PLAINTIFF'S EXHIBIT

GP-1301

PRODUCT DEVELOPMENT & TECHNICAL SERVICE
SIX MONTHS REPORT

January thru June 1974

TABLE OF CONTENTS

	Page
SIX MONTH SUMMARY	
Photograph of Type X Bench Test	1
Summary	2
Six Months Sales & Profits from New Products Developed Within the Past Five Years	3
Estimated Annual Cost Savings Generated in the Past Six Months	3
PRODUCT DEVELOPMENT SECTION	
Firedoors	4
Non-Asbestos Joint Compounds	4
Bag products	4
Ready mix	4
Replacement for Casein	4
Woodgrain Gypsum Board	5
Carbon Fiber	5
More Efficient Core Waterproofing	5
Talc Formula Ready Mix	6
MANUFACTURING SERVICES SECTION	
Wallboard	7
Elimination of vermiculite from 5/8" Type X Firestop	7
1/2" Type XXX Firestop Cost Reduction	7
Particle Size Study	7

SGP 0014617

Page

Plant assistance..... 7

U.L. follow-up service..... 8

Pre-Dec..... 8

Joint System..... 8

Quality problems..... 8

Raw material shortages..... 8

Speed Set..... 9

Plastic bags for ready mix..... 9

Continuous viscosity equipment..... 9

Field service..... 9

Non-mercurial preservative..... 9

Analyses..... 9

MARKETING SERVICES SECTION

Shaft Wall System..... 10

Texture Survey..... 10

Structural Labeling for Predecorated Wallboard..... 10

Dens-Cote Radiant Heat Ceilings..... 11

Comparison of G-P and U.S.G. #1 Pottery Plaster..... 11

INDUSTRY REPRESENTATION SECTION

ASTM..... 12

New performance specifications for gypsum wallboard (C-36)..... 12

Application standards..... 12

Type X Test Method..... 12

Predecorated wallboard specifications..... 12

SGP 0014618

Page

Gypsum Association..... 12

Materials Handling Committee..... 12

Technical Committee..... 13

PATENTS & LICENSING SECTION

Firestop..... 14

PVA/Asphalt Wax Waterproofing..... 14



Prize Winning Photograph of ASTM
Type X Bench Test Taken By George Green

SIX MONTH REPORT SUMMARY

New products developed in the past five years generated $1,418,382 sales and $293,833 profits for the first half of 1974. Cost savings achieved during the first six months are estimated at $233,000 annually based on the sales for the first half. The individual new products and savings are listed on page 3.

There has been progress on a number of products under development. The latest firedoors are ready for testing at Underwriters in Canada. A non-asbestos dry joint compound is being market tested in Chicago and a recently formulated non-asbestos ready mix looks promising on the basis of preliminary laboratory testing. Elimination of asbestos continues to be a high priority project due to severe manufacturing restrictions involved in using this raw material. Trial runs of a laminated woodgrain paper with printed grooves have been made. This product has been requested by the Distribution Division to fill the need for a low cost non-combustible panel for mobile homes. In an effort to retain casein as an economical joint system binder, a combination casein/starch formula is being market tested. If successful, the formula could be marketed economically at the highest projected price for casein.

The major plant service was the elimination of vermiculite from our 5/8" Type X Firestop. In addition to the cost savings, vermiculite is in short supply so it prevents procurement problems. Now we are attempting to reduce our raw material costs of 1/2" Firestop. Other services performed were assistance with the new flatcar loading procedures, purity analyses of gypsum deposits and core drillings, investigation of Dens-Cote radiant heat ceiling and joint system, relocation of the Speed Set manufacture, and an investigation of a new ready mix container.

Services to Sales included the development of a more economical shaft wall system, a competitive texture survey, field service on joint system products, a structural label for predecorated wall panels, and the comparison of the wear life of U.S.G.'s and our pottery plaster.

