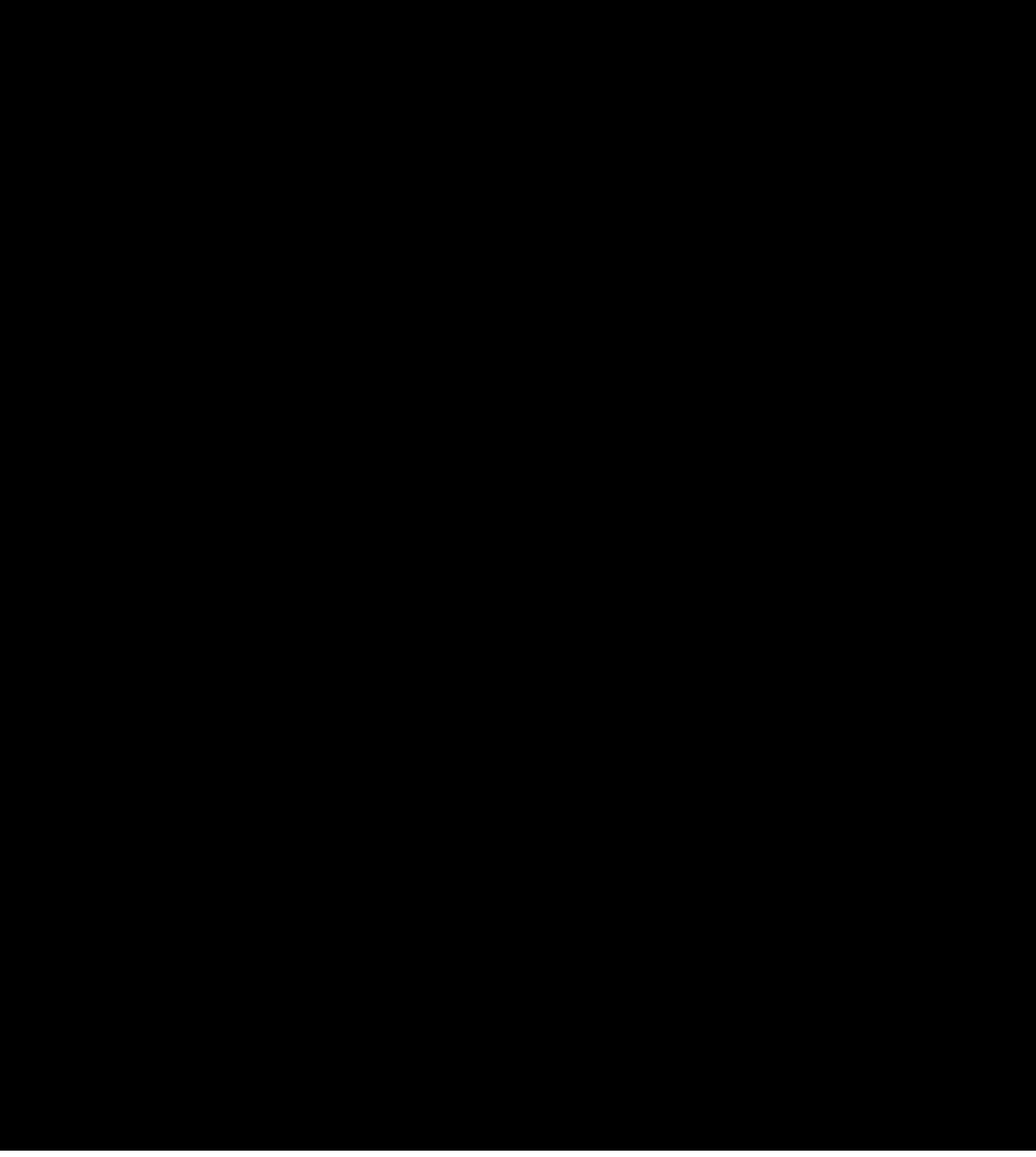




RESEARCH PROGRESS REPORT FOR DECEMBER 1946

Paint Laboratory

Specifications

1. - TT-E-508 - Federal Specification

Interior Semi-Gloss White Enamel, RGL-18500. Brush full body. Set in 1/2 hr. Dry hard in 16 hrs. Oleoresinous type product.

