CITY Cleveland DATE April 27, 1955 FOR MR. L. NUSSER
CLEVELAND

SUBJECT MARCH PRODUCT DEVELOPMENT REPORT
Paint, Varnish & Lacquer Laboratories

ANSWERING LETTER OF

Recently there has been a great deal of attention given to the question of toxicity of coatings by the legislative bodies and some national associations. The following excerpt from Bernard L. Oser in the Food-Drug-Cosmetic Law Journal 693,696, November 1953, may help you to understand the complexity of this problem:

> "There is no foundation in toxicology for regarding all substances as either poisonous or deleterious, on the one hand, or safe or harmless, on the other. The optical physicist has his absolute white and absolute black, but there are no absolutes for the toxicologist.
>
> "Toxicity" depends on species, age, weight, sex, dosage, route of administration, physiological or pathological state, and manifold other factors comprising "experimental conditions." Translation of toxicity data into terms of real or potential effect under any given set of circumstances as, for example, the determination of hazard to any particular segment of the population or to the public health generally, involves considerations that go far beyond toxicity effects in laboratory animals.
>
> "He succinctly sums this up by saying "there is no zero degree of toxicity, of poisonousness, of deleteriousness, or indeed, of hazard."

In the past formulas have been sent through marked non-toxic. You can see from the above the reasons for cautioning you not to mark your formulas in this manner. In the future on formulas of this nature designate only specific information, i.e., permissible lead content or clearance by the Bureau of Animal Industry. Also, be sure to designate if special handling is required by the manufacturing department to meet the specifications of the formula.

While most Glidden products may be completely safe when used for their intended purposes and in accordance with proper instructions, even the most harmless of materials may prove toxic if improperly applied or if used in improper quantities. Therefore, we must avoid general or unqualified statements on the subject of toxicity to properly minimize our Company's risks with reference to this matter.

In view of the risks inevitably present in toxicity representations or statements, no correspondence or communications containing such statements are to be made by any laboratory employees to prospective customers or customers of our Company. All requests for statements concerning the toxicity of our products must be referred to the Legal Department for approval prior to submission to your customer. The Legal Department where necessary will consult with our technical personnel and will then provide a properly qualified statement which can be submitted to your customer.

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E. Schulte

Enamel for Fibre Hampers

We have been selling Victor Products 92-W-106 white enamel for use on fibre hampers for several years. However, recently they requested a white enamel to air dry in 4 to 6 hours with better initial color as well as better color retention upon ageing. GL-65317 has been formulated at a $2.14 bulk cost for this use with V-872. Initial color and color retention is much improved with this new formulation. Reduction is four to one with xylol for spray.

Semi Gloss Black Baking Enamel

Scott Portafold Seat Company have been buying GL-64391-A for this use, but have recently complained that hardness and mar resistance were not satisfactory. GL-65353 has been formulated to overcome these objections and satisfactory results, we understand, are being obtained at present. The black enamel is reduced 4 to 1 with xylol for spray and baked 4-1/2 minutes at 350° F. in an infra red tunnel.

K. F. ATWOOD

Lead Industries Association, Project No. 20

This is an evaluation of a number of pigmentations in wash primer and anti-corrosive intermediate formulations. The project is being re-run because of early unexplainable failure of the red lead formulations in the first test. A new pigment of particular interest, basic lead silico-chromate, made by National Lead, is included in this test.

Kewaunee Mfg. Co. - Vinyl Organosol

We have been working on this one for a long time. They require two to four hours exposure to such materials as concentrated H_2SO_4 and HNO_3, also one-half hour to furfural and ketone solvents.

Our earlier materials could pass these tests, but were deficient in gloss and mar resistance. The gloss was raised to 65° by the use of Pliovic AO and Exon 470. The mar resistance was improved by using a solvent combination of S158 and S56 to obtain good dispersion and fusion, and use of Duponol G and 67T52 for surface slickness.

Characteristics of GL-64596-B:

N.V.	50.2%
Vis.	120"
Sheen	65°
Adhesion to steel	Good
Impact	OK 30" direct and reverse
Hardness	H pencil
Bake	20' @ 350°

PRODUCT DEVELOPMENT REPORT
ANALYTICAL LABORATORY
MARCH, 1955

The following new pigment standards have been set up and will be shipped out shortly.