During the six months, trainee Howard Schutte was transferred from Tigard to Acme as joint system quality supervisor and Kermit McCarthy was hired as a trainee for the plant organization. We also recruited and hired Dan Harmon for Eastern Operations and he was sent to Brunswick for training.

SIX MONTHS SALES & PROFITS FROM NEW PRODUCTS DEVELOPED WITHIN THE PAST FIVE YEARS

Unit	Product	Sales Volume	List Sales Amount	Gross Profit Amount
MSF	Pre-Dec Wallboard (All)	22,984	$1,329,751	$ 279,839
MSF	Shaft-Liner Panels	25	5,632	1,020
MLF	Metal T Splines	75	17,734	1,508
MLF	L-Runners & J-Channels	10	1,208	(148)
BGS	Polystyrene Texture	18,438	59,712	10,109
BGS	Vinyl Topping	2,348	4,345	1,505
	Total		$1,418,382	$ 293,833

*ESTIMATED ANNUAL COST SAVINGS GENERATED IN THE PAST SIX MONTHS

1.	5/8" Firestop vermiculite elimination	$113,000
2.	Reduction in polyvinyl acetate at Akron, Chicago, Marietta and Milford	31,000
3.	Reduction in polyvinyl alcohol content at Akron, Chicago, Marietta and Milford	66,000
4.	Use of Elvace at Chicago and Milford	23,000
	Total	$233,000

*Based on first six months sales in 1974

PRODUCT DEVELOPMENT

1. Firedoors

The test doors fabricated at Walled Lake Door Company have been at Underwriter's for several months. U.L. has problems with their wall furnace at Northbrook which they led us to believe would be solved within a short time. Months passed during which we contacted them at least once each week. Finally it was decided to ship the doors to Canada. Following that decision, it took another month to get U.L. to ship the doors and now we are waiting for confirmation that they have arrived at U.L. in Canada.

2. Non-asbestos Joint Compounds

a) Bag products - Based on Acme's experience with non-asbestos vinyl bedding, topping and All Purpose, similar products were developed using limestone as the basic filler. In order to prevent contamination with casein products, the non-asbestos vinyls are being manufactured in Marietta and shipped to Chicago. The trials were favorable, so a truckload of the non-asbestos vinyls was shipped followed by two carloads. This should provide enough experience to determine whether these products will be acceptable.

b) Ready Mix - The development of an asbestos-free ready mix has progressed more slowly. A stable viscosity without asbestos is difficult to achieve, but a recent formula developed by Bill Gettel looks encouraging. We are continuing to pursue it on a high priority basis.

3. Replacement for Casein

Casein at the current price of 80¢ per pound would make bedding, topping and All Purpose formulas uneconomical. In other words, they would have to be priced too high to be competitive. One possibility is to phase out casein products entirely and replace them with vinyls. However, the vinyls are not completely proven and, even if they were, there isn't enough vinyl adhesive available. If a replacement or extender for casein could be found, it would give us another alternative.

A formula in which 75% of the casein was replaced by a modified starch seemed to be satisfactory. The starch is one that we have used as an adhesive in the past for joint systems and texture products. About 600 bags were manufactured at Akron and shipped to the Rochester and Wilmington branches. If this product is acceptable, we can continue to profitably furnish a casein formula even if the price of casein reaches $1 per pound.

SGP 0014623

PRODUCT DEVELOPMENT SECTION

4. Woodgrain Gypsum Board

About a year ago we were co-operating with the Kalamazoo Division and the Cincinnati Printing Division to manufacture a low cost woodgrain paper with groove lines or stripes. The striping was the problem because we had previously been unsuccessful in printing the grooves during the lamination. It was, therefore, decided to have the stripes printed on the paper. We designed a printing roll to apply the stripes at the proper location with the edge stripes extending out wider to permit some deviation in alignment during lamination. Trial runs of the striped woodgrain paper were made at Orchard Paper Company. About the time the roll for printing the stripes was ready, paper came into short supply and Kalamazoo lost interest.

The project was revived by the Distribution Division in their discussions with Orchard Paper Company. We arranged to have the roll for printing the stripes shipped from the Cincinnati Printing Division to Orchard, and the first roll of paper was sent to Wilmington for trial. The glue applicator roll at Wilmington is so far from the press roll that the thin paper wrinkles excessively before making contact with the board.

A second run was made, this time at Fort Dodge because of the shorter distance between the applicator roll and the press roll. Two methods were tried, one where the adhesive was applied to the paper and the other with the adhesive applied to the board. The application of adhesive to the paper was best. The alignment of the stripes does not appear to be a problem, but more precise guiding equipment would be helpful. About 800 boards were manufactured and will be shipped to various markets to evaluate shipping and market acceptance.

5. Carbon Fiber

Union Carbide has developed a carbon fiber in the same filament form of the glass we use. The potential advantage of the carbon fibers is that it will withstand 3000° C, whereas glass fiber melts at 1300° F. The carbon fiber will eventually be priced between $1 and $2 per pound, but it is conceivable that smaller quantities will be necessary. In any event, we requested and have received several small spools of carbon fiber. Exploratory testing is underway to determine whether there is any advantage to the carbon fiber.

6. More Efficient Core Waterproofing

Trials were made at Sigurd, Lovell and Brunswick to confirm the synergistic effect of polyvinyl alcohol and asphalt/wax emulsion. The water resistance of the core can be substantially improved with a fully hydrolyzed PVA in aqueous solution added to the wallboard. The core will absorb about 1% water in the standard ASTM test. The paper, however,

absorbs 6% to 7%; so this somewhat negates the advantage gained by the use of the PVA. There are two factors which seem to affect the absorbency of the paper. One is the absorbent bond liner of our paper and the other is the wetting type foams we use.

In order for all plants to use the PVA/asphalt-wax system, it would be necessary to have equipment to solubilize the PVA and meter it into the mixer. Sigurd has a steam generator and some tanks to do this, so we have suggested they use the PVA/AWE system in all their water resistant boards. In addition, some silicone treated paper and rosin size (non-wetting type) foam has been sent to Sigurd to try to overcome the paper absorbency.

DuPont has advised us that there is no polyvinyl alcohol of the type we have been experimenting with available at this time. However, we are inclined to continue the project so the work will be finished whenever the alcohol supply loosens up.

7. Talc Formula Ready Mix

A ready mix formula containing a substantial amount of talc was developed to meet the requirements of the Houston, Texas, market. Even though the formula was well received, only limited quantities have been sold in Houston. Shipments of the formula into other markets have fared better and repeat shipments are being made in several instances. The limestone version of the talc formula has been tried in Atlanta; Georgia; Raleigh, North Carolina; and Grand Rapids, Michigan; apparently with success but without much feedback. For some reason the talc formula has less crack resistance than the regular, so this would have to be rectified. Because of involvement in Elvace emulsion, reduced polyvinyl alcohol, asbestos elimination, and other projects, the talc formula has been allowed to languish. As soon as some other things are taken care of, the talc formula will be reassessed. It is a problem for a plant to have two ready mix fillers to contend with, so we want to select the best one.

MANUFACTURING SERVICES SECTION

MANUFACTURING SERVICES

1. Wallboard

a) Elimination of vermiculite from 5/8" Type X Firestop - U.L. insisted that we conduct a wood joist floor-ceiling test in order to show that the 5/8" Type X without vermiculite will provide one-hour fire protection for wood frame walls and ceilings. The board easily passed the test and U.L. extended all the fire ratings covered by the old board except for columns, beams, and certain two-hour assemblies. We plan to test a column in an attempt to gain acceptance for all ratings held by the old formula. In the meantime, Sales considers the basic ratings to be sufficient to market the 5/8" Type X without vermiculite so we are taking advantage of the cost savings. Based on the past six months' sales of 5/8" Type X Firestop, the annual savings will be $113,000.