2. - TT-P-146 - Federal Specification

Gray Floor Enamel, RGL-14481-A. This formula is an oleo-resinous gray floor enamel based on TT-V-121 varnish. We have had to reformulate to include 30% of the varnish as V-742 in order to pass the water test.

R-14 Light Para Toner Replacement

In an effort to alleviate the shortage of para toners and also to reduce the bleeding tendencies of our syndicate red enamels, the following combination has proved acceptable:

R-167 (Penn Red C Lithol)	37%
YW-70 Red Orange (Calco)	63%

The mass tone is cleaner and brighter; hiding power is greater; but exterior permanence is poorer tending to go brown on exposure. This is not too important since the substitution is being made only in interior enamels.

The cost is \$44.20 per 100 lbs. as compared to \$75.00 per 100 lbs. for R-14. This allows for the inclusion of additional hiding or for a substantial saving in cost.

Fungus Resisting Whites

In our September 1946 report there is a list of fungus resisting whites applied at various times from March 1946 to May 1946. Further paints were applied on November 15th, and these are listed in the October 1946 report.

Of the earlier paints, #2 containing 5% of CH-206 on the weight of the paint solids is the best. 3% Shirlan, 3% G-4, or 3% Phenyl Mercuric Oleate are insufficient in 12-W-209-B. The other tests are failing with the #4 vinyl enamel which contained no fungicide showing a complete coverage by a green strain of mildew.

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Those tests applied 11/15/46 are noted as follows:

- #18 - 12-W-209-B / 4% Phenyl Mercuric Oleate is noticeably spotted with black mildew growth.
- #15 - 12-W-209-B / 4% Hyamine 3258,
- #16 - 12-W-209-B / 4% of G-4, and
- #17 - 12-W-209-B / 4% Bionol EC Powder as well as
- #12 - Control both coated and uncoated with DDT are all showing signs of mildew growth in mortar joints only.

The other paints in the series are showing no growth. It appears that the original recommendation of 5% Dowicide based on paint solids is equal or better than anything we have tested so far.

Mr. Pratt has made some interesting investigations on Y-569 insofar as manufacturing goes. We refer you to this month's Specialties report which contains this information.

Investigation of Water Permeability of House Paint Films

We have been invited to participate in an investigation being conducted by the Bureau of Ships Laboratory of the Phila. Navy Yard in conjunction with the Technical Committee of the Phila. Paint Varnish and Production Club in which the water permeability of paint films is being measured with the thought in mind that this may be an index of the value of a protective coating, or perhaps limits of permeability might be set in order to obtain certain characteristics in a metal primer or a house paint as typical examples. However, these are ultimate objectives. The following immediate objectives are outlined;

1. To determine the pigment volume concentration - permeability relationship in both a metal primer and a house paint.
2. To determine the p.v.c. - permeability relationship of each individual pigment used in the metal primer and the house paint.
3. To determine whether the permeability of the primer or paint at any given p.v.c. can be calculated from the permeability data of the individual pigments.

The primer work will be based on a pigment combination of 44.7% Asbestine 5X and 55.3% zinc yellow incorporated in 52-R-13 type alkyd resin at p.v.c.'s of 10, 20, 30, 40, 50, and 60. These paints will be reduced to 75 KU for application with mineral spirits. These paints will be made by another laboratory. Our laboratory will prepare the house paint system based on the following typical paint at 28.5% P.V.

