Mr. W. R. Tomc
DECEMBER, 1967 RESEARCH REPORT

GLIDDEN - DURKEE DIV.

S.C.M.

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RESEARCH REPORT

December, 1967

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TRADE-MAINTENANCE

EXPOSURE REPORTS

December 1967

SUBJECT: Accelerated Testing

RS97000T4054	RS95000M1154
RS97001T5054	RS9500eI2111
RS97002I9054	RS95004I5114
RS97003I6026	RS95006P1101
	RS95007I4108

CONTRIBUTORS: K. Kramer, H. Lawson

SUMMARY:

Exposures - Exterior

Cleveland - 19 series of new exposures - 147 panels.
Sub-Tropical - 22 series of new exposures - 101 panels.
New Orleans - 2 series of new exposures - 12 panels.
Baltimore - 1 series of new exposures - 7 panels.
Minneapolis - 2 series of new exposures - 12 panels.

G.T.M.G.'s

Nothing new to report.

Weatherometer

The Weatherometer back-log is remaining steady at 35 panels.

Fadeometer

The Fadeometer is once again in operation.

Salt-Sprays & Immersion Tanks

Nothing new to report.

Demineralizer

The Demineralizer is operating to specification with two week intervals between regenerations.

TRADE-MAINTENANCE

FILLERS - MASTICS

December 1968

SUBJECT: Y-5317 Improvement
NT23021T3266

CONTRIBUTOR: H. Sheets

SUMMARY: This work was started to determine if K-1666 can be replaced by RCR-0108 in the Y-5317 formula.

When the K-1666 is replaced on an equal solids basis with RCR-0108 the block filler is too heavy in viscosity and does not level.

A reformulation using 20% AC-61 and 80% RCR-0108 gives a 104 KU viscosit and good leveling, but the filler does not have enough body under the brush and tends to brush out too thin. When the filler dries it leaves holes in the block.

A formulation was made using 52.8 lbs. of Alsibronz mica per 100 gallons of filler. The N-356 silica was cut on equal volume as the Alsibronz wa added. The Alsibronz was added at the end of the grind and required the addition of some of the AC-61 to get all the mica ground in.

The resulting block filler was very thixotropic, filled and leveled quite well, and had a viscosity of 114 KU. After one week at room temperature the viscosity is 116 KU. The filler brushes quite well and does not shrink or develop holes on drying. The filler dries to a relatively hard finish. Water soak and tests for topcoat hold-out will be run.

TRADE-MAINTENANCE

HIGH BODY PAINTS

December 1967

SUBJECT: Develop Hi-Gel Thixotropic Water Paints With Application Properties Of Regular Paints.

CONTRIBUTORS: V. A. Donegan, H. J. Kreinheder, G. Sweitzer
NT26011T3163
NT23029T3263
NT27000T3263

SUMMARY: Reformulation of Ultra Flat continued. Pigment studies for improved uniformity and lap sheen were evaluated.

K-1666 from Reading using Igepal CA-630 was evaluated versus Cleveland plant K-1666. Only scrub resistance was poorer.

Nuvis 44-W, a thickener was tested for improving color acceptance in the revision of Ultra Flat. No improvement was noted.

Deefo 97-2 defoamer was evaluated in Y-5118-F as a replacement for E-624 The 97-2 defoamer was poorer than E-624.

Painter Latex Paint is being reformulated to use K-7255. Besides changing vehicles the product is to be upgraded. An increase of 5¢ per gallon in latex presents excellent scrub resistance compared to the current Y-5370-J. Equivalent hiding was obtained using Zopaque R-77-S, calcium carbonate, talc, and clay. Brushing properties were poorer than those of Y-5370-J, but acceptable. The best combination of brushability and flow was obtained with a small addition of Kelzan.

DISCUSSION: Work continued on the K-7255 revision of Ultra-Flat. A slight lap sheen has been noticed with application over bare Upson board, and a tendency for non-uniformity in the brush tracks. In an effort to improve the uniform, replacement of N-356, (amorphorus silica) with Min U. Sil of several sizes (10, 15 and 30 Micron) was studied. Difficult brushing was encountered with the 10 and 15 micron materials. Uniformity and lap sheen were improved with the 30 micron Min U. Sil compared to a control with N-356.

To further study lap sheen a factorial design experiment with five factors was used. Factors studied were P.V.C. - (57-62), thickener type - (Cellosize versus Methocel), thickener level - (3# versus 6#), glycol addition for hold-open time -(2800A° versus a normal batch of K-7255 at 5500A°). The 2800A° batch was prepared on the K-7255 formula for use in this experiment.

The test paints were shaded a medium blue with Dramatone and applied by brush in a 2-1/2 to 3 inch strip around the edges of a one foot

square section of bare Upson board. After drying the center section was rolled with a Dynel roller overlapping the brushed section one inch.

Evaluation of the panels and analysis of the data shows no one single factor, other than viscosity (high thickener level) to be significant. Best results were obtained by several factors interacting; they are Cellosize at the higher level, with glycol and the smaller particle size latex. Further evaluation and study will follow.

A special batch of K-1666, P-617331, from Reading using Igepal CA-630 in place of Alipal CO-436 was evaluated in Y-5118-F. Room temperature, roll, and 140° F. oven stability were equal to, or better than a control using Cleveland plant K-1666. The Cleveland plant material had poorer than normal mechanical stability, coagulating after 4 days roll. A normal batch shows no coagulation after 7 days roll.

Color roll stability with the special K-1666 was slightly poorer than the control, showing slight color flocculation between 4 and 7 days roll.

Scrub resistance of the "special" was lower than the control at 7 days air dry.

	Morest Chart	Unsealed	Japalac
Control	268	245	101
Special	130	160	84

Results are in double strokes. Further testing for storage stability will follow.

Nuvis 44-W, a polysaccharide thickener from Nuodex was evaluated in the K-7255 version of Ultra Flat without RCR-2102. Nuodex claims improved color acceptance and color stability with this material compared to Cellosize or Methocel. Rub-up and color roll tests failed to show any improvement over Cellosize in the K-7255 Ultra Flat formula.

Deefo 97-2 defoamer was evaluated in Y-5118-F as a replacement for E-624. Evaluation was on a pound-for-pound substitution and at a 3/4 replacement level. Defoamer activity was tested at overnight, 4 days and 7 days storage in a 140° F. oven.

Deefo 97-2 defoamer was poorer than E-624 initially and after aging at both levels of substitution.

A complete reformulation of Y-5370-J, Painter Latex, is in process in order to upgrade the current product and to incorporate K-7255 as the vehicle. Reformulation occurred initially at an equal PVC of 69.0%. A formula with K-7255 having 10 pounds per 100 gallons of a permanent plasticizer, Eastman 135 and 25 pounds per 100 gallons of BCA gives quite good film formation

at 50° F. as shown by color difference testing. Alipal CO-436 gives the system good stability and adequate color acceptance as initially investigated.

The addition of 54.4 pounds per 100 gallons, or 5¢ per gallon, of K-7255, lowering the P/C to 63.4%, gives increased scrubability. Over 500 double scrubs over a Morest Chart and 200 double scrubs over Japalac are obtained after seven days of drying at room temperature. After an equivalent dry time Y-5370-J gives 150 strokes over a Morest Chart and 150 over Japalac. The scrub data for the K-7255 paint is quite reproducible. Y-5370-J, however, does not always exhibit the same data as quite low values have been observed.

In order to obtain hiding equivalent to Y-5370-J, several extender systems were employed with Zopaque R-55, W-755. The addition of Nytal 300 in replacement of $CaCO_3$ produced no increase in hiding. The pigmentation of Y-5370-J involving Mineralite Mica 3X and Hydrite MP showed better hide, however, brushability was sacrificed when used with K-7255.

Zopaque R-77-S was introduced to give greater hide. Since enamel hold-out is not a prime prerequisite, the low hold-out characteristics of R-77-S were not considered. R-77-S in combination with Nytal 300, $CaCO_3$, and Al-Sil-Ate, W, clay, was found to give equivalent hide to Y-5370-J when tinted to the same color. This was determined by light scattering techniques.

Brushability is not adequate with the aforementioned pigmentation system. In order to upgrade the brushing characteristics, the HEC level was decreased and various levels of Kelzan were studied. Results show that 1 pound per 100 gallons of Kelzan and 5 pounds per 100 gallons of HEC gives adequate brushing qualities while sacrificing very little in flow and leveling.

The most recent formulation will be examined for color and viscosity stability.

TM-6

TRADE-MAINTENANCE

LATEX PAINT - EXTERIOR December 1967

SUBJECT: EXTERIOR LATEX CURRENT PROBLEMS
NT230231516Z

CONTRIBUTORS: J. Patrick, N. Petro, W. Kirkpatrick, G. E. Pekarek

SUMMARY: Water Leachable Staining (Water Spotting)

The brown water spotting problem associated with Y-3600-T Spred House Paint has been found to be due to the V-2197 long oil linseed alkyd modifier.

Five new Glidden alkyds are being examined as possible replacements for the V-2197. Water spot tests indicated that Y-3600-T based on RE-22484, RE-22485, RE-22486 (safflower alkyds) and RE-22487, RE-22488 (tall oil alkyds) did not exhibit the typical brown staining associated with V-2197 based Y-3600-T.

Water immersion tests on Y-3600-T formulations, based on the subject alkyds, indicate that the tall oil alkyd RE-22488, based system, has the best water resistance. The other alkyd modified systems were judged equivalent to the V-2197 based 3600-T.

A test was also run to establish the early wash off resistance of the subject coatings. The coatings were applied at ambient temperature and allowed to air dry for 40 mintues. The coatings were then subjected to a jet spray of water played continuously across the surface of the coatings for 5 minutes. The control (based on V-2197) started to wash off first, followed by RE-22488, RE-22485, and RE-22486, in that order. RE-22484 (safflower) and RE-22487 (tall oil) based Y-3600-T were not included in this test. These were rejected because of poor roll stability. A repeat of the water spray test allowing an additional 15 minute air dry resulted in the same order of failure.

Thirty day viscosity stability of 3600-T based on the subject alkyds has been determined at room temperature, 120° F., and at 140° F. These data are summarized in Figures 1-3.

Room temperature storage for 30 days indicates that the control 3600-T based on V-2197 exhibits the best stability. The stability behavior at 120° F. and 140° F. is best illustrated by examining Figures 2 and 3. In general the viscosity stability of the V-2197 control at the elevated temperatures was comparable to or fell intermediate between the other alkyd modified 3600-T systems. Exposure tests were initiated for all the subject alkyds at 1/3 and 2/3 alkyd modification levels. (Reference: 7-313, 7-314, 7-345, 7-346, 7-315, N7-315).

stability of the alkyd modified 3600-T may be related to the degree and ease of emulsification of the alkyd modifier. A phase separation study of unpigmented batches (all ingredients of 3600-T minus pigments) was made at alkyd concentrations ranging from 100% alkyd to 30% alkyd using WL-97 control and RE-22488 (tall oil alkyd). The 100% alkyd systems show little or no phase separation on standing. As latex (AC-34) is introduced (90% alkyd, 80%, etc.) the phase break occurs. Y-219 shows phase separation throughout the entire range of concentrations studied (90% alkyd through 30%). RE-22488 (tall oil alkyd) also shows a phase separation from 90% to 40% alkyd, but the rate of separation is slower. The 30% alkyd, 70% latex based on RE-22488 shows little or no phase separation.

SUBJECT: Exterior Latex Product Improvement
WI230 2275262

SUMMARY: The film build, hiding, and lap sheen characteristics of Y-3600-T Spred House Paint need improvement to increase the market penetration of this product.

The following studies have been initiated to improve these properties:

1. High Solids Spred House Paint
2. Thixotropic Spred House Paint
3. Factorial Experiment - Five Factors at two levels.

(1) High Solids Spred House Paint - Y-3600-T Type

Four paints have been prepared at incremental solids increases corresponding to a cost increase of 5, 10, 15, and 20¢ per gallon. Each nickel increase corresponds to a volume solids increase of about 0.5 gallons. The pigment volume concentration was maintained at 30% by adjusting the inert level (Neosil A). Evaluation tests are now underway.

Reference: (J1431-90-1, 91-1, 98, 99)

(2) Thixotropic Spred House Paint

The following grinds have been submitted to Mr. V. Donegan for development of thixotropic house paints based on Tyzor/Kelzan:

a) Y-3600-T with reduced Cellosize content.
b) Y-3600 based on Strodex/Calgon surfactants.

Preliminary results indicated that a low degree of thixotropy was induced. These studies are continuing.

Reference: (1431-89-1, 1431-98)

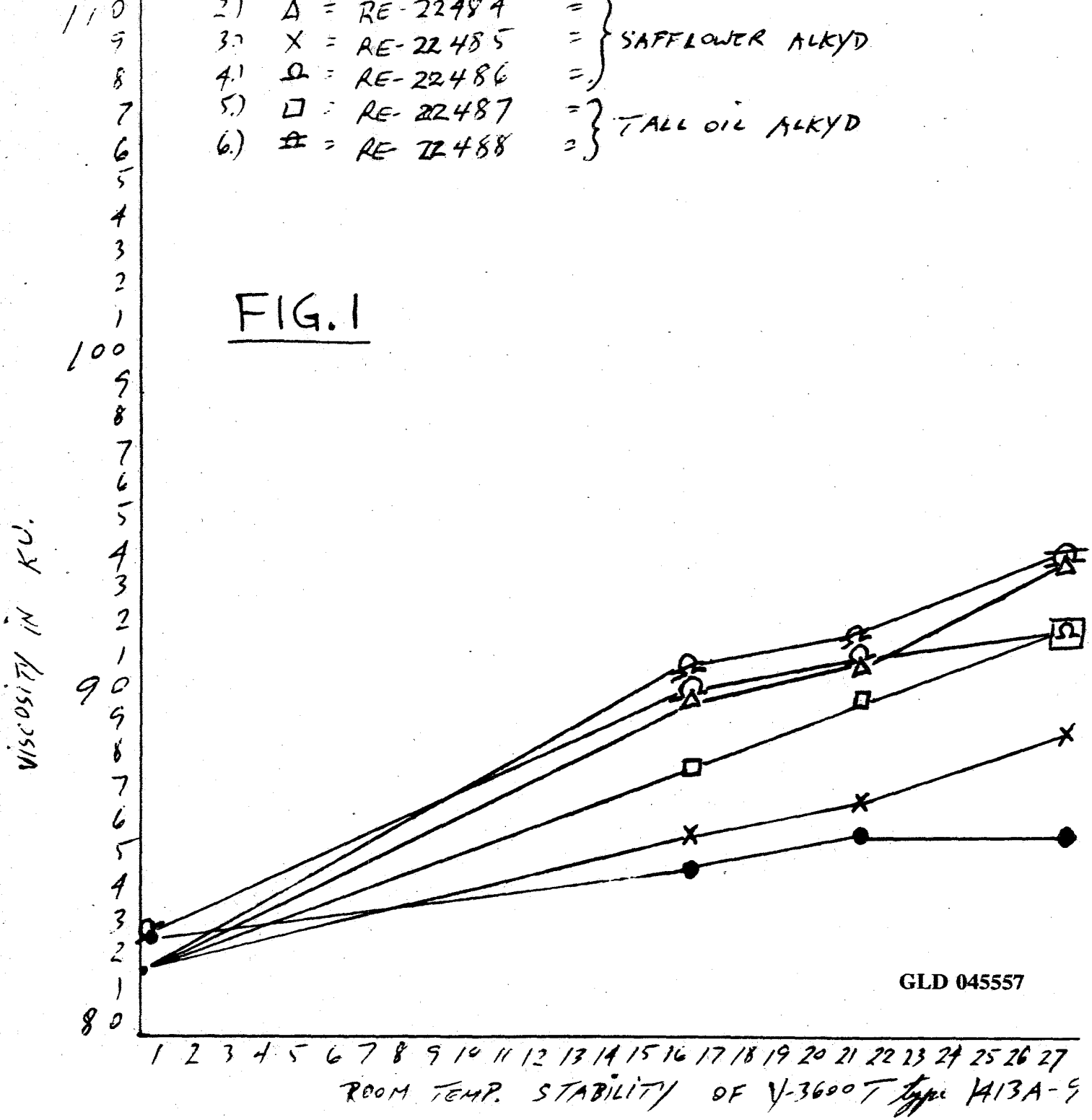


FIG. 1

GLD 045557

12/29/67

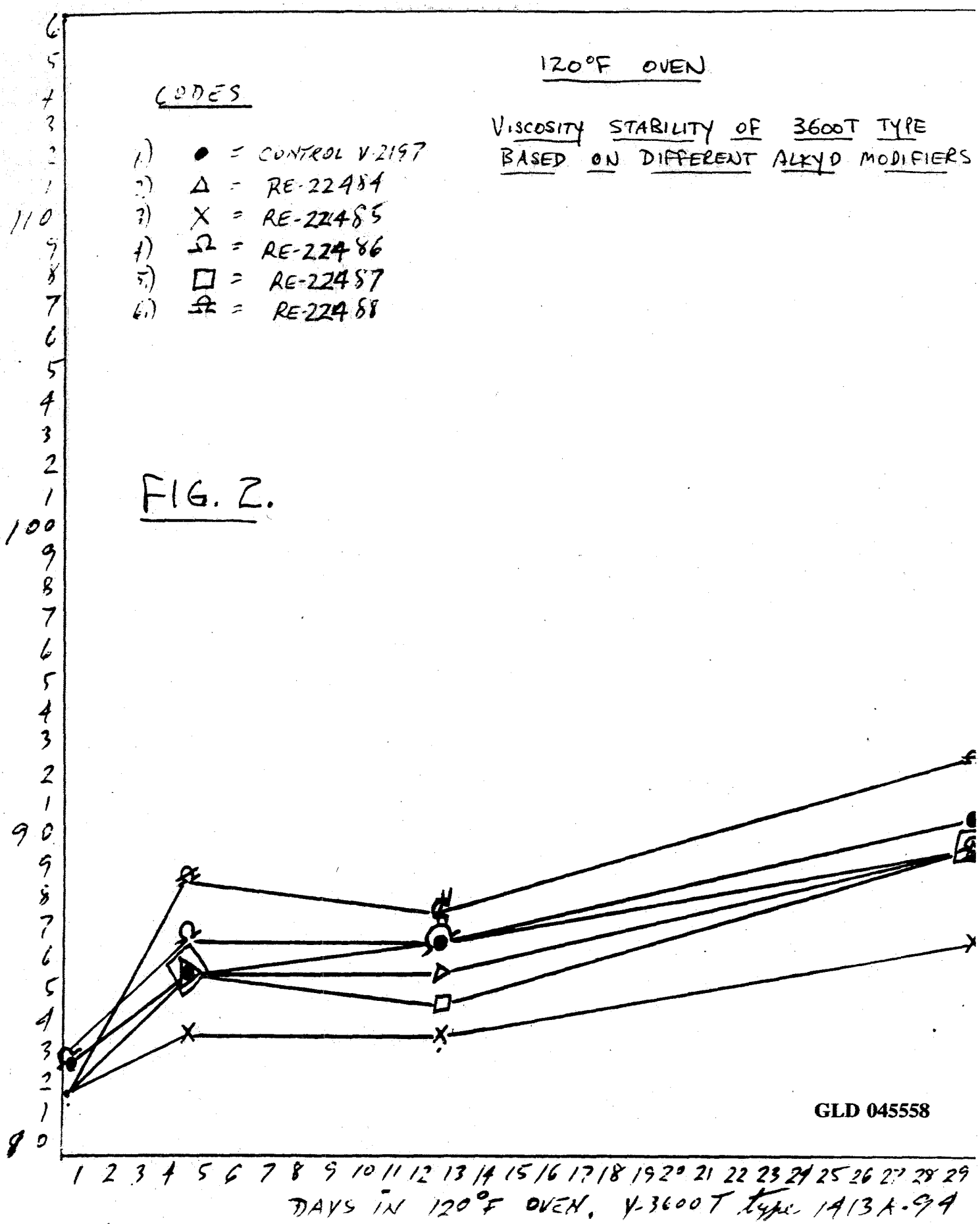
120°F OVEN

VISCOSITY STABILITY OF 3600T TYPE BASED ON DIFFERENT ALKYD MODIFIERS

CODES

1.) ● = CONTROL V-2197
2.) Δ = RE-22484
3.) X = RE-22485
4.) Ω = RE-22486
5.) □ = RE-22487
6.) ⏃ = RE-22488

FIG. 2.



GLD 045558

TM-10 12/29/67

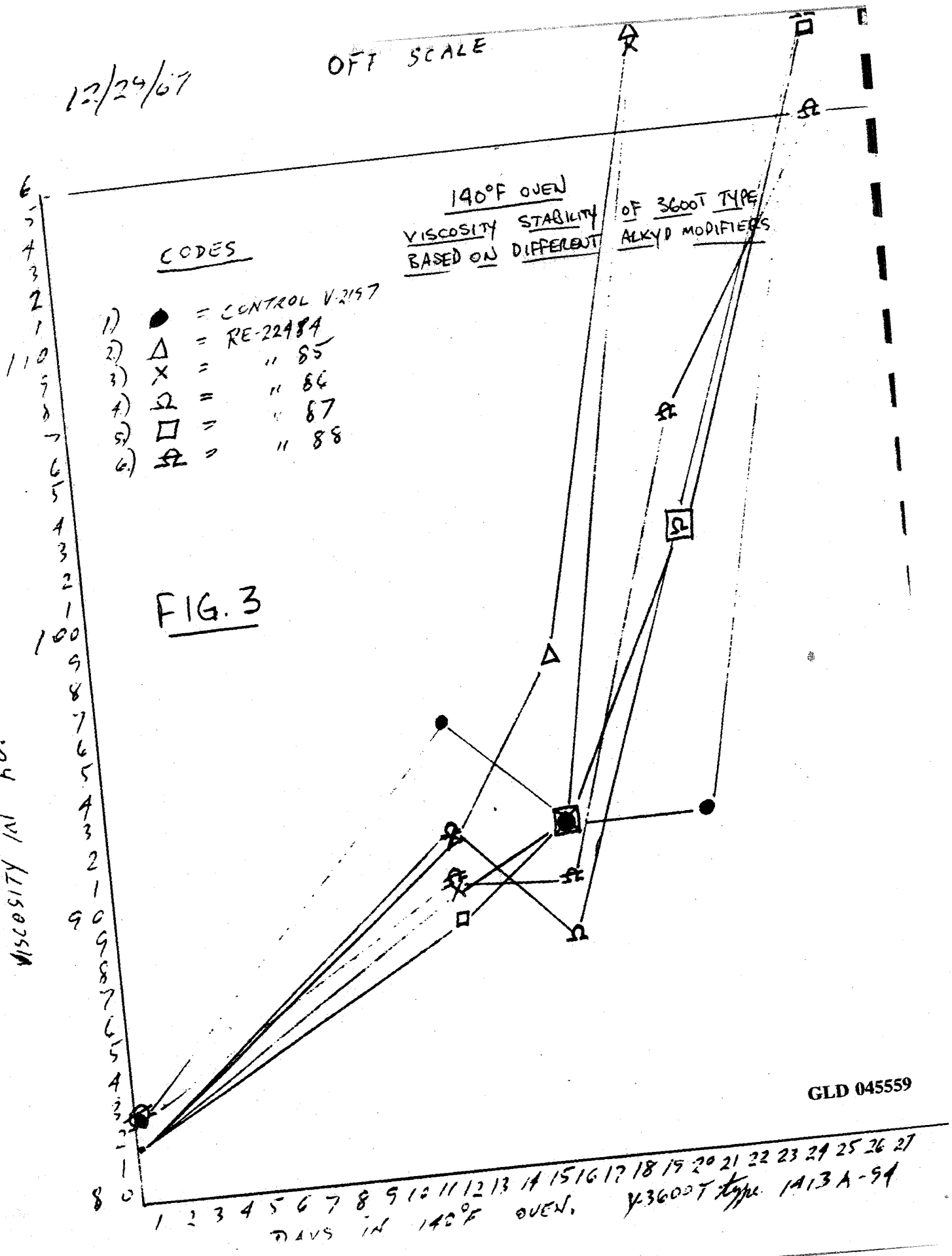


FIG. 3

GLD 045559

(3) Factorial Design

A 2^5 factorial design has been set up and a series of paints are being prepared. The variables included in the study are:

1. Alkyd type: V-2197 (linseed oil alkyd)
   RE-22488 (tall oil alkyd)
2. Alkyd concentration: 66.6%, 30% (binder basis)
3. Thickener level: 4.5, 6.0, lbs./gal.
4. Process variable: Alkyd in grind.
   Alkyd in letdown.
5. Titanium Dioxide level: Standard
   0.75 lbs./gal. increase

Primary emphasis is being placed on the effects of these variables and their interactions on lap sheen, hide, film build, flow and leveling.