In addition to the cost savings, we established a lower value for flexural strength of 5/8" Type X Firestop with U.L. As paper has become weaker, we were having more and more difficulties meeting the U.L. standards.

b) 1/2" Type XXX Firestop cost reduction - Tests are underway to determine whether the vermiculite or clay can be eliminated or the glass fiber content reduced. One possibility is to develop a Type X 1/2" Firestop that would not pass all the ratings but would provide the basic assemblies. This would mean having two 1/2" Firestop products just as we do with 5/8" Firestop. At one time the volume of 1/2" Firestop did not justify this undertaking, but on the basis of our current volume of business, savings of $100,000 per year are possible.

c) Particle size study - Board stucco samples after the grinding operations were analyzed on the Coulter Counter to determine the particle size distribution. These results were compared with particle size determinations made five years ago. Several plants' stucco is coarser than it was then. This probably reflects the increased machine speeds. We have requested slurry cubes to be sent from each plant to compare the compressive strengths. If the strengths are low, it might be advisable to investigate means to obtain finer grinds at some plants.

d) Plant assistance - Several plant visits were made by Joe Watt, particularly with respect to car loading problems.

SGP 0014628

e) U.L. follow-up service - The investigation of a new procedure involving more scrutiny on our part and less from U.L. is being handled by Eastern Operations. Thus far, there has not been agreement on the details of the new procedure.

2. Pre-Dec

Brunswick has been using two coaters to obtain a uniform texture pattern. Don Klus made a plant investigation and noticed the doctor roll was out of round. A new doctor roll was prepared and installed. Brunswick is now back to making a uniform pattern with one coater roll.

3. Joint System

a) Quality problems - Almost as soon as the grit problem in ready mix was solved, we were faced with complaints of high shrinkage and inferior working properties. It had been determined that the combination of Dowicil preservative and Calgon dispersant reacted to form grit particles. In view of the shrinkage complaints, Calgon was put back into the formula. This has resolved the shrinkage complaints without causing a recurrence of the grit.

Excessive cracking in ready mix at Akron, Chicago, and Milford suddenly became a quality problem This was finally traced to our switch to Reichold polyvinyl acetate resin when DuPont discontinued the manufacture of polyvinyl acetate. The problem was traced to the fact that Reichold emulsion contained only 4% Dibutyl Phthalate whereas the DuPont emulsion had 8%. We requested that Reichold increase the Dibutyl Phthalate plasticizer to 8% and this seems to have corrected the problem. As a quick measure to improve the cracking, we had increased the mica and reduced the asbestos; but these ingredients are now back to their normal levels.

b) Raw material shortages - We are on an allotment basis in our purchases of polyvinyl acetate and polyvinyl alcohol. DuPont's exit from the homopolymer vinyl acetate market put us in a position of buying from Reichold exclusively. We had been evaluating a copolymer emulsion called Elvace and, after field and market testing, converted Milford and Chicago. Initially this saved 15¢ per pail, but recent increases in the price of Elvace make the current savings 11¢ per pail.

Even more critical is the short supply of polyvinyl alcohol which we use in ready mix and dry vinyl products. Some investigation was done on a summer formula ready mix having 50% less polyvinyl alcohol. Market testing of this formula was started immediately. There was no unfavorable reaction (in fact, the working properties were probably improved), so we how have all plants using the reduced polyvinyl alcohol formula. This will keep our ready mix operation going and also free up some alcohol for use in the dry vinyl products.

c) Speed Set - The location of Speed Set manufacturing was moved from Acme to Blue Rapids. We simultaneously introduced a new Speed Set formula which was developed by Howard Schutte when he was in training at Tigard. The new formula is substantially improved in mixing and working properties. The relocation to Blue Rapids will result in lower costs and should improve our service to the other plants. Also, Blue Rapids' larger size blending equipment and the readily available Denscal should permit better response to orders.

