Project #177 - Pigment Studies

Exposure series 27070-82 F was examined after 12 months at Florida, vertical south. These are cedar bevel siding panels primed with A2 W 2 SWP Undercoater. Production control samples of RANC titanium dioxide from Titanium Pigment Corporation are compared in a modified A2 W 8 SWP Trim and Tinting White, the guide or control sample of which uses 180 pounds per 100 gallons of 6630 dry rutile non-chalking titanium oxide. All paints are shaded light green with phthalocyanine and ferrite bases.

Results at Florida lend themselves quite readily at present to simple groupings:

a. The control formula shows normal or satisfactory color retention, very little chalk and normal dirt, would be rated very good in general appearance except for a moderate amount of mold growth. Test samples corresponding very closely to the control are:

D57A1 #4 D57A8 #4

D57C16 #4A D57C18 #4

b. Noticeably more faded, but not more chalky nor more subject to dirt and mold: D57E15 #4, D57A31 #3A, D57C17 #3, and probably D57C17 #4, although it shows a trifle more dirt.

c. D57A12 #6A, though differing in no other way from those in group (a), looks slightly best of the series because of having the least mold growth.

d. D57A29 #5, though it has the same light mold growth as (c) rates as one of the poorest in general appearance because of greatest fading. Also, it is the only one to show more than very slight chalk rub-off.

A recent examination of parallel Chicago exposures at 14 months show no outstanding variations from the above, but differences are smaller. Actually, D57C17 #4 is the only lot showing noticeably more fading than normal. D57C18 #4 and D57A1 #4 are the only ones to show a slight superiority in this respect.

0007-SWP-000114133

Project #177 - Cont.

The same ten lots of RANC were exposed in an M20 J automotive enamel, baking type. Duplicate exposures, 26326-78, were made on metal in white enamels and in blue tints of these enamels. After 12 months' exposure in Florida and Chicago no significant differences in performance between the ten lots could be observed. These panels have been returned for further weathering.

The house paint series included a sample of Japanese titanium oxide from the Sao Paulo plant. This was one of the fastest chalking TiO_2's in a light tint we have ever seen. Even considering that it obviously is an anatase type some caution in its use is indicated.

Series 28725-48 C, F was prepared for exposure to test the color stability of a group of yellow pigments in PVAc paints based on National Starch's 12 K 51. They include a purified form of Merck's DNC dinitro carbanilide in both yellow and Verdas Green; three types of Hansa yellow supplied by the Dry Color Department; du Pont Dalamar Yellow and equivalents from Dry Color in pulp and dry form; 80 A 14 Sun Yellow straight and in blends; Luco-Tex Canton Yellow, regular and experimental formulas, and Murolite PVAc yellows.

0007-SWP-000114134

Project #177 - Pigment Studies

Exposure series 24054-24107 C, F was studied recently after 24 months at Florida, vertical south, and the same at Chicago. Its supplement, 24284-99 C, F was also covered, exposure conditions essentially the same. Our monthly report of December, 1957, presented a one year progress report on these tests. All panels are cedar bevel siding primed with A2 W 2 SWP Undercoater. The main purpose is to evaluate several titanium dioxides for tint retention. Intermix Low PVC and A2 W 8 SWP Trim and Tinting White are the basic formulas involved. Both are shaded light blue with phthalocyanine and, on account of the interest in chalking and clean-up, the same paints are also tested as white.

The following summary classifies the titanium pigments on the basis of the most important results to date. Again, mold growth is not a problem at either location, but results on dirt collection show up in many cases as considerably more interesting than at one year.

Group 1. Good tint retention.

Unitane OR-640 and R 610 (as before, relatively). Normal chalking, not particularly clean, but essentially as clean as any in the series.

Group 2. Poor tint retention.

(a) As before, Unitane OR 540, Ti-Pure R 510 sulfate process, Titanox RC, Ti-Cal R-27 (poorest, very yellow face), Titanox RCHT.

