

M. VAN LOO  
Cont.

#148 - Examination of White Lead

The series of single pigment oil pastes reported in our January report has been re-examined after 9 weeks' storage. These pastes were of equal Plastograph consistency after milling. We now find that the plastic viscosity has dropped slightly on all pastes, the largest changes occurring with 18 dry basic carbonate white lead, Dutch Boy Dutch basic carbonate, 1403 dry anatase titanium dioxide, 2059 dry zinc oxide XX 503, 2295 dry zinc oxide ZZZ-35. The yield value has dropped on all pastes except Dutch Boy Dutch and Dutch Boy H.T.S. which had the lowest values when fresh. The largest lowering is with 1403, 2059, and 2295. Thixotropy has increased slightly with 1707 dry zinc oxide XX 50, and decreased to a low value with 1403 dry and with 2173 dry rutile titanium dioxide.

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#177 - Pigment Studies

Work continues on the study of white pigment opacity factors.

Paint Type I - House Paint - Single opacity pigment plus extender formulated to 18,000 Holley units. P.V.C. constant at 36% by the addition of 20 F magnesium silicate.

| Dry No.                             | %<br>Bright-<br>ness | Opacity Sq.Ft./Lb. |        |        |        |        |
|-------------------------------------|----------------------|--------------------|--------|--------|--------|--------|
|                                     |                      | 91% CR             | 93% CR | 95% CR | 97% CR | 98% CR |
| **461 L Lithopone                   | 86.3                 | 52.5               | 44.8   | 37.2   | 30.2   | 26.5   |
| 1901 TiO <sub>2</sub> (Anatase, LO) | 86.5                 | 252.0              | 215.0  | 176.0  | 138.0  | 118.0  |
| **2132 Titanox RC HT                | 85.5                 | 113.0              | 97.0   | 80.3   | 64.5   | -      |
| **2140 Titanox RC                   | 85.6                 | 104.0              | 90.0   | 76.0   | -      | -      |
| 1895 Lead Titanate                  | 81.4                 | 187.8              | 159.0  | 130.0  | 108.0  | 96.0   |
| 1897 Ti Bar HA                      | 85.8                 | 82.3               | 71.8   | 60.8   | 49.7   | 42.8   |

\*\*Values have been checked twice before.

Semi-Lustre Opacity

Several tests have been made to compare the various formulations set forth in the February 11 Semi-Lustre formula sheets. The recent modification which uses 200 pounds of rutile TiO<sub>2</sub> 2173 dry instead of the 250 pounds called for by Alternate 5 of the original instruction was also studied.

The work was done in three groups of tests. First the various alternates in the February 11 instruction were evaluated. Second, opacities were compared on paints containing (a) 575 pounds Titanox RC HT 2132 dry (alternate 3), (b) 250 pounds 2173 dry (alternate 5), and (c) 200 pounds 2173 dry (new formula). The third group of tests was made to justify the findings under groups 1 and 2.

Summarizing the findings by groups:

Group 1 - All paints alternates 1 - 8 are substantially equal in opacity. Details given under table 1 attached.

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Table I

Vehicle A

| Opague Pigment      | Holley Cost per 100 gal. | Paint Characteristics |                |          | Opacity Spread |       |        |        |
|---------------------|--------------------------|-----------------------|----------------|----------|----------------|-------|--------|--------|
|                     |                          | Pigment               | 3-day Visc.    | Wt./Gal. | Grind          | Gloss | 93% CR | 97% CR |
| 1. 2132 - 461 L     | 21,430                   | \$37.21               | 20.4*          | 12.30    | 12.37          | 3 +   | 80     | 516    |
| 3. 2132             | 21,470                   | 35.56                 | 22.4           | 11.90    | 12.01          | 3 +   | 70     | 500    |
| 4. 1897 - 2173      | 21,600                   | 48.89                 | 18.4           | 12.60    | 12.71          | 3     | 56     | 505    |
| 5. 2173             | 19,000                   | 47.20                 | 20.6           | 11.50    | 11.61          | 3     | 74     | 506    |
| 8. 1403             | 20,670                   | 52.59                 | 31.6*          | 12.50    | 12.83          | 3 +   | 47     | 480    |
| <u>Vehicle B **</u> |                          |                       |                |          |                |       |        |        |
| 2. 2132 - 461 L     | 21,430                   | 37.65                 | 32.4           | 12.69    | 12.70          | 3 +   | 48     | 520    |
| 6. 2173             | 19,000                   | 47.20                 | 35.4           | 11.70    | 11.76          | 3     | 23     | 620    |
| 7. 1403             | 20,670                   | 52.59                 | 54.4 + 1/8 cup | 12.80    | 12.92          | 4     | 53     | 560    |

\*1 day viscosity.