SUBJECT: Craftsman Light Tint Base

SUMMARY: Eleven Dramatone colors were evaluated for Weatherometer fading in two Craftsman tint base formulations; (1 oz. and 4 oz. per gallon).

1. 40% PVC - zinc oxide 75#, TiO_2 165#, Camel White 149#, Binder 1/3 alkyd.
2. 40% PVC - TiO_2 175#, Camel White 178#, Binder 1/3 alkyd.

After 300 hours exposure the two formulations were judged to be equivalent. Y-3625 (Gray and Phthalo Green) shows slightly better fade resistance.

The following tints were rejected for severe fading after 300 hours Weatherometer exposure:

Light Yellow (Hansa), Yellow Green, Orange and Fast Red.

The following colors were returned for additional exposure:

Violet, Red Oxide, Phthalo Blue, Phthalo Green, Yellow Oxide, Neutral Toner, and Gray.

One month package stability tests have been completed on the tint base formulations.

Reference: (W7-394-1)

SUBJECT: Complaint Problems
NT23027T3154

SUMMARY: San Francisco reported that a batch of 3600-T (34696EG) was returned in a "kicked out state" from Portland and that a batch of Y-3625 (34696EG) was suspect as a potential problem batch.

1) Y-3600-T - The condition of the "kicked out" batch was duplicated by freezing a control batch. Raw materials and manufacturing procedures are being examined as other possible problem sources.

2) Y-3625 - Quality control tests indicate that this batch is satisfactory in all respects except for viscosity which is below specification.

SUBJECT: Miscellaneous Evaluations

SUMMARY: 1) Ultra-Adhesive's Deefo 97-2 defoamer was evaluated in Y-3625 and found to be inferior to Defoamer 357# our standard defoamer.

2) Color Corporation's Irgazin Violet and 414 Yellow are being evaluated versus Dramatone Violet and Lemon Yellow for Weatherometer fade resistance in Y-3625.

Reference: (W7-413)

TRADE-MAINTENANCE

LATEX PAINT - INTERIOR December 1967

SUBJECT: New Spred Satin Formulations & Development
NT2301/T3263

CONTRIBUTORS: R. Ashcroft, M. Cammarato, R. Kreider

SUMMARY: 1) Three different samples of Methocel 15000, 90 HGDG were evaluated for the purpose of establishing raw material specifications on the seed content. Although the wet films showed different levels of seed content when filmed from a 2% solution, on drying the seeds could not be visually detected. Paints prepared using these 2% solutions showed the presence of seeds before film drying. After drying, however, the seeds left minute holes in the film which reached to the substrate in some cases.

2) Two water dispersed organic red colorants from Hilton Davis were evaluated as possible alternates in Y-3484 Cherry Red. The Toluidine Red colorant appears to disperse readily but does not have the proper tone and cast to be usable for matching the Y-3484 chip. The second sample was based on Naphthol Red and, therefore, was no match for the presently used toluidine red. In addition the Naphthol Red colorant caused the paint to coagulate on short term aging.

3) The Architectural White (Y-3403) formula was re-adjusted to meet the viscosity specification of 85-90 KU. The original formula produced a final paint viscosity of 95-100 KU after viscosity adjustment with water. A reduction in Methocel 15000 90 HGDG was required.

4) A Reading produced batch of Y-3454, P-264 (Green Ice) was sent to the Spred Satin Laboratory from the Quality Control Laboratory for evaluation. This batch was out of specification.

5) Nine defoamers were evaluated for effectiveness in the new Spred Satin. Included in the series was Nalco 121 and Drew 9135X which are coded under the same code number E-624. Nalco 121 was found to be markedly inferior to Drew 913SX. It was recommended that a separate code number be issued to Nalco 121 and that it should not be used in new Satin.

6) During the month of December 1967 the formulations for new Spred Satin produced in the pebble mill and Cowles mill were re-written to include the manufacturing changes found successful in the regions. These formulas now include the up-to-date raw material costs as requested.

DISCUSSION: 1) Evaluation of Methocel for Seed Content

The purpose in carrying out this work was to determine the effect of large amounts of seeds on new Spred Satin films. To do this work the Dow Chemical Co. submitted three samples of Methocel 15000 90 HGDG thickener having different levels of seed or gel particles. Two percent solutions were made and films made on hiding power charts. In the wet films it was visually apparent that the seed content varied in the samples. On drying the films showed no signs visually of any seeds present in the films.

Paints were then made based on Y-3418 in which the thickeners were introduced. These paints were again drawndown over a hiding power chart with a three mil Bird applicator. The wet paint films showed small particles were present but on drying no visual signs of the small seeds or gel particles was apparent. All three paints were equal. Based on the information obtained in this work it does not appear justifiable to set up rigid quality control specifications for Methocel 15000, 90 HGDG in new Satin.

2) Water Dispersed Colorants From Hilton Davis

Initial manufacture of Cherry Red imposed a supply strain on Holland Color to supply Toluidine colorant for use in Cherry Red (new Spred Satin). Hilton Davis supplied us with two colorants based on toluidine and naphthol red. Both colors failed to approach the color required in order to match the Cherry Red chip. The toluidine colorant dispersed readily and the paints showed satisfactory stability when heat aged at 140° F. Their naphthol red, however, caused the paint to coagulate on heat aging. The cause of this situation is unknown. No further work is planned with either of these colorants.

3) Architectural White (Y-3403)

The Cleveland plant informed the laboratory that Y-3403 failed to be in the viscosity specification after final adjustment. The viscosity specification of Y-3403 was established by application of the paint by brush to be 85-90 KU. In some instances Cleveland's production of Y-3403 was 95 to 100 KU. Verification of these results were forthcoming from Atlanta. Based on these comments laboratory work was done to specify reduced levels of Methocel 15000, 90 HGDG. Reduction of the Methocel amount by 0.25 pounds per 100 gallons allowed the final viscosity adjustment to place the final paint viscosity on specification

4) Evaluation of Reading Satin Production
Green Ice Y-3454, P-264

This sample was submitted to Quality Control and was subsequently sent to the Satin Laboratory because of deviations in physical properties This batch was compared against Cleveland production Y-3454, P-607. The hide was a trace less than P-607 and the match was a mismatch to the chip. The following physical constants were obtained:

	P-264	Specification
Pounds per Gallon	11.10	11.25 ± 0.15
Viscosity	106 KU	90-95 KU
pH	7.7	7.0 - 7.8
Solids, weight	48.6%	50%

It was concluded that this batch was abnormal and failed to meet release specifications.

5) Evaluation of Defoamer Candidates for Spred Satin

A total of seven defoamer candidates and a re-evaluation of Drew 913SX and Nalco 121 which are both listed under the same code number, E-624, was made during the month of December. The defoamers are listed below:

E-624 - Drew 913-SX	Hodag PV-22
E-624 - Nalco 121	Hodag PV-93
North G.L.N.	Hodag Q-324
Nopco NDW	Colloid 600
	Colloid 677

Duplicate testing of Drew 913SX and Nalco 121 by roller, brush and heat aging for defoamer effectiveness showed conclusively that these two defoamers are not alternate materials for use in New Spred Satin. Nalco 121 failed to collapse the copious foam generated under the roller. This information and recommendation was made to the plants.

Of the remaining defoamers only North's GLN looked equal to Drew 913SX. This defoamer is being aged at room temperature and will be tested for defoaming efficiency after 3 months.

6) Re-Writing Of New Spred Satin Formulations

Complete revisions of the Satin formulation was made both on the pebble mill and Cowles procedures for all tint bases and ready-mixed colors. These precedures incorporate the latest manufacturing methods used successfully in the regional plants.

SUBJECT: Experimental Latices In Semi-Gloss Latex
NT27001T3363

CONTRIBUTOR: H. Sheets

SUMMARY: A portion of this work involved the evaluation of experimental latices, 1580-10A and 1580-10B, in the typical semi-gloss latex formula. 1580-10A and B are diacetone acrylamide containing latices.

In one set of formulations the 1580-10A and B were used to replace AC-61 only in the semi-gloss, and in another set of formulations they were used as a replacement for both AC-61 and RCR-0108.

All semi-gloss paints based on the 1580-10A and B were quite brittle and were quite poor in wet adhesion on the scrub test.

The epoxy ester emulsion 611-Q was also evaluated as a replacement for AC-61 in the semi-gloss formula. The 611-Q gave good film flexibility and dry adhesion, but was not quite as good as AC-61 in wet adhesion.

SUBJECT: Latex Semi-Gloss

CONTRIBUTORS: H. Carroll, R. Venus, F. Wickert, J. Scarry

SUMMARY: Throughout the month of December 1967 work continued on the stabilization of the Y-3700 line Semi-Gloss, particularly the high hide white formula containing 280 lbs. of TiO_2.

Work conducted in this area in recent months has revealed fairly conclusive evidence that the stability of the Y-3700 formula decreases with increasing TiO_2 levels. It is not completely understood why this is so, but nevertheless a number of surface active agents were tested as a means of correcting the inherent problem.

DISCUSSION: Of the surfactants employed, Gafac LO-529, an organic phosphate ester, was of particular interest. When added to the grind at a level of 3 lbs. per 100 gallons it improves the dispersion of the millbase. When used in combination with letdown surfactants E-239 or E-237 and E-133 it aids stability. These conclusions have been confirmed by and observed 9-10 KU increase in viscosity after 14 days in the 140° oven. With the surfactants employed in the current Y-3700 formulas, the 280 lbs. TiO_2 levels either kick-out or exhibited a significant increase in viscosity.

It was also observed that 2 lbs. per 100 gallons of E-133 in the letdown gives a definite improvement in oven stability. Both E-237 and E-239 aid oven stability also. E-237 gives slightly increased stability. E-239 gives a little sharper gloss.

Initial batches of Y-3700 line were started in Toronto for T. Eaton. No major problems were encountered in the productions made with supervision from Cleveland other than a lower gloss than expected. Later batches made with RA-45 replacing R-900 gave gloss increases of 8-10 units.

TRADE-MAINTENANCE

MISCELLANEOUS December 1967

SUBJECT: Water Thinned Floor Paint
NT24100T3364

CONTRIBUTORS: E. E. Saville, R. W. Kreider

SUMMARY: 1. A list of properties to be considered before releasing a water-thinned floor paint is given.

2. Glidden Polyurethane Florenamel will be used as a standard to be matched, if possible, in a water-thinned paint.

3. Sherwin-Williams' Loxon, Pratt & Lambert Floor Paint, Dutch Standard Floor Paint, and Rohm & Haas suggested formula F-254 have been studied for comparative performance.

4. K-7255, Rhoplex AC-61, Arolin 376, Polytex 611-Q, Monsanto RF-6315 and V-6014 are being considered for use. A combination of Rhoplex AC-61 and V-6014 shows potential.

REPORT: 1a) Properties to Consider In Floor Paint Formulation

A list of properties have been considered in formulating floor paint systems. This check-list will be reviewed before releasing a paint for production.

1. Storage Stability
2. Colorant Acceptance
3. Odor
4. Ignition Temperature - flash point.
5. Application
6. Flow and leveling.
7. Tool clean-up.
8. Drying.
9. Hiding
10. Appearance
11. Performance over substrates.
12. Durability - Interior-Exterior
13. Floor clean-up.
14. Heat resistance.
15. Discoloration
16. Floor wax acceptance.
17. Manufacturing procedure, types of production.
18. Cost
19. Control procedures.
20. Limitations

2a) Control Paints For Formulating

Glidden Polyurethane Plastic Florenamel, a solvent paint, will be used as a standard to approach in formulating water thinned floor paints. This paint does not have the easy brushing or easy clean-up of a water-thinned paint but appears to have other fine properties.

3a) A simple screening test has been used to evaluate paints. Drawdowns are made on glass and one and two coats are brushed on asbestos board. Water immersion, abrasion and clean-up tests are run on these panels.

4a) Combination of vehicles were tested using the same procedures as in 3a). A straight latex paint made with K-7255 blistered and seemed too brittle. K-7255 modified with Polytex 611-Q had slightly better adhesion but slightly greater water sensitivity.

Spred Satin (new) C18A is extremely flat and absorbed water rapidly.

Glid-Gloss 15055 No. 2 has a suitable gloss but appears too water sensitive.

Arolin 376, ADM, remains water soluble.

Arolin 376 plus driers reduced the water sensitivity.

Arolin 376 made into a paint had a high gloss but also had a high degree of water sensitivity. The high cost of Arolin 376 makes it impractical at this time.

Arolin 376 combined with Rhoplex AC-61 had a decided reduction in gloss.

Rhoplex AC-61 has good water resistance and is being considered the base latex for further studies.

By combining AC-61 and V-6014 a good brushing, fair leveling paint has been developed with good abrasive resistance and good water resistance. A high loading of the oleoresinous binder increases the dry time to 16 hours. However, V-6014 must be made with a non-yellowing oil before it can be practical for a floor paint.

At present a combination of high amount of latex with a low amount of alkyd or oleoresinous binder looks most favorable for a floor paint.

SUBJECT: Water Reducible Speedenamel
NT28002T5362

CONTRIBUTOR: H. Sheets

SUMMARY: A blend of Spencer Kellogg D.V. 1695 and ADM Arlon 376 at 12½ to 87½% of each respectively appears to give the best combination of cure and gloss in the water reducible Speedenamel

formulation. The initial formulations were adjusted to about 75 KU viscosity. At this viscosity they tended to cause "drag" on the brush, and picked up 9-10 KU in about 1 week at room temperature. The viscosity of later formulations was reduced to 63-64 KU and there was very little viscosity pick-up. The viscosity reduction was obtained with little reduction in solids, by increasing the amount of Cellosolve and decreasing the amount of water used in the letdown.

The lower viscosity formulation brushes much better, but tends to sag at around 3 mils wet. This was overcome by the addition of 6 lbs. per 100 gallon batch of Bentone 27.

At present the best drier combination appears to be lead, cobalt, manganese, and zirconium, with Exkin No. 2 for anti-skin.

A primer based on D.V. 1695 was also formulated. The primer contains 1 lb. per gallon of Busan 11, and can be used on wood or metal as it is reduced in low odor mineral spirits rather than water, but water can be used for cleanup of the equipment used. The primer gives very good hold-out when topcoated with the water reducible topcoat or the standard Speedenamel.

A series of metal and wood Weatherometer panels have been prepared using the water reducible system vs.. the standard Speedenamel. A series of metal panels also have been prepared using the water reducible versus standard for salt spray, humidity and water immersion tests.

TM-20

SUBJECT: To Work Out Concentrated Dramatone Colors

CONTRIBUTOR: F. Coenen

SUMMARY: A concentrated Dramatone Red Oxide, 100% stronger than the standard material, and a concentrated Neutral Toner, 50% stronger than the standard material, have been developed.

DISCUSSION: In the realization of the idea to shade deep hues with a concentrated Dramatone color, some facts have to be considered in order to understand the possibilities. Based on the difference of actual pigment-load in each of the standard Dramatone colors, a uniform increase in color strength of all our Dramatone colors cannot be achieved. Eight colors of our line will allow a 50% or 100% increase in color strength, whereas Yellow Oxide, Orange and Lemon Yellow do not allow increased pigment loads, for the pigment volume in the standard material is already very high. Any further increase would result in unacceptable consistencies. This consistency is the most characteristic fact with regard to possible increases in color strength of any given color. For the predispersed material in the Cowles, mixer must have fine flow properties in order to go through the sand mill.

Based on these facts, Red Oxide could be made 100% stronger, and Neutral Toner 50% stronger, even though both colors allow somewhat higher increases. That cannot be done, or should not be done, for the ratios of standard color to concentrated color would give the color lab great difficulties with later work.

The ratio of standard Red Oxide to concentrated Red Oxide = 1 to 2, respectively. The ratio of standard Neutral Toner to concentrated Neutral Toner - 2 to 3, respectively.

The new Red Oxide would allow an addition of 8 fl. oz. per gallon with a color strength of 16 fl. oz. standard Red Oxide. The new Neutral Toner would also allow an addition of 8 fl. oz. per gallon with a color strength of 12 fl. oz. standard Neutral Toner.

F. Coenen

(Suggested Code Number: RFT-67005-H-50) = 50% stronger than standard.

RFT-67005-H Concentrated Dramatone Neutral Toner

For Production Evaluation

100 Gallons		Cowles Mixer & Sandmill		R7M-21C
C-711	24.96%	37.05 Gals.	345.00 Lbs.)	
S-714	9.62%	15.88 "	133.00 ")	Mix First
C-834	6.71%	10.50 "	92.80 ")	
E-133	3.83%	6.60 "	53.00 ")	
B-312	.48%	.42 "	6.60 ")	Cowles Mixer: Up to 120° F.
J-4637	53.53%	28.22 "	740.00 ")	
E-231	.72%	1.08 "	10.00 ")	Reduce speed and add: Mix for 5 minutes.
E-419	.15%	.25 "	2.00 ")	Then Add: Mix for 2 minutes.
	100.00%	100.00 Gals.	1382.40 Lbs.	

Slow Sand Mill Pass Necessary

N.V.B. Volume: 45.92%
N.V.B. Weight: 64.73%

Vehicle Solids:	10.72%
Pigment:	54.01%
Volatile:	35.27%
	100.00%

(Suggested Code Number: RFT-67003-K-100) = 100% Stronger than standard.

RFT-67003-K Concentrated Dramatone Red Oxide For Production Evaluation

100 Gallons	Cowles Mixer & Sandmill		R7M-13A
C-711	17.14%	31.59 Gals. 294.00 Lbs.	)
S-714	10.26%	21.06 " 176.00 Lbs.	) Mix First
E-231	.58%	1.08 " 10.00 "	)
			Then Add:
C-834	5.15%	10.00 " 88.40 "	)
Aldosperse ML-14	.49%	1.00 " 8.40 "	)
Pegosperse 200-ML	.48%	1.00 " 8.20 "	) Mix Again
Tween 20	.54%	1.00 " 9.20 "	)
			Cowles Mixer:
N-413	4.72%	3.58 " 81.00 "	)
R-4098	7.00%	2.80 " 120.00 "	) Go up to 120° F.
R-509	50.14%	20.04 " 860.00 "	)
			Reduce Speed & Add:
Lec. Alc. W-14-B-X	1.03%	2.00 " 17.60 "	) Mix for 5 minutes.
E-133	2.35%	4.60 " 40.40 "	)
			Then add:
E-419	.12%	.25 " 2.00 "	) Mix for 2 minutes.
	100.00%	100.00 Gals. 1715.20 "	

Needs A Slow Sandmill Pass

N.V.B. Volume: 46.20%
N.V.B. Weight: 72.05%

Vehicle Solids: 10.19%
Pigments: 61.86%
Volatile: 27.95%

100.00%

Lecithin Alcolec W-13-B-X from The American Lecithin Co.

(Suggested Code Number: RFT-66041-F-100) = 100% Stronger than standard.

RFT-66041-F Concentrated Dramatone Phthalo Blue For Production Evaluation

100 Gallons	Cowles Mixer & Sandmill		R8A-2A		
C-711	8.90%	10.00	Gals.	93.00	Lbs.)
S-714	19.14%	23.91	"	200.00	")
C-834	7.65%	9.00	"	80.00	")
E-133	3.37%	4.00	"	35.20	") Mix First
Lec. Alc. W-14-B-X	1.68%	2.00	"	17.60	")
Flexricin P-1	.73%	1.00	"	7.60	")
E-231	.96%	1.08	"	10.00	")
C-268	.96%	1.08	"	10.00	")
N. Methyl 2 Pyrrolidone	1.63%	2.00	"	17.00	")
					Cowles Mixer:
N-413	17.32%	8.00	"	181.00	")
RV-6909	.06%	.05	"	.60	") Up To 120° F.
B-4714	14.35%	11.76	"	150.00	")
					Reduce Speed & Add
C-711	23.06%	25.87	"	241.00	") Mix For 5 Minutes
					Then Add:
E-419	.19%	.25	"	2.00	") Mix For 2 Minutes
	100.00%	100.00	Gals.	1045.00	Lbs.

N.V.B. Volume: 37.07%
N.V.B. Weight: 46.36%

NEEDS A SLOW SANDMILL PASS

Vehicle Solids:	14.63%
Pigments:	31.73%
Volatile:	53.64%
	100.00%

TM-24

TRADE-MAINTENANCE

SOLVENT REDUCED - TRADE PRODUCTS December 1967

SUBJECT: Exterior Solvent Thinned Paints
NT26042T4262 NT24069T4262
NT23051T4268 NT23051T4268

CONTRIBUTORS: W. Green, R. Ruzicka, J. Southwick

SUMMARIES: 1. A high hiding gelled alkyd house paint as a substitute for Y-5003 in the San Francisco plant has been developed using gelled alkyd RCR-6505.

2. Competitive House Paint Evaluation of Pittsburgh 1-57 and 1-54, Sears 30-25024, 2301-4, S.W. Kem-l-Coat, National Lead 110 and 111, S.W. 473, S. W. 471, Benjamin Moore 100, DuPont and Pratt & Lambert.

3. A feeder drier evaluation in Y-5003 comparing Nuact Paste and Litharge for improved dry stability.

4. An exposure series comparing mildewcides; Vancide PA, Dow 1013 and Super-Adit at 7.2¢, 9¢, and 13.5¢ per gallon in Y-1801, Endurance Non-Chalk and Y-5003 Ultra Hide. Paints were applied to yellow pine and sent to Baltimore and New Orleans.

l) A high hiding gelled alkyd house paint as a substitute for Y-5003 in the San Francisco plant has been made in the laboratory. This paint is made with RCR-6505 and 3 lbs. per gallon of titanium dioxide. RCR-6505 is a 60% N.V. tall oil alkyd made with 5% Versamide 335.

The purpose of this paint is to replace the current oil version of Y-5003 in San Francisco. The high humidity in the coastal areas cause excessive flashing and dry complaints with standard oil paints. Alkyd enamels have sufficient dry to overcome these problems. However, standard alkyd enamels have poor brushing and low build. By gelling these paints with Versamide 335 we are able to obtain excellent brushing paints comparable with Y-5003. We are also able to obtain a measurable increase in film build with no sagging.

A sample of this paint has been sent to San Francisco for evaluation prior to issuing a formula.

2) COMPETITIVE HOUSE PAINT EVALUATION

The primary purpose of this report is to compare competitive paints to Glidden's four new thixotropic oil paints, Y-1803, Y-5003, Y-1800 and Y-1801. Exposure tests have been made in Cleveland, New Orleans, and Baltimore. A special "wall" has been built with a two foot over hang to give a better evaluation of uniformity of exposure from over hang to foundation. This test primarily evaluates dirt pickup and general appearance. Blister exposures are also being run on the GTMG units.

Formulas have been calculated based on the can analysis. The calculated weights per gallon are then compared to actual weights per gallon to determine reproducability of the product in relation to the published analysis. The Pure Pure White from Sears showed too high weight per gallon. Moore's 100, SW's 471 and Moore's 110-01 showed lower weights per gallon. All other paints tested showed good correlation between calculated and actual weights per gallon.

Brushing tests were made to show base of application and hiding. One coat hiding was advertised by five competitors. We claim one coat hiding on all four of our paints. Of the paints tested, only three paints show true one coat hiding -- Y-1803, Y-5003 and Kem 1 Coat. Y-1800 and Y-1801 were very good, but did not equal the top three. Sears Snowhite, Moore's 109-01 and Pittsburghs 1-45 did not give one coat hiding as advertised.

The durability of these paints will be evaluated at a later date.

Reference is made to the hiding chart attached to this report. Hiding is listed three ways. First by amounts of titanium dioxide, secondly by equal film thickness (3 mil drawdown), third by brushouts. The first method is usually a good indication of the best hiding power provided the paints tested are comparable types i.e. oil, alkyd Thixo etc. It does not take into effect such properties as flow, build, toning, solids, and effects of other pigments. The second method is a good test for hiding provided each paint is similar in film build. It shows the effects of toning, other pigments and solids. It does not take into effect flow and film build. The third method is the best

indication of hiding, but is the most difficult to evaluate. All three methods are presented here to show the effects of properly controlling body flow and hiding pigment.

The Moore's 109-01 has a very poor dispersion and does not perform in relationship to the label analysis. Likewise the Sears Snowhite performs better than would be expected from the label analysis.

Included in this report is a table of estimated costs. These costs were calculated from the label analysis and do not represent actual coat. They can, however, be used as a loose guide to compare relative material cost differences. No consideration was given to driers, mildewcides or special additives which might influence cost. For instance, Kem 1 Coat is known to contain 18¢ worth of fungicide. This is abnormally high and would effect the cost above that of a normal amount of additive.

Note that paints containing leaded pigments tend to be much higher in cost compared to zinc oxide paints.

Wade Green

1. Sears - Pure Pure White House and Trim Paint 30-2502 - New label* no formula change - advertizes one coat coverage over any color - 500 sq. ft. per gallon maximum coverage
*This paint was previously sold as Master-Mixed Pure-Pure White.

2. Sears - Snowhite One Coat House Paint - Self Cleaning White 2301-4
Same label - new formula* advertises one coat coverage over any color. Coverage recommended as a maximum of 440 sq. ft. per gallon.
*This formula shows a radical decrease in quality - primarily a drop in titanium.

3. Pittsburgh - Sun Proof House Paint 1-57 - Chalk Resistant
No previous label or formula available - Recommends one or two coats.

4. Sherwin Williams - Kem 1 Coat Premium House Paint A3W15 - New
Paint advertized as exceptional white with guaranteed one coat coverage - flash resistant.

5. National Lead - Dutch Boy 110 Bright White - Self Cleaning
New label, same formula. Recommend 2 coats at 600 sq. ft. per gallon.

6. Sherwin Williams - 473 Trim & Tinting White - New label no previous formula available - Recommends 2 coats.

7. Sherwin Williams - 471 Gloss White - New label new formula
Recommends 2 coats.

8. Benjamin Moore & Co. - 100 Exterior White - This paint is advertised as having exceptional hiding with brilliant whiteness. They recommend two coat work. Same label, same formula.

9. Pittsburgh - Titanic Outside White 1-54 - No label or formula change since 1961. Recommend one or two coats.

10. National Lead - Dutch Boy 111 Gloss White - New label information on formula not available - recommends two coats.

11. Benjamin Moore - One Coat House Paint 109-01 - No data available on old label or formula - Recommended one coat over most repaint jobs.

E.I. Du Pont De Nemours - Trim & Shutter Gloss Enamel 800 - New formula
New Paint Recommendation 1-2 coats at 350-500 sq. ft. per gallon.

13. Pratt & Lambert - 300 Chalk Resistant White - No data on label or formula - Recommended one or two coat work.

14. Benjamin Moore - Moore's House Paint 110-01 - Label and formula data not available - Recommended one or two coat work.

15. Pittsburgh Plate Glass - Sun-Proof One Coat House Paint 1-45 - Same label slight change in analysis. Advertizes one coat coverage.

This table is a list of estimated material costs is based on the can analysis. The Glidden formulas also list actual cost for comparison purposes.

	Cost/Gallon	Actual Cost/Gallon	ZNO	Pb-ZNO	White Pb
Dutch Boy 110	~~2.67~~ 2.32		X		X
Dutch Boy 111	~~2.53~~ 2.27		X		X
Kem 1 Coat	~~2.47~~ 2.09			X	
Moore's 100	~~2.33~~ 1.95		X		X
Y-1803	~~2.29~~ 2.09	2.11	X		
SWP 471	~~2.26~~ 1.81			X	
P & L 303	2.26 1.80		X		
Moore's 109-01	~~2.23~~ 1.92		X		
Y-5003	~~2.22~~ 1.90	2.04	X		
SWP 473	~~2.20~~ 1.74			X	
Snowhite	~~2.18~~ 1.72		X		
Du Pont 800	2.07				
Y-1801	~~1.97~~ 1.65	1.84	X		
Moore's 110-01	~~1.90~~ 1.60		X		
Pittsburgh 1-54	~~1.89~~ 1.57		X		
Pittsburgh 1-45	1.88				
Y-1800	~~1.86~~ 1.71	1.80	X		
Pittsburgh 1-57	~~1.82~~ 1.49		X		
Sears Pure Pure White	1.71				

The above costs do not include any additives that may have been added to the paint.

corrected by memo 1/8/68 Green to Rowell

This chart lists hiding by amount of titanium dioxide, 3 mil draw down, and by brushout.

hiding as rated by:

Amount of titanium dioxide/gal.		by 3 mil draw down	by brushing
Du Pont 800	4.19#	Kem 1 Coat	Y-1803
Pittsburgh 1-45	3.40#	Y-1803	Y-5003
Kem 1 Coat	3.29#	Y-5003	Kem 1 Coat
Y-1803	3.20#	Pitts. 1-45	Y-1800
Y-5003	3.00#	Du Pont 800	Y-1801
Moores 109-01	3.00#	Moore 109-01	Pittsburgh 1-45
*Sears Pure Pure White	2.82#	Pure Pure White	Sears Pure Pure White
Y-1801	2.00#	Y-1801	Moore's 100
Y-1800	2.00#	Y-1800	Moore's 109-01
*Moore's 100	2.00#	Moore's 110-01	Moore's 110-01
*SWP 471	1.95#	Moore's 100	SWP 471
Dutch Boy 110	1.88#	SWP 471	Snowhite
*Moore's 110-01	1.79#	Snowhite	Dutch Boy 110
P & L 303	1.70#	P & L 303	Du Pont 800
Pittsburgh 1-54	1.61#	SWP 473	SWP 473
Snowhite	1.46#	Dutch Boy 111	Dutch Boy 111
SWP 473	1.45#	Dutch Boy 110	P & L 303
Dutch Boy 111	1.38#	Pitts. 1-54	Pitts. 1-54
Pittsburgh 1-57	1.26#	Pitts. 1-57	Pitts. 1-57

This chart lists products in order of ease of brushing.

Y-5003	Excellent
Y-1803	Excellent
Y-1801	Excellent
Y-1800	Excellent
Kem 1 Coat	Very Good
Sears Pure Pure White	Very Good
Pittsburgh 1-57	Good
P & L 303	Good
SWP 473	Fair - Good
SWP 471	Fair
Dutch Boy 110	Fair
Moore's 109-01	Fair
Moore's 110-01	Fair
Dutch Boy 111	Fair - Poor
Snowhite	Fair - Poor
Moore's 100	Poor
Pittsburgh 1-45	Poor
Pittsburgh 1-54	Poor
Du Pont 800	Poor

	Sears Pure Pure White		Sears Snowhite		Pittsburgh 1-57		SWP Kem 1 Coat	
	Formula	Analysis	Formula	Analysis	Formula	Analysis	Formula	Analysis
Titanium dioxide	2.82 #/gal	75	1.46 #/gal	17.2	1.26 #/gal	15	3.29 #/gal	47
Titanium Calcium								
Zinc Oxide			2.94 #/gal	34.5	2.10 #/gal	25	2.49 #/gal	35
Silicates	0.94 #/gal	25	4.12 #/gal	48.3			0.98 #/gal	14
Carbonates					5.04 #/gal	60	0.27 #/gal	4
Busan								
Silica White Lead								
Carbonate White Lead								
Linseed Oil	0.09 gal/gal	10.7	0.50 gal/gal	73.9	0.49 gal/gal	75	0.51 gal/gal	69
Alkyd Solids	0.26 gal/gal	34.4						
Chlorinated Resin	0.09 gal/gal	13.4						
Solvent & Driers	0.43 gal/gal	41.5	0.22 gal/gal	26.1	0.20 gal/gal	25	0.28 gal/gal	31
% Pigment	35.7		61		61.5		54	
% Vehicle	64.3		39		38.5		46	
NV by weight	73.7		89.9		90.4		86.3	
NV by Volume	56.6		78.4		79.7		71.5	
PVC	21.5		35.7		38.2		28.2	
Calculated wt./gal.	10.5		13.9		13.6		12.9	
actual wt./gal.	11.1		13.8		13.5		12.8	
grind	4-5		5-6		2		3-4	
visc.	86 KU		86 KU		79 KU		89 KU	
gloss	67		75		58		78	
3 month gloss	68		56		26		51	
brushing	Very Good		Fair-Poor		Good		Very Good	
cost	1.71		2.18		1.82		2.47	
tinted	Yes		No		No		No	

GLD 045579

	SWP 473		National Lead Dutch Boy 110		SWP 471		Benjamin Moore 100	
	Formula	Analysis	Formula	Analysis	Formula	Analysis	Formula	Analysis
Titanium dioxide	1.45 #/gal	18	1.88 #/gal	20.9	1.95 #/gal	25%	1.19 #/gal	13.6
Titanium Calcium							2.79 #/gal	31.8
Zinc Oxide	*2.90 #/gal	36	2.25 #/gal	25.0	*2.89 #/gal	37	2.39 #/gal	27.3
Silicates	2.99 #/gal	37	2.18 #/gal	24.3	2.96 #/gal	38	1.29	14.1
Carbonates	0.73 #/gal	9					0.10	1.2
Busan								
Silica White Lead			0.96 #/gal	10.7			1.00	11.4
Carbonate White Lead			1.72 #/gal	19.1				
Linseed Oil	0.55 gal/gal	78	0.56 gal/gal	79.1	0.49 gal/gal	70	0.51 gal/gal	75
Alkyd Solids								
Chlorinated Resin								
Solvent & Driers	0.19 gal/gal	22	0.18 gal/gal	20.9	0.26 gal/gal	30	0.209 gal/gal	25
% Pigment	59		61.3		58		61.7	
% Vehicle	41		38.7		42		38.3	
NV by Weight	91		91.8		87.8		89.5	
NV by Volume	81		81.7		73.0		79.0	
PVC	32		31.2		33.0		35.0	
Calculated wt./gal.	13.6		14.6		13.4		14.2	
Actual wt./gal.	13.2		14.4		12.3		13.1	
grind	1-3		3-4		0-4		0	
visc.	82 KU		89 KU		89 KU		90 KU	
gloss	77		48		82		77	
3 month gloss	38		15		48		62	
brushing	Fair-Good		Fair		Fair		Poor	
cost	2.20		2.67		2.26		2.33	
tinted	No		No		No		No	

*leaded Zinc

*
Leaded Zinc

GLD 045580

	Pittsburgh 1-54		National Lead Dutch Boy 111		Benjamin Moore 109-01		Du Pont 800	
	Formula	Analysis	Formula	Analysis	Formula	Analysis	Formula	Analysis
Titanium dioxide	.31 #/gal	2.5	1.38 #/gal	15.4	1.64 #/gal	19	4.19	38
Titanium Calcium	4.35 #/gal	24.7			4.20 #/gal	48.6		
Zinc Oxide	2.00	16	2.30 #/gal	25.7	1.99 #/gal	23.1		
Silicates			2.52 #/gal	28.2	0.80 #/gal	9.3		
Carbonates								
Busan								
Silica White Lead			1.37 #/gal	15.35				
Carbonate White Lead			1.37 #/gal	15.35				
Linseed Oil	0.50 gal/gal	32	0.55 gal/gal	77.9	0.49 gal/gal	73.1		
Alkyd Solids							0.45 gal/gal	37
Chlorinated Resin								
Solvent & Driers	0.28 gal/gal	14.8	0.19 gal/gal	22.1	0.22 gal/gal	26.9	0.42 gal/gal	25
% Pigment	--		61.4		61.5		--	
% Vehicle	--		38.6		38.5		--	
NV by weight	84.6		91.8		89.5		75.2	
NV by volume	71.4		80.9		77.6		57.5	
PVC	29.7		32.3		36.2		21.2	
Calculated wt./gal.	12.5		14.5		14		11	
Actual wt./gal.	12.6		14.3		14		11.2	
grind	1-2		4-specky		0		5-6	
visc	79 KU		89 KU		92 KU		72 KU	
gloss	67		67		68		88	
3 month gloss	42		23		43		78	
brushing	Poor		Fair-Poor		Fair		Poor	
cost	1.89		2.53		2.23		2.07	
tinted	No		No		No		Yes	

GLD 045581

	Pratt & Lambert 303		Benjamin Moore 110-01		Pittsburgh 1-45		Glidden from Anal Y-1801	
	Formula	Analysis	Formula	Analysis	Formula	Analysis	Formula	Analys
Titanium dioxide	1.70 #/gal	12.6	0.97	12.4	3.40 #/gal	30.2	0.86 #/gal	12
Titanium Calcium			2.72	34.8			3.91 #/gal	57
Zinc Oxide	2.93 #/gal	21.7	1.94	24.8			2.04 #/gal	29
Silicates	2.35 #/gal	23.5	0.96	15.7	1.27 #/gal	11.3		
Carbonates			1.23	12.3				
Busan								
Silica White Lead								
Carbonate White Lead								
Linseed Oil	* .53 gal/gal	31.8	0.48 gal/gal	69.6	0.12 gal/gal	8.7	0.46 gal/gal	63
Alkyd Solids					0.23 gal/gal	18.5		
Chlorinated Resin					0.10 gal/gal	8.7		
Solvent & Driers	.22 gal/gal	10.4	0.26 gal/gal	30.4	0/39 gal/gal	22.6	0.32 gal/gal	36
% Pigment	57.8		58.7		--		54	
% Vehicle	42.2		41.3		--		46	
NV by Weight	83.5		86.8		77.4		83.3	
NV by Volume	78.4		74.3		60.8		67.6	
PVC	31.5		35.6		25.1		31.5	
Calculated wt/gal	13.5		13.3		11.2		12.6	
Actual wt/gal	13.3		11.5		11.5			
grind	4-5		5		5-6			
visc	89 KU		84 KU		72 KU			
gloss	80		82		88			
3 month gloss			43		78			
brushing	Good		Fair		Poor			
cost	2.20		1.90		1.88		1.97	
tinted	No		Yes		Yes		Yes	

*Safflower Oil

GLD 045582

	Glidden Actual Y-1801 Formula	Analysis
Titanium dioxide	0.85 #/gal	
Titanium Calcium	3.84 #/gal	
Zinc Oxide	2.00 #/gal	
Silicates		
Carbonates		
Busan		
Silica White Lead		
Carbonate White Lead		
Linseed Oil	0.47 gal/gal	
Alkyd Solids		
Chlorinated Resin		
Solvent & Driers	0.31 gal/gal	
% Pigment		
% Vehicle		
NV by weight	82.3	
NV by volume	69.0	
PVC	31.3	
Calculated wt/gal		
Actual wt/gal		
grind		
visc		
gloss		
3 month gloss		
brushing		
cost	1.84	
tinted		

3) A feeder drier evaluation in Y-5003 shows an improvement in dry. Drier studies were made comparing standard Y-5003 with Y-5003 plus 2 lbs. per 100 gallons of litharge and with Y-5003 plus 5 lbs. per 100 gallons of Nuact paste. The litharge shows a 5 hour improvement in dry. The Nuact paste shows a 5 hour increase in dry. The dry recorded here is not dry-to-touch time but is read as complete film dry. All of the paints dried-to-touch in about 7 hours. These paints will be tested for loss of dry in 6 months.

4) An exposure series comparing Vancide PA, Dow 1013 and Super-Adit at 7.2¢, 9¢, and 13.5¢ per gallon has been made and exposed at Cleveland, New Orleans, and Baltimore. This series was exposed on 4 ft. yellow pine siding. Y-1800-G, Y-1803, and Kem-1-Coat were included as standards. The mildewcide ladders were run in Y-1801 and Y-5003. Both the alkyd and oil version of Kem-1-Coat were used as controls.

SUBJECT: Glid-Tone Varnish Stains - Y-1201, Y-1202, Y-1203

CONTRIBUTORS: D. Sutherland, J. Davis, J. Southwick

SUMMARY: The San Francisco plant has satisfactorily completed the manufacture of the initial batches of the varnish stains that have been revised to comply with Rule 66. This is an entirely new formulation that affords the opportunity to eliminate some specialized varnish cooks from inventory, i.e., V-525 (V-357), V-533 (V-306-C) and V-755 (V-405).

The new formulation is composed of V-2390 (V-863) and V-2283 (V-891), both alkyds, in conjunction with V-415 (replaces V-46). A new gilsonite solution, V-739, has been introduced to replace V-755. The V-739 is easier to manufacture and easier to incorporate in the stains.

We recommend that the new formula be adopted nationally. Besides the obvious inventory advantages, the new material has a substantially lower raw material cost.

If desired the V-415 may be cold-cut in large quantities and used as required, or the resin may be cold-cut in each individual batch - this is entirely up to each production man and the economics involved. It will be necessary, however, to deplete the inventories of the obsolete raw materials, or have an alternate disposition, before manufacturing the new varnish stains.

SUBJECT: D-142, Burnt Sienna Replacement In Glid-Tone Stains
NT26042T4262

CONTRIBUTORS: J. Davis, J. Southwick

OBJECTIVE: To find a suitable replacement for D-142 (Burnt Sienna) which is becoming increasingly difficult to obtain and is used in a number of the Glid-Tone Wood Stain colors.

SUMMARY: A sample of D-142 (BS-6653, Lot 26) from the Chas. Pfizer Company, which, according to them is off specification, was tested in Y-244, Modern Red Mahogany Stain and found to be acceptable.

Also received from Pfizer was a sample of 7852 Burnt Sienna which was a possible replacement for D-144,old code R-21. This was rejected due to the dirtier color of the Pfizer material. Four samples were received from Reading where D-144 was used as replacement for D-142. These samples; Y-244 Modern Red Mahogany, Y-245 Walnut, Y-252 Maple, and Y-258 Fruitwood were tested versus the standards. Results showed in all cases a slightly dirtier, browner tone than the standard but we feel not enough to bring complaints and, therefore, R-144 is temporarily approved as a direct replacement for D-142 in pebble mill batches only. Work will continue to find a final replacement for the D-142.

SUBJECT: Glidden Manufactured Odorless Flat Wall Resin RCR-6507 & Cargill 72245 Versus Standard F-2233
NT27006T4363

CONTRIBUTORS: J. Davis, J. Southwick

SUMMARY: RCR-6507 and the Cargill resin were tested in Y-5718, White Tint Base versus the standard resin F-2233 (ADM). The results show the Glidden material to be equal to the standard in application, enamel holdout, hiding, tint strength, flow, and uniformity. The viscosity of the paint made using the Glidden vehicle is 90 KU's, the minimum for this formulation, while the standard has a viscosity of 113 KU. The lower viscosity of this material can be corrected with minor formula adjustments if necessary. Another pilot plant batch of this material is to be made.

The Y-5718 using the Cargill material has a satisfactory viscosity of 97 KU. As in the Glidden material all properties of the Cargill are acceptable in comparison to the standard with the exception of hiding and tint strength, which is high, and enamel holdout which is slightly poorer, indicating the inability of this resin to maintain as high a PVC as the standard. These problems are easily corrected with the addition of 2-1/2% more resin which lowers the PVC slightly. All materials have excellent package stability after 10 days. All paints have excellent odorless qualities.

CONCLUSION: Both the Glidden RCR-6507 and the Cargill resins are acceptable as replacements for our standard F-2233 if minor formulation adjustments are made. Special formulas will be written for each resin.

SUBJECT: Odorless Alkyd Flat - Low Cost

CONTRIBUTORS: J. Southwick, D. Sutherland

OBJECT: Investigate possibilities of lowering the raw material cost of EGL-64544 and Chicago's A-3000-B.

SUMMARY: An investigation into the reduction of the raw material cost of our low cost alkyd flats has been made. The main approach to this reduction has been through pigmentation. By the use of selected extenders in combination with titanium calcium(30%), flats have been made that maintain high dry-hide with no sacrifice in other properties. The combination of extenders showing the best efficiency proved to be Al-Sil-Ate NC, Nytal 300, and Atomite with up to a quarter of a pound per gallon of diatomaceous silica for flatting. By judicious selection of extender pigments, a saving in the raw material cost of $.05 to $.10 per gallon can be realized.

With the adoption of a Glidden manufactured odorless alkyd resin, the RMC can be dropped another $.05 to $.07 per gallon. The work on this new vehicle is nearing completion.

SUBJECT: Y-5099 Eggshell Stipple Uniformity Evaluation
NT23048T4263

CONTRIBUTORS: J. Davis, J. Southwick

OBJECTIVES: To test several batch retains for Dramatone acceptance and gloss uniformity and to make necessary formulation corrections to eliminate any problems encountered.

SUMMARY: Occasional complaints have been brought to our attention concerning the sheen uniformity of the eggshell stipple after the addition of Dramatone. Several Cleveland batch retains were tested in an attempt to get duplication of the problem arising in the field. One batch which has a gloss of only 10 duplicated the problem others did not. Glosses on batches checked ranged from 20-60 and no uniformity problems were apparent. It was noted that a definite increase in gloss takes place in the package probably due to drier adsorption.

CONCLUSION: If the gloss of all batches are kept above the formula specification minimum, no uniformity problems should appear. However, the formulation will be revised to include Nuact Paste (E-396) to combat the increased gloss in the package. The W-137 (RCHT-X Ticol) will be replaced by our W-138 (RCHT Ticol) which has a

higher oil absorbtion and gives slightly higher hiding and slightly lower gloss. Thixin will be increased from 7 to 10 lbs. for better stipple effect and our gloss specification will be changed from the present 25-30 to 25-35 to allow a wider acceptance range and to help deter any more uniformity complaints from low gloss stipples.

SUBJECT: Spred Lustre - Odorless Flat Alkyd
NT23048T4263 NT27006T4363

CONTRIBUTORS: J. Bednarik, J. Sainsbury, J. Southwick

SUMMARY: The Resin Laboratory prepared a batch of experimental Glidden Odorless Flat Wall Alkyd (RCR-6507) with a trace increase in the Glycerine level. The objective was to compensate for a modified manufacturing procedure.