(b) Down-graded from Group 4 formerly, Ti-Cal R 60 now seems very poor.

Group 3. Near normal, upper range, probably satisfactory. Titanox RANC and RA 50; not equivalent as before, but with the former showing a rather definite edge and RA 50 almost dropping to Group 4.

Group 4. Somewhat below normal, probably unsatisfactory. Ti-Pure R 510 chloride process (now R-500) and R 110 Z (now R 100) as before, relatively good in Intermix but poor in A2 W 8.

0007-SWP-000114135

Project #177 - Cont.

Supplementary Group

du Pont's special samples „958 B and SR-40-1, variations of R 610, were previously rated in Groups 2 and 4. Since these are in a separate exposure series, with a guide containing OR 640, and since the two year results look relatively better, these deserve a reconsideration. Both now seem at least equal to the guide in color retention, and are normal in chalking and clean-up.

Generally speaking, the samples poorest in fading are holding the most dirt on the whites. This dirt on the tints, plus adherent chalk makes an unsightly mask. The only apparent exception is RA 50, which is on the poor side for tint retention but cleaning up well.

Two related series of exposures, numbered 27242-50 and 27284-27307 F, C were studied recently after one year at Florida and at Chicago, vertical south. All are cedar bevel siding primed with A2 W 2 SWP Undercoater. The purpose is to evaluate three Monastral Red pigments from du Pont for which unusual permanence has been claimed, namely Red B, Red Y and Violet R.

The 27284 series covers the trial of these pigments in A2 W 8 SWP Tinting White and in Intermix Low PVC. Further, each formula tests the colors in a light and dark tint approximating the shades of 6 and 22 grams of Kem Tinting Color Red Oxide per pint of paint, respectively. This color, representing a stable red for practical use, serves as the control. Besides the three du Pont materials, toluidine is also included as an example known to be fugitive in tints.

The Florida tests in the Intermix tints show serious mold growth, but for purposes of a one year progress report, it is felt that color retention only should be considered. In this the Florida and Chicago panels agree well, with one exception. Red oxide looks very good. du Pont Red Y looks equally good; in fact, in A2 W 8, in which chalking is a factor, it looks better in most cases. du Pont Red B is a little more faded than either of these. A few cases show it nearly equal. Toluidine, as expected, shows extreme fading. Violet R is the exception mentioned above; Chicago panels show it consistently on a par with Red B, which is rather good for a violet shade, but Florida panels show it definitely more faded.

0007-SWP-000114136

Project #177 - Cont.

Series 27242-50 covers similar comparisons in latex house paint, in this case PVA Flexbond 800, two coats over oil primer. The two levels of color are one and four ounces per gallon on the Kem Tinting Color basis. Though not chalking, these tests are all clean and bright, and the ratings at the two locations agree well. Except for toluidine, it is difficult to choose between any pair of paints, since none show more than "8" fading. Red B and Violet R tend to show slightly more fading than Red Y or red oxide. It should be mentioned that the mere estimate of fading or loss of color tells only part of the story. These pigments, though in some cases more susceptible to fading than red oxide, are of great interest because of their brightness and eye-appeal, as against the dull salmon color of red oxide.

Panels 28629-56 C were prepared for exposure at Chicago only, vertical south, all cedar bevel siding primed with A2 W 2 SWP Undercoater shaded blue. These are a part of a study which includes PVA latex paints and non-oxidizing automotive enamel. The purpose is to evaluate certain titanium dioxides for chalking, fading and durability, as has been done over the past two years or so with a long list of TiO_2 pigments. The ones covered by this series are Calco's OR 640 and OR 540, five lots of each having been submitted to check for uniformity of production. The OR 540 samples are compared against a guide paint using Ti-Pure R 510 and the OR 640 samples against New Jersey Zinc's R 760. All are incorporated in two formulas: regular A2 W 8 SWP Trim and Tinting White and Intermix Low PVC, both being shaded light blue.

