INTER-OFFICE MEMO **TENNECO CHEMICALS, INC.**

TO	Mr. J. Fath	AT	Piscataway	DATE	July 13, 1972
FROM	Dr. P. A. Lobo	AT	Piscataway	COPY TO	
SUBJECT	JAPANESE TRIP - June 24 - July 8, 1972				

The following summarizes the major results of my recent trip to Japan:

PVC Reactor Technology

In meetings with seven Japanese PVC producers, Sumitomo, Kanegafuchi, Denka, Mitsui Toatsu, Sekisui, Nippon Zeon, and Shin-Etsu it was determined that only the latter company is operating suspension reactors above 13,000 gallons in size. Shin-Etsu's plant, comprising seven 34,000 gallon stainless steel reactors, has a capacity of 175,000 tons per annum and has been operating for over a year.

The Shin-Etsu technology also includes a special technique which eliminates manual reactor cleaning as well as radical new developments in dryer design. Preliminary evaluation of their resins has shown them generally comparable to our polymers. As a result of a visit to their plant, I feel their plant construction and computerized control system are highly sophisticated and that we must seriously consider their technology for our proposed PVC plant.

The PVC industry in Japan has an average reactor size above that of the U.S. and may be ahead in the application of computer control to PVC plants. Essentially, all the firms I met with either already had complete plants under on-line control, or were testing the concept in their plants. Techniques in reactor cleanings seemed at a par with those in the U.S. with high pressure water generally utilized.

PVC Paste Resins

Four companies expressed a keen interest in licensing us their know-how for the production of paste resins, Sumitomo, Shin-Etsu, Mitsui and Kanegafuchi. Sumitomo has already licensed Allied and Stauffer in this country and Firestone produces dispersion resins under license from Kanegafuchi.

It appears that anyone of these processes might readily be adapted to our existing 3700 gallon glass-lined reactors at Burlington. I have requested samples of these resins be air-mailed to us and will send additional details to the Japanese companies on our reactor design so that we can determine if a viable project can be developed at an early date.

Polyvinyl Butyral

At a meeting with Sekisui, the sole manufacturer and fabricator of polyvinyl butyral in Japan, the Sekisui people informed me that as yet they had not made a decision on licensing their technology in the States. They suggested we continue to work with

their New Jersey representative as it may be six to twelve months before a policy is formulated. Sekisui is currently building a plant in Mexico in association with a Japanese partner.

PVC Purchase

During meetings with PVC producers and the major Japanese trading companies, our 1973 requirement for 10,000-15,000 tons of general purpose homopolymer was reviewed. At the present time PVC production is curtailed at 75% of capacity by the PVC cartel in an effort to raise domestic prices. Exports are controlled by an export cartel which sets export quantities for individual companies. Compounding these difficulties are the future uncertainty of the value of the Yen in relation to the Dollar.

Several companies felt they might be able to export to us outside the control of the cartel since we are a producer and would use the material internally. This circumstance would minimize, if not eliminate, any danger of dumping charges. Samples of PVC homopolymer will be mailed to us for our evaluation by potential suppliers and several companies agreed to determine immediately from the cartel if direct export was possible.

Impact Modifiers

Kureha and Kanegafuchi were not interested in a meeting to discuss possible licensing of their impact modifier know-how at this time. Consequently, a meeting was arranged with Japan Synthetic Rubber who produces products reported to be competitive to those of Kureha and Kanegafuchi. Samples will be air-mailed to us for our evaluation. Additionally, it was determined from the Nissho-Iwai people that they are in the early stages of marketing Mitsubishi Rayon's impact modifier in the States. Samples will be requested from Nissho's New York office.

Dye Technology

Meetings were held with Mitsui Toatsu to obtain additional information on the structure, manufacturing process and cost of the three Mitsui disperse dyes which we are interested in producing in the States. The Mitsui people are willing to work with us on an exclusive basis in the disperse dye field, and as an indication of this interest will send us five of their dyes just developed for our evaluation. I am highly optimistic that this association will be of great value to us in the long-term.

I also met with Daito, Nippon Kayaku, and Sumitomo, three other leading producers of disperse dyes, however, as developed earlier - their technology is not available to us, or uncompetitive in the U.S. market.

A meeting was held with Hodogaya, the acknowledged leader in the cationic dye field in Japan. We have been marketing limited quantities of Hodogaya's dyes for five years, however, recent revaluation of the Yen has made this virtually impossible. Hodogaya has excess intermediates capacity and is anxious to export intermediates to a U.S. firm for conversion to the finished dyes. This opportunity is open to us if we so desire. As forecasts for cationics are bullish, I feel we should consider their offer seriously.

