides which were equally dirty. At 4 months, however, the guide and the P.E. Soya tests were cleaner on the north than the blended oil tests.

0007-SWP-044337

0007-SWP-000113707

Paint Research
March, 1951

-22-

#97 - Cont.

chalking and generally less dirt, but possibly more fading of the tints. The evaluation of the formula changes lead to the following general conclusions:

- (1) No film failure greater than "slight microscopic" checking, very slight cracking and some wrinkling. Film failure is not significant on any whites, but on the tints the catalyst-bodied soya and, to a less extent, SO₂-bodied and soya/chinawood show checking and wrinkling tendencies.
 - (2) Appearance at least satisfactory on all, with the vehicle tests all generally cleaner and better looking than the guide and the whites containing rutile noticeably slow in clean-up.
 - (3) At about one year, the Pittsburgh oil test was rated definitely cleanest of the whites and SO₂-treated soya somewhat dirty, but at two years there is little choice.
 - (4) At one year, Pittsburgh oil in the tints was definitely criticised for fading, with our soya/chinawood only slightly better and SO₂ bodied soya best. At about two years, there is no choice on four out of the six sets of panels, but the remaining two (Chicago, coal weather painting) show the soya/chinawood and Pittsburgh samples as somewhat better in color than our three specially treated soya.
3. 18220-40 P. Examined after two years' exposure at Florida vertical south and at Chicago north and south. The panels are primed with Rex 450 Undermaster of matching shade. The tests involve Rex 471 SWF Gloss White of 4-19-48 and Rex 455 Colonial Yellow of 4-21-48 as guides and basic formulas, using (510) bodied linseed oil. In the test samples, this is replaced by (a) CV 48, 50/50/20% linseed/soya/chinawood oil and (b) (3516), 80/20% soya/chinawood. Previous examination at about one year indicated slightly better gloss retention, but noticeably more dirt with (3516), with CV 48 a little cleaner but not equal to (510). At present, the whites at Florida seem identical and the tints also look almost exactly alike, but the soya samples show a little more free chalk rub-off. At Chicago, the entire series in general is quite satisfactory in appearance, although the soya tests, especially (3516), show a little more dirt than the guides and a little more chalk-mask fading. There seems to have been a slight improvement in the appearance of the (3516) sample relative to the others over the past year.

0007-SWP-044338

0007-SWP-000113708

Paint Research
March, 1951

-21-

#27 + Cont.

3. Dutch Boy Buff tests against SWP show some contradictions in the two series, due both to location and to time of exposure. In a clear majority of cases Dutch Boy shows less fading, but there are definite instances showing the opposite. The trend of film durability favors SWP, but certain cases show no failure on the Dutch Boy where it would be logical to expect some. SWP tint base rates consistently better in clean-up.
2. 12914-29 and 13225-36 F, C were examined after 24 months at Florida, vertical south. The panels are primed with Rex 450 Undercoater of contrasting shade. Corresponding Chicago tests, south and north, were also covered on the basis of readings available at 20 months and 23 months, respectively. These series test the same paints, but the first was painted out in July at temperatures above 85° F., while the latter was done in November at 45 - 60° F. The paints are:
 - (a) Rex 471 SWP Gloss White.
 - (1) Three formulas test pigment changes, all rutile titanium, all anatase and 50/50 rutile anatase.
 - (2) Five vehicle changes in the anatase type,
RB 8474 for (45) linseed - Bis soya, air blown. (Old number, CV-7027).
RB 8471 " " " - SO₂ treated soya. (" " , CV-7028).
RB 8472 " " " - Catalyst bodied soya. (" " , CV-7028).
RB 8473 " " " - 80/20% soya/CWO, bodied. (Old " , CVR-584).
RB 8477 " " " - Pittsburgh's 80-500 soya(" " , CVR-570).
 - (b) Rex 471 SWP Geneva Cream of 7-31-47 is used as a guide and basic formula for tint tests of the above bodied oils, no pigment changes being tried. The report necessarily goes to some length to point out possible differences up to two years which might be the result of the painting conditions or the formula changes. Space does not permit the mention of all such differences here. The effects due to the painting conditions are rather slight and do not seem very significant as yet with regard to durability. The warm weather group shows more free and more uniform

0007-SWP-044339

0007-SWP-000113709

Paint Research
March, 1961

-20-

#97 - Cont.

2. 15461-70 CS, CN, P. The paints cover reformulation of SWP Westchester Gray to improve flow, gloss and uniformity. The formulative changes include variations in type and reduction of amount of extender. 20 dry magnesium silicate is compared with 2504 dry super fine magnesium silicate, 312 dry Nylal 500, 313 dry Sierra Mistron T-076, and 566 dry calcium carbonate. Vehicle changes include introduction of blown linseed oils and/or alkyd. Exposures Chicago south and north vertical and Miami south vertical.
3. 15506-10 CS, CN, P. The paints compare P.E. esters of linseed and soya fatty acids submitted by Resin Research with bodied linseed oil (510) and Dr. Humm's soya ester AV 1101 in Rex 471 SWP Gloss White. Exposures Chicago south and north vertical and Miami south vertical.
4. 15511-25 CS, CN, P. The paints were made at Mr. Holton's suggestion to test vinyl ether plasticisers in SWP, and carry 1/4, 1/2, 1, 2, 4 and 8 gallons polyvinyl methyl ether solution per 100 gallons SWP. The use of two gallons or more of the ether plasticiser solution degraded brushing and flow properties. Exposures Chicago south and north vertical and Miami south vertical.

Exposure series examined during the month include:

1. 11772-86 P, C. Examined after 30 months' exposure at Florida, vertical south, and 34 months at Chicago, south and north. The paints are tested both as two coats self-primed and over special primers (Rex 430 SWP Undercoater except in the case of the Dutch Boy paints, where their #010 primer was used). Regular Rex 471 SWP Gloss White is compared to purchased samples of Dutch Boy #110 White and O'Brien's Thermolized Tung Oil White; also Dutch Boy #124 Buff is compared to SWP Tint Base shaded to match.

A study of this series and another small series testing Dutch Boy paints shows at the present stage some conflicting results, too involved to present here in detail. A few general statements may be made:

1. O'Brien's TTO White is clearly inferior to SWP and Dutch Boy in clean-up and film durability.
2. Dutch Boy #110 White rates from approximately the same as Rex 471 to definitely poorer, depending upon exposure location and time. It shows serious checking and incipient cracking at Florida, whereas Rex 471 shows none. The bulk of the evidence indicates that Rex 471 cleans up better.

0007-SWP-044340

0007-SWP-000113710

Paint Research
March, 1951

-19-

#97 - Cont.

The Linseed Oil Mill has prepared a special (SLO) AV 1187 bodied oil from unrefrigerated and unbleached (44), also a batch of regular (SLO) Lot 551-4 from the same lot of raw oil for our evaluation in SWP. Five gallon samples of each oil were submitted to Paint Research and the Chicago plant ordered a drum of each oil for SWP production. The two samples of special (SLO) were compared in the laboratory for general performance in SWP Gloss White. The sample of AV 1187 was very similar to the (SLO) control Lot 551-4 in all respects, as indicated by the following data:

	Batch OJ 823 P Using Lot 551-4	Batch OJ 824 P Using AV 1187
Brushing	Good	Good
Flow	Good -	Good
Set-to-touch	7 hr. 45 min.	7 hr. 45 min.
Over night	Good	Good
Gloss	Good	Good
Color	Slightly red	Slightly green
Viscosity #3		
Fresh	19.2"	22"
Over night	24.6"	24.4"
10 days	30"	30.2"

Work was continued on the reformulation of Rex 477 SWP Westchester Gray to obtain a higher and more uniform gloss as well as better tint retention on exposure. We have encountered some difficulty with our suggested revision 804 P formulated with part blown and part heat bodied linseed for the bodied oil portion of the vehicle. Laboratory batches as well as plant production made with (213) blown linseed shows rather bad flooding and streaking. This condition was not observed when all of the bodied oil is introduced as heat bodied linseed. Work is being continued on this problem.

Panels prepared for exposure include the following:

1. 15437-41 CS, CS, F. The paints compare Eagle-Picher's #416 zinc oxide with other zinc oxides such as 2295 dry Iso 222-55, 2059 dry New Jersey Zinc XI 503 and 1707 dry New Jersey XI 50 oxide in Rex 436 SWP Fume Resisting White. Exposures Chicago south and north vertical and Miami south vertical.