1)	Bl-61	Indo Blue	Harmon Color
2)	W-188	Nytal #300	R. T. Vanderbilt
3)	W-202	#2 Barytes	Thompson Weinman
4)	B-50	Blue Black water sol. prod.	National Aniline
5)	B-12	Oil Black	American Cyanimid
6)	Bn-21	Spirit Brown	National Aniline
7)	YW-115	C. P. Chrome, Med.	Reichhold Cml.
8)	YW-68	Raw Sienna	Reichard Coulston
9)	B-4	Bone Black	Binney & Smith
10)	B-7	Lampblack	Monsanto
11)	B-12	Oil Black	American Cyanimid
12)	B-26-B	Carbon Black	Binney & Smith
13)	B-50	Blue Black pwd.	National Aniline
14)	Bn-4	Walnut Brown	N. Y. Color & Chem.
15)	Bn-21	Spirit Brown	National Aniline
16)	Bn-59	#759 Brown Oxide	Reichard Coulston
17)	R-293	Metallic Brown	C. K. Williams
18)	R-298	Permanent Carmine	General Dystuff
19)	YW-47	Cadmium Lithopone Lemon	Chem. & Pig.
20)	YW-48	Cadmium Lithopone Golden	Chem. & Pig.
21)	YW-49	Cadmium Lithopone Primrose	Chem. & Pig.
22)	YW-56	Cadmium Lithopone Orange	Chem. & Pig.
23)	W-192	1767 Talc	Whittaker Clark & Daniels
24)	W-202	#22 Barytes	Thompson Weinman
25)	YW-115	C. P. Chrome Orange	Reichhold
26)	YW-108	Sun Yellow "N"	Harshaw
27)	R-206	Permanent Red Toner	Brooklyn Color

R. H. FAUD

MISCELLANEOUS -- We are continuing to evaluate a number of new latexes supplied by companies desiring to break into butadiene styrene latex production. Several of them have come up with surprisingly different and interesting materials. We shall continue our evaluation of them and pass on a full report as quickly as we can reach firm conclusions.

J. G. Kingston

OIL PRODUCTS LABORATORY

Y-555 GLIDDENCOAT -- A few months ago it was brought to our attention that Metronite (W-31) is an excellent pigment for enamel undercoats because of its non-clogging characteristics in sandpaper. We decided to investigate W-31 with the use of V-37 (phenolic cold cut) for harder dry. The results were harder dry and much improved sanding. The brushing was improved slightly and enamel hold out, flow, color, hiding were the same as the regular formula. The Y-555-L formula with these improvements has been sent to the plant to be checked and field tested.

Y-2950 RIPOLIN SEMI-GLOSS -- Y-2950-J has been formulated to use S-240 (low odor solvent). We are also using Bentone W-195 in place of 67-T-300 for settling and sag control. The W-195 is more efficient and gives better uniformity from batch to batch. A definite ease of brushing is also noted with the use of W-195. The formula is being checked out in the plant.

Y-1252 JAPALAC ORANGE -- The duPont people have presented the information that chrome orange (YW-22) can be replaced by a combination of molybdate orange (YW-11) and chrome yellow (YW-2) to give better gloss retention, better color retention, increased hiding and lower cost. Y-1252-F has been formulated using YW-111 and YW-2 to match the standard color. The results were increased hiding and lower cost. Our weatherometer exposures are showing better gloss and color retention.

LOW ODOR SOLVENTS -- Tests have been run using citrus limonene (Glidden Naval Stores) with mineral spirits (S-43) and low odor solvent (S-240). The plan is to stock a better solvent to replace the mineral spirits and turpentine recommendation on our label. It has been decided to use GL-64757, 3 ounces per gallon citrus limonene with S-43, to give good odor and good solvency.

J. E. Southwick

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4/13/55

627-R

PRODUCT DEVELOPMENT REPORT FOR MARCH, 1955

Paint Laboratory

Specifications

We have just recently developed RGL-25928, Federal Specification TT-P-664 Lacquer Resisting Rust-Inhibiting Synthetic Primer. Samples have been sent to Aberdeen Proving Ground for qualification testing.

We have received an additional order for 85 drums of RGL-23465-B, #611 Green Zinc Chromate Primer for Fairchild Aircraft, Hagerstown, Maryland. This will bring the total to 219 drums of this material that the subject customer has bought this calendar year.

(W. C. Bivans)

Vinyl Alkyd Paints

RL-13511 Vyn-Al Red Lead Primer For General Use — Bulk Cost: $1.88 in 500 gal. lot

Reduce 5-1 with 178-C-3 for spray or brush full body.
Apply 1-1.25 mils dry film thickness.
Dry to recoat in 1 hour
Coverage 350 sq. feet per gallon.
Designed to be used either as a primer over bare metal or over old paint. Can be recoated with straight vinyl topcoats or vinyl alkyd topcoats.

RL-13538 Brown Vyn-Al Paint — Bulk Cost:$2.00 in 500 gallon lots

Reduce 5-1 with 178-C-3 for spray or brush full body
Apply 1.0 mil dry film thickness
Dry to recoat in 1 hour
Coverage 350 sq. ft. per gallon
This was formulated for New York Central Railroad

RL-13539 Gray Vyn-Al Paint — Bulk Cost: $2.33 in 500 gal. lots

This was formulated for New York Central Railroad
Reduce 5-1 with 178-C-3 for spray or brush full body
Apply 1.0 mil dry film thickness
Dry to recoat in 1 hour
Coverage 350 sq. ft. per gallon

Wash Primer - 178-G-1 - MIL-P-15328

Recently we had a complaint from the Coast Guard on this material claiming that we did not meet the required distillation range. The distillation range using the specified Snyder 6 ball distillation column is 78.2° - 82°F.

