EIPC-EBFRIP SEMINAR, LONDON 21ST JANUARY 2010

This very well-attended workshop was organised by EIPC with EBFRIP to bring an awareness of the potential problems that could be brought to our industry by a revision, or recast, of the RoHS Directive with regard to halogenated flame retardants. Held at the offices of Intellect in Russell Square London, the workshop was opened by **Dr. Konrad Wundt** who welcomed everyone and thanked them for getting into the city for a prompt start. The controversy of the future use of FRs such as TBBPA (Tetrabrom bisphenol A) continues, even though risk assessment procedures were completed 8 years ago, and the scientific committee of the European Commission decided that TBBPA may be used without restriction. TBBPA is used as a flame retardant in more that 80% of the circuit boards manufactured in Europe, and has been used without any problems for many years. It was his aim that the electronics industry and its suppliers should be free to use halogenated and/or halogen-free materials for technical reasons, not for political ones. The conversion to halogen-free and/or bromine-free resin systems would incur high costs, and take several years/ The problems of another well-meaning but naive EC initiative, 'lead-free' are well-known and we live with them still.

Mr Iain Nicol from the Department of Business, Innovation & Skills gave an update on the RoHS recast negotiations in Brussels. Why did the Commission propose the recast? The original directive 2002/95/EC commits the Commission to review with particular reference to consider the inclusion of Categories 8 and 9 (medical devices and control and monitoring equipment) and the need to adapt the list of restricted substances.

The scope of the RoHS Directive is now defined more completely in the RoHS Directive itself rather than in the WEEE Directive. There is no change to the list of restricted substances listed in the RoHS Directive, but there is a list of four substances to be reviewed by comitology procedure to establish whether they should be added to the restricted list.

The criteria for determining whether the use of restricted substances should be permitted in particular applications have changed and now allow for socio-economic aspects to be taken into account, but with a 4 year maximum validity for exemptions. European Parliament started their own discussions in November and has a timetable which sets 24 Feb 2010 as the Environment Committee deadline for amendments, then an Environment Committee vote during April.

Jill Evans, a Plaid Cymru MEP, with 'Green' credentials and persuasion, published a draft report on 16 November which was subject to an initial discussion by the Environment Committee on 1 December. While some MEPs expressed support for the draft, many expressed concerns, including the need for further information on substitute substances. The Commission maintained their position, however. This suggests that the period between now and 24 February is an important period in terms of contacting and influencing Environment Committee MEPs. Here the work of EBFRIP is essential. Some other dates include **April 6-7**: where there will be an Exchange of Views on

Amendments in Environment Committee; **May 4**: A Vote in Environment Committee, and by June **15-16**: A Vote in Plenary. So little time, so much to be done.

Looking at the changes being brought about by the EC in this matter, **Dr. Phil Hope of CEFIC** in Belgium spoke from the perspective of the chemical industry. When legislation is 'recast' by the powers that be, a great deal of extra work needs to be performed by the industries concerned. His body, the European Chemical Industry Council, is based in Brussels, and employs 140 people looking after the interest of their members. They also work downstream with their members users, such as the electrical and electronics industries, to address deselection and substitution of chemicals used in that sector, namely E&EE of which EIPC is a member. There are three players in this scenario: the European Parliament, The European Council, & The European Commission. The Commission, through the DG Environment, commissioned the Öko Institut to review the list of RoHS substances, who initially reported that no changes were needed, but then made a new Annex (III) of substances for review, which included

- TBBPA
- HBCDD
- DEHP, BBP, DBP
- MCCP
- SCCPs
- Nonylphenol and nonylphenol ethoxylates
- Organobromine & organochlorine compounds
- PVC

Denmark pushed for inclusion in Annex 4 the addition of brominated flame retardants, chlorinated FRs, PVC, etc. CEFIC wanted some consistency in legislation, to avoid duplication of procedures and criteria, with assessment using appropriate expertise, and they believe that Annex III will cause unnecessary administration costs, and acts as a de-selection list. They want consistency with REACh, which applies to E&EE, and they feel that legislation should be defined by co-decisions, with substance restrictions decided by comitology* with scrutiny.

