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PABCO INSULATIONS STORY
as seen through the eyes of H. P. Hoopes

I came to Berkeley in August of 1931 to complete my chemistry education at the University and to find a job to feed and keep the rest of my body. I went to work as a laboratory assistant at 45¢ per hour (5¢ more than minimum because of being in the laboratory) for the Paraffine Co., which after five name changes on my paycheck ended in the present name of Fibreboard Corp.

My insulation career began in 1946, working through Irv Hovgaard and Sam Abrahams, the latter of whom reported to the Vice President of Plant Rubber and Asbestos Co., Mr. R. H. Chase. The Emeryville plant started production in November, 1941 as Plant Rubber and Asbestos Co., who had their start in 1917 in Redwood City, developing a process of recovering a suitable magnesium carbonate using the bittern, the residual solution from the adjacent solar harvesting of salt from sea water.

The actual date is obscured, but most accounts place the beginning of "85% Magnesia" insulation in the 1880's, since the patent for it was granted July 20, 1886.

The "modern" process by the 1920's for making Magnesia was a pan-molding steam-setting of basic magnesium carbonate as we did in Redwood City or as a filter press process. All slabs and half sections or segments made thusly required milling to final dimensions having dry density of 22-26 lbs. per cubic foot and a milled loss of 25-30%.

Work was started at Research, Redwood City in the 1930s to refine and chemically control the final basic magnesium carbonate by forming an intermediate step of a needle-like crystal of magnesium carbonate trihydrate. This was successful, and a light density precision molded final product could be produced. The engineering firm in San Francisco of L. S. Rosener built the 12 mold station Emeryville Plant based on laboratory bench work -- skipping a pilot plant step.

We received 3000 gallon tank trucks from Westvaco at Newark, California of magnesium hydroxide, carbonated the diluted hydroxide in tall conical bottom tanks with 9-11% CO_2 taken directly off the super heat coils of the large boilers of the Paraffine Co. complex. This took about 3-5 hours and at a definite titrated end point we had beautiful crystals about 3-5 μ wide by 10-15 μ long. Batches were mixed with asbestos (and later borax to raise the use temperature limit to 600°F.) and stored in the present "Smith Mixers", weighed into small "smith mixers" above each station, preheated with "live" steam, and then set in the present type molds in a "quiescent" period for 22 minutes. The cycle time started around 26 minutes.

By the time we stopped manufacturing "85% Precision Molded Magnesia" in April, 1966, the volume of sales was so low that it was uneconomical to produce even though we had reduced the complete cycle time to 13 minutes with many processing changes over the original plant operations.

This light density product (11-12 lbs. per cubic foot) was taken almost 100% by the U.S. Navy during the war years for ship work, due to its improved qualities (particularly density) -- in fact they wrote a new class in the specifications just for the product. This made it a proprietary item. By means of a disclosure letter we had each of our competitors in the plant and offered them an engineering license agreement. The competition at that time included the following:

Johns-Manville
Keasby-Mattison
Ruberoid
Philip-Carey
Ehret
Mundet

The last three named took licenses and built precision molding plants immediately after the war was over. The first two went off on their own development programs. It was the late 1950s before either had a light density product. The third never tried to make Magnesia.

Again, in Redwood City and before the Emeryville plant was built, various methods of making a light density diatomaceous silica and/or a lime silica insulation were being explored. No real progress was made until a pilot plant could be built at Emeryville. There is even more chemistry and control need here than in the light density Magnesia. Strange approaches were proposed; i.e., dry mixing of unslaked lime and earth using the heat of reaction to preheat,cold slurry with steam heated fingers preheating the slurry as the fingers were in and out of the slurry. I (with some help) convinced the then president of Plant Rubber and Asbestos that research must present a process for calcium silicate that could be made in the magnesia process equipment--except for induration.

Eighteen months later, in April of 1948, we began the manufacture of Caltherm for 1200°F. use. By May, 1953 the name change to Caltemp came because of a late trademark filing by us. (Keasby-Mattison had filed Kay-therm earlier but did not get into production of a calcium silicate until the late 1950s.)

Our two products complemented each other and many jobs had Caltemp inner layer and Magnesia outer layer. Magnesia's death was slow starting but accelerated at a rapid rate toward the end mainly because of distributor-user inventories. There are still applicators today who will swear that "none of the new ones worked as well as Magnesia". Johns-Manville made the last USA magnesia in 1971. It is still being made in England and on the continent.

Probably the greatest impact on magnesia was Kaylo, introduced in 1949-50 by Owens Illinois made at Berlin, New Jersey. With a well-planned "dog and pony" show, they captured the new and younger design engineers, with <u>one</u> product for use to 1200°F.

Calcium silicates had their introductory problems. They were harder to cut or saw, they couldn't be "hammered" over rivets and welds, they didn't hinge, etc. Kaylo had several product failures due most probably to overselling (within four years the entire manufacture and sales was turned over to Owens-Corning). We had two big on-site shrinkage failures in 1956.

Pabco Caltemp high quality could probably best be traced to the intensive work of the four research chemists then in the division, who formed a task force to determine the cause of on-site shrinkage and to eliminate this type of failure forever. It was a dramatic time. Suffice to say the final solution was found to be the lime to silica molar ratio in the product. A control test was devised (and is used today) to routinely determine that Pabco passes and to learn how competition compares -- which is usually poorer.

The following is a list of names of men who have been or are in Insulations Research:

Sam Abrahams
Rube Lewon
Lou Collonge
Royal Mattison
Gus Dinkfeld
O. D. Smith
George Lechich
John Butler
Bill Jacques
Ed Torbohn
Fred Heidl
George Nummy
Max Doss
Fred Karklin
Ollie Brown
Bill Meyers
Sig Cohen
Frank Heil
Jo Ann Dunlap
Charles Miller
Bob Beck
Jim Blair
Jack Weber
Jess Neal
Bob Brown
Bill Kaye
Murvin Frandy
Paul Graham
Bob Lum
Bill Weller
Larry Killoran
Vern Edwards
Bill Riesenberg
Vedat Suer
Harry Hoopes

The operating plant since 1946 has changed considerably. 85% Magnesia (85% Basic Magnesium Carbonate and 15% Asbestos) was being run seven days, 21 shifts per week since it started. I believe one March we produced a record amount of $283,000 List. 18N2½ was the largest pipe size and 2N1 was the fastest moving. We still had a large business with the railroads for steam engine boiler lagging. This was a curved and tapered milled block made at Redwood City. Actually, all milling was done at Redwood City until we shut it down, January, 1957.

Probably the earliest process change was from 100% chrysotile asbestos to 100% amosite. This took about two years and improved the quality and heat soaking performance. Starting with a grade known as M-1, we "suffered" through the war with many variations requiring special processing equipment until 1968, when we began the use of an opened and graded SK fibre processed in South Africa. By 1969, this was pressure packed and flatted in water repellant coverings.

The following is a list of foremen and quality control men in the plant, both now and in the past:

<u>Emeryville Foremen</u>
John Peretti
Fred Heidl
George Mummy
Paul Ross
Benny Maes
Nick Simatovich
Harry Deahl
Dick Smith
Lyle Brown
Al Oliver
Larry Killoran
Bud Halverson
Mike Parker
Ray Ringgenberg
Lyle Gibe
Tom Clancy
London Evans
Mancie Herring
Lou Gavazza
Jim Morgan

<u>Quality Control Men</u>
Larry Killoran
Bob Beck
Bill Parks
Ray Fox
Ray Ringgenberg

By the time Caltherm (Caltemp) came along we had some major building changes. The second and third floors extended about 40 yards East and the first of four batching systems was built. This was a tank and a tube directly above the East Smith Mixer. This system was replaced by the two tank stand-by system still present.

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Then we developed the cut-off carbonating tank moving system into the East "Magnesia" mixer. Finally, we have the present flow-cycling system in 1971. This would be a good time to name the maintenance engineers who are or have been in the plant. They are the following:

John Cunha
Warren Coolbaugh
Earl Spotswood
Bill Kaye
Bruce McNay
Vern Edwards
Bill Reisenberg
Ken Cahill
Larry Spencer
Jay Neyland
Bud Courtney

By the time R&D had been able to formulate Caltemp to meet 1350°F. (vs. 1200°F.) and finally 1500°F. "voices" began to be heard of health hazards due to asbestos in the bodies of workmen. Asbestosis, like silicosis, has been accepted by most states as a compensatory disease for many years, but now plaintiff attorneys were beginning "third party" suits claiming that the manufacturers of insulations should have warned the workers that they were handling a hazardous product. Most recently O.S.H.A. has issued and revised its famous paragraphs beginning with Title 29 Part 1910 on the subject.

In the meantime and with 1350 Super Caltemp we were awarded DuPont's stamp of approval for their inhibited calcium silicate type 102.1 We had always complied with their general specification 102.0, a regular calcium silicate, but this gave us an entry with our regular production to all DuPont jobs. Our licensee, Ehret Co. (now Keene Co.), was also approved. Neither Johns-Manville regular Thermobestos or O.C.F. Kaylo would meet these stringent requirements of not only having a high water leachable silicate ion but also passing a performance test submitting the insulation to six days against stressed austenitic stainless steel at 210°F. when immersed in water containing 1500 ppm of chloride ion. The phenomenon of halide (chloride) attack is not fully understood and there has been much work done in the last ten years, but DuPont is satisfied that if a calcium silicate insulation contains sufficient water leachable silicate (20,000 ppm minimum with an expected average of 25,000 ppm), it will always pass their rigid performance test.

