THE LABORATORY IN 1947

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The year 1947 was one of substantial technical progress. Many products were reinstated in our line, several new postwar finishes were placed in production, and our line as a whole was returned to prewar quality or better. All these changes created trying factory problems, which in turn taxed laboratory facilities to the limit. A total of 526 formula changes were made in listed items (of which 236 are currently available in the U. S.). In number and complexity, the formula changes made in 1947 exceeded those made in any previous year.

PRODUCTION EFFORT

The demand for our products remained at a high level throughout 1947, but production in general was limited by the amount of titanium dioxide we were able to obtain. Strange as it may seem, we received 15% more titanium dioxide in 1947 than in 1946 and about double the amount that we received in 1941. Total receipts of all types of titanium pigments at Buffalo amounted to 3.4 million pounds in 1947.

While factory achievements are not properly a part of a laboratory report, some production statistics developed for this report proved so surprising that they are summarized in the next few paragraphs as a matter of general interest.

Our Buffalo factories produced slightly more than 2.7 million gallons in 1947, of which 35% represented our principal listed pigmented specialties. Our total production of these specialties was a third higher in 1947 than it was in 1946 and was 75% higher than it was in 1941.

Specifically, the 1947 production of the following lines was double, or more than double, what it was in 1941:

"61" Floor Varnish Colors
"61" Quick Drying Enamel White
Lyt-all Double Duty Primer
Lyt-all Flowing Flat
Oil Stain

The 1947 production of the following items increased 50% to 75% above 1941 production:

"61" Floor & Porch Enamel
"61" Enamel White Gloss
"61" Enamel Eggshell - White and Colors
"61" Quick Drying Enamel Colors
Paste Filler

Solidex had not yet been developed in 1941 but 1947 production of this one line amounted to 120,246 gallons.

RAW MATERIALS

During the last half of 1947, shortages of pentaerythritol (since relieved) and phthalic anhydride seriously threatened production of finishes containing alkyd resin. The shortage of phthalic anhydride was alleviated by substituting commercial alkyd resins, of which there was and is no shortage, for resins of our own manufacture. Today, Effecto, Verdura Trim & Shutter Finish, Vitralite Transportation Finish, Lyt-all Stippling Eggshell and The New Vitralite Enamel are all produced from purchased alkyds. In these lines, 235,527 pounds of purchased resins were consumed in 1947. This represents about 50,000 pounds of phthalic anhydride --an amount equivalent to a fifth of our total phthalic anhydride receipts. Some of these purchased resins permitted us to make slightly better and slightly less expensive finished paints than could be obtained with our own resins; most substitutions resulted in substantial cost increases.

One important drying oil, Selected Oil 200, became unobtainable early in 1947 and our consumption dropped from 139,238 gallons in 1946 to 12,403 gallons in 1947. This oil was a key constituent in "61" Enamel Eggshell and Vitralite Enamel Eggshell. The substitute formulas, produced from April to October, lost their gloss and were unsatisfactory. Conditions have once more changed and we are again purchasing Selected Oil 200. Our eggshell enamel formulas have been returned to their prior quality.

A new drying oil derived from soya oil--Selected Oil 500--was successfully and economically substituted for linseed oil in house paint and in some 71 other listed items (about one third of our line) for part of the year. 147,000 gallons of Selected Oil 500 were consumed at Buffalo and at our subsidiary manufacturing companies during 1947, but its use has now been discontinued because linseed oil costs less than Selected Oil 500. The clerical and supervisory work connected with the adoption of this oil and then its withdrawal was staggering but the oil saved us about $44,000. Research work connected with Selected Oil 500 cost $1881.

The "odorless" solvent adopted for use in Lyt-all Flowing Flat in 1946 was suddenly withdrawn from the market in 1947. A search for a substitute was immediately started and ultimately led to the adoption of another solvent, before our stocks of the first solvent had completely run out. The use of "odorless" solvent has been extended to Solidex.

Considerable work was done in 1947 in examining chlorinated rubber (Parlon) and silicone resins. The former can be used effectively to make chemical resistant finishes--the latter to make heat

resistant finishes (that withstand up to 1000°F.). Several chlorinated rubber coatings are now being produced. The silicones are resins for the epicure, since they cost about 20 times as much as typical varnish resins and produce paints that have to sell in the price range of $25 to $30 per gallon. We actually sold a few gallons of paint at this price level to a manufacturer of electric heaters.