This resin (1429-A-43) was evaluated in Spred Lustre Y-4618-J and rejected because of insufficient self-sealing properties. Gloss uniformity over substrates of varying porosity is a necessary function of Spred Lustre. Other properties - gloss, viscosity, sag control, application - were acceptable.

SUBJECT: Spred Lustre - Use Of Zinc Oxide
NT23048T4263 NT23053T4268

CONTRIBUTORS: J. Bednarik, J. Sainsbury, J. Southwick

SUMMARY: Incorporation of zinc oxide (W-514 at 10 lbs. per 100 gallons) into Spred Lustre made with both F-2233 (ADM odorless 5555-MO-30) or RCR-6507 (Glidden Odorless Flat Alkyd) showed very little effect. The W-514 was substituted for the 20 lbs. of N-413 in Y-4600-A. No significant effect was noted on dispersion, viscosity, flow, sag control, gloss, uniformity over substrates of varying porosity, application, dry, or hiding.

Periodic examinations of stability, viscosity, drift, gloss retention-hazing, and oven stability are scheduled. Very careful checks will be made into any possible seeding.

SUBJECT: Spred Gloss Enamel - Non-Yellowing
NT23048T4263

CONTRIBUTORS: J. Bednarik, J. Sainsbury, J. Southwick

SUMMARY: Two resin modifications, Damar and Picco 6140-3, are being evaluated in Spred Gloss Enamel White Y-900-A. The objective is the removal of zinc oxide without sacrificing non-yellowing, Yellowingtests, gloss retention, haze resistance, and exposure tests have been initiated. These will be reported as conclusive observations are available.

SUBJECT: Spred Gloss Enamel - Drier Series
NT23048T4263

CONTRIBUTORS: J. Bednarik, J. Sainsbury, J. Southwick

CONCLUSIONS: Evaluation of Mooney Chemicals recommendations of drier systems in Spred Gloss Enamel Y-900-A showed improved dry with either Tallates or Ten-Cems. However, the increased dry is impractical due to the cost increase or discoloration due to manganese.

DISCUSSION: Two drier systems recommended by Mooney were evaluated versus the standard system in Spred Gloss Enamel White Y-900-A. The systems evaluated were: % Drier Metal based on vehicle solids:

	Standard	0.052% Co	0.240% Pb	0.034% Ca
No.1	Experimental	0.052% Co	0.480% Pb	0.030% Mn
No.2	Experimental	0.078% Co	0.480% Pb	0.102% Ca

Both Tallates and Ten-Cems were evaluated.

Drier costs based on Cleveland raw material for the Tallates are:

	Standard	2.99¢ per gallon
No.1	Experimental	3.29¢ per gallon
No.2	Experimental	6.20¢ per gallon

The Experimental No. 1 system was found to be equal to the standard drier system but was unacceptable due to a brownish-red staining from the manganese.

The Experimental No. 2 system improved the dry from 6 hours to 4 hours but this improvement is not practical in light of the extra 3.2¢ per gallon.

Comparison of Tallate versus Ten-Cem in each system showed equal dry but a trace less staining for Experimental No. 1, equal to 1/2 hour better dry for the standard, and 1/4-3/4 hour better dry for Experimental No. 2.

Dry stability will be evaluated to make sure no substantial product improvement is available with these experimental systems.

SUBJECT: Spred Gloss Enamel - Post 4
NT23048T4263

CONTRIBUTORS: J. Bednarik, J. Sainsbury, J. Southwick

SUMMARY: Due to questions from manufacturing and sales departments we have re-evaluated the use of E-173 (Post 4) in Spred Gloss Enamel White Y-900-A. Our conclusions are:

Post 4 additions into the dispersion phase significantly contribute to flocculation. While a noticeable increase is made in the sag resistance, the loss of hide and color due to flocculation rules out the use of Post 4 in this way.

Post 4 additions in low levels (1/2-1 liquid ounce per gallon) as a post-additive to a completed batch to further control the sag resistance is acceptable. Little if any flocculation is evident, but a trace (1-3 KU) viscosity increase and a significant increase in flow control is achieved.

SUBJECT: Competitive Product Evaluation - Spred Lustre Alkyd NT24070T4163 Semi-Gloss Enamel

CONTRIBUTORS: J. Bednarik, J. Sainsbury, J. Southwick

SUMMARY: We have completed our evaluation of the new "partial odorless" Spred Lustre Alkyd Semi-Gloss Enamel versus 6 major competitive products:

DuPont	Duco	#260	Satin Sheen
Benjamin Moore	Dulamel	#207-01	Semi-Gloss
National Lead	Diamond	#11-17	Semi-Lustre
Pittsburgh	Satin Hide	#20-6	Lo-Lustre
Sears-Roebuck	Satin	#7611-4	Semi-Gloss
Sherwin-Williams	Kem-Glo	#391	Semi-Gloss

This comparison showed the new "partial odorless" Spred Lustre to be the best general purpose product evaluated.

All testing results are based on standardized laboratory tests or, where opinion is required (application, odor, appearance, wet hiding), on tests from unlabeled containers by a panel of four qualified laboratory personnel.

Characteristics Rated Superior (X) & Inferior (0) *

	DuPont	Glidden	B.Moore	Nat.Lead	PPG	Sears	S-W
Application	X	X					0
Odor				0	X	X	0
Appearance		X	X		X		
Uniformity		X	X	0	X	0	0
Color	0		0	X	X	0	
Reflect./Brightness				X	0		
Wet Hide		X	0	X			
Dry Hide			0	X			
Flow					0		
Sag Control			X		X		
Dry			0			X	X
Washability			0	X		X	
Burnishing Resistance		X	X	X		X	X

	DuPont	Glidden	B.Moore	Nat.Lead	PPG	Sears	S-W
Lap Time		X	X		O		O
Self-Priming		X	X	O	X		
Gloss			O		X	X	O
Gloss Retention	O				O		
Film Aging	O				O		
TOTAL RATING	-2	+7	0	+3	+2	+3	-3

Number of X's (superior ratings) minus number of O's (inferior ratings).

DISCUSSION: Specific Test Comparisons

General Characteristics	DuPont	Glidden	B.Moore	Nat. Lead	PPG	Sears	S-W
Dispersion(grind)	4-6½	6	5-6	6	5½	6	5-6
Weight/Gallon	10.6#	11.1#	10.9#	11.4#	11.1#	11.7#	11.2#
Viscosity (KU)	91	88	79	82	79	83	72
%N.V.(Label Anal)	64%	68%	69%	73%	68%	71%	70%
Label Description							
Non-Yellowing		Yes	Yes	Yes	Yes	Yes	
Odorless	Yes				Yes	Yes	
Self-Priming		Yes				Yes	Yes

Visual Characteristics

Color	Blued Dirty	Heavily Blued	Yellow	Lightly Blued	Trace Blued	Very Dirty	Heavily Blued
Reflectance	85.3	85.6	88.2	85.7	86.1	83.2	85.2

- Colormaster Tri-Stimulus Colorometer - measure of color brightness or cleanliness - 100 maximum.

Wet Hiding	800	1050	700	1370	900	1010	970

- Pfund Cryptometer - No. 35 Top Plate, Wedge Constant 0.0035.
- Evaluation from unlabeled cans - Sq. Ft. per Gallon

Hiding	97.2	98.1	95.5	99.0	97.4	97.7	100

- Colormaster Tri-stimulus Colorometer - Contrast Ratio - 100 maximum.

Hiding	99.1%	100.0%	97.4%	101.0%	99.1%	99.6%	102.4%

- % of Spred Lustre - based on Contrast Ratio

Hiding and reflectance comparisons are dependent upon the color and type of color each product has. The very dirty color of the Sears' Satin is detrimental to the reflectance of the product, but is

advantageous for hiding. Just the opposite is true for the natural color unblued B. Moore Dulamel.

Theoretical titanium dioxide level - based on label analysis and actual weight per gallon - expressed as pounds per gallon:

	DuPont	Glidden	B. Moore	Nat.Lead	PPG	Sears	S-W
	2.90	3.00	2.15	4.13	2.92	3.19	2.93
Dry-3 mil wet film	4-5/8	6	8½	8	5-5/8	3-3/4	5-3/4

- 12 hour cycle - B-K Automatic Dry Recorder - hours

6 Week Aged film	Brittle	OK	OK	OK	Brittle	OK	OK
Lap Time Minutes	20	25	25	20-25	10	15-20	10-15

Comparative evaluation - dependent upon conditions at time of comparison.

Washability

Gardner Straight Line Scrubber - 3 mil wet film drawdowns aged one month - soiled with four items - scrubbed 35 cycles with Bon-Ami and water - reported as approximate percentage of soiling agent removed.

Lipstick	100%	100%	100%	100%	100%	100%	100%
Crayon	100%	100%	100%	100%	100%	100%	100%
Pencil	50%	100%	100%	100%	75%	100%	100%
Ball PointPen	75%	75%	50%	100%	75%	100%	75%
Burnishing	Yes	No	No	No	Yes	No	No

Application - unlabeled can - panel rating

Glidden	Rated best.
DuPont	Rated equal to or trace poorer.
PPG	Rated good - trace ropy and thin.
B. Moore	Same as PPG
Sears	Acceptable - thin.
Nat. Lead	Acceptable - heavy with noticeable drag.
S-W	Poorest - rated fair - thin - noticeable drag.

Odor - during application

PPG and Sears were rated best - completely odorless.

Glidden, DuPont and B. Moore were rated good - very mild.

Nat. Lead and S-W were the poorest - noticeable odor.

Leveling

DuPont	Glidden	B.Moore	Nat.Lead	PPG	Sears	S-W
5	5-6	4	6	2	5	6

- N.Y.P.C. Leveling Meter - ratings of 0 (no flow) to 10 (complete flow) - normal acceptable range is 4-8.

Sag Resistance

11	9-10	12	9	12	10	8

- Leneta Anti-Sag Meter - ratings of 3 (complete sag) to 12 (no sag) - normal acceptable range is 6 (3 mils wet) to 10 (5 mils wet).

Uniformity & Self-Sealing

- brushed over wallboards partially primed with Spred Vapor Barrier and Painter Latex.

Over Y-3416	OK	Good	Good	OK	Good	OK	Good
Over Y-5370	OK	Good	Good	Poor	Good	Poor	Poor
Over unprimed	OK	Good	Good	Poor	Good	Fair	Fair
Self-primed	Good	Good	Good	Fair*	Good	Good*	OK*

* Second coat is very high gloss compared to first coat.

Gloss Data

Gloss - 3 mil drawdown on Leneta Form 3B Opacity charts - 60° Photo Volt

Initial	40	49	82	66	58	57	80
1 Month	22	33	53	50	33	42	51

Gloss - 3 mil drawdown on Morest Penetration charts - 60°
Photo Volt - sealed background/unsealed background

	43/24	55/31	83/61	73/5	63/33	60/17	70/49
Brushed Gloss	28	51	65	59	62	56	47
2nd Coat	31	40	48	54	40	50	49

Non-yellowing tests and gloss stability upon aging have been initiated. Results of these tests will be available in 2-3 months. Specific data and panels on all tests are available for inspection at the Research Center.

Work is planned to evaluate two tints (very light yellow and medium green) of these semi-glosses in the near future.

TRADE-MAINTENANCE

M-1 TRADE MAINTENANCE December 1967

SUBJECT: Converted Epoxy
NM23013M1368

CONTRIBUTORS: E. Hood, P. Begany

SUMMARY: 1. Busan 11 In Epoxy Ester Coating

Six months Florida exposure panels have been inspected of GL-67299, White Epoxy Ester Enamel, and GL-67299 containing 150 pounds of Busan 11 per 100 gallons. GL-67299 has chalked heavily. The Busan 11 modification has not chalked but does show moderate dirt collection.

2. Lubrizol CA-21 Curing Agent

A 6 month inspection of a comparative yellowing test of Nu-Pon Cote and a Lubrizol CA-21 cured epoxy show that the Lubrizol CA-21 cured epoxy has yellowed less in the smoke room and window exposures.

3. Evaluation Of Titanox CL-NC

Titanox CL-NC is being compared with W-944 and W-948 in both Nu-Pon Cote and Durable Polyurethane on exterior exposure.

SUBJECT: Water Reducible Epoxy Ester Primer
NM28007M1368

CONTRIBUTORS: E. Hood, P. Begany

SUMMARY: 1. H_2O Reducible Epoxy Ester Primer is more economical than Y-5570 on a solids basis.

	Bulk Cost	N.V.Volume
Y-5570, Metallite Nu-Pon Primer	$2.95	39.0%
PB43-67, H_2O Reducible Epoxy Ester Primer	$3.13	45.9%

2. One hundred-fifty pounds of N-531, mica, per 100 gallons greatly improves salt spray, humidity, and water resistance.

3. PB43-67, Water Reducible Epoxy Ester Primer, and Y-5570, Metallite Nu-Pon Primer, are being compared for recoatability with Rustmaster, Lifemaster, Nu-Pon Cote, and Vinyl-Cote at varous time intervals (4 hours, 1 day, 5 days, 1 week, 1 month, 6 months, and 1 year). On 4 hours, 1 day, 5 days, and 1 week recoat, Lifemaster, Rustmaster, and Nu-Pon Cote are at least as good over water reducible primer as over Y-5570. The adhesion of Vinyl-Cote is much better over

water reducible primer than over Y-5570. The film flexibility of water reducible primer is much better than Y-5570. Nu-Pon Cote has a crawling tendency over 1 month aged Y-5570 but not over 1 month aged water reducible epoxy ester primer.

4. In our work to develop a lead-free water reducible epoxy ester primer, PB91-67, pigmented with RX-2022 Iron Phosphate (Pfizer) is testing out better than PB63-67 red lead primer.

Active But No Reported Work During Current Month

NM25007M1268	Parlon
NM25009M1268	Block Filler
NM27009M1168	Rule 66
NM27016M1764	Seamless Floors
NM28001M1168	Demonstration Manual
NM28011M1168	ASTM D1

Letters Closed During The Month

NM24030M1168 Preparation of Detailed Specification For Trade Sales
Closed 12-11-67

SM24005M1168 Central Region Requests
Closed 12-11-67

TRADE-MAINTENANCE

M-2 INDUSTRIAL

December 1967

SUBJECT: Leadless Hi-Mil Primer
NM27006M2322

CONTRIBUTORS: F. Jeffers, P. Begany

SUMMARY: The condition on the two storage tanks has not changed since last reported.

SUBJECT: Urethane Epoxy
NM27012M2222

CONTRIBUTORS: E. Hood, P. Begany

SUMMARY: Following are the results of Cleveland exposure testing of urethane-epoxy:

Coating System	6 Month Cleveland Exposure	1 Year Cleveland Exposure
1. Nu-Pon Cote (Y-5251 & Y-5240)	Moderate chalk.	Heavy chalk.
2. Vinyl-Cote (Y-5251, Y-5285, Y-5280)	No change.	Slight gloss loss.
3. Durable Polyurethane (Y-5251 Y EGL-65415)	No change.	No change.
4. Mobay Durable Polyurethane (Y-5251 & FJ43-66)	Moderate yellowing.	Moderate chalk.
5. Epon 1009 - Desmodur N (Y-5251 & FJ44-66)	Slight gloss loss.	Heavy chalk.
6. Epon 1009 - Desmodur L (Y-5251 & FJ45-66)	Bad yellowing and moderate chalk.	Heavy chalk.

SUBJECT: Chemical Resistance Test - Glid-Flake
NM28002M2122

CONTRIBUTORS: F. Jeffers

SUMMARY: A one month interim report has been submitted which shows that:

1. It is good for acids at room temperature for one month. Other acids at elevated temperatures have not been determined.

2. Alkali resistance is fair to good at room temperature, nowever, at elevated temperature it has no resistance.

3. Solvent resistance is not satisfactory either at room or at elevated temperatures.

SUBJECT: Weld-Thru Primers
NM28003M2310

CONTRIBUTORS: F. Jeffers

SUMMARY: The following primers are being tested in the Weatherometer and Salt Spray cabinets.

Sch. No.

258 SF-19196 - Hi-Solids Aluminum Weld Thru Primer Vinyl Alkyd
259 RL-19418 - Zinc Dust Primer - Phenoxy
260 Carbo-Zinc #11 - Zinc Silicate
261 Monsanto - Aluminum
262 Silbond H-6 - Zinc Dust - Ethyl Silicate
263 178-G-1 - Metal Conditioning Primer - Poly Vinyl Butyrol
264 RL-19388 - Zinc Chromate - Poly Vinyl Butyrol

Salt Spray - 250 Hours

Sch. No.

258 Failed
259 Bad Blistering and Rusting at the scoreline.
260 No change.
261 Bad rusting (scoreline).
262 No change.
263 Failed
264 Failed

There are no results on the Weatherometer panels at this time.

SUBJECT: Water Reducible Epoxy
NM28010M2222

CONTRIBUTORS: E. Hood, P. Begany

SUMMARY: 1. The shading color and Dramatone acceptance is much better when added to the polyamide component than it is

in the epoxy component. Therefore, we are going to pigment the polyamide component and have the epoxy emulsion component unpigmented.

2. The addition of 50 pounds of N-413, magnesium silicate per 100 gallons of pigmented base improves sag resistance and anti-settling. The gloss reading is 85°.

3. A modification of water reducible converted epoxy with Spencer Kellogg DV-1695 was investigated to improve clean-up with soap and water. It is unsatisfactory because it caused a hazy appearing film.

4. PB82-67, White Water Reducible Converted Epoxy Base, has passed 1 week at 110° F. stability, and 5 freeze-thaw tests.

5. Merginamide L-220 (Stephan Chemical) and also Armocure 100 (Armour) were found to be unsatisfactory as curing agents for our water reducible converted epoxy.

6. Igepal CO-890 and Igepal CO-430 (General Aniline & Film) are not as effective as Triton X-100 as wetting agents in our water reducible converted epoxy.

7. Pot life is extended by blending Epi-Rez 2051, epoxy emulsion, with an emulsion of F5151, Epi-Rez 242.

SUBJECT: Statistical Design
NM17001M2822

CONTRIBUTORS: F. Jeffers, B. Payne

SUMMARY: Sixteen samples were received from the resin group. Eight of these samples represent the OH acrylic numbered 1 through 8. Eight samples numbered 1-A through 8-A represent the NCO acrylic.

All 16 samples were at 50% $\pm$ 1% NVM. Testing was performed by the Maintenance and Wood Laboratories. Samples when mixed were applied 3 mils wet on tin plate using a bar coater.

Pigmented films will not be tested until the results of the preliminary design are known. Following is a list of tests that are to be run.

1. Pot life.
2. Recoat
3. Adhesion
4. Impact
5. Pencil hardness.
6. Dust-free; Tack-free; Dry-through.
7. Film appearance.
8. Film thickness.
9. Flexibility.
10. Chemical Resistance.

1. Samples In Mixing Order Of Design

OH Sample No.	NCO Sample No.	OH %	NCO%
7	7-A	.39	2.28
8	2-A	.88	4.85
6	4-A	.83	2.62
3	8-A	.41	4.65
1	3-A	.89	2.74
5	1-A	.38	5.00
4	5-A	.39	2.10
2	6-A	.90	4.32

2. Samples In Mixing Order Of Design

OH Sample No.	NCO Sample No.	OH %	NCO %
8	8-A	.88	4.65
7	4-A	.39	2.28
3	2-A	.41	4.85
6	7-A	.83	2.28
5	6-A	.38	4.32
1	5-A	.89	2.10
2	1-A	.90	5.00
4	3-A	.39	2.74

Statistical Design Tests

SEE FOLLOWING PAGE

STATISTICAL DESIGN TESTS

OH / NCO MATERIALS	POT LIFE Hours	RECOAT	ADHESION	IMPACT	PENCIL HARDNESS	DUST FREE Minutes	TACK FREE Minutes	DRY THRU Minutes	FILM APPEARANCE	FLEXIBILITY	FILM THICKNESS-Mils
7-7A	24	5	.1	.1	1	180	180	180	9	.1	1.2
8-2A	5	5	.1	.1	2	20	25	30	9	.1	1.2
6-4A	8	5	9.0	9.0	3	20	25	30	5	10	1.2
3-8A	5	5	.1	.1	4	15	20	25	9	2	1.2
1-3A	8	5	.1	.1	4	10	15	20	10	1	1.2
5-1A	24	5	9.0	9.0	2	30	35	60	9	10	1.2
4-5A	24	5	3.0	3.0	4	20	25	35	6	4	1.2
2-6A	8	5	.1	.1	4	15	20	120	9	10	1.2
8-8A	5	5	.1	.1	5	5	10	20	9	.1	1.2
7-4A	24	5	9.0	9.0	4	10	15	25	10	8	1.2
3-2A	8	5	2.0	2.0	4	10	20	25	8	2	1.2
6-7A	20	5	.1	.1	1	180	180	180	8	.1	1.2
5-6A	8	5	.1	.1	4	10	120	180	9	10	1.2
1-5A	18	5	5.0	5.0	4	10	20	30	9	5	1.2
2-1A	18	5	.1	.1	4	30	45	90	9	10	1.2
4-3A	16	5	5.0	5.0	4	10	20	30	10	2	1.2

KEY: (Except for Pot Life and Dry Times)

10 = Perfect
0.1 = Failure

Pot Life numbers = Hours
Dry Times numbers = Minutes

GLD 045600

CHEMICAL RESISTANCE TEST ON STATISTICAL DESIGN

MATERIALS	10% Sulphuric	10% Hydrochloric	10% Nitric	10% Acetic	10% Phosphoric	10% Potassium	3% Hydrogen Peroxide	85% Lactic Acid	S-431	S-423	S-614	S-213	Linseed Oil Fatty Acid	10% Phenol	10% Ammonia
7-7-A	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
8-2-A	10	10	5	10	10	10	10	10	10	.1	.1	10	10	10	10
6-4-A	10	10	.1	10	10	10	10	10	10	.1	.1	10	10	10	10
3-8-A	10	10	5	10	10	10	10	10	10	.1	.1	10	10	10	10
1-3-A	10	10	5	10	10	10	10	10	10	.1	.1	10	10	10	10
5-1-A	7	10	.1	10	10	10	10	.1	.1	.1	.1	10	.1	7	10
4-5-A	10	10	.1	10	10	10	10	.1	.1	.1	.1	10	.1	10	10
2-6-A	7	10	.1	.1	.1	10	10	.1	.1	.1	.1	10	.1	10	10
8-8-A	10	10	5	10	10	10	10	10	.1	.1	.1	.1	.1	10	10
7-4-A	10	10	.1	.1	10	10	10	.1	.1	.1	.1	10	.1	.1	10
3-2-A	10	10	.1	10	10	10	10	10	10	.1	.1	10	.1	.1	10
6-7-A	.1	10	.1	.1	.1	10	.1	.1	.1	.1	.1	.1	.1	.1	10
5-6-A	7	10	.1	.1	.1	10	.1	.1	.1	.1	.1	10	.1	.1	10
1-5-A	10	10	.1	10	10	10	10	10	10	.1	.1	10	.1	.1	10
2-1-A	10	10	.1	10	10	10	10	.1	.1	.1	.1	10	.1	.1	10
4-3-A	10	10	.1	10	10	10	10	10	10	.1	.1	10	10	10	10

KEY: 10 = Perfect
0.1 = Failure

GLD 045601

SUBJECT: Supplement To Statistical Design
NM17001M2822

CONTRIBUTORS: F. Jeffers, B. Payne

SUMMARY: The following materials were submitted by the Resin group for possible new coatings by the Maintenance and Wood Laboratories.

