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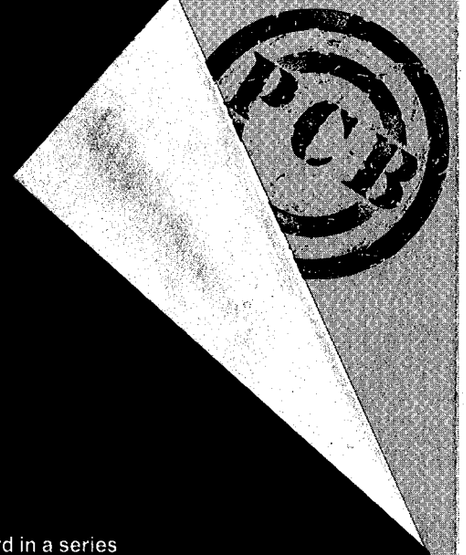

Third in a series

CONTROLLING PCBs
The Options Available

Canadian Council of Resource and Environment Ministers

The Options Available

Storage

Polychlorinated biphenyls (PCBs) are stored at industry sites, in provincially approved central storage facilities, and by some small enterprises such as electrical contractors. Commercial storage sites in Canada are either full or are not permitted to accept wastes from outside provincial boundaries. The way in which storage sites are operated and maintained varies with each province.

Disposal

At present, there are no approved destruction facilities in Canada for high concentration PCBs. Nor can Canadian authorities use destruction facilities in the United States, as imports of PCBs have been banned by the U.S. since 1980. Similarly, most European countries do not accept international shipments of PCBs.

In the past, PCBs have been disposed of by burning or incineration either separately or along with waste oil, or with municipal and industrial waste. They have also been disposed of in landfills as a free liquid or in drums, in discarded electrical equipment or as constituents of paper, plastics, or miscellaneous oily wastes.

Since 1977, PCB wastes, including PCB-contaminated equipment, have been stored, awaiting the installation of suitable disposal facilities. Currently, some provinces are taking steps to establish and operate disposal facilities for hazardous wastes, including PCBs. British Columbia has taken an active role in determining suitable mobile technologies for destroying PCBs in Western Canada. Alberta has selected a site for its fixed facility and expects it to be fully operational by 1988. Saskatchewan has established a permanent enclosed facility in Regina for a mobile low concentration PCB treatment process which has been in use in the province since 1983. Manitoba initiated a hazardous waste management program in 1982 and selection of a site for a facility will begin in early 1986. A low concentration PCB treatment unit was purchased and installed in Manitoba in late 1985. Ontario has just completed a series of public hearings on a proposal to use mobile PCB destruction units throughout the province and regulations have been prepared to control their use. In addition, Ontario is in the process of establishing a site for a fixed facility to destroy a variety of hazardous wastes, including PCBs. The Atlantic provinces are considering the use of mobile units. Quebec has initiated a search for a suitable location for destruction facilities.

Disposal Technologies

Currently, the most effective method of disposal of high concentration PCBs is through high temperature incineration or thermal destruction. Liquids are most efficiently burned in injection-type incinerators. PCB-contaminated solids are burned in rotary kiln incinerators.

Liquid injection incinerators burn a support fuel and accept PCB liquid wastes as part of their total fuel requirement. Although they can accept some sludges, they are not designed to accept solids, such as contaminated soils or equipment. These incinerators must be fitted with gas scrubbing systems to remove by-products of combustion, such as hydrogen chloride, from the flue gas. This is currently the technology of choice for destroying high concentration PCB liquid wastes.

The rotary kiln in combination with a liquid injection incinerator is the most versatile technology for destruction of hazardous wastes in general, and most PCB wastes in particular. They can handle both liquid and solid materials as well as sludges of variable consistencies.

Commercial hazardous waste incinerators are usually a combination of liquid injection and rotary kiln incinerators. Ducting of the gases from the rotary kiln through the secondary combustion chamber ensures that PCBs in the gases are totally destroyed. Gas scrubbing systems are also used to remove by-products of combustion from the flue gas.

For disposal of low concentration PCB liquids, high efficiency boilers can sometimes be used. These boilers, used for steam and/or electricity generation, are fired by oil, coal or natural gas, and often approach the time and temperature combustion characteristics of liquid injection incinerators. Cost benefits in using boilers to destroy PCBs include energy recovery and lower transportation costs. Boilers, however, are often limited in their destruction capabilities due to a lack of hydrogen chloride emission control and sometimes by time-temperature combustion conditions and possible boiler corrosion problems. As a general rule, their use should be limited to low level PCB liquid wastes with concentrations of PCBs less than 500 parts per million.

In addition to PCB destruction through incineration, chemical treatment technologies to destroy PCBs are being introduced. A number of sodium-based chemical dechlorination processes are in use to destroy PCBs in low level contaminated mineral oils. Several other techniques are now being evaluated.

Residues from incineration and other decontaminated materials can be disposed of in landfills.

Mobile Facilities

Many destruction technologies can be made mobile. Mobile chemical treatment units for transformer oils with low PCB contamination are being used in Canada, but no mobile incineration units for high concentration PCBs have yet been introduced. Mobile systems have advantages in reducing the impact on communities since no single site is used for extensive destruction of wastes from other areas. Also, since the unit is movable, no permanent inconvenience to the community would be expected.

In Saskatchewan, as well as the U.S., companies use a mobile sodium-based process for decontaminating transformer oil containing low concentrations of PCBs. The provinces of British Columbia and Manitoba and Hydro-Québec have also used this process. The advantage of this process over incineration is that the transformer oil can be decontaminated on site and the oil can be recovered and reused.

Incineration at sea is another potential alternative to a permanent, land-based facility. Its advantage is that destruction takes place far from residential communities.

Disposal Facilities in Other OECD Member Countries

In other Organization for Economic Cooperation and Development (OECD) countries, high temperature incineration is the method most frequently used to destroy PCBs. It usually occurs at fixed locations, although ship-board incinerators are also in use and mobile incinerators are being considered. Norway uses cement kilns; Germany has mostly rotary kilns. The U.S. permits the burning of low level PCB wastes in high efficiency boilers. Landfilling is not generally considered an acceptable alternative for PCB disposal except in the U.S., in specific sites in areas with geological formations of extremely low permeability, and in Germany in a large salt mine.

Member countries which currently lack adequate disposal facilities include Australia, Canada, Finland, Great Britain, Greece, Japan, New Zealand, Portugal, Sweden and Switzerland. These countries either store PCB wastes pending the establishment of destruction facilities, or transport them across international boundaries to established facilities in other countries. Some of these countries also use facilities aboard ships such as "Vulcanus II", which operates out of The Hague, The Netherlands.

PCB Substitutes

Safer alternatives have been found for PCBs in all their previous applications. As PCB-filled transformers come to the end of their service life, they are being replaced either with dry-type transformers or with units filled with an approved dielectric fluid, such as silicone oils or transformer-grade mineral oil.

Towards Solving the Problem

The federal and provincial governments in Canada are working cooperatively to deal with PCBs and their ultimate phasing-out from the Canadian environment. Actions are focussing on the establishment of a national system of destruction facilities for PCBs and other hazardous wastes; the implementation of a uniform system for the transportation of hazardous wastes, including PCBs; the development of environmental quality objectives and national standards for PCBs and associated pollutants; the prevention of PCB spills; and the greater exchange of information on hazardous wastes such as PCBs.

Many of these activities are well under way yet some will take time to implement. But progress is being made by all levels of government, working together, towards solving the problem of PCBs in Canada.