



## THINGS TO COME

**B**ritish Columbia has had many firsts when it comes to product stewardship. This fall is no exception, as another first is set to come our way.

One of the criticisms levelled at B.C.'s extended producer responsibility (EPR) system is that stewardship agencies charged with managing programs on behalf of their industries are essentially monopolies. So far, the system is one steward for each product category: Product Care for paint, BCUOMA for oil, Encorp Pacific Canada for non-alcohol beverage containers, etc., etc. However, that's about to change.

The way the Recycling Regulation is written, more than one group may be formed to provide stewardship for the same product category. Having approved a plan by Electronic Stewardship Association of B.C. (ESABC) that rolled out August 1st, B.C.'s Ministry of Environment has conditionally approved a second



*Commodore 64*

EPR program for electronics.

The Western Canada Computer Industry Association (WCCIA) will offer a very different program than ESABC. One that relies on a return-to-retail model rather than the depot-drop system established by Encorp on behalf of ESABC.

Another difference is the emphasis on reuse in the WCCIA plan. In theory, a steady stream of used computer components used to rebuild and refurbish systems could become the basis for a whole new secondary industry.

While it will take some time to accumulate sufficient

data from these two programs to make any determination of effectiveness or comparison possible, one thing is for certain: observers of B.C.'s EPR system will have no shortage of issues to discuss in the months and years to come.

Who knows, electronics may just spark a whole new debate. — BM

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### MARK YOUR CALENDAR!



**34th Annual  
Zero Waste Conference  
June 25-27, 2008, Vancouver**

### HISTORY OF THE WEEE (MAN)

The WEEE man is made from the amount of electronic waste an average UK throws away in a lifetime if we keep disposing of products at the current rate. Manufacturers and retailers in the European Union (EU) are now responsible for recycling this waste under the Waste Electric and Electronic Equipment Directive (WEEED) (enacted by the EU). Another EU Directive that works in conjunction with the WEEED is the Restriction of Hazardous Substances (RoHS). RoHS controls the use of certain hazardous substances and requires the substitution of various heavy metals (lead, mercury, cadmium, and hexavalent chromium) and Brominated Flame Retardants (BFRs, including polybrominated biphenyls, PBBs, and polybrominated diphenyl ethers, PBDEs) in new electrical and electronic equipment (WEEE) entering the market after July 2006. There is no reason to believe that in Canada our WEEE per capita is less than in the UK.

### WHY SHOULD WEEE WORRY?

E-waste has become a major environmental concern. Two distinct problems exist regarding WEEE: the volume of computers and related e-waste that is improperly disposed of in landfills, and the toxic nature of both the computer chip manufacturing process and the computer itself as a waste product.

Few studies have reported the health effects of recycling and disassembly operations on worker health. For instance, the impacts of specific operations on worker exposure are not well understood. Sjödin et al. (1999) studied computer technicians at electronic dismantling plants. The study indicated that PBDEs used in EEE, including fully brominated congener BDE-209, contaminate the working environment and accumulate in workers' tissues. Given the threats of these flame retardants and their widespread appearance, including alarming levels in marine mammals, it is essential that research be also focused on how these compounds reach the environment, how they transfer from waste streams to air, water and soil, and how they are transported to distant locations, such as Canada's far north.

### WHERE ARE WEEE TODAY?

Currently, electronics are so prevalent in every facet of society that they are considered to represent the single largest solid waste management problem facing the planet. EEE have relatively brief life spans. For example,



*The Royal Society of Arts WEEE Man*

500 million computers will become obsolete in the US during the period 1997-2007.

WEEE typically contain polymer plastics such as thermoplastics, thermosets and elastomers as well as BFRs. Morf et al., (2005) determined that WEEE accounts for the largest volume of BFRs, in particular, PBDEs, compared to other wastes such as auto-shredder waste. Deca-BDE is still widely used, though restrictions continue to be debated in the EU and North America. Prevedouros et al., (2004) estimated that the flow of Penta-BDE in disposed WEEE in the EU was between 17 and 60 metric tonnes per year during 2000-2005.

### PBDES IN WEEE

PBDEs are used globally as flame retardants. They are considered highly toxic, persistent; endocrine-disrupting chemicals, with potential for long-range transport. In addition, they are regarded as probable persistent organic pollutants (POPs) to be named under the Stockholm Convention, developed in 2001.

One major source of PBDEs in the environment is the plastics industry, in particular plastics used in WEEE. Over the past three decades, BFRs have been incorporated in these plastics. The use of computer equipment in particular has expanded by several orders of magnitude since the 1980s, making e-waste a major likely source of PBDEs in the environment. Although many manufac-

turers have phased it out, some of the BFRs contained in earlier electronic equipment, many older models containing substantial quantities of BFRs are still entering the end-of-life phase.

### WEEE IN CANADA

According to a report commissioned by Environment Canada in 2003 the total amount of end-of-life IT and telecom equipment recycled and disposed was estimated to be about 81,000 metric tonnes in 2002 and about 91,000 tonnes in 2010, i.e., a 12 percent increase over the 8-year period. The 2002 amount was equivalent to 2.7 kg per capita for a Canadian population of 30 million people, 1.1 percent of the total disposed residential waste stream in Canada. In B.C., the estimates of discarded WEEE is 20 000 metric tonnes per year.

### WHAT CAN WEEE DO?

The percentage of BFRs in WEEE is a concern for their ultimate transfer to the environment as they are considered to be endocrine disrupting chemicals. Of equal importance is the management of this WEEE stream. When they are separated from the main waste stream (landfills, incinerators) and recycled, these plastics should be identified as containing flame retardant additives so that the recycled product is one that will not harm human or animal health.

Ongoing research in the Department of Chemical & Biological Engineering at UBC is being used to develop a mass balance model to predict the environmental fate of PBDEs from WEEE streams in Canada. The need for proper recycling and treatment of WEEE is apparent as the volumes of e-waste increase and regulations for exporting WEEE to other countries for final disposal are further enforced. The impact of both the WEEE and the RoHS for manufacturing electronic equipment worldwide is already changing the way electronic equipment is produced and discarded, as these directives put the onus on the manufacturer for assuring proper end-of-life treatment.

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