0007-SWP-044341

0007-SWP-000113711

Paint Research
March, 1951

-18-

#97 - SWP 471

The Vegetable Products Research Laboratory submitted a gallon of linseed oil AVN-65, produced by the mixed solvent extraction method, for test in SWP. The solvent extracted oil was compared with regular stock (2) raw linseed oil.

	<u>AVN-65</u>	<u>(2) From Stock</u>
Iodine No.	191.5	185.6
Heated Oil Foots	1.2	0.85
Acid No.	1.0	2.2
Color	11.0	11.0
Moisture	0.16	0.01

Test batches of SWP made with each oil were compared for brushing, flow, drying, etc. The solvent extracted oil AVN-65 was found to be similar to regular (2) in brushing, flow, and slightly better in drying characteristics. The improved drying is apparently due to the higher iodine value of the oil. However, the paint made with AVN-65 had a characteristic solvent odor that could not be detected in the regular sample. The slightly higher amount of oil foots had no apparent effect on gloss or drying properties.

Experimental Batches Rex 471

	<u>OJ 828 P</u> <u>Using AVN-65</u>	<u>OJ 829 P</u> <u>(2) From Stock</u>
Brushing	Good	Good
Flow	Good (-)	Good (-)
Set-to-touch	6 hr. 48 min.	7 hr. 55 min.
Over night dry	O.K.	O.K.
Gloss	Good	Good
Odor	Slightly more odor than 829 P.	Characteristic

The paints will be exposed at Chicago and Florida.

0007-SWP-044342

0007-SWP-000113712

Paint Research
February, 1951

-20-

#97 - SWP 471

The suspension effects of a number of agents in SWP 450 Undercoater and SWP Gloss White - Rex 471 were checked after a year's storage in one gallon containers. A penetrometer was improvised by equipping the shaft of the Gardner Mobilometer with a suitable guide and bracket supporting it in a vertical position above the paint container. The shaft was loaded with a 100 gram weight and allowed to fall freely from a point five inches above the paint. The time required for the shaft to come to rest in the settled paste or on the bottom indicated the amount of settling in each sample from extent of separation between the point of rest and the bottom.

The SWP Undercoater - Rex 450 samples were made in accordance with Formula Card #51. One series contained (324) heat bodied linseed as a bodying agent and a parallel series carried no (324). The series containing (324) exhibited increased thixotropy. The paints in this group consistently offered more resistance to penetration using the instrument than their parallels in the (324)-free series, but the settled pastes were not firmer on the usual knife test. Batches containing 1/2% water by volume settled to firm, tough cakes showing considerable agglomeration. They could not be re-dispersed satisfactorily by stirring. The combination of 3 pounds aluminum stearate - 547 dry and 3 pounds lecithin - (5094) looked best from the standpoints of thixotropy and softness of settled cake. 5 pounds of calcium stearate - 1826 dry was a close second from the standpoint of settled cake characteristics, and it responded best on the basis of re-dispersibility by simple stirring.

SWP Gloss White - Rex 471 studies included the same variations of suspending agents in the presence and absence of (324). The tendency for (324) to promote thixotropy was not as evident in this formulation, but the performance of the suspension aids followed the same pattern as that described for Rex 450.

The combination of lecithin with aluminum stearate produces a greater suspension effect than either one of these agents alone. This effect is being investigated with calcium as well as aluminum stearate and is being tested in a broader range of pigment and vehicle combinations.

A series of 2-1/2" x 6" wood panels has been prepared to study the effects of treatments with silicone type water-proofing compounds upon the adhesion and general durability of conventional paint systems. Preparations containing silicones GE 81145, GE 81091, GE 9980, Dow-Corning's XR 129 A, and a commercial product, "Stopall" are being compared in this test. None of the silicones show adverse effects upon the adhesion of Save-Lite Undercoater - Rex 24129 and Enameloid White -

0007-SWP-044343

0007-SWP-000113713

Paint Research
February, 1951

-21-

#97 - Cont.

Rex 710 coating systems. A series of Rex 450 and Rex 471 coating systems is being exposed in the Weather-Ometer. These are showing no significant differences between coatings applied over silicone water-proofing compositions or on bare wood after 455 hours of exposure.