Rechecks of our production of base and acid component revealed that our initial boiling point was entirely too low. In the acid component our initial boiling point was around 60°F. for the minimum of 78°F.

Checks on denatured alcohols from Shell and Publicker also gave low

PRODUCT DEVELOPMENT REPORT

TORONTO

MARCH 1955

Staining of White House Paints by driers

Discussion of the color of white house paint by the Cleveland laboratory has recalled some test work done over the past few years regarding the staining of white house paints. We have had this problem for many years and on occasion have found it necessary to repaint certain jobs which were off color. For a long time this discoloration was a mystery to us and at one time we blamed it on iron contamination from drums in which certain raw materials were stored. A more recent series of tests proved that manganese is the main staining agent used in white house paints. Tests were made by filling bottles with O-132 and adding small amounts of drier solution. Some interesting results were obtained.

(1) Manganese alone with no other drier does not cause discoloration of oil.
(2) True auxiliary driers such as lead or cerium are necessary for staining to occur. By true driers we refer to metals capable of existing in two or more states of oxidation. Lead and cerium fulfill this requirement. Zinc and calcium do not.
(3) Oxygen is necessary for staining.
(4) Light is a catalyst for the reaction.
(5) The color is not permanent but fades as oxygen is absorbed by the oil.
(6) Staining by manganese plus lead is more rapid than staining by manganese plus cerium. However, once the staining effect has taken place the cerium combination takes longer to bleach out.

If a bottle of linseed oil containing lead and manganese drier is exposed to air a dark brown color forms at the surface and gradually disperses through the liquid causing the whole solution to become a very dark brown. If the bottle is then sealed up the color will be absorbed in less than 24 hours. If the oil is once again exposed to air the dark color will reappear. Addition of benzoyl peroxide will bleach out the color.

Light is apparently a catalyst for the staining reaction but is not essential. Staining with cobalt is similar to that caused by manganese except that the color is a bright green. The staining effect produced by cobalt is much weaker indicating that cobalt would be a more desirable drier for white house paint. Elimination of lead from paint as is done with the new Y-1850 formula should eliminate this staining. However, there is some danger of drier absorption unless an auxiliary drier such as lead or cerium is present.

Whilst the staining by manganese is not permanent, it would appear that it might be the cause of complaints especially with paints which have been freshly made. A paint could be quite white in the can but could discolor as soon as it is brushed out, since the catalytic agent, oxygen and light, are always present.

It now appears evident that our original trouble with discoloration of white house paint was caused by manganese drier. At the time we were having the most trouble we used D-15. It is very difficult to control the metal content of a drier such as D-15 and it is very likely that at times we got much higher manganese content than normal. This would depend on the way the metal was taken up during the cook. The use of naphthenate drier affords much better control over the metal content but our tests have indicated that only a very small percentage of manganese in the presence of lead will produce discoloration. It appears that aging of the paint counteracts this trouble to some extent but the best solution obviously is to formulate paint in such a way that drier discoloration is impossible. As mentioned before, the staining due to cobalt is much weaker than with manganese and very likely a suitable combination of cobalt with lead or cerium would eliminate drier staining in our white paints. Our experiments indicate that it does not matter in what form the manganese is present, that is, whether it is present as naphthenate, linoleate, resinate, etc. It is the total metal content that is the important factor. We do not know what is the function of the auxiliary drier such as lead or cerium but it is evident that they play an essential part in the reaction. Color change is obviously due to oxidation of the manganese to a higher state and in the absence of air the linseed oil appears to reduce this back to the lower state to cause the change of color. The addition of calcium or zinc does not appear to have much influence.

It was noted that where lead naphthenate was added to linseed oil a white precipitate soon showed up which finally settled out to the bottom of the bottle. This was true in all cases where lead was used. Addition of calcium delayed but did not prevent this precipitation. Cerium has the advantage over lead in that it does not show any precipitation at all.

The staining reaction is due to oxidation of the manganese drier in the presence of lead. Linseed oil is not necessary to produce the color change. However, it has been shown that linseed oil in the absence of oxygen can bleach out the color and if the driers are aged in the presence of linseed oil the color change no longer takes place. In other words the color reaction can be initiated and reversed several times but ultimately reaches a stage where discoloration is not produced regardless of how much air is present. We have no explanation for this phenomenon.

Staining of the dried film lasts long enough to be objectionable from a customer standpoint. We have not investigated fully but it appears logical to assume that the color would bleach out in sunlight. On the other hand, we do not know what influence drier has on the yellowing of paint in the absence of light. If other laboratories have studied this problem we would appreciate comments.

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F. L. STEELE

Gloss White Lacquer, TL-5083-D

A great number of complaints have been received in the past regarding the discoloration of our Gloss White Lacquer, TL-5083. The lacquer was turning yellow in the can after being in storage for any length of time. In March 1953 samples of the lacquer were set aside with certain additives and stabilizers as follows: