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CORPORATE PLANNING

April 30, 1968

Mr. R. J. McEvoy
Central Files

To comply with your recent request for a list of new products and processes, which the Company should give consideration to as a part of the long range Corporate Planning for future growth, I submit the following for your consideration:

1. Glass Reinforced Ceramic Composites

Concept:

This concept involves the use of glass fibers to improve the green strengths and/or fired strengths of ceramic composites.

Status:

OCF has never had a sponsored program in the area of reinforced ceramics. We have worked, however, on an unofficial and quite limited basis with several outside companies and Universities. Indications are glass fibers will substantially improve green strengths, increase drying rates and, in a few cases, reports have come back to us to the effect that glass fibers also improve fired strengths even though they seem to disappear in the matrix.

Probability of Success:

The probability of improving strengths of green ware to reduce in-process handling damage and breakage are extremely high. Probability of improving fired strengths of ceramic composites are about 50/50. Development of higher temperature resistant fibers will improve those odds.

Recommendations:

I have recommended R&D in this area for a number of years. With adequate facilities and manpower, we could be the ones who make the big breakthrough in the use of glass fibers as reinforcement for ceramic composites. Yes, I would recommend that OCF undertake such a study.

2. Glass Fiber Reinforced Concrete [illegible]

Concept: [illegible]

This concept involves the use of coated glass fibers as reinforcement for concrete. Glass could be a possible replacement for steel and/or asbestos.

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Status:

OCF has carried out considerable research over the past 20 years in this area. Problems of alkali attack, adhesion, modulus and costs have not, as yet, been solved. There is considerable interest in this concept throughout the world including behind the Iron Curtain. OCF has a cooperative program (FIM sponsored) under way on evaluating a crack propagation concept evolved by a Dr. Klink of RPI.

Probability of Success:

Probability of success is at best 50/50. Basic problems of alkali attack and adhesion have not been solved although recent work in England, Russia and our own program with Dr. Klink show promise.

Recommendations:

The potential market for glass fibers as reinforcement for concrete is so large that it staggers the imagination. It is the consensus of most of the people working in this area that the problems of reinforcing concrete with glass fibers will eventually be solved. We could, with our vast background in glass fiber, resin and concrete technology, be the ones to make the breakthrough. The FIM Division is planning to continue sponsoring a glass reinforced concrete program at Granville. I fully support such a study.

Glass Fiber - Sulfur Composites

Concept:

This concept involves the use of glass fibers to reinforce sulfur.

Status:

Basic work (patent granted) by OCF indicates sulfur can be reinforced with glass fibers to achieve composites having exceptional structural strengths. Southwest Research has followed up on this concept, and has demonstrated the ability to build low cost buildings using mixtures of glass fibers and molten sulfur as the "adhesive" to hold the concrete or cinder block walls together. This concept offers a real potential for low cost housing, especially for the underdeveloped nations of the world.

Probability of Success:

100%

Recommendations:

This program was placed on the shelf by the International Division. It does not offer OCF a high profit - high volume market. However, it could gain for OCF and the U.S. "points" in solving the housing problems for many of the underdeveloped nations of the world. I recommend this program at least be re-evaluated by Management for possible follow up as a solution to the World's housing problems.

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4. Glass Fiber Reinforced Calcium Silicate Insulation

Concept:

This concept covers the development of a treated glass fiber which can be used as a replacement for asbestos in the reinforcement of calcium silicate insulations.

Status:

It is currently a Marketing sponsored R&D Program. However, due to a shortage of manpower, the program is temporarily on the shelf. Asbestos, the current reinforcing fiber for calcium silicates is reported to cause cancer. Because of adverse publicity, possible court actions and for protection of our position in the calcium silicate market, it is necessary for OCF to eventually receive asbestos fibers from Laylo. It would be very desirable if we were the first to replace asbestos in the calcium silicate market.

Probability of Success:

Less than 25%.

Recommendations:

Reactivate this program as soon as manpower becomes available. This is a tough problem to solve, however, I recommend we continue with our program. We just can't allow one of our competitors to be first in the removal of asbestos.