A revision of Rex 471 - SWP Gloss White has been suggested in which the TiO₂ portion has been altered on an opacity equivalence basis. Rex 471 Card 64 carries 150 pounds 1405 dry anatase titanium dioxide and 75 pounds 2132 dry Titanox RC HT. The revision which is proposed would carry 100 pounds 1405 dry and 160 pounds 2132 dry. On both draw-down and paint-out comparisons opacity is equal on the two pigmentations.

A cooperative exposure series has been arranged with the St. Joseph Lead Company to evaluate the zinc oxides which they offer for exterior use. Pigments of other producers will be used as reference standards. The following zinc pigments will be compared.

St. Joseph Lead Company

Green Label Zinc Oxide	#17
" " " "	#40
" " " "	#42

New Jersey Zinc Company

Horse Head Zinc Oxide	XX 592
" " " "	XX 50
" " " "	XX 503

American Zinc Sales Company

Azo Zinc Oxide	ZZZ-33
" " " "	ZZZ-55

Comparisons will be made in both a lead-free formula, Rex 436 - SWP Fume Resisting White, and in a lead-containing formulation, Rex 471 - SWP Gloss White.

Work has continued on the reformulation of SWP Westchester Gray - Rex 477 to secure better uniformity of gloss, less flashing and improved tint retention on exposure. We have had fair success in obtaining the characteristics desired by the use of a few gallons of blown linseed oil and the replacement of magnesium silicate 20 dry with a high consistency type magnesium silicate 2304 dry. If 2304 dry is not avail-

0007-SWP-044344

0007-SWP-000113714

Paint Research
February, 1961

-22-

#97 - Cont.

able at all plants, 515 dry Sierra Mistron Talc could be used as an alternate. A factory batch of Westchester Gray will be made on the proposed formula QJ 804 P and quart samples of the new production will be sent to Cleveland for their inspection. The new formula is approximately 8-1/4¢ higher in cost than the regular Rex 477. Work will continue in a search for further improvement.

Panels prepared for exposure during the month include the following:

- (1) 15410-21 CS, CN. To study the Durez liquid resins 50800 and 14994 as replacements for 5 and 10% of the oil in Rex 471 SWP Gloss White and Rex 54 Commonwealth Barn Red. The thought was that these resins might help speed up drying to combat flatting due to fogs such as are encountered on the west coast. We were not impressed by the resins or their performance.
- (2) 15422-4 CS, CN and F. Studying use of Resin Research RC 7482 and RC 7483 which are dispersions of Dow Latex 744 (high vinyl chloride-vinylidene chloride polymer) in air blown linseed as replacements for the heat bodied linseed in SWP. The paints were low in gloss and slow in drying. The paint made using RC 7483 showed definite incompatibility and therefore was not used in the final exposures.

Reports of examinations of panels on exposure included the following:

- (1) Panels 7055-61 F, C, exposed 4 years at Florida and 57 months at Chicago, vertical south. The paints include Rex 471 - SWP Gloss White of 10-13-42, pre-war vehicle, with all TiO₂ as R-200 rutile TiO₂ as the basic formula, six batches of varying PVC's. The variation was accomplished by holding the pigmentation constant and changing the relative amounts of (2) raw linseed oil and (48), then bodied linseed. The formulas vary from 50% PVC, using largely (2) and only a small amount of (48) through 32, 34, 36, and 40% PVC's to 45% PVC, which carries only (48) in the binder.

Florida tests were very consistent in showing uniformly good durability on all paints for 2 years, slight failure on the higher PVC's at 3 years and a marked difference favoring the medium PVC's (34 and 36%) at 4 years. The record on dirt and clean-up also favored the medium PVC's. In the Chicago group

0007-SWP-044345

0007-SWP-000113715

Paint Research
February, 1961

-23-

#97 - Cont.

there seemed to be little or no choice according to PVC. While the series is too limited to cover the whole subject of PVC levels, it is interesting that paints of such a wide range of PVC's did actually perform satisfactorily for about 3 years at each location. The most important factor appears to be the selection of bodied oils and their proportions in the total binder.