One of the most interesting and valuable raw materials uncovered in 1947 was an antifoaming agent for use in varnish making. Foaming is a nuisance and a fire hazard in cooking many types of varnish; it is also a deterrent to production for a foaming kettle requires the undivided attention of a varnish maker. When foaming is absent, a varnish maker can process several kettles simultaneously. If the new antifoaming agent, in an amount equal to a quarter of an aspirin tablet, is added to a hundred gallon batch of varnish, foaming subsides instantly. This agent should help to lower varnish production costs in the future. Incidentally, the agent is a silicone resin. Minute amounts of other silicone resins have also been found useful in reducing the streaking and flooding of colored enamels.

Substances which reduce foaming and streaking are known as surface-active agents. There are literally hundreds of such substances, small additions of which have a profound effect on settling, sagging, wetting, leveling, and other properties, in addition to foaming and streaking. The importance of surface-active agents in paint formulation is just now being recognized. Unfortunately, no general rules exist--the agent which retards streaking in one formula may have no effect on any other formula.

For years, Amberol F7, a modified phenolic resin and our most widely used "hard" resin, has been a key constituent in such products as "61" Floor Varnish, "61" Quick Drying Enamel Colors and "61" Floor & Porch Enamel. Last year, due to a rather peculiar economic situation, pentaerythritol resins were less costly than Amberol F7. Formulas were changed to take advantage of this fact and our consumption of Amberol F7 dropped from 297 thousand pounds in 1946 to 176 thousand pounds in 1947. The cent and a half per pound differential between the two resin types saved us $1860 without a single sacrifice in product quality.

One new raw material--sorbic acid--threatens to be a future competitor of maleic anhydride as a resin chemical and oil treating agent. Sorbic acid is not yet in commercial production, but we tested it in 1947 and found that it makes harder-drying vehicles than maleic anhydride. Development work cost $446.

Another raw material--dicyclopentadiene--is a cheap and plentiful by-product of the petroleum and gas refining industries. It, too, offers interest as a resin chemical and as an oil treating agent, but its paint uses are covered by a series of involved patents. Nonetheless, we are investigating its value in exterior and interior finishes and have spent $462 in developing information on the product.

In an average year, the laboratory examines from 300 to 400 new raw materials, from which it obtains many of its ideas for new products and product improvements. The New Vitralite Enamel, for example, depended upon the development of a proper resin; "odorless" Lyt-all Flowing Flat had to wait until a suitable solvent was produced. Frequently, the laboratory is able to interest a raw material supply house in developing a new or improved commodity. This was the case with The New Vitralite Enamel resin. Last year, we examined 353 new raw materials, from which were culled 70 items for actual adoption. The examination of these new materials cost $8813, of which $7000 was spent in obtaining only negative information.

TRADE SALES DEVELOPMENTS

The following trade sales finishes were materially improved in 1947:

Lyt-all Stippling Eggshell - Now produced in a true egg-shell and completely uniform sheen; formerly showed differences in gloss between high spots and valleys. Development cost $480.

Lyt-all Flowing Flat - Now has better overnight hardness, better package stability and better tintability than any prior formula. Development cost $1543.

Solidex - Now made with improved texture and with reduced odor. Development cost $204.

Bar Top Varnish - Now made on an extremely alcohol resistant formula; formerly same as "61" Floor Varnish Clear Gloss.

Pratt's Patent Liquid Drier - Now made with very mild odor.

"38" Pale Trim Varnish Gloss, Satin and Dull - Now made with easier working qualities.

Effecto, The Outdoor Enamel (U. S. formula) - Now made to dry in 4-6 hours without wrinkling, even under adverse conditions of application. Development cost $1529.

"61" Quick Drying Enamel - Wartime formula replaced by faster drying postwar formula. Development cost $1780.

The New Vitralite Enamel and Undercoating - All items now level considerably better and have better working than any prior formula. The New Vitralite Enamel Gloss has much improved gloss retention. Undercoating is now free of pinholing when applied on new wood. Total development work to date has cost $3553.

Machine Tool Enamel - Returned to prewar quality. Laboratory work cost $96.

Marine Bottom Paint Hard Racing Green and Red - Returned to prewar quality. Laboratory work cost $76.

Marine Deck Paint - Returned to prewar quality. Laboratory work cost $97.

Impermalin Spar Varnish - Returned to prewar quality.

"38" Preservative Varnish - Returned to prewar quality.

