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MEMORANDUM REPORT #M-511

RESULTS OF FIELD TEST OF LOW ODOR TRADE SALES
 FINISHES DEVELOPED ON INVESTIGATIONS WF-233,
 234, 235 & 242 - CLASS C

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MEMORANDUM REPORT #M-511

RESULTS OF FIELD TEST OF LOW ODOR
TRADE SALES FINISHES DEVELOPED ON
INVESTIGATIONS WT-233,
234, 235, AND 242 - CLASS C

This report covers the performance of low odor interior finishes described in Supplementary Release Letter #1273-A as compared with that of the corresponding conventional materials under field conditions. See attached list of experimental and control products.

SUMMARY AND CONCLUSIONS

All general and specific recommendations made in this report are intended as information to be used in writing a release letter and as suggestions for further laboratory work and should not be construed as a basis for other action. The tests covered in this report indicate that the following low odor finishes are marketable as equal to, or better than the corresponding conventional product, in overall application properties and final appearance. Odor, of course, is superior in all cases.

1)	Primer Sealer Low Odor	P-689-U-29856
2)	Ovalite Enamel Undercoater Low Odor	P-66-U-34254
3)	T & C Flowing Flat Low Odor	P-621-U-29827
4)	CC Flat #7 Light Green Low Odor	P-621-U-29829
5)	CC Flat #13 Light Gray Low Odor	P-621-U-29828
6)	CC "Dulux" Semi-Gloss White Low Odor	P-69-U-22087
7)	CC "Dulux" Semi-Gloss #7 Lt. Green Low Odor	P-69-U-22088
8)	CC "Dulux" Semi-Gloss #8 Med. Green " "	P-69-U-22070
9)	CC "Dulux" Semi-Gloss #13 Lt. Gray " "	P-69-U-22089
10)	CC "Dulux" Semi-Gloss #14 Med. Gray Low Odor	P-69-U-22092

The following low odor finishes are not yet suitable for marketing because of unsatisfactory performance in one or more properties as shown.

1)	CC Flat #11 Medium Blue Low Odor Poor Hiding	P-621-U-22082 See page 10
2)	CC Flat #11 Medium Blue Rippled appearance	621-841 See page 10
3)	"Dulux" Super-White Low Odor*	P-58-U-26292
4)	"Dulux" Maintenance White Low Odor*	P-58-U-26270
5)	"Dulux" High Hiding White Low Odor*	P-58-U-22048
6)	"Dulux" Marine Enamel Low Odor*	P-58-U-26256

* At low temperatures number 3 through 6 require excessive thinning and have low gloss.

See page 12 & 13

All of the low odor finishes show a more rapid increase in viscosity as the temperature decreases than do the control products.

This may lead to excessive use of thinners and result in inferior film properties and appearance. Therefore, a caution limiting the use of thinner to not more than one pint/gallon should be included in the label direction.

The absence of unpleasant odors or irritating fumes may cause the user of these materials to provide so little ventilation that the rate of dry is adversely affected. The need for ventilation to achieve proper dry should be noted in the label directions.

DETAILS

The information given in this report is based on four sets of tests.

1) Laboratory Supervised Tests.

Twenty-five test rooms were painted by professional painters. The writer was present during the painting of each of these rooms to record and evaluate the conditions of the test, the painters' ratings of the products, and to observe and analyze the relative performance of the paints. These tests represent the opinions of 17 painters employed by 5 different organizations. Detailed information from these tests will provide the major portion of the data upon which adjustments in the formulas can be based.

2) Laboratory Tests at Temperature and Humidity Extremes.

This work was done in the variable temperature/variable humidity room at Marshall Laboratory under conditions simulating seasonal weather extremes (40° to 90°F. and 15% to 90% Relative Humidity) for which field tests cannot be planned conveniently. Application and film properties were compared with the paints at equal viscosities. Film properties were also compared with the paints adjusted to approximately equal brushing ease.

3) Individual Home Owner Tests.

Control and low odor products were applied side by side in the homes of members of the Marshall Laboratory. Relative ratings were requested strictly on the basis of performance rather than an odor.

4) Sales Department Tests.

One hundred fifty-six tests were conducted by the regional Sales offices through both professional and amateur painters. These tests were designed primarily to sample the reaction of a wide variety of commercial, institutional, and individual customers to the low odor aspects of the paints and secondarily to note overall performance. In these tests there were many instances where controls were not used or where a control of the same quality as the low odor paint was not available.

When interpreting the significance of the comments on differences between the two types of paint, the following points should be considered.