0007-SWP-000114137

H. VAN LOO
Cont.

#103 - Cont.

	Type of Primer	Rust on Stripped Surface
52-MC-22	Regular	B (lower 1/4)
52-MC-22	25% Zinc Chromate replaced with Micalith-G.	B (lower 1/5)
52-MC-22	50% Zinc Chromate replaced with Micalith-G.	B (lower 1/6)
52-MC-22	66-2/3% Zinc Chromate replaced with Micalith-G.	B (lower 1/10)
52-MC-23	Regular	S
52-MC-23	25% red lead replaced with Micalith-G.	VS
52-MC-22	Regular	(C)
52-MC-22	25% Zinc Chromate replaced with Micalith-G.	C
52-MC-22	50% "	C
52-MC-25	Regular	(B)
52-MC-25	25% red lead replaced with Micalith-G.	C

In this connection, it may be of interest to report that General Mining Associates, of Baltimore, have taken over the production and distribution of Micalith-G from the Chemical and Pigment Division of the Glidden Company.

#177 - Pigment Studies

Work continued on the preparation of graphs for the opacity bulletin, which should be completed for circulation during the current month.

0007-SWP-044768

0007-SWP-000114138

M. VAN LOO
Cont.

#177 - Cont.

Oil Absorption Studies

In cooperation with the program of test standardization being undertaken by A.S.T.M. we have reported in detail the oil absorption test method being used in our organization. In addition we commented as follows regarding the test, incorporating ideas contributed by the Auxiliaries Research Laboratory and the White Lead Department:

1. Atmospheric Conditions

We do not have available positive evidence to demonstrate the importance of constant humidity and temperature conditions but we do know that as the humidity varies so do oil absorption values. We have tried oven drying the pigments without success. Apparently, the exposed surface is so great that the pigment returns to equilibrium with the atmosphere the moment that the sample is placed under test.

2. Type of Oil

The type of oil used should be standardized in every possible way if values are to be exchanged between laboratories throughout the country. The unstable nature of linseed oils defies the establishment of a standard sample; therefore, all possible qualifying tests should be run including spectrometric examination to establish linkages, and degree of polymerization.

One possibility might be to establish a standard pigment to test oils.

3. Time of Test

The rate of addition of oil should be standardized to uniform the amount of work done on a given sample.

4. Spatula

The spatula should be accurately defined, length, breadth, flexibility, elasticity, etc. The spatula should be so selected that by its flexibility it will tend to uniform the differences in pressure applied by various operators.

It is emphasized that although minimum O.A. values are obtained at maximum pressures, greater uniformity is usually obtained when less pressure is used with a more flexible spatula.

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0007-SWP-000114139

#177 - Cont.

5. Size of Sample

The sample must be of adequate size for accurate measurements. More than this merely extends the time required for each test.

In addition to the above comments regarding the factors influencing oil absorption measurements, it may be mentioned that our real interest is in the oil demands of various pigments and pigment mixtures. With this in mind, we have tried to ascertain some ratio between oil absorption and oil demand. To date, we have not been successful in establishing this relationship. In our work we have made it a practice to determine oil absorption of pigments with the actual vehicles with which they are to be used.

#182 - Study of Improved Mixing and Grinding Practices

Surface Active Agents

Factory production records on Enamel ... White - Rex 710 were studied in an effort to correlate production rates with varying amounts of surface active agents used in paste feeds on plant five-roll Lehmann mills. All except two of these batches were made up to 900 gallons. The exceptions were 550 gallon batches ground on mill #6 and will be noted by an asterisk in the mill identification column of the table of data listed below. CW (2343) is Acto #450 and the percentages shown are based on the weight of the pigment. CW (2419) is Nuade.