Two varnish projects started in 1947 have not yet been completed. One concerns the improvement of floor varnish and the other the improvement of spar varnish. Devoe's Super Marble Floor Varnish, which is said to be made from a new type of synthetic resin that has been exploited by Jones-Dabney, is more wear-resistant than "61" Floor Varnish although it is less stable in the package. The resin is advertised as being the reaction product of epichlorhydrin and bisphenol. Resins of this type have been patented by Resinous Products & Chemical Co. but are not being produced by that company. The Resinous Products & Chemical Co. has agreed to work with us on the resin end of the problem. An improved spar varnish will be selected from a large series of experimental spar varnishes that are now being exposed in Florida. $494 has so far been spent on these two projects.

Considerable work was done in 1947 in an effort to improve the odor of Lyt-all Double Duty Primer, but the present formula proved to be better balanced than any mild odor formula that was tested. This work represented an investment of $891.

In 1946, work was started on the development of lower cost oil colors (achieved by reducing the oil content) and was completed in 1947. A total of $1612 was spent on this project but it will result in annual savings of $4500, based on 1946 production of oil colors.

The standard colors that constitute our Vitralite Transportation Finish line were established in 1947 but most of our production has consisted of special colors. All told, 201 requests for special products or special colors were received from our fleet and railway customers in 1947. These specials were developed at a total cost of $5878. They represent 70% of all projects referred to the laboratory by our trade sales offices. An additional $979 was spent on research work connected with fleet and railway finishes. Most of this work pertained to improvements in putties, surfacers, and the other undercoatings that form part of the Vitralite Transportation Finish line, but it also included the development of a new line of striping enamels and a line of baking finishes (for use with infrared lamps). A faster air drying line of Vitralite Transportation Finishes is now under development.

A new knot sealer, Sealer WP-578, was perfected in 1947 and has been added to our line as an unlisted product.

A great deal of work has been done and is still being done on solid color flat wall paint (Lyt-all Spectrum Colors). In 1947, $1020 was spent but we still have no product that is reasonably foolproof.

INDUSTRIAL SALES DEVELOPMENTS

Since World War II began, the nature of the laboratory's work for the Industrial Sales Department has undergone a change. For the ten or fifteen years prior to the war, a major part of all laboratory effort was directed toward sample matching. Today, sample matching is a rarity; much of our work is now concerned with the development of new finishes without regard for competing standards. It costs more and it takes longer to do original work than it does to imitate competing paints, but the customer gets a better product and the laboratory, as well as the company, is strengthened by the acquisition of fundamental knowledge. This changed policy has evolved without deliberation on anyone's part. It is probably due to a variety of conditions. Business is plentiful, and we have the "inside track" in many accounts; also, many of our old time salesmen are gradually being replaced with new men, who are not sample-minded.

Of all laboratory work done for the Industrial Sales Department in 1947, 83% was represented by the principal fields listed on the next page. Certain statistical details concerning this work are also shown.

The sale of wrinkle finishes has grown steadily over the past ten years. In 1938, we had virtually no wrinkle business; in 1939, we sold 9200 gallons; in 1943, our peak wartime year, we sold 70,000 gallons; in 1947, sales reached an all time high of 91,850 gallons (10% above 1946). This phenomenal growth has been due in no small part to the continuous research and development work that has been carried on under Mr. Hoffman's supervision. Last year, $2745 was spent on 141 sales problems involving wrinkle finishes. Another $479 was spent on research. Our 1947 wrinkle finishes were characterized by better hardness and greater positiveness than prior formulas. This fact was largely responsible for obtaining the Hawley Products Co. account, to whom we sold 10,000 gallons of a black wrinkle, GX068, during the last three months of 1947. The Royal Typewriter Co., our largest wrinkle account, bought 25,000 gallons of another black, GX011, in 1947. We also produced 11,000 gallons of G27920, a general purpose wrinkle black, in 1947.