- (2) Panels 10058-60 C. Examined after 41 months' exposure at Chicago, vertical south. Rex 471 SWP Gloss White, bodied oil type using 50/50 rutile/anatase titanium, was the control formula, and the tests were the same except for the substitution of CVR-189 and CVR-240 for (48), then bodied linseed oil. These oils are Driscoy "A" and Driscoy "B" respectively, bodied by us. The original paints were rated as very closely alike except for a slight yellowness of the specials. Chicago exposures for a considerable time showed a slight preference for the Driscoy samples as to whiteness, with "A" slightly cleanest. At the end of 41 months, however, there was no choice. All were clean and good except for moderate erosion. The Florida results cannot be presented fully because the panels were lost. Routine reports up to 24 months indicated that (a) Driscoy "B" was inclined to hold more dirt than "A" or (48), and (b) Driscoy "A" started to show microscopic film failure slightly earliest of the three.
- (3) Panels 10997-11004 C. Examined after 4 years' exposure at Chicago, vertical north and south, and reported with the corresponding Florida panels (south only) which had been retired at 3 years. Regular Rex 471 SWP Gloss White of 6-15-46 as guide was compared with Titanium Pigment Corporation's Ex-4508 low PVC lined oil vehicle house paint, made with liquids prepared by us, as follows:

CVR 599-1 Lined linseed, low acid value, low in body. Using (44).

CVR 600 Very similar, but both A. V. and body increased.

CVR 602 Made from (320) and (44). Close to T.P.C. specifications.

These oils used at 44 gallons with 21 gallons of (44), plus, in each case, 11 gallons of CVR 572, a linseed oil treated with MgO. All paints were tested both over Rex 450 Undercoater and as two coats self-primed.

0007-SWP-044346

0007-SWP-000113716

Paint Research
February, 1951

-24-

#97 - Cont.

There have been minor variations possibly due to differences in the above oils, but the essential fact is that all of the special paints failed very badly by erosion at Chicago, and showed considerable to bad checking and cracking at Florida, whereas all guides were relatively good. The contrast between Rex 450-primed and self-primed tests at Chicago was very striking, the Rex 450 remaining in good condition after the eroding away of the entire top coat, while the self-primed test areas were practically down to the bare wood. There were indications that CVR 599-1 was slightly more durable than the other special oils.

- (4) Panels 11116-22 F, C. Examined after 5 years' exposure vertical south in Florida and south and north vertical in Chicago. A comparison of linseed and soya oils in SWP Gloss White. The regular linseed SWP formulas include those of pre-war 4-8-42 and 10-13-42 and the bodied linseed formula of 6-13-46. One soya oil formula uses (1273) alkali refined soya for the unbodied portion of the binder and EV-7027 bis-bodied soya for the bodied oil portion. The second soya oil formula is based on unbodied and bodied Pittsburgh 80-500 Selected Soya, also plus doubled manganese drier and 0.02% cobalt.

The interest was primarily in dirt collection. At three years all the test paints are alike in clean-up, although earlier reports indicated somewhat greater dirt collection on the soya paints in Chicago, with no differences in Florida. The pre-war high oil formulas show serious checking and cracking in Florida, but the film condition of the other paints is good enough to warrant further exposure.

- (5) Panels 13154-45 F, FY were examined after 24 months' exposure at Florida, vertical south, with supplementary examination of Chicago tests at 22 months. These consist of cedar and yellow pine bevel siding, testing the following 2- and 3-coat systems, the Rex 471 SWP Gloss White being a regular formula using all 1405 dry anatase titanium and 100% linseed vehicle:

Rex 450 Undercoater - Rex 471	Rex 471 - 471 - 471
2 coats Rex 471	50-gal. Al - 450 - 471
Aluminum Primer, 50-gal. length-Rex 471	50-gal. Al - 471 - 471
Rex 23015 Al Primer, 13-gal. " -Rex 471	13-gal. Al - 450 - 471
Rex 450 - 450 - 471	13-gal. Al - 471 - 471
Rex 450 - 471 - 471	

0007-SWP-044347

0007-SWP-000113717

Paint Research
February, 1961

-25-

#97 - Cont.

Most of the panels, including those self-primed, are showing very little failure at either location. In this set self-priming is apparently equal to special priming up to two years. The only serious failure at Florida is on yellow pine, and is generally on both guide and test. The two-coat job using the 15-gallon aluminum primer might be called slightly inferior at Florida, and is the only one definitely inferior on Chicago exposure. Both 2-coat jobs using aluminum primer are developing appreciable "show-through" at Chicago. All tests continue on exposure.