The military, Atomic Energy Commission, and now Bechtel have written leachable chloride maximums and leachable silicate minimums as well as performance tests for any type of insulation used over austenitic stainless steels. In fact, some branches of the military and A.E.C. are taking the attitude that their purchases must all meet these requirements. The performance tests of the groups other than DuPont are not as stringent as the latter.

Pabco Super Caltemp Type NA is approved for MIL-I-24244, A.E.C., and Bechtel. We expect to have DuPont approval the first quarter of 1973.

In 1962 we extended our licensees to the Chemical and Insulating Co. in Darlington County, Durham, England. This plant today is still making a high percentage of Magnesia but their calcium silicate (Paratemp) has increased by five times since 1963. They pay royalty only on calcium silicate.

We had an interesting period during 1960 in which the three licensees refused to pay royalties on the basis that the original patents had expired. A settlement was reached based on a brief filed by Marion Plant of Brobeck, Phlegers & Harrison, attorneys, as a result of our joint visit to the Philip Carey plant which showed they were using an active patent. The revised agreement spelled out the patent coverage with the licensee's right to accept or not use any new patents issued to us.

Induration of calcium silicate is necessary. Our molds are open to atmospheric pressure and are jacketed with moving hot water at 210°F. During the quiescent period in the mold a gell is formed sufficient conversion of the lime and silica to make a handleable form or shape. Temperatures of around 400°F. or higher are necessary to complete this reaction to the final calcium silicate monohydrate. This can only be done in an autoclave type vessel. (As we began plant experiments, the men corrupted the word "indurate" to "indurator" thereby ignoring the technical name of autoclave.)

Raw material, formulation, and process changes have allowed us to maintain quality of the finished product and drop the time at 200 gpsi (386°F.) to three hours from twelve hours (for the first experiments).

As asbestos shipped to us became processed and classified at the plant in South Africa, we began to be able to reduce the percentage in Caltemp from approximately 12% by weight at the start to approximately 6% by the time we stopped using it in September, 1971.

There are many reasons why Pabco--a long way from the major eastern markets--has been able to compete in a market dominated by the two large volume manufacturers, Johns-Manville and Owens Corning Fibreglas. Service and ingenuity. In the mid-forties and fifties when Mr. R. H. Chase as general manager of Plant Rubber and Asbestos began establishing the E.S.U. (Engineering Service Units) principle throughout the midwest and eastern seaboard, service and quality were his two main selling points. Service, specifically meeting a promised delivery date, was almost unheard of by distributors. If a distributor could be convinced to try our "new light weight Magnesia", Rube gave them a promised delivery date--and we met it. From that point on we might give long or short delivery dates, but we met them; and most important, the customer was ours. We had E.S.Us in Cleveland, Boston, NewYork, Philadelphia, and Raleigh, North Carolina--with the North Brothers distributing and applying our products throughout the southeast. We also expanded throughout the midcontinent and west where we are presently marketing.

The second factor of ingenuity which helped expand our insulations revolved around patents, packaging, and shipping. As mentioned, our original process and product was patented and subsequently licensed, but royalties were continued by subsequent patents on calcium silicate process and product and by equipment patents that have continued royalties through today. These include the patents on Removeable Mold Liner, "spider" or Open Core Plug, Chrysotile and Fibre Glass for Amosite Asbestos, Rubber Cone Preheaters, and Calquartz (for sodium hydroxide). I have just learned that our asbestos-free formulation and process patent will be issued.

No other insulation manufacturer has protected his packaged product with the care of Pabco. Being a friable product, calcium silicates need not only ingredients of a nature to hold them together during handling, but the package must be able to withstand the shock of rough treatment all along the way until it is in place on the job. Tubes in cartons to "solidify" the pack were first used by us. All of the rail car shipments leaving the plant have at least two gates in them which divides a full car into three cars for minimum damage in transit.

Well, the job that began in 1931 for me is coming to a close, but the work and new problems will continue in good hands. Two things are now accomplished that mean very much to me. A 100% acceptable asbestos free Pabco Super Caltemp with patent coverage is first, and the second is Du Pont 102.1 specification approval of our product for use on austenitic stainless steels.

Finally, I hope the log is kept up to date for use and background of the present and future managers of our division.

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