

P.c.b.s—as safe as salt?

Polychlorinated biphenyls, widely used as liquid dielectrics in transformers, have been blamed for causing cancer and their use is now tightly controlled in Britain and the US. Many of the fears about these chemicals are unjustified, however, according to Monsanto, a former manufacturer.

Though reputed to be carcinogenic, polychlorinated biphenyls (p.c.b.s) are actually no more dangerous than table salt, according to Monsanto, a former manufacturer of the controversial chemicals.

This opinion, if substantiated, will be welcome news to hard-pressed US utilities who are now faced with the task of disposing of thousands of tons of the material each year (see *Electrical Review*, 1 October).

"Standard toxicity tests demonstrate that p.c.b.s are less harmful than table salt," says the company. In addition a review of recent international health studies on the chemical "do not provide the exposure-related results that would justify concluding that p.c.b.s are carcinogenic in human beings," says Dr William Gaffey, manager of epidemiology with Monsanto.

First produced in 1929, p.c.b.s are compounds of carbon, hydrogen and chlorine which are chemically inert and fire resistant. They also display good arc resistance and high electric strength which soon brought them to the attention of designers of heavy electrical equipment, particularly capacitors and transformers, and since the 1940s they have been widely used in askarel liquid dielectrics. These fluids, perhaps better known under one of their trade names—Pyrochlor, Aroclor, Inerteen or Pyranol, for example—comprise a mixture of p.c.b. and trichlorobenzene which reduces the viscosity of the p.c.b.

For more than 30 years, askarel-filled electrical equipment was chosen, in the US, in most high-rise buildings, schools, hospitals, and industries where fires or explosions were of particular concern.

A wide range of other applications for p.c.b.s has also been found including hydraulic and heat transfer fluids, lubricants, surface coatings, printing inks and adhesives.

Since the late 1960s, however, use of the substances has been severely curtailed because of fears about their toxicity and their persistence in the environment.

One of the most widely publicised scares about the health threat from p.c.b.s occurred in 1968 in Yusho, Japan. Some 1,000 people became ill after eating cooking oil, which was contaminated with up to 3,000 p.p.m. of p.c.b. Symptoms included skin discolouration, acne-like conditions, eye discharges and central nervous system irregularities. Though p.c.b.s were initially blamed for these problems, they are now generally thought to have been caused by impurities in the oil.

Since then the compounds have acquired a reputation for being highly toxic to fishes and birds and have even been blamed for

inducing cancers in humans. These fears were exacerbated by the belief that the compounds are extremely resistant to biological breakdown and have half lives of hundreds of years.

In response to these worries, Monsanto phased out sales of p.c.b.s for applications which could lead to environmental releases between 1970 and 1972. Sales were then restricted to selected customers solely for use in totally enclosed electrical equipment. The US Government approved continued production of these uses, until effective substitutes could be developed, to prevent disruption of the country's power transmission systems.

In 1976, however, the Toxic Substances Control Act was enacted which included provisions for the total regulation of p.c.b.s. Monsanto ceased production of p.c.b.s in the following year and, in 1979, the US Environmental Protection Agency banned future manufacture of p.c.b.s.

As reported in this week's news, the EPA has recently followed this up with further restrictions on the use of askarel-filled equipment.

All this legislation is a gross over-reaction to a relatively innocuous chemical, according to Monsanto. The company has "no intention or desire to re-enter the p.c.b. business", it says, but is concerned that the substance should be more accurately understood. Because this has not been the case, there has been "needless public panic and over zealous, costly regulation", Monsanto says.

To support its claims, the company cites some 24 studies on human exposure to p.c.b.s which, it says, "show no relationship between any specific type of cancer and p.c.b.s, nor any increase in overall cancer mortality as a result of p.c.b. exposure. Neither do they show a connection between p.c.b.s and other serious illnesses or death."

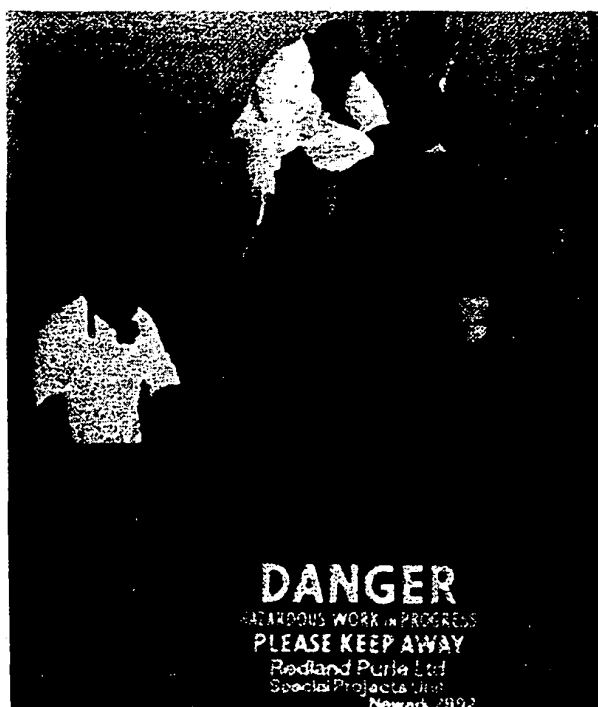
The studies include data on large numbers of industrial workers who, over many years, were occupationally exposed to p.c.b.s at significantly higher levels than are usually found in the environment. One study, for example, involved more than 2,500 electrical equipment manufacturing workers, more than half of whom were exposed to p.c.b.s at work for more than 20 years.

A November 1981 review of toxicity studies concluded "there is no evidence of an excess in total mortality or in mortality due to cancer, cardiovascular disease, or nervous system disease associated with occupational exposure to p.c.b.s. "P.c.b.s have not been linked to any human cancer and studies to date indicate it is highly unlikely future studies will establish such a link."

This evidence, however, seems unlikely to persuade the EPA to withdraw its ban on p.c.b. manufacture, and substitute fluids such as silicone and complex esters are gaining in popularity.

The UK situation is similar, with the CEEB having installed no new askarel-filled transformers since the late 1970s (see

Electrical Review, 1 May, 1981). In the rest of Europe, however, the superior fire resistance of askarels is more highly valued and p.c.b.s. are still being manufactured in Germany, France, Spain, Italy and some Eastern European countries. □



Removing askarel dielectric from a transformer—are such precautions unnecessary?

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