d) Plastic bags for ready mix - The cost of filling four-gallon cartons and the skyrocketing cost of metal pails has caused more emphasis to be put on the plastic bags. One thousand 6-mil printed plastic bags were purchased. An adhesive has been found that will tie the bags together during shipment so the problem of the bags sliding around has been solved. Now what we need is to determine the market acceptance of the bag material. The projected cost per bag is 30¢, and the filling cost with the proper equipment should be no more expensive than filling pails and significantly less than the cost of filling four-gallon boxes.

e) Continuous viscosity equipment - The continuous viscosity recorders have been installed at three plants. Thus far only Milford is using the equipment to good advantage.

f) Field service - George Fowler has been establishing contacts with customers in the markets serviced by Chicago, Milford, and Marietta. He has concentrated on Chicago recently because of the testing of a non-asbestos vinyl and because Chicago needs more business. He has also responded to field problems in Baltimore, Maryland; Raleigh, North Carolina; and Lexington, Kentucky. George also coordinated the relocation of Speed Set manufacturing and has arranged numerous plant trials at Marietta and field trials in the Atlanta market.

g) Non-mercurial preservative - The restrictions on the use of mercurial preservatives make the elimination of mercurials a worthwhile undertaking. At Chicago we cannot use mercurials at all because our wash-up water goes directly into the municipal sewage system. The Dowicil preservative is not as effective as we would like, so a search was made for a more effective non-mercurial preservative. Out of about 25 candidates, two were found to be worthy of plant trials which will be made at Akron and Milford.

4. Analyses

It has been necessary to conduct analyses two days some weeks in order to handle the number of samples submitted. We have had extra samples from Grand Rapids where they have encountered high concentrations of salt recently. In addition to the regular analyses Fort Dodge core drillings, competitive products and by-product gypsum samples were submitted.

MARKETING SERVICES SECTION

MARKETING SERVICES

1. Shaft Wall System

A new shaft wall system has been devised by Ray Hinkel at the request of Sales to compete with other systems which are less expensive to install than our shaft wall. Since our T-stud wall was developed, U.S.G., Flintkote and Kaiser have come out with cavity walls with a single stud and utilizing 1" wallboard as opposed to the 1-5/8" gypsum panels in the G-P shaft walls. The new method involves an I-stud with tabs punched out of the web to engage 1" panels. The finish side would be faced with two layers of 5/8" Firestop. This system should be fully competitive and may even have some advantages over the other systems. Indications are that we can pass the two-hour fire test at the University of California. This is where U.S.G. and Kaiser have tested their new shaft walls.

Because of the investment required for testing and dies for the new system, it has been decided to proceed with structural tests only at this time. We have purchased hand formed I-studs for this purpose. Enough studs were purchased for the fire tests as well in the event that we decide to proceed.

2. Texture Survey

A comparison was made of our texture products with that of several other manufacturers. Our textures (both wall and ceiling) ranked high in spraying properties, whiteness and bond but some competitive textures have better hiding properties than ours. This is something we will investigate. Our textures were the only ones that were asbestos free. We have probably not taken advantage of this.

3. Structural Labeling for Predecorated Wallboard

We had previously conducted shear tests on ceiling (truss roof) sections using Pre-Dec and established a U.L. label to be used in combination with the U.L. flamespread label. Certain states require structural ratings for walls, so Sales requested a similar label for 1/4" and 5/16" wallboard that is decorated with a Pre-Dec coating, a printed pattern, or a laminated film for use on partitions. After contacting U.L., it was evident that it would require many months in order to conduct the tests and attain the ratings. It was decided to have General Testing Inc., who are local, witness the racking tests and provide a labeling service. The tests were completed and now three plants are equipped to label 5/16" wallboards certifying a racking resistance of 115 pounds

per lineal foot. These General Testing labels will be used on the so-called Pre-Dec blanks and on the laminated woodgrain gypsum panel we are developing.

4. Dens-Cote Radiant Heat Ceilings

After a rash of complaints in which the finish coat separated from the base coat, we revised our instructions to require that the second or finish coat be applied in double back fashion before the first coat sets. There is inadequate bond between coats if they are applied in two separate operations. The directions in our literature have also be changed.