Factory Test Data

Test No.	Mill No.	Agent	Consistency	Mill Rate	Grind Hegman	2147 Dry Lot No.
1	4	2.3% CW (2343)	87	56 GPH	6	3A6H15
2	4	2.3% CW (2343)	88	98.2 "	5-3/4	3A6H15
3	4	(1.0% CW (2343)	115	85.7 ") 92.3	6	3A6H15
		(1.0% CW (2343)	97	133 ")	6	3A6F20
4	4	2.3% CW (2343)	200	124	6	3A6F20
5	6	None	67	70.6	6-1/2	3A6H15
6	6	None	100	69.2	6	3A6H15

0007-SWP-044770

0007-SWP-000114140

Project #177 - Pigment Studies

The Cleveland Purchasing Department has requested an evaluation for color and strength of several competitive phthalo Green Lake colors with S-W Solfast Green 50% Lake 79-C-27. Fastolux Green 64-2500 from Ansbacher Siegle Corporation was found to be the nearest match in masstone and strength to 79 C 27. The Heliogen Green GL Powder from General Dyestuff Company appeared to be the second best match for the Sherwin-Williams material.

Comparison With 79 C 27

	Color	Strength
Heliogen Green GL Pdr. General Dyestuff Co.	Slightly light in color	Equal but greener 2nd best match
Fastolux Green - 64-2500 J-65654 (Ansbacher Siegle Corp.)	Same color	Same strength but greener. Best match.
Monastral GL-761-D E. I. du Pont	Chalky and lighter	Weak in tinting strength.
Monastral Green Lake GL-754-D (SD-518)* E. I. du Pont	Light and chalky	Very weak.
Phthalocyanine Green Lake Standard Ultramarine and Color Co.	Light and chalky	Much stronger than 79 C 27.

*Recommended for floor coverings only and restricted for sale.

0007-SWP-044771

0007-SWP-000114141

Project #177 - Pigment Studies

Exposure panels 30527-54 C, F were prepared for Florida and Chicago, vertical south. These are all on cedar bevel siding and A2 W 2 SWP Undercoater is used for the priming coat. The main purpose of this series is to evaluate Ti-Pure R-900. This TiO_2 is submitted by du Pont as an "improved R-500 chloride type." Materials compared with R-900 are R-500, R-510, Unitane OR-640 and OR-540, and Titanox RA-50. These are tried in A2 W 8 SWP Trim and Tinting White, which carries R-610 and is used as the guide paint. An extension of the above comparisons is made by testing the following in Intermix Low PVC: R-610, R-900, R-500 lot 8210 (chloride) and R-510 lot 1181 (sulfate). All the paints mentioned were put out both as white and shaded light blue with phthalocyanine.

A secondary purpose of the series is to evaluate Unitane OR-540, a new sample coded lot 117223 as against the regular material used in the past. The new grade is claimed to have softer texture and improved wetting and grinding properties.

Exposures 25842-80 F, C were examined after 24 months at Florida, vertical south, and nearly 30 months at Chicago, north and south. All are cedar bevel siding panels, primed with A2 W 2 SWP Undercoater. The main purpose of the series is to evaluate five lots of sulfate process TiO_2 and five lots of chloride process TiO_2, from du Pont. As comparison pigments, we have used R-610, regularly used in A2 W 8 SWP Trim and Tinting White, which is used as the basic formula and guide paint, TPC's RA-50 and New Jersey Zinc's R-750. The series consists of the A2 W 8 in white and in yellow and gray tints. Yellowing of the white paints is a prime consideration, as well as chalking, durability and tint retention.

Referring to the whites, we have checked these panels at Chicago much more frequently than usual in the early stages, trying to spot <u>rutile yellowing</u>, particularly in damp weather. None was noted during the first six months (spring and summer of 1957), but with the wet weather of late October and November, with chalking just starting to develop, some slight occurrence of yellowing was seen. In a special series of six readings in November, December and February (up to 9 months), rutile yellowing was observed to be rather noticeable on the guide but very slight on any of the tests. In chalking and dirt, the very slight differences <u>within</u> the chloride and the sulfate groups were as great as any differences noted throughout the series.

0007-SWP-000114142

Project #177 - Cont.

Considering the whites at a later stage, 30 months at Chicago, in a relatively wet period of October, 1959, there was a somewhat different picture. Panels which showed fairly noticeable though not particularly bad yellowing are R-750 and all but one of the five sulfate samples. Showing a very slight yellowing were the R-610 guide and RA-50. The chloride samples showed no yellowing. Chalking at this stage was normal for all, rated 6 or 7. The chloride samples were cleaner than the sulfate or any others. The chloride samples showed less mold on the south, but the reverse was very obviously true of the north panels.

Florida white tests show definite rutile yellowing at 24 months on the R-750 sample only. RA-50 and three of the five sulfate samples show slight yellowing, all others none. The chloride tests might be given a slight edge with regard to mold and dirt.

Concerning the tints, no location shows any clear-cut differences in fading or in mold and dirt. The grays look poorest because of white chalk-mask, and one of the chloride lots, #8914, shows up as slightly the worst of the series. The R-610 guide looks best by a small margin.

0007-SWP-044773

0007-SWP-000114143

Project #177 - Pigment Studies

Panels 30711-20 C, F were exposed at Chicago and at Florida, vertical south, all cedar bevel siding primed with A2 W 2 SWP Undercoater. The purpose was to evaluate Mistron Talc as used with the cationic surfactant Arquad 2HT. Claims have been made for considerable improvement in the body characteristics, leveling, etc., of house paints containing Mistron when such an agent is used. For comparison purposes, Nytal 300, Desertalc No. 53, and Mistron MSC, a stearate surface treated talc, are included. The specific Mistron talcs tested with and without Arquad 2HT, at about 1.5%, are #139, Vapor CI and T-076.

Four panels were prepared for exposure at Chicago and Florida, vertical south, numbered 30726-30 C, F. These were cedar bevel siding, primed with A2 W 2 SWP Undercoater. The purpose is to evaluate P-25 ultra-fine titanium dioxide from Godfrey L. Cabot, Inc. It is tried only in A2 W 8 SWP Trim and Tinting White in relatively small amounts to determine whether it could be used to increase the chalking rate through addition as on the Color Meter to provide a white as well as a tinting base. The amounts used are 1/4, 1/8 and 1/16 pounds. The paints are shaded blue, so that not only chalking but fading differences should be easy to ascertain.

Exposure series 28285-99 F, C was examined recently after 12 months at Florida and 14 months at Chicago, vertical south. All are cedar bevel siding panels primed with A2 W 2 SWP Undercoater of matching shade. The purpose was to evaluate two experimental samples of 50% Ti-Cal pigments from du Pont, designated only as samples A and B, R-50 type. First, these were tried in A2 W 4 SWP Gloss White, Card 2, the basic formula of which (used as guide) carries 175 pounds of 6680 dry RCHT, along with a smaller amount of anatase TiO_2. Differences in performance are minor; the specials seem somewhat slower in clean-up than the guide, yet they show less mold growth. A sample using Titanox C-50 seems the same as sample B. On some occasions, however, the Ti-Cal 50 pigments show severe rutile yellowing, the Titanox C-50 none.

Second, comparisons were made in A2 W 8 SWP Trim and Tinting White, Card 8, shaded both to Berkeley Yellow and to Chelsea Gray. The basic formula and guide in this case carries 325 pounds of 6685 dry RC. Although showing up much more at Florida than at Chicago, the regular has much better tint retention than either of the special samples or C-50. The guide, perhaps because of less free chalking, shows considerably more mold growth and somewhat more dirt than the tests. Again, occasionally the du Pont samples showed rutile yellowing.

0007-SWP-000114144