Early in 1947, wrinkle finishes were advanced in price and immediately thereafter the trade became intensely interested in spatter or hammered metal finishes. This reaction to the price advance subsided shortly and our customers continued to buy wrinkle finishes. In the meantime, however, we had been forced to develop some 48 spatter enamels for many of these accounts at a cost of $866. Only two accounts bought any real volume of spatter finishes in 1947--Colonial Radio, to whom we sold 730 gallons of a brown spatter, GX2136, and General Motors of Canada, to whom we sold 1060

LABORATORY WORK ON INDUSTRIAL PROJECTS

Industry, Type Finish or Work	1947 No. Problems	1947 Cost of Work	1946 No. Problems	1946 Cost of Work	1945 No. Problems	1945 Cost of Work
Novelty Finishes						
Wrinkle	141	$ 2745	180	$ 2534	133	$ 2002
Spatter, Hammer	35	866	60	1479		
Flock	4	226	18	312		
Subtotal	180	3837	258	4325		
Electrical Appliances	114	3816	105	2820	38	1220
Leather, Rubber, Rubber Fabric	79	3120	62	2280	67	2975
Machinery, Tools	70	2481	77	1841		
Collapsible Tube Finishes	78	2056	76	2019	33	975
Slide Fasteners (Zippers)	50	1780	24	320		
Furniture, Fixtures						
Wood	18	536	62	1911		
Metal	37	1214	47	1601		
Subtotal	55	1750	109	3512		
Metal Decorating Finishes	70	1458	67	1334	62	1132
Toys, Novelties, Sporting Goods	34	1305	22	841		
Tile Board	24	1190	15	1109		
Aircraft	33	960	7	153	85	5074
Paper	13	877	18	332	8	410
Casket	20	685	9	185	19	528
Navy Inspection Forms	30	408	21	228	95	1298
Hair Pin	12	347	12	167		
Automobile Accessories	17	345	-	-		
Abrasive Paper	9	319	13	315		
Business Machines*	11	278	13	263		
Venetian Blinds	10	249	7	308		
High Bake White	7	178	9	374		
Total Above Major Projects	916	$27439	929	$18821	540	$15614

*Exoludes wrinkle finishes. 13 wrinkle projects costing $386 were completed for Royal Typewriter Co. and their subcontractor, Hawley Products. If these figures are added to other work on business machine finishes, the projects total 24 and cost $664.

gallons of a tan spatter, GX2136. Considerable work was done for Ditto, Inc., for whom a special gunmetal spatter, GX7208, was developed. This product does not discolor when exposed to the duplicating dye used in the Ditto process.

In the fabric coating field, $3120 was spent on 79 different projects. Most of the laboratory effort was concerned with two accounts--Haartz-Mason, Inc. and Buffalo Weaving and Belting Co. Laboratory work for Haartz-Mason cost $1476; sales amounted to $45,533. Laboratory work for Buffalo Weaving and Belting Co. cost $536; sales amounted to $25,503. Haartz-Mason produces football covers and baby carriage topping. Buffalo Weaving and Belting Co. produces grease resistant canvas conveyor belts for the food and baking industry. Duro Gloss Rubber Co., another customer in this same general field, revived interest in a number of prewar lacquers for use in the production of children's rainwear. The coated fabrics field offers greater risks than many types of industrial business because a few cents' worth of lacquer converts cotton cloth and rubber compound into many square yards of expensive fabric. The fabric in turn is frequently used on relatively costly finished products. If anything goes wrong--and that seems to be the rule in this business--the paint manufacturer finds himself in hot water.

Our 1947 sales to the collapsible tube industry proved to be disappointing. On a gallonage basis, U. S. sales dropped 27% (from 26,000 gallons in 1946 to 19,000 gallons in 1947), but on a dollar basis, they dropped only 4% (from $78,240 in 1946 to $75,008 in 1947). In Canada, sales increased from 1300 U. S. gallons to 2000 U. S. gallons during the same period.

There is probably no other phase of industrial work that has commanded more time and effort than the development of collapsible tube coatings. Whether we are actually weak in our technical or sales approach, whether we received poor "breaks", or whether the present situation represents a low ebb in sales that will be followed by an upsurge in business is difficult to determine. If the survey made on tube coatings by Battelle Memorial Institute in 1946 is any criterion, we ranked exceptionally well from a technical viewpoint. Our technical men made twelve service calls on tube accounts in 1947. We spent $2056 in laboratory work on 78 sales problems connected with tube coatings in 1947 and another $6578 on research work. A total of $12,651 has been spent on tube coating work during the past two years. Actually, more laboratory effort was spent on tube coating work per sales dollar than in almost any other field.