1. Since only one batch of each experimental product has been tested and usually only one or two different batches of the standard product were used as controls, it is apparent that small differences in the relative ratings can become signifi-

cant only in the light of experience with subsequent experimental batches.

2. In three of the above sets of tests, these materials were applied over a wide variety of substrates, by persons of various degrees of skill, who are accustomed to differing techniques of painting and whose painting tools are not necessarily of the same style, size, quality or condition. Under these circumstances unanimity of opinion is not to be expected.

Because of the large number of uncontrolled variables it is felt that a straight statistical report of the test results would not be meaningful. It is believed, however, that a reasonably representative cross section of conditions and opinion has been obtained and the comments and recommendations made here-in represent the writer's best judgment in interpreting and weighting the available data.

GENERAL COMMENTS

- 1) Flow. In all of the low odor paints except the "Dulux" Super White Enamel there is a noticeable increase in flow. There is a slight decrease in sag resistance accompanying this but it can be tolerated for the sake of a smoother film. However, future batches should not be allowed to fall lower in sag resistance than these test batches.
- 2) Odor. The results of the sales department tests together with comments on odor from the other tests show almost complete agreement on the improvement in odor of the experimental paints over that of the controls. The odor improvement is outstanding in all cases except that of the already low in odor "Dulux" Super White Enamel where the improvement is necessarily more moderate. There is evidence that for the flat paints especially and, to a somewhat lesser degree for the other materials, there is an improvement in residual odor.

Instances of complaints about the odor are so few that it is likely that they represent deviations from normal odor perception or inaccurate recall where the odor was compared on the basis of "previous experience with such and such paint."

- 3) Effect of temperature extremes. All of these low odor products are subjected to a more rapid increase in viscosity as the temperature is lowered than are the conventional materials. In general, the viscosities of both control and experimental products are reasonably close together at about 90°F. then, as the temperature is lowered, both products increase moderately in viscosity, until, in the range of 40°-50°F., the increase becomes quite rapid. In every instance the low odor analogue maintains the higher rate of viscosity increase.

Comparison of our low odor paints with those of competitors shows that in this respect competitive low odor paints more closely resemble our conventional materials than our low odor products. This appears to be an effect inherent in our low odor

resin and/or solvent. There does not seem to be any resin kickout at low temperatures since the paints withstood several freeze thaw cycles without suffering damage.

Except as noted for "Dulux" Super White Enamel low odor, our low odor paints can be thinned to satisfactory brushing consistency at temperatures as low as 40°F. and still produce satisfactory films when applied and allowed to dry at that temperature. At such low temperatures, up to 48 hours are required for hard dry for the primer sealer, the semi-gloss and the gloss products while about 24 hours suffices for the flats, and enamel undercoaters.

Higher than normal temperature tends to cause poorer lapping qualities and poorer appearance of laps for both types of paint.

- 4) Effect of humidity extremes. The influence of humidity on the performance and appearance of these paints is so slight as to be negligible. Relative humidities of 40% and 90% at 40°F. and 13% and 90% at 90°F. were employed with no apparent ill effect. However, paints applied under conditions which permit condensation to occur on the incompletely dried surface are almost certain to be marred.
- 5) Stability. Stability data will be furnished in a later report.

MARSHALL LABORATORY

William J. McConaghey
WILLIAM J. MC CONEGHEY

WJMC:LMA
10/15/52

LOW ODOR PRODUCTS

CONTROL PRODUCTS

Low Odor T & C Flat White	P-621-U-29827	Painter's High Hiding Flat	P-621-R-84784
Low Odor CC Flat #7 Lt. Green	P-621-U-29829	Oil Color Tints of	"
Low Odor CC Flat #13 Lt. Gray	P-621-U-29828	Oil Color Tints of	621-841
Low Odor CC Flat #11 Med. Blue	P-621-U-22082	CC Flat #11 Med. Blue	60-1
Low Odor CC Semi-Gloss White	P-69-U-22087	"Ducc" Semi-Gloss White	60-1
Low Odor CC Semi-Gloss #7 Lt. Green	P-69-U-22088	Oil Color Tints of	60-1
Low Odor CC Semi-Gloss #8 Med. Green	P-69-U-22090	Oil Color Tints of	60-1
Low Odor CC Semi-Gloss #13 Lt. Gray	P-69-U-22089	Oil Color Tints of	60-1
Low Odor CC Semi-Gloss #14 Med. Gray	P-69-U-22092	Oil Color Tints of	60-1
Low Odor "Dulux" H. H. Maint. White	P-58-U-22048	"Dulux H. H. Maint. White	58-5884
Low Odor "Dulux" Maint. White	P-58-U-26270	"Dulux" Maint. White	58-488
Low Odor "Dulux" Super White	P-58-U-26292	"Dulux" Super White	58-5223
Low Odor Ovalite Undercoater	P-66-U-34251	"Ducc" Undercoater	80-41
Low Odor Primer Sealer	P-689-29856	Primer Sealer	689-784
Odorless Solvent	T-8845	Mineral Spirits	H-287

* These tints were made with oil colors rather than plant tinting bases because low odor tinting bases were not yet available.

