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KAYLO RESEARCH AND DEVELOPMENT
MONTHLY REPORT FOR JANUARY 1968

Mr. A. J. Pearson, Toledo

Mr. J. Rhoads, Berlin

Mr. H. V. Smith, Toledo

This report summarizes major Process Development activities carried out in January by the Kaylo Research and Development Laboratory in cooperation with Berlin plant personnel in support of plant operations. It also briefly summarizes the status of Marketing supported Kaylo Product Development programs.

Process Development

1. Process Audit

Continuing audits of the Berlin operation by R & D indicates a substantial upsurge in product quality, workmanship, plant appearance and equipment and mold maintenance. This was evidenced by higher job efficiencies and higher throughputs in December and January.

A quality control product audit, conducted on February 1 by Marketing and Toledo and plant Quality Control personnel gave further evidence of the recent upsurge in product quality. Included in this audit were many of the pipe sizes, which are considered the toughest to pour, i.e., those sizes which normally have the highest incidence of visual defects and low job efficiencies. The general consensus of those present at the audit was quality of Kaylo pipe had improved in recent months with fewer air holes and broken corners. Kaylo block was of very high quality, probably the best on the market today.

2. Batch

A. Carbon Modified K-10 Batch

Approval was received from Marketing to carry out an extended trial of carbon block modified K-10 batch. This study will determine whether elimination of mold oiling is possible, provided an internal lubricant is added to the batch. One block train is currently being cycled without oiling. As of February 1 the train had been cycled ten times and still looked good. Final results from this study should be available in late February.

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Terry
Use of imported dry milled ash widely preferred

B. 700 Pound Dust Batch

J. Helser, of Berlin Process Control, summarized and issued in report form all of the data from 700 pound dust batch formulations poured at Berlin in recent months. These data, coupled with R & D data from Granville trials, all indicate the so called 700 pound dust batch (400 pounds of Berlin process dust and 300 pounds of Jeffrey hammermilled offware) will produce a high quality product, which fully meets the CAS.

The plant is in the process of preparing a 901 to cover the purchase of a Jeffrey hammermill and supporting dust handling equipment. In the meantime, arrangements have been made to have substantial quantities of offware processed through a Jeffrey hammermill. This will permit extensive 8 and 16 hour trials of the 700 pound dust batch to be conducted at Berlin so as to verify process performance and product quality under plant conditions.

C. Prehardenable K-17 Core

Extensive research has been directed toward a prehardenable K-17 batch. A cement modified batch was developed, which fully meets UL product requirements and the CAS except for compressive strength. A search of UL records confirm the fact compressive strength is not a part of the current UL procedure. A summary report on prehardenable K-17 batch will be issued by February 15 by R & D. A meeting of Marketing, Manufacturing, Toledo Quality Control and Process Control, R & D and Product Testing personnel must follow for future action on this program.

D. K-10 Block Batch

It has been a known fact for years that batch formulations designed for Kaylo pipe did not always yield good Kaylo block and vice versa. With the greater process flexibility now available at Berlin, development of batch formulations specifically designed for block or for pipe is now possible. A modified version of the 10L-8 batch designed especially for block was placed in production in January. This batch is lower in cost, has an improved visual appearance and yields a product of superior quality.

3. ProcessA. Process Meeting

A comprehensive monthly process and quality review meeting was held at Berlin on January 18, 1968. The next meeting is tentatively scheduled for February 21 to coincide with the next plant trip by the writer. These meetings will provide for regular review and follow-up of all plant and plant-R & D process programs as to status, timing and responsibility.

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B. Bulk Storage

In December 1967 the plant went full time on the 8 bag (752 pound) cement batch identified as 10L-8. This batch formulation contains a substantially higher percentage of Portland cement than quicklime. Plans are to switch in early February one of the bulk systems from quicklime to Portland cement with a possible daily savings of over \$40. Installation of a third bulk system (in our plans for near future) to handle quicklime will bring daily savings over \$70. (Note: Plant Engineering informs me a third system can be added to the present bulk system at minimum cost, a fourth system to handle diatomaceous earth would be quite expensive.)

C. Water Control - Batch

For years the Berlin process has been plagued with density control. The main cause for this problem has been water measurement. Recently, the problem has been compounded by the practice of adding cement to the asbestos tank, causing build up in the tank, which affects the accuracy of the present water measuring system. Purchase of a water meter is under consideration. Locating a meter, which will yield the accuracy needed to control water solids of Kaylo batch, is currently underway. An alternate method of measuring water even more accurately than commercially available meters can be studied by Plant Engineering, Plant Process Control and R & D. Results of this study will be reported in February.