Of our eight U. S. tube accounts, one--Wheeling Stamping Co.--bought three fourths of all the coatings sold to this industry in 1947; this one account bought slightly more than it did in 1946. Our next largest account--A. H. Wirz--bought only two thirds what it did in 1946. Our third largest account in 1946--New England Collapsible Tube Co.--bought virtually nothing in 1947. One new account--Atlas Collapsible Tube Co.--bought $578 worth of coatings in 1947. Tube manufacturers tell us that the demand for collapsible tubes has dropped way below the 1946 demand.

Bad luck played a part at the A. H. Wirz account. We developed an outstanding one coat product, GX634, for Prell (a cream shampoo put out by Proctor & Gamble) tubes, only to learn that the tubes were to be filled hot. Our coating cracked under these conditions when the filled tube was crimped. A new coating has since been formulated for hot-filling but has not yet been tested in production. Another coating to meet Colgate requirements is likewise awaiting a production test.

At New England Collapsible Tube Co., one of our products, GX195, is approved but our price is too high and Pittsburgh Plate Glass Co. is enjoying that business. The Atlas Collapsible Tube Co. is using G28681 on Dr. West's Toothpaste tubes. The Sun Tube Corp. (of Canada) is finishing Ipana tubes with GX630. The National Collapsible Tube Co. formerly bought our coatings for use on Williams Shaving Cream tubes but the business has been lost because Williams products are now put up in aluminum tubes, which cannot now be produced by the National Collapsible Tube Co.

$1780 was spent on laboratory work for slide fastener (zipper) accounts. Most of the work was for Talon, Inc., whose 1947 purchases amounted to $35,097, but sales of $6300 were also made to Conmar. Two other fastener accounts, Segalock and G. E. Prentice, purchased small quantities. The big problem in making fasteners is to have the painted parts match the dyed tapes to which the fastener is attached. After much controversy, it was finally established that our finishes for Talon, Inc. were held within closer color limits than were the dyed tapes. A secondary problem connected with fastener finishes is the perpetual demand for new colors. Each season brings forth new colors for women's wear and fasteners have to be produced in these fashionable high style colors. In 1947, we developed 60 new colors for Talon, Inc. and each had to be produced in two forms--a fast bake enamel for certain parts and a so-called universal enamel of greater flexibility for other parts. All Talon, Inc. enamels were produced with improved impact resistance during 1947.

It is claimed that 95% of all furniture manufactured in the U. S. is of wood construction, but our company has never been an important factor in the wood furniture field. The larger manufacturers are located in the south where we have no factory and where we cannot adequately service such accounts. Beyond this, the market has always been keyed to low prices. In view of this situation, it is not surprising that our furniture accounts are not run-of-mine manufacturers. Our largest furniture account--Western Electric Co. --makes phone booths, on which 22,673 gallons of our varnishes were applied in 1947. Storkline, another large account, bought 17,274 gallons of varnish for finishing nursery furniture. Sikes Chair purchased 4000 gallons of varnish and would have bought more had alkyd resin been more plentiful.

In 1947, the laboratory developed an almost indestructible furniture varnish based upon a new type of phenolic resin. The varnish required the addition of an accelerator or catalyst just before use and it had to be cured at 140°F. These factors discouraged real

interest in the development, even though the finish was harder, tougher, more mar-resistant, and more alcohol-resistant than any currently available finish. A similar varnish was used in Germany ten years ago, at which time we were offered a license.

$536 was spent on wood furniture problems in 1947; more than twice that amount ($1214) was spent on metal furniture problems. We have three active accounts in this field--Masell, Bridge Metal Products and Cole Products. A non-streaking, dipping, olive green enamel was our major contribution in 1947. A total of 6,500 gallons were sold to Masell.

The metal decorating industry presents a somewhat similar technical and sales picture to that offered by the collapsible tube industry. Sales during 1947 amounted to $214,852, half of which represented the business of one customer--American Can Co. U. S. sales dropped 22% in volume (from 87,000 gallons in 1946 to 68,000 gallons in 1947) but Canadian sales increased 27% (from 31,000 U. S. gallons in 1946 to 39,400 U. S. gallons in 1947). The drop-off in U. S. sales was due in part to shortages of titanium dioxide. This pigment constitutes 40% of the weight of an average metal decorating enamel. Work on metal decorating sales problems cost $1458 in 1947. An additional $502 was spent on research work.