Note: Despite differences in line number, the low odor paints are similar in quality to the control paints except for the use of low odor resins and solvent.

JWC:LMA
10/15/52

PRIMER SEALER

Low Odor Paint:	Primer Sealer - Low Odor	P-689-U-29856
Control Paint :	Primer Sealer	698-784

No. of laboratory supervised tests	9
No. of home owner tests	7
No. of Sales Department tests	0

The result of these tests show that for practical purposes, the the low odor primer sealer and its control are identical in working properties and final appearance.

Comments:

- 1) The untinted low odor primer sealer is slightly darker than the control - probably the result of the darkness of this batch of low odor resin.
- 2) The low odor primer sealer has improved flow at the expense of slightly poorer sag resistance.
- 3) Low odor primer sealer is set to touch about 1-2 hours sooner than the control but overnight dry and hardness are identical.
- 4) Drying rate at low temperatures is drastically reduced for both products requiring 24-48 hours, to become tack free and hard. The low odor primer sealer maintains an advantage in drying rate even under these conditions.
- 5) According to the professional painters on the laboratory supervised jobs, our primer sealers are about equal in hiding to others on the market but most of them would prefer a better hiding product, if available.

Recommendations:

- 1) Market the low odor primer sealer with no change in formula.
- 2) Set the sag reading of this batch as the maximum permitted in subsequent plant batches.
- 3) Consider the feasibility of increasing the hiding of primer sealers.

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UNDERCOATER

Low Odor Paint: Ovalite Enamel Undercoater Low Odor P-66-U-34254
Control Paint : Brush "Ducco" Undercoater 80-41

No. of laboratory supervised tests	6
No. of home owner tests	10
No. of Sales Department Tests	0

The results show that the low odor undercoater is generally better in working properties and final appearance than the control.

Comments:

- 1) Advantages of the low odor undercoater.
 - a) Improved flow at the expense of decreased sag resistance.
 - b) Better brushing.
 - c) A slightly greater spreading rate.
 - d) A more uniform final appearance.
 - e) Faster drying but stays open long enough for easy working.
- 2) Both materials sand easily.
- 3) Hot weather may cause poorer lapping in both products.

Recommendations:

- 1) Market the low odor undercoater with no change in formula.
- 2) Set the sag reading of this batch as the maximum permitted in subsequent plant batches.

- 0 -

FLAT WHITE AND TINTS

Low Odor Paints: T & C Flat White low odor P-621-U-29827
CC Flat #7 Lt. Green low odor P-621-U-29829
CC Flat #13 Lt. Gray low odor P-621-U-29828

Control Paint: Painter's High Hiding Flat and oil color
tints to match the above colors. P-621-R-84784

No. of laboratory supervised tests	5
No. of home owner tests	7
No. of Sales Department tests	32

The results of these tests show that there is a slight preference for the working properties of the low odor flat paint. Final appearance also shows some improvement.

Comments:

- 1) Flow of the low odor flat is improved at the expense of a slight decrease in sag resistance.
- 2) Drag at lap is less for the low odor flat.
- 3) Brushing ease of both paints is very good.
- 4) Some painters are accustomed to using flat paints with more flow than these and consequently rated these low, claiming faster application, better appearance, and better hiding for the flowing type of paint. Moore's Saniflat and Davis Prim Flat are mentioned in this connection.
- 5) The low odor T & C Flat, its control, Painter's H. H. Flat, and the standard T & C Flat that is now on the market are all subject to a severe bodying effect when contaminated with as little as 1/2% of water by weight. Though the paint becomes so thick that it won't pour out of the pot, the easy spreading and brushing properties of the paints are scarcely diminished. Flow and leveling are reduced but the overall appearance of the job is not seriously affected.

Recommendations:

- 1) Market the low odor white and tinted flat paints with no change in formula.
- 2) Set the sag reading of this batch as the maximum permitted in subsequent plant batches.
- 3) Check the working properties of the two competitive paints listed in (4) above.
- 4) Determine whether the bodying effect of contamination by water can be eliminated or controlled. Though the quality of the paint job is apparently not seriously affected, customer reaction to the phenomenon may be adverse.