Dye Intermediates

Contacts were made with the major trading companies, Mitsui and Sumitomo Shoji as well as Sakai and the dye firms mentioned above, to determine the availability of intermediates of interest to us. In general, disperse dye and acid dye intermediates will be critically short in 1973 because of poor forecasting. Consequently, it may be difficult to obtain even the small amounts currently purchased. I believe that the personal contact in Japan will be of benefit in giving us some preference on future purchases. Efforts to obtain H-Acid and Isatin for immediate shipment were unsuccessful.

Para-Hydroxybenzoic Acid

Discussions were held with Mitsui Toatsu and Uneo's sales representatives, Kanematsu-Gosho, as to the status of para-hydroxybenzoic acid in Japan in view of our current requirements. Uneo's has 5000 tons per year of capacity via their continuous process with Mitsui's capacity of 180 tons/year with export capability of 100 tons per year. Evaluation of samples of both products by manufacturing is either underway or scheduled.

Stabilization of Formaldehyde

Mitsui Toatsu has received a U.S. patent covering a novel stabilizer for formaldehyde which is reportedly better than currently used by most formaldehyde producers in the States. They will send us a sample for our evaluation and have indicated an interest in licensing this technology, if we should so desire.

Heat Stable PVC

In a meeting with Nippon Zeon, samples of their thermally stable PVC were requested and will be sent us. This is a new product which supposedly requires less stabilizer, so that the more expensive non-toxic stabilizers can be used at little or no increase in cost. Nippon Zeon is still evaluating their product's market prospects in Japan and hence, has not decided on a licensing policy.

Newport Division

At the request of the Newport Division, inquiries were made to determine the availability of technology for the manufacture of l-menthol. Although it was not possible to definitely confirm Glidden's acquisition of Takasago's know-how in this area, there may be a possibility of obtaining similar technology from Nippon Terpene.

Sanyo Chemical produces a line of resins based on dimer acids which are similar to General Mills' products. Newport's interest in following up in these two areas will be determined.

Licensees

Visits were made to the offices of Harima-Kasai and Kikuchi Pigment as well as Harima's plant near Osaka. Although the latter facility is relatively small, I was impressed by the enthusiasm and interest of Harima's operating and technical staff. They are currently evaluating synthetic acids for dryer manufacture and are making efforts to produce zirconium-base driers. Unfortunately, the main producer of zirconium carbonate in Japan is a major competitor in the drier field.

Kikuchi Pigment is still having difficulty penetrating the liquid stabilizer market as a newcomer against numerous firms that have been in the business for years. They are just about to start sampling Supercryl 100 to local PVC pipe producers. As Kikuchi has substantial stabilizer business with these people, they are optimistic about selling our product which is reportedly better than Japanese flow modifiers.

Polyols

Meetings were held with four of the major polyol manufacturers in Japan - Sanyo, Mitsui Toatsu, Nippon Soda and Asahi Denka, to obtain additional information on their technology for the manufacture of polyols and to evaluate the extent of their involvment in new product development. Sanyo's personal, product mix and research and application capability are impressive. They recently have licensed their know-how through Scientific Design on a non-exclusive basis to a U.S. firm who reportedly is building a plant. Nippon Soda and Mitsui also have broad product lines and can be considered potential licensors.

Polyol plants of all companies visited are small and considerable scale-up will be necessary to obtain a viable U.S. plant. Scientific Design has apparently done this with Sanyo's process and is willing to guarantee performance in larger reactors than is Sanyo. Immediate steps are to evaluate additional samples of polyols from Sanyo, Mitsui and Nippon Soda, including polyols imparting flame retardancy to the polyurethane, and to further define project economics.

Kanematsu Gosho

A meeting was held with our agent for specialty chemicals, colors and lubricants in Japan, Kanematsu-Gosho. They are making good progress with the Anderols having sold as much in the first six months of 1972 as in all of 1971. This firm also handles drier sales for Harima.

I believe the trip was highly successful in moving our licensing of disperse dyes ahead and in determining the present status of PVC technology in Japan. Also, the contacts made with PVC producers and intermediate manufacturers should assist us in our purchases of these materials during next year. Detailed reports of my meeting with the various companies in Japan are available should you desire additional information.

P. A. Lobo

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