Plastics Europe have cogent views as well, they say that the plans are not aligned with REACh, that the Öko-Institut report says that no robust recommendation is possible on restriction today, and that a restriction on PVC is scientifically unfounded. They add that restrictions on BPA and BFRs should be based on scientific evidence and REACh RA. The scope should remain closed, and the Impact on the viability of SMEs, critically affected by the economic crisis, should be assessed

From the perspective of an E&EE manufacturer, **Malte Becker of Electrolux** spoke about RoHS & REACh. His company is a member of CECED the European Household manufacturing association, of which body he is the REACh member. Last year a meeting of Council confirmed specific differences between RoHS and REACh due to the focus on waste streams. RoHS is chemical legislation, not waste legislation. RoHS is complimentary to Reach. The Evans report wanted to ban immediately BFRs, CFRs, DEHP,

BBP, DBP. By deleting Article 4.7. CECED wants any directive to be based on sound science, including the impact of alternatives, and take into account socio-economic considerations as well as the availability and reliability of alternatives. He outlined their proposals, amongst which is a 2 7month time period for evaluations. as opposed to 'politically nice' time periods set arbitrarily. The European Parliament position is unclear, there are sceptical views about unsubstantiated substance bans, so the outcome remains unclear, but he wished everyone good luck with their discussions.

Michael Weinhold of EIPC listed the challenges for the PCB industry. He wondered if there was a technical or ecological need for halogen free laminates and prepregs? Who is in the driving seat: technology or politics? Less than 10% of PCBs made in Europe are using halogen free materials, although most mobile 'phones made in the Far East use halogen free laminates. The PCB is under extreme cost pressure, if there is technical reason for a change, that's fine, but is this economical? He reiterated the comment that the 'lead-free' legislation was a classic example of where legislation is imposed which is not based on scientific evidence, and which offered no advantage for industry whatsoever. In the world of soldering, silver is causing more problems than lead ever did. Surely a decision as to what materials should be used should be made by the industry and end users, and not by politicians.

Mr. K Kannah of Chemtura Manufacturing, is Vice-Chairman of EBFRIP. He introduced EBFRIP, which comprises Albermarle, Chemtura, and ICL Industrial. TBBPA is used in 90% of all PCBs, and TBBPA is the most researched flame retardant and offers several advantages to the designer and fabricator, with reliable mechanical and thermal performance, giving good loading rates etc. It meets stringent fire safety requirement such as UL 94V-0. It has no nasty connotations, and is not a SoVHC as far as Reach is concerned. It is toxic to aquatic environment, but offers no risk to health, and there is no restriction on use, nor any need for substitution, and there is no danger from waste products and their combustion. So it was a great surprise when the Öko institute decided that it should be included under the scope of RoHS. There was no scientific evidence for this, none whatsoever, and Öko have admitted to this. True it was for a short time in Annex 3 but is out now, and now we have a politician proposing a ban of all halogenated flame retardants and compounds including TBBPA. He repeated that the European Parliament discussions will lead to a plenary vote in June. It is a real 'dogs dinner' of a situation, Annex 3, EBFRIP state, is always going to be open to misinterpretation A study showed conclusively that brominated flame retardants contained in WEEE plastics can be safely handled in modern household waste incinerators. He reminded the delegates of VECAP = the voluntary emission control action programme which has been implemented by and used by responsible members of industry who optimise processes to minimise omissions. There are no restrictions on TBBPA in the USA, none in Asia, and Japan recognises that TBBPA poses no risk. Is that not enough?

Alun Morgan of Isola Group looked at the difference between halogen containing and halogen-free base materials. Fire safety means fire retardants, as fire kills people, so flame retardants are used to suppress the combustion process. Alun explained how flame retardants are chemically bound to the polymer material. FRs are both additive and reactive. Halogens are five highly reactive non-metallic compounds which include fluorine, chlorine, bromine iodine, and Alun described where they are used in various forms and Halogen free means 'free of halogenated flame retardant'. HF laminates have the same specifications as non-HF free but the values vary somewhat.

Dr. Adrian Beard of Clariant Produkte GmbH is an expert on phosphorous based flame retardants for halogen-free PCBs. Halogen-free laminates account for 8.5% of the market. There are three halogen-free flame retardants – phosphorus based, nitrogen based, and mineral FRs. TBBPA is the current industry standard. Adrian explained how phosphorus based additives can be employed, and a non-halogenated filler has high thermal stability (>300oC), and good eco-toxicological properties. For the PCB industry specifically, they are Exolit OP030 is for rigid boards and Exolit OP 935 for flexible circuitry. They are technically viable, with some pros and cons. PINFA stands for the Phosphorous, Inorganic and Nitrogen Flame Retardants Association and is sector group within CEFIC, the European Chemical Industry Council, and has a common aim of continuously improving the environmental and health profile of flame retardant products.