Sample No.	1524A-42	1524A-43	1524A-58	1524A-50	1524A-52	1524A-55
% N.V.	56.7%	63.8%	65.8%	68.7%	38.5%	61.5%
Viscosity	A	V-W	S	U-V	D	F
NCO(100%Basis)	8.3	8.3	7.4	4.9	4.0	3.0
Solvents	S-423	S-423/ S-614	S-423/ S-614	S-423	S-423/ S-614	S-423
Resin Backbone	Epoxy	Epoxy	Epoxy	Polyester	Vinyl	Polyester

The above materials were mixed in proper ratios of NCO to OH with the following:

Sample No.	1524A-54	1524A-57
% N.V.	68.4	60.2
Acid No.	.4	1.2
Viscosity	B	B+
%OH	5% (100% Basis)	3.2% (as is)
Solvents	S-423	S-423/S-614
Backbone	Polyester	Epoxy

These materials were handled in the same manner as were the original Statistical Design. Physical and Chemical Tests proved to be unsatisfactory. However, 1524-A-58 and 1524-A-50 were mixed in proper ratio with #2 OH acrylic (1524A6) which proved to have excellent acid and alkali resistance. A paint using #2 acrylic has been made and panels are in the process of being prepared. Following are the proposed schedules using Desmodur N, Desmophen 650 as control.

Sch. 265 - 1st Coat - Y5251 Nu-Pon Cote Primer
2nd Coat - EGL-65415 Durable Urethane/Desmodur N
3rd Coat - " " " "

Sch. 266 - 1st Coat - Y-5251 Nu-Pon Cote Primer
2nd Coat - EGL-65415 Durable Urethane/1524A-58
3rd Coat - " " " "

Sch. 267 - 1st Coat - Y-5251 Nu-Pon Cote Primer
2nd Coat - 19-A-26 #2 Acrylic/1524A-58
3rd Coat - " " " "

Sch. 268 - 1st Coat - Y-5251 Nu-Pon Cote Primer
2nd Coat - 19-A-26 #2 Acrylic/1524A-50
3rd Coat - " " " "

ACTIVE BUT NO REPORT DURING CURRENT MONTH

NM24009M2122 - Sinclair
NM24011M2222 - Semi-Gloss Water Reducible
NM26006M2322 - External Pipe Coating
NM27004M2122 - General Letter
NM27005M2222 - Zinc - Phenoxy Primer
NM28008M2121 - Krotan
NM28009M2122 - BMX Blocks
SM25001M2219 - Water Reducible Government
SM25002M2219 - Water Reducible Anti-Fouling

CLOSED DURING MONTH

NM28013M2722 Bendix Panels - Closed 12/11/67

INDUSTRIAL PRODUCTS

CAN COATING LABORATORY

December, 1967

SUBJECT: PRODUCTION CONTROL - CLEVELAND (REACTORS) - SI23009I1103

SUMMARY: We received a wet sample of VR-61015-A, P-371785 from Crown Can's Orlando factory. Our tests showed:

1. This sample did eyehole badly as the customer had reported (worse than our retain).

2. No contamination could be found by infra-red analysis and physical examination showed nothing unusual.

3. Addition of Modaflow solution VR-67022 (20 liq. oz. per 55 gal. drum) was effective in overcoming the eyeholing condition.

Mr. Moyer of Crown Tech. Service and Mr. Keefe of our Atlanta plant were advised of these findings. Mr. Keefe will arrange to supply Orlando with the necessary amount of VR-67022.

SUBJECT: PACK TESTS - WHITE ACRYLIC SANITARY ENAMELS - NI28005I1103

SUMMARY: Our laboratory test packs on the white acrylic sanitary enamels are now completed (initial, 6 weeks @ 120°F., 12 weeks @ 120°F.). All the test ends were reviewed by Mr. Hafeli and resin lab personnel. Detailed gradings are available and will be written up in a final report. General conclusions and impressions were:

1. SW-7099 and EGL-67350 are about equal in performance, with EGL-67426-A definitely inferio to the other two.

2. This basic type enamel will be suitable for selected products only (no bad staining products).

3. More work will be needed (if the market for this type product warrants it) to check out performance in other areas.
   a. Enamel and resin modifications.
   b. Other plate surfaces (TFS).

4. Competitive white enamels and conventional controls should be run for comparison.

SUBJECT: PREPARATION OF SAMPLES AND EXHIBITS - NI24035I1103

SUMMARY: We evaluated three enamels on Weirchrome TFS for process resistance in a pumpkin pack.

   a. VR66030 (epoxy-urea)
   b. EGL68392 (acrylic)
   c. VR55102 (oleoresinous)

These enamels were selected mainly because the customer (Campbell Soup) desired a baked film with minimum color. Rather surprisingly all enamels passed the processing test with almost perfect ratings. Gallon samples of each coating were made up and submitted to Campbell.

Future work is planned to investigate other types of TFS, short bake schedules, and extended pack resistance.

SUBJECT: PAINT CAN LINER FOR SPRED SATIN - NI27053I1203

SUMMARY: We have screened several more lining types for Spred Satin resistance. These included resol phenolic (Ciba), low-bake phenolics (Varcum and UCC) double coat systems (epoxy size, epoxy-phenolic topcoat) and Crown Can #920 lining. None of these linings approached the resistance we have obtained with National Can #7701 on our screening test (half-filled cans @ 120°F.).

As noted before, #7701 is not a completely satisfactory solution to this problem because of the solvent-soluble dye used as a colorant. In addition, we have heard that National Can would like to see a less expensive coating than #7701. (This fits in with our analysis as a methylon type). Future work on this project will be guided by Messrs. Hafeli and Kingston after they have reviewed results to date.

SUBJECT: SAMPLES SUBMITTED - DECEMBER, 1967

DATE	MATERIAL	FORMULA	AMOUNT	CUSTOMER
12/12/67	#55102 Sanitary Enamel	VR55102	1 gallon	Campbell
12/12/67	#66030 Clear NuPon	VR66030	1 gallon	Campbell
12/12/67	#68392 Acrylic	EGL68392	1 gallon	Campbell
12/13/67	#67022 Flow Control	VR67022	1 quart	Federal Tin

CONTRIBUTORS: A. Kukuca, G. Tulk

LITHO COATINGS LABORATORY December, 1967

SUBJECT: REGULATION #3 REVISION OF VR63013 - CROWN CORK & SEAL CO. - NI27054I1203

SUMMARY: VR67043 has been formulated to meet Regulation #3. The sales department also requested a Rule 66 modification of this formula to furnish to Los Angeles plants. VR67049 has been developed to meet the solvent regulations of Rule 66. This DPR will be returned.

SUBJECT: VACRALIN - GENERAL SALES - NI24115I1303

SUMMARY: 1. Vacralin VR-67023 lined cans have been stored at the Research Center for three months at 120°F. packed with Orange Drink, Black Cherry and Strawberry Soda. Previous pack openings have shown little change in the can lining or in the product packed. However, after three months storage the Vacralin films now are severely blushed while control cans lined with a commercial vinylite coating (VR67019) show no signs of attack.

2. Two gallons of VR-66014 were prepared in the lab and sent to Aluminum Company of America Pittsburgh laboratory.

SUBJECT: PREPARE EGL67350 SAMPLE - CANADIAN CANNERS - SI28070I1103

SUMMARY: Five gallons of EGL67350 white sanitary enamel were made in the laboratory and shipped to Mr. B. Miller in Toronto.

SUBJECT: WET INK VARNISH FOR BEVERAGE CANS - GENERAL SALES - NI28006I1303

SUMMARY: Five stearic acid alkyds were evaluated to determine if increasing the oil length or changing the method of cooking would improve the flow of the varnish. None of these revisions improved the flow, but incorporating ethylene glycol as part of the polyol and changing the PE/glycerol ratio substantially improved the flow. However, the film hardness was only fair.

Three tall oil alkyds (V-2347, V-2373, V-2352) a soya (V-2254) a DCO (V-2462), a coconut (V-2712), and a castor oil alkyd (F-2777) were evaluated with 20% melamine modification to determine which has the best properties for a wet ink varnish.

The V-2352 tall oil alkyd had the best combined properties of adhesion, film toughness, and mar resistance. The flow of the varnish was only fair since the alkyd contains xylol. Replacing the xylol in the alkyd with Solvesso 150 gave good flow when rollercoated. The initial color and color retention of the alkyd melamine varnish are as good as the stearic alkyd used by Heekin.

Mr. Greulich was advised of our test results. We hope to get a trial run at Heekin Can for a thorough evaluation of this vehicle.

SUBJECT: LOW COST WET INK VARNISH - GENERAL SALES - NI28011I1303

SUMMARY: Two rosin modified tall oil alkyds (SX5-35 and SX5-44) prepared by the Central Resin Lab were evaluated. Both alkyds had poor mar resistance and poor toughness.

A current production tall oil alkyd (V-2373) has been evaluated with various driers to develop good hardness. The addition of 0.06% Zirconium gives a hard mar resistant film with excellent color. The alkyd, however, is too high in viscosity to give a varnish with 40-50' #4 Ford cup viscosity at 50% N.V.

Two competitive alkyd varnishes were tested and show excellent hardness, mar resistance, adhesion and color. This Ford cup viscosities are 42" and 60" at approximately 50% N.V.

In order to compete with this type of varnish, an alkyd must be developed with a viscosity of W-Y @ 60% N.V. in mineral spirits with a maximum color of five. It will also have to cure to a good hard film without the addition of amine resins.

SUBJECT: COIL COATING CONTAINERS - GENERAL SALES - NI26018I1303

SUMMARY: Last month we reported that our Gold EGL68342 drifted considerably in color when applied by reverse roll coat at Enamel Products on November 15th.

By replacing the Microlith Red RT with Microlith Red BRT color stability of the coating under shear was greatly improved.

The plate coated at Enamel Products and fabricated into containers at Campbell Soup failed on processing (250° 60 min.). The customer's tests also indicated that the higher the film weight, the poorer the process resistance.

Production coated plate at film weights of 11.6, 14, and 22 mgm/4 sq. in., fabricated into domes on the Erichsen testing unit here at the Research Center and processed were satisfact

It was necessary to bake the gold at 525° for 120 sec. to produce process failure on our equipment and our recommended bake of 525° for 60 sec., and also at 525° for 80 sec. proces resistance of the system was excellent.

By reducing the epoxy to acrylic level 5% we improved the bake stability of the coating; a decrease of more than 5% resulted in bad blocking of the coated stock.

A competitive gold will be run at Campbell and future action on our part will depend upon the outcome.

SUBJECT: NEW VEHICLE DEVELOPMENT PROGRAM - NI16011I1303

SUMMARY: The following acid acrylic resins were checked as white roll coat enamel vehicles, 1572A-9, 1572A-1, 1572A-11, 1572A-13, 1572A-34, 1572A-39, 1572A-57 1572A-58 in a project aimed at developing an enamel with better flexibility and block resistance than EGL67426-B (based on RCR6318 and RCR6319).

The control systems in these tests was EGL67426-B, and screening tests were fabrication into screw caps (dry heat, $CuSO_4$ immersion) and blocking resistance (80#/sq. in. @ 110°F.-115°F./15 min.).

All resins were checked at:

1. Pigment binder ratios of 60:40, 55:45, 50:50, 45:55%.
2. Epoxy levels of - 25, 20, 15, 10%.
3. With epoxy molecular wt. variations - F-5161, F-5106, F-5158.
4. With and without BDMA (Benzyl dimethyl amine).

None of the resins produced a coating equal to EGL67426-B. The best system was resin 1572A-39 (RE23302) at 50:50% pigment, vehicle and 26:74% epoxy to acrylic ratio but it was inferior to EGL67426-B in fabrication.

SUBJECT: REVISE VINYL COATINGS FOR RULE 66 - NATIONAL CAN CORP. - SI27093I1203

SUMMARY: 1. Five gallons of VR67037 Rule 66 type vinyl spray were prepared in the laboratory and shipped to National Can's Long Island Plant for a trial run.

2. Several solvent suppliers are working with B. F. Goodrich to formulate Rule 66 conforming solvent systems for Geon 222 resin. This work is intended to provide us with solvents to allow reformulation of VR61153 and VR61154. Mr. Prout and Mr. Jimenez of Goodrich visited the Research Center on December 6, 1967 and gave us several suggested solvent combinations resulting from their program. These solvent blends are being evaluated in our VR61153 formula.

SUBJECT: PRESHIPMENT SAMPLES TESTED

Geon 222 Resin	3 lots
S6171 Resin Soln.	2 lots
Atlanta Vinyl Prod.	2 lots
Toronto Vinyl Prod.	1 lot
Central Enamel Prod.	2 lots

SUBJECT: SAMPLES SHIPPED

1-5	VR67037 Beer Can Body Spray	National Can (Long Island)
1-1/4	VR67046 Clear Can End Varnish	Nubian (R. E. Meyers)
1-5	EGL67350 White Sanitary Enamel	Toronto (B. Miller)
1-1	VR65043 Vacralin	Reading (J. P. Harner)
2-1	VR66014 Vacralin Spray Liner	Alcoa
1-1	VR65044 Wet Ink Varnish	International (Bush)

SUBJECT: DLR'S ACTIVE BUT NOT WORKED ON

NI25026I1303	Owens-Illinois Closures
NI26003I1303	Coatings for TFS
NI27035I1303	New Geon Resins
NI27042I1103	Vacralin Taste Program
NI27048I1303	Varnish for Miraseam Can
SI27153I1203	Revise EGL65437-A

CONTRIBUTORS: W. E. Reich, W. R. Armstrong, R. L. Mandley, R. L. Toth, J. Rebar, R. Woodruff

INDUSTRIAL WOOD COATINGS LABORATORY December, 1967

SUBJECT: PAPER IMPREGNATION - NI26022I4308

SUMMARY: In our continuing search for improved properties of the decorative laminates we have been investigating various monomers. The monomers looked at in this last series consist of several "buy-outs" and some experimental systems prepared by the Resin Research Group.

Monomers tested were substituted in EGL68300A as a direct replacement for RCR3024 (patent situation). Impregnated papers were prepared and laminated six monutes at 260°F. and 200 psi.

MONOMER AND MANUFACTURER	RESULTS
t-stibbene - Shell Chemical	Incompatible
para-Diisopropenyl benzene - Shell	Incompatible
Monomer X-980 - Acrylic - Rohm & Haas	Paper too tacky
Monomer X-970 - Acrylic - Rohm & Haas	Paper too tacky
Tri Vinyl Benzene	Poor Cure - No mar resistance
Di Methyl maleate	Poor cure - no mar resistance
1316A24 - Epoxy Acrylate - Glidden	Bad pitting in laminated film
957A10 - Epoxy - Acrylic Acid - Glidden	Poor cure - no mar resistance
1512A31 - Epoxy Acrylate - Glidden	Pure cure - no mar resistance

None of the above monomers showed much promise and the epoxy-acrylic types, which with some modification might be interesting are higher in cost than our present system.

As reported previously we have been looking for a resin system which will contribute less color in clear overlays and on light colored laminates. Although RCR4238 type resin does give us much better color but a softer film, so it was decided to investigate the manufacturing procedure of RCR4247. A sample of RCR4247 (1253A79) was prepared by the Resin Group which was considerable lighter in color. This sample was prepared by the same procedu as used in the manufacture of RCR4238. Sample 1253A79 was substituted in EGL68300A as a direct replacement for RCR4247. Clear paper was impregnated and laminates were made over a white background along with our standard clear overlay. The new resin produced a much lighter overlay. If 1253A79 can be manufactured in the Plant in large volume to the same specifications as the laboratory sample we should have no further complaints about color.

SUBJECT: EXTERIOR PREFINISH SYSTEMS - NI27037I4308

SUMMARY: Exterior exposures of wood and plywood panels sealed with a Polyurea sealer have shown us that durability is greatly improved. The sealer is a low solids wash coat or dip.

We have extended this idea as an edge sealer for hardboard, with considerable promise. Polyurea edge sealer not only reduces the amount of water that soaks into the cut edge of the panel, but also controls the edge cracking and delamination of the panels.

We have coded the 15% N.V. solution EGL68448 Polyurea edge sealer, and EGL68449 converter.

SUBJECT: TIBBALS FLOORING - NI28000I4108

SUMMARY: Because of the excellent abrasion resistance shown by EGL68303 clear Poly-Lure, we conducted a test on the Tibbals finishing line at Oneida, Tennessee on December 14.

The system was as follows:

Filler	GP53382 type
Sealer	RGL19205
Topcoat	EGL68303

The sealer performed in a satisfactory manner. There was a slight increase in viscosity on the roll, probably due to loss of solvents.

The filler obviously did not have the proper solvent system for this line. When the solvent was slowed down with Solvesso 150 to correct poor cleanup, we got blistering and popping.

The topcoat EGL68303 Poly-Lure, did not cure completely on the Tibbals line. The lack of cure was evident from the slight hot-tack and lack of hardness in heavy areas.

Tibbals will run a blocking test, print test, and wear test on the samples run. The results will be sent directly to the lab.

We plan to investigate the filler situation more completely, as we suspect that we did not have standard material.

We plan to improve the speed of cure on EGL68303.

SUBJECT: NAHB EXHIBIT - NI28031I4108

SUMMARY: The 1967 show was at the International Amphitheater in Chicago. This was the first year that anyone from the Ind. Wood Coatings Section had worked in the booth.

In addition to the Polyester bath tub, the item which attracted the most interest was the Poly-Urea coated window. Representatives from nearly all of the large mill-work companies stopped to discuss the window. The reaction was so general that it indicates the industry must be under considerable pressure to come out with completely finished windows.

The Decolure panels and the pre-finished hard-board siding attracted considerable attention during the first two days of the show. When the contractors and builders arrived, they were more interested in the block fillers and trade sales items.

SUBJECT: TRIPS DURING DECEMBER

SUMMARY:

December 3, 4, 5
J. Watson to NAHB, Chicago

December 6, 7
D. Raymond to NAHB, Chicago

December 14, 15
B. Payne to Tibbals Flooring, Oneida, Tennessee

SUBJECT: SAMPLES SHIPPED DURING DECEMBER

SUMMARY:

12/14/67 to Matt Andrews, 17100 Van Aken Blvd., Shaker Hts, Ohio
1 qt. EGL68422 Polyurethane
1 qt. EGL68423 Converter

12/26/67 to P. C. Herzog, Portland, Oregon
1 qt. EGL68300A Impregnating Resin

CONTRIBUTORS: J. Watson, D. G. Raymond, B. Payne, J. Kerby

AUTOMOTIVE LABORATORY December, 1967

SUBJECT: IMPROVED BLACK FLOWCOAT PRIMERS
FORD MOTOR CO. - SI27168I7207
GENERAL MOTORS CORP. - SI2801lI7307

SUMMARY: Evaluation of Central Region Resin Laboratory resins formulated specifically for this project continues. Primary goals are an alternate for F-467 at equal properties and a resin providing improved properties over GRV3480. None of the resins received during the month met these requirements.

Ford Motor Co. requested information on effect of isopropanol on film build of XM64463-C Black Flocoat Primer. Study was made and results reported. Ten gallons of XM64463-C in which isopropanol replaced part of the water were made and shipped to Ford.

SUBJECT: IMPROVE THROWING POWER AND SALT SPRAY RESISTANCE OF BODY ELECTROCOAT - GENERAL AUTOMOTIVE - NI25032I3207

SUMMARY: 1. Slimetrol RX-16 was evaluated as a biocide in EXM67141 bath and found effective. No deterioration of resistance properties was observed. However, a few pinholes developed on throwing power strips run in baths with Slimetrol. This must be checked further.

2. A new approach to a hard resin additive to maleinized oils to upgrade throwing power, corrosion resistance, and gravelometer was initiated. Specific resins made and evaluated were the monoester of Epon 1001 and diphenolic acid, and the mixed diester of Epon 1001, linseed F.A., and diphenolic acid. The monoester proved too reactive with maleinized oils. The diester with maleinized oils yielded electrodeposited films having excellent corrosion resistance on Bonderite and excellent gravelometer, but poor corrosion resistance on C.R.S. Further work on this is planned.

3. Variations of GRV3485 with other resins substituted for F-467 were evaluated and judged not as good.

4. A variation of GRV3485 in which linseed replaced soya and methacrylic acid was increased to 6% showed significantly improved gravelometer resistance. This will be pursued further.

5. A series of four Epon 1004 linseed F. A. esters differing only in the amount of carboxyl introduced through half esterification with tetrahydrophthalic anhydride was evaluated. Ease of solubilization decreased with increasing acid value. The lowest acid value was 42. Those which could be solubilized showed excellent gravelometer and salt spray resistance on Bonderite and exceptional salt spray resistance on unphosphated steel. Sufficiently smooth films on throwing power strips could not be produced, thus salt spray exposure of these was not run. Baths are being held for observation to establish hydrolytic stability of this type resin.

6. Steam hydrolyzed RCR1070 was evaluated against RCR1070 hydrolyzed in the customary manner with triethylamine and water. EXM64098 samples made from each showed no differences.

7. Ion exchange treatment of Monroe wheel tank bath was repeated with Dowex 21K in place of Dowex 2X8 as reported in November. Again, no decrease in coulombs per gram was observed, thus introducing a question of whether anionic contamination is a significant factor in the poor electrical efficiency of #70 quality baths at steady state. The next approach planned is a study of different ratios of diisopropanolamine and diethylenetriamine in EXM64090 to determine effects on coulombs per gram.

SUBJECT: ELECTROCOAT FOR GASKETS - DETROIT GASKET CO. - SI28014I3307

SUMMARY: 1. Several other resins were evaluated for resistance to excessive hardening during the five hours at 350°F. heat test. None showed any promise.

2. Antioxidants were found ineffective in preventing heat hardening.

SUBJECT: TESTING SAN FRANCISCO BATCHES OF K-187 and XM64463-C

SUMMARY: XM64463-C P-33373 was tested and approved.

SUBJECT: XM67815 ALUMINUM E/C - FORD MOTOR OF ENGLAND - LN18006I3315

SUMMARY: 1. A revised formulation made with dry aluminum powder rather than solvent-wet aluminum paste was made. Metallic brightness was significantly better than that of the original.

2. A study of various solvents in the formulation showed that best metallic appearance resulted from butyl cellosolve and that metallic appearance decreased with decreasing miscibility of the solvent.

3. Temperature at which GRV3389 and GRV3390A are blended was shown to have considerable effect on color. Lower temperature is preferable.

4. A two package maintaining system showed satisfactory solubility characteristics.

5. Pump stability testing resulted in some loss of color but little film thickness loss. Color change prevention will be attempted through increasing aluminum content.

6. Conventional methods of pigment to binder ratio determination have proven useless because of partial conversion of aluminum to the oxide during ashing. Separation by filtration or centrifuging was unsatisfactory. A new technique being developed depends on conversion of the aluminum to aluminate through reaction with aqueous diethylamine and subsequent ashing to yield aluminum oxide.

SUBJECT: GLOSS AND FLAT BLACK CHROME TRIM ENAMELS - TERNSTEDT - SI28035I7307 and SI28036I7307

SUMMARY: 1. Replicate panels of XM67819 prepared here were exposed simultaneously in Ternstedt's and Central Region's humidity cabinets. Only the panels in Ternstedt's cabinet, which is a true condensing type, failed. Triple the normal exposure of 96 hours in the local cabinet still did not cause failure. Also exposure in the Cleveland Condensing Humidity Cabinet did not cause failure.