- (6) Panels 15185-86 F, C were examined after 24 months' exposure at Florida, vertical south, and 21 months at Chicago, north and south. Regular Rex 471 SWP Gloss White using 20 F magnesium silicate is compared with CW 2879 micronized 20 F and with Nylal 500. Neither location showed any differences, except a very slight preference for Nylal on one of two tests. Likewise, no differences showed up between the two grades of 20 F in Rex 459 Barkely Yellow, no test of Nylal being involved. Supplementary tests based on factory-made pastes reduced and studied in the laboratory covered 20 F, Nylal 500 and a 2201 Atomite-2205 Carbola Talc blend in Rex 471 and Rex 475 Colonial Yellow. The Colonial Yellow group came up with the only obvious variation from normal in the entire series, namely excessive dirt and fading with Nylal 500. However, this may have been largely due to the fact that the sample used in this tint was specified as "off-color" and may have been below standard in other respects also.

0007-SWP-044348

0007-SWP-000113718

Paint Research
January, 1951

-15-

#97 - SWP 471

Some work was done on the reformulation of SWP Westchester Gray. An effort was made to reduce the percentage of inert and improve the uniformity and degree of gloss. The inert was reduced from 400 to 300 pounds by the use of two high consistency magnesium silicates, 313 dry and 2304 dry. Small amounts of Rheotol (R. T. Vanderbilt Co.) and blown linseed oil (798) are being used to improve the flow and gloss. Work continues.

A few tests were run on LW 1 - W 5, Oakland's 50% Reduction Paste Paint, SWP, and Exterior Semi-Paste C 78 W 9 to determine the water-spotting tendencies of each formulation. LW 1 - W 5 was reduced 50% with boiled linseed oil and the Exterior Semi-Paste C 78 W 9 was reduced with three quarts of raw linseed oil per gallon, while SWP was applied full body. 16 panels were painted with each product and at one hour intervals one paint-out of each product was exposed to a fine spray of water for a few seconds. The panels were then placed in a 95% humidity chamber for 30 minutes. They were then removed and allowed to dry. At the end of the test the panels were inspected for gloss, water spots or pitting of the film.

When the paint films are still wet (i.e., not set-to-touch) the water droplets mar the surface but the paints finally dry with good gloss except for the pits in the surface. The films seem to be especially vulnerable to moisture at about the set-to-touch time. As such films continue to dry they show fine surface wrinkling and flatting. After the films have set to touch they are less vulnerable to moisture and dry to good gloss. Therefore, house paints applied where there are heavy dews or fogs (as in the Bay area) are susceptible to flatting when subjected to condensation at about the time the film starts to set.

Water Spot- ting Tests	OJ 688 F LW1-W5 50% Red. Paste	OJ 691 P SWP Gloss White - Card 62	OJ 692 P Ext. Semi-Paste Paint C78 W9
0 hr.	Deeply pitted	Deeply pitted	Deeply pitted
1 hr.	"	"	"
2 hr.	"	"	"
3 hr.	"	"	Pitted
4 hr.	"	"	"
5 hr.	"	"	"

0007-SWP-044349

0007-SWP-000113719

Paint Research
January, 1951

-14-

#97 - Cont.

Water Spot- ting Tests	OJ 688 P LW1-W5 50% Red, Paste	OJ 691 P SWP Gloss White - Card 62	OJ 692 P Ext. Semi-Paste Paint C78 W9
6 hr.	Pitted	Pitted	Pitted
7 hr.	"	Bad surface pitting.	Bad surface pitting; slightly flat.
8 hr.	Bad surface pitting; slightly flat.	Bad surface pitting; slightly flat.	Bad* surface pitting; def. flat.
9 hr.	Bad* surface pitting; slightly flat.	Slight* surface pitting; definitely flat.	Definite surface pitting; very slightly flat.
10 hr.	Bad* surface pitting; slightly flat.	Slight* surface pitting; definitely flat.	"
11 hr.	Trace surface pitting.	Slight surface pitting.	O.K.
12 hr.	O.K.	O.K.	O.K.
13 to 15 hr.	O.K.	O.K.	O.K.

*Set-to-touch time - approx.

The Resin Research Department submitted two SO₂ blown linseed oils to be evaluated for durability in SWP.

RC 8103 - SO₂ blown soya - Epon 1004
Body - Z₅ Solids - 100%

RC 8104 - SO₂ blown soya
Body - Z₃ Solids - 100%

0007-SWP-044350

0007-SWP-000113720

Paint Research
January, 1951

-15-

#97 - Cont.