5. Structural Roof Deck

Concept:

Develop a "dry" structural roof deck to broaden our line of structural and building products.

Status:

During the past 20 years OCF people have developed, or had made available to them, three structural roof deck products - Tectum, an inorganic bonded sical product now produced by National Gypsum, Solas Clay Foam Panels now being introduced on the market by Dow and a calcium silicate product called "Lifa" developed by OI. OCF does not currently produce or market a structural roof deck product. No active program is currently under way.

Probability of Success:

It all depends on whether the product must be based on glass fibers. "Dry" structural roof decks have already been developed. However, if the criteria is the product is to be based on glass, then the probability is less than 1 in 10.

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Recommendations:

OCF Marketing has an urgent need for such a product. R&D should have an active program in this area. Marketing of already developed structural decks should also be considered.

6. Inorganic Reinforced Plastic Systems

Concept:

This concept covers Inorganic - Glass Fiber Composites capable of being molded in standard FRP presses using standard molding techniques.

Status:

Recent exploratory investigations in this area indicate the possibility of developing inorganic slurry systems which can be reinforced with glass fibers to produce products having strengths comparable to reinforced plastic, but at a substantially lower cost. Being completely inorganic, they would also be rated fireproof.

Probability of Success:

95%

Recommendations:

An active program should be set up to pursue the development of all inorganic molding systems. Such systems offer lower costs, higher modulus and incombustibility. We could easily be the ones who develop such a product. It could be a serious threat to our future growth in the FRP market if someone else should come up with such a product.

7. Fire Rated Acoustical Products

Concept:

This concept covers the development of one and two hour rated tile and ceiling board acoustical products.

Status:

OCF now markets R1 and R2 (one and two hour rated) glass fiber, fire rated acoustical tile and ceiling board products. Gross margins of such products are extremely poor. Customer acceptance of the R1 and R2 products are also marginal.

Probability of Success:

25% or less if we go the glass fiber route, 99% if we go the Fourdrinier wet process.

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Recommendations:

OCF must develop a complete line of one and two hour rated tile and ceiling board products if we are to remain in the acoustical market. Various programs currently under way at Granville must be continued.

8. High Temperature Glass Fiber Insulation

Concept:

This concept covers the development of a high temperature insulation product based on glass fibers which will supplement, or eventually replace, Kaylo in the high temperature market.

Status:

OCF developed several years ago a product called Multi-Temp. Gross margins were lower than those obtained on Kaylo. I&C Marketing withdrew the product from the Market. Several new concepts of producing a lower cost "Multi-Temp" high temp insulation are currently under way.

Probability of Success:

50/50

Recommendations:

Program initiated recently which involves heat felting of the glass fibers, followed up with a post saturation of clay, shows considerable promise. This program should be continued.

9. Glass Reinforced Fused Salt Composites

Concept:

This concept involves the reinforcement of fused salt with glass fibers to produce structural composites.

Status:

This concept has been reduced to practice. Patents have been filed for. However, there is no current program and no apparent interest within the company on this concept. We have demonstrated it is possible to achieve flex strength as high as 75,000 psi. It is possible to adapt this concept to produce structural ice.

Probability of Success:

Technical - 95%
Commercial - ?

Recommendations:

This offers the company a new concept of producing non-metallic high strength

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composition. Market Research should be carried out to determine whether markets exist for such composites.

In addition to the above, there are a number of product concepts in the high temperature (calcium silicate) insulation field which we hope to develop in the not too distant future. They include such products as Marinite, fire rated wall assemblies, ceramic drying pellets, high temperature oven door insulation, 1500°F insulation, insulating cements, furnace insulation, elevator door and shaft insulation, pipe fittings, large size sectional ware and bonded aggregate composites. If you would like to review any of the above in greater detail, please call me.

Finally, over the years we, as a company, have directed our efforts toward glass fibers. I've heard many people say from time to time, nothing new comes out of Research. Yet, in the past 10 - 15 years two completely different products, namely glass foam pellets and glass flake, have been developed. For some reason, neither found any success on the market. I believe both products deserve a re-evaluation as to possible market applications. Incidentally, both are proprietary OCF products.

R. F. Shannon

RFS/pb