Monsanto

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SUBJECT : International Electrotechnical Commission 10B, Brussels Mtg.

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Electrical Grade Aroclor 1242

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I. IEC Commission International Power Factor Specification (Delivered to the Customer)

Bayer (Germany), Prodelec (France) and the delegates from all other countries except the UK did not bat an eye lash over their recommending a 1.5% max. power factor for Aroclor 1242 at 60 Hz and 90 C delivered to the customer. The UK sought a higher limit at 3% and as chairman of the committee I avoided submitting a proposal on behalf of the USA, prior to our meeting.

However, the USA and the UK were able to get the committee to allow a 2% power factor max. at 60 Hz and 90 C delivered to the customer. The UK and the USA delegations appear the only ones in trouble with power factor problems.

A practical commercial example giving adequate insight into Monsanto's problems is the following analysis of our situation in Sweden.

II. Capacitor Aroclor 1242 - Sweden -- An Analysis of Monsanto's PF Troubles Delivered to the Customer

Liljeholmens are the sole large user of capacitor Aroclor 1242 in Sweden. They buy 400 tons (800,000 lbs.) per year, mainly from Prodelec. Liljeholmens lacks confidence in Monsanto. They give us only a minor portion of their business.

Liljeholmens allow a max. power factor of 1.5% at 50 Hz and 100 C for any one shipment and expect their suppliers average shipments to not exceed 1.0%.

Newport's readings on our material packaged in aluminum 2.5 ton tote bins ready for shipment to Liljeholmens have been mostly in the range of 1.3 to 1.5%.

Liljeholmens readings on receipt of our material ranged from 0.3 to over 3%. They rejected and returned 4 out of 15 shipments or 27%. On receipt of the returned shipments Newport got power factor readings around 12%, confirming Liljeholmens contention of poor quality.

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By contrast, Prodelec have had 100% acceptance of their Aroclor 1242 shipped in tote bins made of steel with an aluminum liner.

As packaged ready for shipment Prodelec read power factor levels of 0.2% to 0.3%. On receipt of the Prodelec material Liljeholmens obtained readings ranging from 0.3 to 0.5% which are well within their requirements. These values are about 5 times below our values as shipped and up to 40 times below our readings on the shipments rejected and returned to Monsanto.

This reflects ample proof that Monsanto's aluminum tote bins are not suitable. We now seek to ship Liljeholmens a stainless steel tanker, provided that Liljeholmens will accept such a large quantity from us.

At this point we refer back to our IEC - 10B commission meeting. The delegates from France and Germany who recommended a 1.5% power factor but finally agreed to a 2.0% level would have caused the delegations from the UK and USA (representing Monsanto's interests) even further embarrassment by insisting on a value well below 1.5%, if they wished to do so.

We feel fortunate in getting the 2.0% level because we are also worried about the quality in Monsanto's drums, shipped worldwide to users who have purchased competitively. The concensus is that the power factor of Monsanto's material is inferior to Bayer and Prodelec quality.

About four years ago I reported that while Prodelec use a steel drum lacquer lined, similar to ours, they rinse and clean their drums. Bayer use a drum with a special zinc coating and emphasize that not all zinc coatings are satisfactory. Bayer also rinse and clean their drums. Today these people do the same things and appear free from power factor trouble.

In the interim we learned that high quality power factor Aroclor 1242 remains good when aged in our drums that have been rinsed and cleaned with good quality Aroclor 1242. However, we do not rinse and clean our drums except at MMK. (However, the latter are in trouble over the thermal stability of their power factor vs. Kaneclor 300. This is another subject that plagues Monsanto about PF.)

III. Possible Air Contamination

Dr. Munch found that as little as 1 ppb. of HCl has marked adverse effect on the power factor. Whether at Newport or at WGK all of us have concern about possible

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air contamination regarding sampling, packaging, analyzing, etc. Because of this it is encouraging to note that Newport expect to have their in-line cell operating shortly and will attempt a closed loop filling of containers, circulating through a Porocel column to achieve the best possible power factor. This value as packaged has been assigned as an internal goal of 0.1% at 50 Hz and 100 C. It must be noted that this related to the Munch procedure which gives readings 4 or 5 times lower than by the procedure formerly used at Newport. Newport believe that the difference lies mainly in the cell cleaning.

IV. Pollution

The delegate from France who is the technical representative of Prodelec said that through Europe and even in Sweden where the Government is more concerned than elsewhere -- the pressure against Aroclor regarding pollution is coming mainly from Monsanto. He does not share our views and said that Prodelec does not intend to stop sales to non-electrical outlets. Bayer's technical representative also indicated feeling that the pressure is mainly from Monsanto's actions but conceded that eventually it may go this way.

We give these comments as a prelude to the following analysis and reasoning applied to the situation in Sweden, by Prodelec.