D. Waste Slurry

Plant audits conducted by R & D last summer and fall indicated one of the major causes for variability of batch properties, processing and product properties was use of waste slurry. Substantial improvements have been made recently at the plant in the handling and holding (now under constant agitation) of waste slurry. A study will be undertaken shortly to gain even better control over waste water composition and solids. A piece of equipment commercially available and now in use by the water treating and process industry for separating solids from water will be investigated. From an economic standpoint, we must continue to use waste slurry. At the same time reduction of its effect on batch consistency, processing and product quality is of the utmost importance to the plant operation.

E. Vacuum Stripping

A major Kaylo process problem, which has existed from day one, has been stripping of flatware. A concept known as 'vacuum stripping' was suggested years ago as a means for overcoming this problem. In January, Berlin plant maintenance and engineering personnel on their own initiative built and successfully tested a prototype vacuum stripping device for flatware (core and block).

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E. Vacuum Stripping (Cont.)

Once it is installed on the line, we can expect a reduction in block and core offware. NEM caused by chips remaining under the false bottom plates and chipped and broken corners should be reduced substantially. Pouring rates should also increase since stripping continues to be one of our current throughput bottlenecks.

F. Prehardening

Meetings were held with Toledo General Engineering personnel to review process problems relating to prehardening of Kaylo. General Engineering will conduct studies at Berlin directed toward collecting data as to rates of prehardening, temperatures required and alternate methods for heating the molds and batch to reduce prehardening time. During these meetings Kaylo R & D passed on to General Engineering a number of suggestions relating to modifications which could be made to the existing prehardeners to make them even more effective. These modifications could also be incorporated into the design of the new prehardeners to be installed on pouring line 3.

G. Graphite Treated Molds

Dr. C. L. McKinnis of the Kaylo R & D Lab has evolved a new concept for eliminating the need for oiling of molds. It involves the application of a molecular layer of graphite to the metal surface of the mold. The current thinking is to apply this coating in the mold shop at the time the train is being cleaned. Initial lab data shows promise. Arrangements have been made with M. Hardwick to evaluate this concept at Berlin under plant conditions, possibly in late February.

H. SID Cycles

Back in the 1950's it was believed long up and down cycles were necessary to prevent ware 'blow-ups'. In fact, for years a multiple step operation was used to bring the SID cylinder up to pressure. The same in reverse was used to lower the pressure. In the early 1960's experiments were conducted at Granville, which indicated up and down cycles could be reduced substantially without adversely affecting product properties. J. Helser, Berlin Process Control, reduced the up and down cycle to one half hour and one hour respectively in recent years. In January he further reduced the up cycle to 15 minutes and the down cycle to 30 minutes. What does this mean? Capacity of the present SID's has been increased the equivalent of two or more trains per day. Also, we may have gained a foothold on extending the patent protection on the SID process (OCF SID patent has expired). The special process 'tricks' needed to make such short up and down cycles work without blowing up the ware are probably patentable.

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4. Raw MaterialsA. Glass Technology

A meeting was held at Berlin with Glass Technology personnel to determine how and where they could help. A comprehensive review of batch materials used, sources of raw materials and methods of mixing were provided Glass Technology. Areas where Glass Technology could provide immediate help were defined. They include: Locate alternate vendors of lime and silica, chemical analysis of all batch materials as a prelude for writing tighter purchase specifications and analysis of Kaylo batch and product on a regular basis to determine chemical variation for future upgrading and process control.

B. Diatomaceous Earth

The current 10L-8 batch requires substantially less diatomaceous earth than previous batch formulations. Even so, diatomaceous earth is an expensive raw material. We need an alternate source for obvious reasons. Also, indications are a second source will create the competition needed to obtain lower prices. Active programs are underway with both Dicalite and United Sierra. Plant trials of a Dicalite material is tentatively scheduled for February.

C. Amosite Asbestos

A meeting was held with Mr. Cryor, President of North American Asbestos Corporation, concerning fiber length of amosite asbestos. The problem is purchase specs for amosite asbestos are so loose it is difficult to have any basis for rejection. This meeting was prompted by the fact it was the combined 'belief' of plant and R & D personnel K-3 asbestos shipped to Berlin last fall as the equivalent of W-3 asbestos was actually shorter and could have been a possible cause for lower product strength. A basis for evaluating amosite asbestos fiber length and for compliance with a specification also to be worked out is under active negotiation.

Mr. Cryor is also arranging to have amosite asbestos dry milled in either Africa or England for us. All other manufacturers of calcium silicates dry mill their asbestos (we wet grind). Plant trials will be made with the dry milled asbestos as soon as it arrives to determine whether improved product properties are possible.