Dr. Paul Goodman of Cobham Technical Services in the UK was concerned about the impact of restricting organobromines and organ chlorines in electrical equipment. Organ halogens are used in a wide variety of plastics, including PCBs, but why do environmental NGOs demand that they should be banned?

- NGOs think they are hazardous - they are not.
- All organo halogens emit benzofurans and benzodioxins when burnt – partly misleading, but a few do not, including TBBPA.
- Burning halogen free plastics also emits hazardous substances. No.
- Organohalogen FRs prevent recycling of WEEE – not true, Br-FR plastics can be recycled.
- There are suitable alternatives – true, but there is insufficient capacity to replace all FRs.

The reason why they want them banned is that WEEE is recycled in developing countries using dangerous processes that cause death and illness. Some of this e-waste is from Europe. Higher profits can often be achieved by hand dismantling in India rather than smelting in the EU. There are problems with recycling in Asia, China & India, as well as several African countries. China and India have their own waste nowadays, both countries have their own RoHS, and 87% of recycling in India is of domestic products. It would be far better to stop dangerous recycling processes than to interfere at the source where none is needed. In the USA the EPA are studying risks and hazards from PCB recycling, but have some way to go before reporting on their findings.

Emma Hudson from Underwriters Laboratories in the UK explained how the UL can help PCB manufacturers get their halogen-free products to market. UL746E and 796 are their standards for halogen-free materials, which remain unchanged. Testing is based on total halogen content in base materials under Test 2C12 of IEC61189-2. Emma talked in some detail through the various parameters for the CCIL comparisons, and how these were made, in single and multi-layer boards. She gave two options for finding recognised laminate parameters, either the UL Certification Directory (Listing Cards), or the UL iQ Database. Time to market can be reduced if the materials can be added without test, or minimal testing, to recognised PCBs using the UL information on www.UL.com Verify the UL grade designation, as this is not always the same name used by the manufacturer for marketing. Complete a Submission Form prior to requesting a quote, and supply the Information required to evaluate the request and prepare a quote. Request a quote as soon as possible from your local commercial team or via UL's web based tool at www.ul.com/imdquote

Nigel White from Atotech is an experienced surface finishes man, and spoke on processing recommendations for PTH and metallisation for advanced base materials. He described the function of desmear prior to plating, and looked at the different properties of various processes including electroless copper, conductive polymer, or palladium based PTH. He touched on the demands of lead-free soldering where higher temperatures are involved, and barrel cracking which can follow as a result. There are many pitfalls to successful electroplating, so desmear parameters should be established by base material manufacturers or process suppliers. Halogenated or halogen-free laminates are not a problem for Atotech, but should be qualified.

Gavin Barclay from ACS Industries knows all about drilling, and he touched upon some of the considerations to be borne in mind when using halogen-free materials. It's the fillers in the laminate that cause problems for the drill, in life of the drill and the hole accuracy itself. The larger the filler particle, the greater the drill wear. Halogen-free materials are harder to drill, and the harder the material the shorter the drill life, and blunt drills lead to quality issues, as well as slower drill speed in rpm, reducing throughput. So, drill manufacturers are experimenting with DLC (Diamond Like Carbide) coatings which improve performance by making the drill bit harder, but not so hard that it becomes brittle. His company has ULF (UnionTool Lubricant Film) which has very close characteristic to diamond, with excellent film endurance, and good hole quality. Higher hit rates are possible, and the life of the drill itself is hugely protracted. ULF coated drills can make it much easier to drill low-CTE materials, which uncoated drills struggle with.

To wind up proceedings, there was a Panel Discussion, which concluded that the only certain thing to have emerged from the day was uncertainty itself. No one argues that flame-retardancy is a good thing, it saves lives, but there is a strong argument in favour of the *status quo*, which works, has been proved to work, and is supported strongly in the USA, Asia and Japan.

Only in Europe do crusading politicians see that their ‘Green’ label provides them with the unfounded and ill-informed presumptuousness to push for change where none is needed.

It is earnestly to be hope that the powerful chemical industry lobby will be successful in forming the correct opinion amongst MEPs before anyone of them casts a vote which, if it goes the wrong way, could once again burden European manufacturing industry with yet higher costs and delays and further reduce our already weak competitiveness.

J.H.Ling
EIPC.