2. Initial evaluations of a gloss black made from acrylic resin 1522A23 and Cymel 301 produced satisfactory results. Cratering which is a problem with other low bake gloss blacks, was not evident. Work on this will continue after a means for duplicating failure in the Ternstedt humidity cabinet is found.

SUBJECT: IMPROVED ANTI-FOAM SYSTEM FOR XM64407 - WALKER PARKERSBERG - SI18020I7215

SUMMARY: Screening of anti-foamers has begun.

SUBJECT: FLAT BLACK E/C ENAMEL - TRICO - SI28066I7107

SUMMARY: A black electrocoat enamel was formulated in #83 quality with N-326 Syloid included to Control 60° gloss between 10 and 15. Earlier attempts with surface treatment syloids resulted in waxy float on the bath surface, a condition not apparent with the untreated N-326. Trico windshield wiper assembly components will be coated and returned to the customer for evaluation.

SUBJECT: LETTERS NOT WORKED ON

SUMMARY:

LN17029I3207 Merville & Morgan - Peugeot Primer
SI27164I7115 Lear Siegler - Testing
SI27162I7315 Gibraltar Steel - Strap Coatings
SI27163I7315 U. S. Steel - Black Strap Coating
SI27165I7115 Production Plating - Testing
NI27020I3307 Ford - Upgrade EXM64090-C
SI28012I3307 General Motors - E/C Sheet Metal Primer
LN18007I3115 General Industrial Paints - EXM67141 Sample

SUBJECT: SAMPLES SHIPPED

SUMMARY:

XM64463C (Special with S-88) - 2 - 5's - Ford Motor Co.
EXM68069 Black #83 Electrocoat - 1 gal. - Research Center (for Tecumseh)
Seven Sets of Steel Strap in Six Colors - Gibraltar Steel

SUBJECT: TRIPS

SUMMARY: J. E. Ruecke - General Motors, Detroit - 12/1/67
Master Lock Co., Milwaukee - 12/6-7/67

CONTRIBUTORS: J. E. Ruecke, R. Hordusky, P. V. Kunz, R. Bukowski, D. Allen, R. Markus

ELECTROCOAT FORMULATION AND DEMONSTRATION LABORATORY December, 1967

SUBJECT: DETERGENT RESISTANT PRIMERS - ACRYLICS - NI27045I3304

SUMMARY: 1. Work has continued on the development of an acrylic laundry primer to meet Whirlpool specifications. The following areas are being investigated for improvement of detergent resistance.

a. Styrene Levels - By going to high styrene levels, acrylic systems can be made to pass the detergent and salt spray portions of the specifications. However, these systems are lacking in the flexibility required by the specification.

b. Lowering acid no. - This approach has been found to improve detergent resistance. The limiting factor here is the acid no. required to give the stability and solubility needed for a practical system.

c. Melamine levels - The optimum level of Cymel 301 has been determined for best detergent resistance.

d. The incorporation of a hydroxyl monomer (HPMA)-the use of the above monomer has been found to improve detergent resistance with a slight loss in flexibility. The optimum level has yet to be established.

e. Replacing Cymel 301 with Benzoguanamine Formaldehyde resin - This approach has resulted in improved detergent in some instances where a direct comparison has been made with Cymel 301. Improved flexibility definitely has been obtained with the B. F. resin. The optimum levels have yet to be determined, also the effect of cooking the B. F. resin in the acrylic portion.

SUBJECT: DETERGENT RESISTANT PRIMERS - EVALUATION OF F-467

SUMMARY: There had been some indications that F-467, a new phenolic resin, if put into the RCR1083 cook in place of F-460, might provide equal or better detergent resistance and also stop the phenolic bleed through problem which occurs when Whirlpool's EXM66072-A is topcoated with white. A very exacting experiment incorporating three bake schedules was run comparing RCR1083 with F-467 against std. RCR1083 with F-460. No significant difference was found between them in salt spray, pencil hardness, impact and conical mandrel. The detergent resistance of F-460 was much better than that of F-467. It averaged out over 12 comparisons to be 43% better. The F-460 gave slightly less bleed through than F-467 although the untopcoated primer based on F-467 had a much cleaner color. On the basis of this experiment, no further work will be done with F-467 in detergent resistant systems. A full, detailed report on this experiment will be issued.

Initial screening has been begun on a maleinized oil-epoxy primer.

SUBJECT: WHITE ROGERS DIVISION OF EMERSON ELECTRIC - SI28058I3312

SUMMARY: A #106 Gray has been formulated for the above customer. The color is #26251 Federal Standard 595. The main requirements are 75-90 gloss, H Pencil Hardness, 200 Hrs. salt spray, and 350 - 500 hours humidity resistance. Of our current resin systems, RCR2106 best fulfills the above requirements as far as properties are concerned. The starting material number is EXM68097. The substrate specified is iron phosphated steel.

SUBJECT: THE WIREMOLD COMPANY - SI28059I3315

SUMMARY: A #102 quality tan starting material, EXM68098, was developed to match the customers color and gloss. Eight gallons were made to coat customer parts.

SUBJECT: ST. LOUIS SERVICE LETTER - SI25178I3115

SUMMARY: Technical service was provided Medart Locker on a throwing power problem with their gray tank.

SUBJECT: MIDWEST SERVICE LETTER - SI25187I3115

SUMMARY: Technical service was provided to Carnes Corp. on a contamination problem with their white tank.

SUBJECT: READING SERVICE LETTER - SI25176I3115

SUMMARY: Several batches made in Reading were tested here.
EXM67038B P-101723 - Had inadequate solubility
K-1632 P-617583 - Approved
K-1632 P-617589 - Approved
EXM67025-C P-101793 - Approved

SUBJECT: NATIONAL SERVICE LETTER - NI24056I3115

SUMMARY: A program of tightening electrocoat manufacturing quality control tests was initiated. The first "Electrocoat Manufacturing Quality Control Bulletin" was issued. It described the tentative "Deionized Water Reduction & Filtration Test" for feed materials. This is a factory test method for determining whether a production batch of electrocoat feed material has adequate solubility.

SUBJECT: SOLVENT FREE ELECTROCOAT ENAMELS - NI27057I3315

SUMMARY: Work has begun on developing a solvent-free acrylic. Several resins have been evaluated but they did not deposit properly. These were: RE22355, RE22356, and RE22357.

SUBJECT: RCR2106, DEVELOPMENT PROGRAM - NI25005I3313, NI17015I3315, NI27030I3315

SUMMARY: #106 quality turnovers have been conducted on two colors, the General Electric Gray #65194, and the V. E. Anderson White #66051. The G. E. gray turnovers were an attempt to convert a #102 quality tank into a #106 quality tank by introduction of #106 quality feed material. The V. E. Anderson turnovers were an attempt to convert a #104 quality tank into a #106 quality. The appearance of craters has forced both these turnover runs to be discontinued. Apparently, the cratering was caused by the introduction into the tanks, at about 1.5 turnovers, of inadequately mixed gallon batches of feed. #106 quality seems to require better mixing than the #102 quality does. If a batch of #106 feed that causes cratering is given additional mixing time or allowed to age about one week, it thins down in viscosity and when introduced into the tank does not cause cratering. To be absolutely certain that the cratering is not intrinsic to mixing #106 with #104 in certain proportions, a second V. E. Anderson turnover run has been started. This run is using a gallon batch of feed which has been provided to be non-cratering by use during the first V. E. Anderson turnover run. This feed will be used for five turnovers which will bring the tank to a composition of 99.5% #106 quality. If cratering is due only to sub-standard feed, then no craters should appear from 0 to 5.0 turnovers. Note: Low mol. wt. electrocoat resins tend to crater.

Formulation work was begun on a family of #106 quality aluminum extrusion coatings. In trying to raise the B/P ratio it was found that the material had excessive flow. Because of this and because of difficulties experienced in maintaining voltage stability on steel in certain formulations, we have decided to evaluate higher molecular weight "RCR-2106's." An eight resin, full factorial experiment has been initiated by the resin lab and ourselves. Most further work on #106 quality aluminum extrusion coatings will be set aside until the high mol. wt. experiment is complete.

Three pilot plant batches of RCR2106 have been manufactured. The batches were all quite similar in properties and it appears that we should be able to make the resin successfully.

DEMONSTRATIONS

Singer Company
G. E. - Ft. Wayne

SERVICE TRIPS

12/5 - S. Hinds to S.P.S., Hatfield, Pa.
12/13 to 12/16 - L. Mambuca to Carnes Corp. Verona, Wisc.

PARTS AND PANELS

International Oil Burner
Bendix Corp.
John Deere
Kewaunee Mfg.
Maytag Co.
Master Lock Co.
Bonnel Co.

CONTRIBUTORS: D. Thrane, J. Erickson, L. Petrak. A. Figoli, D. Shuster, P. Kunz, R. Smego, S. Hinds, L. Mambuca, R. Bair

ELECTROCOATING LABORATORY December, 1967

SUBJECT: PATENT WORK

SUMMARY: Patent investigations on British patents #665195, #482548 and Japanese patent #144755 were completed. These patents were cited by Japan patent office against the basic electrocoat patent application by Ford Motor Company.

British Patent #665195 concerned special alkyd compositions.
British Patent #482548 concerned shellack solutions.
Japan patent #144755 concerned a Urushiol resin solution.

Data was prepared in affidavit form and taken to Japan by Mr. Douthitt.

Together with the above data, the electrical equivalent weight of RCR1083 was again determined as an example of our basic electrocoat resin for comparison to other resins.

SUBJECT: CHROMATED FATTY ACID

SUMMARY: Investigations were carried out on solubilization of fatty acids with chromic acid. A patent disclosure was prepared to cover the data and principle investigated.

SUBJECT: VARIATIONS OF EUROPEAN AND U. S. RCR1070A

SUMMARY: Investigations were made on five samples of RCR1070A (Wulfing 10049) resins and two samples of RCR1070A (Salchi SR-53) resins together with four samples of RCR1070A (U.S.) resins.

The purpose of this work is to discover reasons for production resins variations found in our recent international electrocoat ooperations.

Raw materials as well as process variables are being investigated.

SUBJECT: BLACK PRIMER

SUMMARY: Work on developing a new black electrocoat primer has been delayed pending preparation of the new resins requested.

SUBJECT: TRIPS

SUMMARY: None

CONTRIBUTORS: A. E. Gilchrist and W. Rehman

COATINGS RESEARCH

DECEMBER, 1967

SUBJECT: 100% SOLIDS - NT17002C2376

SUMMARY: Recent results show that diallyl maleate is non-volatile only in the polyester system and not with alkyds. Therefore variations of the butyral polyester were prepared to overcome the short, brittle nature of these films.

Two variations were made using diethylene glycol at different ratios with maleic anhydride: 1512A20 resin with 4/3 ratio DEG/MA and 1512A21 resin with 6/5 ratio DEG/MA. Both resins were very poor drying, requiring more than eight hours for set-to-touch.

1512A16 resin was made with TMP in place of ethylene glycol. This polyester dried reasonably well and is being tested further.

NEW SOLVENTS

Bis (2-vinyl 4-hydroxyethyl) 1,3-dioxolane:
Poor solvency and poor drying.

Allyl butyl maleate:
Reasonable odor and solvency, good drying but with some residual tack. Slower curing and less brittle than diallyl maleate.

DiAllyloxyethyl Maleate:
Very reactive. Solvent alone gelled in two days without catalysts. It is proposed to attempt to use this structure in the design of new polyesters.

SUBJECT: WATER BASED ZINC RICH WELDING PRIMER - SI28022I7307

SUMMARY: A 25 hour study was carried out to determine the feasibility of making a water based welding primer for automotive use. It was concluded that no single package water based vehicle currently available will pass the wash-off test involved in the cleaning and phosphating process prior to baking.

Various latex systems were tested and good films were produced. The precipitation of the latex by zinc dust was overcome by pretreating the latter with ammonium dihydrogen phosphate

The latex systems did not gas excessively or gell after two weeks. Further tests are in progress to determine the stability of these systems since they may be of value in other area

CONTRIBUTORS: R. Gray, P. Abel.

SUBJECT: WATER SOLUBLE AUTOMOTIVE METALLICS - NI27021C1307

SUMMARY: Several melamines were evaluated for physical properties with a particular interest in the improvement of gloss of water soluble automotive metallic enamels. Melamine QR-483 (Rohm and Haas) gave a measurably better gloss than Resimene 730 while being fairly equal in other physical properties. QR-483 appears to be more compatible with the 10% hydroxypropyl methacrylate (HPMA) and 10% acrylic acid modified acrylic polymer (RE23178) that we are currently working with. Melamine 27-400 (RCI) showed some interesting properties. The cure at a 30 minute bake at 250°F. was poor but the cure at a 30 minute bake at 300°F. was slightly better than the Resimene 730 cure at 250°F. The gloss of the higher bake was fairly similar to that of QR-483 but with improved flexibility. Perhaps an acid catalyst might improve the cure while maintaining the other properties. Melamines RI-2027 (Monsanto) and 27-065 (RCI) had very slightly better cures than Resimene 730 but were slightly more sensitive to popping. 27-065 was also slightly less flexibile. Resloom M-75 and Resloom M-80 (Monsanto textile melamines) were faster curing and slightly less flexible. Resloom M-80 had slightly better gloss but was slightly more sensitive to popping. Stability results will determine whether further study should be done on these two melamines.

MD-588 and MD-788 aluminums (Alcan) and 7290 aluminum (Alcoa) were treated to impart water dispersibility. They are being checked for stability. MD-588 and MD-788 have similar appearance and gloss to MD-5079 (Alcan water dispersible aluminum). 7290 aluminum is noticeably finer in particle size, grayer and glossier than MD-5079. L-478 (Silberline water dispersible aluminum) was found to be slightly finer in particle size, grayer and glossier than MD-5079. L-478 falls between MD-5079 and 7290 aluminums in the above properties. The stability is being checked.

Phthalo blue and carbon black pre-dispersed pigments (powder form) from Holland-Suco were checked for use in tinting pastes. The dispersions were cut into pastes on a mixer. The black paste had a good dispersion and produced a very good gloss in a black enamel. The blue paste was slightly seedy but gave good gloss in a blue metallic enamel. Perhaps a better cutting procedure can be found for the blue dispersion. Larger samples have been ordered for further investigation.

In an effort to improve the gloss of the white enamels Titanox CLNC (National Lead) was substituted for TiPure R-960. This produced a noticeable increase in gloss. The additional substitution of QR-483 melamine gives a white enamel with very good gloss.

A ten percent addition of Lustrasol 13-402 (RCI water soluble thermoplastic acrylic) was made to the vehicle of a metallic enamel for better oven flow and gloss. The addition produced a lower gloss so it would seem that Lustrasol 13-402 is not compatible with our vehicle. Diacetone alcohol substituted for butyl cellosolve acetate produced a lower gloss metallic enamel.

Tertiary amines, which give better package stability to water soluble enamels, have contributed to objectionable popping. Diethyl ehtanolamine (a tertiary amine) was tried in the neutralization of a 6% acrylic acid and 10% HPMA modified acrylic polymer. There was noticeably less popping (not quite free of popping) than when used with a 10% acrylic acid and 10% HPMA modified acrylic polymer. There was a noticeable pH drift, however, that was not encountered with other tertiary amines which have been tried.

CONTRIBUTOR: K. Coleman

SUBJECT: SILICONE ACRYLICS - NI26035I2311

SUMMARY: Some significant weatherometer studies are now becoming available and are giving some indication of the durability to be expected.

RE22898	60° Gloss at 1200 hrs. = 17 chalk started at 1200 hrs.
RE22898 & Silicone	60° Gloss at 1200 hrs. - 75 chalk started at 2600 hrs.
RE22899	at 1600 hrs. = 36° gloss
RE22899 & Silicone	at 1600 hrs = 71° gloss
RE22900	at 1000 hrs. = 72° gloss
RE22900 & 10%/Z6018	at 1000 hrs. = 81° gloss
RE22900 & 25%/Z6018	at 1000 hrs. = 82° gloss

Exterior durability data is not yet available. The above results are obtained from cold blended systems. More recent resin systems have the silicone intermediate reacted with the acrylic. The latest of these is an acrylic having a composition in between RE22899 and RE22900. This resin was then reacted with 10% and 25% Z6018 to produce RE23210 and RE23211 respectively. These two silicone acrylics have, to date, shown the most promise. For example, an enamel based on RE23210 (10% silicone) with 5% of plasticizer produces films curing at a PMT of 450 and having H hardness, 3T flexibility and 30"lbs. impact resistance. On the other hand, RE23211 (25% silicone) with 10% plasticizer will produce a film curing at 450-470°F. and having F+ hardness 2T flexibility and 20"lbs. impact on Alodine 1200S treated aluminum. Both full and 30° gloss are being exposed in the weatherometer, Florida and Cleveland. A range of colors have been produced with success in the high gloss systems. These have also been exposed in the weatherometer, Florida and Cleveland. The present work has been confined to an aluminum substrate but further work with different substrates is scheduled. Some enamel costs have been evaluated and it would appear that selling costs on a solid film basis would be in the order of 0.9¢ for the 10% silicone acrylic to 0.96¢/sq.ft./ml for the 25% silicone acrylic enamel.

SUBJECT: COIL COATING CONVENTIONAL TYPE SIDING FINISH SELF-CURE ACRYLICS

RCR6322, Self-Cure Thermosetting Acrylic

SUMMARY: Further work was curried out with composite grinding of black pigments with DuPont's titanium dioxide, R-960 in RCR6322. Two non-flocculating, easy-grind carbon blacks were tested. They were DuPont's A-43-D and Harmon Color's J1027. Flooding was prevelant in the enamel containing DuPont's A-43-D. Harmon Colors J1027 corrected the problem. Flooding-floating was not evident in the enamel containing this pigment.

The following development work was carried out on RCR6322 for weatherometer and exterior exposure. Panels are being exposed in Cleveland @ 45°S. Florida exposures are at 5 and 45°S. in addition to the weatherometer.

LAB CODE	COLOR	COLOR PIGMENTS	TIO2	GLOSS	EPOXY
1350A-44	Olive Tone	Mapico Tan 15 Chrome oxide Green	R960	80+	----
1350A-62	Olive Tone	Carbon Black	R960	15	----
The following were exposed to study 3% epoxy modification.					
1350H-68	White	----	R960	10	----
1350H-70	White	----	R960	10	3%

A carbon black shading base was developed for RCR6322 enamels. The shading base was made in the plasticizer, Rohm & Haas Paraplex G-41, and issued as EGL68425.

The initial 40 gallon batch of EGL68357 was passed as standard on 12/18/67. The batch (181564) had flexibility equivalent to the control. The weight per gallon and viscosity were in spec and the film passed 120 hours Cleveland Condensing Humidity with a rating of 10

RE-23289, Self-Cure Thermosetting Acrylic

The above acrylic was submitted by the resin department to see if it could be used as a more flexible version of RCR6322. RE23289 differed from RCR6322 in that butyl acrylate replaced the ethyl acrylate. The supposition was that butyl acrylate would impart more flexibility to the resin.

Although greater flexibility was in fact obtained the resin still required plasticizer. The improvement in physicals was not significant enough to amount further development. The results are more fully reported in Coatings Research Report #50.

SUBJECT: THERMOSET VINYL ACETATE

SUMMARY: In November, 1967 the thermoset vinyl acetate resin RE23110 was repeated by the resin department to see if it would correlate with the initial sample of RE23110. At the same time RE23242 was submitted for evaluation. This thermoset vinyl acetate was RE23110 with 1% trichloroethylene as a chain regulator.

Testing proved the initial and repeat batch of RE23110 were equivalent. However, a discrepancy was found in the original testing of RE23110 cured with Cymel 301 and Cyzac 1010. This system was found originally to pass ninety to one-hundred MEK rubs but in second analysis was found to pass 200+ MEK rubs.

The addition of trichloroethylene casued darkening of the resin and loss of flexibility. For complete results on above resins refer to Coatings Research Report No. 49.

Thermoset vinyl acetate resins RE23215 and RE23216 are copolymers prepared by the resin department by grafting acrylate monomers on the vinyl acetate copolymer RE-23111.

The purpose of the submission was to see if grafting of acrylate monomers improved on flow hardness and/or flexibility of the thermoset vinyl acetate copolymers.

Testing showed that the above grafting did not improve on the physical properties of the thermoset vinyl acetate resin system.

For complete results refer to Coatings Research Report No. 48.

SUBJECT: COIL COATINGS SAMPLES AND EXHIBITS - NI27038I2111

SUMMARY: The following samples were prepared and shipped during December, 1967. Both samples were based on Acrylure, RCR6322.

CUSTOMER	CODE	TYPE	GLOSS	PURPOSE	SUBSTRATE
Kirsch	EGL68357	Acrylure	80+	Drapery Hardware	Cold-Roll Bond 901
Alcan	EGL68428	Acrylure	10	Experimental Exterior Exp.	Treated Aluminum

SUBJECT: SILICONE POLYESTER - NI26035I2311

SUMMARY: Silicone polyester EGL68424 was prepared and submitted to Alcan for testing as a residential siding finish. This system is a blend of linear polyester RCR6403, Cymel 301 and a Dow Corning silicone polyester R-6-0031. Weatherometer results indicate excellent chalk resistance up to 2000 hrs. No advantage is gained in terms of gloss retention over the straight linear polyester RCR6403 and would not therefore be suitable as a high gloss finish with stringent gloss retention specifications. The low silicone level (7-8% on resin solids) and high volume solids (54.2%) would be advantageous from a cost consideration. The general physical properties of this finish are as follows:

Gloss 60°-10-14
Pencil Hardness - F+
Flexibility - 2T no tape off
Reverse impact resistance - 30 in-lbs no failure
Cure - 380°F. P.M.T.

SUBJECT: THERMOSET VINYL CHLORIDE - NI26035I2311

SUMMARY: Work is being completed on the Thermoset Vinyl Project. The data is being statistically analyzed and should be completed in January, 1968. Selection of the optimum resin, or more probably the optimum conditions for synthesizing a vinyl resin should be finalized at this time. The problem of Humidity failure has not yet been completely resolved due to a suspected deficiency in metal pretreatment. A rather substantial portion of this type failure could be due to this factor.

SUBJECT: VINYL PEELCOAT - NI26034I2211

SUMMARY: Longer term tests are indicating that a system based on Geon 135 and Flexol 1010 (EGL68374A) is superior to a similar system based on D.O.P. in two ways (1 phr of Cyasorb U.V. 24 is required for U.V. resistance).

1. Slightly superior results in the dew cycle weatherometer. After 136 light hours this system completely almost completely peels off whereas the D.O.P. and competitive Conchemco peelcoats only 1/2 peel off.

2. Better initial viscosity at a higher solids occurs when Flexol 1010 is used. A viscosity of 12 secs Zahn #6 at 83% N.V. content is obtained. The results, to date, show that the viscosity stability is equivalent to the Conchemco material.

More detailed tests using line run panels from E. G. Smith of Duracron finishes are in progress. Durability studies are underway in Florida, Cleveland, Minneapolis, and the dew cycle weatherometer.

The peelcoat applied over standard baked and underbaked Nubelar films have also been exposed. E. G. Smith's aluminum is used as the substrate. The peelcoat passes the "wet towel test," blocking and low temperature peelability (overnight at -10°F.). It was observed that when the peelcoat was applied over the Duracron films some gloss increase occurred when the peelcoat was removed. Loss in hardness of the acrylic films was also observed. These effects were also noted with the Conchemco material.