Two major metal decorating developments were made in 1947--a really adherent coating for electrolytic tin plate and a "non-scorching" finishing varnish that withstands the heat generated by seam soldering without discoloration. We sold 3300 gallons of M5464, the coating for electrolytic tin plate, in 1947; the latter development is just being production tested. A new crown (bottle cap) varnish, M5491, was also developed in 1947. This varnish is free from crazing at the edges of the crown skirt. Crazing has always been a periodic problem in crown finishing. 700 gallons of M5491 have been sold since November when the new product was put into production. A new white coating, GX117, for use on home canning discs was favorably received by Casper's Tin Plate. If further tests substantiate preliminary results, this item should run into substantial volume.

After years of trying, we have finally developed a golf ball enamel, G29265, which is of real interest to the Dunlop Co. This enamel is a plasticized version of The New Vitralite Enamel White Gloss. The Dunlop Co. coated several hundred balls with G29265 early in 1947 and the balls were then used by pros in this area during the summer and fall. The balls were examined after play and found to be in excellent condition. Twenty gallons of the enamel were ordered recently for a full production run. All balls from this run will be shipped to Atlanta for sale and distribution in that area. If the enamel passes this full scale try-out, it will be used on all golf balls made by Dunlop. The development of G29265 was handled by our Architectural Enamel Laboratory rather than by our Industrial Enamel Laboratory because of the product's relationship to The New Vitralite Enamel.

Laboratory work on aircraft finishes took a spurt in 1947. $960 went into 33 sales problems and another $408 was spent in completing Navy Department Inspection Forms. Only $381 was spent on these combined activities in 1946. Over 5000 gallons of one blue lacquer, 47-812, was sold in 1947 for use on military aircraft that is being built by Chance Vought and Grumman Aircraft. Activity in military aircraft finishes is apparently keyed to an accelerated rearmament program.

In the paper coating field, most of the $877 spent on laboratory work was for the benefit of F. N. Burt Co., paper box manufacturers. This company is experimenting with a continuous process for coating and "plating" paper. Plating makes lacquer-coated paper look as though it were covered with cellophane. Plating has always been a tedious batch process in which individual sheets of coated paper are placed between polished nickel plates and are then subjected to high pressure and temperature. After collaborating with F. N. Burt Co. engineers, a coating, 4054, was developed which has the instantaneous release from hot polishing plates that is necessary for continuous machine operation. The machine, itself, remains to be built.

Our other large paper coatings customer is the Birge Co., wallpaper manufacturers. For years, we have sold this company a flock adhesive for producing wallpaper that looks like velvet or plush. With increased demand for flocked papers, a faster adhesive was needed so that production could be maintained. A new adhesive, GX194, has allowed the Birge Co. to double production without increased equipment.

Laboratory work on casket finishes cost $685 in 1947 and was more than triple the value of work done in that field a year ago. While National Casket Co. is our biggest customer, considerable work was also done for the Norquist Co. That company is producing military burial boxes for bringing back the bodies of veterans from Asia and Europe. These boxes are given a two coat brown enamel finish, the first coat of which contains fungicide. Our system has just been approved and has thus far resulted in orders for 1500 gallons.

Our work on adhesives for use in the manufacture of abrasive papers remained at about the same level that it did in 1946. Our principal customer, the Carborundum Co., purchased 42,000 gallons of adhesive in 1947 (representing sales of $185,431) as compared with 50,000 gallons in 1946. About 70% of our 1947 volume was shipped during the first half of the year when the Carborundum Co. enjoyed an advantage in product quality over their competitors. However, both Behr-Manning and Minnesota Mining and Manufacturing Co. brought out improved papers (less softening when water soaked) in the latter half of the year with a resultant shrinkage in the Carborundum Co. business and in our business with them. This situation has been corrected through the adoption of a new treatment varnish.

The Carborundum Co. is laying out a new sandpaper plant, in which high bake-short cure adhesives will be used. Sandpaper made from

these adhesives has two to three times the sanding efficiency of current production. Unfortunately, these developments have been paralleled by similar developments by American Cyanamid Co. That company has "use" patents which cover the compositions that now interest the Carborundum Co. We believe that the Carborundum Co. has signed a licensing agreement with American Cyanamid to cover the situation.

Sleekote is the trade-name of a rather interesting industrial item which runs into substantial volume and which promises to run into even greater volume. Sleekote (GX054) is a graphite composition sold to Spring Perch Co., a Bethlehem Steel Co. subsidiary, for use on automobile springs. It protects as well as lubricates. 8400 gallons of Sleekote were sold from August until the end of the year. It is estimated that 116,000 gallons will be needed during 1948, when Ford Motor Co. starts to use the product.