SWP Gloss Whites were made using 19 gallons of RC 8103 or RC 8104 in place of bodied linseed in two formulations based on 3-1/2 and 4 pounds of oil per gallon. Paints made with these oils are somewhat sticky in brushing but good in flow, gloss and drying properties. Exposure tests will be made at Chicago and Florida.

The Laminar Calcium Corporation has submitted a sample of Laminar (Ground Oyster Shells) for test in exterior paints. Laminar is similar to mica in particle shape. It was compared with 2507 dry (mica D. G.) as 7% of the pigment in SWP. The paints will be exposed at Chicago north and south and Florida south only.

Chemical Analysis of Laminar

CaCO ₃	98.40%
MgCO ₃	0.50
Al ₂ O ₃	0.10
SiO ₂	0.20
Fe ₂ O ₃	0.05
Mn*	0.025
Organic as CO ₂	0.40
Moisture	0.20

*Largely MnCO₃

The following groups of house paint panels were prepared for exposure:

1. 15262-79 CS, CN and F. Special SWP Gloss Whites with 40% of the oil as bodied safflower oils, also 100% safflower.

2. 15280-91 CS, CN and F. Supplements series 15262-79. Includes Rex 471 SWP White and variations, Rex 465 Colonial Yellow and variations, and Rex 477 SWP Westchester Gray and variations. Safflower oil at 40% and 100% of oil. Since the experimental paints were somewhat short in flow, Rheotol was added to certain samples to improve flow, using about 5/8 gallon per hundred gallons of paint. A factory batch of Rex 471 with 25% safflower oil was included in the series.

3. 15318-21 CS, CN, F and K. Testing Persolite 4-PVR, an expanded Perlite similar to 1-PVR, in SWP White and Colonial Yellow. Substituted for 20 dry magnesium silicate at both equal volume and equal weight.

0007-SWP-044351

0007-SWP-000113721

Paint Research
January, 1961

-16-

#97 - Cont.

The following series of house paint exposures were examined during the month, with results summarized:

1. Panels 11319-47 C and 11319-51 F were examined after 44 months' exposure at Chicago, north and south, and 56 months at Florida, south only. All are cedar bevel siding panels, and all those which were exposed at both Chicago and Florida (11319-11351) are 2-coats self-primed. The tests were planned in 1946 to cover the formulas which National Lead Company seemed most likely to use in their proposed ready-mixed white house paint. The working formula was based on 20% each of zinc oxide, basic sulfate white lead, basic carbonate white lead, anatase titanium and magnesium silicate. Four separate lead-zinc combinations were tried both at 30% and 34% PVC. National's acicular basic sulfate with (1) National's HTS and XX-505 zinc oxide, (2) HTS and ZZZ-33, (3) National's #111 and ZZZ-33 and (4) 9 dry BSWL with HTS and ZZZ-33. In addition, a formula using 412 co-fumed leaded zinc was made up on the same basis with HTS as supplementary lead. Rex 471 SWP Gloss White of 9/45, using all 1403 anatase titanium was used as the guide, and other formulas put in for comparison purposes were: (1) same as guide but 50/50% 1403/2173 rutile and (b) pre-war Rex 471, all rutile titanium, "high oil" vehicle. The vehicles of all except the last named were as that of the guide, all linseed 60/40 type. The 30% PVC samples of the five "National Lead formulas" were repeated as Chicago tests only over Rex 450 Undercoater and over the MW-401 type zincless primer.

The results were very informative, but too complex to present here in detail. The full report is not being generally distributed, but a limited number of copies are available on request. In general, there is a clear trend at all locations in favor of the regular Rex 471 and the other co-fumed leaded zinc samples, both for durability and appearance. It seems quite clear that the 20% of titanium in the high lead-low zinc mechanical mix formulas does not do the job of clean-up that is done by about 15% in regular Rex 471. It is apparent that National does not get, as they claimed, sufficient activity from the BCWL-BSWL blend to augment the low zinc oxide activity. There are striking differences in appearance in the comparisons of 1403 and 2173 titanium oxides, the latter being dirtier and yellower in cast. The superior film integrity of the co-fumed formulations is apparent both under the Chicago conditions of heavy erosion and the Florida conditions promoting checking and cracking. None of the four lead-zinc blends stands out as either good or bad. There is some evidence favoring the 34% PVC.