	GLOSS OF DURACRON 60°	
	BEFORE	AFTER PEELCOAT
Conchemco Peelcoat	31	50
Geon 135/Flexol 1010	31	60

	HARDNESS		
	INITIAL	AFTER PEELCOAT	ONE WEEK
Conchemco Peelcoat	F+	2B	2B
Geon 135/Flexol 1010	F+	B	B+

E. G. Smith also supplied stainless steel panels for testing. Application was found to be good over this substrate. It is not clear at this stage, what exactly their durability requirements are. If in fact they are more stringent than are met by our present system it would appear necessary to pigment the peelcoat for additional U.V. resistance. For this reason some dew cycle studies are being made with a carbon black pigmented peelcoat. The carbon black was conveniently added as the Dramatone black Y1782.

The formula EGL68374A has been costed and based on Central Region costs a bulk cost of $2.75/gal. was obtained.

CONTRIBUTORS: K. O'Hara, R. Zilke, R. W. Stone

SUBJECT: POLYPROPYLENE - NI27009C1315

SUMMARY: Efforts have finally been successful in making a decent looking polypropylene topcoat dispersion using the new Hercules PB-774 (lot SP-2447) and the new Hercoprime 292 (now called Hercoprime SA-941). Initially difficulties had been encountered in making a coating that would fuse nicely without blistering or mudcracking. It was found that by increasing the amount of slower solvents (by over 50%) that the difficulties of getting a good film were greatly minimized. Two dishwasher tubs were coated with a polypropylene topcoat dispersion using the new resins. Due to lack of experience with this new material, the results were not exactly first class. However, they were judged adequate for the purposes intended.

Since it has become increasingly evident that "Airless Spray" is the desirable way of applying the polypropylene topcoats, efforts have been made to develop a workable material. Some success has been achieved but the main difficulty at present is that the spray gun gets plugged up by the material. This is due largely to the fact that this new lot of solution resin (Hercoprime 292) does not do an adequate job of holding the dispersion together. The resin manufacturer is aware of this and is working on the problem.

In an attempt to raise the solids level of the polypropylene topcoat dispersions, efforts have been made to utilize a stone mill (Morehouse) to manufacture this material. The results have been interesting but not too successful. The chief difficulties appear to be results that are not consistently reproducible and too much "debris" in the dispersions which is difficult to remove.

A "Bramley Beacon" mixer has finally arrived and attempts to make suitable caulking compound for under the polypropylene topcoats are underway. The chief difficulty at present is making a caulk that is more flexible and still retains the good detergent and adhesion properties of our former materials.

Materials were sent to the following places:

PreFinish Metals, Inc. - Elk Grove Village, Illinois
7 gals. EGL68302 Black Polypropylene Disp.

Bennett Industries, Inc. - Peotone, Illinois
1 gallon EGL67573 White Baking Primer
5 gallons EGL67314 Yellow Baking Primer
5 gallons 1568-A-78A White Rollcoat Polypropylene Disp.

Glidden - Salchi S.P.A. - Milan, Italy
5 - polypropylene coated wire racks
25 - 4" x 8" Polypropylene coated panels

Hercules Inc. - Wilmington, Delaware
2 - panels polypropylene coating
1 qt. - EGL68437 White Polypropylene Disp.
1 qt. - EGL68446 White Polypropylene Disp.

CONTRIBUTORS: J. Witko, G. Hardie

SUBJECT: IMPROVEMENT OF NUBELAR (GENERAL SALES) - NI26034I2111

SUMMARY: I. As the result of a reported fading problem with EGL66216, Olive Tone Nubelar Coil Coating, tests have been initiated to determine the cause of this fading if it occurs in properly applied systems. EGL66065A, EGL67413 and EGL67413 modified by replacing Zopaque R-55 with TiPure R960 were each used under EGL66216 and EGL66216-B. The two topcoats were also applied as single coat systems. The Cleveland Condensation Humidity Test showed the EGL66216-B over EGL66065-A system to be weak (few field blisters). All other systems showed no effect after 240 hrs. The systems are under test in Dew Cycle Weatherometer and Florida (H-7-418, WD-7-418 and F-7-348).

II. Kynar 500 Experimental Resins Lots 65-0454 and 67-0454.

Lot 65-0454 gave a marginal grind reading on dispersion and smoth, fused films. Lot 67-0459 gave excellent dispersions and films. Pennsalt Chemical Corp. has informed us that we can expect slightly higher viscosities with these resins. The specification are 60-85" #4 Ford and 10.91 lb./gal. for EGL66064-B. On a standard lab batch the constants are 83" and 10.91 lbs. (14 weeks old). The lab batch using Lot 67-0454 is at 86" and 10.92 lbs after four weeks.

III. Production of 110 gallons of EGL68377, Caribbean Blue Nubelar Coil Coating and 40 gallons of EGL66064 Mist White Nubelar Coil Coating for Elwin G. Smith were made without any technical difficulty.

IV. EGL68434, #68434 Bone White Nubelar Coil Coating, was developed for Inland Steel. This is a different shading of EGL66064-B.

SUBJECT: COIL COATING - APPLIANCE - NI27007I2511

SUMMARY: Trip to Glidden (Nubian) Chicago

PURPOSE: To supervise production of initial 25 gallon batch of EGL67421C White Poly-Lure 3000 Finish.

CONCLUSION: Batch manufactured to standard using RCR6403 P380075. This batch is to be tested at American Screen on precoated aluminum for awnings.

SUBJECT: EXHIBITS AND SAMPLES - GENERAL SALES - NI24034I1111

SUMMARY: I. Organosols - Alcan Brixite

EGL68398, Terra Cotta Two Coat Organosol and EGL68400, Dark Gray Two Coat Organosol were developed and sampled to Alcan Brixite. These coatings have excellent low temperature (-10°F.) over aluminum. They have passed 120 hrs.@ 190°F. CCH with no effect. They are under test as follows H-7-396, W-7-396, 7-324 (Cleveland), F-7-322, 3, 4.

An unpigmented version of EGL66047 White Organosol Primer, was made and tested in CCH under EGL67440-A, White Two Coat Organosol. No effect was noted after 120 hours.

II. Poly-Lure Finishing Systems for Appliances

A series of panels of Poly-Lure 1000 and 3000 have been submitted to the Chicago (Nubian) Division for evaluation as coil applied coatings for appliances.

PAINTS

EGL67314	Nupon Primer (Zinc Chromate)
EGL68426	Clear Nupon Primer
EGL67673	White Poly-Lure 2000 Primer
EGL68457	White Poly-Lure 1000 Finish
EGL68458	White Poly-Lure 3000 Finish

FILMS

Primer 0.2 mil dry
Finish 2 coat 0.9 mil dry
Finish 1 coat 1.0 mil dry

METAL

Aluminum 0.025" Alodine 1200S Q Panel

Cold Rolled Steel	22 gauge	Bonderite 901	Republic Steel
H.D. Galvanized Steel	26 gauge	Bonderite 1303	Republic Steel

FINISH SYSTEMS

SUBSTRATE	PRIMER	POLY-LURE FINISH
Aluminum	No	1000
"	"	3000
"	Poly-Lure 2000	1000
"	"	3000
"	NuPon Clear	1000
"	"	3000
C.R.S.	No	1000
"	"	3000
"	NuPon Zinc Chromate	1000
"	"	3000
H.D.G.	NuPon Clear	1000
"	"	3000
"	NuPon Zinc Chromate	1000
"	"	3000

SUBJECT: SAMPLES AND EXHIBITS - (NI24034I2111) ----The following were shipped during December 1967. GENERAL SALES

EGL	COLOR	QUALITY	PANELS	GALLONS	CUSTOMER	DIVISION	SALESMAN	DATE
67604A	White	Poly-Lure 2000	2	1/4	Kirsh	Central	A. Waldron	12/5
68351	White	Acry-Lure	2	1/4	Kirsh	Central	A. Waldron	12/5
67604A	White	Poly-Lure 2000		1/4	Chamberlain	Central	A. Waldron	12/7
67314	Primer	NuPon		1/4	Chamberlain	Central	A. Waldron	12/7
67302	Terra Cotta	Nubelar		1/8	Chamberlain	Central	A. Waldron	12/7
67413	Primer	NuPon		1/8	Chamberlain	Central	A. Waldron	12/7
67416	White	O.C. Org.		1/4	Chamberlain	Central	A. Waldron	12/7
67435	White	T.C. Org.		1/4	Chamberlain	Central	A. Waldron	12/7
66047	White	Org. Primer		1/4	Chamberlain	Central	A. Waldron	12/7
68930	Bronze Gold	Nubelar (913 primed)	3		Avon Pdts	Central	A. Waldron	12/18
68377	Caribbean Blue	Nubelar (913 primed)	3	1/8	E. G. Smith	Central	Gentholts	12/27
66064B	Mist White	Nubelar (913 primed)	3	1/8	E. G. Smith	Central	Gentholts	12/27
67604A	White	Poly-Lure 2000	2	8	Kaiser	Nubian	R. Elsner	12/5
67314	Primer	NuPon	1		Kaiser	Nubian	R. Elsner	12/5
67673	White Primer	Poly-Lure	1		Kaiser	Nubian	R. Elsner	12/5
67421C	Off White	Poly-Lure 3000	210		Appliance Fin.	Nubian	R. Elsner	12/21
67525A	Off White	Poly-Lure 1000	210		Appliance Fin.	Nubian	R. Elsner	12/21
67526	68 Ohio White	Poly-Lure 2000	2	1/8	Roll Coaters	Nubian	R. Elsner	12/21
68421	White	Poly-Lure 1000	2	1/8	P.F. Metal	Nubian	R. Elsner	12/21
68424	White	Silicone P.E.		1/4	Alcan-Kingston	Toronto	A. LeRoy	12/20
68435	White	Poly-Lure 2000		1/4	Alcan-Kingston	Toronto	A. LeRoy	12/20
68428	White	Acrylure		1/4	Alcan-Kingston	Toronto	A. LeRoy	12/20
65310	Chrom. Phos.	Primer		1/4	Alcan-Kingston	Toronto	A. LeRoy	12/20
67604A	White	Poly-Lure 2000	6			UCB	E. Weith	12/1
67604A	White	Poly-Lure 2000		1/4		Eastern	Blachman	12/5
67716	Gray	Poly-Lure 2000 R.D.	4	1/8	U.S. Steel	Eastern	Pohlman	12/7
67314	--	NuPon Primer		1/8	U.S. Steel	Eastern	Pohlman	12/7
68398	Terra Cotta	T.C. Org.	2+1	1/4	Alcan,Warren	Eastern	Pohlman	12/7
68400	Dark Gray	T.C. Org.	2+1	1/4	Alcan,Warren	Eastern	Pohlman	12/7
66047	White	Org.		1/8	Alcan,Warren	Eastern	Pohlman	12/7
67525A	White	Poly-Lure 1000	4		Eastern	Eastern	Pohlman	12/7
68433	White	Poly-Lure 1000		1	Marwais	S.Fran.	G.Browlie	12/15

GLD 045628

PRODUCTION

EGL	COLOR	QUALITY	PANELS	GALLONS	CUSTOMER	DIVISION	SALESMAN	DATE
67314	Primer	NuPon		255	Eastern	P180652		12/6
68413	White	Poly-Lure 1000		28	Roll Coaters	P181 47		12/8
68377	Caribbean Blue	Nubelar		112	E.G. Smith	P181 63		12/20
66064B	Mist White	Nubelar		40	E.G. Smith	P181 29		1/2/68
67715	Gray	Poly-Lure 2000		280	Republic	P180 80		12/1

DECEMBER, 1967 -

	SAMPLES		PRODUCTION	
	PANELS	WET	CUSTOMER	GAL
Nubelar	9	3	3	150
Poly-Lure 1000	215	3	3	28
Poly-Lure 2000	14	5	6	
Poly-Lure 3000	210	1	1	
Acrylure	2	2	2	
Organosol	6	5	2	
Silicone	0	1	1	
Primer	0	1	6	255
Totals	456	21		433

CONTRIBUTORS: C. W. Bennet, J. F. Roberts, G. B. Hall, P. Timmerman

GLD 045629

POLYMER & PLASTICS

December, 1967

SUBJECT: VEHICLES FOR AIR DRY COATINGS

INTRODUCTION: The first statistical design described in lab report PP-37B is nearing completion. The resins were all successfully prepared and film tests are almost completed.

It is the the intent of this report to describe the second statistical design and to mention future work which will complete the urethane part of this two-package air dry project.

SUMMARY: The second design is based on an epoxide-monobasic acid adduct backbone. The adduct will be reacted with both an aromatic and aliphatic di-isocyanate in order to make the NCO prepolymer. For the two-package mixes, the overall design will be split into four sections described below:

	NCO PREPOLYMER		OH PREPOLYMER
1.	Benzoic acid, t-butyl benzoic acid, DER 332 adduct modified with isocyanate	(with)	Styrene:ethyl acrylate acrylics
2.	" "	(with)	Benzoic acid, t-butyl benzoic acid, DER 332 adducts
3.	Caprylic acid, TOFA, DER 332 modified with isocyanate	(with)	Styrene:ethyl acrylate acrylics
4.	" "	(with)	Caprylic acid, TOFA, DER 332 adducts

This will involve 4×2^3 unsaturated designs and 32 mixtures to test, but it is hoped that 2^2 designs will suffice in which case there will be 16 mixtures to test. An example of one of the 2^3 designs involving the analysis is enclosed; this represents the mixture (I.) in the preceding table.

Resin preparation will begin on December 4, 1967, to be completed by the week beginning December 25, 1967. Film testing will follow. A meeting to discuss the proposed work will be held on December 1, 1967. Messrs, Tomc, Watson, Pratt, Coaster and Backley will be present.

By: Leonard Coaster, Donald A. Backley

POLYMER & PLASTICS

December, 1967

SUBJECT: COMPARISON OF IGEPAL CA-630 VS. TRITON X-100

SUMMARY: A careful comparative evaluation was made to determine the suitability of Igepal CA-630 in K-1666 polymerization. Laboratory batches of latex, analytical checks and paint evaluation of the lab batches of latex showed that the Igepal CA-630 was equivalent to the standard Triton X-100.

A trial production run of K-1666, using Igepal CA-630, was made at Reading. The latex passed all of the standard control tests; however, it proved to be inferior to a control batch of K-1666 when tested in Trade Sales paints.

Approval of Igepal CA-630 for this use can not be given as based upon test results.

INTRODUCTION: The use of alternative sources of supply for emulsion polymerization surfactants has been suggested several times in the past.

The nature of emulsion polymerization is such that it magnifies the subtle differences that are inherent to materials produced by different manufacturers who often use different starting materials and/or processes. Our past experience has shown that such alternates must be carefully evaluated.

In the case of Igepal CA-630, a complete evaluation was made in 1965. All laboratory tests, including Infra-red analysis and Gel Permeation Chromatography, indicated that the material was equivalent to the standard Triton X-100. A production trial at Central Region yielded unsatisfactory latex. Unrelated production problems were later discovered and could explain the poor results of the trial and made this second evaluation desirable.

EXPERIMENTAL - DISCUSSION: Due to the failure to find any differences between CA-630 and Triton X-100 in our previous work, only 5-liter size batches of K-1666 latex were prepared. The sample of Igepal CA-630 was especially selected and submitted by Antara Chemical of GAF.

Test paints were prepared with the experimental latex and a laboratory control batch of K-1666. Ultra Flat and Dripless Latex paints were chosen as the test systems because both show a high sensitivity to differences in the latex.

A production trial run of K-1666, using Igepal CA-630, was made at Reading. A sample of this latex was tested in the same Ultra Flat and Dripless formulations. A batch of K-1666 from Central Region production was used as a control.

EXPERIMENTAL - RESULTS: I. Polymerization: No measurable or visible differences were found from the use of Igepal CA-630 in laboratory preparation of K-1666. See Table I for physical data.

II. Paint Testing - Laboratory Batches: In both the Ultra Flat and the Y-3080B Dripless paint, no significant differences were detected between the control and the test batch of latex. See Table II.

III. Production Trial Run: Manufacture of the latex at Reading was reported to be normal. This batch of P-617331, meets all of the K-1666 specifications. Examination of the clear drawdown showed many fish-eves. Subsequent examination of other Reading K-1666 batches also revealed fish-eying. These did not carry over into the paints and probably are not the reason for the poor results.

The fish-eying problem may be due to either insufficient mixing of the defoamer prior to the sampling or related to the production problems that plagued Reading during the K-7255 scale up. Table III shows the physicals for this batch.

This latex was tested in the same Ultra Flat and Y-3080B Dripless formulations that were used before. A random sample of K-1666 from Central production was used as a control.

While the oven stabilities were satisfactory, the scrubability was much poorer with the trial Reading batch. See Table IV for the test results.

CONCLUSIONS: While laboratory scale batches and analysis fail to detect differences between Igepal CA-630 and Triton X-100 when used in emulsion polymerization, polymerization at a production level did show differences. These differences, as measured by perofrmance tests, show that Igepal CA-630 does not produce the same product as Triton X-100.

Based upon these results, it is not possible to approve Igepal CA-630 for use as a substitute for Triton X-100 in K-1666 polymerization.

R. D. Connerth

TABLE I

K-1666 Latex - Lab Batches

	RE-23008 Std. Control	RE-23009 Igepal CA-630	SPECIFICATIONS
N. V.	52.0%	52.0%	50-52%
pH	4.9	4.9	4.5-5.6
Viscosity	435 cps	410 cps	200-1000 cps
Particle Size	3325Å	3200Å	2300-3500Å
Film Form. Temp.	<45°F.	<45°F.	<46°F.
Mech. Stability	>30 min.	>30 min.	>30 min.
Draw Down	Clear, Seed-free	Clear, Seed-free	Clear, Seed-free

TABLE II

PAINT EVALUATION & TEST RESULTS
Laboratory Batches of Latex

	U L T R A F L A T		Y-3080B Dripless	
	RE-23008	RE-23009	RE-23008	RE-23009
Initial Viscosity	91 Ku	90 Ku	99 Ku	99 Ku
24 Hr. Visc., R.T.	93 Ku	93 Ku	98 Ku	98 Ku
7 Day Visc., R.T.	93 Ku	93 Ku	98 Ku	98 Ku
7 Day Visc., 140°F.	91 Ku	90 Ku	95 Ku	95 Ku
7 Day Roll	86 Ku	88 Ku	94 Ku	95 Ku
Color Stability	OK	OK	OK,sl.chg	OK,sl.chg
Scrub (unsealed)	238 cycles	244 cycles	68 cycles	66 cycles

TABLE III

K-1666 Production Trial P-617331 with Igepal CA-630

PHYSICAL CONSTANTS:

N. V.	51.0%
pH	5.0
Viscosity	380 cps
% Free VAc	0.8%
Particle Size	2920Å
Mech. Stability	30 minutes
Film Form. Temp.	40 °F.
Draw Down	Clear - Many Fish-eyes

TABLE IV

Paint Evaluation of
P-617331

	ULTRA FLAT	
	P-617331	Control
Initial Visc.	96 Ku	96 Ku
24 Hr Visc RT	96 Ku	96 Ku
7 Day Visc RT	99 Ku	97 Ku
7 Day Visc 140°F	102 Ku	100 Ku
7 Day Roll	96 Ku	101 K.O.
Color Stab.	N.G.	N.G.
Scrub (unsealed)	160	245

ANALYTICAL LABORATORY

ANALYSES DECEMBER, 1967

CONTRIBUTORS: H. D. Swafford, D. Senko, J. Schmittgen, E. White, G. Flood, C. Blake, S. Pitcher, R. Evans

Following are listed some of the analyses completed during the month of December, 1967:

During the month, a series of experiments were performed to devise simple means for a wet analysis lab to run assay analyses on hydroxypropyl methacrylate monomer batches. Linear concentration plots were obtained versus percent hydroxyl, versus refractive index, and versus weight per gallon over the range 0 to 100% H.P.M.A. in xylene, with and without 2% water present.

1. #29-129 WHITE POLYESTER EN. (STANDARD-T CHEM. CO.--FOR FRANKLIN MFG. CO.) - NUBIAN

SOLVENT: Xylene, diacetone alcohol, cellosolve acetate, methyl isobutyl ketone.

BINDER: Melamine-formaldehyde modified, neopentyl glycol-adipic acid-isophthalic polyester.

TOTAL SAMPLE		SOLVENT		BINDER		CONSTANTS	
Solvent	37.3%	S-423	50.3%	M.F.	7.1%	NV	62.7
Pigment	28.1%	S-622	23.3%	Isophthalic Acid	43.7%	Veh.NV	48.1
Binder	34.6%	S-558	11.8%	Adipic Acid	20.0%	N_2	1.6
		S-614	14.2%				
		Unk.	0.4%				

* Expressed on Veh. NV.

2. GLASIMAT TM RED COLORED DISCS (GLASTIC CORP.) - ELMWOOD

FILLER: China clay (hydrated aluminum silicate).

MONOMER: Styrene, only.

POLYESTER: O-phthalic maleic--fumaric--"Het" ethylene glycol. There is also present a small amount of a bis-phenol A based, polyol (thought to be the ethylene glycol diether). "Het" content is largest, and only a small o-phthalic content is present (could not quantitate in this four-way mixture). No calcium or magnesium was found.

TOTAL SAMPLE		POLYESTER		CONSTANTS	
Filler & Glass Fiber	67.0%	"Het" anhydride	48.6%	NV	97.0%
Polyester resin:	30.0%			Cl	27.9%*
Styrene	3.0%				

* On Veh. solids.

3. CLEAR TOPCOAT AND WHITE TOPCOAT (RELIANCE--FOR EDISON WOOD PROD.) - NUBIAN

CLEAR TOPCOAT

SOLVENT: Xylene, toluene, n-butanol, isopropanol, butyl acetate.

BINDER: Urea-formaldehyde resin and cellulose acetate butyrate. An acid is also present (see Acid No., below).

SOLVENT		BINDER		CONSTANTS	
S-423	16.7%	U.F.	33.3%	NV	14.7%
S-416	30.4%	C.A.B.	66.7%**	Acid No.	6.4 (43.5 on NV)
S-231	8.0%				
S-222	8.8%			N_2	7.5%*
S-522	35.0%				
Unk. #1	0.5%				
Unk. #2	0.6%				

* Expressed on Veh. NV.
**By difference.

WHITE TOPCOAT

SOLVENT: Xylene, toluene, methyl isobutyl ketone, isopropanol, methyl amyl acetate, methyl ethyl ketone.

BINDER: Nitrocellulose, together with a glycerine--P.E.--cocoanut--o-phthalic alkyd. Ratio of glycerine to P. E. is approximately 1 to 1.

TOTAL SAMPLE		SOLVENT		BINDER		CONSTANTS	
Solvent	46.8%	S-423	22.1%	Nitrocellulose	26.8%	NV	53.2
Pigment	44.3%	S-416	22.9%	P.A.	35.9%	Veh.NV	16.0
Binder	8.9%	S-614	37.9%	Cocoanut -F.A.	25.0%		
		S-222	4.8%				
		S-530	5.4%				
		S-612	5.8%				
		Unk.	1.1%				

4. FLOW COAT PRIMER (JONES DABNEY - FOR WHIRLPOOL) - NUBIAN

SOLVENT: Xylene, diacetone alcohol, small quantity of unknown naphtha.

BINDER: "Epon" - type epoxy resin, urea and melamine-formaldehyde resins (approx. 1 to 1), and a D.C.O. - glycerine--o-phthalic alkyd.

TOTAL SAMPLE		SOLVENT		BINDER		CONSTANTS	
Solvent	42.5%	S-423	62.7%	P.A.	19.2%	NV	57.5%
Pigment	20.1%	S-622	28.3%	D.C.O. F.A.	18.4%	Veh.NV	46.8%
Binder	37.4%	Naphtha	9.0%	U.F. - M.F. Epoxy + Polyol	27.6% Balance		

5. STYPOL 40-2342 (FREEMAN CHEMICAL) - ELMWOOD

MONOMER: Styrene, only.