D. Chrysotile Asbestos

Bauer Milllett tests were run at Granville on 4T and 7D asbestos being used at Berlin. Both were found to be meeting our Purchase Specification as to fiber length.

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5. Alternate High Temperature Insulation Processes

A. Process - New Facility

A comprehensive report is being prepared for Management concerning various processes which must be considered for the new facility and possibly later at Berlin. Various processes, including filter press, bonded aggregate, vertical casting, Crosfield and pan pouring are being reviewed in depth as to advantages and disadvantages of each, capital expenditures needed, throughputs and economics. The R & D report will issue on or about February 15.

B. Crosfield Non-Autoclaved Process

Arrangements were made with the Crosfield people to obtain samples of their product for physical property study and verification and a quantity of their calcium silicate raw material for sample preparation at Granville. As of the date of this report, neither has been received at Granville.

Product Development

1. Stress Corrosion

The second 3,000 pound grind of 2399 glass from Philadelphia Quartz was released to Berlin for plant trials. A series of plant trials was made in January directed toward evaluating the batch formulations developed last summer and fall at Granville. These formulations are expected to produce harder stronger ware and lower batch costs. Samples are being shipped to Granville Product Testing Lab for physical, thermal and stress corrosion testing.

The 10L-STS-1 batch poured on December 28 passed the 6 day stress corrosion test, but was marginal on the 10 day test (3 out of 10 samples cracked). This batch was identical to the one poured and approved last February (1967) by duPont except for the substitution of Philadelphia Quartz 2399 glass for Granville melted 2399 glass. The cause for this variation in results is currently under investigation.

2. 34 Inch Pipe

A substantial percentage of our offware at Berlin is defined as 'short ware'. A request was made last fall to Marketing to change pipe specifications from 35-7/8 inch to 35-3/4 inch and to market a 34 inch product, which could be salvaged from ware with broken corners. Substantial increases in 'packed' ware would be possible if Marketing approved these requests. Marketing rejected the pipe length specification change from 35-7/8 inch to 35-3/4 inch. They did agree, however, to the marketing of out downs (34 inch). This program of salvaging out downs was started in late January.

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3. Asbestos

The experimental program on replacement of asbestos by glass was resumed in January under the direction of Dr. C. L. McKinnis. Difficulty was encountered in dispersing chemically treated glass fibers without attrition to fiber length. Ways of circumventing this difficulty are now being investigated. In the interim experimental glass fiber Kaylo batches mixed with conventional equipment are being run to check the resistance of these chemically treated fibers against the corrosive action of the Kaylo batch.

4. Multi-Temp Pipe Fittings

R. F. Shannon and A. S. Kevlin, of I and C Marketing, met with Insul-Coustics on January 17 for purposes of reviewing the technical aspects of producing Multi-Temp pipe fittings. A detailed report will be prepared by Kaylo R & D covering the Multi-Temp process. Tentative plans call for Insul-Coustics to buy basic wool from OCF, mold to shape, saturate with the OCF developed inorganic saturant, dry, trim and package. The fittings will be marketed by OCF.

5. Careytemp

A report of R & D findings as to asbestos content of Careytemp was prepared and released to Marketing. It is surprising to note Careytemp contains almost as much asbestos as Kaylo, yet their boxes do not carry any warning label and no mention of asbestos appears in their literature.



R. F. Shannon

RFS/ris

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Mr. R. A. Grant, Toledo

November 1, 1967

R. F. Shannon, Granville

Mr. M. Hardick, Berlin

Mr. J. Halser, Berlin

Mr. J. Margata, Berlin

Mr. J. Marzano, Bousar

Mr. R. J. McElroy, Granville

Mr. J. Rhoads, Berlin

Mr. H. V. Smith, Toledo

Central Files

RAYLO RESEARCH AND DEVELOPMENT
MONTHLY REPORT FOR OCTOBER 1967

This report summarizes major process development activities carried out in October by the Raylo Research and Development Laboratory in cooperation with Berlin plant personnel in support of plant operations. It also briefly summarizes the status of Marketing supported Raylo product development programs.

Process Development

1. Process Audit

Per an agreement between M. Hardick and the writer, auditing of the plant process and operation by Raylo R & D personnel is being continued. Each time R & D personnel are in the plant for process meetings or to conduct experimental runs, auditing of all or various process and manufacturing areas are being carried out on 'as time permits' basis. Audits were carried out during the weeks of October 16, 23 and 30. Conditions or procedures, which are affecting productivity, quality or job efficiencies, were called to the attention of the plant Quality Control and Process Control Manager for follow-up.