Liljeholmens use 400 tons/yr. (800,000 lbs.) Aroclor 1242 for capacitors. Liljeholmens export 50% of the finished capacitors. Service loss of the capacitors is one per 1,000. They use 500 kilo of Fuller's earth, which gets discarded in a land-fill. This carries with it 500 kilo of Aroclor 1242. Scrap Aroclor 1242 is returned to Prodelec. Liljeholmens generate 8 tons/yr. of wiping rags and scrap winding materials, also put into the toxic dump.

Analysis

100 kilo Aroclor 1242 in failed capacitors
8,000 kilo Aroclor 1242 in rags and windings
500 kilo Aroclor 1242 in scrap earth

8,600 kilo Aroclor 1242 into environment

Now Prodelec stated that this 8,600 kilo of Aroclor 1242 contains not over 86 kilo of pentachlorobiphenyl and no hexa chlorobiphenyl. Also as virtually no transformer askarel is used in Sweden the Prodelec analysis indicates that the electrical industry puts only 86 kilo or 190 lbs/yr. of the higher chlorinated PCB into the environment in Sweden.

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While this appears as an interesting analysis of the pollution situation as basis for Prodelec's view, it also reveals that Prodelec's normal Pyranol 1499 (Aroclor 1242) does not contain over 1% of the higher chlorinated PCBs. As this is very interesting we asked what the normal composition is. The reply was that in general terms: "no more than 1% penta, no detectable hexa, 25% quarter, 50% tri, 25% dichlor and traces of mono chlor".

Monsanto needs to confirm this. If this is correct, then it appears that Prodelec with their long existing normal Pyranol 1499 (Aroclor 1242) have long been just about as far along as Monsanto expects to attain with our MCS 1016 relative to alleviating the PCB pollution problem.

If this is correct then Prodelec must have been fractionating all along. This would also account for their ability to offer commercially Aroclor Type C1B for which we documented specifications at our IEC-10B meeting in Brussels. This is Pyralene 1500 which is obtained by blending 70% trichlorobiphenyl with 30% dichlorobiphenyl consisting of 2,4' dichloro and 2,2' dichlorobiphenyl isomers.

Thus acquisition of a fractionating column should allow Monsanto to catch up with our competition to make new Aroclor products improve quality via better control than possible with our simple take-over distillation and of course put us into a better stance relative to the pollution problem.

It is also known that Bayer uses a different catalyst than our iron chloride.

V. Competitors Situations on Avoiding Pollution

Regarding the latter certainly Bayer have been incinerating for a long time, even up to 1200 C. If needed they can also incinerate on a boat in the North Sea. Bayer also reclaim transformer Askarel. Bayer feels that Monsanto is creating most of the pressure against PCB. In any event Bayer will not take precipitous action and will not withdraw PCB for non-electrical uses unless and until they have had time required to present completely suitable replacement products to their customers.

Also Prodelec are able to incinerate and have long reclaimed even arced transformer askarel, in amounts as large as 800,000 lbs/yr. or 10% of their annual sales. This has done much to close the loop on higher chlorinated PCB relative to the pollution problem. We have no

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facilities for reclaiming arced transformer askarel. In the USA this has been largely dumped.

VI. Summary

A. Monsanto needs to resolve our power factor problems because they are causing us to lose sales in International competitive areas.

B. Monsanto's package problems, exclusive of tankers, have long been pointed out. Newport has the cheapest possible aluminum tote bins, proved unsatisfactory and cause of power factor trouble.

C. HCl and other plant air pollutants also cause PF contamination and there is evidence that this even caused contamination during sampling to the extent of appearing in the Thermal-Chemical Stability test.

D. Thermal-chemical stability contamination of amazing levels, causing much trouble, has been traced to the sampler wearing HCl and pentachlorophenol contaminated PVC gloves.

E. Newport has been operating at near or over believed capacity to fill orders. Historically when this happens it spells trouble with quality. Now Newport will be at 50% capacity and should have time to handle quality problems.

F. Samples of Bayer and Prodelec Aroclor 1242 are being sent to Dr. Munch to check thermal stability of power factor, a deficiency of all Monsanto Aroclor 1242 vs. Kaneka 300.

G. These samples will also allow probe of competitions level of higher PCBs in Aroclor 1242 relative to the PCB pollution problem. On this I gave Prodelec views that they are not contaminating Sweden.

H. Our findings are expected to help justify the money to be spent for a fractionating column which is probably something we should have had years ago to bring Monsanto quality up to competition levels.

I. Our competitors do not have the troubles that we have with power factor problems. Fortunately at IEC-10B we were able to get our competitors to go along with a more liberal power factor International standard than our competitors would have set.

J. Our competitors do not feel Monsanto's problems over PCB pollution. This may come later but now and in

the foreseeable future they do not appear to plan to discontinue their non-electrical sales.

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