POLYESTER: Isophthalic--maleic--fumaric--diethylene glycol--ethylene glycol.

BINDER		POLYOL		CONSTANTS	
Isophthalic Acid	34.7%	D.E.G.	89.1%	NV	71.5%
M.A.	21.3%	E.G.	10.9%	Acid No.	6.5
Glycols	Balance			OH	1.3%

6. STYPOL 40-2314 (FREEMAN CHEMICAL) - ELMWOOD

MONOMER: Styrene, only.

POLYESTER: Maleic--fumaric--dipropylene glycol.

BINDER		CONSTANTS	
M.A.	44.0%	NV	74.4%
D.P.G.	Balance	Acid No.	19.1
		OH	0.28%*
		Ash	0.05% (Co_2O_3)

* On NV

7. CORESYN (LARSON IND., INC.) - ELMWOOD

MONOMER: Styrene.

POLYESTER: O-phthalic--maleic--fumaric--diethylene glycol.

CONSTANTS		POLYESTER SOLIDS	
NV	66.1%	P.A.	50.2%
Ash	0.07% (Co_2O_3)	M.A.	7.4%
Acid No.	21.9 (as is)	D.E.G.	Balance
OH	1.3% (on NV)		

8. CR-101 POLYESTER (INTERCHEMICAL - FOR NOLIN MFG.) - ELMWOOD

MONOMER: Styrene, only.

BINDER: O-phthalic--maleic--fumaric--propylene glycol. Also appears to contain a small amount of dimerized fatty acids.

BINDER		CONSTANTS	
P.A.	32.6%	NV	63.4%
M.A.	28.4%	Acid No.	2.4 (as is)
P.G.	Balance	OH	0.98%*
		Ash	0.08% (Co_2O_3)

* Expressed on Veh. NV.

9. CR-102 F. R. POLYESTER (INTERCHEMICAL--FOR NOLIN MFG.) - ELMWOOD

MONOMER: Styrene, only.

BINDER: O-phthalic--maleic--fumaric--tetra-bromo-phthalic--ethylene glycol--propylene glycol polyester (approximately 2/1 ratio of E.G./P.G.). Molar ratio of P.A./M.A. is estimated to be approximately 2/1 (cannot be determined quantitatively in the presence of T.B.P.A.).

BINDER		CONSTANTS	
T.B.P.A.	20.6%	NV	64.2%
		Acid No.	83
		OH	0.93%*
		N_2	
		Br	14.2%*
		Ash	0.7% (SiO_2, Co_2O_3)

* Expressed on Veh. NV.

10. KEMVAR-C, KEMVAR-M, AND CATALYST (S. W. -- FOR BIRCHCRAFT KITCHENS) - READING

KEMVAR C

SOLVENT: Xylene, toluene, isobutanol, methyl isobutyl ketone, and a quantity of a ketone solvent which could not be identified (no matching reference spectrum available). It is not any of the commonly used ketones.

PIGMENT: A quantity of silica is present in this sample.

BINDER: Isobutylated urea-formaldehyde resin and vinyl chloride--vinylidene chloride copolymer (approximately 60/40 V.C./VCl_2).

TOTAL SAMPLE		SOLVENT		BINDER		CONSTANTS	
Solvent	80.6%	S-423	36.5%	Vinyl Resin	40%	NV	19.4%
Pigment	1.3%	S-416	15.5%	Isobutylated U.F.	Balance	N_2	7.7%*
Binder	18.1%	S-232	16.7%			Cl	25.0%*
		Unk.Ketone	20.6%			Ash	1.3% (SiO_2)
		S-614	10.7%				

KEMVAR M

SOLVENT: Xylene, toluene, isobutanol, methyl isobutyl ketone, and the same unidentified ketone found in Kemvar C.

PIGMENT: Silica is present in this sample, also.

BINDER: Isobutylated urea-formaldehyde resin, vinyl chloride--vinylidene chloride copolymer resin, and a benzoic acid modified, tall oil--P.E.--o-phthalic alkyd.

TOTAL SAMPLE		SOLVENT		BINDER		MONOBASIC ACIDS	
Solvent	73.8%	S-423	34.1%	Isobutylated U.F.	17%	Tall Oil Acids	80.4%
Pigment	1.3%	S-416	24.5%	Vinyl Resin	25%	Benzoic Acid	19.6%
Binder	24.9%	S-232	20.1%	P.A.	25.6%		
		Unk.Ketone	11.9%	Monobasics	21%	CONSTANTS	
		S-614	9.4%				
						NV	26.2%
						N_2	3.8%*
						Cl	15.3%
						Ash	1.3%* (SiO_2)

KEMVAR CATALYST

SOLVENT: Isopropanol, toluene.

SOLIDS: Solids of this sample consists of an aromatic acid phosphate. Although no reference spectrum is available for confirmation, it is postulated from observed structures that this may well be diphenyl (or di-cresyl acid phosphate).

SOLVENT		CONSTANTS	
S-222	79.8%	NV	38.3%
S-416	20.2%	Acid No.	149.6 (390.6 on NV)

* on Veh. NV.

11. TWO FAST-DRYING EN. (TOUSEY AND MOLINE PAINT CO. - FOR HART-CARTER) - NUBIAN

#2-3069 DESERT SUNSET F. D. EN.

SOLVENT: Xylene, plus some V.M. & P. naphtha, plus some Solvesso No. 100 aromatic naphtha.

PIGMENT: Chrome yellow, titanium dioxide, silica.

BINDER: Styrenated, D.C.O. - glycerine--o-phthalic alkyd.

TOTAL SAMPLE		SOLVENT		PIGMENT	
Solvent	43.1%	S-423	72.8%	TiO_2	66.5%
Pigment	30.1%	S-332	12.6%	$PbCRO_4$	17.9%
Binder	26.8%	S-446	14.6%	SiO_2	10.3%
				$PbSO_4$	3.6%
					98.3%

BINDER		CONSTANTS	
P.A.	25.0%	NV	56.9%
D.C.O. F.A.	27.1%	Veh. NV	38.3%
P.S. + Polyol	Balance		

JDM-0-10-A YELLOW MPM-2184 F. D. EN.

SOLVENT: Xylene, a V. M. & P. naphtha, and an aromatic naphtha comparable to Solvesso 100.

PIGMENT: Chrome yellow, titanium dioxide, silica.

BINDER: Benzoic acid modified, soya--trimethylol ethane--o-phthalic alkyd.

TOTAL SAMPLE		SOLVENT		PIGMENT	
Solvent	43.6%	S-423	73.6%	$PbCRO_4$	39.7%
Pigment	29.4%	S-332	11.2%	TiO_2	44.2%
Binder	27.0%	S-446	15.2%	$PbSO_4$	8.7%
				SiO_2	4.3%
					96.9%

BINDER		CONSTANTS		MONOBASIC ACIDS	
P.A.	37.8%	NV	56.4%		
Monobasics	41.1%	Veh. NV	38.2%	Soya F.A.	79.4%
				Benzoic Acid	20.6%

12. #673 PLATINUM GRAY PRIMER (MINIT SPRAY CORP. - FOR HOTPOINT) - NUBIAN

PIGMENT: Talc, carbon black, titanium dioxide.

BINDER: Nitrocellulose, resin--maleic adduct ester, tricresyl phosphate plasticizer.

PIGMENT		BINDER		CONSTANTS	
Talc	86.5%	N.C.	47.0%	NV	36.5%
TiO_2	12.9%	T.C.P.	8.5%	Veh. NV	20.1%
		Rosin-Maleic	Balance		

13. BLUE VINYL STRIPCOAT (IMPERIAL TYPE METAL) - READING

SOLVENT: Methyl isobutyl ketone, xylene.

BINDER: Dibutyl phthalate plasticizer, vinyl chloride--copolymer resin. The vinyl resin used is an unusual one (contains little or no vinyl acetate). We do not have a matching type on file. This may contain some polyvinyl dichloride resin (Geon Type 3005) as homopolymer, or copolymer with vinyl chloride. In any event, it appears probable that the comonomer used is a chlorinated type (not vinylidene chloride, however). Some "Cab-O-Sil" type silica is present, also.

TOTAL SAMPLE		SOLVENT		BINDER		CONSTANTS	
Solvent	73.1%	S-614	36.2%	Dibutyl Phthalate	17.5%	NV	26.9%
		S-423	63.8%	Vinyl Resin	Balance	Cl	52.0%*
						Ash	0.07% (SiO_2)

* Expressed on Veh. NV.

14. KYANIZE LATEX HOUSE PAINT (KYANIZE PAINTS, INC.) - ELMWOOD

SOLVENT: Water, only.

PIGMENT: Titanium dioxide, talc.

BINDER: Vinyl acetate - n-butyl acrylate* copolymer latex, modified with a quantity of glycerine - unk. type fatty acids** isophthalic alkyd.

WATER SOLUBLES:
Material recovered appears to be largely a sodium fatty acid soap (No thickener was detected). Also present is a small quantity of an alkyl-phenol - ethylene oxide adduct (nonionic emulsifier).

TOTAL SAMPLE		CONSTANTS		PIGMENT		BINDER	
Solvent	50.8%	NV	49.2%	TiO_2	69.9%	Isophthalic	6.9%
Pigment	31.2%			Talc	25.8%	F.A.	6.3%
Binder	18.0%				95.7%	Vinyl Copolymer & Polyol	Balance

* Too little present to identify positively
**Or possible di-butyl fumarate - maleate.

15. BAKING ENAMEL SAMPLE (MFG. UNK.) - BALTIMORE

SOLVENT: Xylene, toluene, and an aromatic naphtha comparable to TS Solvent 28 (S-438).

BINDER: Melamine-formaldehyde modified, glycerine--saturated F.A.--o-phthalic alkyd.

TOTAL SAMPLE		SOLVENT		BINDER	
Solvent	52.3%	S-423	24.9%	P.A.	38.1%
Pigment	19.0%	S-416	35.0%	F.A.	~21%
Binder	28.7%	S-438	40.1%	M.F.	23.8%

FATTY ACIDS		CONSTANTS	
Caprylic	7.1%	NV	47.7%
Capric	8.4%	Veh. NV	35.4%
Lauric	23.9%	N_2	5.36%*
Myristic	13.2%		
Unk.	2.3%		
Palmitic	7.7%		
Stearic	3.1%		
Oleic	13.8%		
Linoleic	8.6%		

* Expressed on Veh. NV.

16. ELECTROFAX BINDERS & PAPERS (PLASKON, CROWN-ZELLERBACH & PLASTIC COATERS - FOR SCM CORPORATION) - UCB

ERS-200 RESIN SOLUTION (PLASKON)

SOLVENT: Toluene, only.

BINDER: Benzoic acid modified, tall oil--trimethylol ethane--o-phthalic alkyd.

SOLVENT		BINDER		CONSTANTS	
S-416	100%	P.A.	35.8%	NV	52.6%
		T.O. F.A.	32.0%	Acid No.	6.0
		Benzoic Acid	2.6%		(11.5 on NV)

Z23PS ELECTROSTATIC PAPER (CROWN-ZELLERBACH)

Resin present consists of an approximately 70/30 copolymer of vinyl acetate/dibutyl fumarate*

* Or, possibly, n-butyl acrylate.

1B-200 ELECTROSTATIC PAPER (PLASTIC COATERS)

Resin used is an isobutyl methacrylate-styrene copolymer resin (approx. 3/1 I.B.M.A./ Styr.), together with a quantity of an o-phthalic alkyd (oxidizing type).

17. ITALVAR ACRYLIC EN. #2 & THINNER (ITALVER S.P.A.--FOR PHILCO ITALIANA) - SALCHI

ACRYLIC EN. #2

SOLVENT: Cellosolve acetate, xylene, toluene, cellosolve, aromatic naphtha, and an unidentified solvent which appears to be an aromatic, chlorinated solvent.

PIGMENT: Titanium dioxide, silica.

BINDER: Epoxy resin plus a terpolymer of ethylacrylate, styrene and unsaturated acid. Estimated ratio of terpolymer/epoxy resin approximately 60/40. Epoxy resin used appears to be about comparable to Shell's Epon-1001. No acryloid AT-70 was available to examine in order to confirm or deny its' presence. However, Mr. Gordon Phillips said that this sounded exactly like AT-70 (styrene, ethyl acrylate, high acid content--used with epoxy resin).

TOTAL SAMPLE		SOLVENT		PIGMENT		CONSTANTS	
Solvent	36.9%	S-558	28.1%	TiO_2	91.1%	NV	63.1%
Pigment	41.1%	S-423	32.7%	SiO_2	6.3%	Veh.NV	37.3%
Binder	22.0%	S-416	2.7%		97.4%	Acid No.	42.9 (on Veh.NV)
		S-572	4.3%				
		Ar. Naphtha	17.2%			Oxirane	1.3%*
		Unk.	15.0%				

* Expressed on Veh. NV.

ITALVAR DILUENT

SOLVENT: Cellosolve acetate, isophorone, Solvesso #150 Aromatic Naphtha.

SOLVENT	
S-558	21.2%
S-640	15.2%
S-460	63.6%

18. ACRYLIC-ACRYLONITRILE LATEX (JOHN DEERE) - ELMWOOD

Monomer composition of this sample consists of: Acrylonitrile, n-butyl acrylate, unsaturated acid. (Small amount).

NV	44.2%
Acid No.	10.4 (on dried film)
N_2	8.6% (32.6% acrylonitrile)

19. KEL SOL 1000 (SPENCER-KELLOGG) - ELMWOOD

This sample consists of a butyl cellosolve solution of an ammonia neutralized, maleinized, linseed oil.

20. RANSPREP SOLUTION (RANSBURG) - READING

SOLVENT: Trichloroethylene, only.

SOLIDS: Solids present consists of an alkyl trimethyl ammonium chloride (where the alkyl group consists of a long-chain hydrocarbon (approx. C-12?).

CONSTANTS

NV 0.5%

21. IMPREGNATED PAPER (RIVERSIDE LAB - FOR STATE OF WEST VIRGINIA) - ELMWOOD

I. R. spectra obtained on solvent extracts of this sample of impregnated paper showed the following components to be present.

1. An isophthalic--maleic--fumaric--propylene glycol polyester.
2. Diallyl phthalate monomer.
3. Benzoyl peroxide. (No tertiary butyl perbenzoate was detectable).

22. RESIN IMPREGNATED PAPERS (JAPANESE) - ELMWOOD

I. R. spectra obtained on various solvent extracts of this impregnated paper showed the following to be present:

1. Diallyl phthalate monomer.
2. Benzoyl peroxide catalyst.
3. Polyester based primarily on o-phthalate esters, plus (probably) some maleate-fumarate esters.

23. IMPREGNATED PAPER (R.C.I.--FOR STATE OF WEST VIRGINIA - ELMWOOD

Various solvent extracts were prepared from this sample of coated and/or impregnated paper. The I. R. spectra obtained on the extracts showed the presence of:

1. A vinyl acetate copolymer resin (approximately 60/40 ratio of vinyl acetate/acrylic). Acrylic used is probably methyl methacrylate and ethyl acrylate.

2. Melamine resin. This is not melamine methacrylate, but more nearly resembles a conventional melamine-formaldehyde resin.

24. URUSHIOL LACQUER (SEKISAN PAINTS, JAPAN) - ELMWOOD

I. R. spectra of electrocoated, baked films were rather featureless, and showed little other than C-H and OH groups. No significant differences were noted between the three spectra (from the cathode, anode, and dipped panel).

The I. R. spectra of anodically plated film and cathodically plated film (uncured) were compared with the transmission spectrum of the sample deposited on a salt crystal. There were no significant spectral (sturctural) differences detectable between the three samples.

25. GRAY ELECTROCATED PANEL (P.P.G.--FOR WHIRLPOOL) -ELMWOOD

The I. R. spectrum of the M.E.K.-toluene solubles from this sample shows the presence of:

1. An "Epon" - type epoxy resin (large amount).

2. Benzoquanamine-formaldehyde resin (Est. 10-20%).

3. Ester groups (Medium amount).

4. Acid groups (small amount).

It is thought likely that the epoxy resin (and ester groups observed) are present as epoxy resin -- fatty acid ester, although this is not conclusive (this could probably be determined by saponification + G.C., et. if required).

Solvent insolubles shows the presence of pigments (china clay, titanium dioxide, silica).

No previously examined P.P.G. electrocoat sample is comparable to this current sample.

26. 1512-A-27 (ALLYL BUTYL MALEATE SYNTHESIS) - ELMWOOD

Combined I.R. & G.C. analysis gave the following composition for this sample:

Diallyl Maleate	16.0%
Diallyl Fumarate	3.3%
n-Butyl Allyl Maleate (Product)	43.1%
n-Butyl Allyl Fumarate	5.2%
Dibutyl Maleate	24.2%
Dibutyl Fumarate	4.9%
Maleic Anhydride	3.3%

27. 1512-A-35 (ALLYLOXYETHYL) MALEATE SYNTHESIS) - ELMWOOD

A small free M.A. content is observable in the spectrum*. Toluene is present in small amount. Otherwise, the structures present are those which would be expected for the di (allyloxyethyl) maleate. Little or no trans structures are present (essentially all maleate).

* Probably less than 5%.

28. 1589AP20 (MANNICH REACTION WITH DIACETONE ACRYLAMIDE, FORMALDEHYDE AND PYRIDINIUM ACETATE) - ELMWOOD

The solids of the two submitted samples (viscous liquids) were examined by I.R. and compared to the spectrum of (molten) diacetone acrylamide. It appears likely that the anticipated reaction did take place. The spectra obtained differ significantly from each other and from spectrum of D.A.A. No reference spectra were available for confirmation of structure. Unfortunately, carboxylate groups absorb very close to the amide absorbtion bands, making confirmation of its presence uncertain.

29. CURE STUDY OF UNSATURATED POLYESTER IN DIALLYL MALEATE - ELMWOOD

The major changes occuring in the I.R. spectrum with time appears to be the physical loss of diallyl maleate by evaporation (film thickness diminishes with time, and all absorbtion bands due to diallyl maleate diminish with time, such that they are virtually non-existent at the end of 24 hours). An additional change occuring with time is the increasing amount of OH content observable, as well as some increase in carbonyl groups (oxidative cross-linking?).

Unsaturation also diminishes with time, but it is not possible to ascertain how much of this disappearance may be due to cross-linking and how much to evaporation of the diallyl maleate (certainly, mostly due to the latter).

30. 1523A68 (SYNTHESIS N-TERT. BUTYL ACRYLAMIDE) - ELMWOOD

The I. R. spectrum of this sample matches exactly the our reference spectrum for this material (manufactured by American Cyanamid, examined 3/19/59).

31. #OS 20637 LATEX (LUBRIZOL) - ELMWOOD

Binder solids consists of a diacetone acrylamide--2-ethylhexyl acrylate copolymer.

BINDER		NV	46.3%
Diacetone Acrylamide	43.5%	Acid No.	2.0 (on solids)
2-ethylhexyl acrylate	Balance	N_2	3.6% (on dried film

32. HAZE FROM 1507A-66 III & P-75020 - ELMWOOD

The "haze" from this sample consists predominantly of paraformaldehyde (I. R. spectrum obtained also showed some melamine resin structures).

33. PAINT CHIPS (FAILURE) - MIDWEST REGION

The following is all that could be learned from examination of the two surfaces of the submitted paint chips:

RED-BROWN SURFACE: The I. R. spectrum obtained showed the presence of an o-phthalic alkyd, silica, calcium carbonate, iron oxide.

WHITE SURFACE: The spectrum obtained showed essentially all pigment (largely silica and silicates). A small ester carbonyl content indicates the presence of some organic ester polymer, but is not present in sufficient amount to characterize.

34. SEDIMENT IN V6105 REDUCED TO Y5013 - ELMWOOD

Sediment present in this sample consists of pentaerythritol.

35. POLYMER FROM V1118, P-547 - ELMWOOD

The I. R. spectrum of this sample of gel is that of (poly) hydroxypropyl methacrylate.

Ash from the gel consisted of iron oxide.

36. HAZE FROM RCR3021 - ELMWOOD

Haze ("gel") consists of paraformaldehyde.

37. HAZE OF PAINT FILM (Y5634) - MADISON

The I. R. spectrum obtained on some of the removed "haze" showed the presence primarily of long-chain hydrocarbon structures (wax and/or mineral oil). Some ester groups are present (small amount), which may be glycerol triesters. The overall appearance is reminiscent of a polish formulation. No indications of alkyd could be found.

38. FOREIGN PARTICLES STRAINED FROM Y5067 - ELMWOOD

Strainings consist largely of an amorphous silica, together with a lesser amount of TiCal (pigment agglomerates). No aluminum stearate (or other soaps were detected).

NUBIAN RESEARCH REPORT

DECEMBER, 1967

SUBJECT: Food Packs to Qualify Coatings

Status: 1. A simulated corn pack was made to determine film quality of NRV-4164 "F" and "C" Enamel when iron drier replaced manganese drier. Based on the results of this test we have determined that the iron drier range should be greater then 80 ± 20 ppm., since adhesion failures were recorded when cans stored three days at 100°F. were examined. The range, 140 ± 20 ppm., appears most promising.

Water pack tests for bench flavor testing using the two driers at different levels have been initiated.

2. Last month we reported that tinplate ends using our interior system-

VR-59045-A Basecoat
VR-62151 Vinyl Topcoat

had been originally checked by Anheuser-Busch, St. Louis with off-flavor reported.

This laboratory coated aluminum foil and tinplate for a re-test vs. the original production samples and Anheuser-Busch flavor results were satisfactory. Ends made from a new production run (American Metal Decorating) were also checked by Anheuser-Busch and were satisfactory. Everyone appears to be satisfied that this interior system is flavor acceptable.

By: R. E. Meyers, H. C. Snodgrass, T. Dal Cason

SUBJECT: Exterior System for Lug Caps

Status: 1. Evaluated closures which had been fabricated from both USS #100 and Weirton CP treated 70# tinplate by White Cap. Our color was excellent but it appears that there is a definite difference in the adhesion to metal of our three-coat white system over these two types of plate. Adhesion over Weirton CP is excellent, whereas adhesion over USS #100 treatment is questionable.

2. We are working on development of a size coat to give satisfactory performance also on USS #100 treatment tinplate.

By: E. W. Eubanks, R. E. Meyers

SUBJECT: Water Thinned Interior Panel Coating System

Status: Four conversion varnishes were evaluated as topcoats for Masonite Corporation's Royal-Cote interior hardboard paneling. Special emphasis was given to testing the non-yellowing properties of each candidate. Other tests performed included pot life, print resistance, sheen stability, cross-hatch adhesion, mar resistance and stain resistance. The four varnishes, 150-T-909,

CL-35883-A, CL-35681, and CL-34900 were applied over various competitive synthetic groundcoat drawdowns supplied by Masonite. The four candidates were essentially equal, except for non-yellowing properties in which case CL-35883-A showed appreciably less tendency to yellow in the 20 hour 140°F. heat test.

Samples of two formulations in CL-35883-A quality, a 10° sheen (CL-36080) and a 30° sheen (CL-36081) were submitted to Masonite in mid-December. Based on the acceptable results of all tests, including good adhesion of a complete system upon refinishing without sanding, large samples were ordered for a limited plant trial to be run sometime in January.

By: M. C. Grippo, W. H. Hinckley, L. J. Mattucci, S. J. Biedron, L. Taylor