SUSTAINABLE LIVING TASMANIA

Sustainable Living Information

Volatile Organic Compounds (VOCs) from electrical equipment in the home & office

"In a typical office or home, Australians could be constantly breathing in a potent cocktail of volatile organic compounds (VOCs) emitted by building materials, paint, carpets, furnishings, office equipment and consumer products, as well as gaseous and particulate pollutants from indoor source".

Dr Steve Brown, CSIRO, March 1998

What are VOCs?

By the mid-1990s researchers in Australia, Sweden, the USA and the UK had identified indoor air quality as a significant workplace health issue, arising from the emission of a mix of over 250 different chemicals, classed as volatile organic compounds (VOCs), that outgas from synthetic furniture, floor coverings, paint and most importantly operating electrical equipment such as computers, printers and photocopiers.

These fixed exposures, which have been linked to the poorly understood condition "sick building syndrome", are an unseen, and largely unknown, consequence of our increasing use of electronic equipment in both the office and the home. This atmospheric mix includes chemicals such as isocyanates, furanes, formaldehyde, polybrominated diphenyl ethers and a host of others, including highly destructive hydroxyl radicals that react quickly and voraciously with other compounds in the air. This reaction can also occur when individual VOCs combine with other reactive chemicals, such as ozone, produced by equipment such as photocopiers and laser printers.

There is no research on the long-term health consequences of human exposure to this mix of chemicals. Estimates by the CSIRO, however, have put the cost of indoor air pollution from ill-health and lost productivity in Australia to be in the order of $12 billion annually.

Much of the problem stems from the use of a class of chemicals called brominated flame retardants (BFRs)[1] which are added to plastic cases and circuit boards (and a wide range of other products) to prevent fire in case of over heating. In addition, the modern high-speed computer uses flame-retardants around the processor unit to drain off the heat generated which is then vented into the room by the computer's cooling fan during operation and in stand-by mode. Although these chemicals serve an important fire protection function, the long term possible health impacts are unknown and little toxicity data exists for many of the approximately 175 different types of BFRs widely used today.

Research by the Karolinska Institute in Stockholm, Sweden, however, is concerning. In their research on BFR levels in human breast milk they found that, since 1972, when the levels were so minute they could scarcely be measured, dramatic annual increases of the chemicals have been detected. The Swedish Union of Clerical and Technical Employees in Industry (SIF) have

[1] Also known as Polybrominated Diphenyl Ethers (PBDEs)

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suggested that this may be linked to a significant increase in childhood allergies.

Australian Government research on PBDEs found that the highest levels of PBDEs in blood samples were from children, and that overall Australians have twice the levels of PBDEs in their blood as people living in European countries. The report concludes from its risk assessment that there is a 'potential risk of neuro-developmental effects in the offspring from maternal exposure, based on results from laboratory animals. As a result of these findings, the Government has adopted a precautionary approach by prohibiting the import and manufacture of PBDEs, but not products containing PBDEs.

An article in New Scientist (21 June 1997) "Chemical Warfare at Work" examined the issue in detail but restricted it to the workplace. However, the importance of also considering the home as a significant scene for this "chemical warfare" was addressed in an EU funded research project run by Lule University of Technology (Sweden) and SIF. Established in 1999, the *"Healthy Office Project"* identified the more than 1.5 million Swedish home computers as an area that needed addressing for health related issues, including chemical emissions from electrical/electronic equipment.

Presently in Australia, while the problem of electrical equipment VOC emissions in the home and workplace has been identified as a significant health problem by the CSIRO, the risks at home remain largely unrecognized. This is of concern considering that the amount of electrical equipment in Australian homes has increased dramatically in recent years with the increasing use of the home as an alternative office. 73% of Australian households have at least one computer. In addition to the increasing use of heat generating plasma TVs and other entertainment equipment, we have ever faster computers necessary for playing the latest computer programs and games. In many cases these devices, especially computers, are located in children's bedrooms thereby exposing children to VOC emissions over an extended amount of time. The long-term health consequences of this exposure are of concern.

Ultra-fine particles and laser printers

Recent research has revealed that laser printers emit particles so small that they are virtually undetectable by all but the most sensitive equipment. According to Physics Professor Lidia Morawska, from the Queensland University of Technology, these particles are so small they can travel to the deepest parts of the lungs and then enter the bloodstream. According to Morawska, other chemicals such as VOCs can adhere to the ultra-fine particles with the potential to cause respiratory and cardiovascular problems. Based on the numbers outlined in the study, of the 62 printers tested, 37 had no emissions, 6 had low emissions, 2 had medium emissions and 17 had high emissions.

In an area where a significant level of scientific uncertainty, or outright ignorance, exists as to the long-term health effects from exposure to the above chemical 'soup', a precautionary approach is warranted. This pamphlet outlines some of the steps at home

and office that can be taken to safe guard your and your family's health.

Recommendations

1) It is highly advisable not to have computers and other electrical equipment such as printers located in bedroom areas. If it is unavoidable, at least ensure that they are turned off when not in use and not left on stand-by. All equipment should be turned off at night.

2) Ensure that adequate air-flow with outside air is maintained in rooms where computers/printers, etc are used to reduce the chance of a build-up of VOCs and other pollutants.

3) Indoor plants reduce VOCs so their use is recommended. Research by the University of Technology, Sydney found that the use of indoor plants can reduce VOCs by up to 100% over 24 hours in a closed environment and between 10-20% in rooms with flow-through air. For ratings on the best plants to remove toxins see: http://www.greendesign.com.au/floor_plants.htm

4) At this time it is not possible to readily find out which laser printers are low emission, but there are calls for standards to be introduced. Until this time, do not place printers close to where people sit and allow good ventilation near printers and ideally use an exhaust fan.

5) Computers and other electrical equipment do most of their out-gassing during the first 18 months of use. During this time it is advisable to install an exhaust fan to vent outgassing VOCs to the outside of the building.

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