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W-91	150 lbs.	
W-11	350 lbs.	
W-6	500 lbs.	
O-52	66½ gals.	
O-134	7½ gals.	
VM-433	0.33 gals.	(0.025% Mn.)
VM-430	0.33 gals.	(0.025% Co.)
VM-432	2.00 gals.	(1.000% Pb.)
S-43	To 85 KU	

Paints of 15, 20, 25, 28.5, 30, 35, 40, 45, and 50% p.v.c. will be prepared as well as paints of the individual pigments in like p.v.c.'s.

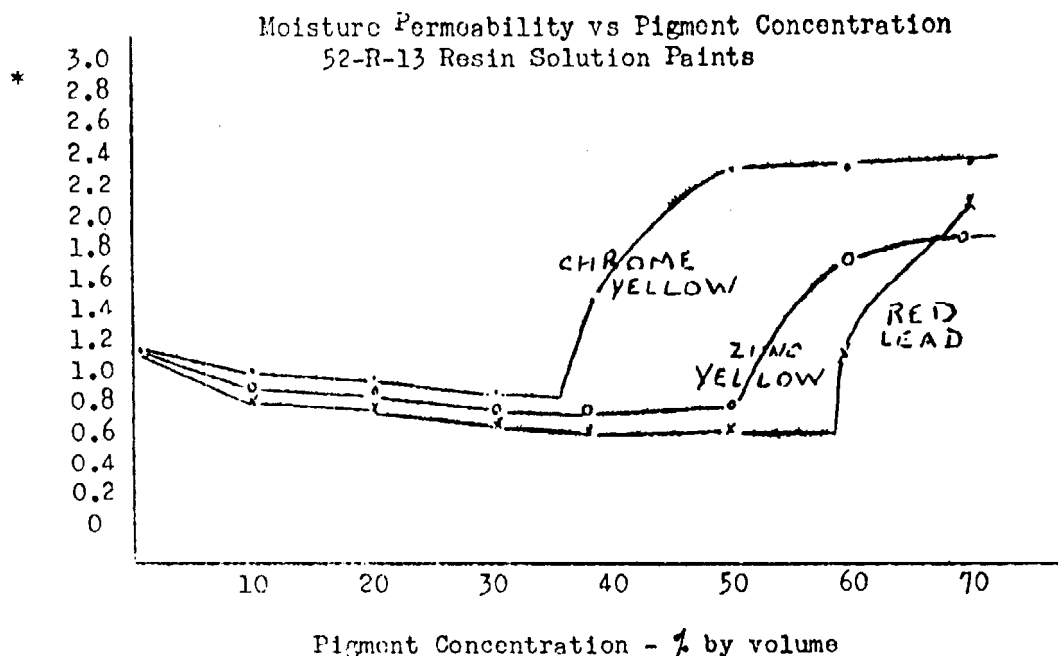
Permeability tests will be run by the U. S. Navy yard personnel and weathering tests will be conducted in our own weather rack. We will try and find some correlation between water permeability and durability. This work is of interest in connection with house paint and in connection with metal primers and is a result of Dr. VonElm's work at New Jersey Zinc.

In our tests we are also including the following house paints at 28.5 p.v.c. to note the effect of pigment on permeability:

1. W-150 (micronized asbestine) replacing W-11
2. W-63 (whiting) replacing W-11
3. York whiting replacing W-11

These paints will also be given exposure tests.

The data collected by Dr. VonElm of New Jersey Zinc Co. is shown on the chart below and illustrates the critical point in the p.v.c. as discussed above.



* Log Permeability Constant P in
Mg/Mil/Day/Cm²/Cm.Hg.

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Metal Primers

We have started a series of primer tests, and these primers were applied on untreated bright aluminum, on steel, and on zinc bond metal. One set of steel panels was painted with the materials when freshly made. Some of the paints were reactive and fatty acids and litharge, very highly reactive materials, were added prior to painting as has been the custom with some companies. It was thought of interest to note how these primers made with highly reactive ingredients would weather and protect metal as compared to more neutral products. Obviously these highly reactive materials would have to be added to the primers within an hour or two before painting.

The zinc bond, aluminum, and another black iron panel set was painted after the materials had aged several days. The materials that had the highly reactive materials added to them had bodied considerably and had to be reduced in this latter set.