0007-SWP-044352

0007-SWP-000113722

Paint Research
January, 1951

-17-

#97 - Cont.

2. Exposures 11945-8 F, C were examined after 30 months' exposure at three locations, Chicago vertical north and south and Florida south. The tests were for the purpose of comparing Rex 471 SWP Gloss White with du Pont's #40 Outside White, on cedar bevel siding panels. The Rex 471, regular of July, 1947, was applied over Rex 450 SWP Undercoater, as was one sample of du Pont's. The latter was also tested as two coats self-primed, (a) with the first coat reduced 1:4 with linseed oil, and (b) both coats full body. The panels from all locations were in almost complete agreement as to trends. The du Pont samples showed the least erosion, but no less of other film failures than the SWP. The Rex 471 looked better, however, because of less dirt and less yellow cast. The du Pont material was believed to carry R-200 rutile titanium oxide, which might account for both the good durability and the relatively poor appearance.

3. Panels 12592-410 C, F were examined after 26 months' exposure at Chicago and 24 months in Florida. Both Rex 450 SWP Undercoater and Rex 471 SWP Gloss White were varied, comparing 1403 dry free chalking anatase TiO_2 with CW 2494, the early production of Calco's Gloucester anatase TiO_2 . CW 2494 in general performed satisfactorily. In special variations du Pont's LW TiO_2 was somewhat dirtier, 2173 TiO_2 also dirtier but slightly more durable, and soya vehicle gave slightly better gloss retention and slightly more dirt collection.

4. Panels 13148-9 F, C were examined after 24 months at Florida, vertical south, and 20 months at Chicago, north and south, cedar bevel siding primed with Rex 450 Undercoater. The tests are as follows:

- OJ 59 M - Regular SWP Tint Base (Cream), co-fumed leaded zinc with supplementary 18 dry BCWL. All linseed vehicle. Shaded with HF 10, HF 20, BO 30.
- OJ 60 M - Same, but 2295 dry ZZZ-33 zinc oxide, 9 dry BSWL, and 18 dry, BCWL as a mechanically blended lead-zinc.
- OJ 61 M - Dutch Boy #124 (National Lead Co.) pigmentation, but same vehicle. Extender and 2174 TiO_2 similar to preceding, but 2295 slightly lower and high in 18 dry as the only lead pigment.

0007-SWP-044353

0007-SWP-000113723

Paint Research
January, 1951

-18-

#97 - Cont.

Florida and Chicago results conflict seriously at this stage. The Florida panels show considerable checking, cracking and mildew and the regular is considerably better than the mechanical-mix specials. However, there is no choice as to fading, and apparently has not been in the past. Chicago panels, on the other hand, show no failure, but much more fading and dirt on the specials, especially the Dutch Boy type, than on the regular. This was not true at one year, however; in fact, the Dutch Boy formula was slightly cleanest and least faded. We feel that part of the explanation lies in the fact that the chalking on this formula went from practically none at one year to a quite heavy but apparently tightly adherent chalk at 20 months. Since the purpose of the test was to seek an explanation of unusually good tint-retention with a Dutch Boy sample in a previous exposure series, this group will be watched closely at both locations in the future.

5. Exposures 15150-2 F, C, testing hexane-extracted linseed oil from the S-W Oil Mill against regular (2) raw linseed oil in Rex 471 SWP Gloss White of early 1948, were examined after 24 months' exposure at Florida, vertical south and 21 months at Chicago, north and south. Both sets of tests, on cedar bevel siding panels using Rex 450 Undercoater, showed the two oils as essentially equivalent in performance through the period which usually shows greatest dirt-collection, loss of gloss and development of chalk. No film failure occurred at either location. Florida tests indicated a possibility of slightly greater dirt collection on the special at about 6 to 12 months, and Chicago tests indicated slightly slower chalking, but neither trend has had any significant results so far.

Note:

We are attaching a planographed copy of the illustration of "SWP - Spreading Rates and Durability" which was distributed at the Trade Sales Technical Board Meeting of November 1-2, 1950. We have a certain number of extra copies, which are available on request. Approximately 1400 copies are being distributed to the S-W branch managers, city salesmen, and Trade Sales representatives.

0007-SWP-044354

0007-SWP-000113724