\*\*We did not have the lighter colored ball oil vehicles used in Vehicle B, therefore it was necessary substitute the darker modifications used in the lint base. Naturally, this lowered the brightness and increased the hiding of the paints in this group.

Paint #6 appears to be out of line, but this may quite logically be explained by the unusual low gloss and the lowered brightness of this surface.

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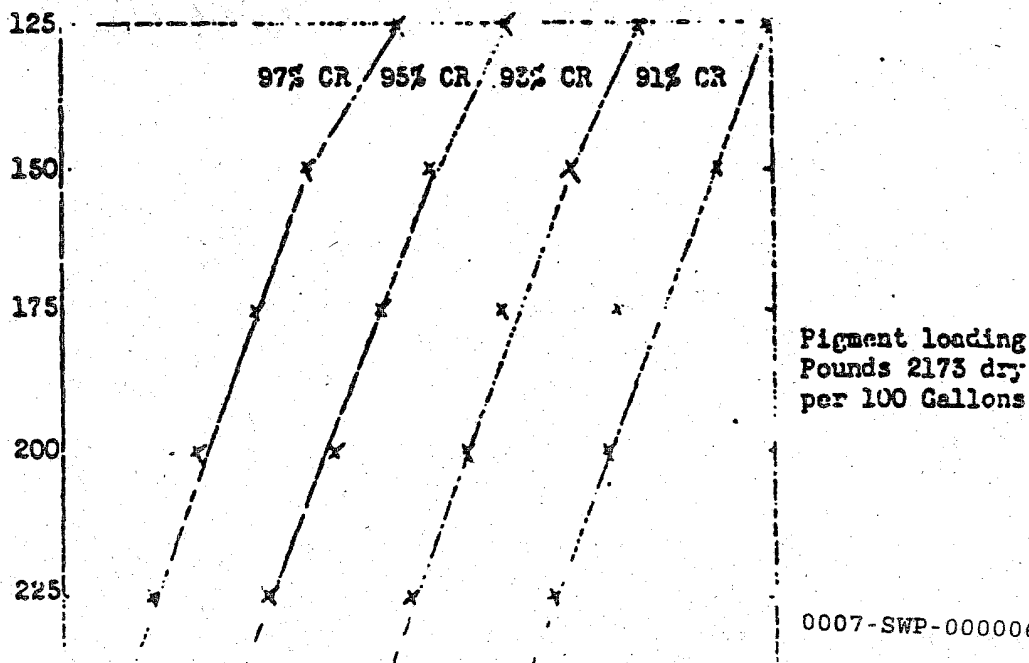
Group 2 - Paints containing: (a) 575 pounds 2132 dry, (b) 250 pounds 2173 dry, and (c) 200 pounds 2173 dry. All give practically equal hiding.

Group 3 - In these tests the attempt was made to prove the results of tests under groups 1 and 2 above. By accomplishing the equal hiding reported above it was postulated that operations are on a sharp curve of diminishing returns when formulating Semi-Lustre with 2173 dry. Tests of group 3 were devised to prove this experimentally.

It should be noted that the pigment volume was held constant throughout these tests by a "make-up" with extender pigment.

Results verified the above conclusion; that is, over the range 125 - 250 pounds loading of 2173 dry in Semi-Lustre it was proven that the opacity developed varies continuously with the pigment loading.

The graph below shows a plot of experimental data (determined by use of the Hunter reflectometer in conjunction with the regular procedure for determining opacity), which illustrates this point.



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Using factors taken from the graph this relationship was found.

At 97 contrast ratio the factor for 2173 dry is 170 sq.ft./lb. at a loading of 200 pounds, whereas at a 250 pound loading the factor is 141 sq.ft./lb. Using these factors in a manner similar to that used with the Holley system the following statistical comparison of paints made at these loadings would hold true.

$$A - 200 \times 170 = 34,000$$

$$B - 250 \times 141 = 35,250$$

It is understandable by this comparison that practical equivalence of opacity in two paints is accomplished, one using 200 pounds 2173 while the other contains 250 pounds.

Summarizing the entire group of tests above it was concluded that the opacity variation at different loadings justifies the seemingly wide disparity between two paints developing equal hiding at a 20% difference in opaque pigment poundage.

It should be borne in mind that this data is limited to Semi-Lustre White pigmented with 2173 dry. There is no assurance (or confidence) that when using 575 pounds of 2132 dry the greatest efficiency with that pigment is being accomplished.

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