Three different top coats were put over each primer, and part of the primer was left without any top coat.

Another series of tests was started on aluminum to determine the best system for painting aluminum which is becoming increasingly used in house construction, with special reference to garage doors, etc. This series includes Y-1851 and several other primers with top coats of Endurance House Paint.

Results will be presented when conclusions have been reached.

Specialties

The raw material situation remains critical so that our efforts are mainly directed at obtaining suitable raw material replacements for products already developed.

Brush Restorer

The critical position of the supply of synthetic detergents made the opening up of this subject necessary. A formula has been submitted made up of an oil soap which is currently available.

General Purpose Cleaner

Work is continuing in an attempt to find other suitable anionic detergents which might fit into this picture.

Industrial Cleaners

Work is underway to make a suitable product for cleaning aluminum sheets. The cationic type detergent seems to be the most promising for this type work. More will be reported on this later.

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DDT Insecticides

Considerable amount of testing at several independent laboratories seems to indicate that the synthetic "knock-down" agents are quite effective as compared to the "older" Pyrethrum extracts. The relative efficiencies of Lethane vs Thanito have not been conclusively established as yet.

Fire Retarding Clear Liquid

Work is continuing in an effort to also incorporate insecticidal characteristics with the hope of obtaining some moth-proofing.

Concentrated 2-4-D Solution

A need for a 40% 2-4-D solution was expressed. Formula RL-8591 was developed to meet this. Morpholine in molar quantities with the free 2-4-D acids yields a soluble product. The use of S-5 and S-91 was necessary to insure low temperature stability.

Y-569 - Mildew X

Some work was done on this problem with the idea of attempting to make a more uniform product in production. It was found that pure S-70 is essential. O-5 can be removed from the formula if necessary as it adds nothing to the solubility. However, it does cut down sublimation. It was suggested that the material be packed in 5's for plant use and Boston Bottles for retail trade to cut down excessive sublimation.

Syndicate Florenamel Investigation

Because of the inferiority of our present floor enamel line as compared with competitors' products, we have temporarily replaced V-357 and O-63 in the regular line with V-742. This cost us about 10¢ per gallon more and is only a temporary expedient. A new varnish has been prepared with the same viscosity of V-742 but down to 45% solids which will actually allow us to save money and give a more durable product. This is being checked at the present time.

Grant Maintenance Paints

Work has now been completed in reformulating our Flat Wall Maintenance Paint, RGL-17582-B, for the W. T. Grant Co. This involved a considerable research program to develop a flat wall paint (actually a low sheen semi-gloss) with a sheen between 15 and 20 on the Gardner 60° Gloss-meter which would show neither a color or gloss flash when applied at various film thicknesses. Our new formula is quite foolproof in its non-flashing characteristics, and it brushes easily with no tendency to sag.

In our investigation of maintenance flat wall paints, we found that by building up succeeding coats of oil primer and flat wall paint we eventually got to a point where we got extreme brittleness. We found this was due to the primer in that we were using a "hold out" type product such as RGL-15585. While Y-4516 does not hold out quite as well on porous surfaces, we did find that it gave a much tougher base for succeeding coats of flat wall paint, and we are about ready to discontinue the O-290 type and go to Y-4516.

Incidentally, the new flat wall line, RGL-17551 to RGL-17565, includes fourteen very desirable shades and might be of interest as a maintenance flat wall line to be put in our master painters' products. It seems to be foolproof, at least as far as flat wall paints can be and carries a complete line of shades. It is recommended for serious consideration in our master painters' line.

Our only present trouble with these maintenance products for the W. T. Grant Co. is that we still are working to perfect the semi-gloss wall paints which apparently lose gloss upon aging.

The Ceiling Flat White, RGL-17471-B, was also reformulated mainly for easier production purposes. Several production batches of this formula have been run through the Hy R Speed mill and come out very successfully without laboratory adjustments.

Evaluation of Sulfate and Carbonate Extenders in House Paint

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
W-163	6-1/8	5-5/8	----	5-5/8	5-5/8	5-5/8	5-5/8
W-6	18	18-1/2	18-1/2	20	17-3/8	18-1/2	7-7/8
W-1	5-3/8	5-3/4	5-3/4	4-1/4	6-3/4	5-3/4	2-5/8
W-10	1-9/16	----	----	----	----	----	----
W-11	5-15/16	7-1/2	5-3/4	7-1/2	7-1/2	----	----
W-143	----	----	7-3/8	----	----	----	----
W-63	----	----	----	----	----	7-1/2	21-3/8
W-91	----	----	----	----	----	----	----
York Whitening	----	----	----	----	----	----	----
W-75	----	----	----	----	----	----	----

	Y-1800-X	1-W-214	(9)	(10)	(11)	(12)	(16)
W-163	----	----	4-3/16	4-3/8	4-3/8	4-3/8	5-5/8
W-6	15	14-3/8	18-1/2	18-1/2	7-7/8	7-7/8	18-1/2
W-1	----	----	5-3/4	5-3/4	2-5/8	2-5/8	5-3/4
W-10	3-1/8	----	----	----	----	----	----
W-11	9-17/64	13-3/4	----	----	----	----	7-1/2
W-143	----	3-13/64	----	----	----	----	----
W-63	----	----	----	----	----	----	----
W-91	4	----	----	----	----	----	----
York Whitening	----	----	6-3/4	----	21-1/4	----	----
W-75	----	----	----	6-3/4	----	21-1/4	----

Conclusions: - It appears that in a white, asbestine is still the best inert, giving the best appearance and best durability. The next best thing appears to be our Campbell Whiting, and this has a slightly cleaner appearance than York Whiting which has been recommended by the DuPont Co. However, the DuPont Co. have not recommended it for whites, and we can see from the panels, which are 1½ years old, that it is not as good as the asbestine or even our present whiting. The calcium sulfate as an inert was probably about as good as our regular whiting. It was noted, however, that if higher amounts of whiting were put in, the durability dropped sharply, whereas with the asbestine it was not noticeable. Also, in this same series of tests it was noted that small changes up or down in zinc or lead had no effect whatsoever.

Another series of tests was run on tints, and here York Whiting showed better color retention than the regular Campbell Whiting, but this difference was not great. Also, the tint retention seems to be better here than in the case of asbestine. Either the sulfate, the Campbell Whiting, or the York Whiting were better for tint retention than the asbestine. For durability there did not seem to be any noticeable difference. However, because of what we generally know, our recommendation for tinting house paints would be probably half asbestine and half whiting.

Evaluation of Non-Staining Pigment Combinations in the Syndicate Regular Quality House Paint

In this series, the regular lithopone-whiting formula was the control, and then combinations of W-66, W-163, W-170, Titanox A24 combined with asbestine and barytes and barytes and whiting were exposed.

Conclusions: - It appears from the above that with barytes in any formula there is a retardation of cleaning and not a great deal of increase in durability. Here again the indications are that we can use a non-chalking or semi-chalking grade of titanium with asbestine and whiting to get a cheap, non-staining, more durable paint than by using lithopone and whiting. This series also indicates that it is better not to use straight non-chalking TiO_2 since very bad dirt retention is gotten.

Evaluation of Chlorinated Rubber - Oil-in-alkyd Combination for Super-Quality Floor Enamel

Exposures of green and red enamels in the above quality, two coats over bare wood, have been out since about last March 1946. Results indicate that good products can be made with chlorinated rubber that will dry very rapidly and have good gloss and will hold up on exposure even on wood. This indicates that good floor enamels and good all-around enamels for interior and exterior use can be made by using the right combination of chlorinated rubber, oil, and alkyd.

Industrial Products

Due to the length of this report, industrial developments will be held over for the next report.

JPH:gs

J. P. HARNER

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