A total of 27,000 gallons of miscellaneous baking whites were sold in 1947, as compared with 44,000 gallons in 1946. This shrinkage was probably caused in part by titanium dioxide and phthalic anhydride shortages. A new low cost white, K1362, was developed and a new alkali resistant white, K1378, were developed during the year. $808 was spent on research connected with white baking enamels. A considerable volume of baking black is also sold each year. In 1947, this totaled 27,500 gallons.

Interest in luminous paint cropped up from an unexpected source in 1947. The Winchester Co. is toying with the idea of marketing a flashlight case coated with luminous paint so that it can be readily seen in the dark. Samples were submitted and tests have been successfully completed. However, there has been no move to start production. 25 gallons of one of these paints, K927, was recently sold to another firm, for coating religious statuary.

In the early days of lacquer, only a handful of active solvents were available in commercial quantities. Today, several solvents are available in almost any desired boiling range. For example, ethyl acetate, MEK (methyl ethyl ketone), and Synest (a proprietary ester type of solvent) are fast solvents which can be used more or less interchangeably.

This provides considerable purchasing latitude and an opportunity to save money by juggling formulas. Approximately $2500 were saved in 1947 by making solvent changes in lacquer thinners, only.

LABORATORY FACILITIES AND EQUIPMENT

Last year, two new control laboratories were completed, equipped, and put into service--one at our Fort Erie Factory and the other at our Lacquer Plant. Heretofore, all Fort Erie production has been tested at Buffalo. This has meant the transfer of 2000 to 3000 batch samples across the border each year, as well as the

tie-up of manufacturing equipment while samples have laid around waiting for the twice-daily messenger service. The new laboratory was staffed with one technical employee who was trained a year in our Buffalo laboratory before assuming his duties at Fort Erie. The Fort Erie laboratory has enabled the plant to cut batch processing time in many instances from a week to two days. This improvement in service has been especially helpful to our industrial customers. The new Lacquer Plant Control Laboratory is one of our finest laboratories. It is conveniently laid out on the second floor level near the center of manufacturing operations, yet it is completely isolated from the factory by a fire wall. These factors make the new laboratory a safer work area than the old fourth floor laboratory in the midst of solvent storage tanks. A great saving in efficiency has also resulted from consolidating all lacquer plant testing in one place. In the old setup, activities spread over two floors and were conducted in two widely separated buildings.

During certain periods in the past year, some factory operations were run seven days per week; others were run six days per week. It was difficult to maintain 48 to 56 hour laboratory service to parallel this irregular factory schedule with only a handful of control employees geared to a 40 hour week.

The following new equipment was acquired during the year:

Deep Freeze Cabinet - for cold checking tests on furniture finishes

du Nouy Interfacial Tensiometer - for studying wetting and grinding problems

Two High Speed Compressed Air Mixers - for nonhazardous mixing of viscous inflammable mixtures

COMPLAINTS

Complaint Record - Buffalo Factory

Year	Total Complaints Received	Per Cent Justified	Complaint Index*
1947	141	38	52
1946	82	43	31
1945	87	37	35
1941	175	27	66
1937	276	26	147

* Number of complaints per million gallons manufactured goods

In 1947, complaints received on products made at our Buffalo factory increased 72% over the previous year. Part of the increase probably resulted from the laboratory's insistence on having a letter of coverage on all complaints. Many local office complaints were previously handled on an informal and unrecorded basis. An example is provided by the record of Industrial Sales Division complaints. 1947 complaints in this department were more than double the number received in 1946.

The per cent of justified complaints has shown a decided decline from last year's all time high. This would seem to indicate that we are finally getting away from instable wartime vehicles.

The four principal reasons for complaint in previous years --viscosity change, speckiness, slow drying, and color--accounted for half of our 1947 complaints. However, a previously minor reason for complaint--gloss--became the second most prevalent complaint in 1947; top honors went to viscosity change.

Complaints on products made by our Fort Erie factory and by our subsidiary plants decreased from 24 in 1946 to 20 in 1947. Exactly half were justified in 1947 (58% were justified in 1946).

Every effort is made to minimize the causes for complaint. Complaints are periodically reviewed at meetings attended by key laboratory and factory personnel. New tests are devised when complaints arise from improper control procedures. Constant study is made of the destructive forces which affect paint in the liquid state as well as in film form.