Flat White and Tints (Cont'd.)

The possibility of contamination by this amount of water cannot be dismissed as too infrequent for concern. At least one manufacturer of Nylon brushes (Wooster Brush Co.) now recommends storing paint brushes in water overnight. This practice, though not general among professional painters, is a fairly common procedure for amateurs and now with the encouragement of the brush manufacturer it may spread. In three of the laboratory supervised tests where this method of storing brushes was used, enough water was carried into the paint to cause bodying.

CC #11 MEDIUM BLUE FLAT

Low odor paint: Color Conditioning #11 Med. Blue Flat P-621-U-22082
Control paint : Pigments Department #11 " " " 621-841

No. of laboratory supervised tests	2
No. of home owner tests	0
No. of Sales Department tests	7

The results of these few tests indicate that neither the color conditioning #11 Medium Blue Flat nor the Pigments Department #11 Medium Blue Flat is suitable for marketing.

Comments:

- 1) The hiding of the low odor paint is poor and that of the control only fair.
- 2) The low odor paint tends to be streaky and uneven in final appearance - possibly as a result of poor hiding.
- 3) On one test the control displayed a rippled appearance on the wall.

Recommendations:

- 1) Do not market either of these paints.
- 2) Correct the above defects. Work has already been started on these paints.

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SEMI-GLOSS WHITE AND TINTS

Low Odor Paints: Color Conditioning Semi-Gloss White Low Odor
P-69-U-22087

Color Conditioning Semi-Gloss #7 Lt. Green
Low Odor P-69-U-22088

Color Conditioning Semi-Gloss #8 Med. Green
Low Odor P-69-U-22090

Color Conditioning Semi-Gloss #15 Lt. Gray
Low Odor P-69-U-22089

Color Conditioning Semi-Gloss #14 Med. Gray
Low Odor P-69-U-22092

Control Paint : "Duco" One Coat Magic Semi-Gloss and Oil
color tints to match the above colors. 60-1

No. of laboratory supervised tests	5
No. of home owner tests	13
No. of Sales Department tests	66

The results of these tests show that the experimental and control products are about equal in brushing properties and final appearance.

Comments:

- 1) The low odor semi-gloss has a definite advantage in drying time.
- 2) Like primer sealers, the semi-gloss paints are retarded in drying at low temperatures, but here again the low odor product maintains its advantage in drying time: about 36 hours vs. about 48 for the control.
- 3) This batch of low odor white semi-gloss though within the normal range of package viscosity for semi-gloss enamels had a higher package viscosity than the control and required nearly twice as much reduction to reach the same brushing consistency as the control.

Recommendations:

- 1) Market the low odor semi-gloss white and tinted paints with no change in formula.

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GLOSS

Low Odor Paint: "Dulux" Super White Low Odor P-58-U-26292
Control Paint : "Dulux" Super White 58-5223

No. of laboratory supervised tests	4
No. of home owner tests	21
No. of Sales Department tests	35

The results of these tests show that these products are rated very high and about equally for all properties except gloss where the low odor enamel is substandard.

Comments:

- 1) The low odor enamel is lower in gloss than the standard enamel.
- 2) At low temperatures the low odor enamel requires excessive thinning to reach brushing consistency: about 1-1/2 pints per gallon. This formula bodies more rapidly with decreasing temperatures, the low odor enamel develops dull streaks where the film is slightly thicker than surrounding areas.
- 4) Flow of the low odor enamel is slightly less than that of the control.

Recommendations:

- 1) Do not release the low odor "Dulux" Super White Enamel for sale immediately.
- 2) Determine whether the poor gloss and streaking of the low odor enamel is a characteristic of this batch or of the formula in general and make the necessary corrections.

MAINTENANCE ENAMELS

"Dulux" Maintenance White Low Odor
"Dulux" High Hiding Maintenance White
Low Odor

P-58-U-26270

P-58-U-22048

On these two low odor paints we have only limited field test information consisting of 4 home owner tests and 10 Sales Department tests on "Dulux" Maintenance White and three Sales Department tests on the High Hiding Maintenance White.

These tests are not sufficiently detailed to yield all the data needed to reach a decision on marketability. However, because of the similarity of their vehicle and pigment compositions to that of "Dulux" Super White Low Odor, they may be subject to the same low gloss and to streaking at low temperatures and we recommend that they be withheld from the market until the cause of the low gloss phenomenon is found and corrected.