5. Comparison of G-P and U.S.G. #1 Pottery Plaster

An investigation is in progress to determine whether there is a difference in the wear properties of the two products. Identical molds were cast using some variations of G-P pottery and U.S.G's product. Clay pieces are being repeatedly slip cast in the molds, removed, and observations made to check the wear properties. Sales claims that we can sell a lot more pottery plaster if our product has equal wear properties.

INDUSTRY REPRESENTATION SECTION

INDUSTRY REPRESENTATION

ASTM

1. New Performance Specifications for Gypsum Wallboard (C-36)

One negative ballot from an ASTM member representing the Department of Health, Education and Welfare kept the new standard from being adopted last Spring. The negative was resolved, so it will be later this summer before we have full acceptance. The new performance standard will eliminate weight as a criterion, reduce the cross directional flexure strength requirement, and have end, edge, and core hardness and resistance to sag as new requirements. This is very timely since many plants were having difficulty meeting the flexure strength.

2. Application Standards

In recent years the gypsum industry has departed from ANSI where most of the application standards were and are currently having them rewritten into ASTM format. The application of veneer base is well along and progress is being made on the rewriting of the old ANSI A.97 specification for gypsum wallboard. This is important because the old A.97 is so out of date it is practically obsolete.

3. Type X Test Method

The development of a test method to identify Type X wallboard has progressed to the point where round robin testing is underway. The method developed at the National Bureau of Standards appears to be very reproducible and, in our opinion, is the best method. One company is still supporting the old two-burner test. The photograph of the NBS method on page 1 by George Green won a first place ASTM award.

4. Predecorated Wallboard Specification

We have written a proposed specification around laminated and coated wallboard products with test methods for each. This specification has been circulated to the members of C-11 for examination and comment.

GYPSUM ASSOCIATION

1. Materials Handling Committee

The Association of American Railroads (AAR) imposed a mandatory loading specification for bulkhead flatcars which would have cost $100 more per

car than the normal loading cost. This was due to excessive claims against the rail companies for board damaged in shipment. Our plants at Acme, Blue Rapids and Sigurd are most affected by this.

The Materials Handling Committee has had several meetings including two with the AAR. A compromise was negotiated which involves a $50-60 per car increase in loading costs. The AAR agreed to a test car program to prove out the method suggested by the Gypsum Association. We participated in the test program and subsequent plant loading seminars. Joe Watt represented us in the planning and implementation of this program which resulted in the AAR accepting our compromise loading method, thereby preventing loading costs from going as high as they would have otherwise.

2. Technical Committee

a) Fire test program - The Gypsum Association testing program is somewhat stymied by our inability to pass load bearing wood stud partitions. An effort to show that wood sizes were the cause proved that this was not a factor. Use of a lower strength wood (Hem-Fir) loaded to full design load (1800 lbs. per stud) was unsuccessful. We are alone in believing that the lighter weight wallboard is partially responsible for the poorer fire performance on wood frame assemblies. Another test using Douglas fir but at less than design load is planned. Once this is out of the way we should be able to return to testing the assemblies needed by the industry.

b) Fire resistance manual - The Gypsum Association publication listing of the fire and sound rated assemblies is due for reprinting in January 1975. The revision of this book is in progress. One meeting in Chicago was held to go through the current manual and make revisions. The final date for new assemblies to be added is the Technical Committee meeting in August. The only assemblies we have to add are some that have been tested by others using our wallboard. Each revision seems to make the fire resistance manual a better reference for fire and sound properties of gypsum products.

PATENTS & LICENSING SECTION

PATENTS & LICENSING

1. Firestop

In compliance with the terms of our license agreements with Canadian gypsum companies, we have offered to extend the latest improvement (elimination of vermiculite) for $2000 each. Our Canadian Firestop patent will expire next January.

2. PVA/Asphalt Wax Waterproofing

An application was submitted on a hurry-up basis and since then we have developed more back-up data to substantiate our claims. It appears, however, that no significant change in the original claims will be necessary.

SGP 0014638