As part of the follow-up of the July-August audit, Berlin requested R & D continue their plotting of plant production data, including physical and thermal properties, offware and job efficiencies. Trends over a five year period were plotted and submitted to Berlin management personnel for study and follow-up. It is hoped these data will permit better process control, as well as knowledge of gradual changes as they occur in the process or product. When adverse trends begin to show up, adjustments in the batch or process can be made immediately.

2. Plant Expansion

Attended a process meeting at Berlin on October 26 at the request of M. Hardick. The purpose of this meeting was to set up a task force of plant, Toledo Engineering, OP Methods Engineering and Raylo R & D personnel who will work toward the objective of increasing plant throughput at least 20 percent. The increased throughput to be achieved on two pouring lines with capital expenditures limited to two additional cylinders and costs of modifying the existing lines to handle the greater throughput.

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November 1, 1957

In support of the task force a search of the records was made to locate a 1953 proposal to build a pipe covering manufacturing facility at the Sayreville plant by OI. It was hoped some of the ideas contained in the Sayreville proposal might be adaptable to the Berlin operation. Copies of the report were submitted to A. Martinez and R. Erdreich for study and evaluation.

A meeting was held at Greenville with GE Methods Engineering to discuss expansion plans in general and R & D objections and suggestions to C. Ritter's initial layout of the proposed plant expansion, which includes a third pouring line, extra driers and relocated fixtures and pipe finishing lines.

3. Wayle Offware/700 Pound Dust Batch

Five thousand pounds of Wayle offware were converted to Wayle dust at Jeffery Manufacturing. This dust was reshipped to Berlin for plant trials on the 700 pound dust batch. Initial plant trials using a combination of 400 pounds of regular plant dust and 300 pounds of Jeffery handcrushed offware loss exceedingly good. Plans are now to run a full shift of this batch composition. If no process or product problems occur, the plant will initiate a 90% for the facility to convert offware to dust. The 700 pound dust batch represents a savings of about \$10,000 per month in batch costs and substantially reduces the disposal and dump problems at Berlin.

4. Assistance To Glass Technology

Provided extensive briefing of Glass Technology and Glass Research personnel at request of Dr. F. Day, so as to acquaint them with the type of raw materials, process of manufacture and type of products produced at Berlin. The objective of Glass Technology is to eventually provide process control assistance to Berlin.

5. 17 Core

For some unexplained reason compressive strengths of 17 core poured from cement modified batch is considerably below minimum set in the C/S. Extensive research was conducted at Greenville. No answers as to why the strengths are lower or how to solve the problems have been obtained to date.

6. Wayle Facility - Georgia

Prepared cost study of manufacture of Wayle in small facility. Data requested by Fiberglas Canada via our Licensee Department.

7. Raw Materials

Several meetings have been held with DicoLite personnel. Efforts are continuing toward upgrading performance of DicoLite in Wayle batch. Currently DicoLite is not the equivalent of Celston R-370 and is not approved as an alternate source of distillaceous earth for Berlin.

November 1, 1967

Product Development1. Stress Corrosion

Manufacturing placed an order for 250,000 pounds of 2377 glass with Philadelphia Quartz. This will produce 1.83 million pounds of STS Laylo and will permit us to complete extensive test marketing and process debugging studies on the STS product. Target date for delivery of the 2377 glass is November 15. At the request of Toledo Purchasing and GP Manufacturing, Laylo R & E prepared the purchase specification for the 2377 glass.

Optimized stress corrosion batch formulations, developed during the past three to four months, were poured as pipe and as block for physical, thermal and stress corrosion testing. Initial data indicates these formulations will yield a substantially stronger and harder product. Samples were submitted to Product Testing Lab for thermal property evaluation and for compliance with de'ont's 6 day test procedure.

2. Replacement of Asbestos

A number of resinous coated fibers were evaluated in October as replacements for asbestos.

- A. Samples reinforced with rubber coated glass fibers were submitted to Product Testing Lab for testing on hot pipe for survival at 1200° F for 96 hours.
- B. Samples of Laylo pipe reinforced with Lotal latex coated glass fibers, plus a small amount of chrysotile asbestos to prevent mud cracking, were poured and submitted to Product Testing Lab for hot pipe testing.
- C. Attempts were made to prepare Laylo insulation reinforced with Chem Lab prepared epoxy coated glass fibers. The fibers caused a major problem of mixing in that they were too flexible and balled up in the mixer. Stiffer fibers with higher epoxy contents will be produced in an attempt to overcome the mixing problem.
- D. Phenolic coated glass fibers obtained from the group working on molding compound were also evaluated in Laylo. The fibers coated with about 0.25 percent phenolic and chopped at the bushing did not survive autoclaving. Arrangements are underway to have fibers coated with a higher percentage of phenolic resin prepared for us. They will be evaluated for survival in the autoclave.

RFS

R. F. Johnson

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