The manner in which the sales offices disposed of recorded complaints is summarized below:

Disposal of Complaints

Sales Division	No. Complaints Referred to Lab. and Subsidiaries	No. Complaint Records Put Through by Sales Division	Cash Settlements (See *)
Eastern	17	16	None
Western	38	26	$539.35
Central	45	18	$ 32.00
Canadian	4	0	Not known
Industrial	57	0	Not known
Total	161	60	$571.35

* Based on information in Complaint Records, 35% of all complaints required no settlement of any kind; 58% required the return or replacement of material; only 7% (4 complaints) required cash settlements.

PERSONNEL

Labor turnover decreased materially in 1947, as shown below:

	1947	1946	1940
Resigned	13	17	2
Transferred to other departments or to subsidiaries	1	1	4
Discharged	1	4	2
Enlisted	1	1	-
Total separations	16	23	8
Average number employees	58	57	55
Separation rate	28%	40%	7%

The separation rate in 1947 was less than it has been at any time during the past seven years--excepting 1943, when employees were more or less frozen in their jobs. Our turnover is high for a technical organization. It should not exceed 10%. Future turnover can probably be reduced by more careful selection of new employees, but conditions during recent years have offered scant opportunity for selecting employees. The primary reason why employees resign is to obtain better wages elsewhere (but not necessarily in technical work).

40% of our turnover occurred in the month of August. Many resignations seemed to follow the vacation period, when some employees apparently utilized their time to shop around for other jobs.

A third of our technical employees continues to be made up of young women.

In general, the laboratory organization is working smoothly and efficiently. Employees are individually interested in the company's problems and are responsive to the slightest suggestions.

LABORATORY EXPENSE

The cost of operating the laboratory in 1947 reached the all time high of $185,557. The cost of laboratory operations has not, however, increased to the same extent that the buying power of the dollar has decreased. Statisticians tell us that the 1941 dollar was worth only 63 cents in 1947. This ratio would establish our 1947 laboratory operating expense at $196,000--if 1941 expenses were used as a base figure and if the number of employees remained constant. We actually had one more laboratory employee in 1947 than we did in 1941.

The money spent on laboratory work in 1947 (and 1946) went into the following channels:

	1947	1946
Research	$ 45,500	$ 37,500
Special Sales Problems (Laboratory Requisitions)	58,900	52,000
Manufacturing Services	81,100	73,400
Total Expense	$ 185,500	$ 162,900

Our sales divisions contributed $42,858 toward the cost of operating the laboratory in 1947. This amount was roughly 40% of the cost of all activities other than those classified as manufacturing services.

The cost of the laboratory in terms of production and sales is indicated below:

Cost of Laboratory Operations

	Research and Formulating (1) Cost in Cents		Manufacturing Services (2) Cost in Cents	
	1947	1946	1947	1946
Cost per Gallon of Product Made at Buffalo			2.7	
Cost per Gallon of Product Made at Buffalo and Fort Erie	3.2	3.2		2.7
Cost per Sales Dollar of Products Made at Buffalo			1.1	
Cost per Sales Dollar of Products Made at Buffalo and Fort Erie	1.2	1.4		1.2

(1) Includes paint formulating for Fort Erie factory but excludes paint formulating for subsidiary manufacturing companies.

(2) With the establishment of a control laboratory at our Fort Erie factory on June 1, 1947, it is difficult to figure the cost of manufacturing services in the same way that we did in 1946. The Buffalo laboratory still tests raw materials for the Fort Erie plant, it still examines complaints on Fort Erie goods and it still renders certain other

services for the Fort Erie factory, but 95% of all Fort Erie manufacturing control since July has been done in Canada. Because of this involved picture, the cost of 1947 manufacturing services is based on the work done by the Buffalo laboratory on Buffalo-made products.

SUMMARY OF LABORATORY WORK

	1947	1946
New products developed	1595	1658
Sales problems submitted to laboratory	1855	1850
Sales problems reported	1915	1852
New research problems assigned	75	86
Research problems completed	73	81
New raw materials investigated	353	327
Raw material shipments tested	2432	2330
Batches tested by Buffalo Control Laboratories	17,132	17,251
Batches tested by Fort Erie Control Laboratory*	867	None
Service calls made by technical employees	129	143
Technical Department Bulletins issued	104	41
Paint Manufacturing Bulletins issued	80	59

* Fort Erie Control Laboratory was established June 1, 1947; figure covers 7 months' operations only.

February 3, 1948